The Effect of Professor Migration on PhD Student Outcomes: The Turkish University Reform of 1933 and the Refugee Professors from Germany

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Abstract

This paper investigates the effects of professor migration on PhD student outcomes. An influx of foreign professors, caused by the exodus of academics fleeing Nazism in the 1930s, leads to an exogenous variation in the Turkish university system as it undergoes a new republican reform to adopt Western higher education methods. The reform, spearheaded by these refugee foreign academics and their young Turkish peers, produces a significant number of PhD students, whose outcomes are affected by their new foreign advisors, as well as the domestic advisors already extant within the system. The study aims to uncover the effects these foreign advisors had on their students and compares their lifetime academic outcomes to those mentored by domestic professors. It examines the influences of co-advisors, gender, minority status, student quality proxies and scholarships, students' previous experience with Western-style teaching, the effects of advisor age, and possible disruptions to PhD studies, on the students' lifetime academic outcomes. It proposes three separate models with dependencies on the attainment of *professorships* later in the academic career, *academic* employment at post-PhD levels, and also any considerable *non-academic* outcomes. Across all proposed models, the study finds significantly better outcomes for students of higher quality who obtain scholarships before, during or after their PhD education, and significantly negative outcomes for students of minority backgrounds.

1) Introduction

In the production of knowledge, the university is seen as the foremost institution for scientific knowledge production. It provides academics with an environment to "breed", or self-reproduce, by training PhD students, who by either working alongside or replacing them, ultimately become knowledge-producing agents themselves. From an economic perspective, these PhD students represent significant human capital in terms of embodied knowledge. Furthermore, some of these students will become the next generation of academics. Thus, studying PhD students provides us with the opportunity to observe knowledge production—both directly and indirectly.

This paper offers a theoretical and empirical study of knowledge production through the analysis of PhD student outcomes. It uses a lesser known historical event, the Turkish University Reform of 1933, by treating it as a natural experiment that enabled knowledge production and where its many facets can be observed. During this period, many displaced scholars from Nazi Germany fled to Turkey and took part in a higher education reform and helped jumpstart the developing country's university system, raising many PhD students, and ultimately facilitating knowledge production.

Recent studies by (Borjas & Doran, 2012), (Moser, Voena, & Waldinger, 2014) and (Franzoni, Scellato, & Stephan, 2013) shave shown that academic mobility and migration (forced or otherwise) can influence scientific productivity significantly. Further, the fact that advisor quality and mentor performance reflects on PhD students has long been documented (Long & McGinnis, 1985), (Malmgren, Ottino, & Amaral, 2010), (Buenstorf & Geissler, 2014), (Hottenrott & Lawson, 2017). By using the Turkish case as a natural experiment, this paper combines both ideas, and explores the impact of an influx of highly skilled, often "star quality" migrant scholars on the outcomes, placements, scientific activities and lifetime productivity of the indigenous PhD students who trained with and followed after them (Scotchmer, 1991), (Zucker, Darby, & Brewer, 1998), (Oettl, 2012).

This paper analyzes the outcomes of the first generation of academics reared by the reformed Turkish university. It tracks the lifetime student outcomes of 434 PhD students in the fields of Natural and Formal Sciences over an early period spanning 33 years as Turkey's university system develops with and alongside them. Observing this "first generation" of new scholars thus allows us the initial genealogical effects of high-skill migration on scientific output and knowledge production, as well as the transmission and generation of knowledge.

The data for this analysis is originally constructed from a large number of historical data sources. The main sources are bibliographies of PhD publications in the Natural and Formal Sciences between 1923 and 1966. These sources allow me to track the PhD students and identify their advisors, which lead to further investigation into the students' backgrounds, academic progress, and career outcomes by examining historical and biographical data. Further sources, such as publications by the Turkish Academy of Sciences and the Scientific and Technological Research Institution of Turkey, as well as issues from various scientific societies, also provide records and information on the individuals examined in this paper, as well as the general development of the Turkish university system. More details on the data set is given in Section III.

The analysis examines the causal effect of professor migration on student outcomes. Three models are proposed, regressing students' *professorship* outcomes, employment as *academics*, and *non-academic outcomes* on a variety of independent characteristics and factors. Across all proposed models, the study finds significantly better outcomes for students of higher quality who obtain scholarships before, during or after their PhD education. Likewise, across all models, significantly negative outcomes are observed for students from minority backgrounds. A multinomial analysis showcases students' preferences towards domestic advisors who had obtained their PhDs abroad. In simpler models, significant positive effects can be observed for the students of these domestic advisors with foreign experience, male students, and students with advisors in the prime of their academic life cycle. Negative effects can be seen for co-advised PhDs and students who had previous experience in Western-style institutions. Interactions between minority students and foreign advisors are found to be disproportionately high, with minority students almost exclusively selecting themselves into mentorships by foreign advisors. Better outcomes can be seen for high-quality students with previous

experience in Western-style institutions. High-quality students who select foreign advisors, however, are observed to suffer worse outcomes as a result of the advisory relationship.

The rest of this paper is organized as follows. Section II offers a historical background, with particular attention given to state of the Turkish university system before the reform, as well as the German situation leading up to the migration event. Section III goes into further details about the data. Section IV explains the identification strategy. Section V analyzes the effect of professor migration on student outcomes. Section VI presents conclusions and offers comments.

2) Historical Background: The Turkish University and German Professor Migration

This section gives an overview of the historical circumstances leading up to that enabled the natural experiment examined in this paper.

a) The (re)Formation of the Turkish University

At the end of World War I, following a series of major defeats and after a long period of decline, the Ottoman Empire entered a period of quick dissolution. The occupation and partitioning of the empire's remaining territories by the Allied powers resulted in the Turkish War of Independence, which ended with the formal abolishment of the Sultanate, and was the end of the Ottoman era. A new government, the Republic of Turkey, was established in 1923 and internationally recognized in its place.

Ten years after the birth of the new republic, as part of a series of sweeping reforms, the Turkish government initiated a significant reform in higher education. The University Reform of 1933 abolished the previous higher education entity *Darülfunun* and established a new University of Istanbul in its place as part of a new university system.

The *Darülfunun*, established in 1863, was the singular higher education entity in the Ottoman Empire. Established to be comparable to European peer institutions and considered to be the first (and only) Ottoman university, it was a product of the *Tanzimat* movement, a period of reform and modernization in the late stages of the Ottoman Empire. Throughout its lifetime, this institution had a reputation for being institutionally unstable. It had closed down and reopened three times during its 90 years of existence, remaining active only for a few years each time. The *Darülfunun* changed hands to the new Turkish Republic following the empire's collapse, and while granted autonomy in the initial years of the republic, criticism of the *Darülfunun* peaked after some years, with significant attention drawn to its inability to act as a scientific institution worthy of a modern republic. Beginning in 1930, the Turkish government started internal investigations of the institution, and within a few years was fully intent in abolishing and reforming it entirely.

In 1932, the Turkish government invited a Swiss pedagogy professor, Albert Malche, to Istanbul. Malche's task was to observe the *Darülfunun* and report on its ability to function as a modern higher education institution, as well as make suggestions as to its reform. Malche provided the Turkish government with an expert report on the instution's failings, and cemented their desire to reform it.

The *Darülfunun* was not proficient in knowledge production. In its 90 years of existence, and roughly 70 years of actual activity, the *Darülfunun* had produced no doctorates in the modern sense. Legislation about a form of higher education diploma, namely the "*icazet rüûsu*" existed, but it was only added to the institution's educational framework in 1916, 53 years after the *Darülfunun* had first opened. Furthermore, this legislative framework was acted upon only by the Faculty of Law, which produced a very small number of law doctorates. Additionally, these diplomas were not comparable to doctorates awarded by peer higher education institutions in Europe, e.g. the *dr. jur..* before the University Reform in 1933. As such, while it cannot be disregarded entirely, it is safe to say that prior to the reform, there were no doctorates completed in Turkey (Dölen & Usta, 2011).

It was a common practice in the late Ottoman Empire to send students abroad for doctoral studies. Starting in the 19th century, Turkish students had begun traveling abroad, most often to Europe, to pursue PhD studies, either by way of affluent families or through state scholarships. Many students

who acquired their doctorates from European universities, upon their return to the homeland, became academics at the newly reformed Turkish university and comprise a special category of domestic advisors (domestic advisors with foreign experience).

The PhD students examined in this paper are the very first students reared by a Turkish university, the first seeds of the nascent Turkish university system.

b) The Exodus from Germany

At the end of January, 1933, Adolf Hitler seized power in Germany. Only a couple of months later in the beginning of April, the Nazi regime passed the *Gesetz zur Wiederherstellung der Berufsbeamtentums,* the Law for the Restoration of the Professional Civil Service. The *Berufsbeamtengesetz* was one of the first anti-Semitic and racist laws of the Third Reich, and was used to dismiss groups of tenured civil servants from service, affecting primarily Jews, other peoples considered Non-Aryans, as well as political opponents or other undesirables. Effectively, this meant that no persons belonging to the aforementioned groups could work in civil service, affecting professors, teachers, judges, and other government positions; the law was later also changed multiple times to include more groups of civil servants, such as doctors, lawyers, and artists. As the Nazi regime tightened its grip over the years, other changes to the law followed. This included the removal of a clause granting special protections to some classes of civil servants regardless of racial origins or political affiliations. Added by the last *Reichspräsident* of Germany, Paul von Hindenburg, these clauses granted exemptions from the law to special cases, such as a history of military service in World War I, . Hindenburg's death in 1934, however, was followed immediately by the removal of these protections.

As a result of this law, dismissals from German universities began immediately. An estimated 15% of professors employed at German universities, numbering around 1,100 to 1,500, were dismissed in accordance with the racist law (Strauss, 1983). If one were to include non-university researchers and junior scientists in training, the dismissals could be estimated to rise to around 2,000 (Akbulut-Yüksel & Yüksel, 2011). These dismissals, alongside the destruction caused by the Nazi regime, proved catastrophic for German academia. A post-war study by Christian von Ferber in 1956 noted a 39% loss in higher education in Germany. A later study published jointly by multiple academics under the title *Handbook of German-speaking Emigration* found that, in the years between 1933 and 1945, science in German-speaking countries had been deprived of one third of its personnel. Unbeknownst at the time to the regime, but evident to those dismissed, German academia was in a state of emergency.

c) Contact and Contract

The Emergency Association for German Scientists Abroad was an organization founded in Zurich, Switzerland, in April 1933. Its founder, Philipp Schwartz, had moved there preemptively in March, a month before he was dismissed from his professorship at the University of Frankfurt due to his Jewish heritage. The association was founded to act as a community to aid those affected by the *Berufsbeamtengesetz* and it intended, primarily, to mediate new job opportunities for Germany's persecuted scholars. Initially a small group of displaced academics who had fled to Switzerland, the association soon grew into a bustling organization funded by academics and Swiss philanthropists, employing both paid and volunteer personnel and working 14 hours a day, constantly flooded with requests for aid and counsel.

A month after its establishment, the association was contacted by Albert Malche, the expert hired by the Turkish government to report on their University Reform. Malche informed the organization of the Turkish government's desire to reform their higher education, and noted that there would be job opportunities for displaced German scholars, leading to a meeting between the *Notgemeinschaft* and the Turkish Ministry of Education. The subsequent negotiations led, initially, to the employment of thirty professors at the reforming Turkish university; Schwartz had expected to find employment for three.

In the following weeks, contracts were drafted between displaced German professors and the Turkish government to employ them at the newly reformed Istanbul University. Soon after, these professors

began migrating to Istanbul. After an initial wave of 30 professors arrived, the refugee academics' numbers rose, as many professors began to bring their educational assistants or aides with them as well. By 1937, the number of German-speaking academics employed at the Turkish university had increased to 134.

Istanbul University Academic Faculty
School Year 1936-37

Rank	Domestic	Foreign	Percentage
Professors	51	44	46.32%
Associate Professors	86	0	0%
Research Assistants	115	0	0%
Educational Assistants	0	33	100.00%
Translators	7	0	0%
Lecturers	14	13	48.15%
OTHER on Payroll	27	0	0%
Total	351	134	27.63%

Table 1: An example of the initial situation at Istanbul University, three years after the reform.

The sudden influx of foreign academic personnel, primarily professors, meant that roughly a half of the professorial seats at the reformed Istanbul University were held by foreign professors, and that over a quarter of the total of academic staff was manned by foreign academics. As the singular entity of Turkish higher education, Istanbul University in 1938 employed one quarter foreign scholars.

Similarly, the above table shows the high number of Turkish associate professors and research assistants. These senior and junior researchers are the peers and students who are expected to be reared by the new university system to form the backbone of Turkish academia in the years to come, and their significant numbers – together comprising over half of the Turkish personnel – make evident the main goal of the migration event as well as the university reform.

The purpose of the Turkish university reform had always been to become self-sufficient in creating knowledge and science within a few generations. As such, the migration event was never seen as a permanent measure. Many of the refugee scientists who migrated to Turkey eventually either returned to Germany, moved to other countries, or passed away, many not being particularly young at the time of their migration. The average stay of a refugee professor in Turkey was 11 years. The role of the foreign professors was to rear the next generation of Turkish academics; eventually, their academic children would replace them. This was evident to many who were part of the reform:

> "That Ataturk wanted not to establish a German sphere of influence, but rather establish a university built on the European example but led by Turks was from the beginning evident. The primary purpose of the German scholars was to rear quality Turkish higher education officials. Which meant, the works of the German scholars would in time render themselves obsolete."

(Grothusen, 1985, p. 548)

The Language Barrier. The overwhelming majority of refugee professors arriving in Turkey did not speak the Turkish language. The contract of employment for these professors initially allowed them to teach in foreign languages such as German or French; these professors were assigned translators who would interpret their lectures in real time. While many of these translators were students or junior scholars in the same field as the professor, and therefore often capable of interpreting the studies accurately and in context, the presence of the language barrier between teacher and student remained a significant hurdle that was rarely fully overcome. The Turkish government attempted to solve this issue by legally binding the professors: a clause in the professors' employment contract required them to learn the Turkish language in three years, after which they would also be expected to provide their students with textbooks and other teaching material in the Turkish language. This was easier legislated than done, however, and not always successful. Many professors had difficulties learning the language, being of advanced age, and for those who succeeded, there was still the matter of using the language at level comfortable enough that they could teach as fluidly as they could in languages they were more proficient in. The language barrier was one of the most major issues in the university

reform, and is examined in detail in this paper as students with and without language skills show significantly different outcomes.

Some students had the ability to overcome the language barriers between themselves and their foreign mentors. The students who had foreign language skills observed significantly better success in their academic careers, and can be categorized in four groups. The first group were students who, prior to entering PhD studies, had attended high schools where the teaching was in a common foreign language, predominantly the same German or French spoken by their mentors. A second group had attended university or masters' equivalent studies abroad prior to pursuing their PhD studies. A small group of students had these language skills handed down to them from affluent or minority families. Further, some students demonstrated language skills by proxy, as they published their dissertations in foreign languages.

3) Data

The PhD students examined in this paper comprise all PhD dissertations completed in the fields of Natural Sciences and Mathematics (including Physics, Chemistry, Astronomy, Biology, Geology and Mathematics, to be henceforth referred to collectively as NATSCI+M) within the early period of the university reform. A period of 36 years (1933-1969) is observed, and the data collects a total of 434 PhD dissertations advised by 90 different unique advisors of separate categories (domestic, foreign, or domestic advisors with foreign experience).

The data is an original work collected by myself. The data includes all PhD students who completed their dissertations in NATSCI+M fields within the period of 1933-1969, and list various types of information categorized as student data (name, gender, minority status, dissertation title, dissertation language, year of dissertation), advisor data (name, gender, age, advisor category, presence period, loss of advisor/disruption to advisory relationship, cause of departure (where available)), student backgrounds and quality (high school, university, master's, PhD, scholarships attained), and student outcomes (final academic rank, total lifetime publications (where available), total lifetime citations (where available), other scientific activities).

The data was limited to the fields of Natural Sciences and Mathematics for a number of reasons. Firstly, in the very early years of the reform, the Faculty of Formal and Natural Sciences at Istanbul University (which housed the NATSCI+M departments) was among the first of two faculties (alongside the Faculty of Law) to receive and establish the required legislative framework for producing PhDs. It started producing PhDs almost immediately after the reform in 1933, with the earliest dissertation being published in 1934. Second, the qualities of the PhD projects conducted in the relative faculty must be considered. At Istanbul University, the strongest Faculty with the most resources and academic staff was the Faculty of Medicine. However, medicine is a field unique to itself when it comes to doctorates, and does not produce PhDs with knowledge production being the primary goal; it produces Medical Doctors with the goal of practice, as opposed to Doctors of Philosophy with the goal of scientific output. The only other comparable faculty, the Faculty of Law, was also in a unique position. While it also established the framework necessary for PhD production at the same time as the Faculty of Formal and Natural Sciences, students at the Faculty of Law were primarily concerned with the social, political, economic and legislative reforms the republic was going through at the time. Many dissertation topics would be given to the students by their professors, and these topics would be greatly influenced by the socio-political context of their time, with many being written to satisfy a direct demand of the government (such as dissertations analysing Swiss marital laws, which were intended to be adopted in Turkey). As such, the only Faculty strong enough to be studied, and relatively unaffected by socio-political contexts pulling it in any direction, was the Faculty of Formal and Natural Sciences. More than any other, this faculty produced science for the sake of science, and the topics of their research were varied, universal, and comparable to modern peers.

Advisor Categories	Unique Advisors	%	Advised	%
Foreign	49	49.49	172	39.63
Domestic	15+	15.15	161	37.10
Domestic with Foreign Experience	35	35.35	101	23.27
Total	99		434	

Table 2. PhD Advisors in the fields of Natural and Formal Sciences.

Another unique quality of the Faculty of Formal and Natural Sciences was the almost even split between domestic and foreign advisors, which allows it to act as an accurate representation of the early reform's professorial cohort.

The below table gives the number of PhD dissertations completed in the fields of Natural and Formal Sciences at Turkish higher education institutions:

Year	Number of Dissertations	Cumulative	Year	Number of Dissertations	Cumulative
1935	1	1	1952	12	148
1936	5	6	1953	24	172
1937	3	9	1954	25	197
1938	3	12	1955	18	215
1939	5	17	1956	12	227
1940	1	18	1957	17	244
1941	6	24	1958	24	268
1942	7	31	1959	15	283
1943	8	39	1960	24	307
1944	4	43	1961	10	317
1945	5	48	1962	8	325
1946	2	50	1963	21	346
1947	7	57	1964	7	353
1948	10	67	1965	15	368
1949	44	111	1966	21	389
1950	12	123	1966+	45	434
1951	13	136			
TOTAL	434				
Average	13.15				

Table 3. Total number of PhD dissertations completed in the fields of Formal and Natural Sciences.

Between 1933 and 1969, the Turkish university system generated a total of 434 PhD dissertations in the fields of Natural and Formal Sciences, averaging at about 13 doctorates a year. Splitting these into 5 year cohorts, however, we can more easily observe how the reformed university system takes a while to develop. The Turkish University system starts producing PhD students in significant numbers only after roughly 10 years after the reform, reaching its peak productivity in the years after 1946. Figures 1 and 2 show the increase (and decrease) of PhD dissertations by year.

5 Year Cohorts	Total PhDs	Average PhDs per 5 Years	Percentage of Total
1935-1940	18	3.6	4.15
1941-1945	30	6	6.91
1946-1950	75	15	17.28
1951-1955	92	18.4	21.20
1956-1960	92	18.4	21.20
1961-1965	61	12.2	14.06
>1966	66	13.2	15.21
TOTAL	434		

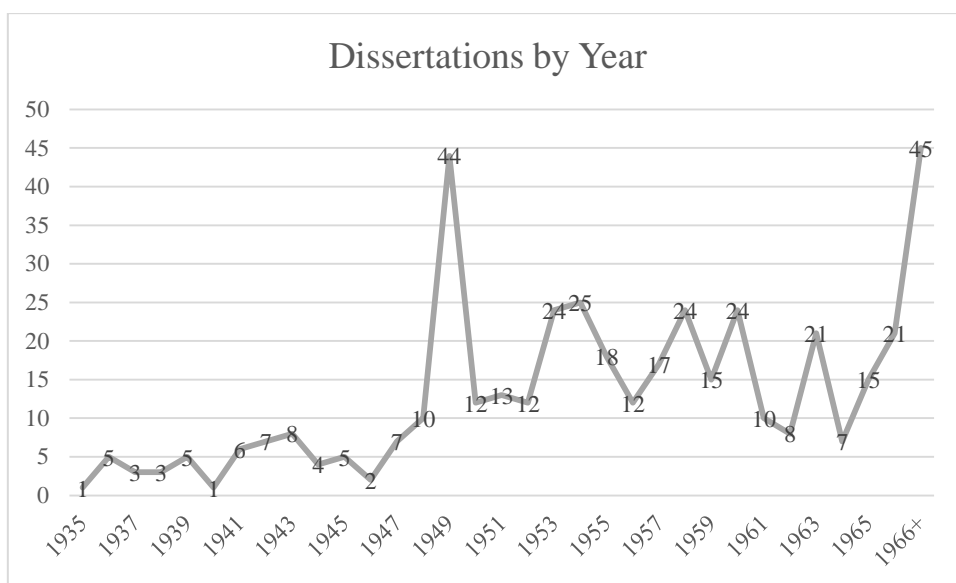*Table 4.* 5-year cohorts.

Figure 1. PhD dissertations completed in the Fields of Natural and Formal Sciences, 1933-1966.
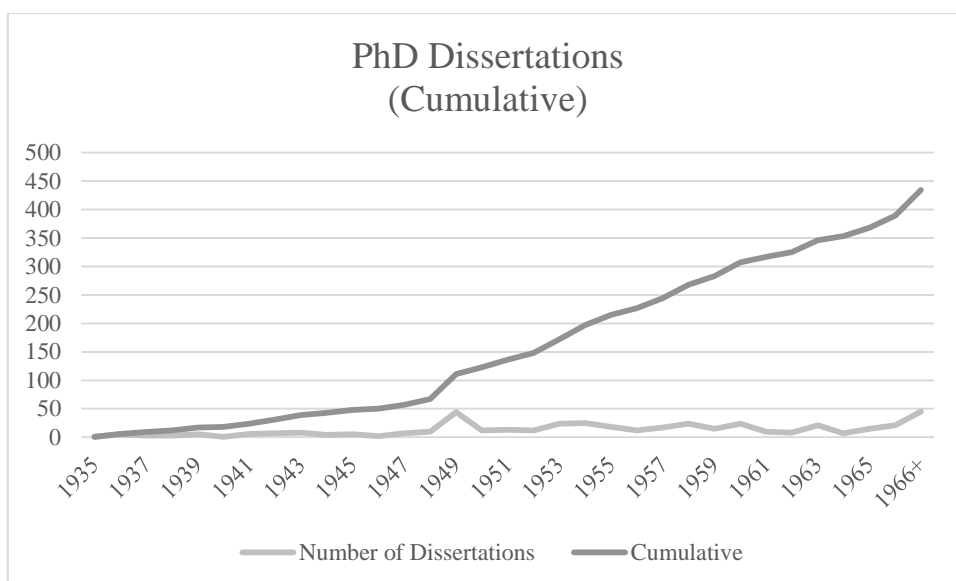

Figure 2. Same as above, also showcasing the increase in cumulative PhD dissertations.

An exogenous shock in 1946-1949. The growth of PhD production in the Turkish university system was subject to an exogenous shock in 1949. The primary cause of this significant spike was a law written into the Turkish constitution in 1946. Article 4936, the *Üniversiteler Kanunu, i.e.* the Law of Universities, made it mandatory for all academic assistants employed at a university to complete a PhD dissertation within three years or risk losing their employment. Assistants already employed at the universities, who had hitherto been unrequired to pursue PhD ranks, were thus made to complete dissertations in three years. As a result of this law, a significant increase in PhD publications was observed, peaking exactly three years later. This is considered an exogenous shock to the natural growth of PhD production, and is represented in the model as *shock*. This will be examined in further detail in Section IV.

The Turkish university reform was not limited to a major reform of Istanbul University. The overhaul taking place in Istanbul, and the refugee professors' migration there, were in fact used as a springboard. Istanbul University was used as a prototype to reform and also establish other new higher education instutions.

	Istanbul University	Higher Institute of Agriculture	Istanbul Technical University	Ankara University	Ege University	Middle East Technical University	Erzurum Ataturk University	Hacettepe University	TOTAL
	est. 1933	est. 1933	est. 1944	est. 1946	est. 1955	est. 1956	est. 1957	est. 1967	
Years Active	36	36	25	23	14	13	12	2	
Physics	31	1	4	19	0	0	1	0	56
Chemistry	118	10	14	53	1	0	0	0	196
Mathematics	29	0	36	12	1	8	0	3	89
Astronomy	20	0	0	9	1	0	0	0	30
Biology	42	0	0	2	0	0	0	0	44
Geology	16	0	2	1	0	0	0	0	19
TOTAL	292	47	81	119	17	21	13	5	434
Percentage of TOTAL	67.28%	10.83%	18.66%	27.42%	3.92%	4.84%	3.00%	1.15%	-

Table 5. Distribution of PhD dissertations completed in Turkey, in order of university establishment.

Universities. Through the 36-year period examined in this analysis, there were a maximum total of 8 universities capable of producing PhD students. The institutions considered are therefore Istanbul University (reformed 1933), Higher Institute of Agriculture (est. 1933), Istanbul Technical University (reformed 1944), Ankara University (est. 1946), Ege University (est. 1955), Middle East Technical University (est. 1956), Erzurum Ataturk University (est. 1957) and Hacettepe University (est. 1967).

Summary Statistics PhD Students			
	YES	NO	Percentage
Foreign Advisor	172	262	39.63%
Domestic Advisor	161	273	37.10%
Domestic Advisor with Foreign Experience	101	333	23.27%
Co-Advisor	140	294	32.26%
Male	265	169	61.06%
Minority	21	413	4.84%
Foreign Experience	94	340	21.66%
Scholarship (Before or During PhD Studies)	44	390	10.14%
Scholarship (After PhD Studies)	75	359	17.28%
Advisor in Prime	198	236	45.62%
Shock of 1946-1949	63	371	14.52%
Disruption	28	406	6.45%

Table 6. Summary statistics of PhD students completing dissertations in the fields of Natural and Formal Sciences.

Table 6 summarizes some of the characteristics of the PhD students examined in this paper. A PhD student who completes a dissertation in the early period of the Turkish university reform has a chance to work with a foreign advisor, a domestic advisor, and a domestic advisor with foreign experience (to be detailed in Advisor Categories below). In the Natural and Formal Sciences, the split between foreign and domestic advisors were similar overall, summing up to 49.49 to 50.51 percent, respectively. However, if one differentiates between both "kinds" of domestic advisors, we observe that of the 434 PhD students examined in this sample, roughly 40% of students had *foreign advisors*, while 37% were assigned to *domestic advisors* and a smaller 23% were mentored by *domestic advisors with foreign experience*. 32% of students who published dissertations were *co-advised*, either by multiple mentors, or within the department rather than with an assigned advisor. The male-to-female ratio of the students in this sample was roughly 2:1, with male students comprising 61% of the student population. It should be noted that these are not pronounced gender differences, especially for the time.[1] Students from *minority* backgrounds published 5% of the PhD dissertations in the fields of Natural and Formal Sciences between 1933-1969, and it is interesting to note that an overwhelming majority of them worked with foreign advisors (19 out of 21). Less than a quarter of students had previous *foreign experience* of their own in Western-style education institutions (such as in a foreign high school, bachelor's level studies conducted abroad or masters' or other graduate studies). While a small minority of students had backgrounds in Western-style education, with some outliers having spent the most of their prior education in such institutions, the overwhelming majority of students were unfamiliar with the new system, making the average amount of years of previous foreign experience even out to 1 year. Students who obtained *scholarships* prior to entering PhD education or during the course of their PhD education were rare, at about 10%, while scholarships earned after the completion of PhD studies were more frequent at 17%. Almost half the students in the sample had advisors who were in their "prime years" of age, as proposed by the academic life cycle theory, between 40 and 60 at the time of the publication of the student's dissertation. 6.45% of the students in the sample suffered a disruption to their advisory relationship during their PhD studies – these disruptions include the advisor leaving, retiring, dying, or relocating to another university. A further type of disruption is caused by the shock of 1946-1949, which 14.52% of the students in the sample were subject to.

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[1] It would also be interesting to remember that this sample is of the "hard sciences", like physics and chemistry and mathematics, where typically, much smaller numbers of women students are observed. In the early decades of the republic; women in Turkey were actively encouraged to do pursue higher education as part of state policy, this led to a significant number of women PhDs and women professors as these students rose in their academic careers.

a) Advisor Categories

There are three groups of advisor categories for PhD students to select into:

- Foreign Advisors
- Domestic Advisors
- Domestic Advisors with Foreign Experience

Foreign Advisors are professors of non-Turkish backgrounds who completed their education in foreign countries. As can be guessed from the dataset, these advisors originated primarily from German-speaking countries and the overwhelming majority of them were migrant or refugee academics on temporary stay in Turkey. *Domestic Advisors* are professors who spent the entirety of their educational background in Turkey (or the late Ottoman Empire, depending on the timeframe) and had no experience in Western-style or foreign higher education institutions. *Domestic Advisors with Foreign Experience,* on the other hand, represent a category of domestic professors who completed at least part of their education in foreign countries and obtained their PhDs abroad, mostly in Europe. The majority of this category of advisors is comprised of former students who, in the late years of the Ottoman educational reforms/early years of the Republican reforms, were sent abroad on state-funded scholarships, and upon their return, took academic positions at the new universities. This group of advisors can thus be considered to have been familiar with Western-style teaching and research methods, as well as having the evidence of higher student quality in the scholarships they'd attained to have been sent abroad in the first place.

Coadvised dissertations: Some PhD dissertations in this dataset were advised by multiple scholars. Dissertations which do not have an advisor directly listed on the dissertation or student records are considered to be *coadvised*. This was an especially common practice in the field of chemistry, where a student would be advised by multiple faculty members, but none were registered as the sole advisor (see Chemistry subsample).

4) Identification

a) Advisor Selection: Multinomial Analysis

In order to identify what defining factors go into advisor selection, a multinomial analysis is conducted on student characteristics prior to entering PhD studies. These include the students' minority status, gender, existence of previous foreign experience, and, scholarships attained prior to entering PhD studies, if any.

MULTINOMIAL ANALYSIS					
Baseline:	**Foreign Advisors**		Relative Risk Ratio		
	Dependent variable:			*Dependent variable:*	
	Domestic Advisor with Foreign Experience	Foreign Advisor		Domestic Advisor with Foreign Experience	Foreign Advisor
	-1	-2		-1	-2
Minority	-2.256***	-2.555**	Minority	0.105***	0.078**
	(0.755)	(1.039)		(0.755)	(1.039)
Male	0.004	0.547**	Male	1.004	1.727**
	(0.231)	(0.274)		(0.231)	(0.274)
Foreign Experience	-0.057	-0.252	Foreign Experience	0.944	0.777
	(0.267)	(0.320)		(0.267)	(0.320)
Scholarship (Before PhD Studies)	-0.598	-1.424**	Scholarship (Before PhD Studies)	0.55	0.241**
	(0.444)	(0.652)		(0.444)	(0.652)
Constant	0.088	-0.646***	Constant	1.092	0.524***
	(0.186)	(0.230)		(0.186)	(0.230)
n					
Akaike Inf. Crit.	921.083	921.083	Akaike Inf. Crit.	921.083	921.083
Note:	*p<0.1; **p<0.05; ***p<0.01				

Table 7. Multinomial Analysis, baseline Foreign Advisors.

Further analyses with other categories as the baselines can be found in the Appendix.

Taking foreign advisors as a baseline for the multinomial analysis, it can be observed that students from *minority* backgrounds are significantly more likely to select into PhD mentorship with foreign

advisors over domestic advisors, which is also true against domestic advisors with foreign experience.[2] *Male* students show significant preferences towards domestic advisors with foreign experience over foreign advisors. This also holds against domestic advisors (see Appendix: Multinomial Analysis: Domestic Baseline). Another significant finding is that students who attained *scholarships* prior to entering PhD studies will prefer domestic advisors with foreign experience over purely foreign advisors. It can be thus inferred that the category of domestic advisors with foreign experience is the more preferred on the basis of gender or student quality. Further, the constant suggests that, controlled for every other characteristic, domestic advisors with foreign experience are the most preferred group overall (see Appendix: Multinomial Analysis: Domestic Advisors with Foreign Experience Baseline).

b) Models
1) Professorship Model

Using this data set, this study investigates the effect of professor migration on student outcomes with the following regression model:

$$Professor = \beta_1 Foreign\ Advisor + \beta_2 Domestic\ Advisor\ with\ Foreign\ Experience + \beta_3 Co\\ - Advisor + \beta_4 Male + \beta_5 Minority + \beta_6 Foreign\ Experience\\ + \beta_7 Scholarship + \beta_8 Advisor\ in\ Prime + \beta_9 Shock + \beta_{10} Disruption$$

The main coefficients of interest are β_1 and β_2, indicating how advisor categories (here *foreign advisors* and *domestic advisors with foreign experience*, respectively) affect PhD student outcomes, alongside β_3, which accounts for the outcomes of *co-advised* PhDs. Other primary coefficients of interest representing student characteristics include the gender (*male*) variable β_4. Students from *minority* backgrounds are controlled for with β_5. The student's *previous experience* in Western-style education institutions or teaching are indicated by β_6, which serves as a proxy of familiarization with the new educational system and, where applicable, the ability to overcome language barriers with teachers and advisors. The attainment of *scholarships*, β_7, is taken as a proxy of student quality, and within itself accounts for various points in time at which the scholarship is earned: before entering PhD education, during the course of it, or after the completion of PhD studies altogether (i.e. grants). Advisors who are considered to be in their *prime years* of age, e.g. between 40 and 60 at the time of the student's dissertation, are represented by β_8. β_9 is a control for the exogenous shock of 1946-1949, and β_{10} is a control for any disruptions the student may have suffered to the advisory relationship over the course of their PhD completion (such as the advisor leaving, changing, dying, etc.).

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[2] As the sample of these minority students is relatively small, we know from the data that 18 out of 21 minority students selected into foreign advisors.

Models by Order of Complexity					
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Dataset:	*Dependent variable:*				
Minorities Included	**Professor**				
Foreign Advisor	0.194	0.197	-0.231	-0.277	-0.289
	(0.335)	(0.335)	(0.374)	(0.379)	(0.406)
Domestic Advisor with Foreign Experience	0.668*	0.669*	0.437	0.362	0.401
	(0.377)	(0.377)	(0.408)	(0.415)	(0.439)
Co-Advisor	-0.346	-0.343	-0.543	-0.439	-0.376
	(0.335)	(0.335)	(0.370)	(0.385)	(0.406)
Male	0.437**	0.436**	0.321	0.319	0.339
	(0.205)	(0.205)	(0.224)	(0.224)	(0.226)
Minority	-1.755***	-1.760***	-1.392**	-1.478**	-1.410**
	(0.578)	(0.579)	(0.602)	(0.610)	(0.611)
Foreign Experience	-	-0.044	-0.089	-0.077	-0.068
		(0.242)	(0.264)	(0.265)	(0.266)
Scholarship (Before PhD)	-	-	1.679***	1.660***	1.680***
			(0.416)	(0.414)	(0.417)
Scholarship (After PhD)	-	-	2.547***	2.524***	2.538***
			(0.421)	(0.422)	(0.423)
Advisor in Prime	-	-	-	0.272	0.294
				(0.266)	(0.267)
Shock of 1946-1949	-	-	-	-	0.419
					(0.324)
Disruption	-	-	-	-	-0.146
					(0.483)
Constant	-0.126	-0.118	-0.248	-0.362	-0.464
	0.329	(0.332)	(0.364)	(0.381)	(0.398)
Observations	434	434	434	434	434
Log Likelihood	-283.536	-283.519	-248.702	-248.181	-247.275
Akaike Inf. Crit.	579.071	581.039	515.405	516.361	518.55
Note:	*p<0.1; **p<0.05; ***p<0.01				

Table 8. Models 1-5 by order of increasing complexity.

In all models analysed for the dataset where students of minority backgrounds are included in the sample, *minority* students suffer significantly reduced chances to become a professor later on in their career. This is a result that is consistent across all models, except the more complex ones where interaction terms are also considered, at which point the effect of belonging to a *minority* group loses statistical significance (see the Interaction Terms Models section for details).[3]

Another finding that is consistent across all models is the effect of attained *scholarships*, the student quality proxy used in this study. The attainment of *scholarships* have a significantly positive effect on student outcomes across the board, and this is true regardless of when the scholarship is attained over the course of the student's academic career (before, during, or after the completion of PhD studies). Nevertheless, it should be noted that scholarships attained after the completion of PhD studies, i.e. grants, have more pronounced effects than those obtained prior to or during PhD studies.

In simpler models, the effect of having a *domestic advisor with foreign experience* reflects positively on student's career outcomes. This is also holds true for students of the *male* gender. However, as the models become more complex and more variables are introduced to the equation, these effects lose significance. In a similar vein, this study finds that having a *foreign advisor* has no significant effect on a student's chances to become a professor later in life. It may even be noted that while simpler models show positive (though statistically insignificant) effects to having one, this coefficient changes signs and becomes negative as the models increase in complexity. This seems to indicate that there are more characteristics to consider when it comes to what makes a professor, a result contrary to the common belief that foreign advisors were hugely impactful in producing Turkey's next generation of academics.

The analysis produces several results that are statistically insignificant. It may nevertheless be interesting to consider findings that are still consistent among them, such as the detrimental effect of completing a PhD with multiple *co-advisors*, which reflects negatively on the student's career prospects across all models. Interestingly – and contrary to the hypotheses of this study – the effect of having *foreign experience* is also statistically insignificant. Further, this effect is also very small, which shows that previous experience in Western-style instutitons or teaching methods can not be said to have had an effect on the students' career outcomes. There are also no significant effects for students who suffer *disruptions* over the course of their PhD studies (though the effect is expectedly negative). Being subjected to the external *shock* of the 1946-1949 legal changes seems to be an unexpectedly positive effect, but does not statistically significantly reflect on students' prospects of obtaining a professorship later in life. The other mainly insignificant variable of note is the effect of '*prime' advisors*. This effect is always positive, but never significant unless university fixed effects are controlled for (see Fixed Effects Models below). This indicates that effect an *advisor in their prime* can have on their PhD students' outcomes differed across universities. Therefore, even though this study can offer no all-encompassing significant proof of the prime advisor theory, it still holds true as long as other factors can be accounted for.

Fixed Effects: Field and University Controls

Integrating field and university fixed effects to the full model produces the results on Table 9. In general, controlling for field or university fixed effects do not change the previous findings. Significant effects can be found across both fields and certain universities, however. Controlling for field effects shows us that, in general, there are significantly reduced opportunities to become a professor of *mathematics* as opposed to others, while majoring in *geology* seems to significantly

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[3] This could be interpreted in the following ways. As civil servants, people employed at the Turkish university institutions had to be of the Turkish nationality, and this would have held for the minority students whose stay in Turkey was temporary. However, this would not have applied to students who belonged to Turkey's extant minority groups (Armenian, Greek, Jewish etc.), i.e. those who held Turkish nationality but not background. There are instances of these students being hired at *academic* levels, which indicates that while pursuing an academic career wasn't entirely closed off to them, *professorships* at Turkish universities mostly were.

increase those chances. Controlling for university effects alongside field effects shows that *Ege University* had the opportunity to produce significantly more professors. Furthermore, a statistically insignificant but perhaps interesting finding is that controlling for field effects more than doubles the negative effect of having a *foreign advisor* on the student's career prospects. Controlling for field effects also nearly eliminates the effect of having a *coadvisor*. This calls for further study, which is detailed in the Chemistry Subsample.

Model 5 (Fixed Effects)							
	Model 5F (Field Controls)		Model 5U (University Controls)			Model 5FU (Field & University Controls)	
Dataset: Minorities Included	Dependent variable: Professor						
	Main	Field Dummies	Main	University Dummies		Main	Field & University Dummies
Foreign Advisor	-0.730	Astronomy 0.588	-0.114	-		-0.620	Astronomy 0.867
	(0.448)	(0.839)	(0.431)	-		-0.471	(0.870)
Domestic Advisor with Foreign Experience	0.305	Biology -0.365	0.587	-		0.469	Biology -0.144
	(0.464)	(0.741)	(0.454)	-		-0.478	(0.774)
Co-Advisor	-0.042	Chemistry -0.046	-0.304	-		-0.035	Chemistry -0.010
	(0.576)	(0.659)	(0.440)	-		-0.597	(0.684)
Male	0.258	Geology 1.880**	0.180	-		0.126	Geology 2.097**
	(0.275)	(0.951)	(0.239)	-		-0.285	(0.981)
Minority	-1.419**	Mathematics -1.383***	-1.336**	-		-1.342*	Mathematics -1.474***
	(0.646)	(0.409)	(0.650)	-		-0.698	(0.431)
Foreign Experience	-0.204	Physics	-0.082	-		-0.236	Physics
	(0.289)		(0.273)	-		-0.296	(1.380)
Scholarship (Before PhD)	1.703***	-	1.746***	Istanbul University	0.115	1.777***	Istanbul University -0.166
	(0.442)	-	(0.424)		(1.369)	-0.458	(1.626)
Scholarship (After PhD)	2.601***	-	2.562***	Higher Institute of Agriculture	1.997	2.679***	Higher Institute of Agriculture 1.957
	(0.435)	-	(0.426)		(1.603)	-0.446	(1.421)
Advisor in Prime	0.201	-	0.507*	Istanbul Technical University	0.721	0.474	Istanbul Technical University 0.502
	(0.287)	-	(0.285)		(1.409)	-0.307	(1.421)
Shock of 1946-1949	0.350	-	0.425	Ankara University	0.560	0.387	Ankara University 0.689
	(0.340)	-	(0.336)		(1.405)	-0.352	(756.868)
Disruption	-0.380	-	-0.172	Ege University	15.725	-0.401	Ege University 15.162***
	(0.533)	-	(0.514)		(701.977)	-0.568	(1.714)
		-		Middle East Technical University	0.278		Middle East Technical University 0.194
		-			(1.690)		(1455.398)
		-		Erzurum Ataturk University	-14.490		Erzurum Ataturk University -15.290
		-			(1455.398)		
		-		Hacettepe University			Hacettepe University
		-					
Constant	-0.009		-0.953			-0.367	
	(0.661)		(1.439)			(1.542)	
Field FE	Yes		-			Yes	
University FE	-		Yes			Yes	
Observations	434		434			434	
Log Likelihood	-232.365		-240.896			-224.716	
Akaike Inf. Crit.	498.731		519.793			497.431	
Note:	*p<0.1; **p<0.05; ***p<0.01						

Table 9. Model 5 with Fixed Effects accounting for both Field and University differences.>

Interaction Terms

In order to observe how certain students characteristics interact with others, an analysis is conducted on a variety of interaction terms. Variables of interest here are *foreign advisors,* interacting with student characteristics such as *foreign experience,* their *minority* status, or whether they obtain *scholarships* (before or after their PhD studies). The other variable of interest is students' *foreign experience*, and how it works together with *scholarships* (again, before or after).

In a model that does not control for field or university fixed effects, the interaction terms are found to have no statistically significant effects on the students' professorship outcomes (Table 10). However, taking either of those effects into consideration results in significant effects (Table 11). *Foreign advisors* who mentor *minority* students are shown to instill much higher success rates in these students, so long as either field, university, or both fixed effects are held constant. From the data, we know that such students often achieved professorships *outside* Turkey and its boundaries. This could indicate that while foreign advisors were successful in rearing minority students to become professors, they could not do the same for domestic students. Higher success rates can also be found in students who had *foreign experience* prior to entering PhD studies, and also obtained *scholarships* before or during their studies: higher quality students, who were also familiar with Western teaching methods, achieved higher rates of success when pursuing professorships. Further, an interesting result can also be found if the point in time at which the student obtained a scholarship is not considered and is instead simplified into a "yes or no, at *any* point in their career", the interaction between *foreign advisors* and these *any scholarships* becomes significantly negative (Appendix 3). This could indicate that high quality students who were mentored by foreign advisors could not benefit from them, and in fact, the relationship was detrimental to the students' outcomes.[4] In this alternate model, being a *male* student also becomes a significant positive effect on later becoming a professor.

The results of these models do not change if the datasets do. The dataset which includes minority students provides the same results as the dataset which excludes them. Somewhat different results can be found, however, if one changes the dependent variable.

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[4] An interesting anecdote by Cahit Arf, a highly successful Turkish mathematician famous for naming the Arf theorem, can be quoted here. In regards to his relationship with Richard von Mises, another highly successful mathematician who -- though not his mentor -- was his senior at the faculty at the time, Arf notes that both "he and I had too much pride" to work well together with one another.

	Model 5 (Interaction Terms)	
	Model 5INT **(Interaction Terms)**	
Dataset:	*Dependent variable:*	
Minorities Included	*Professor*	
	Main	***Interaction Terms***
Foreign Advisor	-0.344 (0.440)	Foreign Advisor * Foreign Experience	0.383 (0.571)
Domestic Advisor with Foreign Experience	0.409 (0.443)	Foreign Advisor * Minority	15.122 (1344.573)
Co-Advisor	-0.441 (0.412)	Foreign Advisor * Scholarship (Before PhD)	-0.512 (0.885)
Male	0.337 (0.230)	Foreign Advisor * Scholarship (After PhD)	-0.066 (0.854)
Minority	-16.288 (1344.573)	Foreign Experience * Scholarship (Before PhD)	15.768 (694.026)
Foreign Experience	-0.39 (0.373)	Foreign Experience * Scholarship (After PhD)	-0.241 (0.966)
Scholarship (Before PhD)	1.533** (0.680)		
Scholarship (After PhD)	2.635*** (0.684)		
Advisor in Prime	0.233 (0.269)		
Shock of 1946-1949	0.388 (0.326)		
Disruption	-0.203 (0.496)		
Constant	-0.356 (0.408)	
Field FE	-	
University FE	-	
Observations	434	
Log Likelihood	-242.807	
Akaike Inf. Crit.	521.613	
Note:	*p<0.1; **p<0.05; ***p<0.01	

Table 10. Model 5 with Interaction Terms.>

Dataset:	Model 5 (Interaction Terms and Fixed Effects)					
	Model 5INTF (Field Dummies, Interaction Terms)			**Model 5INTU** (University Dummies, Interaction Terms)		
Minorities Included	_Dependent variable:_					
	Professor					
	Main	*Field Dummies*	*Interaction Terms*	*Main*	*University Dummies*	*Interaction Terms*
Foreign Advisor	-0.629 (0.477)	Astronomy 0.317 (0.854)	Foreign Advisor * Foreign Experience -0.174 (1248.406)	-0.168 (0.463)	Istanbul University -0.286 (1.320)	Foreign Advisor * Foreign Experience 0.262 (1321.037)
Domestic Advisor with Foreign Experience	0.367 (0.468)	Biology -0.583 (0.751)	Foreign Advisor * Minority 14.854*** (0.933)	0.591 (0.458)	Higher Institute of Agriculture 1.588 (1.562)	Foreign Advisor * Minority 15.052*** (0.902)
Co-Advisor	-0.191 (0.590)	Chemistry -0.197 (0.669)	Foreign Advisor * Scholarship (Before PhD) -0.382 (0.883)	-0.368 (0.446)	Istanbul Technical University 0.269 (1.367)	Foreign Advisor * Scholarship (Before PhD) -0.5 (0.860)
Male	0.202 (0.284)	Geology 1.801* (0.973)	Foreign Advisor * Scholarship (After PhD) -0.07 (634.909)	0.182 (0.242)	Ankara University 0.115 (1.363)	Foreign Advisor * Scholarship (After PhD) -0.049 (693.095)
Minority	-16.055 (1248.405)	Mathematics -1.535*** (0.424)	Foreign Experience * Scholarship (Before PhD) 16.073*** (1.005)	-16.123 (1321.036)	Ege University 16.247 (1157.340)	Foreign Experience * Scholarship (Before PhD) 15.777*** (0.971)
Foreign Experience	-0.34 (0.391)	Physics (0.632)	Foreign Experience * Scholarship (After PhD) -0.26	-0.364 (0.379)	Middle East Technical University -0.265 (1.651)	Foreign Experience * Scholarship (After PhD) -0.185
Scholarship (Before PhD)	1.371* (0.715)			1.564** (0.682)	Erzurum Ataturk University -15.962 (2399.545)	
Scholarship (After PhD)	2.708*** (0.701)			2.637*** (0.691)	Hacettepe University (0.586)	
Advisor in Prime	0.153 (0.289)			0.426 (0.287)		
Shock of 1946-1949	0.347 (0.343)			0.393 (0.337)		
Disruption	-0.4 (0.543)			-0.195 (0.525)		
Constant	0.221 (0.679)			-0.419 (1.400)		
Field FE	Yes			-		
University FE	-			Yes		
Observations	434			434		
Log Likelihood	-227.289			-236.706		
Akaike Inf. Crit.	500.579			523.411		
Note:	*p<0.1; **p<0.05; ***p<0.01					

Table 11. Model 5 with Fixed Effects and Interaction Terms.

2) Academic Model

A further model is proposed by reducing the proxy of student outcomes from professorships to academic employment at any level post-PhD. The *academic* model considers all post-PhDs employed full-time at a university or at a higher education instution, i.e. researchers, assistant professors, associate professors, and professors under the *academic* umbrella, which is taken as the dependent variable instead of only professorships.

$$Academic = \beta_1 Foreign\ Advisor + \beta_2 Domestic\ Advisor\ with\ Foreign\ Experience + \beta_3 Co$$
$$- Advisor + \beta_4 Male + \beta_5 Minority + \beta_6 Foreign\ Experience$$
$$+ \beta_7 Scholarship + \beta_8 Advisor\ in\ Prime + \beta_9 Shock + \beta_{10} Disruption$$

The *academic* model provides somewhat different results compared to the *professor* model (Appendix 4). The most significant findings of the academic model is the effect of *coadvisors* and *foreign experience,* which at almost all levels of model complexity show significant negative effects on the student's outcome to be employed as a full-time academic post-PhD. While the effect of *coadvisors* are an expected result – considering many co-advised students were only co-advised because there were not enough professors to advise them personally, therefore leading to reduced mentorship quality, the impact of *foreign experience* being consistently negative is intriguing, and could be intuited as the result of a system that favored students reared from within itself with no foreign influence. *Male* students also seemed to enjoy better outcomes overall when all levels of academic employment are considered. Furthermore, a positive and statistically significant constant variable for the *academic* model suggests that PhD students reared by the university reform in 1933-1966 were likely to be employed at academic institutions even irrespective of other qualities – the system was attempting to create a new generation of academics.

Other significant results of the *academic* model are consistent with those of the *professor* model, and show negative academic employment prospects for students from *minority* backgrounds, while favoring those who obtained *scholarships* (both before, during and after their PhD studies). For field controls, significantly reduced chances of academic employment in the fields of *biology*, *chemistry*, and *mathematics* can be seen in the models. Interaction terms such as *foreign advisors* assigned to *minority* students and students with *foreign experience* with *scholarships obtained prior to PhD* studies are also consistent with the professor model.

3) Non-Academic Outcomes

In order to take a measure of these reared academics and professors to the country's general human development and historical attainment, I also suggest a model that considers the *non-academic outcomes* of the students examined in this sample. These *non-academic outcomes* are offered to be an assesment of the students' non-academic contributions to society, and include measures such as their memberships in scientific or industrial societies, NGOs, or other known prominent activies (i.e. philanthropism, animal rights, connections to feminist movement etc.), as well as measures of recognition, such as obituaries, testimonials, published interviews, journal articles, documentaries, having things named after them (libraries, collections, halls, buildings, streets, conferences, awards etc).

The non-academic model is almost fully consistent with the *professorship* model. *Minority* students are vastly underrepresented in non-academic measures of recognition, while students with *scholarships* are.

c) Subsample Analyses

A variety of subsample analyses were conducted to determine whether results changed among specific subsamples of students.

1) Academic Placements

To better define students' academic placements and progress in academic careers, the sample was split between students who were hired by their home universities and those hired outside their home universities. The side-by-side analysis of the model then points to some interesting differences seen on Table 13.

For students who were hired by their home universities, only scholarships attained post-doctorate factored significantly into the student's chances of becoming a professor, while scholarships attained prior to or during PhD education lost significance. The effect of having an advisor in their prime years factored significantly positively on the student's outcomes. For students who continued their academic careers outside of their alumni instutitons, consistent with the other models, the student quality proxies in attained scholarships before, during and after PhD completion factored significantly into the student's outcomes, with a greater effect placed on grants attained post-PhD completion. An interesting finding for this group is the student's gender, which -- if male – factors significantly into the student's outcomes when attempting to pursue an academic career in a higher education instutiton they did not graduate from. This could indicate that while gender is not a factor when hiring from within the university, it factors significantly into the decision making if the candidates are coming from outside instutions. Another interesting finding for students hired by institutions not their home university is the significance of the *shock* variable – possibly indicating that the PhDs produced by the supply shock of 1946-1949 found academic placements in outside institutions. Further, there is an overall negative significance to the chance of becoming a professor in a university not the student's alumni institution.

Model 5 Associated Institution Subsample				
Dataset		*Dependent variable:*		
Minorities Included		Professor		
Hired by Home Institution		Not Hired by Home Institution		
Foreign Advisor	0.057 (0.609)	Foreign Advisor		-0.293 (0.755)
Domestic Advisor with Foreign Experience	1.085 (0.780)	Domestic Advisor with Foreign Experience		1.023 (0.757)
Co-Advisor	0.713 (0.623)	Co-Advisor		-0.869 (0.758)
Male	-0.06 (0.396)	Male		1.236*** (0.392)
Minority	-15.967 (882.744)	Minority		-0.09 (0.664)
Foreign Experience	0.42 (0.515)	Foreign Experience		-0.16 (0.407)
Scholarship (Before PhD)	1.076 (0.684)	Scholarship (Before PhD)		1.755*** (0.607)
Scholarship (After PhD)	1.528*** (0.588)	Scholarship (After PhD)		3.472*** (0.715)
Advisor in Prime	1.209*** (0.442)	Advisor in Prime		-0.703 (0.439)
Shock of 1946-1949	-0.166 (0.528)	Shock of 1946-1949		0.923* (0.505)
Disruption	-1.073 (0.692)	Disruption		0.279 (0.957)
Constant	0.135 (0.608)	Constant		-1.642** (0.742)
Observations	202	Observations		232
Log Likelihood	-87.086	Log Likelihood		-113.086
Akaike Inf. Crit.	198.173	Akaike Inf. Crit.		250.171
Note:		*$p<0.1$; **$p<0.05$; ***$p<0.01$		

Table 13. Comparison of Model 5 between PhD students later hired by their Home Institution (Alumni) or outside Institutions.

2) Earlier vs. Later Years

A half-sample split between students who published their dissertations during the early years of the reform (1933-1955) and the later years (1956-1966) produces an almost even division in the number of observations (215 and 219, respectively). The analysis of this subsample provides results consistent with those of the general model, with the student quality proxy of *scholarships* being the biggest indicator in achieving professorships. One difference, however, is that *minority* students having reduced chances to become professors loses statistical significance in the later half of the reform.

3) Chemistry Subsample

An interesting subsample to consider in this study is PhDs completed in the field of Chemistry, which comprises 196 of the 434 PhDs in the sample (45%). The significance of this field can be attributed to a headstart chemistry had over the other natural sciences fields examined in this study: the reform in chemistry education in Turkey began as early as 1915 during the Ottoman Era, almost two decades earlier (Kilickan, 2018, p. 155). The different results of the Chemistry subsample can be seen in Appendix 6. The main difference between the general sample and the chemistry subsample is the significant positive effect of *coadvisors* on professorship outcomes, which could be attributed to the unique quality of chemistry teaching, as this field was more established compared to the others and it was customary to work in groups. Also significant is the detrimental effect of *prime advisors*, indicating that older professors resulted in better outcomes for chemistry students, which again can be attributed to chemistry's earlier establishment and the influence of older advisors who'd aged alongside it.

5) Conclusion

This paper examines the lifetime outcomes of the first PhD students reared after the Turkish university reform as it relates to the arrival of refugee professors from Germany following the rise of Nazism. The results show that the success of the university reform, which established a new higher education system and produced a new generation of academics, could not solely be attributed only to the foreign advisors. While the prevailing narrative that these foreign advisors were highly influential in the development of the new university may still hold true in some aspects, I do not find strong statistical evidence suggesting that it was solely the foreign advisors who raised the successful students of the next Turkish academic generation. The results of this analysis show that the arrival of the refugee professors, which is often written in the Turkish literature about this topic as a net positive, did not reflect as unanimously on the outcomes of the PhD students they advised.

Strong statistical evidence suggests that student quality proxies, i.e. scholarships -- particularly those attained following the completion of a PhD – is most linked to the opportunity to achieve strong academic placements, a finding which is consistent among all suggested models. Unfortunately, I also find strong statistical evidence that students of minority backgrounds, who interestingly congregate significantly around the foreign professors, suffered particularly reduced success in their academic careers due to legislative roadblocks.

Further analyses show favorable outcomes for students of domestic advisors – who had acquired PhDs of their own from Western institutions prior to the reform – achieved higher success rates for their students. This is a finding that often goes unnoticed, these domestic advisors unsung, in most literature surrounding the reform. In simpler analyses I also observe that male students achieve more success in lengthy academic careers, as well as from students who have advisors in the prime of their academic life cycle.

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Appendix

MULTINOMIAL ANALYSIS					
Baseline:	**Domestic Advisors**		Relative Risk Ratio		
	Dependent variable:			*Dependent variable:*	
	Domestic Advisor with Foreign Experience -1	Foreign Advisor -2		Domestic Advisor with Foreign Experience -1	Foreign Advisor -2
Minority	-0.3 (1.233)	2.255*** (0.755)	Minority	0.741 (1.233)	9.54 (0.755)
Male	0.543** (0.271)	-0.004 (0.231)	Male	1.721*** (0.271)	0.996*** (0.231)
Foreign Experience	-0.195 (0.319)	0.057 (0.267)	Foreign Experience	0.823*** (0.319)	1.059*** (0.267)
Scholarship (Before PhD Studies)	-0.826 (0.685)	0.598 (0.444)	Scholarship (Before PhD Studies)	0.438** (0.685)	1.819*** (0.444)
Constant	-0.734*** (0.228)	-0.088 (0.186)	Constant	0.480** (0.228)	0.916*** (0.186)
n Akaike Inf. Crit.	921.083	921.083	Akaike Inf. Crit.	921.083	921.083
Note:	*p<0.1; **p<0.05; ***p<0.01				

Appendix 1. Multinomial Analysis, Domestic Advisors Baseline.

MULTINOMIAL ANALYSIS					
Baseline:	Domestic Advisors with Foreign Experience		Relative Risk Ratio		
	Dependent variable:			*Dependent variable:*	
	Domestic Advisor with Foreign Experience -1	Foreign Advisor -2		Domestic Advisor with Foreign Experience -1	Foreign Advisor -2
Minority	0.3 (1.234)	2.556** (1.039)	Minority	1.35 (1.234)	12.878** (1.039)
Male	-0.543** (0.271)	-0.547** (0.274)	Male	0.581** (0.271)	0.579** (0.274)
Foreign Experience	0.195 (0.319)	0.252 (0.320)	Foreign Experience	1.216 (0.319)	1.287 (0.320)
Scholarship (Before PhD Studies)	0.826 (0.685)	1.425** (0.652)	Scholarship (Before PhD Studies)	2.285 (0.685)	4.156** (0.652)
Constant	0.734*** (0.228)	0.646*** (0.230)	Constant	2.083*** (0.228)	1.907*** (0.230)
n Akaike Inf. Crit.	921.083	921.083	Akaike Inf. Crit.	921.083	921.083
Note:	*p<0.1; **p<0.05; ***p<0.01				

Appendix 2. Multinomial Analysis, Domestic Advisors with Foreign Experience Baseline.

Model 5 (Interaction Terms)		
	Model 5INTa (Interaction Terms, Alternate) Scholarships Combined	
Dataset:	*Dependent variable:*	
Minorities Included	*Professor*	
	Main	**Interaction Terms**
Foreign Advisor	0.145	Foreign Advisor * Foreign Experience
	(0.396)	
Domestic Advisor with Foreign Experience	0.549	Foreign Advisor * Minority
	(0.410)	
Co-Advisor	-0.191	Foreign Advisor * Scholarship
	(0.373)	
Male	0.432**	Foreign Experience * Scholarship
	(0.210)	
Minority	-14.561	
	(489.559)	
Foreign Experience	-0.628	
	(0.488)	
Scholarship (Before PhD)	0.532	
	(0.388)	
Scholarship (After PhD)	0.38	
	(0.246)	
Advisor in Prime	0.351	
	(0.299)	
Shock of 1946-1949	0.024	
	(0.448)	
Disruption	-0.359	
	(0.371)	

Interaction Terms column values:

Foreign Advisor * Foreign Experience	0.815
	(0.585)
Foreign Advisor * Minority	12.94
	(489.559)
Foreign Advisor * Scholarship	-0.968*
	(0.538)
Foreign Experience * Scholarship	0.254
	(0.581)

Constant	-0.359
	(0.371)
Field FE	-
University FE	-
Observations	434
Log Likelihood	-278.585
Akaike Inf. Crit.	587.17
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 3. Model 5 Interaction Terms, Alternate Version.

Scholarship variables are combined into one.

Academic Model	
	Model 5
Dataset: **Minorities Included**	*Dependent variable:* **Academic**
Foreign Advisor	-0.506
	(0.459)
Domestic Advisor with Foreign Experience	-0.055
	(0.496)
Co-Advisor	-1.134**
	(0.462)
Male	0.407*
	(0.237)
Minority	-1.883***
	(0.581)
Foreign Experience	-0.550**
	(0.279)
Scholarship (Before PhD)	2.062***
	(0.578)
Scholarship (After PhD)	3.286***
	(0.744)
Advisor in Prime	-0.317
	(0.304)
Shock of 1946-1949	0.211
	(0.353)
Disruption	0.697
	(0.577)
Constant	0.991**
	(0.454)
Observations	434
Log Likelihood	-219.398
Akaike Inf. Crit.	462.795
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 4. Academic Model, Model 5.

Model 5 Half-Sample Split				
Dataset		*Dependent variable:*		
Minorities Included		Professor		
Early Years (1933-1955)		Later Years (1956-1966)		
Foreign Advisor	-0.455 (0.607)	Foreign Advisor	0.083 (0.630)
Domestic Advisor with Foreign Experience	0.022 (0.686)	Domestic Advisor with Foreign Experience	0.582 (0.596)
Co-Advisor	-0.094 (0.683)	Co-Advisor	-0.662 (0.587)
Male	0.144 (0.331)	Male	0.44 (0.327)
Minority	-1.967** (0.894)	Minority	-1.251 (0.914)
Foreign Experience	0.089 (0.384)	Foreign Experience	-0.217 (0.379)
Scholarship (Before PhD)	1.416*** (0.549)	Scholarship (Before PhD)	1.824*** (0.681)
Scholarship (After PhD)	2.449*** (0.522)	Scholarship (After PhD)	2.723*** (0.764)
Advisor in Prime	0.349 (0.375)	Advisor in Prime	0.265 (0.427)
Shock of 1946-1949	0.498 (0.354)	Shock of 1946-1949	(0.653)
Disruption	0.626 (0.972)	Disruption	-0.881
Constant	-0.397 (0.631)	Constant	-0.335 (0.584)
Observations	215	Observations	219
Log Likelihood	-121.038	Log Likelihood	-121.983
Akaike Inf. Crit.	266.077	Akaike Inf. Crit.	265.966
Note:		*p<0.1; **p<0.05; ***p<0.01		

Appendix 5. Model 5 Half-Sample (Earlier vs. Later Years) split.

Field Subsample Models (Model 5)	
Chemistry	
Dataset *Minorities Included*	*Dependent variable:* Professor
Foreign Advisor	-0.862
	(0.566)
Domestic Advisor with Foreign Experience	-0.099
	(0.568)
Co-Advisor	3.037*
	(1.642)
Male	0.492
	(0.452)
Minority	-1.605*
	(0.858)
Foreign Experience	0.13
	(0.501)
Scholarship (Before PhD)	0.575
	(0.597)
Scholarship (After PhD)	2.836***
	(0.662)
Advisor in Prime	-0.681*
	(0.406)
Shock of 1946-1949	0.643
	(0.477)
Disruption	-1.237
	(0.832)
Constant	0.554
	(0.616)
Observations	196
Log Likelihood	-103.086
Akaike Inf. Crit.	230.171
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix 6. Field Subsample Models: Chemistry Subsample.