The Effects of Business School Education on Manager Career Outcomes

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Abstract: This paper studies the effects of business school education on manager career outcomes and firm performance, using evidence from the Engineering, Science, and Management War Training (ESMWT), that offered MBA-style education to middle managers and production supervisors working at U.S. war industrial facilities during WWII. Using a regression discontinuity design (RD), I show that managers who scored right above the ESWMT entry-exam threshold had a substantially higher probability of being promoted to both middle and top management positions during their career, and engaged systematically more in self-employment and innovative entrepreneurial activities than similar managers who scored right below. Participation in the ESMWT had larger effects on the career outcomes of under-represented groups in firm management, such as nonwhite and female managers, and boosted performance and managerial practices implementation of admitted managers war facilities. Exposure to a network of class-mates from better-performing firms resulted in higher chances of moving into peer companies and founding a business with them.

Keywords: business school education, promotions, entrepreneurship, WWII, network effects
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1 Introduction

Individual managers play a key role in shaping firm performance and worker outcomes. Previous works have shown that CEOs characteristics and behavior affect firm output, adoption of managerial practices and strategic decisions (Bertrand and Schoar, 2003; Bloom and Van Reenen, 2007; Bandiera et al., 2020; Prat and Cai, 2022), and that manager talent can increase employee productivity and reduce turnover (Lazear et al., 2015; Hoffman and Tadelis, 2021; Fenizia, 2022). A few papers have instead focused on the role of CEO's with an MBA education, finding some evidence of a positive short-run impact on firm outcomes (Bhagat et al., 2010), but negative longer-term effects due to increased self-serving practices and reduced employees' wages (Miller and Xu, 2016, 2019; Acemoglu et al., 2022).

However, to what extent business school education affects manager career path remains an open question, in particular for middle managers for whom information on both education and performance over time is usually hard to collect. Moreover, little we know on whether the content of business school programs matter per se or if the professional network created through their attendance contributes to manager professional achievements.

In this paper I study the effects of business school education on middle manager career outcomes, using evidence from the Engineering, Science, and Management War Training (hereafter ESMWT). The ESMWT, sponsored by the U.S. government during WWII, on top of training programs for engineers and scientists, offered free MBA-style education to middle managers and production supervisors employed at war industrial facilities, civilian plants that produced essential war-related items. Through this program, more than 200,000 managers attended management courses, that lasted 18-months and offered "a comprehensive business education to organize, coordinate and supervise production within and across plants" (Armsby, 1946). A distinctive feature of the ESMWT is that it prohibited any discrimination based on gender and race, and therefore gave nonwhite and female managers a unique opportunity to attend business schools for free.

I use newly-assembled panel data, collected from several historical and university archives, on all the eligible managers that applied to the ESMWT, for whom I reconstruct career outcomes through the university reunion books between 1945 and 1975. I complement this information with data on the performance of the war facilities where applicant managers worked, as well as on the implementation of management practices, and on universities and colleges that hosted the ESMWT classes.

To identify the causal effects of the ESMWT on manager career outcomes, I exploit the fact that applicant managers had to score at least 80 points in a ESMWT-set entry-exam. More specifically, I implement a regression discontinuity (RD) design, comparing managers who scored right above the 80-point threshold and thus were admitted to the program

to managers who scored right below and therefore were not admitted. I show that there was no sorting around the entry-exam score threshold, and that managers right above and right the below the threshold were very similar in terms of their professional and personal characteristics and were working in comparable war facilities. Moreover, while no managers who scored below the threshold enrolled in the ESMWT, 97 percent managers who scored above participated in the program, indicating a very high compliance.

I find three key results. First, participation in the ESMWT increased manager's probability of promotion. Specifically, managers who scored right above the 80-point threshold were 42.5 percent more likely to receive at least a promotion during their career than managers who scored right below. This increase involved both promotions to middle management positions, such as plant or general managers, and to top management roles, like business executives and CEOs. Such managers had also higher chances to move to other, better-performing firms than war facilities, such as listed firms or firms included in Fortune 500.

Second, managers who scored right above the 80-point threshold engaged systematically more in self-employment and innovative entrepreneurial activities than managers who scored right below. They were 72.2 percent more likely to become business owners relative to managers who scored right below the threshold, and had 78.4 percent higher chances to (co)found their own business, especially in nascent innovative industries, like consulting and small business investment companies.

Third, participation in the ESMWT had larger effects on the career outcomes of underrepresented groups in firm management, such as nonwhite and female managers. The probability of promotions for nonwhite and female managers who scored right above the ESMWT threshold doubled relative to comparable managers who scored below the threshold, while the probability of owning or co-founding a business tripled. A back-of-the-envelope calculation indicates that participation in the ESMWT closed the occupation gap between white and nonwhite managers around the threshold by 16.1 percentage points and between male and female managers by 14.3 percentage points.

Did the performance of admitted manager facilities improve upon their participation in the ESMWT? I show that value added, sales and productivity of facilities whose managers scored right above the ESWMT threshold, while slightly decreasing during the program implementation, raised between 6.8 and 7.9 percent in the three years after its end, relative to those of plants whose managers scored right below the threshold, more than compensating the initial loss. These firms also widely adopted managerial practices related to factory operations, quality control, human resources management and production planning, both during and after the ESMWT, that resulted in a reduction of worker injuries, scrapped output, absenteeism and late delivered orders.

In addition to receive advanced management education, while attending the ESMWT,

admitted managers may have met colleagues from other facilities, and built a professional network, which may have in turn affected their labor market perspectives. To investigate this channel, I exploit the fact that admitted managers could only enroll into the closest university to their industrial facilities and were *randomly* assigned to sections of roughly 40 students. I find that being exposed to a higher share of managers from better-performing or listed facilities is associated with an increased probability of moving into section-mate firms or co-founding a business with them. By contrast, a higher share of section-mates from different or larger war facilities does not lead to significant results, indicating that the quality rather than the width of the network impacted manager career outcomes.

This paper contributes to several strands of the existing literature. First, it contributes to an extensive literature studying how individual managers affect firm behavior and economic outcomes. Previous papers have shown that CEOs and top executives are central in shaping companies capital structure and investment strategies (Bertrand and Schoar, 2003; Kaplan et al., 2012; Benmelech and Frydman, 2015; Bandiera et al., 2020; Huber et al., 2021; Prat and Cai, 2022); and that manager talent and interpersonal skills reduce employee attrition and turnover (Lazear et al., 2015; Hoffman and Tadelis, 2021), improve workers' allocation to jobs and their career progression (Minni, 2023), and increase productivity also in the public sector (Fenizia, 2022). Focusing on CEO education, Bhagat et al. (2010) and Miller and Xu (2016, 2019) find that managers with MBA improve short-term firm operating performance, but do not affect long-run outcomes and adopt short-term strategic expedients that may harm firm market valuations, while Acemoglu et al. (2022) document that CEOs with business education reduce their employees' wages by not sharing profits with their workers. This work complements prior findings by examining the effects of business school education on manager career outcomes and firm performance. Moreover, while existing works have mostly focused on top executives degrees, I focus on middle managers and supervisors, and their impact on firm organizations and productivity.

Second, this research adds to the literature on management and firm performance. Several papers have provided causal evidence that the adoption of better managerial practices has large and positive effects on firm outcomes (e.g., Bloom et al., 2013; Bruhn et al., 2018; Iacovone et al., 2022; Gosnell et al., 2020; Macchiavello and Morjaria, 2022; Manaresi et al., 2022). Taking a long-run perspective, Giorcelli (2019), Bloom et al. (2020), and Bianchi and Giorcelli (2022) have shown that the impact of management interventions can be long-lasting. This paper contributes to these findings by analyzing the effects of a large program of structured and comprehensive business education on plant performance, with a scale and scope that could be hardly reproduced in modern settings, instead of focusing on specific training or consulting episodes. Moreover, it assesses the role of middle managers in adopting managerial practices, while previous works have focused on higher level of management.

Third, this paper is also related to studies on gender and racial inequalities in the labor market. It is well known that women face a gender gap in earnings, have lower promotion chances and are less present in high-paid jobs (see Goldin, 2014 and Blau and Kahn, 2017 for overviews), patterns that are in a fairly large part explained by demand-side gender discriminations (Sarsons et al., 2021). Focusing on young MBA's professionals, Bertrand et al. (2010) show that male and female earnings are nearly identical at the outset of their careers, but soon diverge mostly due to motherhood. An increasing body of research has also analyzed the origin and persistence of racial inequalities, ranging from the Great Migration (Boustan, 2009; Derenoncourt, 2022) to changes in labor market regulations (Derenoncourt and Montialoux, 2021; Farber et al., 2021). I provide novel micro-level evidence at the nationwide level of how offering managerial education during WWII to under-represented groups increased nonwhite and female managers promotions and engagement into entrepreneurship, reducing the career gap with white colleagues. My results echo Goldin and Olivetti (2013) that shows that WWII benefitted primarily women in the top half of the education distribution. Consistent with Aneja and Xu (2022), my paper also confirms the key role of government policies in exacerbating or reducing racial inequalities.

Finally, this paper contributes to the literature studying the effects of US government's wartime programs on long-run industrialization and innovation. Jaworski (2014) find that counties that received more investment in American South during WWII did not exhibit differential postwar growth, while Garin and Rothbaum (2022) document that government-financed plant construction caused a persistent expansion of high-wage manufacturing jobs and a permanent increase in regional employment. Focusing on innovation, Gross and Sampat (2022) show that large government-sponsored R&D programs during WWII affected both the direction and the location of US inventions in the war aftermath. This paper provides new evidence on a largely unexplored WWII managerial educational intervention and its effect in shaping managerial career and entrepreneurship in the 1950s and 1960s.

The rest of the paper is organized as follows. Section 2 describes the history and the implementation of the ESMWT. Section 3 describes the data collection and reports key summary statistics. 4 presents the empirical strategy and discusses the identification strategy. Section 5 examines the effects of the ESMWT on manager career outcomes. Section 6 studies the effects of participation in the ESMWT on the performance of war industrial facilities where applicant managers worked. Section 7 discusses the network effects created by the ESMWT. Section 8 concludes.

2 Historical Background

In Spring 1940, a few months after the start of WWII, the collapse of France and the Low Countries made it clear that also the US had to prepare for war. Henry Armsby, the Specialist in Engineering Education for the U.S. Office of Education, argued that "warfare had become a test of the relative total scientific, engineering, and management capacities of the belligerent nations" (ESMWT, 1940). It was therefore necessary to promote an advanced training for engineers and scientists to foster technological advancements, and for managers to efficiently organize, coordinate and supervise production (Khurana, 2010).

Under these auspices, on October 9, 1940 President Franklin Roosevelt signed a bill authorizing the Engineering Defense Training (EDT) for "engineers working for the national defense" (Armsby, 1946). In July 1941, the Labor-Federal Security Appropriations Act approved the addition of chemistry, physics, and management-related training, changing the name of the program in Engineering, Science, and Management Defense Training (ESMDT). Finally, after the Japanese attack on Pearl Harbor (December 7, 1941) and the entry of the U.S. into World War II, the War-Time Commission became responsible for this program, that was renamed Engineering, Science, and Management War Training (ESMWT hereafter). Despite the name changes, the content of the program and its delivery remained substantially unchanged.

The goal of the ESMWT program was to "provide without charge college and postgraduate education to engineers, scientists and managers employed at war industrial facilities", civilian plants that, although did not directly produced war items, were considered essential for war production and therefore placed under the control of the War Production Board (ESMWT, 1941).[1] The program costs USD 60 million (USD 1,093 million in 2022 values), a mere 0.025 percent of the total U.S. war spending, and trained almost 1.8 million students, equivalent to 40 percent of the college population in 1940 (Census, 1940). Over a five-year period, it offered courses in engineering, chemistry, physics, and management for a total of 7,037 classes. A distinctive feature of the ESMWT is that it prohibited any discrimination based on age, gender, and race, and therefore gave women and nonwhite workers a unique opportunity to participate into free graduate and post-graduate education (Armsby, 1946).

From an organizational point of view, the ESMWT was run by its central office in Washington DC, that focused on administrative tasks at the national level, such as working with other government agencies, publishing program material, and preparing course guidelines. Given the large number of students involved, it was decided to hold the ESMWT courses

[1] Notably, workers of the 25,393 US war contractors, companies that received contracts for war supplies worth at least $50,000 between June 1940 and September 1945, were not eligible to enroll in the ESMWT program. These companies could apply for another war program, the Training Within Industry Program that provided free management consulting, as analyzed in Bianchi and Giorcelli (2022).

at already existing universities and colleges. To do so, each of the twelve War Manpower Commission regions in which the US had been divided appointed a ESMWT national representative and two ESMWT advisers (Figure A.1, Panel A). The national representative took care of communications with the central ESMWT office in DC. The advisors, "recognized leaders in education", that did not receive any compensation, were responsible for selecting participating universities and colleges in their regions, working close to them to evaluate the needs of the local industries, and "supervising the training programs in the field" (ESMWT, 1941).

To select which universities and colleges would have hosted the ESMWT program, the advisors surveyed the degree-granting institutions in their Manpower Commission regions and chose those within 50 km of war industrial facilities (ESMWT, 1941). This would allow ESMWT trainees to maintain their jobs. Despite hosting the ESMWT program was voluntary, universities and colleges enthusiastically responded to the advisor requests and were willing "to sacrifice space and personnel for for patriotic reasons" (Cardozier, 1993). Between 1940 and 1945, out of 1,209 degree-granting institutions existing in the US 218 (18.03 percent) hosted at least a ESMWT course (Figure A.1, Panel B).

The philosophy of the program was to set the content of the trainings at the centralized level, but then leave a some autonomy to the universities and colleges in running the program, that was taught by their own faculty (ESMWT, 1942). Therefore, on top of determining the local training needs and designing the courses to meet these needs with the ESMWT advisers, universities and colleges were also in charge of recruiting and selecting the trainees, selecting, training, and supervising instructors, submitting a report for each fiscal year of participation to the central ESMWT office, and maintaining records of expenditures in a manner to facilitate a thorough audit (ESMWT Administration, 1945). Institutions were not expected to realize a profit from the program, but were reimbursed for all proper costs incurred in organizing and conducting courses under the program (Armsby, 1946).

The ESMWT was widely advertised to eligible students by programs exhibited on company bulletin boards, as well as newspaper and radio announcements. Trainees could enroll only in the closest participating universities or colleges to their war facility. To recruit the students across all disciplines, the ESMWT set an entry examination, based on a formal test, in person interviews as well as an overall evaluation of the candidate curriculum (ESMWT, 1942). The ESMWT established that the exam grade should be expressed in hundred points and that students who score above 80 points in the entry exam were admitted.

The organization of the ESMWT differed substantially between engineers and scientists, and managers. In fact, engineers and scientists had a strong technical background and needed training only for dealing with specific, sometimes local, war-related issues. As a result, training in engineering, physics and chemistry offered a three-month-long courses on

specific topics, such as war explosives, bombproof structures, and aircraft and tank design. By contrast, it was decided that "managers nationwide required a comprehensive business education to be able to organize, coordinate and supervise production within and across plants" (Khurana, 2010), and were therefore offered an 18-month MBA-style program.

2.1 The Managerial Component of EMSWT

The major problem that the ESMWT had to face in setting up its managerial component was that business school education was still in its infancy at the eve of WWII. Despite a sharp increase in their number since the 1920s, "in 1940 business schools were not offering a professional education yet" (AACSB, 1966). First, there was no widespread agreement on the nature of a curriculum which would prepare students for a career in business" (Khurana, 2010). MBA programs were fairly heterogeneous. They either offered courses in subjects relevant for business, like accounting, finance, business correspondence, or training for specific jobs, such as bankers, or industries with little to none analytical classes (AACSB, 1966). Second, business school faculty often lacked preparation in basic research methods and their published research largely consisted of anecdotical examples or broad generalizations that were rarely subjected to rigorous testing or peer review (Khurana, 2010).

After reading several surveys on the status of business schools and discussing with the Manpower Commission, in Summer 1940 the ESMWT decided that its managerial component had to be organized from scratches and that this was a unique opportunity to create a professional management education in the US (ESMWT Administration, 1941). To do so, the ESMWT relied on the American Association of Colleges and Schools of Business (AACSB), an association born with the goal of "promoting and improving higher business education in North America." Among other activities, the AACSB periodically compiled a list of accredited business schools and of the courses they offered.[2] The ESMWT asked help to the trustees of the AACSB, Deans at twenty-five business schools, who worked close to the U.S. commissioner of education and the twelve local Manpower Commissions to determine the educational needs of U.S. managers.[3] After an intense activity of interviews with business leaders and visits of war facilities in Fall 1940, it became clear that the program should

[2] The list of accredited business schools was compiled after a peer reviewed process that evaluated the quality of curriculum and the professor to student ratio. AACSB also ran surveys on the courses offered by business schools, the content of their curricula, the qualification and publication of business school professors and the professor to student ratio to assess the state of business school education (AACSB, 1966).

[3] In 1940 the trustees were the Deans of Wharton, Harvard Business School, MIT Sloan, Berkeley Haas, Dartmouth Tuck, Chicago Booth, Northwestern Kellogg, Columbia Business School, NYU Stern, Stanford GSB, Ohio State, Tulane, Purdue, University of Illinois Urbana-Champaign, University of Nebraska, Pittsburgh, University of Texas-Austin, University of Wisconsin-Madison, Yale University, University of Colorado Boulder, Boston University, Washington University, University of Michigan, UCLA, St. Louis University.

have included a comprehensive business education with a strong focus on analytic tools to systematically organize and measure production. The ESMWT managerial component took an MBA-style format with compulsory classes in accounting, statistics, quality control, strategy, human resources management, production planning, finance, marketing, and only a class that dealt specifically with local wartime production management techniques (ESMWT Administration, 1941, 1942).

Once the curriculum of the program was set, the Deans organized full-time training for business school faculty who had to deliver the management classes. The faculty trainings happened every year from from January 1941 to May 1945 and needed to be completed once. During this period, perspective ESMWT instructors travelled to DC where they attended a month-long orientation class in management and a four-month training in the specific course they would have taught, decided with the Deans and ESMWT experts agreement (ESMWT Administration, 1941).

The Deans decided to make this program available to production supervisors and middle managers with a B.A. degree working at the war industrial facilities, as defined by the Manpower Commission.[4] Application windows were established every six months from August 1941 to January 1945. Admitted managers attended courses in sections of around 40 workers. For the first time, the allocation of students across different sections was random, anticipating a practice later adopted by several business schools, for instance Harvard Business School in 1949 (Shue, 2013). Students usually took classes full-time three days a week and work in their manufacturing facilities in the rest of the week, and received a certification upon completing the program (ESMWT Administration, 1942).

3 Data

I assembled a new dataset that links applicant managers to the ESMWT and their career outcomes, with the performance of war industrial facilities they were employed at the time of ESMWT application, and universities and colleges that hosted the management classes. These data, collected and digitized from historical archives, provide an unusual level of the details and reflect the exceptional effort undertaken by the U.S. government during WWII to monitor the publicly funded programs it was supporting and to collect systematic information on production of the war facilities. In this section, I describe the data sources and provide key summary statistics. Additional information on the data collection process and the variable definitions can be found in Appendix B.

[4] While surveying war industrial facilities, the regional Manpower Commission classified workers based on their occupation. Workers classified as production supervisors or middle managers with a B.A. degree were eligible to enroll in the managerial component of ESMWT (ESMWT Administration, 1941).

3.1 Managers that Applied for ESMWT

The first step of the data collection targeted the universe of applicants for the managerial component of the ESMWT. As explained in Section 2.1, this program was available to middle managers and production supervisors, holding a B.A. degree and working in a war industrial facility at the time of application, as determined by the regional Manpower Commission (ESMWT Administration, 1941). Specifically, I retrieved the list of applicant managers from the records of the U.S. Office of Education, available at the U.S. National Archives (NARA).

For each applicant manager, the records include candidate full name, date and place of birth, a curriculum with information on education (type of B.A. and university attended) and employment (war facility in which the candidate was working, position, number of years spent there, and previous employment), as well as personal characteristics, such as gender, race and marital status. The records also contain the candidate score in the entry exam and for managers who scored above the 80-point threshold, information on courses taken, grades received, and program completion.

In total, 675,463 managers applied to the ESMWT between July 1941 and January 1945. Applicant managers were on average 26.54 years old, had spent 17.03 years in school, had been employed for 4.39 years, 2.61 of which working in the war industrial facility they were employed at when they applied for the ESMWT (Table 1, column 1). Manager education background was almost equally split between Economics or Business majors and STEM majors (47 and 45 percent respectively). While the great majority of applicants were white men, female and nonwhite managers represented 15 and 8 percent of the total. These numbers were fairly high relative to college population at that time, where female and Afro-American students only represented 4 and 2 percent of enrollment (U.S. Census Bureau, 1940). Slightly more than half applicants were married.

In the ESMWT entry exam applicant managers earned an average score of 74.70, a mean lower than the program threshold of 80 points. The five lowest achieving applicants only scored 37 points, while 65 managers were able to get the maximum score of 100. Applicants that got more than 80 points and were therefore admitted to the ESMWT were 205,933 (30.49 percent), while the remaining 469,530 were excluded. In principle managers who scored below the threshold could apply for the program again in the following application window. However, only 5.22 percent of them did so. Out of these 24,509 re-applicants, 58 percent scored above ESMWT threshold at the second attempt. No manager applied to the program more than three times.

3.2 Career Outcomes of Applicant Managers

I next reconstructed the career outcomes of applicant managers by searching university and college reunion books between 1945 and 1975. Depending on schools, reunion books are compiled either other five or ten years. While the information provided in reunion books shows a substantial heterogeneity across individuals, institutions and years, student full name, date and place of birth, B.A. major, current residential address and occupation are systematically reported.

Using student full name, date and place of birth and B.A. majors within institutions, I matched 77.5 percent of applicant students at least once between 1950 and 1975, a percentage that increases to 81.15 percent for students who scored between 70 and 90 points in the entry exam, and to 86.13 percent for students who scored between 77 and 83 points (Table A.1, columns 1-9).[5] Middle managers, more educated managers, and managers with more working experience are more likely to be matched, likely due to their higher probability of joining a reunion. Female and nonwhite managers are also more likely to be matched, probably due to the fact that they were more positively selected than their male white colleagues and therefore more willing to be included in reunion books. Notably, the score in the ESMWT entry exam does not predict a higher matching probability.

The matching rate is higher for admitted managers relative to the non-admitted ones for the full sample (Table A.1, columns 1-3, significant at one percent). However, if I restrict the sample to managers who scored between 70 and 90 or between 77 and 83 points in the entry exam, the matching rates between admitted and non-admitted groups become substantially identical (Table A.1, columns 4-6 and 7-9, not significant with a p-value of 0.688 and 0.716 respectively). Moreover, for these groups there are not statistically significant differences in the characteristics that predict the matching.

3.3 U.S. War Industrial Facilities

War industrial facilities, whose middle managers and production supervisors could apply to the ESMWT management component, were civilian plants that were considered essential for war production and therefore under the control of the War Production Board (WPB,

[5] I show matching rates within 10 and 3 points of the ESMWT threshold as the first window corresponds to the sample used to estimate equation 1, while the second is the maximum bandwidth that the Stata command `rdrobust` selects across all the outcome variables used in the analysis, as explained in Section 4. It is also worth noting that these matching rates are substantially higher than those obtained through historical Census matches, which usually range between 15 and 30 percent (see Bailey et al., 2020 and Abramitzky et al., 2021 for overviews). Higher matching rates likely depend on the fact that I match students over a rich set of information reported in a very precise manner, such as full names, date and place of birth, and B.A. majors. Moreover, applicant managers are positively selected relative to the Census population, for instance in terms of education, improving the quality of the matching. A more detailed description of the matching procedure could be found in Appendix B.

ESMWT, 1940; ESMWT Administration, 1941).[6] Even if they did not directly receive war contracts from the U.S. government, given their importance for the warfare, such facilities were monthly surveyed by the regional Manpower Commissions, that collected detailed information on their production, performance, workforce, and implementation of managerial practices. I retrieved and digitized this information for the facilities where ESMWT applicant managers were working from the U.S. National Archives (NARA), monthly between 1939 and 1947.

Applicant managers were working at 53,674 war industrial facilities, mostly located around established industrial areas, such as New England and the Mid-West, and where industrialization was nascent, such as in the South (Figure A.1, Panel A). Such companies had on average 2.6 plants and were employing 349.6 workers (Table A.2, Panel A). Most of them (75 percent) were concentrated in the manufacturing sector, followed by services (11 percent), transportation (8 percent) and agriculture (6 percent). On average, 12.5 eligible middle managers and production supervisors per facility applied to ESMWT.

The implementation of key managerial practices, such as factory operation, human resources management, quality, inventory, and sales and orders control appear extremely limited in these firms. The Manpower Commission surveys reported that only between 4 and 9 percent of them were systematically using at least one of such practices before the ESMWT (Table A.2, Panel B), which in turned created severe bottlenecks to their production. For instance, not regularly maintaining machines and safety conditions within the firms resulted in average 27.3 monthly interventions for repairing equipment and 46.5 monthly worker injuries. Poor personnel practices were associate to high absenteeism: the number of absences over the number of work days reached 6 percent, with the risk of jeopardizing war production. Finally, lack of quality, inventory, and sales and orders control determined a substantial fraction of scraped output (12 percent), a massive inventory, accounting for 75 percent of current assets, and a 22 percent of orders delivered past deadline. These statistics show that war facilities were dysfunctional in many aspects of their production and are fully consistent with the need perceived by U.S. government of offering managers a comprehensive business education to organize and supervise war production (Armsby, 1946).

3.4 Institutions that Hosted ESMWT Management Classes

Finally, I collected and digitized data on institutions that hosted the ESMWT management courses. While the U.S. National Archives (NARA) provide the list of the 218 U.S.

[6] The War Production Board was established in January 1942 with Executive Order 9024, replacing the Supply Priorities and Allocations Board and the Office of Production Management. The WPB organized the conversion of production from peacetime work to war needs, allocated scarce materials, established priorities in the distribution of materials and services, and prohibited nonessential production (Herman, 2012).

universities and colleges that participated in the management component of the program, university library archives contain detailed information on course offerings, including name and curricula of faculty involved in teaching, enrollment reports, and correspondence with ESMWT instructors in D.C. regarding courses.

Not surprisingly, the 218 participating institutions were located close to the war industrial facilities, to allow managers to work there while taking ESMWT classes (Figure A.1, Panel B). Universities were 136 (62.38 percent), and colleges 82 colleges (37.61 percent). Only eight of them were women colleges, that allowed only women, and 28 negro colleges, that allowed only "colored students" (Armsby, 1946). Finally, almost half institutions (103) had already a business school, where the management courses took place.

On average, each institution provided instructions to 944.65 managers, 188.93 per year (Table A.3). The ESMWT grouped them in 5,148 different sections, 23.61 per institution, of approximately 40 students each. However, universities and colleges show a substantial heterogeneity in the number of sections. While Harvard Business School provided 253 sections and taught 10,120 students alone, Regis College, Massachusetts, only hosted five for a total of 202 students.

Overall, 1,716 faculty taught the ESMWT managerial courses. While this number implies an average of 7.88 faculty per institution, Harvard Business School granted to the program the highest number of faculty (175), and Loyola University, Illinois, the lowest, with only three faculty serving in the ESMWT.

4 Identification Strategy

To identify the causal effect of business school education on manager career outcomes, I implement a regression discontinuity (RD) design, exploiting the fact that managers had to score at least 80 points in the entry-exam to enroll into ESMWT classes. The intuition for this empirical design is that managers who scored right above the 80-point threshold and thus were admitted to the program were very similar to those who scored right below and therefore were not admitted.

Specifically, I estimate the following specification:

$$\text{career outcome}_{it} = \alpha + \gamma \cdot \text{Enrollment}_i + f(\text{Exam Score}_i) + \epsilon_{it} \tag{1}$$

where $\text{career outcome}_{it}$ is the career outcome of manager i measured in reunion book year t; Enrollment_i is an indicator that equals one if manager i eventually participated in the ESMWT program; Exam Score_i is the regression discontinuity polynomial which controls for a smooth function of the entry exam score of managers i. Following Calonico et al. (2014a,b) the baseline specification for equation 1 uses a local linear specification estimated

separately on each side of threshold. The baseline bandwidth is the optimal bandwidth that minimizes the mean squared error of the point estimator, as suggested by Calonico et al. (2014b, 2017).[7] Standard errors are clustered at the decimal-point entry-exam score bin level. The baseline specification is estimated on the sample of managers whose entry-exam score ranged from 10 points below to 10 points above the threshold and excludes managers who scored below the threshold and reapplied. However, the results are not sensitive to selecting a different entry-exam score window or including re-applicant managers (Tables A.19 and A.20).

The coefficient of interest is γ, that estimates the causal difference in career outcomes of managers who participated in the ESMWT relative to managers that did not, under the two following identification assumptions. First, managers must not have selectively sorted around the threshold. Second, all other factors that could affect manager outcomes other than receiving ESMWT managerial education vary smoothly at the threshold. The rest of this section provides empirical evidence in support to these identification assumptions.

4.1 No Evidence of Sorting around Entry-Exam Score Threshold

A potential violation of the identification assumptions would be represented by managers sorting around the entry-exam score threshold. This would happen, for instance, if faculty who graded the entry-exam inflated the scores of managers who scored right below 80 points to allow them into the ESMWT. However, looking at the full distribution of the decimal-point entry-exam score bins, there is no evidence of a clear discontinuity around the 80-point threshold, normalized to zero (Figure 1, Panel A).

To check for sorting more systematically, I implement the McCrary (2008) test, that uses the number of observations in each decimal-point entry-exam score bins on both sides of the threshold as the dependent variable in equation 1. Panel B of Figure 1 shows that there is not a discontinuous change in the number of observations in the bins around the threshold. The estimated discontinuity t-statistics is 0.018 with a p-value of 0.706, which further confirms lack of sorting or score manipulation.

This result is consistent with the ESMWT set up. Faculty serving in the program received a five-month training in D.C. to make sure the program was implemented in a very similar way across the country. More specifically, faculty received specific indications of how to evaluate candidates across the three components of the entry exam (formal test, in person interviews and evaluation of curriculum, ESMWT, 1942). Moreover, as universities were not making any profit from the program, faculty had no incentives to admit more students by artificially increasing their score (Armsby, 1946).

[7] I perform this analysis using the Stata command `rdrobust`, with a triangular kernel. Tables A.7 – A.10 show that the estimates are robust to using different order polynomials orders and bandwidths.

4.2 Manager Characteristics Vary Smoothly at the Threshold

The second RD identification assumption is that relevant factors that may affect manager career outcomes aside from the ESMWT enrollment vary smoothly at the 80-point threshold. This assumption is crucial to ensure that managers who scored right above the threshold are comparable to managers that scored right below, and may be violated if the latter were systematically different in their characteristics than the former.

To assess whether this identification assumption holds, I graphically show that manager professional characteristics, such as years of education, tenure in war facilities, employment and type of B.A. major, and personal features, like age, gender, race, and marital status, vary smoothly at the threshold (Figure 2, Panels A-H). Moreover, I estimate equation 1 using each of these characteristics as a dependent variable. None of the eight estimated γ coefficients are statistically significant, which further confirms lack of a discontinuity in manager personal and professional outcomes across the two sides of the threshold. It is worth noting the white male managers had not a higher probability of getting admitted to the program relative to female and nonwhite applicants, which confirms the ESMWT effort in not discriminating against historically under-represented groups (Armsby, 1946).

4.3 Facility Characteristics Vary Smoothly at the Threshold

Despite being very comparable in terms of their characteristics, managers who scored above and below the threshold may have been working in different war facilities, a factor that may have affected their career outcomes. To address this potential issue, I test whether characteristics and outcomes of war facilities, measured in the month the first facility manager applied to ESMWT, are comparable across the two sides of the threshold. Since multiple managers from the same facility may have applied to the ESMWT, I associate each facility to the highest applicant manager score. γ estimates of equation 1 using facility characteristics as dependent variables are always small in magnitude and never statistically significant. Moreover, some coefficients are positive and some are negative, which confirms a substantial balance of war facilities across the two sides of the threshold in terms of performance, productivity, size, geographical location, and sectors (Figure A.2, Panel A). Similarly, the number of ESMWT applicant managers and of engineers and scientists that applied to other ESMWT programs is statistically indistinguishable across facilities around the threshold, which suggests that admitted managers were not coming from firms more eager to participate into government programs. I repeat the same exercise looking at the managerial practices, whose implementation appears almost identical in war facilities right above or right below the threshold (Figure A.2, Panel B).

Even if war facilities of managers who scored right above or right below the threshold

were comparable at the time of ESMWT application, they may have been on a different performance trend in the months before, an instance likely to impact manager careers. To check if this is the case, I estimate a constant linear time trend model that allows for an interaction of the constant linear trend with an Above 80 Points indicator, that equals one for facilities whose manager highest score in the ESMWT entry exam was above 80 points. The estimated coefficients on the interaction term are very close to zero and never statistically significant (Table A.4). Moreover, the coefficients on the Above 80 Points indicator are not statistically different from zero for all the variables, fully consistent with the evidence that facility characteristics vary smoothly at the threshold, as shown in Figure A.2.

4.4 Managers Who Scored above the Threshold Enrolled in ESMWT

Finally, I check if the rules for enrolling into the ESMWT were strictly implemented. In particular, I investigate if managers who scored above the 80-point threshold enrolled in the ESMWT and managers who scored below did not.

To do so, in Figure 3 I graphically examine the relationship between test scores and program enrollment. Each point represents the average enrollment in decimal-point entry-exam score bins. The figure shows that there is a sharp discontinuity in the probability of enrolling in the ESMWT around the threshold. Specifically, the probability of enrollment ranges between 97 and 100 percent for managers who scored about the 80-point threshold. By contrast, no managers that scored below such threshold enrolled in the program.[8] Therefore the program followed its enrollment guidelines quite strictly.

Overall, the results presented in this section do not show evidence of violation of the identification assumptions and suggest that managers who scored below the 80-point threshold and could not enroll in the ESMWT are comparable to and therefore represent a reasonable counterfactual for managers who scored above the threshold and were admitted into the program.

5 The Effects of ESMWT on Manager Career Outcomes

In this section, I compare differences in promotions, self-employment and entrepreneurship between managers who scored right above and right below the 80-point ESMWT threshold in their entry exam. I then examine whether under-represented groups, such as female

[8] While the compliance with the program for managers who scored above the 80-point threshold is very high, it is not perfect. For this reason, in Tables A.15 and A.16, I estimate a fuzzy RD where the treatment assignment rule (Exam Score in equation 1) is used an an instrument for ESMWT participation. The RD and the fuzzy RD results are almost identical.

and nonwhite managers, gained larger benefits from the program than their white male colleagues.

5.1 Effects on Promotions

Participating in the ESMWT had large and positive effects on the managers' probability of promotion. Specifically, I define the probability of promotion as an indicator for any advancement in the occupation rankings established by the Manpower Commissions over the entire manager career, as reported in Table B.1.[9] A graphical comparison between managers above and below the threshold shows that the probability of promotion dramatically increased upon ESMWT participation (Figure 4, Panel A). More precisely, estimates of equation 1 indicate that managers who scored right above the ESMWT threshold were 25.6 percentage points more likely to be promoted relative to managers who scored right below (Table 2, Panel A, column 1). Compared to an average probability of promotion of 60.30 percent for managers whose score was right below the threshold, this corresponds to a 42.45 percent increase.

This increased probability involved both promotions to key middle management roles and to leading positions in top management, as shown by Figure 4, Panels B-E. Managers who scored right above the ESMWT threshold had a 20.1 percentage points higher probability of becoming plant managers and 16.8 percentage points higher probability of becoming general managers relative to managers right below, respectively a 49.14 and a 60.43 percent increase relative to the average probability of reaching such positions for managers who scored below the threshold (Table 2, Panel A, columns 2 and 3). Moreover, for such managers the probability of becoming a top executive or a CEO increased by 3.7 and 2.4 percentage points respectively (Table 2, Panel A, columns 4 and 5). While these estimates are small in magnitude, they represent a 127.58 and a 266.67 percent increase relative to the very low chances of hitting top management roles for managers below the threshold.

Next, I examine how the differential promotion patterns between admitted and non-admitted managers evolved over time, considering the promotions to higher positions within 10, 20 and 30 years after ESMWT participation. The probability of overall promotions and promotions to plant and general management positions of admitted managers increased up to 20 years after ESMWT participation, and were still positive and sizable after 30 years (Table 2, Panel B, columns 1-3). By contrast, promotions to top management roles steadily increased during the 30 years after ESMWT (Table 2, Panel B, columns 4-5). Considering

[9] As explained in greater detail in Appendix B.2, I first establish managers job titles at the time of application to the ESMWT and in the reunion books based on the Manpower Commission Surveys, that categorized 18 job titles across 10 occupation rankings within the firm hierarchy. I then define a promotion as any advancement across the 10 occupation rankings.

an average age of 26 years at the time of enrollment, these results indicate that managers reached top positions when they were around 56 years old.

Did participation in ESMWT affect manager chances of moving to other, potentially better-performing, firms than war facilities? I first show that managers who scored right above the threshold were 20.7 percentage points more likely to move to another firm than managers who right scored below it (Table 3, column 1), a 60.0 percent increase relative to the average probability for managers below the threshold. Such managers were also 16.1 percentage points more likely to move to other firms and being promoted as either plant or general managers and 5.9 percentage points more likely to move to other firms and being promoted as top executives (Table 3, columns 2 and 3). These effects correspond to a 68.5 percent and a 2.6-fold increase, respectively, relative to the average probability for managers below the threshold. Moreover, managers who scored above the threshold tended to move to either listed firms or firms included in Fortune 500, therefore larger in size and revenues than war facilities, relative to managers who scored below the threshold. By contrast, managers who scored right above the threshold and continued to work in the war facilities were more likely to get promoted to middle management positions, but did not necessarily receive more promotions to top management roles, relative to managers who scored below the threshold and continued to work in the war facilities (Table 4, columns 1-5).

5.2 Effects on Self-Employment and Entrepreneurship

Attending ESMWT classes systematically increased managers' engagement in self-employment and entrepreneurship. Figure 5, Panels A and B show that the chances of becoming business owners or (co)-founding a business were substantially larger for managers who scored above the threshold, relative to managers who scored below. The coefficients estimated from equation 1 indicate that the former were 10.9 percentage points more likely to become business owners and 9.8 percentage points more likely to (co)found their own business relative to latter (Table 5, columns 1 and 2). These effects correspond to a 72.18 and a 78.40 percent increase relative to the average probabilities for the managers below the threshold.

On top of increasing self-employment, participation in the ESMWT boosted innovative entrepreneurship activities (Figure 5, Panels C and D). Managers who scored above the threshold were 8.3 percent more likely to found an innovative business, defined in the reunion books as the first in the county where managers were operating, a value twice as large as probability for managers below the threshold (Table 5, column 3). Moreover, they systematically engaged more in two nascent industries, consulting that provided management advices to other companies, and small business investment company (SBIC), the first examples of privately owned and managed investment funds that financed small businesses in the form of debt and equity. Admitted managers were 5.5 percentage points more likely

to offer consulting services and 2.9 percentage points more likely to found a SBIC, showing a 261.90 and 290.00 percent increase relative to managers below the threshold (Table 5, columns 4 and 5).

It is worth noting that managers who scored below the ESMWT threshold may have gotten an MBA privately after the end of WWII. If it was the case, my estimates would represent a lower bound for the effects of business school education on manager career outcomes. However, only 15,114 (3.22 percent) managers who scored below the ESMWT threshold reported in the reunion books to have earned an MBA after the ESMWT. This low percentage may be due to the fact that managers would have to paid for MBA out of the pocket and may have considered the return of MBAs not high enough. Repeating the analysis of this and previous section excluding these managers lead to results very similar to the baseline ones (Tables A.5 and A.6).

5.3 Effects ESMWT on Under-Represented Groups of Managers

The U.S. Office of Education prohibited any discrimination in the ESMWT admissions based on race and gender (Armsby, 1946). This feature of the program allowed traditionally under-represented groups, such as nonwhite and female managers, to participate for free in post-graduate education from which they had been historically excluded. An analysis of commencement books from the 25 business schools whose Deans created the ESMWT managerial component indicate that between 1930 and 1939 a total of 5,139 students earned an MBA. Out of them only 25 were nonwhite and a mere 39 were female. Was participation in the ESMWT more beneficial for the career outcomes of these under-represented groups of managers? I answer this question by estimating equation 1 on the sample of nonwhite and female applicant managers, respectively.

The results indicate that the career outcomes of nonwhite and female managers largely improved upon ESMWT participation. Nonwhite managers that scored right above the threshold were 40.3 percentage points more likely to receive a promotion relative to the nonwhite managers who scored right below (Table 6, Panel A, column 1). Relative to a probability of promotions for nonwhite managers right below the threshold of 38.7 percent, this corresponds to a 104.13 percent increase. A simple back-of-the-envelope calculation could be use to measure to what extent the occupation gap between white and nonwhite managers was reduced by the ESMWT. White managers had a probability of promotions of 62.4 percent left at the threshold, 23.7 percentage points higher than that for nonwhite managers. Upon the ESMWT participation, such probabilities increased to 86.6 percent for white managers and to 79.0 percent for nonwhite ones. Therefore, the occupation gap between white and nonwhite managers who attended the ESMWT decreased to 7.6 percentage

points, corresponding to a 16.1 percentage points reduction.[10]

The better perspectives of promotions involved both middle and top management levels. Nonwhite managers who scored right above the threshold were 36.7 percentage points more likely to become plant managers and 33.8 percentage points more likely to become general managers than nonwhite managers who scored right below, respectively a 147.39 and a 186.74 percent raise relative to the average for nonwhite managers below the threshold (Table 6, Panel A, columns 2 and 3). Such managers had a also 4.3 and 3.1 percentage points higher chances of becoming top executives or CEO, which represent a 6.4- and a 7.8-fold increase relative to the very low averages for nonwhite managers below the threshold (Table 6, Panel A, columns 4 and 5).

Similarly, upon taking the ESMWT classes, female managers that scored right above the 80-point threshold, relative to female managers that scored right below, experienced a 37.8 percentage points higher probability of promotions, a 107.69 percent increase with respect to the average of female managers who scored on the left of the threshold (Table 6, Panel B, column 1). A back-of-the-envelope calculation, similar to the one performed for nonwhite managers, indicate that male managers had a probability of promotion to left of the threshold of 64.7 percent, 29.6 percentage points higher than female colleagues. These probabilities increased to 88.2 percent for male managers and to 72.9 percent for female managers to the right of the threshold who attended the ESMWT. The occupation gap between male and female managers dropped to 15.3 percentage points, 14.3 percentage points reduction.[11]

The probability of becoming plant and general managers for female managers who scored above the threshold raised by 33.3 and 28.1 percentage points, respectively, while the chances of reaching top executives and CEOs position increased by 2.1 and 1.7 percentage points relative the female managers right below (Table 6, Panel B, columns 2-5). These coefficients correspond to a 161.65 and a 188.59 percent increase relative to the mean on the left of the threshold for the middle management promotions, and to a 8- and 9.5-fold increase for the top management roles, and are larger than those estimated for nonwhite managers.

The ESMWT also increased nonwhite and female managers self-employment and engagement into entrepreneurship. The probability of becoming a business owner raised by 13.3 percentage points for nonwhite and by 11.5 percentage points for female managers right

[10] These calculation are based on the sample of white managers whose probability of promotion left of the threshold was 62.4 percent and for whom the estimated γ coefficient from equation 1 is 0.242. In interpreting the magnitude of these findings, it is worth noting that the reduction in the occupation gap is computed only for white and nonwhite managers within the bandwidth on the two sides of the threshold. To extend these results to the entire distribution, it would be necessary to assume that the ESMWT impact is linear across the entry-exam score distribution above the threshold. However, this assumption may not hold for high-achieving managers who potentially benefitted less from the program given their outstanding skills.

[11] The probability of promotion left of the threshold for male managers was was 62.7 percent and for them the estimated γ coefficient from equation 1 is 0.235. Also in this case, the occupation gap is computed only for male and female managers within the bandwidth on the two sides of the threshold.

above the threshold, relative to comparable managers right below, while the probability of co-founding a business increased by 12.3 and 9.1 percentage points respectively (Table 7, Panels A and B, columns 1 and 2). These effects correspond to a three-folds relative to the average of managers from the same under-represented groups below the threshold. Nonwhite and female managers admitted to the ESMWT also created substantially more innovative businesses, consulting firms and SBICs, equivalent to a 6.4 to 7.5-fold increase relative to comparable managers below the threshold (Table 7, Panels A and B, columns 3-5).

5.4 Robustness Checks

In this section, I show that my results are robust to a variety of modifications of the baseline specification and of the sample.

Alternative specification of the RD polynomial. Equation 1 uses a local linear specification estimated separately on each side of threshold, following Calonico et al. (2014a,b). Using alternative RD polynomial, such as a second or a third order polynomial lead to very close estimates to the baseline, confirming that my results are not driven by the choice of a specific RD polynomial (Tables A.7 and A.8, Panels A and B).

Different bandwidth. In the baseline specification, following Calonico et al. (2014b, 2017), I use the optimal bandwidth that minimizes the mean squared error of the point estimator. As these optimal bandwidths are between 2 and 3 points below and above the ESMWT threshold for all the outcomes in Tables 2, and 5, I repeat this analysis keeping the bandwidth fixed at either 3 or 2. The results are substantially identical to the baseline ones (Tables A.9 and A.10, Panels A and B). I get very similar results even with a smaller fixed bandwidth of one, despite it reduces substantially the sample size (Tables A.9 and A.10, Panel C).

Including control variables. I next analyze how my results change to adding different sets of control variables. First, I control for manager professional and personal characteristics, such as years of education, tenure in war facilities, employment and type of B.A. major, age, gender, race, and marital status. Not surprisingly, as all these variables vary smoothly at the threshold (Figure 2, Panels A-H), controlling for them leaves the estimates virtually unchanged, but improves the precision of the estimates (Tables A.11 and A.12, Panel A). Similarly, controlling for facility fixed effects or for university fixed effects does not change the results (Tables A.11 and A.12, Panels B and C).

Alternative level of standard errors clustering. To test that autocorrelation within managers from the same facility or that attended the same university within application windows and sections, does not invalidate inference, I cluster the standard errors at the facility, university-application window or university-section level. In all three cases, the significance of the estimates remains unchanged, often leading to smaller standard errors

that in the baseline specification (Tables A.13 and A.14, Panels A-C).

Fuzzy RD. Figure 3 shows that managers who scored below the 80-point threshold did not enroll into the ESMWT. Among managers who score above the threshold, more than 97 percent enrolled into the program, indicating a very high but not full compliance. To test if this is an issue for the validity of my results, I implement a fuzzy RD where I instrument the participation to the ESMWT with the entry exam score. The RD results and the fuzzy RD results are very similar, indicating that the non-perfect compliance to the ESMWT enrollment rule does not affect the baseline estimates (Tables A.15 and A.16).

Placebo test. To test that the estimated effects are truly driven by the ESMWT participation, I check if the RD estimation produces effects of similar size in other points of the test score distribution. To do so, I estimate equation 1 using fake discontinuities at 70, 75, 85 and 90 points in the test score. The estimated coefficients are small in magnitude and statistically insignificant, which confirms that my findings are driven by the real discontinuity and therefore by the ESMWT participation (Tables A.17 and A.18).

Estimating sample. The baseline specification is estimated on the sample of managers whose entry-exam score ranged from 10 points below to 10 points above the entry-exam threshold and that did not re-apply to the program if not admitted. Using alternative ranges, such as 9, 7, 5, and 3 points above and below the threshold, leads to the exact same estimates (Tables A.19 and A.20). I also test if my results are robust to the inclusion of the 24,509 managers who reapplied for the ESMWT after failing their first attempt. I assign to them either the first or the highest score they earned in the entry-exam, obtaining results almost identical to the baseline (Tables A.21 and A.22).

6 The Effects of ESMWT on War Facilities Outcomes

In this section I examine whether manager participation to the ESMWT affected the performance of war facilities they were employed at, as well as the implementation of managerial practices.

6.1 War Facilities Performance

I start this analysis by examining whether the performance of war facilities where admitted managers were employed improved upon their participation in the ESMWT, relative to those where non-admitted manages worked. This data are available on a monthly basis between 1939 and 1947. Since, on average, 12.6 managers per facility applied to the ESMWT, the RD design used in Section 5 could not be extended to this analysis. Instead, I estimate the following DID model:

$$\text{performance}_{it} = \alpha_i + \delta_t + \beta(\text{Treated}_i \cdot \text{During ESMWT}_{it}) + \lambda(\text{Treated}_i \cdot \text{Post ESMWT}_{it}) + \eta_{it} \quad (2)$$

where performance_{it} is number of plants, value added, sales, employment and productivity of war facility i in month-year t; Treated is an indicator for war facilities with at least an applicant manager who scored above the ESMWT threshold in the entry exam; During ESMWT is an indicator for months during which at least an admitted manager was taking the ESMWT classes; and Post ESMWT is an indicator for months after all admitted managers completed the ESMWT classes. α_i are war facilities fixed effects and δ_t are month-year fixed effects. To keep the sample as close as possible to the one used in Section 5, I only include facilities whose highest scoring managers scored three points below or above the ESMWT threshold. The month in which the first manager per facility applied to ESMWT is normalized to -1 and serves as the excluded category. Standard errors are clustered at the highest applicant manager test score decimal bin.

The analysis presented in Table A.4 indicates that facilities whose managers scored three points below or above the ESMWT threshold were on the same pre-trend before the start of the ESMWT, a key identifying assumption of DID specifications.

Estimates of equation 2 indicate that during the ESMWT, the performance of facilities where admitted managers were working decreased relatively to that of non-admitted manager firms. Specifically, value added, sales and productivity of the former declined between 1.5 and 2.5 percent, compared to the latter (Table A.23, columns 2, 3 and 5). This is likely due to the fact that admitted managers only worked part-time during the ESMWT, potentially harming the performance of their facilities. However, after the end of ESMWT, outcomes of admitted manager facilities rose between 6.8 and 7.9 percent, more than compensating the initial loss.[12] By contrast, number of plants and employees remained stable both during and after the ESMWT (Table A.23, columns 1 and 3).

I next examine whether the effects of ESMWT on firm performance depended on the share of managers that participated in it, that ranged between 4 and 33 percent. To do so, I regress war facility outcomes on the Treated indicator interacted with indicators for less than 5, between 5 and 10, 10 and 20, 20 and 30, and more than 30 percent of facility managers admitted to the ESMWT, controlling for total number of facility managers. Such fixed effects allow to estimate the effects within facilities with the same managerial size, since the share of admitted managers may be mechanical higher in plants with a lower total number of managers. The results indicate that when less than ten percent of management

[12] The difference between the two estimated coefficients is statistically significant for value added, sales and TFP, with p-values of 0.000 (Table A.23, columns 2, 3 and 5).

was involved in the ESMWT, value added, sales and TFP of their war facilities increased, but the impact is imprecisely estimated (Table A.24, columns 2, 3, and 5). The effect of the ESMWT on facility outcomes became sizable and significant when between 10 and 20 percent of facility managers participated in it and monotonically increases for larger share of admitted managers. This result suggests that a critical mass of managers should be educated in order to affect overall firm performance.

6.2 Implementation of Managerial Practices

Did participation in the ESMWT also impact the adoption of managerial practices of admitted manager industrial facilities? To answer this question, I estimate equation 2, using indicators for managerial practices implementation as dependent variables. The results indicate that, during the ESMWT, industrial facilities of admitted managers - relative to firms of non-admitted managers - showed a higher probability of implementing any of the nine managerial practices surveyed by the War Manpower Administration, ranging from a 4.5 percent higher likelihood of introducing bonus for workers to a 14.9 percent increased probability of performing output quality control (Table A.25, column 1).[13] Such differences further raised after the end of ESMWT. For instance, the probability of introducing bonus for workers was 21.1 percent higher in industrial facilities of admitted managers relative to firms of non-admitted managers, while the probability of performing output quality control was 55.8 percent larger (Table A.25, column 2).

The interpretation of these results should take into account the self-reported feature of the Manpower Utilization Surveys: admitted managers may have over-reported the adoption of practices upon completing the ESMWT courses. To validate this data, I also look at more tangible measures of good management, such as machinery maintenance, workers injuries, scraped output, absenteeism, amount of inventory, and late delivered orders. Since these values were very important for the US war production, the Manpower Commission put a lot of effort to collect them very precisely (ESMWT TWI Bulletin, 1940). After the end of ESWMT, industrial facilities of admitted managers reported 29.3 percent fewer interventions of repairing machines and 18.4 percent fewer worker injuries than firms of non-admitted managers, indicating a substantial improvement in factory operations (Table A.25, column 2). Scraped output dropped by 29.5 percent, as a result of systematic quality control. Similarly, absenteeism was reduced by 13.5 percent, suggesting better human resource management. The ratio of inventory and current assets dropped by 25.1 percent,

[13] It is worth noting that the probability of adopting managerial practices increased during the ESMWT, even if facility performance suffered during the same months, as shown in Section 6.1. This may be due to the fact that war facilities were not only having their managers working part-time, but also making changes in their organization that may have been beneficial over time, but created some disruptions in the first months on implementation.

likely to du stock monitoring, while late delivered orders decreased by 19.2 percent thanks to production planning and order prioritization.

Adopting new managerial practices implies substantial changes in firm organization whose success may depend on the number of managers willing to implement them. I therefore analyze if the adoption of managerial practices depended on the share of facility managers admitted to the ESMWT, by interacting the Treated indicator of equation 2 with indicators for the share of admitted managers. The results indicate that the adoption of practices, such as factory operations and quality control, was fairly large even when a relatively small share of managers participated in the ESMWT (Table A.26, columns 1 and 2). By contrast, practices like human resources management, inventory control, and sales and order control had a significant higher probability of being implemented in facilities where more than ten percent of managers enrolled in the ESMWT (Table A.26, columns 3-5). This difference could be explained by the fact that factory operations and quality control are simple practices that do not require major transformations in firm structure and can therefore be implemented even by a few managers. Conversely, changing personnel practices and reorganizing production are higher-level business decisions that could require the collection of information on different products or units within a firm, and may be changed only if a substantial share of managers is involved.

7 Network Effects

On top of acquiring state-of-the-art managerial knowledge via the ESMWT participation, admitted managers may have met colleagues from other facilities and built a network, which may have in turn affected their labor market perspectives. To quantity the extent of such effects, I exploit the fact that admitted managers could only enroll into the closest university to their industrial facility to be able to work part-time, and that within universities and application window they were *randomly* allocated to sections of roughly 40 students each. This random assignment happened at the beginning of the first year and students assigned to the same section attended all the courses together for the entire duration of the program.[14] In the rest of this section, I first check that the student assignment to sections was truly random; then I assess what role network effects played in shaping manager career outcomes.

[14] The random allocation of students to sections is a distinctive feature of most today's MBA programs, which followed directly from ESMWT. For instance, in 1949 Harvard Business School began randomly assigning all entering MBA students to sections. However, the implementation of ESMWT random allocation of students present two advantages in terms of identification compared to modern settings. First, sections were not balanced in terms of gender, marital status, undergraduate institution, and previous industry experience, unlike today (Shue, 2013). Second, the sections remained the same for the entire duration of the program, while today students can choose elective classes after the first year (Thomas, 2022).

7.1 Were Managers Randomly Assigned to ESWMT Sections?

I start this analysis by checking if manager section assignment was truly random. First, I test that section assignment does not predict admitted managers' characteristics to make sure that managers with different characteristics were not systematically assigned to particular sections (Braga et al., 2016; Feld and Ulf, 2017; Zanella, 2023). I estimate the following specification, separately for each combination of sections s in university u and application window t:

$$y_{is} = \sum_{s=1}^{n_g} \alpha_s \cdot G_{i,s} + \epsilon_{is} \tag{3}$$

where the dependent variables are pre-determined characteristics of managers i admitted to university u in application window t and assigned to section s, such as years of education, years of tenure in the war facility, years of employment, indicator for college degree in Economics and Business, gender, race, marital status, and entry exam score. The explanatory variables $G_{i,s}$ are indicators for each section s in university u and in application window t , that equal one if managers i was assigned to section s and zero otherwise.

If managers who attended the same university in the same application window were assigned to sections independently from their characteristics, α_s coefficients should not be jointly significantly different from zero. More specifically, Murdoch et al. (2008) explains that, in case of random assignment, the p-values of this test should be uniformly distributed with a mean of 0.5. The distribution of the p-values obtained from the test of joint significance of the α_s coefficients appear largely consistent with the random assignment hypothesis. Figure A.3 indicates that for all manager pre-determined characteristics less than 5 percent of tests display a p-value smaller than 0.05 and less than 10 percent of tests a p-value smaller than 0.10. Moreover, the p-value means are always very close to 0.5, the expected value if students were randomly assigned to sections.

Second, I check that section assignment does not predict admitted managers' war facilities characteristics. I re-estimate equation 3, using as dependent variables number of plants, value added, sales, number of employees, productivity, indicators for facilities in manufacturing sector, number of applicant managers and of other employees that applied to the science and engineering component of ESMWT. Also in this case, for all the manager war facilities pre-determined characteristics less than 5 percent of tests display a p-value smaller than 0.05 and less than 10 percent of tests a p-value smaller than 0.10, with the p-value means always being very close to 0.5 (Figure A.4, Panels A-H).

Overall, these two tests are fully consistent with the idea that managers were truly randomly assigned to their sections and seems to confirm that the guidelines of ESMWT were

followed on the ground.

7.2 Variation in Section Compositions

Despite the assignment of managers to sections seems truly random, to estimate network effects there must be sufficient variation in sections composition in terms of both manager and facility pre-determined characteristics (Olivetti et al., 2020; Thomas, 2022; Zanella, 2023). Testing for variation in sections composition appears important in my context, since each university hosted on average 200 students per year, randomly assigned to only five sections (Table A.3).

However, the characteristics of managers and war facilities per section show a substantial deviation from the mean. Except for age, years of education and entry-exam score, the standard deviation of manager characteristics, such tenure, years of experience, type of college degree, gender, race and marital status, amounts to at least 30 percent of the mean (Table A.27, columns 1 and 2). After controlling for university and application window fixed effects, the level at which the randomization occurs, the residual variations still account for 59 to 76 percent of the overall raw variation in the sample (Table A.27, columns 3-5). These numbers suggest that a large portion of the variation across sections remains within universities and application window pairs, and can be therefore used for meaningful inference.

7.3 The Role on Network Effects

To examine the role of network effects, I estimate the following equation:

$$\text{outcome}_{is} = \sum_{n=1}^{5} \beta_n \cdot \text{Share Mates from Facilities } j = n_{is} + \epsilon_{is} \tag{4}$$

where the outcome variables are either the probability of manager i from section s of moving to firms where a section-mate was working, or of moving and being promoted in a section-mate firm, or of co-founding business with section-mates. *Share Mates from Facilities* j=n with n=*1,...,5* are, respectively, the share of section-mates from different facilities than that of manager i, from larger facilities, from facilities with higher sales, higher TFP and listed facilities. While the share of section-mates from other facilities and from larger facilities measure how wide the manager i network from the ESMWT was, the share of section-mates from better-performing and listed facilities is informative about the quality of the network.

The results indicate that the quality rather than the width of the network affected manager

career outcomes. A one-percentage point higher share of section-mates from different war facilities or from a larger facilities is associated to a higher but not statistically significant probability of moving into section-mate firms. By contrast, one percentage point increase in the share of mates from better-performing facilities, such as with higher sales or more productive, or from listed facilities is associated with a 3.8, 4.1, and 7.8 percentage points higher probability of moving into section-mate firms respectively (Table 8, column 1, significant at one percent). These findings rule out that the estimated effects are purely mechanical, as the probability of becoming co-worker of a section-mate is higher, the larger the firm he/she is working in is. Similarly, only a higher share of section-mates from better-performing and listed facilities raises the probability of moving into section-mate firms and being promoted (Table 8, column 2). Finally, managers were more likely to start businesses with section-mate if exposed to a higher the share of peers from better-performing and listed facilities. Specifically, one percentage point higher share of section-mates from facilities with higher sales and productivity increased the probability of co-founding a business with a mate by 3.7 and 4.5 percentage points respectively. Such probability increases by 6.8 percentage points upon a one percentage point higher share of section-mates from listed companies (Table 8, column 3).

7.4 Network Effects for Nonwhite and Female Managers

In his work on the crisis of the American Dream, Putnam (2016) has underscored how an "opportunity gap" in the U.S. has risen since the late 1970s. Students who belong to under-represented groups or with a disadvantaged background reach lower labor market outcomes, also due to the fact that they lack a productive network. Promoting a more diverse background in classrooms may tremendously help such students in improving their socio-economic status. By allowing and non discriminating against nonwhite and female managers, the ESMWT may have helped them in creative a more diverse and arguably more connected professional network with potential gains in terms of career outcomes.

To investigate this hypothesis, I first check that admitted managers were not assigned to specific sections based on their gender and race. While the ESMWT explicitly prohibited any discrimination (Armsby, 1946), it could be the case that under-represented groups of managers were admitted to the program according to fair criteria, but segregated afterwards. I therefore test if being a nonwhite or a female manager predicts respectively the share of female and nonwhite managers, controlling for the same shares computed at the university-application year pair. In fact, if the university-application year share of male admitted managers were higher than that of female admitted managers, the former would have a mechanical higher probability of being assigned to a section with more same gender peers. None of the estimated coefficients is statistically significant, confirming that managers were

not systematically assigned to sections based on their gender or race (Table A.28 columns 1-4). In terms of variation in the race and gender composition of the sections, Table A.29 shows that, after controlling for university and application window fixed effects, almost 70 percent of the initial variation in the raw sample remains. This indicate that there is a substantial variation in the share of nonwhite and female managers across sections with university-application year pairs.

To test if the exposure to a more diverse network of colleagues was beneficial for nonwhite and female managers, I regress the some outcome variables of equation 4 on the share of nonwhite and female managers per section. Consistently with this hypothesis, I find that a higher share of managers from the *same* group of under-represented managers *reduced* the probability of joining section-mate firms or co-founding businesses with them. Specifically, a one-percent point higher share of nonwhite managers reduced the probability of nonwhite managers to move to a section-mate firm by 3.1 percent, to move into section-mate firms and being promoted by 2.6 percent and to co-found a business with a section-mate by 2.8 percent (Table A.29, columns 1, 3 and 5). Similarly, a one-percent point higher share of female managers decreases the chances of female managers to move to a section-mate firm by 3.5 percent, to move into section-mate firms and being promoted by 2.9 percent and to co-found a business with a section-mate by 2.3 percent (Table A.29, columns 2, 4 and 6).

These results suggest that a more diverse peer composition could help managers from under-represented groups to build a better network, with a positive impact on their career outcomes.

8 Conclusions and Discussion

This paper studies the effects of business school education on manager career outcomes and firm performance, using evidence from the Engineering, Science, and Management War Training (ESMWT). I collected and digitized data on the managers who applied to the ESMWT and I reconstructed their career using university reunion books. I estimate the effects of the ESMWT by exploiting a regression discontinuity design (RD) around the ESMWT entry-exam threshold. I find that managers who scored right above the ESWMT entry-exam threshold had a substantially higher probability of being promoted to both middle and top management positions during their career, and engaged systematically more in self-employment and innovative entrepreneurship activities than similar managers who scored right below. Moreover, participation in the ESMWT had larger effects on the career outcomes of nonwhite and female managers, and boosted performance and managerial practices implementation of admitted managers war facilities. Finally, I find evidence that exposure to a network of class-mates from better-performing firms resulted in higher chances to move

into peer companies and to co-found a business with them.

On top of shedding new light on the largely unexplored effort of the US government to increase managerial capital during WWII, these findings are also informative about the importance of managerial education for middle manager career outcomes. While the content of business education may have changed over decades, this research shows that acquiring business school education can change manager career paths, not only through the direct impact of learning, but also thanks to network effects. Such effects appear stronger for under-represented categories of managers, a result that offers suggestions for more inclusive education policies in the field of management.

Moreover, the results of this research could offer policy implications for countries that are still in the process of designing business school education, by showing that a widespread diffusion of MBA-style programs can boost firm performance, but also spur innovative entrepreneurship, with potential positive effects on economic development.

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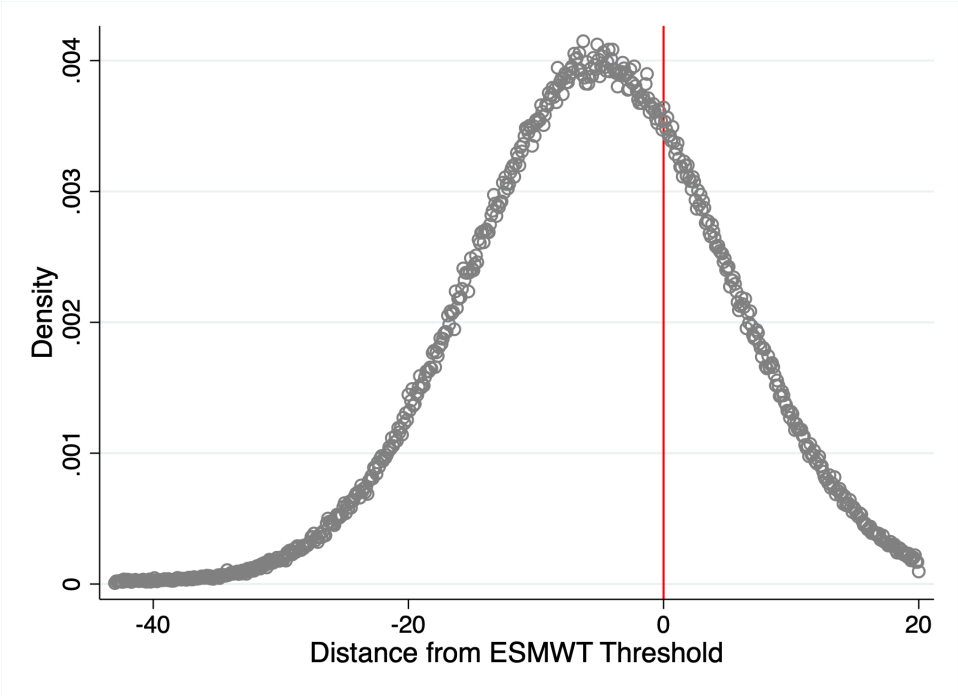
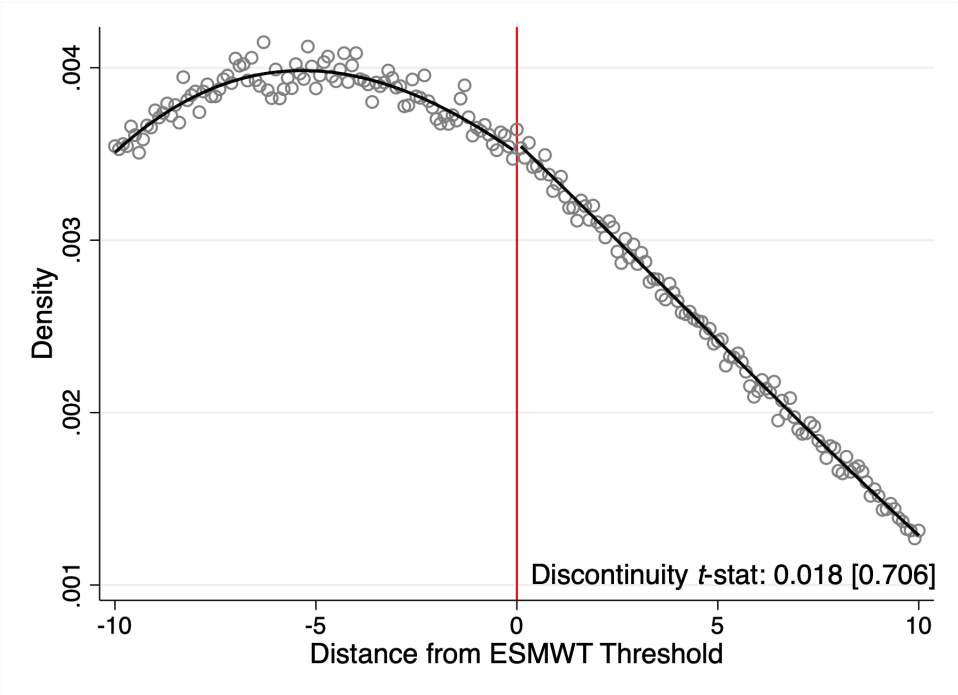
Figures and Tables

Figure 1: Entry-Exam Score Distribution and McCrary (2008) Sorting Test

Panel A: Full Distribution of Entry-Exam Scores



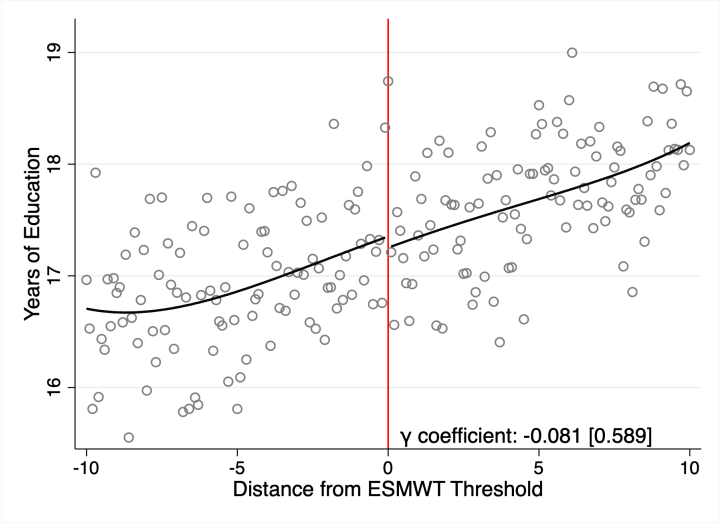
Panel B: Distribution of Entry-Exam Scores around Threshold



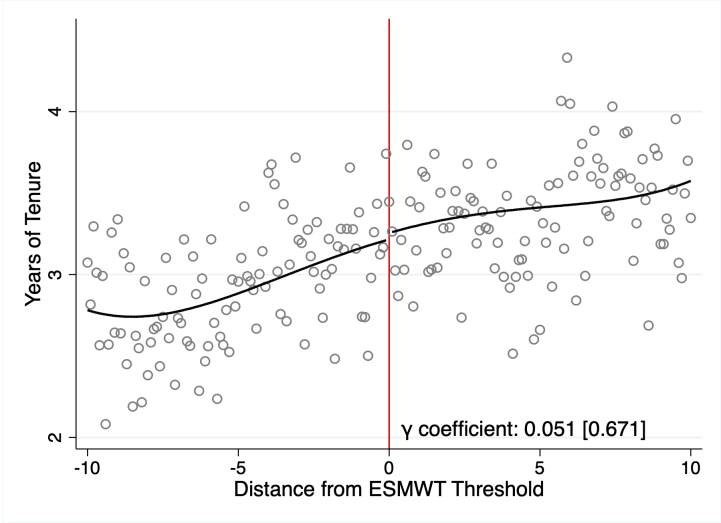
Notes. Panel A shows the full distribution of entry-exam scores, with data collapsed into cumulative decimal-point bins. Panel B implements the McCrary (2008) sorting test, using the number of observations in each cumulative decimal-point bin as the dependent variable on each side of the threshold to test if there is a discontinuity. The McCrary test t-statistics is reported, with p-value in parentheses. Data are provided at the individual level from the U.S. Office of Education ESMWT registries for 675,463 applicant managers.

Figure 2: Balancing Tests for Manager Characteristics around the Threshold – continues

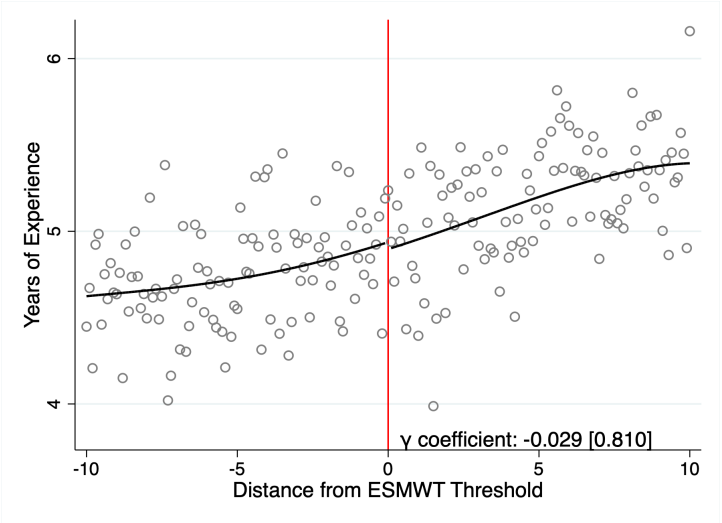
Panel A: Years of Education



Panel B: Years of Tenure in War Facility



Panel C: Years of Employment



Panel D: Economics and Business BA

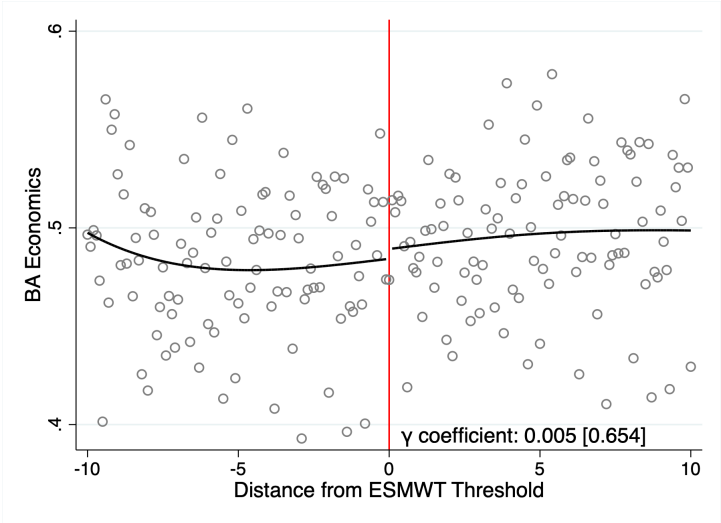
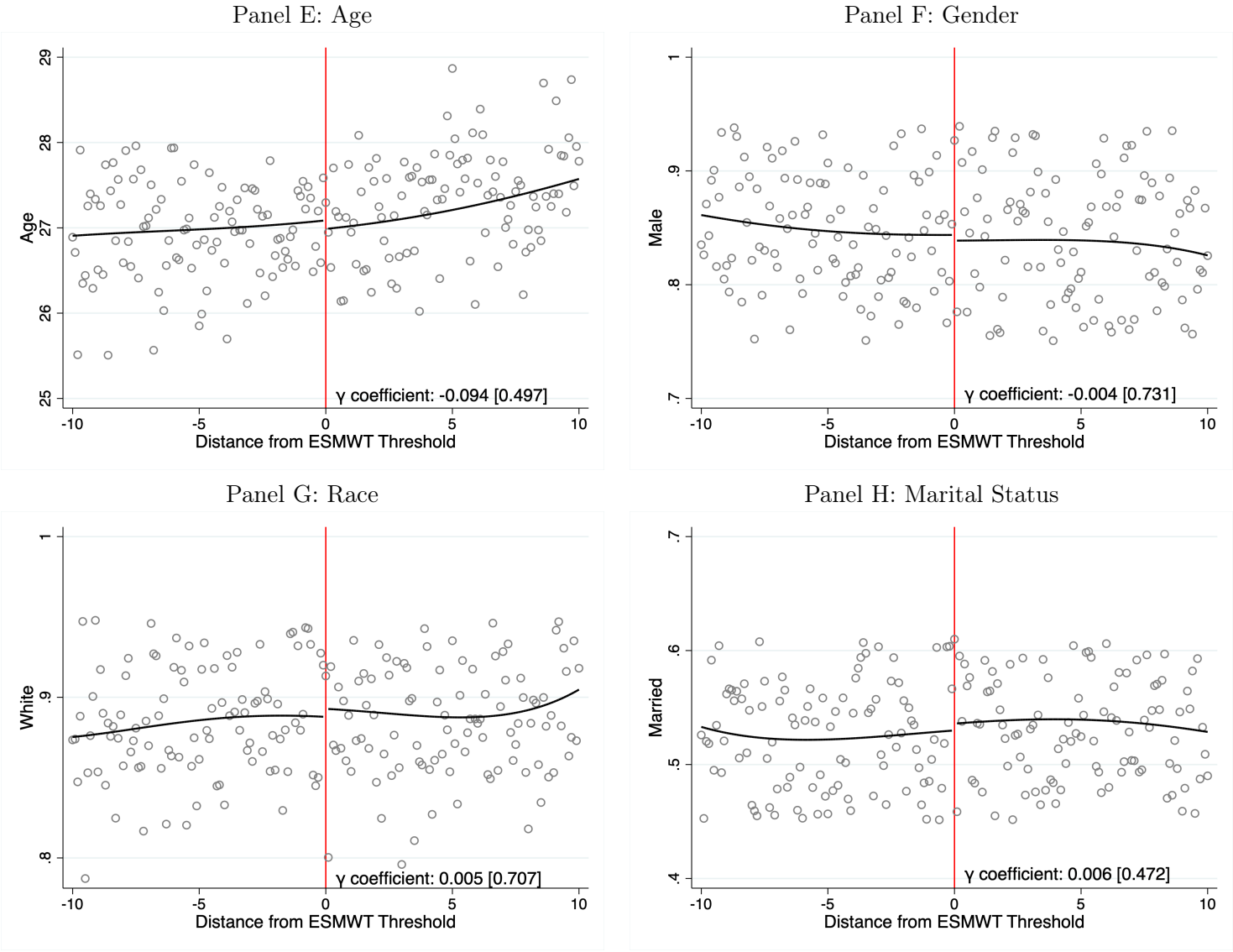
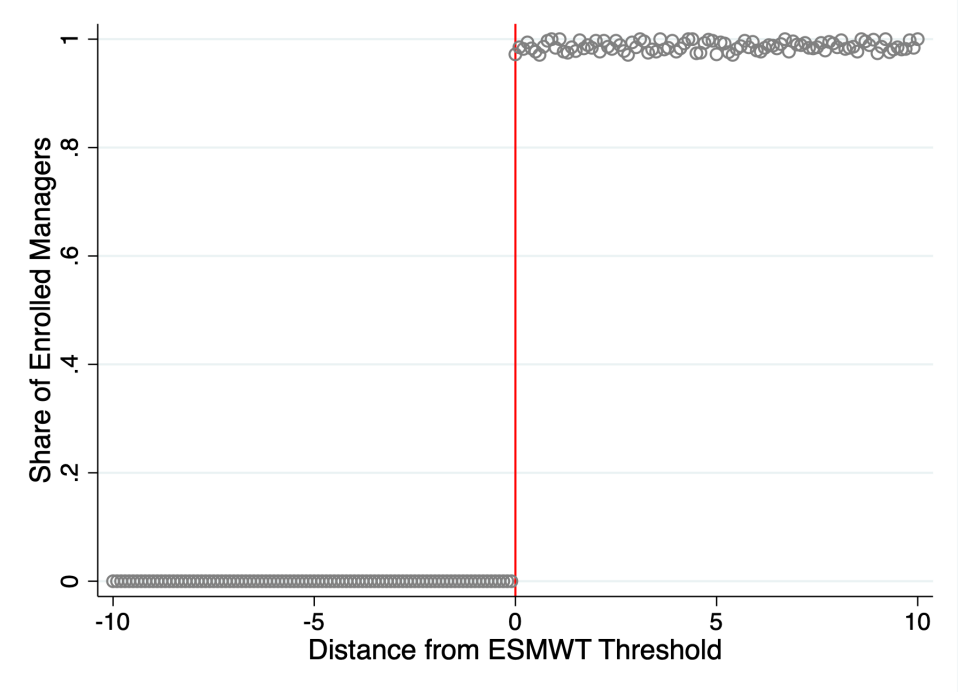


Figure 2: Balancing Tests for Manager Characteristics around the Threshold – continued



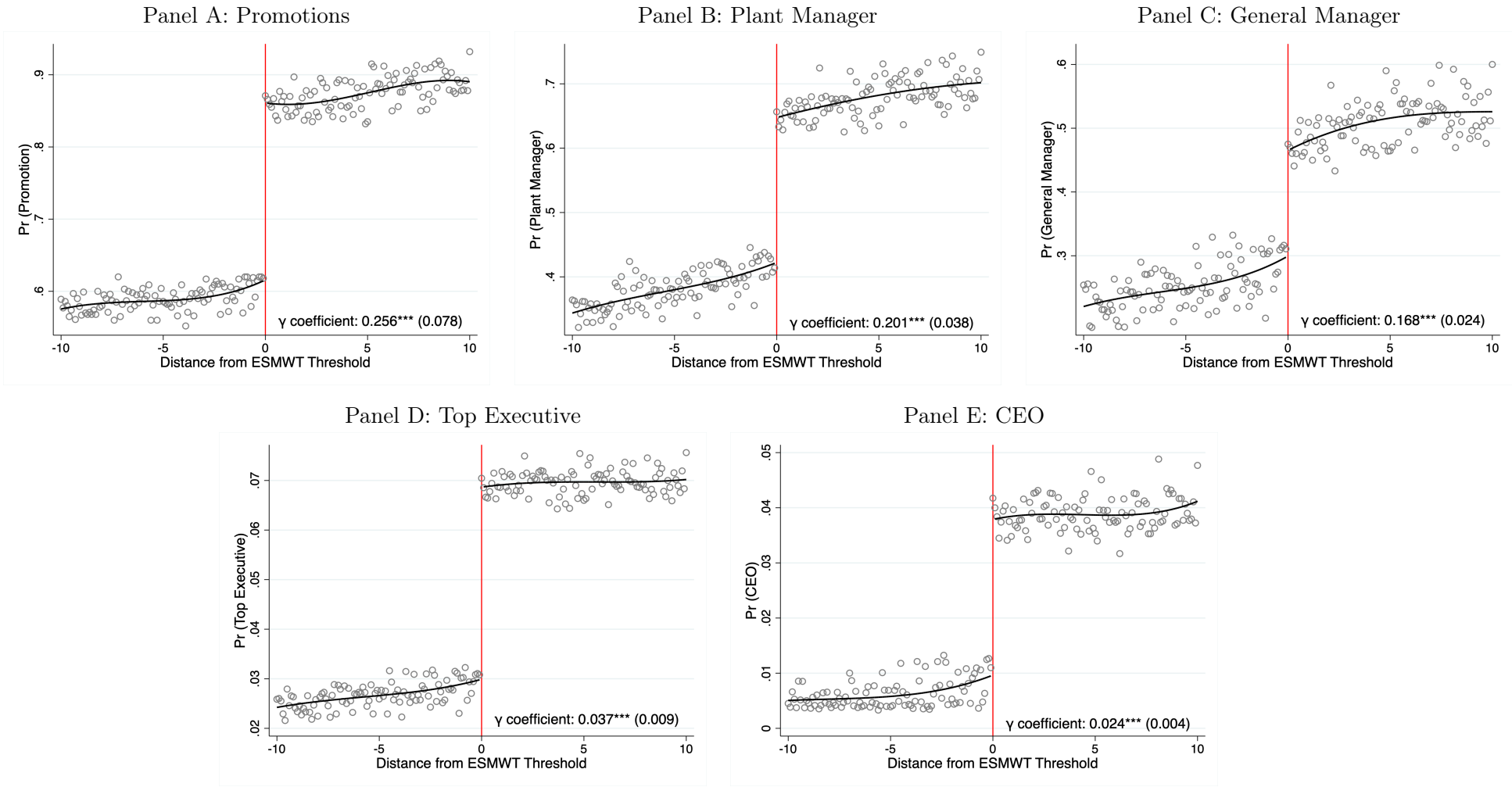
Notes. Average manager personal and professional characteristics by decimal-point entry-exam score bins around the ESMWT threshold. *Years of Education*, *of Tenure in War Facility*, and *of Employment* are, respectively, the number of years of education, of work in the war industrial facility they were employed at when they applied for ESMWT, and total year of employment (Panels A-C). *Economics and Business* is an indicator for managers with a B.A. in either economics or business (Panel D). *Age* is manager age at time of ESMWT application (Panel E). *Male* is an indicator for male managers (Panel F). *White* is an indicator for white managers (Panel G). *Married* is an indicator for married managers (Panel H). γ coefficients from equation 1 using manager characteristics as dependent variable are reported in each Panel, with p-values in parentheses. Standard errors are clustered at the decimal-point entry-exam score bin level. Data are provided at the individual level from the U.S. Office of Education ESMWT registries for 421,794 managers whose score in the entry exam was 10 points above or below the ESMWT threshold.

Figure 3: Manager Enrollment in ESMWT



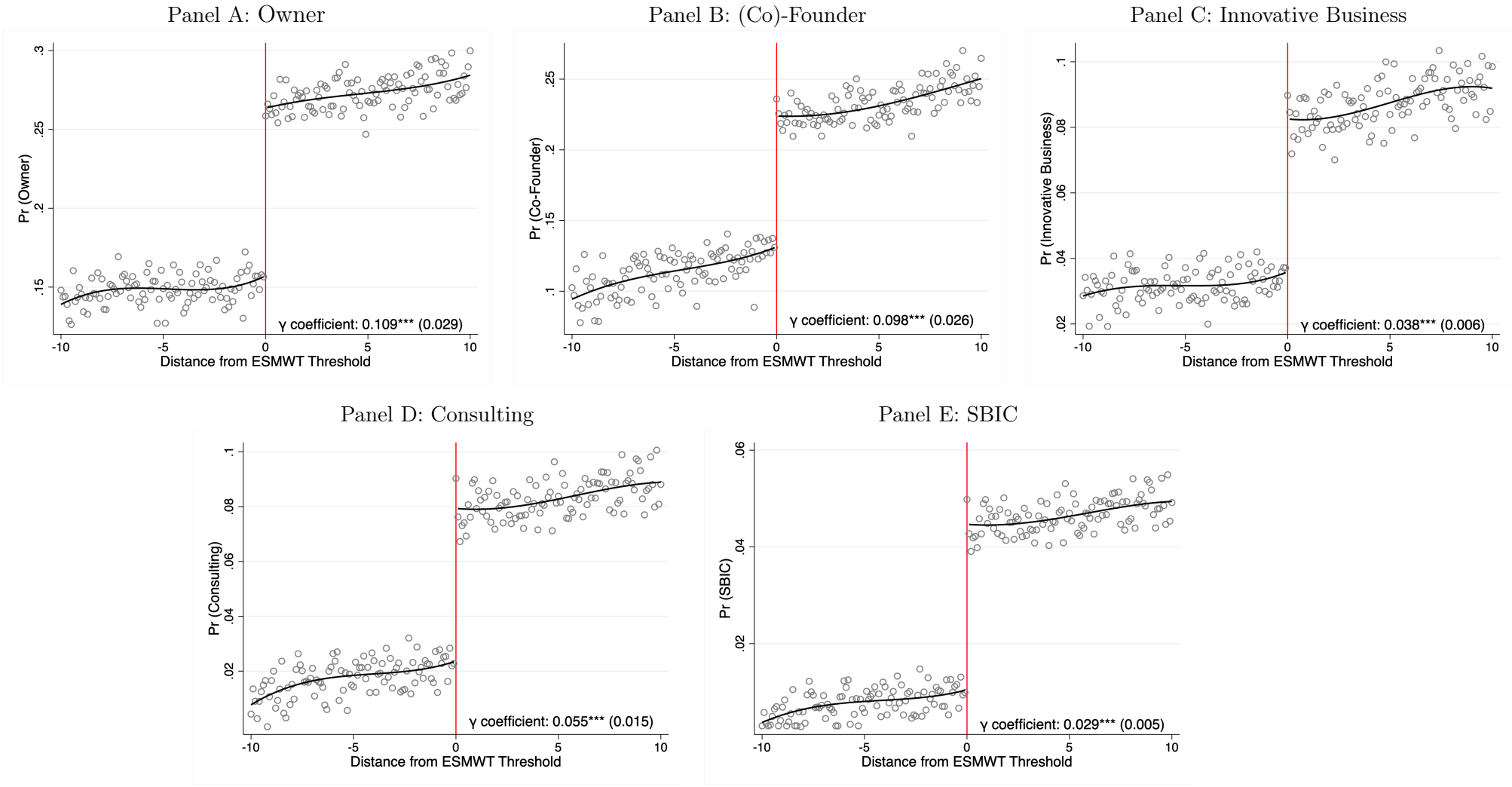
Notes. The figure examines the relationship between test scores and program enrollment. Each point represents the average enrollment in decimal-point entry-exam score bins. Data are provided at the individual level from the U.S. Office of Education ESMWT registries for 675,463 applicant managers.

Figure 4: Promotions Above and Below the ESMWT Threshold



Notes. Average manager career outcomes by decimal-point entry-exam score bins around the ESMWT threshold. *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. γ coefficients estimated from equation 1 are reported in each panel, with standard errors clustered at the decimal-point entry-exam score bin level in parentheses. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Figure 5: Self-Employment and Entrepreneurial Activities Above and Below the ESMWT Threshold



Notes. Average manager career outcomes by decimal-point entry-exam score bins around the ESMWT threshold. *Owner*, *(Co) Founder*, *Innovative Business*, *Consulting*, *SBIC* are indicators for managers who became firm owners, were (co)founders of a new firm, founded a new business (defined as the first in the county), founded a consulting firm or a small business investment company (SBIC). γ coefficients estimated from equation 1 are reported in each panel, with standard errors clustered at the decimal-point entry-exam score bin level in parentheses. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table 1: Summary Statistics for 675,463 Applicant Managers

	Mean (1)	Standard Deviation (2)	Minimum (3)	Maximum (4)
Panel A: Manager Characteristics				
Age	26.54	1.88	22	31
Years of Education	17.03	0.61	16	20
Years of Tenure in War Facility	2.61	0.53	1.50	5.00
Years of Employment	4.39	1.19	1.50	9.50
Type of College Degree				
Economics and Business	0.47	0.50	0	1
STEM	0.45	0.49	0	1
Other	0.08	0.27	0	1
Gender	0.85	0.36	0	1
Race				
White	0.92	0.27	0	1
Afro-American	0.06	0.24	0	1
Other	0.02	0.14	0	1
Marital Status	0.54	0.49	0	1
Panel B: ESMWT Entry Exam				
Entry Exam Score	74.70	9.92	37	100
Above 80 Points (percentage)	30.49	0.46	0	1
Observations	675,463	675,463	675,463	675,463

Notes. Summary statistics for 675,463 managers who applied for the ESMWT between July 1941 and January 1945. Columns 1, 2, 3, and 4 present, respectively, mean, standard deviation, minimum, and maximum of manager personal and professional characteristics in Panel A and of the ESMWT entry-exam in Panel B. *Age* is manager age at time of ESMWT application. *Years of Education*, *of Tenure in War Facility*, and *of Employment* are, respectively, the number of years of education, of work in the war industrial facility they were employed at when they applied for ESMWT, and total year of employment. *Economics and Business* is an indicator for managers with a B.A. in either economics or business, *STEM* is an indicator for managers with a B.A. is a STEM (Science, Technology, Engineering, and Math) major, *Other* is an indicator for any other B.A. type. *Gender* is an indicator for male managers. *White* is an indicator for white managers, *Afro-American* is an indicator for managers classified as negroes, *Other* is an indicator for any other race. *Marital Status* is an indicator for married managers. *Entry Exam Score* is the score managers earned in the entry-exam. *Above 80 Points* is the percentage of managers who scored more than 80 points in the entry exam and were admitted to the ESMWT. Data are provided at the individual level from the U.S. Office of Education ESMWT registries.

Table 2: Effects of ESMWT on Manager Promotions

	Promotion	Plant Manager	General Manager	Top Executive	CEO
	(1)	(2)	(3)	(4)	(5)
Panel A: Overall effects					
Enrollment	0.256***	0.201***	0.168***	0.037***	0.024***
	(0.078)	(0.038)	(0.024)	(0.009)	(0.004)
Observations	124,579	101,372	110,753	115,414	120,432
Mean dep. variable	0.603	0.409	0.278	0.029	0.009
% variation	42.45	49.14	60.43	127.58	266.67
Bandwidth	2.69	2.15	2.31	2.48	2.56
Panel B: Effects over time					
Enroll.*10 Years	0.198***	0.095***	0.078***	0.021***	0.009***
	(0.047)	(0.022)	(0.015)	(0.006)	(0.002)
Enroll.*20 Years	0.355***	0.301***	0.274***	0.035***	0.023***
	(0.038)	(0.039)	(0.035)	(0.006)	(0.004)
Enroll.*30 Years	0.215***	0.207***	0.152***	0.055***	0.040***
	(0.033)	(0.031)	(0.024)	(0.020)	(0.011)
Observations	124,579	101,372	110,753	115,414	120,432
Mean dep. variable	0.603	0.409	0.278	0.029	0.009
% var. 10 years	32.84	23.23	28.06	72.414	100.00
% var. 20 years	58.87	73.59	98.56	120.69	255.56
% var. 30 years	35.66	50.61	54.68	189.66	444.44
Bandwidth	2.69	2.15	2.31	2.48	2.56

Notes. γ coefficients estimated from equation 1 in Panel A and interacted with indicators every ten years in reunion books in Panel B. *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. *Mean dep. variable* is the mean of the dependent variable over the bandwidth on the left side of the threshold. Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from the 80-point threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table 3: Effects of ESMWT on Manager Turnover and Promotions

	Moving	Moving Middle	Moving Top	Listed Firms	Fortune 500
	(1)	(2)	(3)	(4)	(5)
Enrollment	0.207***	0.161***	0.059***	0.169***	0.185***
	(0.076)	(0.012)	(0.013)	(0.021)	(0.025)
Observations	133,675	124,579	115,414	124,172	124,579
Mean dep. variable	0.345	0.235	0.037	0.085	0.088
% variation	60.02	68.51	159.46	198.82	210.23
Bandwidth	2.86	2.67	2.48	2.64	2.68

Notes. γ coefficients estimated from equation 1. *Moving* is an indicator for managers that moved at least once in their career to another firm. *Moving Middle* is an indicator for managers that moved to another firm and became plant or general manager. *Moving Top* is an indicator for managers that moved to another firm and became top executives or CEOs. *Listed Firms* and *Fortune 500* are indicators for managers that moved to listed firms or to firms included in Fortune 500 at least once between two reunion books. *Mean dep. variable* is the mean of the dependent variable over the bandwidth on the left side of the threshold. Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from the 80-point threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table 4: Effects of ESMWT on Manager Promotions within War Facilities

	Promotion	Plant Manager	General Manager	Top Executive	CEO
	(1)	(2)	(3)	(4)	(5)
Enrollment	0.305***	0.243***	0.158***	0.006	0.002
	(0.082)	(0.043)	(0.031)	(0.016)	(0.008)
Observations	119,986	114,485	115,414	129,166	133,675
Mean dep. variable	0.554	0.411	0.169	0.038	0.008
% variation	55.05	59.12	93.49	15.79	25.02
Bandwidth	2.52	2.43	2.49	2.71	2.87

Notes. γ coefficients estimated from equation 1. *Promotion* is an indicator for managers that remained in the war facility and were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that remained in the war facility and became plant or general managers. *Top Executive* and *CEO* are indicators for managers that remained in the war facility and became top executives or CEOs. *Mean dep. variable* is the mean of the dependent variable over the bandwidth on the left side of the threshold. Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from the 80-point threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table 5: Effects of ESMWT on Manager Self-Employment and Entrepreneurial Activities

	Owner	(Co) Founder	Innovative Business	Consulting	SBIC
	(1)	(2)	(3)	(4)	(5)
Enrollment	0.109***	0.098***	0.038***	0.055***	0.029***
	(0.029)	(0.026)	(0.006)	(0.015)	(0.005)
Observations	127,362	124,579	115,887	118,143	117,222
Mean dep. variable	0.151	0.125	0.034	0.021	0.010
% variation	72.18	78.40	111.76	261.90	290.00
Bandwidth	2.71	2.65	2.46	2.51	2.49

Notes. γ coefficients estimated from equation 1. *Owner*, *(Co) Founder*, *Innovative Business*, *Consulting*, *SBIC* are indicators for managers who became firm owners, were (co)founders of a new firm, founded a new business (defined as the first in the county), founded a consulting firm or a small business investment company (SBIC). *Mean dep. variable* is the mean of the dependent variable over the bandwidth on the left side of the threshold. Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from the 80-point threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table 6: Effects of ESMWT on Promotions of Under-Represented Managers

	Promotion	Plant Manager	General Manager	Top Executive	CEO
	(1)	(2)	(3)	(4)	(5)
Panel A: Nonwhite					
Enrollment	0.403***	0.367***	0.338***	0.043***	0.031***
	(0.061)	(0.031)	(0.026)	(0.005)	(0.005)
Observations	10,842	10,135	9,397	10,135	10,135
Mean dep. variable	0.387	0.249	0.181	0.008	0.004
% variation	104.13	147.39	186.74	537.50	775.00
Bandwidth	2.86	2.67	2.48	2.64	2.68
Panel B: Female					
Enrollment	0.378***	0.333***	0.281***	0.021***	0.017***
	(0.065)	(0.029)	(0.022)	(0.011)	(0.005)
Observations	18,524	19,258	19,951	17,833	18,524
Mean dep. variable	0.351	0.206	0.149	0.003	0.002
% variation	107.69	161.65	188.59	700.00	850.00
Bandwidth	2.61	2.73	2.82	2.59	2.68

Notes. γ coefficients estimated from equation 1 estimated on the sample of nonwhite managers in Panel A and of female managers in Panel B. *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. *Mean dep. variable* is the mean of the dependent variable over the bandwidth on the left side of the threshold for nonwhite managers in Panel A and female managers in Panel B. Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from the 80-point threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table 7: Effects of ESMWT on Self-Employment and Entrepreneurial Activities for Under-Represented Managers

	Owner	(Co) Founder	Innovative Business	Consulting	SBIC
	(1)	(2)	(3)	(4)	(5)
Panel A: Nonwhite					
Enrollment	0.133***	0.122***	0.027***	0.038***	0.019***
	(0.020)	(0.021)	(0.006)	(0.005)	(0.004)
Observations	10,508	10,135	10,135	9,771	9,397
Mean dep. variable	0.065	0.058	0.008	0.007	0.004
% variation	204.62	210.34	337.50	542.86	475.00
Bandwidth	2.71	2.65	2.62	2.51	2.49
Panel B: Female					
Enrollment	0.115***	0.091***	0.032***	0.039***	0.017***
	(0.022)	(0.023)	(0.007)	(0.004)	(0.003)
Observations	19,258	18,524	17,151	17,833	17,151
Mean dep. variable	0.051	0.043	0.007	0.006	0.004
% variation	225.49	211.63	457.14	650.00	425.00
Bandwidth	2.71	2.65	2.46	2.51	2.49

Notes. γ coefficients estimated from equation 1 estimated on the sample of nonwhite managers in Panel A and of female managers in Panel B. *Owner*, *(Co) Founder*, *Innovative Business*, *Consulting*, *SBIC* are indicators for managers who became firm owners, were (co)founders of a new firm, founded a new business (defined as the first in the county), founded a consulting firm or a small business investment company (SBIC). *Mean dep. variable* is the mean of the dependent variable over the bandwidth on the left side of the threshold for nonwhite managers in Panel A and female managers in Panel B. Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from the 80-point threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table 8: Effects of ESMWT Network on Manager Career Outcomes

	Pr Moving to Mate Firms (1)	Pr Promotion in Mate Firms (2)	Pr Co-Founding Business with Mates (3)
Share Mates Other Facilities	0.022	0.011	0.015
	(0.019)	(0.015)	(0.016)
Share Mates Larger Facilities	0.027	0.021	0.019
	(0.028)	(0.017)	(0.018)
Share Mates Higher Sales Facilities	0.038***	0.032***	0.037***
	(0.010)	(0.009)	(0.011)
Share Mates Higher TFP Facilities	0.041***	0.038***	0.045***
	(0.008)	(0.011)	(0.012)
Share Mates Listed Facilities	0.078***	0.059***	0.068***
	(0.013)	(0.015)	(0.020)
Observations	205,933	205,933	205,933

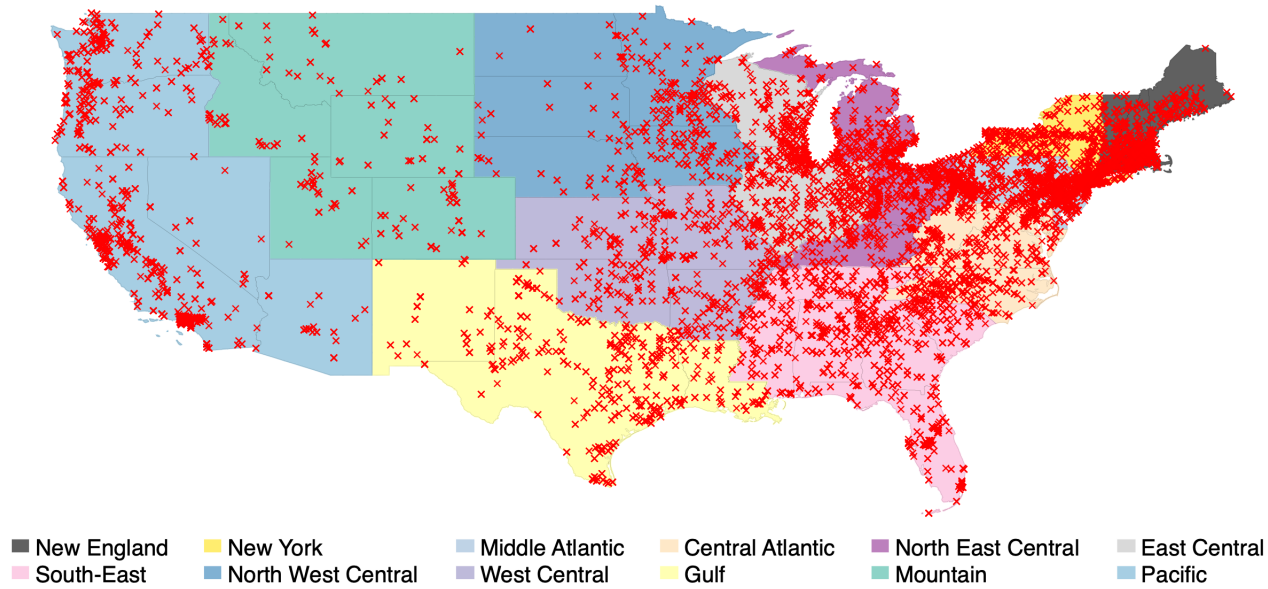
Notes. *Pr Moving to Mate Firms*, *Pr Promotion in Mate Firms*, and *Pr Co-Funding Business with Mates* are the probability of moving to a firm where a section-mate worked (Panel A), moving to a firm where a section-mate worked and being promoted (Panel B), and co-founding a business with a section-mate (Panel C). *Share Mates Other Facilities*, *Larger Facilities*, *Higher Sales Facilities*, *Higher TFP Facilities* and *Listed Facilities* are, respectively, the share of section mates from other facilities, from larger facilities, facilities with higher revenues, higher TFP and listed facilities. Data are provided at the individual level from the U.S. Office of Education ESMWT registries for 205,933 managers whose score in the entry exam was above the ESMWT 80-point threshold.

Online Appendix — Not for Publication

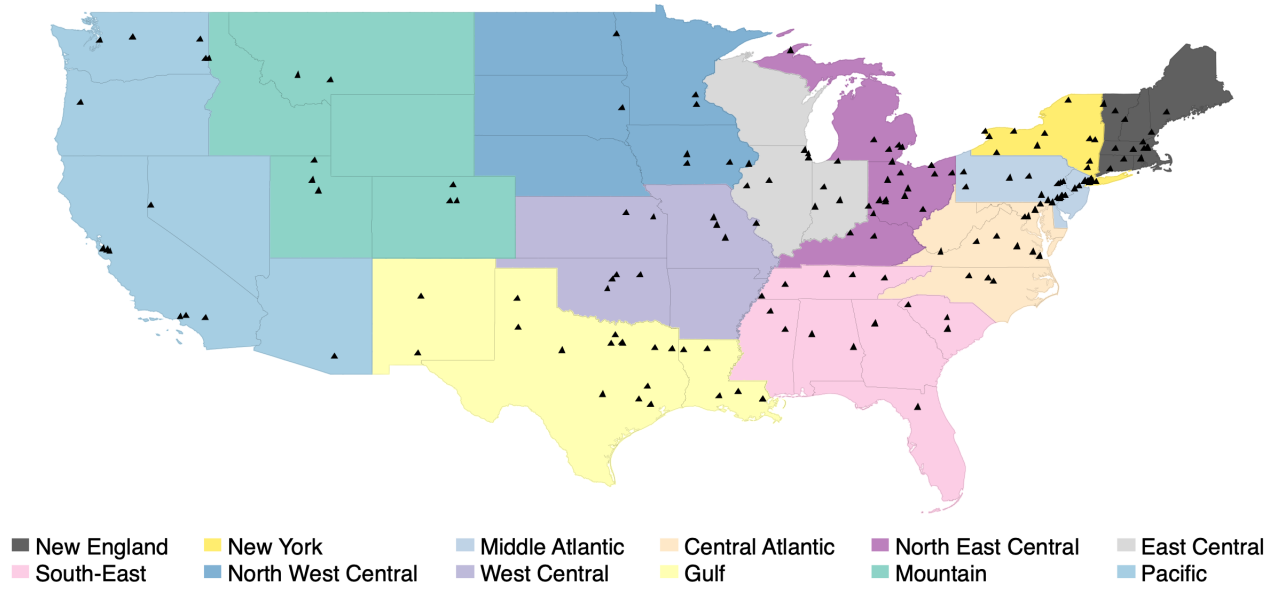
A Additional Figures and Tables

Figure A.1: Manpower Commission Regions and Location of War Industrial Facilities and ESMWT Universities and Colleges

Panel A: Location of U.S. War Industrial Facilities



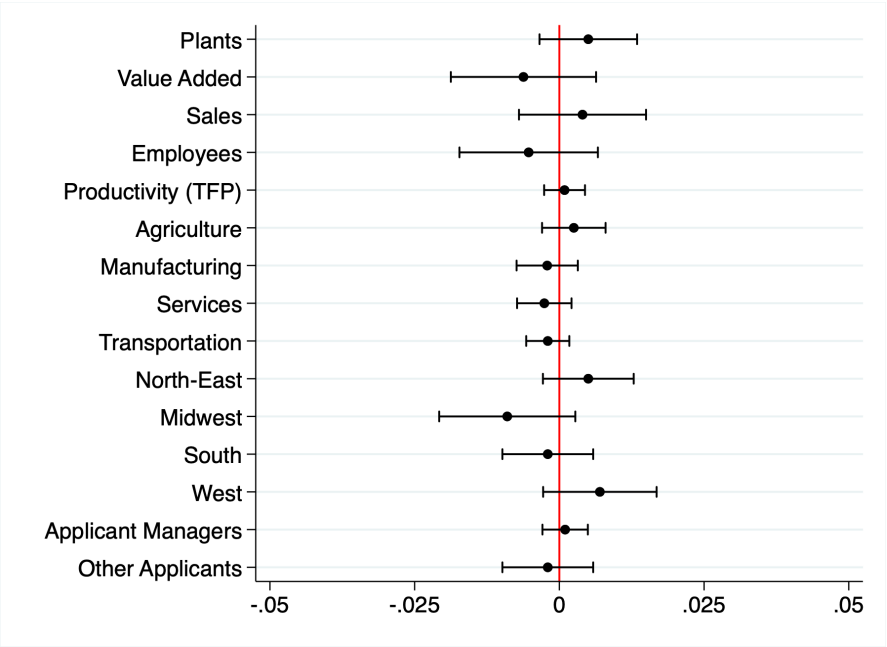
Panel B: Location of University and Colleges that Hosted the ESMWT Managerial Courses



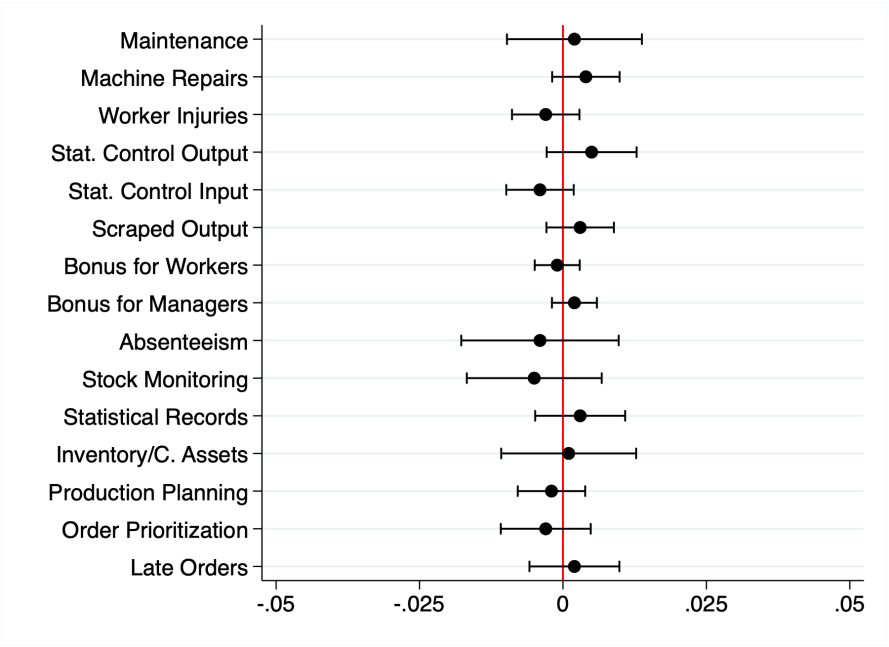
Notes. Map of the 12 Manpower Commission Regions. Panel A reports the location of 53,674 U.S. war industrial facilities whose managers applied for the ESMWT managerial courses. Panel B reports the location of the 218 U.S. universities and colleges that hosted at least a ESMWT managerial course. Data are provided at the facility level from the Manpower Commission Surveys in Panel A and at the university level from university library archives in Panel B.

Figure A.2: Balancing Tests for Facility Characteristics and Managerial Practices

Panel A: Facility Characteristics and Outcomes



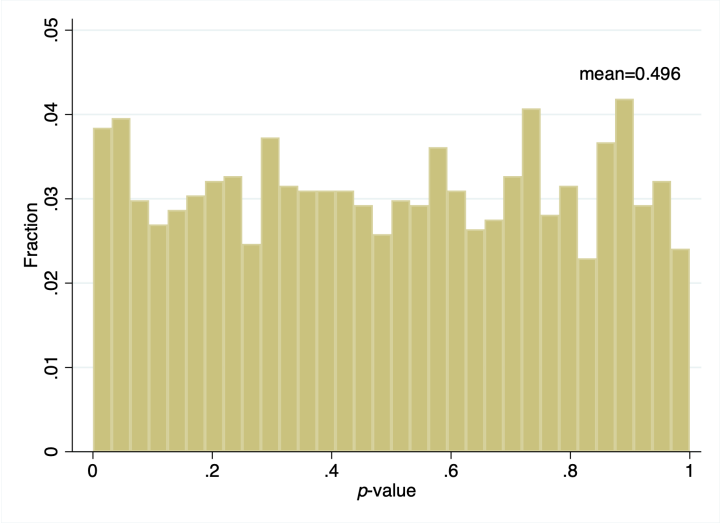
Panel B: Facility Implementation of Managerial Practices



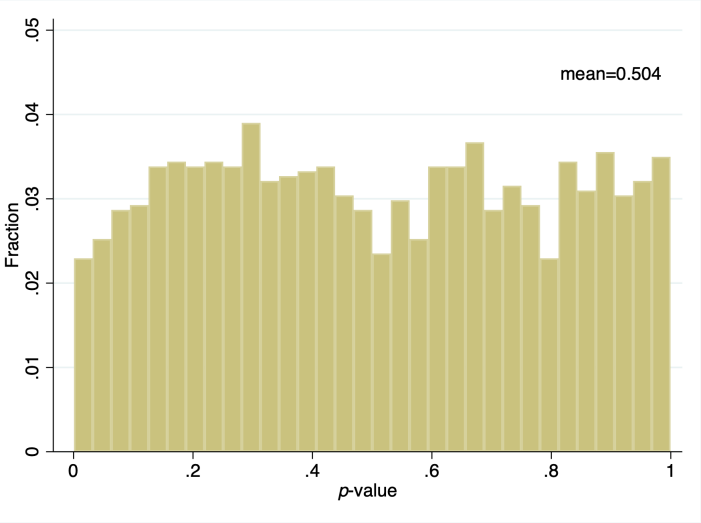
Notes. γ coefficients and 95% confidence intervals from equation 1. Standard errors are clustered at the decimal-point entry-exam score bin level. Facilities are associated with their higher applicant manager score. *Plants* is logged number of plants. *Value Added* and *Sales* are logged 2020 millions USD. *Employees* is logged number of employees. *Productivity (TFP)* is logged total factor productivity revenue, estimated with the Gandhi et al. (2020)'s method. *Agriculture*, *Manufacturing*, *Transportation*, and *Services* are indicators for facilities that operate in the respective sector. *Applicant Managers* is logged number of applicant managers. *Other Applicants* is logged number of engineers and scientists that applied to ESMWT. *Maintenance*, *Stat. Control Output* and *Inputs*, *Bonus for Workers* and *Managers*, *Stock Monitoring*, *Statistical Records*, *Production Planning*, and *Order Prioritization* are indicators for facilities that perform regular maintenance of the machine and of safety conditions, systematically control production outputs and inputs, pay bonuses to workers and managers, monitor inventory, keep track of statistical records, plan production, and prioritize orders based on delivery deadlines. *Machine Repairs* and *Worker Injuries* are monthly logged interventions for repairing machines and number of injured workers. *Scraped Output* and *Late Orders* are monthly percentage of scraped output out of total output and of orders delivered past deadline. *Absenteeism* is the ratio between days of absence and total worked days. *Inventory/C. Assets* is the ratio between facility inventory and its current assets. Data are provided at the facility level from the Manpower Commission Surveys for 18,446 war facilities whose higher applicant manager score was 3 points above or below the ESMWT threshold.

Figure A.3: Distribution of p-values for Managers Characteristics – continues

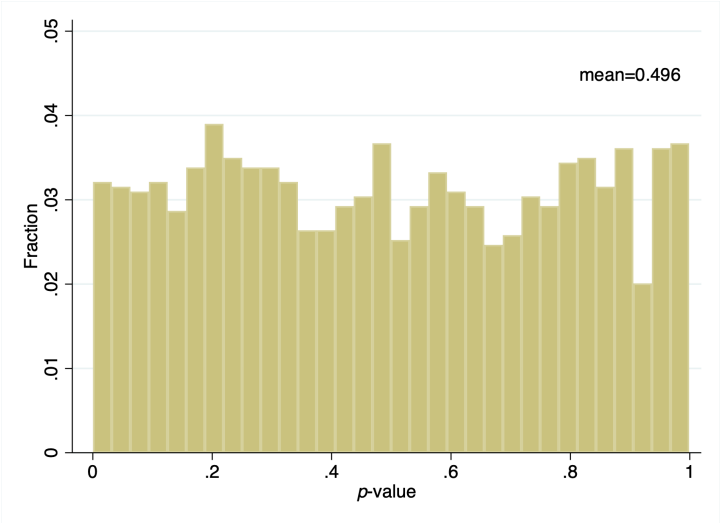
Panel A: Years of Education



Panel B: Years of Tenure in War Facility



Panel C: Years of Employment



Panel D: Economics and Business BA

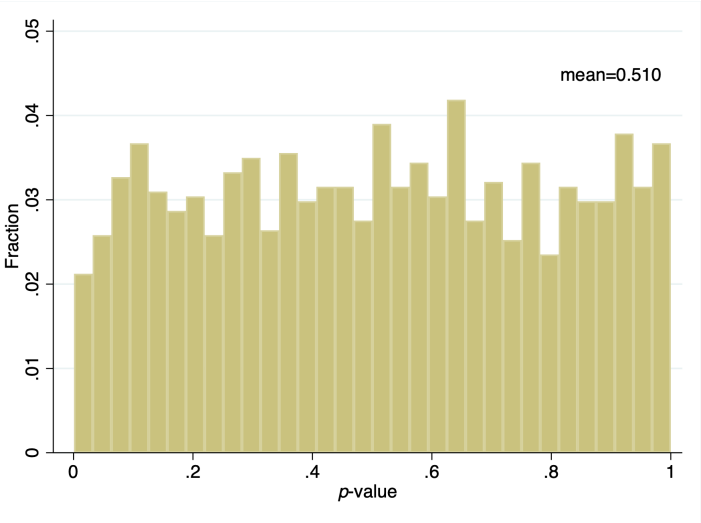
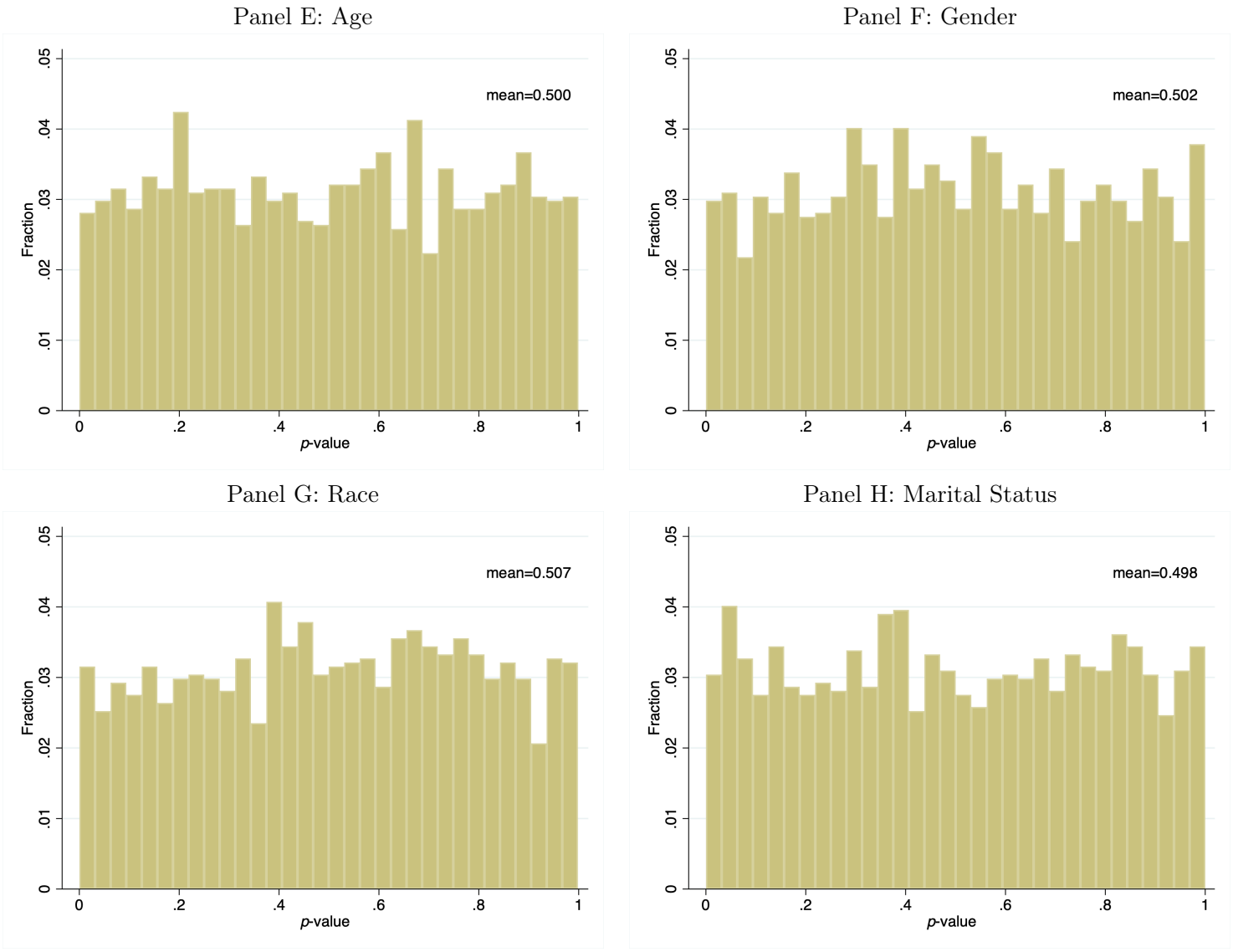


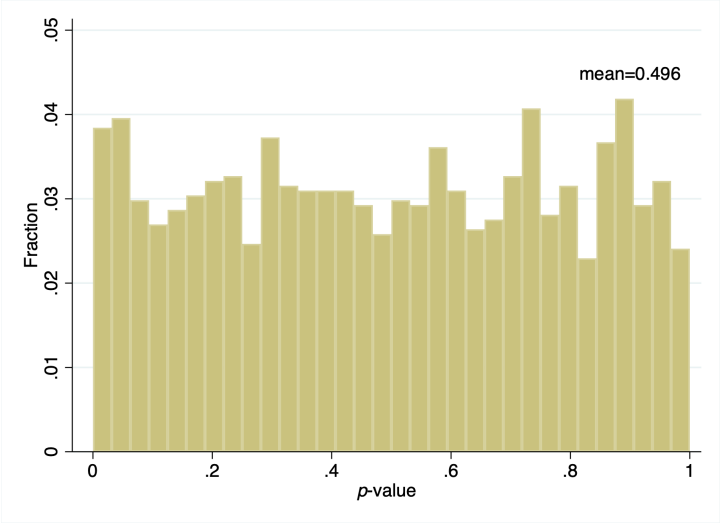
Figure A.3: Distribution of p-values for Managers Characteristics – continued



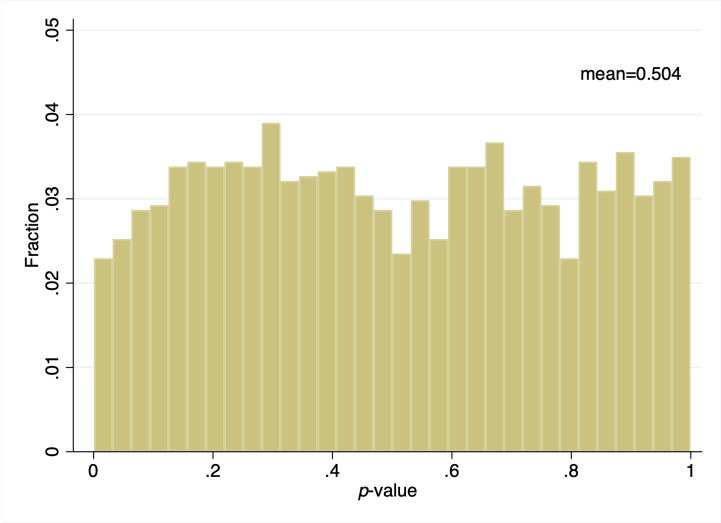
Notes. p-values obtained from testing joint significance of section indicators from regressing manager pre-determined characteristics on section indicators for each university and application window pair. A total of 1,744 regressions have been run. *Mean* is the mean of the p-values, expected to be 0.5 in case of random assignment of managers to sections. *Years of Education*, *of Tenure in War Facility*, and *of Employment* are, respectively, the number of years of education, of work in the war industrial facility they were employed at when they applied for ESMWT, and total year of employment (Panels A-C). *Economics and Business* is an indicator for managers with a B.A. in either economics or business (Panel D). *Age* is manager age at time of ESMWT application (Panel E). *Male* is an indicator for male managers (Panel F). *White* is an indicator for white managers (Panel G). *Married* is an indicator for married managers (Panel H). Data are provided at the individual level from the U.S. Office of Education ESMWT registries for 205,933 managers whose score in the entry exam above the ESMWT 80-point threshold.

Figure A.4: Distribution of p-values for Manager War Facilities Characteristics – continues

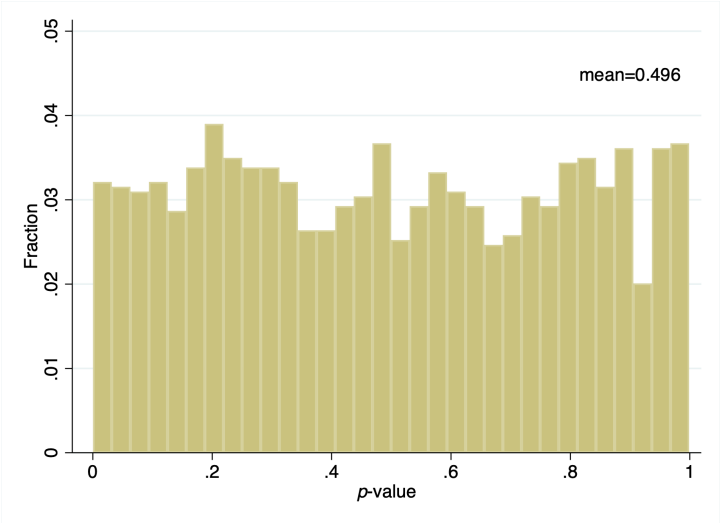
Panel A: Number of Plants



Panel B: Value Added



Panel C: Sales



Panel D: Employees

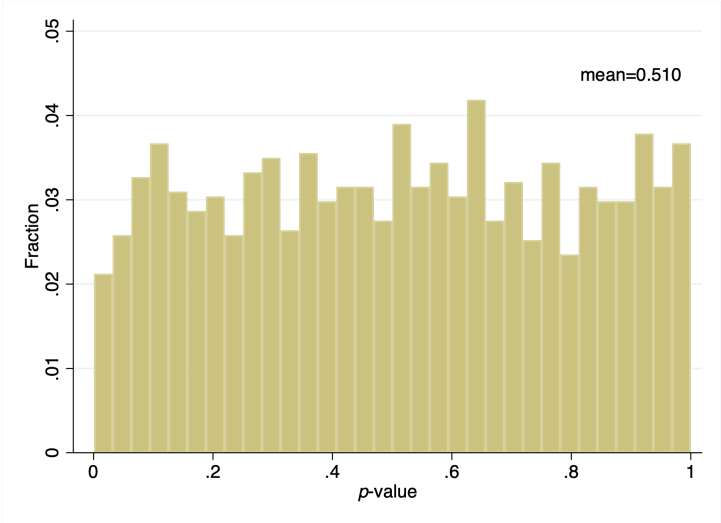
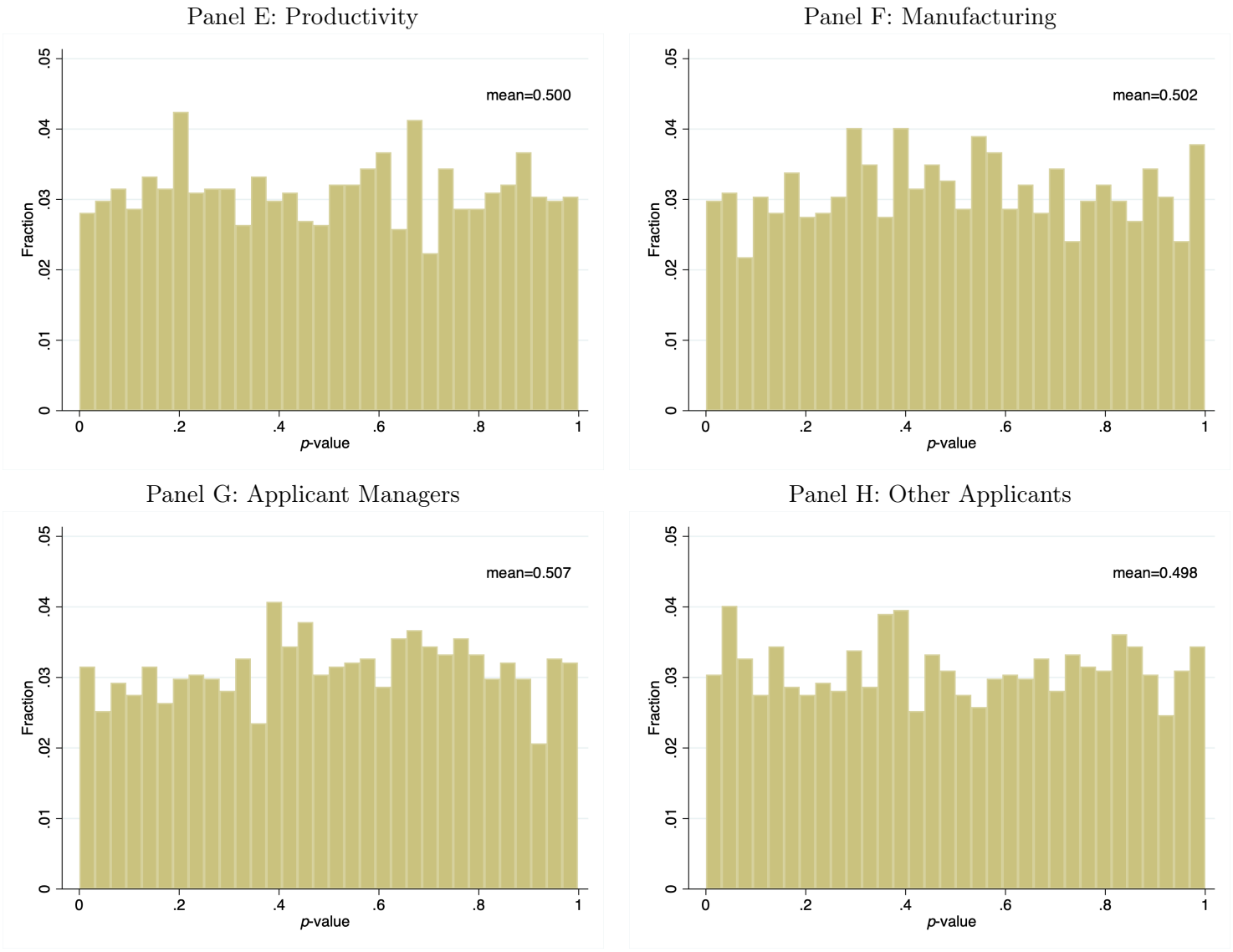


Figure A.4: Distribution of p-values for Manager War Facilities Characteristics – continued



Notes. p-values obtained from testing joint significance of section indicators from regressing war facilities pre-determined characteristics on section indicators for each university and application window pair. A total of 1,744 regressions have been run. *Mean* is the mean of the p-values, expected to be 0.5 in case of random assignment of managers to sections. *Plants* is total number of plants (Panel A). *Value Added* and *Sales* are expressed in millions of 2020 USD (Panels B and C). *Employees* is number of employees (Panel D). *Productivity (TFP)* is logged total factor productivity revenue, estimated with the Gandhi et al. (2020)'s method (Panel E). *Manufacturing* is an indicator for facilities that operate in the manufacturing sector (Panel F). *Applicant Managers* is number of applicant managers (Panel G). *Other Applicants* is number of other applicants to the science and engineering component of ESMWT (Panel H). Data are provided at the war facility level from the Manpower Commission Surveys for 37,654 war facilities whose higher applicant manager score was above the ESMWT 80-point threshold.

Table A.1: Probability of Matching Applicant Managers with Reunion Books Based on Their Observable Characteristics

	All			70-90 Points			77-83 Points		
	Admitted	Non-Admitted	p-value	Admitted	Non-Admitted	p-value	Admitted	Non-Admitted	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Age	0.013	0.011	0.633	0.009	0.008	0.554	0.006	0.007	0.638
	(0.015)	(0.017)		(0.010)	(0.013)		(0.008)	(0.009)	
Middle Managers	0.033***	0.025***	0.000	0.029***	0.025***	0.657	0.025***	0.024***	0.713
	(0.003)	(0.002)		(0.003)	(0.005)		(0.004)	(0.005)	
Years of Education	0.025***	0.014***	0.000	0.021***	0.019***	0.573	0.018***	0.019***	0.672
	(0.004)	(0.003)		(0.003)	(0.004)		(0.004)	(0.004)	
Years of Tenure	0.035***	0.024***	0.000	0.032***	0.028***	0.549	0.030***	0.029***	0.549
	(0.002)	(0.003)		(0.004)	(0.003)		(0.005)	(0.004)	
Years of Employment	0.048***	0.031***	0.000	0.038***	0.035***	0.703	0.036***	0.034***	0.568
	(0.002)	(0.004)		(0.005)	(0.006)		(0.004)	(0.005)	
B.A. Economics and Business	0.009	0.008	0.628	0.009	0.008	0.512	0.007	0.007	0.738
	(0.007)	(0.006)		(0.013)	(0.014)		(0.011)	(0.012)	
Female	0.065***	0.043***	0.000	0.055***	0.049***	0.541	0.047***	0.046***	0.611
	(0.005)	(0.006)		(0.004)	(0.006)		(0.006)	(0.007)	
Non White	0.051***	0.036***	0.000	0.050***	0.044***	0.688	0.047***	0.046***	0.516
	(0.004)	(0.003)		(0.005)	(0.007)		(0.007)	(0.006)	
Marital Status	0.022	0.025	0.514	0.021	0.023	0.504	0.018	0.020	0.569
	(0.024)	(0.028)		(0.023)	(0.019)		(0.022)	(0.021)	
Entry Exam Score	0.016	0.014	0.587	0.015	0.012	0.615	0.013	0.011	0.764
	(0.012)	(0.010)		(0.011)	(0.015)		(0.010)	(0.012)	
Observations	205,933	469,530	675,463	163,560	258,234	421,794	75,371	65,568	140,939
Matching Rate	80.31%	76.27%	0.000	81.23%	81.10%	0.688	86.12%	86.14%	0.716

Notes. Prediction of matching across ESMWT records and reunion books between 1950 and 1975 for 675,463 managers who applied for the ESMWT between July 1941 and January 1945 (columns 1-3), for 421,794 managers who applied for the ESMWT and scored between 70 and 90 points in the entry exam (columns 4-6), and for 140,939 managers who applied for the ESMWT and scored between 77 and 83 points in the entry exam (columns 7-9). p-value for testing the mean difference between admitted and non-admitted managers is reported in columns 3, 6, and 9. *Age* is manager age at time of ESMWT application. *Years of Education*, *of Tenure in War Facility*, and *of Employment* are, respectively, the number of years of education, of work in the war industrial facility they were employed at when they applied for ESMWT, and total year of employment. *Economics and Business* is an indicator for managers with a B.A. in either economics or business, *Female* is an indicator for female managers. *Nonwhite* is an indicator for nonwhite managers. *Marital Status* is an indicator for married managers. *Entry Exam Score* is the score managers earned in the entry-exam. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and reunion books.

Table A.2: Summary Statistics for 53,674 War Industrial Facilities

	Mean	Std. Dev.	Minimum	Maximum
	(1)	(2)	(3)	(4)
Panel A: Firm Characteristics				
Plants	2.55	0.67	1	6
Value Added (k USD)	2,190.13	938.64	1,478.49	2,890.67
Sales (k USD)	3,216.64	1,134.52	2,673.12	3,733.98
Employees	349.62	115.32	100	687
Productivity (TFP)	1.85	0.39	1.43	3.71
Agriculture	0.06	0.24	0	1
Manufacturing	0.75	0.43	0	1
Services	0.11	0.31	0	1
Transportation	0.08	0.27	0	1
Applicant Managers	12.58	1.44	1	25
Panel B: Management Practices				
Factory Operations				
Maintenance of Machines and Safety	0.05	0.22	0	1
Interventions for Machine Repairs	27.33	1.98	12	41
Worker Injuries	46.53	3.48	25	88
Quality Control				
Statistical Control Output	0.04	0.20	0	1
Statistical Control Inputs	0.05	0.22	0	1
Scraped Output (percent)	0.12	0.06	0.05	0.21
Human Resources				
Bonus for Workers	0.06	0.24	0	1
Bonus for Managers	0.04	0.20	0	1
Absenteeism (percent)	0.06	0.02	0.01	0.12
Inventory Control				
Stock Monitoring	0.07	0.26	0	1
Statistical Records	0.06	0.24	0	1
Inventory/Current Assets (percent)	0.75	0.06	0.63	0.824
Sales and Order Control				
Production Planning	0.06	0.24	0	1
Order Prioritization	0.08	0.27	0	1
Late Delivered Orders (percent)	0.22	0.09	0.15	0.35
Observations	53,674	53,674	53,674	53,674

Notes. Summary statistics for 53,674 war industrial facilities with at least a ESMWT applicant manager. Columns 1, 2, 3, and 4 present, respectively, mean, standard deviation, minimum, and maximum of facility characteristics and outcomes in Panel A and of implementation of managerial practices in Panel B, measured in the month the first facility manager applied to ESMWT. *Plants* is total number of plants. *Value Added* and *Sales* are expressed in millions of 2020 USD. *Employees* is number of employees. *Productivity (TFP)* is logged total factor productivity revenue, estimated with the Gandhi et al. (2020)'s method. *Agriculture*, *Manufacturing*, *Transportation*, and *Services* are indicators for facilities that operate in the respective sector. *Applicant Managers* is number of applicant managers. *Maintenance of Machines and Safety*, *Statistical Control Output* and *Inputs*, *Bonus for Workers* and *Managers*, *Stock Monitoring*, *Statistical Records*, *Production Planning*, and *Order Prioritization* are, respectively, indicators for facilities that perform regular maintenance of the machine and of safety conditions, systematically control production outputs and inputs, pay bonuses to workers and managers, monitor inventory, keep track of statistical records, plan production, and prioritize orders based on delivery deadlines. *Interventions of Machine Repairs* and *Worker Injuries* are monthly interventions for repairing machines and number of injured workers. *Scraped Output* and *Late Delivered Orders* are monthly percentage of scraped output out of total output and of orders delivered past deadline. *Absenteeism* is the ratio between days of absence and total worked days. *Inventory/Current Assets* is the ratio between facility inventory and its current assets. Data are provided at the facility level from the Manpower Commission Surveys.

Table A.3: Summary Statistics for 218 Participating Universities and Colleges

	Total	Mean	Standard Deviation	Min	Max
	(1)	(2)	(3)	(4)	(5)
Number of Students	205,933	944.65	102.21	202	10,120
Number of Students per Year	41,187	188.93	25.69	40	2,024
Number of Students per Section	40	39.88	2.33	37	42
Management Sections	5,148	23.61	12.45	5	253
Management Sections per Year	1,030	4.72	2.27	1	52
Teaching Faculty	1,716	7.88	16.71	3	175
Observations	218	218	218	218	218

Notes. Summary statistics for 218 universities and colleges that hosted at least one ESMWT managerial class. Column 1 reports the total number, column 2 the average number, column 3 the standard deviation, columns 4 and 5 the minimum and maximum value of each variable. *Number of Students* is the total number of students. *Number of Students per Year* is the number of students per year. *Number of Students per Section* is the number of students per ESMWT section. *Management Sections* is the total number of ESMWT management sections. *Management Sections per Year* is the number of ESMWT management sections per year. *Teaching Faculty* is the number of institution faculty that taught in the ESMWT managerial component. Data are provided at the university level from university library archives.

Table A.4: Pre-ESMWT Differences in Time Trends for War Facilities around Threshold

	Log Plants		Log Value Added		Log Sales		Log Employees		Log TFP	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Time trend	0.012	0.011	0.031	0.028	0.025	0.026	0.021	0.018	0.015	0.012
	(0.016)	(0.018)	(0.028)	(0.031)	(0.024)	(0.023)	(0.026)	(0.025)	(0.013)	(0.015)
Time trend · Above 80 Points	0.003	0.002	-0.002	-0.001	0.003	0.002	-0.001	-0.002	0.004	0.002
	(0.004)	(0.005)	(0.003)	(0.002)	(0.007)	(0.005)	(0.005)	(0.003)	(0.005)	(0.002)
Above 80 Points	0.003	0.002	-0.005	-0.003	-0.004	-0.002	0.005	0.004	0.003	0.002
	(0.005)	(0.004)	(0.006)	(0.004)	(0.004)	(0.006)	(0.006)	(0.009)	(0.006)	(0.002)
Observations	676,690	676,690	676,690	676,690	676,690	676,690	676,690	676,690	676,690	676,690
War Facility FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month-Year FE	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
County x month-year FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Notes. Coefficients estimated from a constant linear time trend model that allows for an interaction of the constant linear trend with an Above 80 Points indicator, that equals one for facilities whose manager highest score in the ESMWT entry exam was above 80 points. The month in which the first manager per facility applied to ESMWT is normalized to -1 and serves as the excluded category. Facilities are associated with their higher applicant manager score for managers. *Plants* is logged number of plants. *Value Added* and *Sales* are logged millions of 2020 USD. *Employees* is logged number of employees. *Productivity (TFP)* is logged total factor productivity revenue, estimated with the Gandhi et al. (2020)'s method. Standard errors are clustered at the decimal-point entry-exam score bin level. Data are provided at the facility level from the Manpower Commission Surveys for 18,446 war facilities whose higher applicant manager score was 3 points above or below the ESMWT threshold.

Table A.5: Excluding Managers that Earned an MBA after ESMWT

	Promotion	Plant Manager	General Manager	Top Executive	CEO
	(1)	(2)	(3)	(4)	(5)
Enrollment	0.254***	0.200***	0.163***	0.033***	0.028***
	(0.074)	(0.033)	(0.021)	(0.011)	(0.004)
Observations	121,948	100,404	107,598	1112,312	118,144
Bandwidth	2.65	2.16	2.28	2.41	2.53

Notes. γ coefficients estimated from equation 1 excluding 15,114 managers who earned an MBA after the ESMWT. *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from the 80-point threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.6: Excluding Managers that Earned an MBA after ESMWT

	Owner	(Co) Founder	Innovative Business	Consulting	SBIC
	(1)	(2)	(3)	(4)	(5)
Enrollment	0.115***	0.102***	0.041***	0.057***	0.032***
	(0.028)	(0.025)	(0.010)	(0.011)	(0.005)
Observations	125,678	121,434	113,975	116,909	115,002
Bandwidth	2.76	2.61	2.44	2.57	2.40

Notes. γ coefficients estimated from equation 1 excluding 15,114 managers who earned an MBA after the ESMWT. *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Owner*, *(Co) Founder*, *Innovative Business*, *Consulting*, *SBIC* are indicators for managers who became firm owners, were (co)founders of a new firm, founded a new business (defined as the first in the county), founded a consulting firm or a small business investment company (SBIC). Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from the 80-point threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.7: Robustness Check on Promotions – RD Polynomial Specification

	Promotion	Plant Manager	General Manager	Top Executive	CEO
	(1)	(2)	(3)	(4)	(5)
Panel A: Second-Order Polynomial					
Enrollment	0.258***	0.203***	0.165***	0.035***	0.026***
	(0.076)	(0.035)	(0.024)	(0.012)	(0.006)
Observations	125,510	102,737	107,924	115,414	121,392
Bandwidth	2.67	2.18	2.29	2.45	2.58
Panel B: Third-Order Polynomial					
Enrollment	0.255***	0.202***	0.172***	0.039***	0.023***
	(0.071)	(0.033)	(0.026)	(0.011)	(0.009)
Observations	118,589	100,960	109,844	113,088	123,712
Bandwidth	2.52	2.14	2.33	2.40	2.63

Notes. γ coefficients estimated from equation 1 using a second-order (Panel A) or a third-order polynomial (Panel B) polynomial. *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from the 80-point threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.8: Robustness Check on Self-Employment and Entrepreneurial Activities – RD Polynomial Specification

	Owner	(Co) Founder	Innovative Business	Consulting	SBIC
	(1)	(2)	(3)	(4)	(5)
Panel A: Second-Order Polynomial					
Enrollment	0.112***	0.101***	0.040***	0.058***	0.033***
	(0.030)	(0.028)	(0.011)	(0.013)	(0.008)
Observations	131,008	123,712	113,578	118,589	114,485
Bandwidth	2.79	2.63	2.41	2.52	2.43
Panel B: Third-Order Polynomial					
Enrollment	0.107***	0.099***	0.041***	0.052***	0.026***
	(0.031)	(0.029)	(0.008)	(0.014)	(0.006)
Observations	129,166	125,045	116,789	120,876	113,578
Bandwidth	2.75	2.66	2.48	2.57	2.41

Notes. γ coefficients estimated from equation 1 using a second-order (Panel A) or a third-order polynomial (Panel B) polynomial. *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Owner*, *(Co) Founder*, *Innovative Business*, *Consulting*, *SBIC* are indicators for managers who became firm owners, were (co)founders of a new firm, founded a new business (defined as the first in the county), founded a consulting firm or a small business investment company (SBIC). Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from the 80-point threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.9: Robustness Check on Promotions – Different Bandwidths

	Promotion	Plant Manager	General Manager	Top Executive	CEO
	(1)	(2)	(3)	(4)	(5)
Panel A: Bandwidth=3					
Enrollment	0.262***	0.205***	0.173***	0.040***	0.022***
	(0.077)	(0.032)	(0.023)	(0.011)	(0.005)
Observations	140,599	140,599	140,599	140,599	140,599
Panel B: Bandwidth=2					
Enrollment	0.251***	0.198***	0.164***	0.034***	0.020***
	(0.070)	(0.032)	(0.021)	(0.010)	(0.005)
Observations	94,403	94,403	94,403	94,403	94,403
Panel C: Bandwidth=1					
Enrollment	0.249***	0.195***	0.160***	0.032***	0.019***
	(0.066)	(0.027)	(0.012)	(0.008)	(0.003)
Observations	47,571	47,571	47,571	47,571	47,571

Notes. γ coefficients estimated from equation 1 imposing a bandwidth of three (Panel A), two (Panel B), and one (Panel C) point(s) in exam score distance from the 80-point threshold. *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. Standard errors are clustered at the decimal-point entry-exam score bin level. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.10: Robustness Check on Self-Employment and Entrepreneurial Activities – Different Bandwidths

	Owner	(Co) Founder	Innovative Business	Consulting	SBIC
	(1)	(2)	(3)	(4)	(5)
Panel A: Bandwidth=3					
Enrollment	0.115***	0.103***	0.042***	0.059***	0.029***
	(0.031)	(0.028)	(0.012)	(0.017)	(0.010)
Observations	140,599	140,599	140,599	140,599	140,599
Panel B: Bandwidth=2					
Enrollment	0.107***	0.096***	0.035***	0.053***	0.027***
	(0.025)	(0.022)	(0.010)	(0.013)	(0.009)
Observations	94,403	94,403	94,403	94,403	94,403
Panel C: Bandwidth=1					
Enrollment	0.106***	0.095***	0.033***	0.050***	0.026***
	(0.023)	(0.021)	(0.009)	(0.012)	(0.005)
Observations	47,571	47,571	47,571	47,571	47,571

Notes. γ coefficients estimated from equation 1 imposing a bandwidth of three (Panel A), two (Panel B), and one (Panel C) point(s) in exam score distance from the 80-point threshold. *Owner*, *(Co) Founder*, *Innovative Business*, *Consulting*, *SBIC* are indicators for managers who became firm owners, were (co)founders of a new firm, founded a new business (defined as the first in the county), founded a consulting firm or a small business investment company (SBIC). Standard errors are clustered at the decimal-point entry-exam score bin level. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.11: Robustness Check on Promotions – Adding Controls

	Promotion	Plant Manager	General Manager	Top Executive	CEO
	(1)	(2)	(3)	(4)	(5)
Panel A: Controlling for Managers Characteristics					
Enrollment	0.256***	0.201***	0.168***	0.037***	0.024***
	(0.069)	(0.031)	(0.020)	(0.010)	(0.004)
Observations	124,172	103,175	111,218	117,663	121,851
Bandwidth	2.64	2.19	2.36	2.50	2.59
Panel B: Controlling for Facility Fixed Effects					
Enrollment	0.254***	0.197***	0.166***	0.033***	0.021***
	(0.068)	(0.031)	(0.025)	(0.012)	(0.007)
Observations	122,762	101,842	112,596	119,986	118,589
Bandwidth	2.61	2.16	2.39	2.55	2.52
Panel C: Controlling for University Fixed Effects					
Enrollment	0.253***	0.202***	0.175***	0.042***	0.028***
	(0.072)	(0.030)	(0.021)	(0.012)	(0.006)
Observations	125,968	102,305	111,694	118,143	119,054
Bandwidth	2.68	2.17	2.37	2.51	2.53

Notes. γ coefficients estimated from equation 1 controlling for manager's years of education, tenure in war facilities, employment and type of B.A. major, age, gender, race, and marital status (Panel A), facility fixed effects (Panel B), and university fixed effects (Panel C). *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. Standard errors are clustered at the decimal-point entry-exam score bin level. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.12: Robustness Check on Self-Employment and Entrepreneurial Activities – Adding Controls

	Owner	(Co) Founder	Innovative Business	Consulting	SBIC
	(1)	(2)	(3)	(4)	(5)
Panel A: Controlling for Managers Characteristics					
Enrollment	0.109***	0.098***	0.038***	0.055***	0.029***
	(0.025)	(0.022)	(0.007)	(0.011)	(0.006)
Observations	126,425	118,589	113,578	121,392	115,887
Bandwidth	2.69	2.52	2.41	2.58	2.46
Panel B: Controlling for Facility Fixed Effects					
Enrollment	0.106***	0.095***	0.036***	0.051***	0.027***
	(0.021)	(0.021)	(0.006)	(0.010)	(0.005)
Observations	123,712	118,143	115,887	119,054	114,953
Bandwidth	2.63	2.51	2.46	2.53	2.44
Panel C: Controlling for University Fixed Effects					
Enrollment	0.105***	0.096***	0.034***	0.050***	0.030***
	(0.026)	(0.024)	(0.009)	(0.012)	(0.007)
Observations	125,510	117,222	114,953	121,392	118,589
Bandwidth	2.67	2.49	2.44	2.58	2.52

Notes. γ coefficients estimated from equation 1 controlling for manager's years of education, tenure in war facilities, employment and type of B.A. major, age, gender, race, and marital status (Panel A), facility fixed effects (Panel B), and university fixed effects (Panel C). *Owner*, *(Co) Founder*, *Innovative Business*, *Consulting*, *SBIC* are indicators for managers who became firm owners, were (co)founders of a new firm, founded a new business (defined as the first in the county), founded a consulting firm or a small business investment company (SBIC). Standard errors are clustered at the decimal-point entry-exam score bin level. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.13: Robustness Check on Promotions – Clustering Level

	Promotion	Plant Manager	General Manager	Top Executive	CEO
	(1)	(2)	(3)	(4)	(5)
Panel A: Clustering at the Facility Level					
Enrollment	0.256***	0.201***	0.168***	0.037***	0.024***
	(0.076)	(0.032)	(0.021)	(0.011)	(0.007)
Observations	124,579	101,372	110,753	115,414	120,432
Bandwidth	2.69	2.15	2.31	2.48	2.56
Panel B: Clustering at the University-Application Window Level					
Enrollment	0.256***	0.201***	0.168***	0.037***	0.024***
	(0.075)	(0.036)	(0.022)	(0.011)	(0.008)
Observations	124,579	101,372	110,753	115,414	120,432
Bandwidth	2.69	2.15	2.31	2.48	2.56
Panel C: Clustering at the University-Section Level					
Enrollment	0.256***	0.201***	0.168***	0.037***	0.024***
	(0.074)	(0.032)	(0.023)	(0.012)	(0.006)
Observations	124,579	101,372	110,753	115,414	120,432
Bandwidth	2.69	2.15	2.31	2.48	2.56

Notes. γ coefficients estimated from equation 1 controlling for manager's years of education, tenure in war facilities, employment and type of B.A. major, age, gender, race, and marital status (Panel A), facility fixed effects (Panel B), and university fixed effects (Panel C). *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. Standard errors are clustered at the decimal-point entry-exam score bin level. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.14: Robustness Check on Self-Employment and Entrepreneurial Activities – Clustering Level

	Owner	(Co) Founder	Innovative Business	Consulting	SBIC
	(1)	(2)	(3)	(4)	(5)
Panel A: Clustering at the Facility Level					
Enrollment	0.109***	0.098***	0.038***	0.055***	0.029***
	(0.028)	(0.025)	(0.008)	(0.013)	(0.008)
Observations	127,362	124,579	115,887	118,143	117,222
Bandwidth	2.71	2.65	2.46	2.51	2.49
Panel B: Clustering at the University-Application Window Level					
Enrollment	0.109***	0.098***	0.038***	0.055***	0.029***
	(0.025)	(0.026)	(0.009)	(0.013)	(0.008)
Observations	127,362	124,579	115,887	118,143	117,222
Bandwidth	2.71	2.65	2.46	2.51	2.49
Panel C: Clustering at the University-Section Level					
Enrollment	0.109***	0.098***	0.038***	0.055***	0.029***
	(0.027)	(0.025)	(0.008)	(0.012)	(0.007)
Observations	127,362	124,579	115,887	118,143	117,222
Bandwidth	2.71	2.65	2.46	2.51	2.49

Notes. γ coefficients estimated from equation 1 controlling for manager's years of education, tenure in war facilities, employment and type of B.A. major, age, gender, race, and marital status (Panel A), facility fixed effects (Panel B), and university fixed effects (Panel C). *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. Standard errors are clustered at the decimal-point entry-exam score bin level. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.15: Robustness Check on Promotions – Fuzzy RD Specification

	Promotion	Plant Manager	General Manager	Top Executive	CEO
	(1)	(2)	(3)	(4)	(5)
Enrollment	0.257***	0.203***	0.165***	0.038***	0.022***
	(0.075)	(0.031)	(0.022)	(0.010)	(0.006)
Observations	128,267	121,851	110,753	114,485	122,304
Bandwidth	2.73	2.59	2.35	2.43	2.60

Notes. γ coefficients estimated from equation 1 estimated with a fuzzy RD that instruments ESMWT participation with the entry-exams score. *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. Standard errors are clustered at the decimal-point entry-exam score bin level. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.16: Robustness Check on Self-Employment and Entrepreneurial Activities – Fuzzy RD Specification

	Owner	(Co) Founder	Innovative Business	Consulting	SBIC
	(1)	(2)	(3)	(4)	(5)
Enrollment	0.109***	0.098***	0.038***	0.055***	0.029***
	(0.029)	(0.026)	(0.010)	(0.015)	(0.009)
Observations	127,813	124,172	117,222	120,876	119,054
Bandwidth	2.72	2.64	2.49	2.57	2.53

Notes. *Notes*. γ coefficients estimated from equation 1 estimated with a fuzzy RD that instruments ESMWT participation with the entry-exams score. *Owner*, *(Co) Founder*, *Innovative Business*, *Consulting*, *SBIC* are indicators for managers who became firm owners, were (co)founders of a new firm, founded a new business (defined as the first in the county), founded a consulting firm or a small business investment company (SBIC). Pre-program mean refers to the mean of outcomes on the two sides of the cut-off the month before ESMWT enrollment. Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from the 80-point threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.17: Robustness Check on Promotions – Placebo Tests

	Promotion	Plant Manager	General Manager	Top Executive	CEO
	(1)	(2)	(3)	(4)	(5)
Panel A: Threshold=70					
Enrollment	0.010	0.006	0.005	0.002	0.002
	(0.011)	(0.009)	(0.009)	(0.006)	(0.005)
Observations	129,476	100,082	112,298	117,857	119,531
Bandwidth	2.74	2.11	2.37	2.49	2.52
Panel B: Threshold=75					
Enrollment	0.009	0.007	0.006	0.003	0.002
	(0.013)	(0.008)	(0.005)	(0.006)	(0.005)
Observations	140,956	115,941	126,927	129,044	134,764
Bandwidth	2.65	2.17	2.38	2.42	2.53
Panel C: Threshold=85					
Enrollment	0.011	0.009	0.006	0.004	0.002
	(0.010)	(0.012)	(0.008)	(0.009)	(0.004)
Observations	85,294	70,604	76,149	79,772	82,025
Bandwidth	2.61	2.16	2.33	2.44	2.51
Panel D: Threshold=90					
Enrollment	0.012	0.009	0.007	0.004	0.001
	(0.013)	(0.011)	(0.009)	(0.006)	(0.005)
Observations	45,777	37,186	42,304	43,232	44,333
Bandwidth	2.57	2.10	2.38	2.43	2.49

Notes. γ coefficients estimated from equation 1 using a fake discontinuity at 70 (Panel A), 75 (Panel B), 85 (Panel C), and 90 (Panel D) point threshold. *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from each panel threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.18: Robustness Check on Self-Employment and Entrepreneurial Activities – Placebo Tests

	Owner	(Co) Founder	Innovative Business	Consulting	SBIC
	(1)	(2)	(3)	(4)	(5)
Panel A: Threshold=70					
Enrollment	0.010	0.008	0.005	0.003	0.001
	(0.014)	(0.012)	(0.006)	(0.004)	(0.003)
Observations	126,677	118,803	118,309	117,857	119,264
Bandwidth	2.68	2.51	2.50	2.49	2.52
Panel B: Threshold=75					
Enrollment	0.012	0.009	0.004	0.003	0.002
	(0.011)	(0.010)	(0.006)	(0.005)	(0.004)
Observations	144,655	135,782	133,730	131,124	135,259
Bandwidth	2.72	2.55	2.51	2.46	2.54
Panel C: Threshold=85					
Enrollment	0.014	0.010	0.005	0.004	0.002
	(0.013)	(0.011)	(0.006)	(0.005)	(0.005)
Observations	86,601	82,025	82,635	79,772	82,343
Bandwidth	2.65	2.51	2.53	2.44	2.52
Panel D: Threshold=90					
Enrollment	0.015	0.012	0.006	0.004	0.003
	(0.016)	(0.011)	(0.008)	(0.005)	(0.004)
Observations	46,349	45,966	44,891	42,703	45,432
Bandwidth	2.60	2.58	2.52	2.40	2.55

Notes. γ coefficients estimated from equation 1 using a fake discontinuity at 70 (Panel A), 75 (Panel B), 85 (Panel C), and 90 (Panel D) point threshold. *Owner*, *(Co) Founder*, *Innovative Business*, *Consulting*, *SBIC* are indicators for managers who became firm owners, were (co)founders of a new firm, founded a new business (defined as the first in the county), founded a consulting firm or a small business investment company (SBIC). Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from each panel threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.19: Robustness Check on Managers Promotions – Estimating Sample

	Promotion	Plant Manager	General Manager	Top Executive	CEO
	(1)	(2)	(3)	(4)	(5)
Panel A: Points above/below threshold=9					
Enrollment	0.256***	0.201***	0.168***	0.037***	0.024***
	(0.079)	(0.040)	(0.027)	(0.010)	(0.004)
Observations	128,267	102,305	109,844	116,344	118,143
Bandwidth	2.73	2.17	2.33	2.47	2.51
Panel B: Points above/below threshold=7					
Enrollment	0.256***	0.201***	0.168***	0.037***	0.024***
	(0.081)	(0.042)	(0.030)	(0.011)	(0.006)
Observations	127,362	103,175	108,400	118,589	119,511
Bandwidth	2.71	2.19	2.30	2.52	2.54
Panel C: Points above/below threshold=5					
Enrollment	0.256***	0.201***	0.168***	0.037***	0.024***
	(0.082)	(0.045)	(0.033)	(0.012)	(0.007)
Observations	124,579	101,842	107,924	121,851	120,432
Bandwidth	2.65	2.16	2.29	2.59	2.56
Panel D: Points above/below threshold=3					
Enrollment	0.256***	0.201***	0.168***	0.037***	0.024***
	(0.085)	(0.048)	(0.036)	(0.013)	(0.008)
Observations	126,878	104,129	105,980	115,414	121,392
Bandwidth	2.70	2.21	2.25	2.45	2.58

Notes. γ coefficients estimated from equation 1 using as estimating sample managers whose entry-exam score ranged from 9 (Panel A), 7 (Panel B), 5 (Panel C), and 3 (Panel D) points above and below the threshold. *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from each panel threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.20: Robustness Check on Self-Employments and Entrepreneurial Activities – Estimating Sample

	Owner	(Co) Founder	Innovative Business	Consulting	SBIC
	(1)	(2)	(3)	(4)	(5)
Panel A: Points above/below threshold=9					
Enrollment	0.109***	0.098***	0.038***	0.055***	0.029***
	(0.030)	(0.027)	(0.007)	(0.016)	(0.006)
Observations	128,743	122,762	117,222	119,986	113,578
Bandwidth	2.74	2.61	2.49	2.55	2.41
Panel B: Points above/below threshold=7					
Enrollment	0.109***	0.098***	0.038***	0.055***	0.029***
	(0.031)	(0.029)	(0.009)	(0.017)	(0.008)
Observations	127,813	121,392	114,953	118,143	115,414
Bandwidth	2.72	2.58	2.44	2.51	2.45
Panel C: Points above/below threshold=5					
Enrollment	0.109***	0.098***	0.038***	0.055***	0.029***
	(0.033)	(0.030)	(0.011)	(0.018)	(0.009)
Observations	128,743	118,143	113,578	119,054	117,222
Bandwidth	2.74	2.51	2.41	2.53	2.49
Panel D: Points above/below threshold=3					
Enrollment	0.109***	0.098***	0.038***	0.055***	0.029***
	(0.035)	(0.033)	(0.013)	(0.020)	(0.010)
Observations	130,102	116,344	115,887	118,143	120,876
Bandwidth	2.77	2.47	2.46	2.51	2.57

Notes. γ coefficients estimated from equation 1 using as estimating sample managers whose entry-exam score ranged from 9 (Panel A), 7 (Panel B), 5 (Panel C), and 3 (Panel D) points above and below the threshold. *Owner*, *(Co) Founder*, *Innovative Business*, *Consulting*, *SBIC* are indicators for managers who became firm owners, were (co)founders of a new firm, founded a new business (defined as the first in the county), founded a consulting firm or a small business investment company (SBIC). Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from each panel threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.21: Robustness Check on Managers Promotions – Including Re-Applicant Managers

	Promotion	Plant Manager	General Manager	Top Executive	CEO
	(1)	(2)	(3)	(4)	(5)
Panel A: Considering the first score in the entry exam					
Enrollment	0.255***	0.203***	0.162***	0.038***	0.027***
	(0.071)	(0.042)	(0.024)	(0.011)	(0.003)
Observations	130,421	103,908	110,871	118,002	119,334
Bandwidth	2.75	2.13	2.30	2.41	2.54
Panel B: Considering the highest score in the entry exam					
Enrollment	0.259***	0.205***	0.166***	0.041***	0.029***
	(0.073)	(0.040)	(0.023)	(0.010)	(0.004)
Observations	130,466	104,384	111,022	120,209	118,641
Bandwidth	2.76	2.20	2.32	2.55	2.51

Notes. γ coefficients estimated from equation 1 using as including 24,509 managers that scored below the threshold at their first attempt and reapplied to the ESMWT, assigning to them the first (Panel A) or the highest (Panel B) score earned in the entry-exam. *Promotion* is an indicator for managers that were promoted at least one in their career, relative to the position held at the time of ESMWT application. *Plant* and *General Manager* are indicators for managers that became plant or general managers. *Top Executive* and *CEO* are indicators for managers that became top executives or CEOs. Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from each panel threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.22: Robustness Check on Self-Employments and Entrepreneurial Activities – Including Re-Applicant Managers

	Owner	(Co) Founder	Innovative Business	Consulting	SBIC
	(1)	(2)	(3)	(4)	(5)
Panel A: Considering the first score in the entry exam					
Enrollment	0.106***	0.097***	0.039***	0.053***	0.030***
	(0.028)	(0.0257)	(0.006)	(0.012)	(0.005)
Observations	130,012	124,094	119,347	121,698	115,038
Bandwidth	2.76	2.64	2.52	2.58	2.47
Panel B: Considering the highest score in the entry exam					
Enrollment	0.112***	0.103***	0.040***	0.059***	0.034***
	(0.031)	(0.029)	(0.009)	(0.017)	(0.008)
Observations	129,244	123,571	116,785	119,879	117,415
Bandwidth	2.71	2.53	2.48	2.54	2.41

Notes. γ coefficients estimated from equation 1 using as including 24,509 managers that scored below the threshold at their first attempt and reapplied to the ESMWT, assigning to them the first (Panel A) or the highest (Panel B) score earned in the entry-exam. *Owner*, *(Co) Founder*, *Innovative Business*, *Consulting*, *SBIC* are indicators for managers who became firm owners, were (co)founders of a new firm, founded a new business (defined as the first in the county), founded a consulting firm or a small business investment company (SBIC). Standard errors are clustered at the decimal-point entry-exam score bin level. Bandwidths are chosen using the MSE optimal procedure suggested by Calonico et al. (2017) and are reported in exam score distance from each panel threshold. Data are provided at the individual level from the U.S. Office of Education ESMWT registries and from university and college reunion books.

Table A.23: Effects of ESMWT on War Facility Performance

	Plants	Value Added	Sales	Employees	TFP
	(1)	(2)	(3)	(4)	(5)
Treated · During ESMWT	0.002	-0.022***	-0.025***	0.004	-0.015***
	(0.009)	(0.006)	(0.010)	(0.003)	(0.003)
Treated · Post ESMWT	0.005	0.076***	0.075***	0.005	0.066***
	(0.012)	(0.011)	(0.015)	(0.008)	(0.014)
Observations	1,549,464	1,549,464	1,549,464	1,549,464	1,549,464
p-value difference	0.000	0.000	0.000	0.000	0.000
War Facility FE	Yes	Yes	Yes	Yes	Yes
Month-Year FE	Yes	Yes	Yes	Yes	Yes

Notes. β and λ coefficients estimated from equation 2, estimated on the sample of 18,446 war facilities whose highest manager score was 3 points above or below the threshold. *Treated* is an indicator for war facilities whose highest manager score was above the 80-point ESMWT threshold. During ESMWT is an indicator for months during which at least an admitted manager was taking the ESMWT classes; Post ESMWT is an indicator for months after all admitted managers completed the ESMWT classes. *Plants* is total number of plants. *Value Added* and *Sales* are expressed in millions of 2020 USD. *Employees* is number of employees. *Productivity (TFP)* is logged total factor productivity revenue, estimated with the Gandhi et al. (2020)'s method. p-value difference is the p-value of testing for equality between the Treated·During ESMWT and the Treated·Post ESMWT coefficients. Data are provided at the facility level from the Manpower Commission Surveys.

Table A.24: Effects of ESMWT on Firm Performance, by Share of Enrolled Managers

	Plants	Value Added	Sales	Employees	TFP
	(1)	(2)	(3)	(4)	(5)
Treated · Less 5%	0.002	0.021	0.026	0.004	0.018
	(0.002)	(0.020)	(0.022)	(0.005)	(0.019)
Treated · 5-10%	0.005	0.028	0.031	0.003	0.025
	(0.004)	(0.022)	(0.032)	(0.006)	(0.021)
Treated · 10-20%	0.007	0.071***	0.077***	0.005	0.069***
	(0.009)	(0.018)	(0.019)	(0.008)	(0.013)
Treated · 20-30%	0.008	0.093***	0.098***	0.004	0.089***
	(0.007)	(0.027)	(0.023)	(0.006)	(0.021)
Treated ·More 30%	0.004	0.158***	0.166***	0.003	0.151***
	(0.010)	(0.021)	(0.023)	(0.004)	(0.020)
Observations	1,549,464	1,549,464	1,549,464	1,549,464	1,549,464
War Facility FE	Yes	Yes	Yes	Yes	Yes
Month-Year ·N. of Managers FE	Yes	Yes	Yes	Yes	Yes

Notes. *Treated* is an indicator for war facilities whose highest manager score was above the 80-point ESMWT threshold. *Less 5*, *5-10%*, *10-20%*, *20-30%*, *More 30%* are indicators for less than 5, 5-10, 10-20, 20-30 and more than 30 percent of facility managers admitted to the ESMWT. The sample includes 18,446 war facilities whose highest scoring manager scored 3 points above or below the threshold. *Plants* is total number of plants. *Value Added* and *Sales* are expressed in millions of 2020 USD. *Employees* is number of employees. *Productivity (TFP)* is logged total factor productivity revenue, estimated with the Gandhi et al. (2020)'s method. Each regression controls for war facility fixed effects and fixed effects for month-year interacted with number of manager the month before the first facility manager applied for ESMWT. Data are provided at the facility level from the Manpower Commission Surveys.

Table A.25: Effects of ESMWT on Managerial Practices

	Treated · During ESMWT	Treated · Post ESMWT	Observations
	(1)	(2)	(3)
Factory Operations			
Maintenance of Machines and Safety	0.121***	0.451***	1,549,464
	(0.035)	(0.187)	
Interventions for Machine Repairs	-0.091***	-0.293***	1,549,464
	(0.015)	(0.056)	
Worker Injuries	-0.045***	-0.184***	1,549,464
	(0.007)	(0.058)	
Quality Control			
Statistical Control Output	0.149***	0.558***	1,549,464
	(0.021)	(0.123)	
Statistical Control Inputs	0.133***	0.532***	1,549,464
	(0.035)	(0.151)	
Scraped Output (percent)	-0.148***	-0.295***	1,549,464
	(0.031)	(0.098)	
Human Resources			
Bonus for Workers	0.045***	0.211***	1,549,464
	(0.011)	(0.046)	
Bonus for Managers	0.056***	0.225***	1,549,464
	(0.014)	(0.082)	
Absenteeism (percent)	-0.041***	-0.135***	1,549,464
	(0.012)	(0.033)	
Inventory Control			
Stock Monitoring	0.132***	0.349***	1,549,464
	(0.042)	(0.079)	
Statistical Records	0.145***	0.363***	1,549,464
	(0.038)	(0.052)	
Inventory/Current Assets (percent)	-0.058***	-0.251***	1,549,464
	(0.019)	(0.071)	
Sales and Order Control			
Production Planning	0.064***	0.443***	1,549,464
	(0.011)	(0.108)	
Order Prioritization	0.065***	0.518***	1,549,464
	(0.012)	(0.163)	
Late Delivered Orders (percent)	-0.048***	-0.192***	1,549,464
	(0.010)	(0.031)	

Notes. *Maintenance of Machines and Safety*, *Statistical Control Output* and *Inputs*, *Bonus for Workers* and *Managers*, *Stock Monitoring*, *Statistical Records*, *Production Planning*, and *Order Prioritization* are, respectively, indicators for facilities that perform regular maintenance of the machine and of safety conditions, systematically control production outputs and inputs, pay bonuses to workers and managers, monitor inventory, keep track of statistical records, plan production, and prioritize orders based on delivery deadlines. *Interventions of Machine Repairs* and *Worker Injuries* are monthly interventions for repairing machines and number of injured workers. *Scraped Output* and *Late Delivered Orders* are monthly percentage of scraped output out of total output and of orders delivered past deadline. *Absenteeism* is the ratio between days of absence and total worked days. *Inventory/Current Assets* is the ratio between facility inventory and its current assets. Data are provided at the facility level from the Manpower Commission Surveys.

Table A.26: Effects of ESMWT on Plant Practices, by Share of Managers

Observations: 1,549,464	Treated · Less 5% (1)	Treated · 5-10% (2)	Treated · 10-20% (3)	Treated · 20-30% (4)	Treated · More 30% (5)
Factory Operations					
Maintenance of Machines and Safety	0.368***	0.403***	0.444***	0.489***	0.551***
	(0.095)	(0.088)	(0.096)	(0.101)	(0.125)
Interventions for Machine Repairs	-0.243***	-0.289***	-0.298***	-0.301***	-0.334***
	(0.068)	(0.071)	(0.089)	(0.104)	(0.127)
Worker Injuries	-0.155***	-0.168***	-0.171***	-0.198***	-0.228***
	(0.044)	(0.049)	(0.055)	(0.061)	(0.089)
Quality Control					
Statistical Control Output	0.389***	0.451***	0.555***	0.669***	0.726***
	(0.071)	(0.077)	(0.181)	(0.109)	(0.123)
Statistical Control Inputs	0.377***	0.432***	0.543***	0.618***	0.690***
	(0.081)	(0.099)	(0.125)	(0.138)	(0.149)
Scraped Output (percent)	-0.201***	-0.222***	-0.298***	-0.329***	-0.425***
	(0.076)	(0.089)	(0.100)	(0.109)	(0.126)
Human Resources					
Bonus for Workers	0.044	0.059	0.167***	0.369***	0.416***
	(0.051)	(0.065)	(0.063)	(0.103)	(0.111)
Bonus for Managers	0.041	0.062	0.178***	0.392***	0.452***
	(0.054)	(0.067)	(0.066)	(0.106)	(0.115)
Absenteeism (percent)	-0.033	-0.049	-0.139***	-0.203***	-0.251***
	(0.038)	(0.054)	(0.031)	(0.045)	(0.061)
Inventory Control					
Stock Monitoring	0.221	0.287**	0.398***	0.405***	0.434***
	(0.202)	(0.144)	(0.107)	(0.131)	(0.127)
Statistical Records	0.238	0.291**	0.401***	0.438***	0.447***
	(0.218)	(0.150)	(0.113)	(0.119)	(0.138)
Inventory/Current Assets (percent)	-0.155	-0.189**	-0.271***	-0.309***	-0.331***
	(0.167)	(0.091)	(0.087)	(0.098)	(0.096)
Sales and Order Control					
Production Planning	0.231	0.309**	0.449***	0.479***	0.747***
	(0.216)	(0.155)	(0.102)	(0.109)	(0.169)
Order Prioritization	0.371	0.425**	0.540***	0.599***	0.655***
	(0.298)	(0.215)	(0.200)	(0.214)	(0.231)
Late Delivered Orders (percent)	0.108	0.176*	0.204***	0.223***	0.249***
	(0.078)	(0.089)	(0.069)	(0.067)	(0.071)

Notes. *Maintenance of Machines and Safety*, *Statistical Control Output* and *Inputs*, *Bonus for Workers* and *Managers*, *Stock Monitoring*, *Statistical Records*, *Production Planning*, and *Order Prioritization* are, respectively, indicators for facilities that perform regular maintenance of the machine and of safety conditions, systematically control production outputs and inputs, pay bonuses to workers and managers, monitor inventory, keep track of statistical records, plan production, and prioritize orders based on delivery deadlines. *Interventions of Machine Repairs* and *Worker Injuries* are monthly interventions for repairing machines and number of injured workers. *Scraped Output* and *Late Delivered Orders* are monthly percentage of scraped output out of total output and of orders delivered past deadline. *Absenteeism* is the ratio between days of absence and total worked days. *Inventory/Current Assets* is the ratio between facility inventory and its current assets. Data are provided at the facility level from the Manpower Commission Surveys.

Table A.27: Variation in Sections Composition

	Raw Mean (1)	Raw St. Dev. (2)	Residuals Mean (3)	Residuals St. Dev. (4)	Residuals Variation (%) (5)
Panel A: Manager Characteristics					
Age	27.61	1.59	0.00	0.95	59.75
Years of Education	18.34	0.51	0.00	0.36	70.55
Years of Tenure in War Facility	2.98	0.90	0.00	0.61	68.16
Years of Employment	4.87	1.90	0.00	1.19	62.59
Type of College Degree					
Economics and Business	0.49	0.51	0.00	0.30	59.41
STEM	0.46	0.47	0.00	0.32	68.18
Other	0.07	0.28	0.00	0.19	69.11
Gender	0.86	0.35	0.00	0.24	69.49
Race					
White	0.91	0.26	0.00	0.18	69.42
Afro-American	0.07	0.23	0.00	0.14	61.58
Other	0.02	0.15	0.00	0.10	64.63
Marital Status	0.53	0.48	0.00	0.33	67.72
Entry Exam Score	86.52	4.40	0.00	2.83	64.34
Observations	205,933	205,933	205,933	205,933	205,933
Panel B: Facility Characteristics					
Plants	2.68	0.78	0.00	0.49	62.82
Value Added	2,367.11	1,098.72	0.00	651.43	59.29
Sales	3,468.91	1,346.29	0.00	1,024.39	76.09
Employees	376.23	120.33	0.00	74.51	61.92
Productivity (TFP)	1.91	0.45	0.00	0.30	66.67
Manufacturing	0.74	0.41	0.00	0.31	75.61
Number of Facilities	23.46	4.38	0.00	3.08	70.32
Number of Listed Facilities	5.45	1.59	0.00	1.15	72.33
Observations	37,654	37,654	37,654	37,654	37,654

Notes. Columns 1 and 2 report the average section pre-determined manager (Panel A) and facility (Panel B) characteristics. Columns 3 and 4 report the residuals mean and standard deviation after controlling for university and application window fixed effects. Column 5 reports the residual variation in percentage terms (column 4/column 2). *Age* is manager age at time of ESMWT application. *Years of Education*, *of Tenure in War Facility*, and *of Employment* are, respectively, the number of years of education, of work in the war industrial facility they were employed at when they applied for ESMWT, and total year of employment. *Economics and Business* is an indicator for managers with a B.A. in either economics or business, *STEM* is an indicator for managers with a B.A. is a STEM (Science, Technology, Engineering, and Math) major, *Other* is an indicator for any other B.A. type. *Gender* is an indicator for male managers. *White* is an indicator for white managers, *Afro-American* is an indicator for managers classified as negroes, *Other* is an indicator for any other race. *Marital Status* is an indicator for married managers. *Entry Exam Score* is the score managers earned in the entry-exam. *Plants* is total number of plants. *Value Added* and *Sales* are expressed in millions of 2020 USD . *Employees* is number of employees. *Productivity (TFP)* is logged total factor productivity revenue, estimated with the Gandhi et al. (2020)'s method. *Manufacturing* is an indicator for facilities that operate in the manufacturing sector. *Number of Facilities* and *Number of Listed Facilities* are the number of different manager facilities and listed facilities. Data are provided at the individual level from the U.S. Office of Education ESMWT registries for 205,933 managers whose score in the entry exam was above the ESMWT 80-point threshold in Panel A and at the war facility level from the Manpower Commission Surveys for 37,654 war facilities whose higher applicant manager score was above the ESMWT 80-point threshold in Panel B.

Table A.28: Probability of Assignment to Sections Based on Race and Gender

	Share of Nonwhite Managers		Share of Female Managers	
	(1)	(2)	(3)	(4)
Nonwhite	0.001	0.003		
	(0.002)	(0.004)		
Female			0.003	0.004
			(0.005)	(0.006)
Observations	205,933	205,933	205,933	205,933
University FE	No	Yes	No	Yes
Application Window FE	No	Yes	No	Yes

Notes. *Female* and *Nonwhite* are indicators for nonwhite and female admitted managers. *Share of Nonwhite* and *Female Managers* are the correspondent shares by ESMWT sections. Controls for university and application windows shares of the same variables are included in the regressions but not reported. Data are provided at the individual level from the U.S. Office of Education ESMWT registries for 205,933 managers whose score in the entry exam was above the ESMWT 80-point threshold.

Table A.29: Effects of ESMWT Network on Manager Career Outcomes for Nonwhite and Female Managers

	Pr Moving to Mate Firms		Pr Promotion in Mate Firms		Pr Co-Funding Business with Mates	
	(1)	(2)	(3)	(4)	(5)	(6)
Share Nonwhite	-0.031***		-0.026***		-0.028***	
	(0.006)		(0.004)		(0.007)	
Share Women		-0.035***		-0.029***		-0.023***
		(0.005)		(0.010)		(0.005)
Observations	20,595	30,882	20,595	30,882	20,595	30,882

Notes. *Pr Moving to Mate Firms*, *Pr Promotion in Mate Firms*, and *Pr Co-Funding Business with Mates* are the probability of moving to a firm where a section-mate worked, moving to a firm where a section-mate worked and being promoted, and co-founding a business with a section-mate. *Share Nonwhite* and *Women* are, respectively, the share of nonwhite and female managers per section. Data are provided at the individual level from the U.S. Office of Education ESMWT registries for 20,595 nonwhite managers and 30,882 female managers whose score in the entry exam was above the ESMWT 80-point threshold.

B Data Collection and Dataset Construction

In this Appendix, I provide a detailed description of the data collection process and how the datasets used in the main analysis have been constructed. I also list, describe and define all the variables mentioned in the paper (Tables B.2 and B.3).

B.1 Data Collection and Description of Primary Sources

Records of Managers that Applied to the ESMWT. The first step of the data collection targeted the universe of managers who applied for the managerial component of the ESMWT. I collected and digitized these data from the registries of the U.S. Office of Education, stored at National Archives and Record Administration (Record Group 12.5.8, "Records of the Engineering, Science, and Management War Training (ESMWT) Program" 1940-1945, College Park, MD). For each applicant manager, the registries contain the candidate full name, date and place of birth, a curriculum with information on education (type of B.A. and university attended) and employment (war facility in which the candidate was working, position, number of years spent there, and previous employment), as well as personal characteristics, such as gender, race and marital status, and the score in the ESMWT entry-exam. For managers who scored above the 80-point threshold information on courses taken, grades received and program completion are also available.

Career Outcomes of Applicant Managers. The second step of the data collection involved the reconstruction of the career outcomes of applicant managers. Since one condition for applying to the ESMWT was holding a college degree, both admitted and non-admitted managers had the opportunity to appear in the reunion books edited by the universities and colleges where they got their B.A. In order to appear in the reunion book, former students had to mail to their B.A. institutions a short piece of around 1,000 words with a description of life and family events, career achievements, hobbies, volunteer activities, and a picture, regardless the effective attendance of the reunion events. Slightly more than half institutions applicant managers graduated from organized reunions every five years, with the others doing so every ten years. While the content included in the books varies across students, universities and years, almost all entries contain student first and last name, date and place of birth, B.A. type, as well as information on current and past occupations, the main outcome variables used in my analysis. In some instances additional details such as family status, volunteering activities, hobbies, short biographies or anecdotes about college years are available. I accessed reunion books either five or ten years since applicant manager's graduation year from the university and college archives, either directly or through several interlibrary borrowings at UCLA and Harvard University.

Linking with U.S. Office of Education Records. In the reunion books I searched for applicant manager's first and last name. Once an entry with the same first and last name and in the same B.A. institution of an applicant manager was found, I checked whether information on date and place of birth, and type of B.A. were consistent between reunion books and U.S. Office of Education. Only if *all* the data were consistently recorded across the two sources of data, I considered the manager matched and I recorded the career outcomes provided in the reunion books in that specific year. Using the same method, I linked managers *across* reunion books between 1945 and 1975. I did not find any records about reunions for ESMWT classes.

I matched 77.5 percent of applicant managers at least once between 1950 and 1970. While data on reunion attendance are not available on a large scale, anecdotical evidence collected from the university reunion summary suggests that in the 1950s and 1960s around 60 percent former students participated in reunions, while today the percentage is lower than 30 percent. The higher participation rate of applicant managers may be driven by two factors. First, appearing in a reunion book does not necessarily imply attending the in-person events. Second, most applicant managers worked fairly close to their B.A. institutions. Specifically, 71 percent of applicant managers worked within 50 miles of their B.A. institutions, and 85 percent in the same state at the time of ESMWT. This kept the monetary and time costs of attending reunions low.

Among the matched managers, all are linked within 10 years since the ESMWT, 93.41 percent also within 20 years, and 85.7 percent also within 30 years. The fact that the percentages remain fairly constant over years indicates that managers committed to reunion events tended to systematically attend them, a pattern still observed today, based on anecdotical evidence from the university reunion summary. Moreover, 4.5 and 8.3 percent of missing managers after 20 and 30 years are reported as dead by the reunion books. It is worth noting that these matching rates are substantially higher than those obtained through historical Census linking, that are below 30 percent (Bailey et al., 2020). This difference is due to several reasons. First, I match over type-written and not hand-written names, that dramatically reduces spelling mistakes, also kept low by the high education of applicant managers (Shen et al., 2021). Second, I rely on a much border set of matching variables, that includes date of birth, instead of age often misreported in Census data (Abramitzky et al., 2021). Third, applicant managers are a small positively selected sample of the entire Census population, that substantially cancels the probability of observing individuals with the exact same matching variables. Specifically, I do not find two or more individuals with the same first and last name, born in the same place in the same date that had graduated from the same institutions with the same major in the same year. Finally, as the reunion books report both the maiden and the married last names for women, I can also link female

managers, which is still not possible with Census data.

As shown in Table A.1, middle managers, more educated managers and managers with longer pre-ESMWT employment are more likely to be matched, as well as for female and nonwhite managers. By contrast, ESMWT participation does not increase the matching rate. This result is consistent with the fact that admitted managers who attended reunions were committed and not influenced by other educational attainments. While on average the matching rate for managers who scored above the 80-point threshold in the ESMWT entry-exam is slightly higher than for managers who scored below (80.31 vs 76.27 percent, Table A.1, columns 1 and 2), it becomes almost identical across the two groups ten points above and below the threshold, the sample used to estimate equation 1 (Table A.1, columns 4 and 5). Similarly, within three points from the threshold, the maximum bandwidth used while estimating equation 1, the matching rate is the same among the two groups (Table A.1, columns 7 and 8).

U.S. War Industrial Facilities. In order to apply to the ESMWT, managers had to be employed in war industrial facilities, civilian plants that, while did not receive war contracts from the U.S. government, were considered essential for war production, and therefore placed under the control of the War Production Boards (WPB). For this reason, such plants were surveyed by the regional Manpower Commissions that collected data on their performance and managerial practices implementation, monthly between October 1939 and June 1947. I collected and digitized this data from the National Archives and Record Administration (Record Group 179, "Records of the War Production Board [WPB]" 1940-1947, College Park, MD) for the 53,674 war industrial facilities where applicant managers were employed at the time of ESMWT application. The data contain detailed data on location and sector, as well as number of plants, value added, sales, number of employees, implementation of managerial practices in the areas of factory operations, quality control, human resources management, inventory control, and sales and order control. Moreover, they contain information on conditions of workers, such as injuries and absenteeism, and production, such as intervention for repairing machines, scrapped output, inventory, and late delivered orders.

Universities and Colleges that Hosted the ESMWT. I collected and digitized the list of the 218 institutions that hosted the managerial component of the ESMWT form the National Archives and Record Administration (Record Group 12.5.8, "Records of the Engineering, Science, and Management War Training (ESMWT) Program" 1940-1945, College Park, MD). I next accessed the ESMWT material stored at the university and college archives, either directly or through scanned copies or interlibrary borrowings at UCLA and Harvard University. Such material indicates which courses the university offered, the name and curricula of faculty who taught them, when they were trained to teach and where, enrollment reports, correspondence with ESMWT instructors in D.C. regarding courses, and

the yearly budget, and the overall cost of the program.

B.2 Definition of Manager Career Outcomes

Manager career outcomes are recorded from university and college reunion books. Since joining a reunion book was voluntary and the guidelines for the submitting a piece are fairly general, the information available shows a substantial heterogeneity. To define manager career outcomes consistently across individuals, institutions and years, I proceeded as follows. First, I establish managers job titles at the time of application to the ESMWT from the Manpower Commission Surveys, that categorized 18 job titles across 10 occupation rankings within the firm hierarchy, as shown in Table B.1. I then associate the occupations reported in the reunion books with the job titles defined by the Manpower Commission surveys.

Regarding the outcomes used in Section 5.1, I define the *probability of promotion* as an indicator for any advancement in the occupation ranking over the entire manager career. The choice of not looking at promotions within job titles is motivated by the fact that almost all applicants got such type of advancement at least once in their career, but also by the fact that small promotions may not be accurately reported in the reunion books, especially for low occupation ranking and over a five to ten year span. I define *probability of becoming plant* and *general managers* as indicators for promotions to plant and general manager levels, to measure career advancements to medium and high-ranking positions within firm middle management. Finally, I define the *probability of becoming top executive and CEOs* as indicators for any promotion to job titles within executive management, and promotions to CEO role. I do not use indicators for the probability of becoming vice-president or president, because the applicants who reached those roles are too few to make meaningful inference.

Regarding the outcomes used in Section 5.2, I define *probability of becoming business owner* and *co-founder* as indicators for applicants reporting to own and having co-founded their business. The *probability of co-found an innovative business* is defined as an indicator for having co-founded a business reported to be the first in the county or in the state of where applicants were operating. Finally, *probability of co-found consulting firms* and *SBICs* are indicators for reporting to having co-founded a consulting firm or a small business investment company (SBIC). SBICs, infant forms of venture capital companies formally recognized in 1958, relied on private investment fund managers to helping small U.S. businesses access long-term capital for growth and job creation (Zeidman, 1966).

Table B.1: Job Titles and Occupation Ranking by Manpower Commission Surveys

Job Title	Occupation Ranking	Category
Foreman Level I	I	Production Supervision
Foreman Level II	I	Production Supervision
Assembly Supervisor	I	Production Supervision
Line Supervisor	II	Production Supervision
Manufacturing Supervisor	II	Production Supervision
Department Head	III	Production Supervision
Operation Manager	IV	Middle Management
Division Manager	IV	Middle Management
Department Manager	V	Middle Management
Plant Manager	V	Middle Management
Regional Manager	VI	Middle Management
Operation Manager	VI	Middle Management
General Manager	VII	Middle Management
Chief Financial Officer (CFO)	VIII	Executive Management
Chief Operating Officer (COO)	VIII	Executive Management
Chief Executive Officer (CEO)	IX	Executive Management
Vice President	X	Executive Management
President	X	Executive Management

height

Notes. Job titles and occupation rankings recorded by the Manpower Commission Surveys for workers at war industrial facilities, collected from the National Archives and Record Administration (Record Group 179, "Records of the War Production Board [WPB]" 1940-1947, College Park, MD) for the 53,674 war industrial facilities where applicant managers were employed at the time of ESMWT application.

Table B.2: List of Variables, With Their Definitions, Sources and Years of Coverage – Applicant Managers (continues)

Variable	Definition	Sources and Years of Coverage
Age	Applicant age computed from date of birth at time of ESMWT application	ESMWT registries, 1941-1945
Years of Education	Applicant years of education computed from CV submitted at time of ESMWT application	ESMWT registries, 1941-1945
Years of Tenure in War Facility	Applicant years of work at war industrial facility computed from CV submitted at time of ESMWT application	ESMWT registries, 1941-1945
Years of Employment	Applicant total years of employment computed from CV submitted at time of ESMWT application	ESMWT registries, 1941-1945
Type of College Degree	Indicators for B.A. in either Economics and Business, STEM or other majors from CV submitted at time of ESMWT application	ESMWT registries, 1941-1945
Gender	Indicators for male and female applicants as declared in the ESMWT application	ESMWT registries, 1941-1945
Race	Indicators for white and nonwhite applicants as declared in the ESMWT application	ESMWT registries, 1941-1945
Marital Status	Indicators for married applicants as declared in the ESMWT application	ESMWT registries, 1941-1945
Entry-Exam Score	Scrore applicants received in entry-exam out of 100 points available	ESMWT registries, 1941-1945
Enrollment	Indicator for admitted managers that enrolled in the ESMWT	ESMWT registries, 1941-1945
Promotions	Indicator for any advancement in the occupation ranking over the entire manager career (see Table B.1)	Reunion Books, 1945-1975
Plant Managers	Indicator for promotions to plant manager role (see Table B.1)	Reunion Books, 1945-1975
General Managers	Indicator for promotions to general manager role (see Table B.1)	Reunion Books, 1945-1975
Top Executive	Indicator for any promotion with executive management roles (see Table B.1)	Reunion Books, 1945-1975
CEO	Indicator for any promotion to CEO role (see Table B.1)	Reunion Books, 1945-1975
Moving	Indicator for applicants that moved to another firm relative to the war industrial facility at time of ESMWT application	Reunion Books, 1945-1975
Middle Managers	Indicator for applicants that reached any middle management role conditional on moving to another firm	Reunion Books, 1945-1975
Top Managers	Indicator for applicants that reached any executive management role conditional on moving to another firm	Reunion Books, 1945-1975
Listed Firms	Indicator for applicants that moved to a listed firm	Reunion Books, 1945-1975
Fortune 500	Indicator for applicants that moved to a firm included in the Fortune 500 list	Reunion Books, 1945-1975
Owner	Indicators for applicants reporting to own their business	Reunion Books, 1945-1975
Co-Founder	Indicators for applicants reporting to have co-founded their business	Reunion Books, 1945-1975
Innovative Business	Indicators for applicants reporting to have co-founded the first type of business in county or state where they operated	Reunion Books, 1945-1975
Consulting	Indicators for applicants reporting to have co-founded a consulting company	Reunion Books, 1945-1975
SBIC	Indicators for applicants reporting to have co-founded a small business investment company (SBIC)	Reunion Books, 1945-1975

Table B.2: List of Variables, With Their Definitions, Sources and Years of Coverage – Applicant Managers (continued)

Variable	Definition	Source, Frequency and Years of Coverage
Moving to Mate Firms	Indicator for admitted managers who moved to a section-mate firm	ESMWT registries, 1941-1945 and Reunion Books, 1945-1975
Promotion in Mate Firms	Indicator for admitted managers who moved to a section-mate firm and was promoted	ESMWT registries, 1941-1945 and Reunion Books, 1945-1975
Co-Founding Business with Mates	Indicator for admitted managers who co-founded a business with section-mate	ESMWT registries, 1941-1945 and Reunion Books, 1945-1975
Share Mates Other Facilities	Share of section-mates working in a different war facility	ESMWT registries, 1941-1945 and Reunion Books, 1945-1975
Share Mates Larger Facilities	Share of section-mates working in a different and larger war facility	ESMWT registries, 1941-1945 and Reunion Books, 1945-1975
Share Mates Higher Sales Facilities	Share of section-mates working in a different war facility with higher sales	ESMWT registries, 1941-1945 and Reunion Books, 1945-1975
Share Mates Higher TFP Facilities	Share of section-mates working in a different war facility with higher TFP	ESMWT registries, 1941-1945 and Reunion Books, 1945-1975
Share Mates Listed Facilities	Share of section-mates working in a different war facility that is listed	ESMWT registries, 1941-1945 and Reunion Books, 1945-1975
Share of Nonwhite Managers	Share of nonwhite section-mates	ESMWT registries, 1941-1945 and Reunion Books, 1945-1975
Share of Female Managers	Share of female section-mates	ESMWT registries, 1941-1945 and Reunion Books, 1945-1975

Table B.3: List of Variables, With Their Definitions, Sources and Years of Coverage – War Industrial Facilities

Variable	Definition	Source, Frequency and Years of Coverage
Plants	Number of firm plants	Manpower Commission Surveys, 1939-1947
Value Added (k USD)	Difference between firm gross income and intermediate inputs	Manpower Commission Surveys, 1939-1947
Sales (k USD)	Annual revenues from sales	Manpower Commission Surveys, 1939-1947
Employees	Number of employees	Manpower Commission Surveys, 1939-1947
Productivity (TFP)	Total factor productivity, computed with the Gandhi et al. (2020)'s methodology	Manpower Commission Surveys, 1939-1947
Sector	Sector in which firm operated (agriculture, manufacturing, transportation or services)	Manpower Commission Surveys, 1939-1947
Maintenance of Machines and Safety	Indicator for firms reporting regular maintenance of machines and of safety conditions	Manpower Commission Surveys, 1939-1947
Interventions for Machine Repairs	Number of interventions for Machine Repairs	Manpower Commission Surveys, 1939-1947
Worker Injuries	Number of worker injuries	Manpower Commission Surveys, 1939-1947
Statistical Control Output	Indicator for firms reporting use of statistical techniques to control production outputs	Manpower Commission Surveys, 1939-1947
Statistical Control Inputs	Indicator for firms reporting use of statistical techniques to control production inputs	Manpower Commission Surveys, 1939-1947
Scraped Output (percent)	Percentage of scrapped output out of total production	Manpower Commission Surveys, 1939-1947
Bonus for Workers	Indicator for firms reporting to pay bonuses to workers	Manpower Commission Surveys, 1939-1947
Bonus for Managers	Indicator for firms reporting to pay bonuses to managers	Manpower Commission Surveys, 1939-1947
Absenteeism (percent)	Percentage of absent days out of available work days in a month	Manpower Commission Surveys, 1939-1947
Stock Monitoring	Indicator for firms reporting periodic control of stocks	Manpower Commission Surveys, 1939-1947
Statistical Records	Indicator for firms reporting systematic records of statistics on production	Manpower Commission Surveys, 1939-1947
Inventory/Current Assets (percent)	Value of inventory at cost out of firm current assets	Manpower Commission Surveys, 1939-1947
Production Planning	Indicator for firms reporting to plan production based on order delivery dates	Manpower Commission Surveys, 1939-1947
Order Prioritization	Indicator for firms reporting to prioritize orders based on delivery dates	Manpower Commission Surveys, 1939-1947
Late Delivered Orders (percent)	Percentage of late delivered orders out of total order s delivered in a month	Manpower Commission Surveys, 1939-1947

B.3 Estimation of TFP

To estimate total factor productivity (TFP), I use the methodology proposed by Gandhi et al. (2020, GNR), which develops a nonparametric estimation of gross-output production functions. For robustness, I show that my TFP results are robust to using different estimation methods, such Olley and Pakes (1996, OP), Levinsohn and Petrin (2003, LP), Ackerberg et al. (2015, ACF), and the Solow's residuals (Table B.4).

Table B.4: Effects of ESMWT on War Facility Performance

	GNR	OP	LP	ACF	Solow's Residuals
	(1)	(2)	(3)	(4)	(5)
Treated·During ESMWT	-0.015***	-0.012***	-0.015***	-0.014***	-0.013***
	(0.003)	(0.004)	(0.005)	(0.003)	(0.003)
Treated·Post ESMWT	0.066***	0.061***	0.068***	0.065***	0.063***
	(0.014)	(0.010)	(0.012)	(0.010)	(0.013)
Observations	1,549,464	1,549,464	1,549,464	1,549,464	1,549,464
War Facility FE	Yes	Yes	Yes	Yes	Yes
Month-Year FE	Yes	Yes	Yes	Yes	Yes

Notes. β and λ coefficients estimated from equation 2, estimated on the sample of 18,446 war facilities whose highest manager score was 3 points above or below the threshold. *Treated* is an indicator for war facilities whose highest manager score was above the 80-point ESMWT threshold. During ESMWT is an indicator for months during which at least an admitted manager was taking the ESMWT classes; Post ESMWT is an indicator for months after all admitted managers completed the ESMWT classes. TFP is computed using methodologies by Gandhi et al. (2020, column 1), Olley and Pakes (1996, column 2), Levinsohn and Petrin (2003, column 3), Ackerberg et al. (2015, column 4), and the Solow's residuals (column 5). Data are provided at the facility level from the Manpower Commission Surveys.

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