Discrimination, Managers, and Firm Performance: Evidence from "Aryanizations" in Nazi Germany*

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Abstract

Large-scale increases in discriminatory attitudes can lead to the dismissal of highly qualified business leaders who belong to targeted groups. We study how the forced removal of Jewish managers in Nazi Germany, caused by surging antisemitism, affected large firms. The loss of Jewish managers with certain qualifications led to large and persistent stock price reductions for affected firms. Dividend payments and returns on assets also declined. A back-of-the-envelope calculation suggests that the aggregate market valuation of firms listed in Berlin fell by 1.8 percent of German GNP. The findings imply that discrimination can lead to persistent and first-order economic losses.

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Large-scale increases in discriminatory attitudes can lead to the dismissal of highly qualified business leaders who belong to targeted groups. Recent political developments in several countries have renewed interest in the effects of this form of discrimination. For example, the travel ban on citizens of seven Muslim-majority countries has raised fears among large U.S. corporations that increasing discrimination will leave them unable to retain talent.[1] In Turkey, several thousand executives who follow the cleric Fethullah Gülen have been arrested or have fled overseas since 2016, fueling concerns of an economic collapse (New York Times 2017; The Economist 2017b). History is replete with cases where the rise of a discriminatory ideology forced highly qualified individuals to give up important positions in the economy. Examples include the forced internment of Japanese-Americans during World War II, the eviction of the entrepreneurial Huguenots from 17th century France, the expulsion of Asians from Uganda in 1972, and the emigration of ethnic Chinese from Indonesia following discriminatory laws in 1959 and anti-Chinese riots in 1998.[2]

Such discriminatory dismissals are, of course, extremely hurtful to the targeted individuals. But there is little evidence on whether such discrimination can cause economic losses for firms and the economy as a whole, beyond hurting the welfare of the discriminated individuals. In particular, it has not been established how easily firms can replace leaders who leave due to discrimination, which particular individual characteristics are hard to replace, and how long it can take firms to recover.

In this paper, we analyze one of the most horrendous episodes of discrimination in human history, the treatment of Jews in Nazi Germany. Our study examines how the removal of senior managers of Jewish origin, caused by the rise of antisemitism in Nazi Germany, affected large German firms. After the Nazis gained power on January 30, 1933, discrimination against Jews quickly became commonplace in Germany. By 1938, individuals with Jewish ancestry had effectively been excluded from the German economy. Using newly collected data, we show that firms that had employed managers of Jewish origin were unable to replace them adequately. The stock prices, dividend payments, and returns on assets of these firms declined persistently after 1933 and did not recover for at least 10 years, the end of our sample period. Losing managers with university degrees and with connections to other firms was particularly harmful, while losing experienced managers had little effect. A back-of-the-envelope calculation suggests that removing managers

[1] Concerned firms include Amazon (Wingfield and Wakabayashi 2017), Nike (Cox 2017), MasterCard (McGregor 2017), and Ben & Jerry's (Solheim 2017).

[2] Japanese-Americans were on average highly educated and some were important managers, in particular in firms supplying agricultural products (Chin 2005). They were interned due to "race prejudice" (U.S. CWRIC 1982). The Huguenots (French Protestants) were among the "wealthiest merchants and most successful industrialists" and their influence on the French economy was "disproportionate to their numbers" (Scoville 1953). After 1685, over 200,000 Huguenots left France following religious persecution. Most settled in England, the Dutch Republic, and Prussia (for example, Hornung 2014). Asians made up less than one percent of the Ugandan population but owned 90 percent of businesses and paid 90 percent of tax revenue. In 1972, about 50,000 Asians were expelled by military ruler Idi Amin (BBC 2016). Ethnic Chinese have an "impressive business presence" in Indonesia and have faced repeated waves of ethnic discrimination since the 18th century (Koning 2007).

of Jewish origin reduced the aggregate market valuation of firms listed in Berlin by 1.8 percent of German gross national product.[3] This sizable decrease shows that the rise of a discriminatory ideology can lead to first-order and persistent economic losses, by causing the removal of qualified business leaders.

Before the rise of the Nazis, managers of Jewish origin played a key role in the German economy. In fact, the "economic role of Jews in Germany (...) was greater than that in Western industrialized countries like England, France, or Holland. It also exceeded almost certainly their role in the development of the American economy" (Mosse 1987, p. 23). Managers of Jewish origin were assimilated into the German economic elite. Intermarriages and conversions to Christianity were common. Managers of Jewish origin worked in all types of firms, including in some of the largest German firms that were not associated with Judaism in any way (for example, *Allianz*, *BMW*, *Daimler-Benz*, *Siemens & Halske*, and *I.G. Farben*). After the Nazis gained power, antisemitism surged across the whole economy and German firms began to dismiss managers of Jewish origin. *Deutsche Bank*, for example, forced CEO Oscar Wassermann and executive board member Theodor Frank to resign their positions by June 1, 1933 (James 2001, pp. 25-26). The dismissals targeted a range of individuals, including managers who had converted to Christianity in the 19th century or Christians who had just one Jewish ancestor. Firms that happened to employ managers of Jewish origin lost a significant fraction of their senior managers as a result of antisemitic discrimination. Other firms did not have any managers of Jewish origin and, therefore, remained unscathed.

To carry out our analysis, we collect the names and characteristics of individuals holding around 30,000 senior management positions in all 655 German firms listed on the Berlin Stock Exchange. We also digitize more than 240,000 daily stock prices from a historic publication series by the Berlin Stock Exchange, and data on dividends and returns on assets from historic volumes of *Handbuch der deutschen Aktiengesellschaften*. We consult various historical sources to identify which managers were of Jewish origin. While the fraction of Jews among the German population in the early 1930s was only 0.8 percent, our new data show that 15.8 percent of senior management positions in listed firms were held by individuals of Jewish origin in 1932. We find that the share of managers of Jewish origin (which for simplicity we call "Jewish managers") was roughly constant between 1928 and 1932, plunged dramatically in 1933 (by about a third), and dropped to practically zero in 1938. Jewish managers had exceptional characteristics compared to other managers in 1932. For example, Jewish managers were on average more experienced, more likely to hold a university degree, and more connected to other firms, as measured by seats on the supervisory boards of other firms.

[3]This number is likely to be a lower bound for the aggregate economic losses to the German economy due to antisemitic discrimination, since Jews were also removed from lower-level positions, firms not listed in Berlin, and important positions in universities, law courts, hospitals, orchestras, theaters, and other institutions. Of course, this number also does not attempt to do justice to the indescribable human suffering and loss of life that the Nazi ideology brought on Jews and other targeted groups.

We present four main sets of results. We first show that losing the Jewish managers changed the observable characteristics of managers at firms that had employed a higher fraction of Jewish managers in 1932. The number of managers with firm-specific tenure, general managerial experience, university degrees, and the total number of connections to other firms fell significantly, relative to firms that had not employed any Jewish managers in 1932. The effects on all management characteristics persisted at least until 1938, the end of our sample period on manager characteristics.

In the second set of results, we show that the loss of Jewish managers affected firms' stock prices. The stock price of the average firm that had employed Jewish managers in 1932 (where 22 percent of managers had been of Jewish origin) declined by 10.3 log points after the Nazis came to power, relative to a firm without Jewish managers in 1932. We also estimate the timing of the stock price drop. Before the Nazis came to power, stock prices of firms with a higher fraction of Jewish managers were not on differential trends. Starting in 1933, when Jewish managers were forced out of their firms, stock prices of firms with a higher fraction of Jewish managers declined sharply. These losses persisted until the end of the stock price sample period in 1943, 10 years after the Nazis had gained power. The stock price results are unchanged when we control for several firm observables, such as connections to the Nazi Party (Ferguson and Voth 2008), firm size, age, and industry. The results are also similar in a sample of firms that all had at least one Jewish manager (using only intensive margin variation in the fraction of Jewish managers in 1932 to identify the effect).

We proceed to investigate whether stock price fell because firms lost managers with specific characteristics. The results indicate that stock prices only declined for firms that had at least one of two features: first, firms that lost a large share of university-educated managers; and second, firms that lost a large share of total managerial connections (measured by seats on other firms' supervisory boards). Stock prices did not fall for other firms that lost Jewish managers. In particular, there were no effects for firms that lost small shares of their university-educated and connected managers or for firms that lost experienced managers. This is an important finding. It implies that *not all* firms with a higher fraction of Jewish managers in 1932 experienced lower stock prices after 1933. Hence, it is unlikely that other shocks to firms with Jewish managers in 1932 explain the declines in stock prices. Rather, the findings strengthen the view that losses of particular managerial characteristics (i.e. losses of educated and connected managers) lowered firm performance.

We explore further whether the declines in stock prices after 1933 were caused by the removal of Jewish managers or by other shocks that were correlated with the fraction of Jewish managers in 1932. We first consider shocks that resulted from the general increase in antisemitism after 1933. One possibility is that the Nazi government used repressive measures against firms that had employed Jewish managers in 1932. To explore this possibility, we restrict the sample to only firms favored by the Nazi government, such as firms that supported the Nazis before 1933 or firms that received forced labor from the Nazi government. The restriction reduces sample size from 655 to

171 firms, but the estimated effect of losing Jewish managers remains of similar magnitude and statistically significant. This suggests that repression by the Nazi government does not explain the effect of losing Jewish managers.

To further investigate the effect of shocks resulting from antisemitism, we identify firms that the public and the Nazis perceived to be "Jewish," using a range of historical sources.[4] It was well-known in Nazi Germany that these firms were connected to Judaism, so antisemitic measures by the government and the public were focused on these firms. We find that the stock prices of "Jewish firms" started to decline significantly after 1935. This is consistent with the historical literature, which argues that large firms associated with Judaism suffered from government repression after 1935 (Barkai 1990, p. 83; Strauss 1999, p. XVII; James 2001, p. 38). Importantly, we show that the effect of losing Jewish managers remains unchanged when we control for the effect on Jewish firms. Furthermore, comparing the evolution of stock prices of Jewish firms to firms that lost Jewish managers is revealing. The stock prices of Jewish firms fell in 1935 and recovered fully by 1943, once all formerly Jewish firms had been taken over by non-Jews. The stock prices of firms with Jewish managers in 1932 declined most strongly in 1933 and 1934, when firms started to remove Jewish managers, and remained low until 1943. The contrasting evolution of stock prices suggests that the effects of losing Jewish managers were not driven by government repression, losses of customers, or other forces that hit Jewish firms, but by forces specifically associated with the loss of Jewish managers.

We consider other potential shocks to firms that were driven by antisemitic discrimination and that may have been correlated with the fraction of Jewish managers in 1932. We find that a decrease in the number of lower-ranked Jewish employees is unlikely to drive the results, because the effects of losing Jewish managers are stable when we restrict the sample to regions and sectors that employed very few lower-ranked Jewish employees in 1933. The effects are also stable when we exclude firms with large Jewish investors or firms affected by antisemitic retail boycotts.

The second type of correlated shocks we consider stems from differential changes in firms' demand that are unrelated to antisemitic discrimination. The Nazi government started heavy rearmament and infrastructure programs after 1933. This disproportionately benefited firms in armament production and construction. We test whether firms in these sectors drive our results. First, we exclude from the sample all firms that appear on historical lists of suppliers to the Reichswehr. Second, we drop all firms in iron and steel production, machine tools, and chemicals, which amounts to dropping around half of our sample firms. Third, we exclude all firms in the construction sector. In all these different samples, the effects are similar to the baseline estimates. These results suggest that differences in exposure to Nazi rearmament or construction programs do not affect the results. Our final robustness check identifies firms that had international activities, using narra-

[4]This group of "Jewish firms" is distinct from firms with Jewish managers in 1932, since many German firms happened to employ managers of Jewish origin without being perceived as "Jewish", for example *BMW*, *Deutsche Reichsbahn*, or *I.G. Farben*.

tive evidence from historical firm records. International customers or trading partners may have reduced demand for the products of some firms in response to the rise of the Nazis or the removal of Jewish managers. When we exclude firms with international activities from the sample, the findings remain essentially unchanged. Taken together, all these tests confirm that other shocks, due to rising antisemitic discrimination or due to differences in demand, do not explain the stock price declines for firms that lost Jewish managers.

In the third set of results, we estimate the aggregate cost of losing Jewish managers for firms listed in Berlin. A back-of-the-envelope calculation shows that the loss of the Jewish managers reduced the market capitalization of the average listed firm by 5.2 percent after 1933. This implies a decrease in the aggregate market valuation of 1.8 percent of German GNP. This result shows that discrimination can cause serious economic losses when it leads to the exclusion of qualified individuals from leading positions. The calculation assumes that removing the Jewish managers from affected firms had negligible spillover effects on firms that had not employed any Jewish managers in 1932. We test for such spillovers within regions and industries, and find statistically insignificant and negative spillover effects. This suggests that the calculation might, if anything, underestimate the aggregate loss for listed firms.

In the fourth set of results, we analyze the effects of losing Jewish managers on two additional measures of firm performance, dividend payments and returns on assets. We find that after 1933, dividend payments fell by approximately 7.5 percent for the average firm with Jewish managers in 1932 (which lost 22 percent of its managers). This magnitude is similar to the fall in stock prices, which suggests that investors priced the stocks proportional to the dividends. We also find that after 1933, the average firm that had employed Jewish managers in 1932 experienced a decline in its return on assets by 4.1 percentage points. These results indicate that the loss of Jewish managers not only reduced market valuations, but also led to real losses in firm efficiency and profitability.

This paper contributes to the literature by studying discriminatory removals of highly qualified individuals in leading positions, i.e. "discrimination at the top," and by studying whether discrimination causes economic losses beyond hurting discriminated individuals. The objective of our study differs from the existing discrimination literature, which has largely focused on discrimination against women, black people, and underprivileged groups.[5]

In the existing literature on discrimination against women and blacks, few papers analyze the effects of discrimination on firms. English soccer clubs with more black players achieve higher league positions, conditional on the wage bill (Szymanski 2000). Inspired by Becker's (1957) influential prediction that discrimination reduces firm profitability, a number of papers show that firms with a higher proportion of female employees earn higher profits and have longer survival rates (Hellerstein et al. 2002; Kawaguchi 2007; Weber and Zulehner 2014). In contrast, we propose

[5]The literature has largely analyzed whether discrimination against women and blacks affects individual hiring probabilities and wages (see Altonji and Blank 1999; Bertrand 2011; Bertrand and Duflo 2017 for extensive surveys).

a quasi-experimental research design to estimate firm-level effects: We identify an economy-wide increase in discrimination and then use firm-level variation in exposure to this shock to estimate how rising discrimination affects firms.

An additional innovation of our approach is that we use stock prices to measure the costs of discrimination for firms. Stock prices are a particularly attractive measure for the cost of discrimination for firms because stock prices represent the present discounted value of future cash flows from stock holdings. Hence, changes in stock prices fully incorporate how market participants value the long-run costs of discrimination. Furthermore, by aggregating the firm-level estimates we can approximate the aggregate cost of discrimination for all listed firms. The current literature contains little empirical evidence for how changes in discriminatory attitudes affect aggregate outcomes.[6] A large literature has used wages to measure discrimination. Fewer papers use other market prices. For example, an important paper by List (2004) uses trading prices of sportscards to analyze whether individuals from minorities face discrimination.

Another related literature studies management practices. Influential studies by Bloom and Van Reenen (2007) and Bloom et al. (2017) argue that good management practices are akin to a more efficient production technology. Gosnell et al. (forthcoming) show that adopting certain management practices raises worker productivity.[7] The results of our paper highlight a complementary channel: Management quality depends not only on adoptable and learnable management practices, but also on the exceptional human capital of individual managers who are hard to replace. Consistent with the findings of our paper, Kaplan et al. (2012) and Bandiera et al. (2017, forthcoming) document a relationship between firm performance and individual managers' ability and behavior, respectively.[8] We contribute to the literature by using a quasi-experimental research design. This allows us to show that losing educated and connected managers affects firm performance, while losing experienced managers does not. Furthermore, our approach enables us to trace firm performance over time. We show that the effects of losing managers can be large and can persist for at least 10 years after the initial shock. In contrast, most studies of manager deaths have focused on short-run effects. Studies of manager deaths find either small positive or small negative short-run stock returns, depending on the characteristics of the managers (Johnson et al. 1985; Worrell et al. 1986; Hayes and Schaefer 1999; Borokhovich et al. 2006; Salas 2010; Nguyen and Nielsen 2010; Fee et al. 2013; Jenter et al. 2017).[9]

[6]Hsieh et al. (forthcoming) use a structural Roy model to argue that declining discrimination against women and blacks raised U.S. aggregate productivity.

[7]Some studies find that training firms to improve general management practices can improve firm performance (Bruhn et al. 2010, 2018; Bruhn and Zia 2013; Bloom et al. 2013a, forthcoming; Drexler et al. 2014; Giorcelli 2019). Other studies report limited effects (Cole et al. 2011; Karlan and Valdivia 2011; Karlan et al. 2015). This suggests the effects may vary by the nature of training or firm type, size, or the available human capital in the firm.

[8]More generally, Bertrand and Schoar (2003) find evidence that there are differences in "style" across managers, while Malmendier and Tate (2005) focus on the effects of overconfident managers on corporate investment decisions.

[9]Unlike many older managers who die, the Jewish managers in our setting were often at the peak of their ability. Also related, Bennedsen et al. (2016) analyze temporary manager absences due to hospitalizations, finding transient

Finally, we show that the loss of the Jewish elite affected the German economy. Our specific contribution is to highlight the cost for firms. Related, the dismissal of Jewish scientists and teachers in Nazi Germany reduced the output of German science departments (Waldinger 2010, 2012, 2016) and harmed the education of students (Akbulut-Yuksel and Yuksel 2015). In Russia, the severity of the Holocaust was associated with long-run political and economic outcomes of cities and regions (Acemoglu et al. 2011; Grosfeld et al. 2013).

1 Historical Context

1.1 Jews in the German Economy

Following the partial emancipation of Jews in the wake of the Napoleonic wars, and in particular following the full emancipation during German unification in 1871, Jews became increasingly influential in the German economy. They founded many important firms and became leading managers in some of the largest German corporations. In 1908, 22 percent of the richest 747 Prussians with fortunes exceeding 5 million Mark were of Jewish origin (Mosse 1987, p. 6). In 1928, Jews paid more than 30 percent of Berlin's city taxes, despite being only 5 percent of the population (Elon 2003, p. 259). Notwithstanding occasional episodes of antisemitism, German Jews were almost entirely assimilated, especially among the economic elite. Inter-religious marriages were common in the decades before 1933.[10] Historians have argued that one could hardly differentiate a Jewish economic elite from a non-Jewish elite during the years of the Weimar Republic (for example Münzel 2006, p. 89).

1.2 The Rise of the Nazi Party

The antisemitic National Socialist German Workers' Party (NSDAP), commonly referred to as the Nazi Party, received only 2.6 of votes in the May 1928 election to the German Reichstag. In the wake of the Great Depression, the party's vote share rose to 37.3 percent in the July 1932 election. In the following election in November 1932, the Nazi's vote share declined to 33.1 percent, and many political observers predicted a gradual decline of the Nazi movement (see for example Enderis 1933, a New York Times article published on January 1, 1933). Despite the declining vote share of his party, a political vacuum allowed Hitler to become chancellor on January 30, 1933. In the following

effects on firms. Ahern and Dittmar (2012) report that stock returns declined when the Norwegian gender quota for corporate boards was first discussed, but Nygaard (2011) documents positive returns and Eckbo et al. (2016) find no significant effect on returns when the quota became mandatory. For small and young startups in Norway, Becker and Hvide (2017) report that the death of the founding entrepreneur reduced growth of the startup.

[10] Intermarriage between Jews and Christians increased from 8.4 percent in 1901 to 29.9 percent in 1915. Baptisms of Jewish men jumped from 8.4 percent in 1901 to 21 percent in 1918 (Elon 2003, p. 229). These numbers were presumably higher during the Weimar Republic and in particular among the economic elite.

months and years, the Nazi government started a host of measures targeting Jews that ultimately culminated in the Holocaust.

1.3 "Aryanizations" of Stock-Market Listed Firms

The Nazi government did not pass any laws that explicitly forced private firms to dismiss Jewish employees before 1938. Nonetheless, many Jewish managers lost their positions as early as 1933, because of the rise of antisemitism.[11] As the dismissals were not guided by formal rules, the "forced resignation of Jews from the boards of (...) enterprises (...) was a gradual process effected with widely differing degrees of dignity and consideration" (Mosse 1987, p. 376). Many listed firms exploited laws and events that did not directly affect them to remove Jewish managers. For example, the law specifying the dismissal of Jewish civil servants of April 7, 1933 applied only to managers in firms that were majority-owned by the state (Münzel 2006, pp. 126-128). Some privately owned firms nevertheless used the law as a pretext to dismiss Jewish managers.

In the following years, more and more Jewish managers were forced out of their firms. By 1938, virtually all Jewish managers had left their firms, sometimes because non-Jews saw the political situation as an opportunity to further their own careers by pushing Jews out or because Jewish managers migrated abroad to escape rising discrimination.[12] Following the ordinance on the "Elimination of Jews from the German Economy" from November 12, 1938, all joint stock firms were forced to dismiss remaining Jewish board members to avoid being liquidated (Benz 1988, pp. 324).

The timing of the actual removal of the Jewish managers may have been endogenous to firm performance, as firms tend to dismiss managers when firms are performing poorly (Murphy and Zimmerman 1993; Denis and Denis 1995; Hayes and Schaefer 1999; Fee et al. 2013; Jenter and Lewellen 2017). We therefore use variation in the fraction of Jewish managers in 1932 as the treatment variable in our analysis.

Our newly collected data on managers in all German firms that were listed in Berlin show how the loss of Jewish managers affected firms. We find that Jews were over-represented among senior managers relative to their population share of 0.8 percent. Jews held between 15 percent and 16 percent of senior management positions in 1928 and 1932 (Figure 1). By the end of 1933, the fraction

[11] The racist neologism "Aryanization" was coined during the 1930s. In the historical literature the term "Aryanization" is used as a synonym for the exclusion of Jews from the German economy (see Bajohr 2002, p. 11, for a discussion of the term). In particular, the term is used for three different types of discriminatory measures against Jews: first, the removal of Jews from senior management positions in large German firms (Münzel 2006); second, the forced sale or liquidation of smaller Jewish firms (Bajohr 2002, Kreutzmüller 2017); and third, discrimination against Jewish firms by customers, suppliers, and/or the government. In this paper we focus on the first type of "Aryanization."

[12] Of the approximately 522,000 German Jews, around 304,000 managed to emigrate before the beginning of World War II (United States Holocaust Memorial Museum 2017). The main destinations of Jewish managers were the United States, the United Kingdom, Switzerland, the Netherlands, and France (Münzel 2006, p. 246). Most of the rest were brutally murdered in concentration camps. Victims included the former *Commerzbank* executives Albert Katzenellenbogen and Ludwig Berliner and the former *Leonhard Tietz AG* executive Franz Baumann. Very few survived the Holocaust in Germany.

of Jewish managers had fallen by about one third. By 1938, virtually no Jewish managers remained in firms that were listed in Berlin.

1.4 The Berlin Stock Exchange

The Berlin Stock Exchange was by far the largest stock exchange in 1930s Germany and one of the largest in the world, at the level of the stock exchanges in London or Paris. It generated about 66 percent of financial transaction tax revenue in Germany. Most major German firms were listed in Berlin. The next-largest German stock exchanges generated 12 percent (Frankfurt) and 9 percent (Hamburg) of transaction tax revenue (Gömmel and Pohl 1992, p. 179). The evidence in Ferguson and Voth (2008) and our results on the stock prices of "Jewish firms" in Section 4.1 below show that stock prices adjusted quickly and in predictable ways to the release of new information. This suggests that we can use stock prices from 1930s Berlin to meaningfully measure the impact of removing the Jewish managers.

2 Data

2.1 Data on Senior Managers of Listed Firms

Data on Managers

One contribution of this paper is to construct a comprehensive new database that contains the names and characteristics of all senior managers of German firms listed on the Berlin Stock Exchange in 1932. We collect the data using a range of historical sources. The 1932 edition of the *Handbuch der deutschen Aktiengesellschaften* contains information on all senior managers (executive and supervisory board members) of German joint stock firms. We extract information for all firms that were listed in Berlin in 1932.[13] The 655 firms in our sample employed 4,873 senior managers, holding a total of 7,791 positions in 1932 (Table 1).[14] We collect similar data for the years 1928, 1933, and 1938 from the respective volumes of the *Handbuch der deutschen Aktiengesellschaften*, as detailed in Data Appendix B.1.

Identifying Jewish Managers

The *Handbuch der deutschen Aktiengesellschaften* does not report information on the Jewish origin of managers. We therefore consult multiple additional sources to identify Jewish managers. Münzel

[13] In 1932, a total of 784 stocks were listed on the Berlin Stock Exchange. The *Handbuch der deutschen Aktiengesellschaften* reports only information on German firms, so we exclude 25 stocks of foreign firms. We also exclude eight stocks for which the *Handbuch* does not report board members and two stocks that were never traded in our sample period. A total of 41 firms issued multiple stocks (for example *Hermes Kreditversicherungsbank A.G.* issued two stocks), so we choose the most frequently traded stock for these firms. Of the remaining 708 firms, we exclude 16 stocks of firms in liquidation and 37 stocks of firms that merged with other firms during our sample period.

[14] Some managers held multiple positions because they could hold both executive and supervisory board positions in the same firm, or executive positions and/or supervisory positions in multiple firms.

(2006) lists Jewish managers in the 300 largest joint stock firms and Windolf (2011) compiles a list of Jewish managers in German firms. The *Biographisches Handbuch der deutschsprachigen Emigration nach 1933* contains short biographies of Jewish business people who emigrated from Nazi Germany. Köhler (2008) studies private bankers of Jewish origin. For managers who did not appear in these sources, we conduct a manual search in the online database *World Biographical Information System* (WBIS). The database combines information from various collections of biographies, for example *Deutsches Biographisches Archiv* (DBA) and *Jüdisches Biographisches Archiv* (JBA), which allow us to infer whether a manager was of Jewish origin. Finally, we hand-check all managers who did not appear in the previous sources by conducting an internet search to find information on their religion. Further details on the data collection are in Data Appendix B.1.

We classify managers as Jewish based on who was considered Jewish in Nazi Germany. This classification includes practicing Jews, such as banker Max Warburg who was active in the Jewish community of Hamburg. It also includes individuals with Jewish ancestors who had converted to Christianity, in many cases already during the 19th century; this definition includes, for example, *I.G. Farben* manager Carl von Weinberg.[15] All these managers were forced out of their firms because of their Jewish ancestry.

Our data show that 423 of 4,873 managers (around 9 percent) were individuals of Jewish origin (Table 1) in 1932. They held 1,230 out of 7,791 manager positions (around 16 percent).[16] Using our data, we show that already in 1933 one third of the Jewish managers were dismissed from their positions and by 1938 virtually all Jewish managers had been dismissed (Figure 1).

Characteristics of Managers

We extract information on the characteristics of managers for the years 1928, 1932, 1933, and 1938 from the respective volumes of the *Handbuch der deutschen Aktiengesellschaften*, as detailed in Data Appendix B.1.2. Overall, we collect data on 29,834 manager positions for these four years. Table 1 summarizes the manager characteristics for 1932, the year before the Nazis came to power. While about 1 percent of the relevant age cohorts were studying at a university at the turn of the century (Windolf 1990), 36 percent of managers held a university degree. This figure was even higher for Jewish managers, 45 percent of whom held a university degree. Similarly, Jewish managers were more likely to hold the honorary title of *Kommerzienrat* (8.8 versus 4.3 percent). This title was granted by the German Emperor to individuals who made outstanding contributions to society. It is roughly comparable to the honors system of the United Kingdom today.[17] The greater prevalence

[15]This approach follows the definition of the historical literature on Jews in the Germany economy (see for example the discussions in Mosse 1987 and Münzel 2006, pp. 80-92).

[16]This fraction is identical to the one reported by Windolf (2011) in his historical study about the German-Jewish economic elite.

[17]Businessmen could apply for the title of *Kommerzienrat*. A rigorous selection process based on wealth, income, public service, charitable activities, and standing among peers ensured that only the most successful businessmen were awarded the coveted title (for more information see Mosse, 1987, pp. 3). In 1919, the German Reich officially discontinued the awards but most individuals who had been awarded the title continued to list it in official documents.

of academic and honorary recognition among the Jewish managers suggests that they had higher general human capital than other managers.

Jewish managers had longer tenure in their firms, measured by whether they had already held a manager position in the same firm in 1928 (70.9 versus 61.8 percent). Similarly, they had more general managerial experience, as measured by whether they had already held a manager position in any of the sample firms in 1928 (83.0 versus 68.3 percent). Finally, Jewish managers were also better connected to other firms, as demonstrated by the greater number of supervisory board positions (2.9 versus 1.1) in other firms. The differences between Jewish and non-Jewish managers were not driven by the types of firms that they worked for. Compared to their non-Jewish colleagues in the same firms, Jewish managers held more academic and honorary titles, had longer tenure, greater experience, and more connections to other firms (see Table 1, column 4). Overall, the statistics suggests that Jewish managers were exceptional along a number of dimensions.[18]

2.2 Data on Stock Prices

We manually digitize stock prices from historical listings (called *Börse und Wirtschaft*, later *Monatskursblatt Berliner Börse*) of the Berlin Stock Exchange (see Data Appendix B.2.1 for details). We record more than 240,000 daily stock prices for the universe of German firms listed in Berlin, for the months January and July of the years 1929 to 1943.[19]

Some stocks, especially those of smaller firms, were not traded every day. We therefore average stock prices in a plus and minus 10-day window around January 10th and July 10th of each year.[20] Between 1929 and 1943, the stocks of some firms were consolidated. For example, *Dresdner Bank* stocks were consolidated on August 4, 1932, at an old-stock:new-stock ratio of 10:3. As a result, the reported stock price increased by 333 percent. We account for these consolidations by dividing all stock prices by the consolidation ratio (3.333 in our example) after each consolidation. Between 1929 and 1943, some firms issued new stocks and offered existing shareholders a subscription right to prevent stock dilution. We also adjust stock prices for mechanical drops after the deduction

[18]There are two factors that could explain the exceptional characteristics of Jewish managers. First, discrimination against Jews may have been prevalent even before 1933 and thus Jews would have had to be exceptional to be hired as managers. Second, a large literature has highlighted the exceptional human capital of German Jews and, in particular, the entrepreneurial culture that flourished in the German Jewish community (for example, Botticini and Eckstein 2007, 2012). In the 15th and 16th centuries, Jews were barred from entering many professions and therefore concentrated their economic activity on trade and banking (Elon 2003, pp. 21). In the 18th and the early 19th centuries, many Jewish manufacturing firms were founded by individuals who had traded such goods in the past (Mosse 1987, pp. 55-56). The entrepreneurial spirit exhibited by many Jews contributed to the lasting success of Jews in manager-run businesses (Ziegler 2000).

[19]The German banking crisis led to the closure of the Berlin Stock Exchange between September 1931, and April 12, 1932. For 1932, we therefore use stock prices for April and October. The results are robust to dropping all observations for 1932 (Table A.8, columns 1-2).

[20]The results are robust to averaging stock prices in a plus-minus three-day or plus-minus five-day window around January 10th and July 10th or to averaging stock prices for all days of January and July (see Table A.8).

of subscription rights by multiplying subsequent stock prices by the corresponding adjustment factor.[21]

2.3 Data on Dividend Payments

We manually digitize the dividend payments of the sample firms from the listings of the Berlin Stock Exchange and from the 1935 and 1941 editions of the *Handbuch der deutschen Aktiengesellschaften* (see Appendix B.2.2 for details).

2.4 Data on Returns on Assets

We also digitize data on firms' returns on assets from the 1932 and 1941 editions of the *Handbuch der deutschen Aktiengesellschaften*. The return on assets is the ratio of profits before interest payments and taxes to total assets. The data are for the years 1931, 1936, and 1940. Many firms do not report all income statement and balance sheet items that are required for the calculation of the return on assets. As a result, the data allow us to calculate the return on assets for 289 firms (see Appendix B.2.4 for details).

2.5 Data on Control Variables

Finally, we collect data on various firm-level control variables measured in 1932. We obtain connections of managers to the Nazi Party from Ferguson and Voth (2008). The measure indicates whether any of the firms' managers made financial contributions or provided political support to Hitler, Göring, or the Nazi Party. We also collect data on nominal capital, industry classifications[22], and firm age from the *Handbuch der deutschen Aktiengesellschaften (1932)*. Finally, we collect data on the period during which the balance sheet is reported from *Monatskursblatt Berliner Börse.*

2.6 Summary Statistics on Firms

Table 2 summarizes the firm data for the year 1932. The average firm employed roughly 12 senior managers in 1932, of which 14 percent were of Jewish origin (column 1). The average firm with at least one Jewish manager employed about three Jewish managers in 1932, corresponding to a fraction of Jewish managers of 22 percent (column 3).

We present statistics for all firms (column 1), firms without Jewish managers (column 2), and firms with at least one Jewish manager (columns 3-7). This allows us to assess to what extent firms with a higher fraction of Jewish managers were different from other firms. We first compare firms without Jewish managers (column 2) to firms with at least one Jewish manager (column

[21] See Appendix B.2.1 for details. The adjustment of stock prices for stock consolidations and subscription rights is standard practice in the construction of long-run stock indices (see, for example, Ronge 2002, p. 58). The results without these adjustments are almost identical to the results reported in the paper.

[22] The industry classifications are: financial services, insurance, transport, mining/iron/steel, machinery/electronics, construction/stones/earth, textile/clothing, chemistry/paper/wood, food/drinks, and other (consisting mainly of retail/trade/energy provision).

3). Both types of firms were on average of similar age and reported their financial statements at similar times. But the two sets of firms differed on other characteristics. Since Jewish managers were exceptionally qualified, the average firm with Jewish managers had more qualified managers, as measured by managers with tenure in the firm, general experience, university degrees, and connections. Perhaps surprisingly, the average firm with Jewish managers was more connected to the Nazi Party. This can be explained by the fact that firms with highly qualified managers were more connected to politicians. Furthermore, the average firm with at least one Jewish manager was larger, both measured by the number of senior managers and by the nominal capital of the firm. There are two reasons for this. First, the probability of employing a Jewish manager increases mechanically with the number of managers and second, the exceptional characteristics of Jewish managers allowed them to manage larger firms.[23]

Throughout our analysis below, we account for differences between firms with and without Jewish managers using several approaches. First, all regressions include a full set of firm fixed effects that control for permanent differences across firms. Most importantly, our identification strategy does not require that firms were similar on observables in 1932. It only requires that firms with a higher fraction of Jewish managers would have evolved in parallel to other firms had the Jewish managers not been dismissed. We present evidence in support of this assumption below. For example, we show that the stock prices of firms with a higher fraction of Jewish managers were following parallel trends to firms without Jewish managers before 1933.

To further strengthen our identification strategy, we control for potential shocks to firms with different characteristics by using a wide range of control variables interacted with full sets of time fixed effects. For instance, controls for connections to the Nazi Party or various controls for firm size (nominal capital and the total number of managers) do not significantly change our estimates (Appendix Table A.7, columns 1-3). We also construct subsamples where firm characteristics are similar. We consistently find that the effects of interest do not vary in these subsamples. For instance, we show that the effects are similar in samples with only small and only large firms (Appendix Table A.7, columns 5-6).

In robustness checks, we estimate results in samples of firms that all had at least one Jewish manager. Conditional on having at least one Jewish manager, firms with a higher fraction of Jewish managers were similar to firms with a lower fraction of Jewish managers (Table 2, columns 4-5). The firms look particularly similar along all observable characteristics if we exclude conglomerate firms from our sample (columns 6-7). Conglomerates had extremely high nominal capital. The two conglomerates in our sample were the national railroads *Reichsbahn* and the chemical producer *I.G. Farben*. Both had a positive but low fraction of Jewish managers.

[23]The large difference in average nominal capital is predominately driven by two conglomerate firms: the national railroads *Reichsbahn* and the chemical producer *I.G. Farben*. Conglomerates were large firms composed of formerly independent companies that operated under one management in 1932. Without these two firms, the average nominal capital of firms with at least one Jewish manager was 16.31 million Reichsmark (RM).

3 The Effect of Losing Jewish Managers on the Characteristics of Firms' Senior Management

This section presents the first set of main results. We analyze how the removal of Jewish managers affected the overall characteristics of firms' senior management. For this analysis, we use data on manager characteristics for the years 1928, 1932, 1933, and 1938. This approach allows us to investigate effects on characteristics until 1938, when virtually no Jewish managers remained in their firms.

Our empirical strategy compares changes in manager characteristics in firms that had employed Jewish managers in 1932, and lost them after the Nazi government took power in January 1933, to changes in firms that had not employed Jewish managers. We estimate the effects by running the following specification:

$$\begin{aligned} log(Characteristic_{it}) &= \sum_{\tau=1928}^{1938} \beta_\tau Fraction\ Jewish\ Managers\ (1932)_i \times 1\left[t\left(i\right)=\tau\right] \\ &+ FirmFE_i + YearFE_t + \epsilon_{it}. \end{aligned} \tag{1}$$

The outcome variable is the log of a certain manager characteristic in firm i in year t, for example the log of the number of managers with a university degree in firm i in year t.[24]

$Fraction\ Jewish\ Managers\ (1932)_i$ measures the fraction of Jewish managers in firm i in 1932. It is interacted with indicator variables for 1928, 1933, and 1938. The interaction with the indicator for 1932 is excluded from the regression so that the coefficients are estimated relative to 1932, the last year before the Nazis came to power. $FirmFE_i$ is a full set of firm fixed effects and $YearFE_t$ is a full set of year effects (for 1928, 1933, and 1938). To account for potential correlation of standard errors within firms, we cluster standard errors at the firm level.

We plot the yearly coefficients and the corresponding 95 percent confidence intervals in Figure 2. The first outcome variable is a measure for firm tenure, i.e., the number of managers who had been working as managers in the same firm since 1928. From 1932 to 1933, firms with a higher fraction of Jewish managers in 1932 experienced a sharp decline in the number of managers with tenure since 1928, relative to firms without Jewish managers (Figure 2, panel a). The drop continued until 1938 when virtually all Jewish managers had been dismissed (see Figure 1). For both 1933 and 1938, the difference between firms that lost Jewish managers and other firms is statistically significant, relative to their 1932 values. This finding is not surprising, because once a manager with tenure is expelled, finding a replacement with the same length of tenure in the firm is impossible.

[24] A small number of firms report zeros on some of the outcome variables, so we cannot include them in specifications using the log outcome variable. Appendix Table A.1 reports robustness checks using the inverse hyperbolic sine transformation, which is an approximation to the log transformation that permits using zero values. The results are almost identical.

The second outcome variable is a measure for experience, i.e., the number of managers who held a manager position in any of the sample firms in 1928. Firms could have compensated for the loss of an experienced Jew by hiring a manager who had experience running another firm. The results show that firms with a higher fraction of Jewish managers in 1932 experienced a statistically significant decline in the number of experienced managers, relative to other firms (panel b). This suggests that the firms did not replace the dismissed Jewish managers with other managers of similar experience.[25]

We also examine whether firms compensated for the loss of Jewish managers who held a university degree. We find that firms with a higher fraction of Jewish managers in 1932 employed fewer managers with a university degree after 1933 (panel c). The difference between firms with a higher fraction of Jewish managers and firms without Jewish managers is statistically significant in 1938. Hence, firms did not replace the highly educated Jewish managers with similarly educated non-Jews.

The remaining panels analyze the effect of losing Jewish managers on the connections of managers. We measure connections as the total number of supervisory board positions in other firms held by managers of a firm. These connections are measured contemporaneously, i.e., to measure connections in 1933 we only use an individual's supervisory board positions in 1933. Total connections (panel d), connections to firms in the same industry (panel e), and connections to firms in other industries (panel f) dropped sharply and significantly in 1933. They remained low until 1938. This shows that firms with a higher fraction of Jewish managers in 1932 did not compensate for the loss of well-connected managers after 1933.

We test the robustness of the graphical analysis by estimating the following differences-in-differences specification:

$$\begin{aligned} log(Characteristic_{it}) &= \beta_1 \, Fraction\ Jewish\ Managers\ (1932)_i \times Post\ 1933_t \\ &+ FirmFE_i + YearFE_t + \beta_c \, Controls_{it} + \epsilon_{it}, \end{aligned} \tag{2}$$

where $Post\ 1933_t$ is an indicator variable that is equal to one for all years after 1932, and zero otherwise. $Controls_{it}$ is a vector of firm-level control variables, described in detail below. We measure all controls in 1932, and interact them with year fixed effects, to ensure the control variables cannot endogenously respond to the removal of the Jewish managers.

Table 3 presents the results for all manager characteristics, using one panel for each outcome variable. The specifications reported in column 1 control for firm and year fixed effects. The coefficients on the interaction of the fraction of Jewish managers in 1932 with a post-1933 indicator are negative and significant for all outcome variables, consistent with the graphical evidence. The

[25]There was a significant degree of turnover in senior manager positions, so firms were in principle able to find new managers. For example, 37 percent of senior managers in 1932 were not employed in the same firm in 1928, and 30 percent had not held a senior management position in any of the sample firms in 1928 (Table 1).

average firm with Jewish managers in 1932 lost 22 percent of its managers after the Nazis came to power. The point estimate in column 1 of panel A therefore implies that the average firm with Jewish managers experienced a decline in the number of managers with tenure since 1928 of approximately 18 log points.

The specifications reported in column 2 additionally control for connections to the Nazi Party, interacted with year fixed effects, to ensure that the differential treatment of connected firms by the Nazis cannot explain the results. The point estimates remain essentially unchanged. We also add control variables for the timing of a firm's publication of financial statements (column 3), for firm age (column 4), and for the firm's nominal capital (column 5). All controls are interacted with a full set of year fixed effects. The coefficients remain significant and stable, suggesting that the findings cannot be explained by shocks that are correlated with firms' reporting schedule, age, or size. The specifications reported in column 6 add 10 industry fixed effects, interacted with a full set of year fixed effects. The industry fixed effects account for potential shocks that may have hit different industries in different years. The coefficients remain negative and significant.

We also estimate results with an alternative treatment variable, a binary indicator for whether the firm had any Jewish managers in 1932. The results using the indicator are quantitatively close to the results using the fraction as treatment variable (Appendix Table A.2). For instance, column 1 reports that the average firm with Jewish managers experienced a decline in the number of managers with tenure since 1928 of approximately 23 log points, compared to 18 log points implied by the fraction treatment in Table 3. The point estimates are similar when we add the control variables. All coefficients remain significantly different from zero in the specifications with the full set of controls (column 6).

Taken together, the evidence from Figure 2 and Tables 3 and A.2 shows that the removal of Jewish managers had a lasting impact on the characteristics of managers at firms that had employed Jewish managers in 1932. In 1938, these firms still had fewer managers with firm-specific tenure, general managerial experience, a university degree, and fewer connections to other firms. The persistent decline in these manager characteristics up to 1938 is noteworthy, because firms had up to five years to replace the Jewish managers after 1933.[26]

There are three possible interpretations of these results. First, managers may have all the bargaining power in wage negotiations with the firm or the managerial labor market may be perfectly competitive, with only a small role for firm-specific human capital. In both cases, firms have to fully compensate managers for their marginal product, firm value is independent of managerial characteristics, and firms have no incentive to hire managers with similar characteristics. Under this interpretation, the loss of Jewish managers would not have affected firm value.

[26] Appendix Table A.3 shows that the decrease in manager characteristics was not primarily a result of a lower number of managers overall. There is little evidence that the number of managers evolved differently at affected firms, relative to firms without Jewish managers.

Second, the manager characteristics we analyze may be beneficial to firm value. Tenure is likely associated with firm-specific human capital, while experience and a university education are likely associated with general human capital. Firm-specific human capital generates rents for the employer in standard models (Becker 1964). General human capital can benefit the employer if there are information frictions on managerial labor markets (Acemoglu and Pischke 1998; Dessein and Prat 2018). The number of connections could proxy for a manager's quality, since only reputable managers may be offered multiple board positions. In addition, managers with many connections could improve information flows to providers of inputs and outputs, and ease collusion among competitors. Despite the benefits, frictions on the labor market for managers may have left firms unable to adequately replace the Jewish managers. Under this second interpretation, the loss of the Jewish managers would have harmed firm value.

A third interpretation views the characteristics we analyze as detrimental to firm value. Highly educated and experienced managers may be more skilled at becoming entrenched and extracting rents from their employers (Shleifer and Vishny 1989). Managers with many connections may be busier, and hence may enforce weaker corporate governance (Fich and Shivdasani 2006). They may also have an incentive to seek rents for the other firms they serve. Even if the detrimental nature of these characteristics were known, firms may not choose to endogenously fire their managers, because firing signals to investors that the firm is performing poorly or because firing managers is costly. Under this third interpretation, firms had no incentive to hire managers with similar characteristics in place of the Jewish managers. The exogenous removal of the Jewish managers may have raised firm value.

The following section allows us to differentiate between the three interpretations. We analyze how firm stock market performance responded to the removal of the Jewish managers. Subsequently, we test whether any of the manager characteristics were particularly beneficial or harmful to the stock market performance of firms.

4 The Effect of Losing Jewish Managers on Stock Prices

4.1 The Average Effect on Stock Prices

In this section, we investigate the effect on stock prices. We estimate the following regression:

$$\begin{aligned} log(Stock\ Price_{it}) &= \sum_{\tau=1929.0}^{1943.5} \beta_\tau\ Fraction\ Jewish\ Managers\ (1932)_i \times 1\left[t\left(i\right)=\tau\right] \\ &+ \ FirmFE_i + TimeFE_t + \beta_c\ Controls_{it} + \epsilon_{it}. \end{aligned} \tag{3}$$

The specification is similar to the previous section, but uses the log of the stock price as the outcome variable.[27] As explained in Section 2, we have two observations of the stock price for each firm i per year, around January 10th and July 10th. The data cover the years from 1929 to 1943.[28] We exclude January 10, 1933 as the last observation before Hitler became Chancellor on January 30, 1933. We plot the estimated coefficients β_τ and the 95 percent confidence intervals in Figure 3. Panel a shows the coefficients of a specification with a full set of firm and time fixed effects. Panel b plots the coefficients of a specification that further controls for connections to the Nazi Party, reporting period, firm age, nominal capital, and industry fixed effects, all measured in 1932 and interacted with a full set of time fixed effects.

The main identifying assumption is that the stock prices of firms with a higher fraction of Jewish managers in 1932 would have followed the same trend as the stock prices of firms without Jewish managers, if Jewish managers had not been expelled from their firms. Before January 1933, the coefficients on the fraction of Jewish managers are small and not significantly different from zero. This indicates that the stock prices of firms with a higher fraction of Jewish managers were on similar time trends while the Jewish managers were still at their firms. Firms with a higher fraction of Jewish managers were not exposed to different shocks before 1933, in line with our identification assumption.

After January 1933, the trends diverged. The stock price of the average firm with a higher fraction of Jewish managers started to decline sharply, compared to the stock price of a firm without Jewish managers.[29] Interestingly, our estimated short-run effect of losing Jewish managers is close to the initial stock price responses to prominent manager exits in recent times. For example, after Apple CEO Steve Jobs took permanent medical leave in 2011, the Apple stock fell by 6 percent (BBC

[27] The results of this section focus on stock price changes, without incorporating dividend payments into the analysis. We examine the effect of losing Jewish managers on dividends separately in Section 6.1, finding a negative effect. In an additional robustness check, we adjust the stock prices for dividends, assuming that investors immediately reinvest the dividend into the stock (see Appendix B.2.3 for details), and re-estimate equation (3). The adjustment means that the coefficients measure the effect of losing Jewish managers on the return of investing (on January 10, 1933) into the average firm with Jewish managers in 1932, relative to investing into a firm without Jewish managers in 1932. We use the adjusted stock prices to construct Appendix Figure A.2. The pattern over time is almost identical to Figure 3. The point estimate corresponding to Table 4, column 6 using the adjusted stock prices is -0.475 (0.152). The more negative coefficient is consistent with the finding that firms that lost Jewish managers paid out lower dividends after 1933.

[28] As we have two observations per year, the data contain 30 time periods. Time fixed effects do not refer to years but refer to January 10th and July 10th of each year, i.e., there are two time fixed effects per year, 29 time fixed effects overall.

[29] The stock price of the average firm with Jewish managers declined by 7.1 log points between January and July 1933 (Figure 3, panel b). The sharp decline is consistent with the timing of events described in the historical literature. For example, Münzel (2006) documents that "from the very start" of the Nazi reign there was "radical pressure on elite managers of Jewish origin", with "more than a third of Jewish executives losing their positions" by July 1933. Similarly, our manager data show that the average firm had lost 34 percent of the Jewish managers it would lose by 1938. The point estimate on the stock price in July 1933 amounts to 51 percent of the July 1938 point estimate. The difference between the fraction of managers lost and drop in stock prices may be explained by the sharp decline in the number of connected managers in 1933, as documented in Figure 2. We show that losing connected managers led to larger effects in Section 4.2 below.

2011). When Fiat Chrysler CEO Sergio Marchionne stepped down due to surgery in 2018, the Fiat Chrysler stock lost 5 percent (Reuters 2018).

The effects of losing Jewish managers persisted until the end of our stock sample period. The specification with the full set of controls suggests that in January 1943, 10 years after the Nazis had come to power, the stock price of an average firm that had employed Jewish managers in 1932 (which lost 22 percent of its managers) was still 11.6 log points below that of a comparable firm that had not employed any Jewish managers. The individual point estimate for January 1943 is significantly different from zero at the 1 percent level, as are all of the point estimates from July 1933 onward. The results are similar with and without the controls, strengthening the view that firms with Jewish managers were not fundamentally different from other firms, except for losing Jewish managers.

We also estimate results with the following differences-in-differences specification:

$$\begin{aligned} log(Stock\ Price_{it}) &= \beta_1\ Fraction\ Jewish\ Managers\ (1932)_i \times Post\ 1933_t \\ &+ FirmFE_i + TimeFE_t + \beta_c\ Controls_{it} + \epsilon_{it}, \end{aligned} \tag{4}$$

The regressor of interest is the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. The point estimate in the specification with only firm and time fixed effects is significant at the 1 percent level (Table 4, column 1). The point estimate indicates that after the Nazis came to power, the stock price of the average firm that had employed Jewish managers was 10.3 log points lower after 1933, compared to the stock price of firms that had not employed any Jewish managers.[30] The addition of the controls in the subsequent columns hardly affects the coefficient. In particular, we control for an indicator for a connection to the Nazi party, an indicator for reporting company results in January, firm age, and nominal capital, all interacted with a full set of time effects (columns 1-5). Furthermore, we control for a set of 10 industry fixed effects, all interacted with a full set of time effects (column 6). The effect remains stable and significant even if it is estimated from within-industry variation in the share of Jewish managers in 1932. This offers further evidence that differential exposure to other shocks cannot explain the effect.

By comparing the 1932 and 1933 editions of *Handbuch der deutschen Aktiengesellschaften*, we can identify which firms lost some of their Jewish managers already in 1933 and which firms lost Jewish managers only after 1933. We estimate how this differential timing affected stock prices. Firms that lost some of their Jewish managers in 1933 experienced lower stock prices in 1933 (Appendix Table A.4, first row of coefficients). In the following years, when these firms lost the remaining Jewish managers, their stock price declined somewhat further (second row of coefficients). Firms that lost all their Jewish managers after 1933 experienced no decline in stock prices in 1933

[30] In the average firm that had employed Jewish managers in 1932, about 22 percent of managers were Jewish. Hence, the estimates imply a decline in stock price for the average firm with Jewish managers of 0.469 * 0.22 * 100 = 10.3 log points.

(third row of coefficients), but experienced lower stock prices after 1933 (fourth row of coefficients). This suggests that the sharp decline in stock prices in 1933 (seen in Figure 3) was entirely driven by firms that lost managers in 1933. Of course, this result should be interpreted with caution, since Jewish managers may have left their firms for endogenous reasons. For this reason we use the fraction of Jewish managers in 1932 as the treatment variable in the baseline specifications. The fraction of Jewish managers in 1932 is immune to endogenous timing decisions of manager separations. [31]

We alternatively measure the firm's exposure to Jewish managers using a binary indicator for whether the firm employed any Jewish managers in 1932 (Appendix Table A.5). After 1933, firms with Jewish managers experienced a decline in stock prices of 14.7 log points, an effect that is comparable to the result using the fraction treatment. The addition of the control variables hardly affects the point estimate.

The persistent effects of losing Jewish managers on stock prices are consistent with the persistent effects on the characteristics of senior managers found in the previous section. The stock price results support the view that firms had gained rents from employing the Jewish managers, and, hence, that the managers' salaries did not reflect their marginal contribution to their firms' market value. Frictions in the labor market presumably left firms unable to replace managers with certain characteristics, and this persistently lowered their stock market valuation. Next, we conduct a number of robustness checks. We subsequently turn to assessing whether firms that lost certain managerial characteristics suffered larger stock price declines.

Robustness

In the first robustness check, we estimate intensive margin effects, using a sample of firms that all employed at least one Jewish manager in 1932. In this sample, the observable characteristics of firms with a higher fraction of Jewish managers were similar to firms with a lower fraction of Jewish managers (see Table 2, columns 4-5). We find that the coefficient on the fraction of Jewish managers in 1932 in this sample is of similar magnitude but slightly smaller than in the full sample, and significant at the 10 percent level (Appendix Table A.6, columns 1-2). Firms with a higher fraction of Jewish managers were particularly similar to firms with a lower fraction of Jewish managers if we additionally exclude the two conglomerate firms from our sample: the national railroads *Reichsbahn* and the chemical producer *I.G. Farben* (see Table 2, columns 6-7 and Section 2.6). If we use only firms with at least one Jewish manager and exclude the two conglomerates, the coefficient on the fraction of Jewish managers in 1932 is of similar magnitude to the full sample

[31] Our data on the composition of firm management cover the years 1928, 1932, 1933, and 1938 (see Figure 1) We can therefore explore the exact timing of dismissals by investigating changes between 1932 and 1933 but not for the subsequent years until 1938. By 1938, virtually all Jewish managers had left their firms (Figure 1, last bar). While the results above suggest that the stock market reacted sharply to the timing of dismissals for the first wave of dismissals, the later dismissals may have been more anticipated and hence the dismissal of all Jewish managers seems to have been priced in by 1937 (see Figure 3, panel b).

and significant at the 5 percent level (Appendix Table A.6, columns 3-4). These intensive margin results show that differences between firms with and without Jewish managers do not drive the effect of losing Jewish managers.

We also find that various ways to control for firm size do not affect the findings, including parametric and non-parametric controls for nominal capital, for the total number of managers, and for both variables simultaneously (Appendix Table A.7, columns 1-3). There is no heterogeneity in the effects by firm size (Appendix Table A.7, columns 4-6). The estimated effect is slightly larger, in absolute magnitude, if we drop observations from 1932, suggesting that differential shocks during the stock market closure cannot explain our findings (Appendix Table A.8, columns 1-2). For the baseline results, we average stock prices in a plus-minus 10-day window around January 10th and July 10th of each year. The results are robust to averaging stock prices in time windows of plus-minus five or three days around the respective dates (Appendix Table A.8, columns 3-6). Finally, the results are robust to averaging stock prices for the whole month of January and July of each year (Appendix Table A.8, columns 7-8).

Some firms were not traded in the plus-minus 10 day window around each January 10th and July 10th, either because the stocks were relatively illiquid, or because firms were no longer listed on the Berlin Stock Exchange. The results are robust to restricting the sample to regularly traded firms and become even larger, in absolute magnitude, if we restrict the sample to firms without any missing observations (Appendix Table A.9).

We investigate whether firms that lost Jewish managers were more likely to be delisted from the stock market. We regress an indicator for whether the firm was delisted after January 1933 on the fraction of Jewish managers in 1932. The coefficient is negative, small, and insignificant, indicating that firms with Jewish managers were not more likely to be delisted (Appendix Table A.10, column 1). The results are similar if we add the full set of control variables (column 2), or if we estimate an extended Cox hazard model (columns 3-4).

Appendix Table A.11 explores whether the effects depend on the role of the Jewish managers. We define important managers as executive board members and the chair and vice chair of the supervisory board. Regular managers are the other members of the supervisory board.[32] The point estimate for losing managers in important positions is slightly larger than the point estimate for losing managers in regular positions. However, the estimates are close in magnitude and not statistically different, suggesting that losing managers in both types of positions affects firm performance.

[32]The supervisory board was actively involved in the management of the firm in the 1930s. Firm founders often held the chairs and vice chairs of the supervisory board. Until the late 19th century, the supervisory board had been the main decision maker in German firms. After a revision of commercial law in 1884, German executive board members became gradually more important in decision-making (Münzel, 2006, p. 43).

4.2 The Effect of Losing Managers with Certain Characteristics on Stock Prices

To investigate whether the loss of certain managerial characteristics was responsible for the decline in stock prices, we estimate the following specification:

$$\begin{aligned} log(Stock\ Price_{it}) = {} & \beta_1 \cdot 1[0 < Characteristic\ Lost\ due\ to\ Losing\ Jewish\ Managers < 0.20]_i \times Post\ 1933_t \\ & + \beta_2 \cdot 1[0.20 \leq Characteristic\ Lost\ due\ to\ Losing\ Jewish\ Managers < 0.80]_i \times Post\ 1933_t \\ & + \beta_3 \cdot 1[0.80 \leq Characteristic\ Lost\ due\ to\ Losing\ Jewish\ Managers]_i \times Post\ 1933_t \\ & + FirmFE_i + TimeFE_t + \beta_c\ Controls_{it} + \epsilon_{it}. \end{aligned} \tag{5}$$

As before, the outcome variable is the log stock price. The three main explanatory variables are indicators for whether in 1932 Jewish managers were responsible for 1) less than 20 percent, 2) 20 percent to 80 percent, or 3) more than 80 percent of a given managerial characteristic (such as connections to other firms). To be clear, if a firm did not lose any Jewish managers, the three indicator variables are zero, so that the coefficients on the three indicator variables are estimated relative to a firm that did not employ any Jewish managers in 1932. The three indicator variables are all interacted with an indicator for the months after January 1933.[33]

We start by examining the effect of losing connections to other firms. After 1933, stock prices declined by 11.4 log points (significant at the 10 percent level) in firms that lost Jewish managers but did not lose more than 20 percent of the firm's connections (Table 5, column 1), relative to firms without Jewish managers in 1932. Stock prices declined by 14.4 log points (significant at the 1 percent level) in firms where the Jewish managers were responsible for 20 percent to less than 80 percent of the firm's connections, and by 36.6 log points (significant at the 1 percent level) in firms where the Jewish managers were responsible for more than 80 percent of the firm's connections, relative to firms without Jewish managers in 1932.[34] The results suggest that firms that lost a large share of their managerial connections suffered larger declines in stock prices. In line with other

[33]One concern could be that all firms that lost a larger share of a given characteristic also lost a larger fraction of Jewish managers in 1932. In that case, the indicator variables might simply proxy for firms that lost a high share of Jewish managers. To test this concern, we ran specifications where in addition to the three indicator variables, we include the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. The coefficient on the fraction is statistically insignificant and positive, while the coefficients on the indicator variables remain at the same significance levels and of similar magnitude to the results presented in this section. This implies that the indicator variables are not simply proxies for a high fraction of Jewish managers in 1932, but that they capture additional variation in the characteristics of Jewish managers.

[34]In unreported results, we analyzed separately whether the effect is driven by losing managers with within- or outside-industry connections. The point estimates for both types of connections are of similar magnitude, indicating that losing both within- and outside industry connections had similar effects.

recent studies, these findings imply that social capital matters for firm outcomes, and that it is hard to replace (Glaeser et al. 2002; Cai and Szeidl 2017; Haselmann et al. 2018).

Next, we study the effect of losing Jewish managers with a university degree. After 1933, stock prices declined by 5.2 log points (not significant) in firms that lost Jewish managers but did not lose more than 20 percent of the firm's managers with a degree (Table 5, column 3). Stock prices declined by 21.4 log points (significant at the 1 percent level) in firms where the Jewish managers made up 20 percent to less than 80 percent of the firm's managers with a degree, and by 62.3 log points (significant at the 1 percent level) in firms where the Jewish managers made up more than 80 percent of the firm's managers with a degree. The results indicate that firms that lost a large share of their highly educated managers suffered larger declines in stock prices. The results on losing larger shares of connections and managers with degrees are robust to the inclusion of the additional control variables (Table 5, columns 2 and 4).

Last, we study the effect of losing Jewish managers with managerial experience since 1928. The specification without controls suggests there is a larger effect for firms losing a larger share of experienced managers (Table 5, column 5). However, the inclusion of the control variables renders the estimates for losing smaller or larger shares of experienced managers similar (Table 5, column 6). For example, the point estimate on losing over 80 percent of experienced managers is statistically insignificant and of similar magnitude to the point estimate on losing less than 20 percent of experienced managers. This suggests that the loss of experienced managers does not account for most of the average effect of losing Jewish managers.[35]

To compare the effect of losing different manager characteristics more conclusively, we also estimate specifications that simultaneously include the indicator variables for all three characteristics. These specifications estimate the effect of losing one characteristic, while keeping constant changes in the other characteristics. Therefore, the results account for potential correlations between different characteristics. For example, managers with many connections may also have been more educated. The estimates are of similar magnitude compared to the previous specifications (Table 5, columns 7-8). The coefficients on losing more than 80 percent of connections and managers with degrees are statistically significant with and without the controls. The coefficients on losing larger shares of experienced managers are statistically insignificant with and without the controls. This implies that the earlier results did not rely on spurious correlations between the different managerial characteristics.[36]

[35]In unreported specifications, we examine separately whether losing managers with tenure in the firm or managers with experience in another firms has an effect. We find little evidence that losing managers with general experience, firm-specific tenure, or experience in another firm lowered stock prices.

[36]In unreported results, we vary the definition of the explanatory variables that indicate a greater loss in the managerial characteristics. For example, we use 25 and 75 percent as the cutoffs, or 50 percent. In all these specifications, the point estimates on losing a larger share of connections and university-educated managers are negative, while the point estimates on losing any share of experienced managers are small and mostly positive.

Overall, the results suggest that managers with many connections and university degrees significantly contribute to firm value. The findings are consistent with the view that connections and education are positively correlated with managerial human capital. There is no clear evidence that a loss of experienced managers harms firm value, as long as the reduction in managerial experience is not accompanied by a reduction in the connections and the education level of managers. This finding could indicate that the positive effects of experience on firm-specific human capital are outweighed by the negative effects of experience through rent-seeking and entrenchment.

The coefficients on firms with Jewish managers that lost less than 20 percent of all three managerial characteristics are positive, close to zero, and statistically insignificant in columns 7 and 8. Hence, losing Jewish managers *per se* had no significant effect on stock prices. This is a key finding, which validates our identification strategy. One may be concerned that firms with Jewish managers in 1932 suffered from other shocks after 1933. Potential shocks that may be correlated with a higher fraction of Jewish managers in 1932 include, for example, repression by the Nazi government, different exposure to government policies, consumer retail boycotts, a loss of lower-ranked Jewish employees, or a loss of Jewish customers. But the results in columns 7 and 8 show that firms with Jewish managers in 1932 and firms with no Jewish managers in 1932 remained on similar trends after 1933, unless Jewish managers were responsible for a large share of the firm's highly educated or connected managers. This suggests that firms with Jewish managers were not exposed to other shocks after the Nazis came to power, apart from losing managers with certain characteristics. The following section presents further evidence that other potential shocks to firms do not account for the effects on stock prices.

4.3 Alternative Explanations for the Effect on Stock Prices

The results in the previous subsections indicate that the removal of connected and educated Jewish managers led to declines in firms' stock prices. The absence of an effect for firms that lost neither a large share of connected nor of educated Jewish managers already suggests that correlated shocks do not drive the estimated effect of losing Jewish managers. In this section, we further explore whether the decline in stock prices was driven by the removal of Jewish managers or whether firms with Jewish managers suffered from other shocks after 1933 that were correlated with the fraction of Jewish managers in 1932. We consider two types of shocks: those resulting from other discriminatory measures against Jews, and those arising from other shocks to the demand for the products of some firms.

4.3.1 Other Discrimination Against Jews

Other discriminatory measures against Jews in Nazi Germany may have disproportionately affected firms with a higher fraction of Jewish managers. We explore this possibility with five tests. First, we estimate the effect of losing Jewish managers for firms that were favored by the Nazi government. Second, we measure which firms were perceived as "Jewish" and explore how the effect

of losing Jewish managers changes if we control for post-1933 changes in stock prices of "Jewish" firms. Third, we analyze effects in sectors and areas with very few lower-ranked Jewish employees. Fourth, we analyze effects for firms without large Jewish shareholders. Finally, we investigate the effect of losing managers in a sample of firms that were not affected by antisemitic boycotts in the retail sector.

Effect in a Sample of Firms Favored by the Nazi Government

In a first test, we restrict the sample to firms that were favored by the Nazi regime. It is likely that these firms were not exposed to repressive measures by the Nazi government, but rather experienced political support after 1933. We identify firms favored by the Nazi government based on three criteria. First, we include firms that had managers who made financial contributions or provided political support to Hitler, Göring, or the Nazi Party before 1933. This measure was developed by Ferguson and Voth (2008). Examples of such firms are the insurance company *Allianz* and the car manufacturer *Daimler Benz*. Second, we include firms that received forced labor workers from the Nazi government. This measure is based on the "Catalogue of Camps and Prisons in Germany and German-occupied Territories 1939-1945." Examples of such firms are *I.G. Farbe*n and the oil and gas company *Deutsche Öl.* Third, we exclude firms that the German public or the Nazi government perceived as "Jewish" (see below for the definition of "Jewish" firms) from this sample. Overall, this sample includes 171 firms that were favored by the Nazis.

Despite the fact that this sample of firms is much smaller than the full sample, the effect of losing Jewish managers remains significant at the 5 percent level in the specification with all controls. The point estimate is somewhat larger than in the full sample (Table 6). Hence, losing Jewish managers affected stock prices in a similar way even in a sample of firms that were not negatively exposed to government repression in Nazi Germany.

Discrimination Against Firms Perceived as "Jewish"

In a second test, we analyze firms that were associated with Judaism more generally. Such firms may have suffered after the Nazis came to power, for example because of antisemitic measures by the government or because they suffered from consumer boycotts against Jewish firms. To test this possibility, we identify a group of firms that contemporaries explicitly named as "Jewish firms." We systematically record all firms that are mentioned as being connected to Jews or Judaism in a range of historical sources about Jews in Germany (Bruer 1927; Landsberg 1927a,b; Priester 1927; Mosse 1987).[37] The majority of these "Jewish firms" had a Jewish founder, for example the department store *Leonhard Tietz,* which was founded by the Jewish merchant of the same name, or *Allgemeine*

[37]As the historical sources only cover certain industries, we augment the definition of "Jewish firms" with the definition of "Jewish firms" in Mosse (1987), the standard reference on Jews in the German economy. All results hold if we focus on the definition that relies only on the contemporary sources.

Electricitätsgesellschaft, one of the largest electrical companies in the world, which was founded by the Jewish industrialist Emil Rathenau.[38]

We separately analyze the evolution of the stock prices of Jewish firms (Table 7). We find negative but insignificant coefficients for the stock prices of Jewish firms after 1933 (columns 1-2). The pattern becomes clearer when we separately consider the period after 1935. The stock prices of Jewish firms hardly changed in 1933 and 1934, but declined significantly by 12.7 log points after 1935 (columns 3-4). These findings are consistent with historical accounts: During the early years of Nazi rule, large Jewish firms were not harmed by policies of the government because the Nazi government wanted to boost employment and did not target any firms that were vital for the economic recovery (James 2001, p. 38). After passing the Nuremberg racial laws in 1935, however, the Nazi government explicitly began to target large firms perceived to be Jewish (Barkai 1990, p. 83; Strauss 1999, p. XVII; James 2001, p. 38).

Importantly, controlling for Jewish firms does not affect the post-1933 coefficient on the fraction of Jewish managers in 1932 (Table 7, columns 5-6). These results indicate that Jewish firms indeed suffered in Nazi Germany, but that the effect on Jewish firms was orthogonal to the effect of losing Jewish managers.

To further explore the development of Jewish firms over time, we run a specification akin to equation 3 and additionally include an indicator for Jewish firms, interacted with a full set of time fixed effects. Appendix Figure A.3 plots the point estimates on the indicator for Jewish firms over time. Stock prices of Jewish firms remained constant until January 1935, and then started to decline. They reached their lowest point in 1939. By 1943, they had fully recovered. The recovery of stock prices of Jewish firms suggests that discriminatory measures against these firms had only temporary effects, which lasted until they were taken over by non-Jews and were not any more associated with Judaism. In contrast, the stock prices of firms that lost Jewish managers remained persistently low, even after all Jewish managers had left their firms by 1938.

Taken together, these findings imply that the effect of losing Jewish managers cannot be explained by other shocks that hit "Jewish firms." This is hardly surprising. Many firms that had employed managers of Jewish origin were not perceived to be "Jewish" in any way by the Nazis or the public, and hence unlikely to face direct repression or shocks to demand. These firms included, for example, *BMW*, *Deutsche Reichsbahn*, or *I.G. Farben*. They happened to employ managers of Jewish origin and as a result suffered from losing their Jewish managers but not from other discriminatory measures.

[38]The average fraction of managers with Jewish origin was slightly higher in "Jewish firms" compared to other firms (22 versus 13 percent), but there was significant variation in both groups. The 1st to 99th percentile range of the percentage of Jewish managers was from 0 to 50 percent for "Jewish firms" , and from 0 to 58 percent for other firms.

Discrimination Against Lower-Ranked Jewish Employees

In a third test, we explore whether the stock prices of firms with Jewish managers declined because the loss of Jewish managers was correlated with discrimination against lower-ranked Jewish employees. There are no consistent data on the number of lower-ranked Jewish employees for firms that were listed on the Berlin Stock Exchange. We therefore collect data on the share of Jews among lower-ranked employees from historical statistics published by the German Statistical Agency (*Statistisches Reichsamt*, see Appendix B.3 for details). These data are based on the 1933 census and report the fraction of Jews by sector (manufacturing or services) and region or large city (for example, Berlin, Hamburg, Breslau, Königsberg). Whenever we are able to use the city-level information, we do so (for about 33 percent of the sample). Otherwise, we use regional information.

The data allow us to estimate the effect of losing Jewish managers for firms in region-sector cells with very low fractions of lower ranked Jewish employees (Table A.12). We first focus on firms in region-sector cells with the lowest quartile of Jewish blue collar workers (columns 1-2). Next, we focus on firms in region-sector cells with the lowest quartile of lower-ranked Jewish white collar workers (columns 3-4).[39] In both samples, the post-1933 coefficient on the share of Jewish managers in 1932 is larger in absolute magnitude than in the baseline. Despite the small sample sizes, the coefficients remain significant at the 5 or 10 percent levels.

Finally, we estimate the effect for firms in region-sector cells with the lowest quartiles of both measures of lower ranked Jewish employees. In this sample, the percentage of Jews is only 0.22 percent among blue collar workers and 0.02 percent among lower ranked white collar workers (Appendix Figure A.4). In contrast, the share of Jewish managers is still 10.7 percent in this sample (compared to 13.8 percent in the full sample). In this sample, the post-1933 coefficient on the share of Jewish managers in 1932 is larger in absolute magnitude than in the baseline and significant at the 5 percent level. Overall, these results suggest that the underperformance of firms that lost Jewish managers was not predominantly driven by a reduction in the supply of lower-ranked Jewish employees.

Discrimination Against Jewish Shareholders

In a fourth test, we explore whether the stock prices of firms with Jewish managers declined because the fraction of Jewish managers in 1932 was correlated with the presence of Jewish shareholders in 1932. There is no complete register of shareholders for this time period, but the *Handbuch der deutschen Aktiengesellschaften 1932* lists large shareholders for the firms in our sample. For example, the industrial property developer *Königstadt AG* lists two large shareholders: *Bank für Brau*

[39] Lower-ranked white collar workers do not contain the senior managers that are the focus of our analysis because high-level white color workers are separately listed in the census data.

and the Jewish private bank *Gebrüder Arnhold*. We identify all Jewish individuals or firms (such as Jewish private banks) that were large shareholders in any of the sample firms.[40]

We drop all firms that had a large Jewish shareholder in 1932 from the sample. The coefficient on the fraction of Jewish managers in 1932 is slightly larger but of similar magnitude than in the full sample, and statistically significant at the 1 percent level (Appendix Table A.13). This implies that "fire sales" of large blocks of stocks by Jewish shareholders do not affect the estimated effect of losing Jewish managers. This finding is consistent with the historical literature, which suggests that Jewish private banks and other Jewish shareholders were not able to sell their stocks, but that their stock portfolios were mostly seized and redistributed as a whole.[41]

Discrimination by Retail Customers

In a fifth test, we consider potential discrimination by retail customers that may have been correlated with the share of Jewish managers. We focus on antisemitic customer boycotts that disproportionately hit retail firms by estimating results for non-retailers only. In this restricted sample, the results are similar to the baseline results (Table 8, columns 9-10). This suggests that customer discrimination cannot explain why firms with Jewish managers experienced declines in stock prices.

4.3.2 Correlated Demand Shocks (Not Directly Related to Discrimination)

Next, we explore whether other demand shocks, that were not directly caused by discrimination against Jews, may have disproportionately affected firms with a larger share of Jewish managers in 1932. Such demand shocks may have been caused by increased government spending in rearmament and infrastructure, or because international customers retaliated against firms that dismissed their Jewish managers.

Rearmament Spending

Soon after gaining power, the Nazi government started a massive rearmament program. Armament spending increased from about 0.8 billion RM in 1932 to 30 billion in 1939 (Carroll 1968). To analyze demand shocks caused by armament spending, we estimate results for samples of firms that were unlikely to be affected by such shocks. First, we exclude all firms that the Reichswehr had identified

[40] We classify firms as having a large Jewish shareholder if an individual shareholder was of Jewish origin (as defined in Section 2.1), if an institutional shareholder was perceived as a "Jewish firm" (as defined in Section 4.3.1), or if the institutional shareholder was Jewish private bank (as listed in Köhler 2008).

[41] We test the historical accounts further in unreported specifications. We use the full sample of firms and include an additional treatment variable: an indicator for having a large Jewish shareholder interacted with a post-1933 indicator. The coefficient on this additional variable is small and insignificant in specifications with or without additional regressors. For instance, the coefficient is 0.027 (0.058), conditional on all the controls and on the fraction of Jewish managers in 1932 interacted with a post-1933 indicator. This shows that having a large Jewish shareholder did not affect stock prices after 1933, confirming the historical narrative.

as important for rearmament.[42] The results remain almost unchanged in this sample (Table 8, columns 3-4).

Second, we exclude all firms in industries that were relevant for rearmament and hence most firms that may have been affected directly or indirectly by increased armament spending. In particular, we exclude all firms in iron and steel production, machine tools, and chemicals. Despite dropping about half of all firms in our baseline sample, the coefficient remains similar to the baseline effect (Table 8, columns 5-6).

Infrastructure Investments

The new government also invested heavily in infrastructure works of various kinds, especially infrastructure that would be useful during a war: strategic roads (the famous *Autobahn*), airfields, barracks, and waterways (Tooze 2008, p. 45). We therefore estimate results in a sample of firms that were unlikely to benefit from large infrastructure investments by excluding all firms in construction. The results are similar to the baseline results (Table 8, columns 7-8).

Reduced Demand by International Customers

Finally, we consider whether lower demand by non-government actors from abroad may have disproportionately hit firms with a larger share of Jewish managers. In particular, we analyze whether firms with international activities may have suffered differential shocks after 1933. International customers may have reacted to the rise of the Nazis or to the removal of Jewish managers by reducing demand for the products of firms that had employed Jewish managers. Alternatively, international trading partners may have been less willing to work with German firms that had dismissed their Jewish managers. The *Handbuch der deutschen Aktiengesellschaften 1932* includes a written narrative about each firm. We code international firms as those firms that reported "imports," "exports," or "foreign activity" as part of their business activities. For example, the large brewery *Dortmunder Actien-Brauerei* reported "beer export: to Holland, France, Belgium, and overseas" among its business activities. We estimate the effect of losing Jewish managers in the sample of firms without international business activities. In this sample, the results remain similar to the baseline results (Table 8, columns 9-10). This suggests that shocks to firms with international operations cannot explain the effect of losing Jewish managers.

[42] We identify firms that may have benefited from increased armament spending based on a list of firms that the Reichswehr had identified as important for rearmament production, as summarized in two lists published in Hansen (1978). *Anlage Nr. 6*, pp. 217 reports firms that prepared for the production of armament material in 1927/28. *Anlage Nr. 10*, pp. 226 reports firms that were important providers of inputs for armaments production in 1931. We exclude all firms that were named in any of the two lists.

5 The Effect on the Aggregate Market Valuation of Listed Firms

A back-of-the-envelope calculation allows us to estimate the aggregate decrease in market valuation of firms listed in Berlin due to the loss of Jewish managers. The calculation relies on the assumption that firms without Jewish managers were not affected by the removal of Jewish managers from other firms. In other words, the assumption is that there were no spillover effects from affected firms to firms without Jewish managers. Positive spillovers may exist because firms without Jewish managers could have taken over market share from firms in their industry that lost Jewish managers. Negative spillovers may exist in the form of reduced productivity spillovers among firms in the same industry, lower regional aggregate demand, or because firms that had employed Jewish managers poached managers from unaffected firms.

We explore the plausibility of the assumption of no spillovers by testing for spillovers within industries and within regions. We estimate regressions based on versions of equation 4 and report the results in Appendix Table A.14. The regressors of interest include the original regressor (the firm's fraction of Jewish managers) and the average fraction of Jewish managers in all other firms in the industry or the region, all interacted with an indicator for the months after January 1933. While the coefficients on the firm's fraction of Jewish managers are stable and statistically significant, the coefficients on the industry- and region-level fractions of Jewish managers are all insignificant and negative. There is no evidence that positive spillovers played an important role. If anything, the negative coefficients suggest that spillovers amplified the negative firm-level effects of removing the Jewish managers. Papers by Moretti (2010), Greenstone et al. (2010), Bloom et al. (2013b), and Huber (2018) similarly suggest that spillover effects tend to amplify the effects of firm-level shocks. Negative spillovers would imply that the following calculation underestimates the aggregate loss to the German economy.

The aggregate market capitalization of firms in the sample was approximately 20.1 billion Reichsmark, based on data of the market capitalization of firms from January 1933 or the closest available month before January 1933. The average fraction of Jewish managers for all firms in the sample was 0.14 in 1932 (Table 2). The point estimate for the effect of the fraction of Jewish managers in 1932 on the average log stock prices after 1933 is -0.46 (Table 4, column 6). This implies a decrease of 36.87 percent ($= 100 \cdot [e^{-0.46} - 1]$) if the firm lost all its managers. Multiplying the percentage decrease with the average fraction of Jewish managers results in a 5.16 percent ($= -36.87 \cdot 0.14$) decline in the stock price of the average firm. Multiplying this average decline with the total market capitalization in January 1933 gives an approximate loss of market valuation of 1.04 billion ($= 0.0516 \cdot 20.1$) Reichsmark due to the stock price decrease. German gross national product in 1933 was 58.4 billion Reichsmark (Räth 2009), so the stock price drop due to the removal of the Jewish managers reduced the market valuation of firms by 1.78 percent of the gross national

product. This number is likely an underestimate of the aggregate loss to the German economy due to aggregate antisemitic discrimination, since the expulsion of Jews affected the economy through more channels than just the loss of managers in firms listed on the Berlin Stock Exchange.

6 The Effect of Losing Jewish Managers on Dividends and Returns on Assets

6.1 Dividends

In the previous sections, we presented evidence that the loss of Jewish managers changed the characteristics of firms' senior management and reduced firms' stock prices. We now turn to assessing the effect on additional measures of firm performance. The first measure is the dividend paid to investors. Together with stock price changes, the dividend determines the return of a stock to investors. The dividend also conveys information about the profitability of a firm, since it is usually paid out of firm profits. We use annual data on the dividend payments of all 655 firms in our sample for the years 1929 to 1943 (see Section 2.3 for details). The dividend is reported as a percentage of the nominal stock value. We estimate specifications equivalent to equation 4, using dividends as the dependent variable. As the dividend information is reported at yearly intervals, we replace the time fixed effects with year fixed effects.

Firms that lost a higher fraction of Jewish managers lowered dividend payments after 1933, but the effect is imprecisely estimated in the specification without controls (Table 9, column 1). Adding the controls renders the effect significantly different from zero at the 5 percent level. The point estimate indicates that the average firm with Jewish managers (which lost 22 percent of its managers) paid a dividend that was on average 0.34 percentage points lower from 1933 onward (Table 9, column 2). The average dividend paid by all firms in the sample was 4.6 percent, so the average firm with Jewish managers reduced its dividends by around 7.5 percent after 1933.

The specifications using the binary treatment indicator estimate a slightly larger decrease in the dividend for the average firm with Jewish managers (Table 9, columns 3-4). The point estimate in column 4, conditional on all controls, implies a decrease in the average dividend after 1933 of 0.46 percentage points, a 10 percent drop relative to the average dividend paid by firms in the sample. The effect on the stock price of the average firm with Jewish managers was 10.2 log points (Table 4, column 6), so the decrease in dividends was of similar proportional magnitude to the drop in stock prices. This suggests that investors priced the stocks proportionately to the dividends.

6.2 Returns on Assets

We also examine how the loss of Jewish managers affected firms' returns on assets, which is the ratio of profits before interest payments and taxes to total assets. The return on assets is a com-

monly used measure of the performance of firm managers, because it captures how efficiently the firm uses its available assets to generate profits (see Section 2.4 for details on the data). We estimate specifications equivalent to equation 4, but use the return on assets measured in 1931, 1936, and 1940 as the dependent variable.

In the specification with firm and year fixed effects, the coefficient on the fraction of Jewish managers interacted with a post-1933 indicator is negative and significant at the 5 percent level (Table 9, column 5). In the specification with all controls, the coefficient is also significant at the 5 percent level. The point estimate implies that the return on assets of the average firm with Jewish managers was 4.1 percentage points lower after 1933 (Table 9, column 6). The specification with the binary treatment indicator estimates a similar decrease of 5.3 percentage points for the average firm with Jewish managers, which is significant at the 10 percent level (Table 9, column 8).

Overall, the evidence in this section indicates that the effect of losing Jewish managers went beyond stock prices. The reductions in dividends and returns on assets show that the firms were less profitable and less efficient after losing the Jewish managers.

7 Conclusion

We study the economic effects of discrimination against Jewish managers in German firms. Our analysis relies on newly digitized data, based on a large number of historical sources. We collect information on the characteristics of senior managers at all firms listed on the Berlin Stock Exchange, as well as stock prices, dividend payments, and returns on assets of these firms.

The removal of the Jewish managers, caused by rising antisemitism after the Nazis came to power in 1933, negatively affected German firms, including some of the largest and most important corporations. The observable characteristics of senior managers changed in long-lasting ways in firms that had employed Jewish managers. For example, the number of managers with firm-specific tenure, general experience, and a university education, as well as the total number of managerial connections to other firms fell. After 1933, the stock prices of affected firms dropped sharply and remained low until the end of our sample period in 1943. The dividend payments and the returns on assets of affected firms also decreased, indicating that firms were less profitable and efficient because they were unable to replace the Jewish managers adequately. A back-of-the-envelope calculation implies that removing the Jewish managers caused large reductions in the aggregate market valuation of listed firms.

The findings of this paper inform our understanding of how discrimination can cause real economic harm, by leading to the removal of highly qualified business leaders. We study arguably the most severe form of discrimination against a particular group of individuals, but even less severe forms of discrimination can lead to a loss of talent. As highlighted above, the travel ban on citizens of seven Muslim-majority countries in the United States or the persecution of Turkish business-

men who follow the cleric Fethullah Gulen are current examples of rising discrimination that are likely to affect firms. Even the perception of not being welcome in a country may lead to outflow of highly qualified individuals with similar consequences. A recent survey in the wake of the Brexit referendum suggests, for example, that 12 percent of continental Europeans who make between £100,001 ($130,000) and £200,000 a year were planning to leave the United Kingdom in the coming years (The Economist 2017a). The results in our paper indicate that such an exodus would have large economic consequences.

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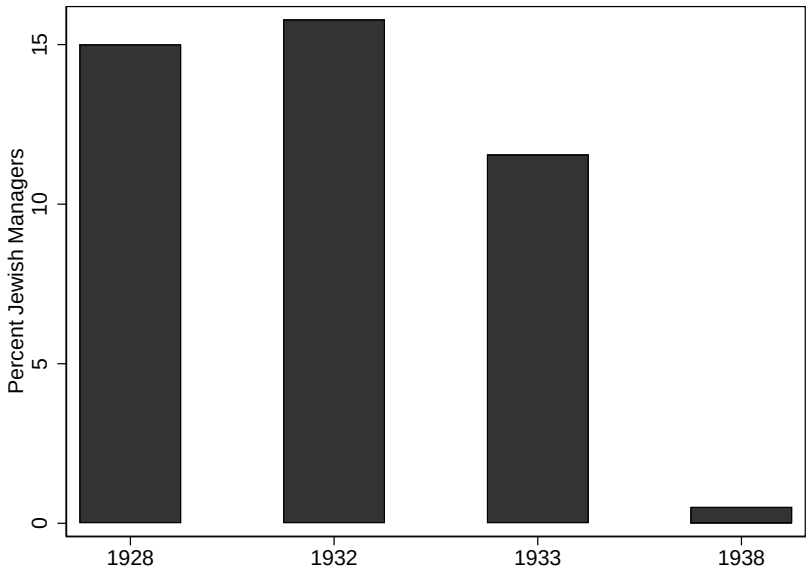
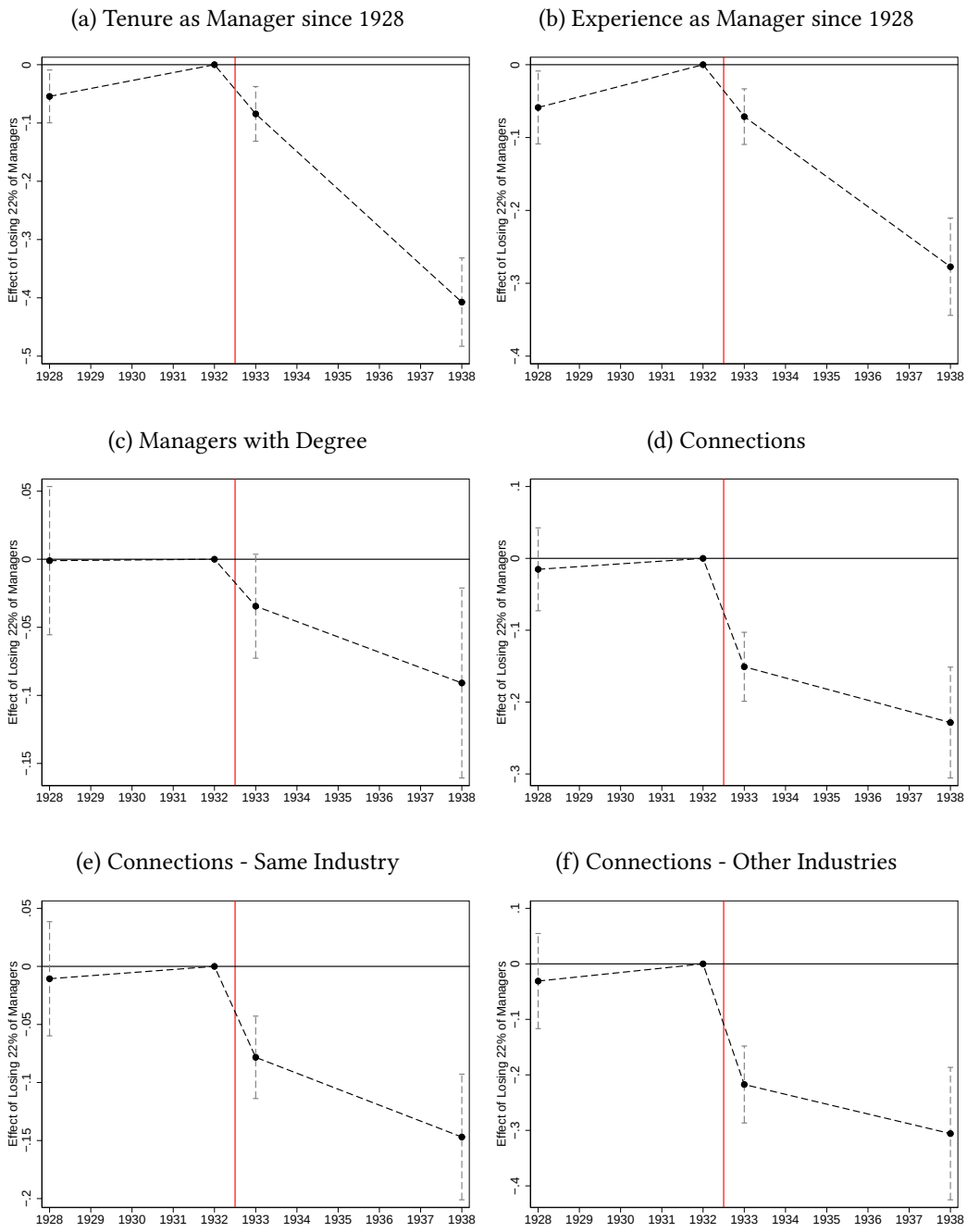
Figures

Figure 1: Percentage of Jewish Managers over Time



Notes: The figure reports the percentage of senior management positions that were held by Jewish managers in the 655 firms that were listed on the Berlin Stock Exchange.

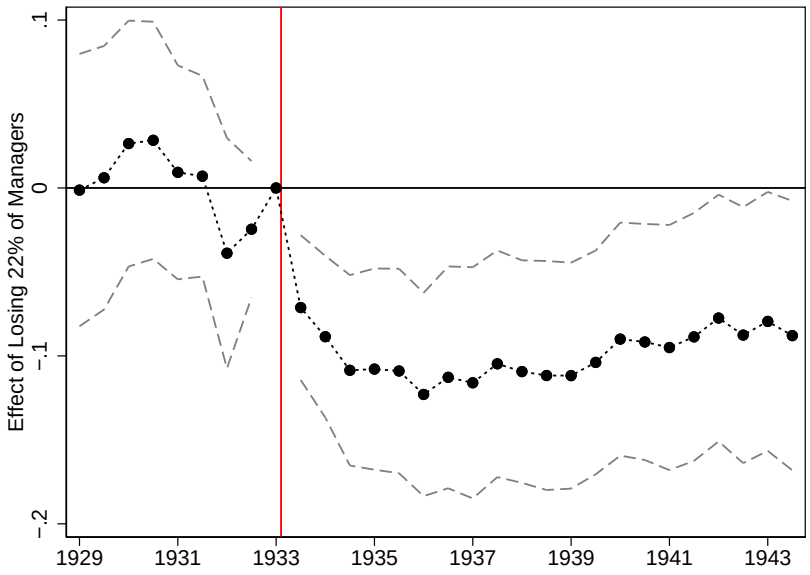
Figure 2: The Effect of Losing Jewish Managers on Manager Characteristics



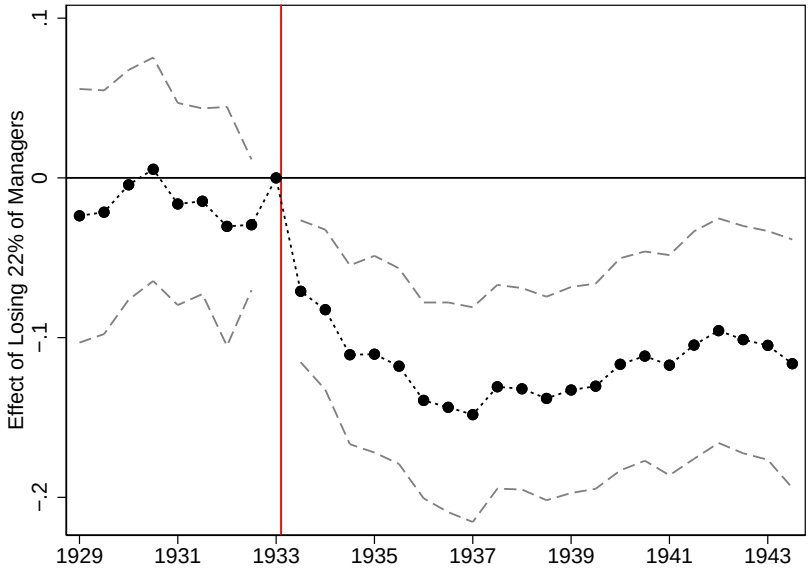
Notes: The figure reports yearly coefficients (β_τ) and 95 percent confidence intervals from equation 1. Each panel reports results for different dependent variables, which are indicated in the heading of the panel. The dependent variables are in natural logarithms. The main explanatory variables are the fraction of Jewish managers in 1932, interacted with a fixed effect for each year. The interaction with 1932, the last year before the Nazis gained power, is the excluded interaction. Coefficients and standard errors are scaled to reflect the effect on the average firm with Jewish managers in 1932. The average such firm lost 22 percent of its managers after 1932. All regressions include firm and year fixed effects. Standard errors are clustered at the firm level.

Figure 3: The Effect of Losing Jewish Managers on Stock Prices

(a) With Firm and Year Fixed Effects



(b) With All Controls



Notes: The figure reports coefficients (β_τ) and 95 percent confidence intervals from equation 3. The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The main explanatory variables are the fraction of Jewish managers in 1932, interacted with a fixed effect for each time period. The interaction with January 1933, the last period before the Nazis gained power, is the excluded interaction. Coefficients and standard errors are scaled to reflect the effect on the average firm with Jewish managers in 1932. The average such firm lost 22 percent of its managers after 1932. Panel (a) controls for firm and time fixed effects. Panel (b) additionally controls for an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All these additional controls are interacted with a full set of time fixed effects. Standard errors are clustered at the firm level.

Tables

Table 1: Summary Statistics on Managers in 1932

	(1)	(2)	(3)	(4)
	All Managers	Jewish Managers	Non-Jewish Managers	Non-Jewish Managers in Firms with Jewish Managers
Number of senior management positions	7,791	1,230	6,561	4,426
Number of senior managers	4,873	423	4,450	2,902
Manager characteristics (manager level):				
% managers with university degree	36.18	45.15	35.33	37.35
% managers with *Kommerzienrat* title	4.72	8.75	4.34	4.62
% managers with tenure since 1928	62.59	70.92	61.80	61.06
% managers with experience since 1928	69.61	82.98	68.34	68.47
Avg. number of supervisory board positions	1.26	2.90	1.11	1.16

Notes: The data on managers are for the year 1932 and were collected from various historical sources (see Section 2 for details).

Table 2: Summary Statistics on Firms in 1932

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All Firms	No Jewish Managers	At Least One Jewish Manager				
			All	Fraction Jewish Managers ≤ Median	> Median	Fraction Jewish Managers ≤ Median	> Median
						Without Conglomerates	
Number of firms	655	247	408	215	193	213	193
Number of senior managers	11.89	8.64	13.86	13.56	14.20	13.24	14.20
Number of Jewish senior managers	1.88	0.00	3.01	1.61	4.58	1.58	4.58
Fraction of Jewish senior managers	0.14	0.00	0.22	0.12	0.33	0.12	0.33
Number of managers with tenure since 1928	7.54	5.43	8.82	8.40	9.29	8.14	9.29
Number of managers with experience since 1928	9.21	6.37	10.92	10.41	11.50	10.14	11.50
Number of managers with degree	4.94	3.11	6.06	5.71	6.44	5.47	6.44
Number of connections	37.57	16.98	50.04	40.71	60.43	40.27	60.43
Number of connections to the same industry	15.97	9.50	19.89	17.96	22.04	17.78	22.04
Number of connections to other industries	21.60	7.48	30.15	22.75	38.39	22.49	38.39
Nazi connection	0.17	0.09	0.21	0.22	0.20	0.22	0.20
Nominal capital (in million RM)	36.30	4.71	55.43	91.69	15.03	17.47	15.03
Firm age (in years)	42.06	42.89	41.55	40.95	42.23	41.25	42.23
Balance sheet reported in January	0.68	0.66	0.69	0.70	0.68	0.70	0.68

Notes: The data on managers, their characteristics, and control variables are for the year 1932 and were collected from various historical sources (see Section 2 for details).

Table 3: The Effect on the Characteristics of Firms' Senior Management

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Dep. Variable: log(# of Managers with Tenure since 1928), # of obs./firms: 2407/655						
Frac. Jewish Managers (1932)	-0.840***	-0.835***	-0.831***	-0.830***	-0.830***	-0.813***
× Post 1933	(0.110)	(0.112)	(0.112)	(0.112)	(0.112)	(0.113)
R^2	0.747	0.747	0.749	0.749	0.749	0.757
Panel B: Dep. Variable: log(# of Managers with Experience since 1928), # of obs./firms: 2487/655						
Frac. Jewish Managers (1932)	-0.586***	-0.601***	-0.599***	-0.598***	-0.594***	-0.597***
× Post 1933	(0.104)	(0.104)	(0.104)	(0.105)	(0.105)	(0.107)
R^2	0.660	0.663	0.663	0.665	0.665	0.681
Panel C: Dep. Variable: log(# of Managers with Degree), # of obs./firms: 2400/645						
Frac. Jewish Managers (1932)	-0.272**	-0.257**	-0.257**	-0.256**	-0.255**	-0.218**
× Post 1933	(0.108)	(0.108)	(0.108)	(0.108)	(0.108)	(0.109)
R^2	0.016	0.022	0.022	0.029	0.029	0.053
Panel D: Dep. Variable: log(# of Connections), # of obs./firms: 2530/655						
Frac. Jewish Managers (1932)	-0.812***	-0.808***	-0.813***	-0.811***	-0.812***	-0.746***
× Post 1933	(0.136)	(0.136)	(0.137)	(0.138)	(0.138)	(0.141)
R^2	0.220	0.222	0.230	0.232	0.233	0.253
Panel E: Dep. Variable: log(# of Connections to Firms in the Same Ind.)						
Frac. Jewish Managers (1932)	-0.474***	-0.471***	-0.478***	-0.476***	-0.475***	-0.386***
× Post 1933	(0.095)	(0.096)	(0.097)	(0.097)	(0.097)	(0.098)
R^2	0.166	0.169	0.174	0.181	0.182	0.228
Panel F: Dep. Variable: log(# of Connections to Firms in Different Ind.)						
Frac. Jewish Managers (1932)	-1.091***	-1.086***	-1.089***	-1.084***	-1.084***	-1.046***
× Post 1933	(0.191)	(0.191)	(0.191)	(0.191)	(0.192)	(0.195)
R^2	0.178	0.179	0.185	0.187	0.188	0.212
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Nazi Connection × Time FE		Yes	Yes	Yes	Yes	Yes
Reporting Period × Time FE			Yes	Yes	Yes	Yes
Firm Age × Time FE				Yes	Yes	Yes
Nominal Capital × Time FE					Yes	Yes
Industry FE × Time FE						Yes

Notes: The Table reports point estimates (β_1) from equation 2 for different dependent variables, which are indicated in the heading of each panel. The main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the years after 1932. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of year fixed effects. The data include the years 1928, 1932, 1933, and 1938. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table 4: The Effect on Stock Prices

Dep. Variable: log(Stock Price)	(1)	(2)	(3)	(4)	(5)	(6)
Frac. Jewish Managers (1932)	-0.469***	-0.459***	-0.458***	-0.479***	-0.479***	-0.464***
× Post 1933	(0.138)	(0.136)	(0.136)	(0.134)	(0.134)	(0.138)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Nazi Connection × Time FE		Yes	Yes	Yes	Yes	Yes
Reporting Period × Time FE			Yes	Yes	Yes	Yes
Firm Age × Time FE				Yes	Yes	Yes
Nominal Capital × Time FE					Yes	Yes
Industry FE × Time FE						Yes
Number of Observations	12710	12710	12710	12710	12710	12710
Number of Firms	655	655	655	655	655	655
R^2	0.566	0.569	0.570	0.580	0.582	0.622

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table 5: The Effect of Losing Managers with Certain Characteristics on Stock Prices

Dep. Variable: log(Stock Price)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0 < Lost Characteristics at Firm with Jewish Manager (1932) < 0.20	-0.114*	-0.082	-0.052	-0.037	-0.111**	-0.093*	0.000	0.058
× Post 1933	(0.064)	(0.061)	(0.047)	(0.046)	(0.055)	(0.050)	(0.069)	(0.065)
0.20 ≤ Connections Lost < 0.80	-0.144***	-0.133***					-0.019	-0.013
× Post 1933	(0.046)	(0.045)					(0.060)	(0.057)
0.80 ≤ Connections Lost	-0.366***	-0.359***					-0.203*	-0.191*
× Post 1933	(0.109)	(0.098)					(0.119)	(0.107)
0.20 ≤ Degrees Lost < 0.80			-0.214***	-0.199***			-0.180***	-0.167***
× Post 1933			(0.053)	(0.051)			(0.067)	(0.064)
0.80 ≤ Degrees Lost			-0.623***	-0.733***			-0.554***	-0.668***
× Post 1933			(0.208)	(0.209)			(0.210)	(0.214)
0.20 ≤ Experienced Managers Lost < 0.80					-0.170***	-0.163***	0.019	0.016
× Post 1933					(0.048)	(0.047)	(0.077)	(0.065)
0.80 ≤ Experienced Managers Lost					-0.385***	-0.110	-0.179	0.081
× Post 1933					(0.077)	(0.170)	(0.118)	(0.198)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Controls		Yes		Yes		Yes		Yes
Number of Observations	12710	12710	12710	12710	12710	12710	12710	12710
Number of Firms	655	655	655	655	655	655	655	655
R^2	0.567	0.623	0.572	0.629	0.566	0.622	0.573	0.630

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The main explanatory variables in columns 1 to 6 are indicators for whether losing Jewish managers reduced the value of the given managerial characteristic by: 1) less than 20 percent, 2) 20 percent to less than 80 percent, and 3) more than 80 percent. In columns 7 and 8, the first explanatory variable indicates firms where the loss of Jewish managers reduced the value of all three managerial characteristic by less than 20 percent. (Including multiple heterogeneity categories in one regression, as we do in columns 7 and 8, requires defining one baseline category for losing less than 20 percent in all categories, in order to avoid a problem of perfect multicollinearity.) For firms without Jewish managers in 1932, all of the reported indicator variables in all columns are zero. The main explanatory variables are all interacted with an indicator for the months after January 1933. The control variables are identical to Table 4. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table 6: The Effect on Stock Prices of Firms Favored by the Nazis

Dep. Variable: log(Stock Price)	(1)	(2)
Frac. Jewish Managers (1932)	-0.576*	-0.704**
× Post 1933	(0.333)	(0.313)
Firm FE	Yes	Yes
Time FE	Yes	Yes
All Controls		Yes
Number of Observations	3834	3834
Number of Firms	171	171
R^2	0.563	0.663

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. The sample of favored firms contains firms with connections to the Nazi Party and firms that received forced labor workers from the Nazi government. We exclude firms historically perceived as Jewish. The control variables are identical to Table 4. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table 7: The Effect on Stock Prices of Firms Perceived As Jewish

Dep. Variable: log(Stock Price)	(1)	(2)	(3)	(4)	(5)	(6)
Jewish Firm	-0.127	-0.137	-0.021	-0.041	0.029	0.007
× Post 1933	(0.096)	(0.084)	(0.097)	(0.090)	(0.099)	(0.092)
Jewish Firm			-0.140**	-0.127**	-0.142**	-0.131**
× Post 1935			(0.057)	(0.059)	(0.058)	(0.060)
Frac. Jewish Managers (1932)					-0.446***	-0.441***
× Post 1933					(0.138)	(0.138)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
All Controls		Yes		Yes		Yes
Number of Observations	12710	12710	12710	12710	12710	12710
Number of Firms	655	655	655	655	655	655
R^2	0.563	0.619	0.563	0.620	0.567	0.623

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The first main explanatory variable is an indicator for firms historically perceived as Jewish, interacted with an indicator for the months after January 1933. The second main explanatory variable is an indicator for firms historically perceived as Jewish, interacted with an indicator for the months after January 1935. The third main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. The control variables are identical to Table 4. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table 8: Correlated Demand Shocks

Dep. Variable: log(Stock Price)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	No Retail		No Arms Producers		No Iron and Steel, Machines, Chemicals		No Construction		Non-International Firms	
Frac. Jewish Managers (1932)	-0.463***	-0.464***	-0.457***	-0.449***	-0.588***	-0.425**	-0.460***	-0.461***	-0.479***	-0.376**
	(0.140)	(0.140)	(0.138)	(0.138)	(0.170)	(0.187)	(0.145)	(0.144)	(0.162)	(0.165)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Controls		Yes		Yes		Yes		Yes		Yes
Number of Observations	12546	12546	12070	12070	7588	7588	12004	12004	7657	7657
Number of Firms	647	647	626	626	386	386	620	620	419	419
R^2	0.563	0.621	0.561	0.619	0.532	0.605	0.558	0.616	0.564	0.624

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. We drop from the sample: firms in the retail sector (columns 1 and 2); firms that the Reichswehr had listed as important for armaments production, based on Hansen (1978) (columns 3 and 4); firms producing iron and steel, machines, and chemicals (columns 5 and 6); firms in the construction sector (columns 7 and 8); firms that were internationally active (columns 9 and 10). The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

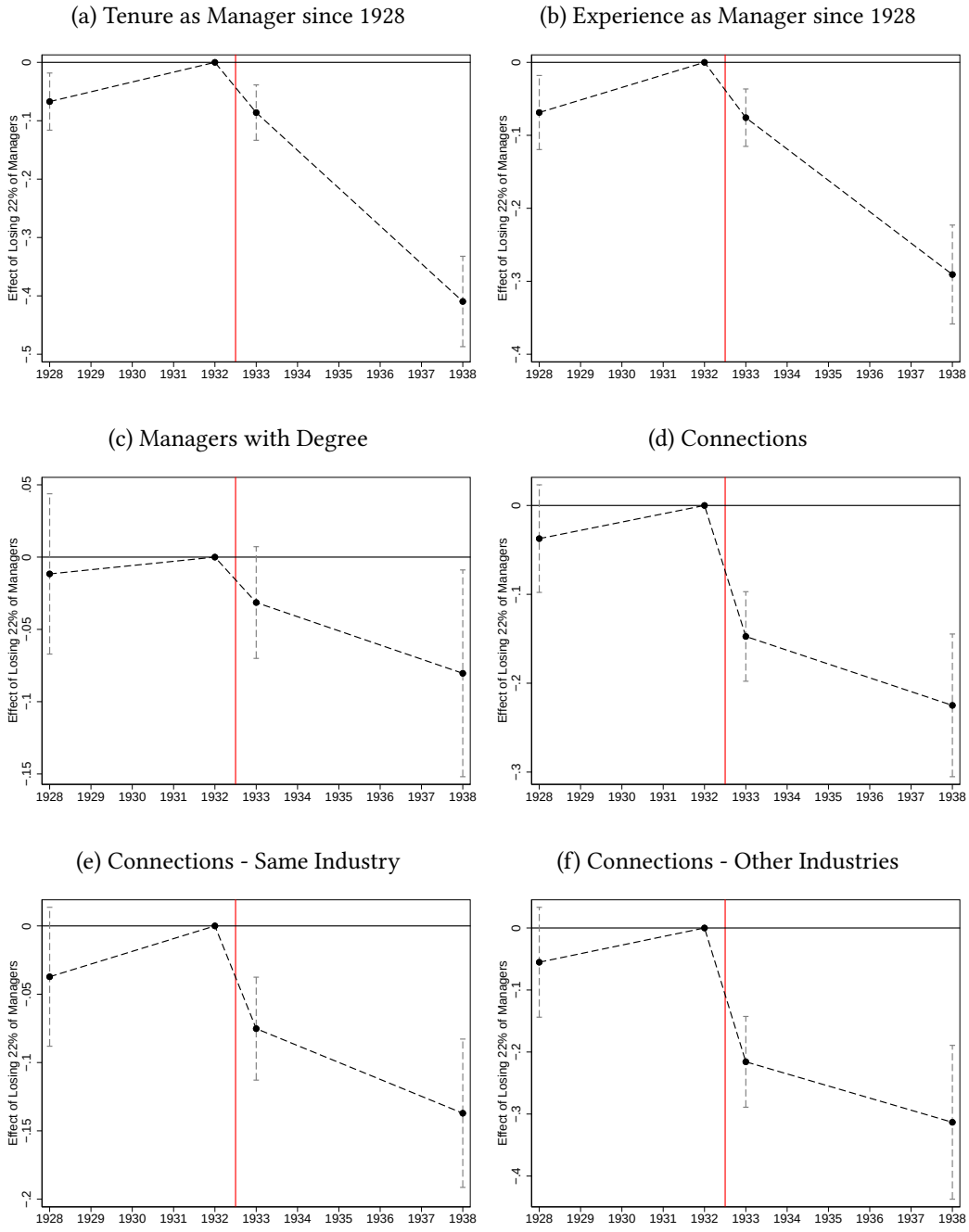
Table 9: The Effect on Dividends and Returns on Assets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Variable:	Dividends				Return on Assets			
Frac. Jewish Managers (1932)	-1.266	-1.557**			-0.235**	-0.187**		
× Post 1933	(0.960)	(0.778)			(0.105)	(0.079)		
Firm with Jewish Managers (1932)			-0.528	-0.459*			-0.060*	-0.053*
× Post 1933			(0.326)	(0.252)			(0.033)	(0.029)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Controls		Yes		Yes		Yes		Yes
Number of Observations	7379	7379	7379	7379	492	492	492	492
Number of Firms	655	655	655	655	289	289	289	289
R^2	0.176	0.240	0.177	0.240	0.401	0.560	0.398	0.559

Notes: The dependent variable in columns 1 to 4 is the annual dividend payment, measured as a percentage of the nominal stock value. The data in columns 1 to 4 include the years 1929 to 1943. The dependent variable in columns 5 to 8 is the return on assets, measured as the ratio of profits before interest payments and taxes to total assets. The data in columns 5 to 8 include the years 1931, 1936, and 1940. The first main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. The second main explanatory variable is an indicator for whether the firm had any Jewish managers in 1932, interacted with an indicator for the months after January 1933. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

A Online Appendix Figures and Tables

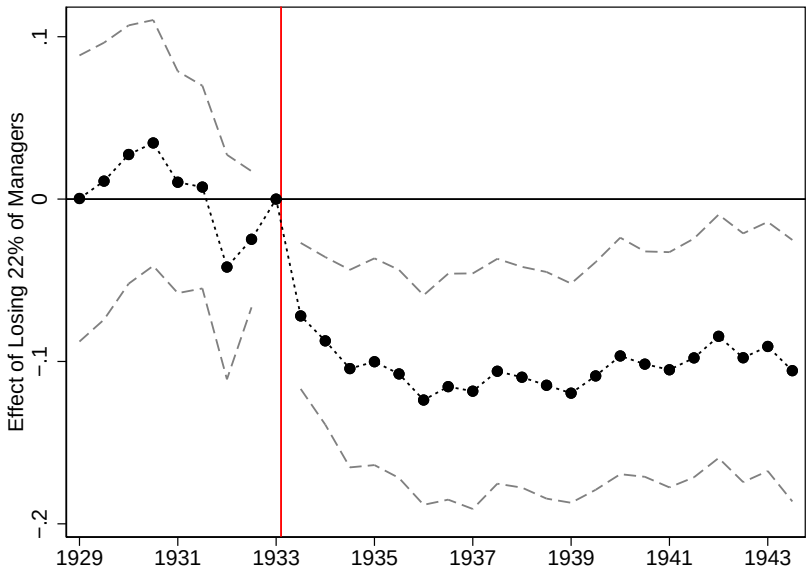
Figure A.1: The Effect of Losing Jewish Managers on Manager Characteristics (With All Controls)



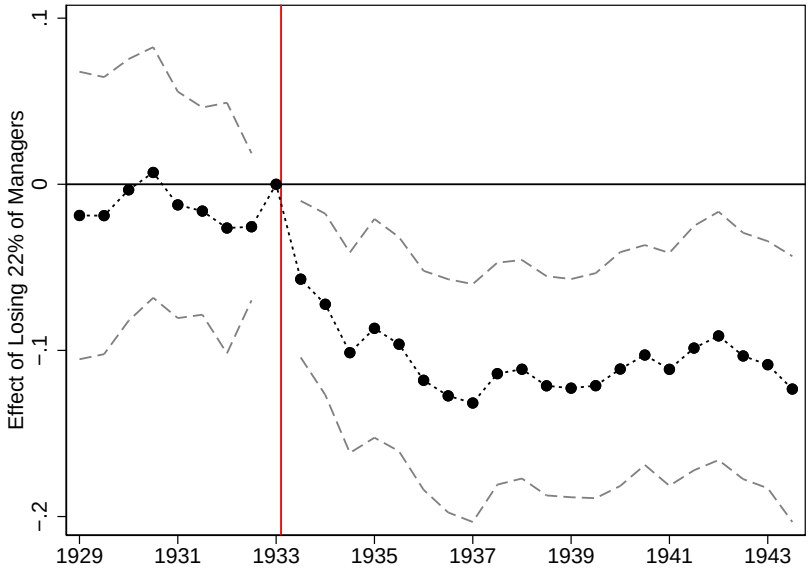
Notes: The figure reports yearly coefficients (β_τ) and 95 percent confidence intervals from equation 1. Each panel reports results for different dependent variables, which are indicated in the heading of the panel. The dependent variables are in natural logarithms. The main explanatory variables are the fraction of Jewish managers in 1932, interacted with a fixed effect for each year. The interaction with 1932, the last year before the Nazis gained power, is the excluded interaction. Coefficients and standard errors are scaled to reflect the effect on the average firm with Jewish managers in 1932. The average such firm lost 22 percent of its managers after 1932. All regressions include firm and year fixed and the following control variables: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of year fixed effects. The data include the years 1928, 1932, 1933, and 1938. Standard errors are clustered at the firm level.

Figure A.2: The Effect on Stock Prices, Adjusted for Dividend Payments

(a) With Firm and Year Fixed Effects

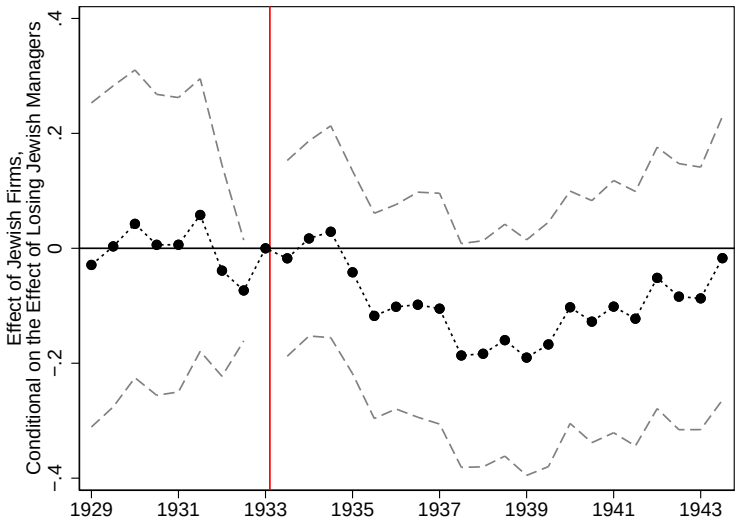


(b) With All Controls



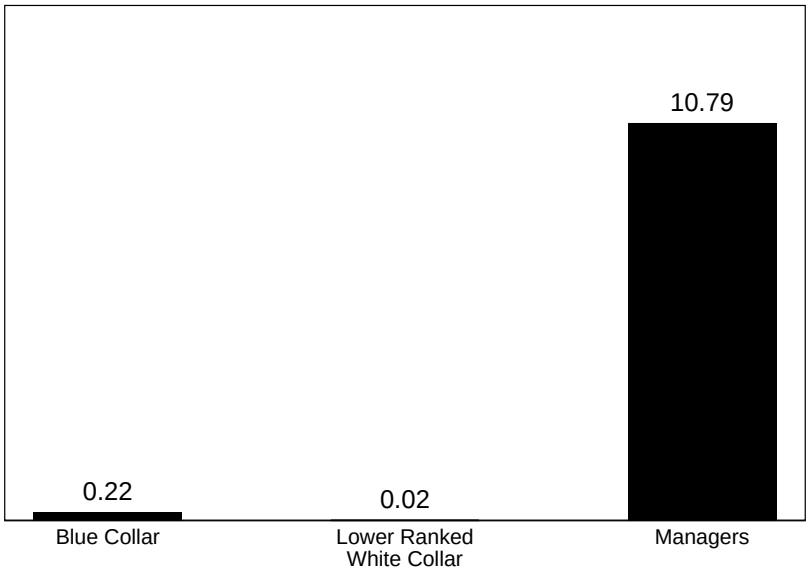
Notes: This figure is identical to Figure 3, except that the stock prices in the dependent variable are adjusted for dividend payments. We adjust for dividend payments by assuming that investors immediately reinvest the dividend paid out by a firm into the stock of that firm (see Appendix B.2.3 for details). This adjustment means that the coefficients measure the effect of losing Jewish managers on the return of investing (on January 10, 1933) into the average firm with Jewish managers in 1932, relative to investing into a firm without Jewish managers in 1932.

Figure A.3: The Effect on Stock Prices of Firms Perceived as Jewish



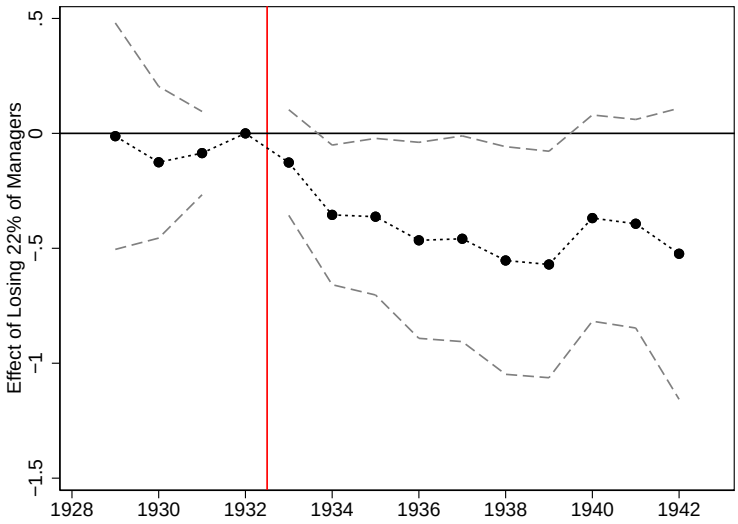
Notes: The figure reports coefficients (β_τ) and 95 percent confidence intervals from a regression similar to equation 3. The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The main explanatory variable is an indicator for whether the firm was perceived as Jewish by contempories, interacted with a fixed effect for each time period. The interaction with January 1933, the last period before the Nazis gained power, is the excluded interaction. The regression also controls for the fraction of Jewish managers in 1932, interacted with a full set of time fixed effects, and all controls used in Figure 3, panel (b). Standard errors are clustered at the firm level.

Figure A.4: The Share of Jews in Region-Sector Cells With Few Lower-Ranked Jewish Employees



Notes: The figure reports the average percentage of blue collar workers (left bar), lower ranked white color workers (middle bar) and managers (right bar) in the sample of firms with in region-sector cells with the lowest quartiles of both blue collar workers and lower-ranked white collar employees. This sample is equivalent to the estimatation sample for columns 5 and 6 in Table A.12. The data on lower ranked employees come from the 1933 census (see Section B.3 for details). The data on managers come from Handbuch der Deutschen Aktiengesellschaften 1932.

Figure A.5: The Effect on Dividends



Notes: The figure reports coefficients (β_τ) and 95 percent confidence intervals from a regression similar to equation 3. The dependent variable is the annual dividend payment, measured as a percentage of the nominal stock value. The main explanatory variables are the fraction of Jewish managers in 1932, interacted with a fixed effect for each year. The interaction with 1932, the last year before the Nazis gained power, is the excluded interaction. The control variables include: firm fixed effects, time fixed effects, an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. Standard errors are clustered at the firm level.

Table A.1: The Effect on the Characteristics of Firms' Senior Management, using the Inverse Hyperbolic Sine

Dep. Variable:	(1) # of Managers with Tenure since 1928	(2) # of Managers with Experience since 1928	(3) # of Managers with Degree	(4) # of Connections	(5) # of Connections to Firms in the Same Industry	(6) # of Connections to Firms in Different Industries
Frac. Jewish Managers (1932)	-0.958***	-0.662***	-0.215**	-0.756***	-0.423***	-1.015***
× Post 1933	(0.115)	(0.096)	(0.093)	(0.122)	(0.082)	(0.183)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	2530	2530	2530	2530	2530	2530
Number of Firms	655	655	655	655	655	655
R^2	0.713	0.635	0.011	0.225	0.167	0.164

Notes: The heading of each column lists the relevant dependent variable. All dependent variables are transformed using the inverse hyperbolic sine transformation, an approximation to the log transformation that permits using zero values. The main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the years after 1932. The data include the years 1928, 1932, 1933, and 1938. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.2: The Effect on the Characteristics of Firms' Senior Management (Binary Treatment Indicator)

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Dep. Variable: log(# of Managers with Tenure since 1928), # of obs./firms: 2407/655						
Firm with Jewish Managers (1932)	-0.227***	-0.227***	-0.225***	-0.225***	-0.226***	-0.215***
× Post 1933	(0.031)	(0.032)	(0.031)	(0.032)	(0.031)	(0.032)
R^2	0.746	0.746	0.747	0.747	0.747	0.755
Panel B: Dep. Variable: log(# of Managers with Experience since 1928), # of obs./firms: 2487/655						
Firm with Jewish Managers (1932)	-0.149***	-0.163***	-0.162***	-0.161***	-0.159***	-0.150***
× Post 1933	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.031)
R^2	0.657	0.661	0.662	0.663	0.664	0.678
Panel C: Dep. Variable: log(# of Managers with Degree), # of obs./firms: 2400/645						
Firm with Jewish Managers (1932)	-0.144***	-0.133***	-0.133***	-0.132***	-0.131***	-0.123***
× Post 1933	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)
R^2	0.024	0.028	0.028	0.035	0.035	0.058
Panel D: Dep. Variable: log(# of Connections), # of obs./firms: 2530/655						
Firm with Jewish Managers (1932)	-0.233***	-0.232***	-0.233***	-0.231***	-0.234***	-0.218***
× Post 1933	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
R^2	0.217	0.218	0.226	0.229	0.230	0.251
Panel E: Dep. Variable: log(# of Connections to Firms in the Same Ind.)						
Firm with Jewish Managers (1932)	-0.159***	-0.158***	-0.161***	-0.159***	-0.158***	-0.138***
× Post 1933	(0.025)	(0.026)	(0.026)	(0.025)	(0.025)	(0.026)
R^2	0.169	0.172	0.177	0.183	0.184	0.231
Panel F: Dep. Variable: log(# of Connections to Firms in Different Ind.)						
Firm with Jewish Managers (1932)	-0.276***	-0.274***	-0.274***	-0.271***	-0.275***	-0.257***
× Post 1933	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.059)
R^2	0.171	0.171	0.178	0.179	0.181	0.205
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Nazi Connection × Time FE		Yes	Yes	Yes	Yes	Yes
Reporting Period × Time FE			Yes	Yes	Yes	Yes
Firm Age × Time FE				Yes	Yes	Yes
Nominal Capital × Time FE					Yes	Yes
Industry FE × Time FE						Yes

Notes: The heading of each panel lists the relevant dependent variable. The main explanatory variable is an indicator for whether the firm had any Jewish managers in 1932, interacted with an indicator for the years after 1932. The control variables are identical to Table 3. The data include the years 1928, 1932, 1933, and 1938. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.3: The Effect on the Total Number of Managers

Dep. Variable:	(1)	(2)	(3)	(4)	(5)	(6)
	# of Managers			log(# of Managers)		
Jewish Managers (1932)	0.074			0.007		
× Post 1933	(0.100)			(0.004)		
Frac. Jewish Managers (1932)		0.359			-0.080	
× Post 1933		(0.939)			(0.056)	
Firm with Jewish Managers (1932)			0.089			-0.026*
× Post 1933			(0.216)			(0.015)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
All Controls	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	2530	2530	2530	2530	2530	2530
Number of Firms	655	655	655	655	655	655
R^2	0.429	0.429	0.429	0.359	0.358	0.358

Notes: The dependent variable in columns 1 to 3 is the number of managers. The dependent variable in columns 4 to 6 is the natural logarithm of the number of managers. The first explanatory variable measures the number of Jewish managers in 1932. The second explanatory variable measures the fraction of Jewish managers in 1932. The third explanatory variable is an indicator for whether the firm had any Jewish managers in 1932. The three explanatory variables are all interacted with an indicator for the years after 1932. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. We also control for the log of the total number of managers in 1928 because there was a secular decrease in the number of managers in firms that had large boards in 1928. All controls are interacted with a full set of year fixed effects. The data include the years 1928, 1932, 1933, and 1938. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.4: The Effect of Dismissals in 1933 and Dismissals After 1933 on Stock Prices

Dep. Variable: log(Stock Price)	(1)	(2)
Firms with dismissals in 1933		
Frac. Jewish Managers (1932)	-0.408***	-0.343**
× 𝟙(1933)	(0.154)	(0.157)
Frac. Jewish Managers (1932)	-0.534***	-0.490***
× Post 1934	(0.146)	(0.149)
Firms with all dismissals after 1933		
Frac. Jewish Managers (1932)	-0.100	0.039
× 𝟙(1933)	(0.217)	(0.209)
Frac. Jewish Managers (1932)	-0.307	-0.440**
× Post 1934	(0.235)	(0.224)
Firm FE	Yes	Yes
Time FE	Yes	Yes
All Controls		Yes
Number of Observations	12710	12710
Number of Firms	655	655
R^2	0.567	0.622

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The main explanatory variables measures the fraction of Jewish managers in 1932, interacted with an indicator for (a) July 1933, (b) January 1934 and all months after, (c) July 1933 in firms with dismissals after 1933, and (d) January 1934 and all months after in firms with dismissals after 1933. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.5: The Effect on Stock Prices (Binary Treatment Indicator)

Dep. Variable: log(Stock Price)	(1)	(2)	(3)	(4)	(5)	(6)
Firm with Jewish Managers (1932)	-0.147***	-0.138***	-0.137***	-0.142***	-0.140***	-0.133***
× Post 1933	(0.043)	(0.042)	(0.041)	(0.041)	(0.041)	(0.041)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Nazi Connection × Time FE		Yes	Yes	Yes	Yes	Yes
Reporting Period × Time FE			Yes	Yes	Yes	Yes
Firm Age × Time FE				Yes	Yes	Yes
Nominal Capital × Time FE					Yes	Yes
Industry FE × Time FE						Yes
Number of Observations	12710	12710	12710	12710	12710	12710
Number of Firms	655	655	655	655	655	655
R^2	0.566	0.568	0.570	0.579	0.581	0.621

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The main explanatory variable is an indicator for whether the firm had any Jewish managers in 1932, interacted with an indicator for the months after January 1933. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.6: The Effect on Stock Prices of Firms With At Least One Jewish Manager

Dep. Variable: log(Stock Price)	(1)	(2)	(3)	(4)
	At Least One Jewish Manager		Without Conglomerates	
Frac. Jewish Managers (1932)	-0.298	-0.370*	-0.297	-0.394**
× Post 1933	(0.195)	(0.188)	(0.196)	(0.187)
Firm FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
All Controls		Yes		Yes
Number of Observations	8648	8648	8593	8593
Number of Firms	408	408	406	406
R^2	0.565	0.626	0.566	0.630

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The sample contains all firms with at least one Jewish manager. In addition, we drop conglomerates in columns 3 and 4. The main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.7: The Effect on Stock Prices Controlling for Firm Size

Dep. Variable: log(Stock Price)	(1)	(2)	(3)	(4)	(5)	(6)
		Full Sample		Without Conglomerates	Firm Size ≤ Median	Firm Size > Median
Panel A: Measure of Firm Size: Nominal Capital						
Frac. Jewish Managers (1932)	-0.464***	-0.416***	-0.403***	-0.441***	-0.637**	-0.468***
× Post 1933	(0.138)	(0.136)	(0.134)	(0.134)	(0.268)	(0.159)
Number of Observations	12710	12710	12710	12655	5170	7540
Number of Firms	655	655	655	653	335	320
R^2	0.622	0.628	0.635	0.626	0.660	0.630
Panel B: Measure of Firm Size: Total Number of Managers						
Frac. Jewish Managers (1932)	-0.416***	-0.381***	-0.368***	-0.401***	-0.493**	-0.433**
× Post 1933	(0.135)	(0.136)	(0.137)	(0.136)	(0.215)	(0.169)
Number of Observations	12710	12710	12710	12655	5950	6760
Number of Firms	655	655	655	653	345	310
R^2	0.624	0.624	0.634	0.625	0.657	0.623
Panel C: Measure of Firm Size: Both Nominal Capital and Total Number of Managers						
Frac. Jewish Managers (1932)	-0.418***	-0.380***	-0.358***	-0.404***		
× Post 1933	(0.135)	(0.135)	(0.132)	(0.135)		
Number of Observations	12710	12710	12710	12655		
Number of Firms	655	655	655	653		
R^2	0.625	0.629	0.647	0.627		
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
All Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm Size	Yes			Yes	Yes	Yes
Log of Firm Size		Yes				
Deciles of Firm Size			Yes			

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. We use the full sample in columns 1 to 3. In column 4, we drop conglomerates. In column 5, the sample contains only firms below the median for the respective firm size measure (panel A: nominal capital, panel B: total number of managers). In column 6, the sample contains only firms above the median for the respective firm size measure. Column 1 and columns 4 to 7 control for the level of nominal capital, column 2 for natural logarithm of nominal capital, and column 3 for deciles of nominal capital. All specifications control for: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, and industry fixed effects. All controls, including the controls for nominal capital, are interacted with a full set of time fixed effects. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.8: The Effect on Stock Prices Using Alternative Stock Price Measures

Dep. Variable: log(Stock Price)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Exclude 1932		5-day Window		3-day Window		Monthly Stock Prices	
Frac. Jewish Managers (1932)	-0.530***	-0.512***	-0.484***	-0.468***	-0.489***	-0.468***	-0.456***	-0.445***
× Post 1933	(0.148)	(0.149)	(0.141)	(0.139)	(0.144)	(0.142)	(0.137)	(0.137)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Controls		Yes		Yes		Yes		Yes
Number of Observations	11841	11841	11781	11781	11330	11330	12762	12762
Number of Firms	655	655	653	653	653	653	654	654
R^2	0.502	0.565	0.554	0.612	0.545	0.605	0.571	0.626

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window (columns 1 and 2), plus-minus five-day window (columns 3 and 4), or plus-minus three-day window (columns 5 and 6) around January 10th and July 10th of each year. Stock prices in columns 7 and 8 are averaged over the entire month of January and July of each year. We exclude the observations for 1932 in columns 1 and 2. The main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.9: The Effect on Stock Prices of Regularly Traded Firms

Dep. Variable: log(Stock Price)	(1)	(2)	(3)	(4)	(5)	(6)
	≥ 15 stock prices		≥ 25 stock prices		30 stock prices	
Frac. Jewish Managers (1932)	-0.421***	-0.445***	-0.396**	-0.421***	-0.700***	-0.725***
× Post 1933	(0.146)	(0.145)	(0.157)	(0.154)	(0.235)	(0.233)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
All Controls		Yes		Yes		Yes
Number of Observations	10645	10645	8755	8755	3690	3690
Number of Firms	401	401	306	306	123	123
R^2	0.574	0.639	0.597	0.667	0.570	0.677

Notes: We include firms that were traded on at least 15 Januarys or Julys between January 1929 and July 1943 in columns 1 and 2. We include firms that were traded on at least 25 Januarys or Julys in columns 3 and 4. We include firms that were traded on all 30 Januarys or Julys in columns 5 and 6. The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.10: The Effect on Firm Delisting

Dep. Variable: Delisting Indicator	(1)	(2)	(3)	(4)
	Linear Probability Model		Extended Cox Hazard Model	
Frac. Jewish Managers (1932)	-0.018	-0.038		
	(0.128)	(0.130)		
Frac. Jewish Managers (1932)			-0.415	-0.315
× Post 1933			(0.448)	(0.457)
All Controls		Yes		Yes
Number of Firms	655	655	655	655
R^2	0.000	0.051		

Notes: Columns 1 and 2 report the results of a cross-sectional, linear probability model. The dependent variable in columns 1 and 2 is an indicator that is equal to 1 if the firm was delisted after January 1933. The main explanatory variable measures the fraction of Jewish managers in 1932. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. Columns 3 and 4 report the results of an extended Cox hazard model, with time-varying coefficients. The data include two periods, before and after January 1933. The dependent variable in columns 3 and 4 is the natural logarithm of the relative hazard of being delisted in the relevant period. The main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the period after January 1933. The control variables are as in columns 1 and 2, but all are interacted with fixed effects for the periods before and after January 1933. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.11: The Effect of Losing Managers in Important and Regular Positions on Stock Prices

Dep. Variable: log(Stock Price)	(1)	(2)	(3)	(4)	(5)	(6)
Frac. Jewish Managers in Important Positions (1932) × Post 1933	-0.253*	-0.263*	-0.262*	-0.290**	-0.288**	-0.267**
	(0.137)	(0.135)	(0.135)	(0.131)	(0.131)	(0.128)
Frac. Jewish Managers in Regular Positions (1932) × Post 1933	-0.213	-0.197	-0.196	-0.197	-0.198	-0.207
	(0.130)	(0.128)	(0.128)	(0.127)	(0.127)	(0.128)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Nazi Connection × Time FE		Yes	Yes	Yes	Yes	Yes
Reporting Period × Time FE			Yes	Yes	Yes	Yes
Firm Age × Time FE				Yes	Yes	Yes
Nominal Capital × Time FE					Yes	Yes
Industry FE × Time FE						Yes
Number of Observations	12698	12698	12698	12698	12698	12698
Number of Firms	654	654	654	654	654	654
R^2	0.566	0.569	0.570	0.580	0.582	0.622

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The first main explanatory variable measures the fraction of Jewish managers in important positions in 1932, interacted with an indicator for the months after January 1933. Important positions are defined as executive board positions or chair and vice chair of the supervisory board. The second main explanatory variable measures the fraction of Jewish managers in regular supervisory board positions in 1932, interacted with an indicator for the months after January 1933. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.12: The Effect on Stock Prices in Region-Sector Cells With Few Lower-Ranked Jewish Employees

Dep. Variable: log(Stock Price)	(1)	(2)	(3)	(4)	(5)	(6)
	Below 25th Percentile of Jewish Employees Among:					
	Blue Collar Workers		Lower-Ranked White Collar Employees		Both Categories	
Frac. Jewish Managers (1932)	-0.776**	-0.689*	-0.750**	-0.758**	-0.857**	-0.860**
× Post 1933	(0.338)	(0.370)	(0.329)	(0.365)	(0.367)	(0.416)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
All Controls		Yes		Yes		Yes
Number of Observations	2824	2824	2888	2888	2342	2342
Number of Firms	165	165	165	165	136	136
R^2	0.569	0.662	0.588	0.667	0.578	0.666

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. In columns 1 and 2, we only include firms in regions-sector cells below the 25th percentile among blue collar workers. In columns 3 and 4, we only include firms in regions-sector cells below the 25th percentile among lower-ranked white collar employees. In columns 5 and 6, we only include firms in regions-sector cells below the 25th percentile among both blue collar workers and lower-ranked white collar employees. The data for the lower-ranked employees are from the 1933 German census. The additional control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.13: The Effect on Stock Prices of Firms Without Large Jewish Shareholders

Dep. Variable: log(Stock Price)	(1)	(2)
Frac. Jewish Managers (1932)	-0.480***	-0.489***
× Post 1933	(0.156)	(0.157)
Firm FE	Yes	Yes
Time FE	Yes	Yes
All Controls		Yes
Number of Observations	11329	11329
Number of Firms	589	589
R^2	0.560	0.621

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The main explanatory variable measures the fraction of Jewish managers in 1932, interacted with an indicator for the months after January 1933. We drop firms from the sample where a Jewish individual or a Jewish firm (for example a Jewish private bank) was a large shareholders. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.14: The Effect on Stock Prices, Testing for Spillover Effects

Dep. Variable: log(Stock Price)	(1)	(2)	(3)	(4)	(5)	(6)
Frac. Jewish Managers (1932)	-0.461***	-0.461***	-0.432***	-0.430***	-0.423***	-0.408***
× Post 1933	(0.140)	(0.135)	(0.144)	(0.142)	(0.150)	(0.145)
Avg. Frac. Jewish Managers (Industry)	-0.151	-0.395			-0.166	-0.416
× Post 1933	(0.480)	(0.452)			(0.491)	(0.459)
Avg. Frac. Jewish Managers (Region)			-0.269	-0.370	-0.275	-0.385
× Post 1933			(0.360)	(0.349)	(0.368)	(0.355)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls		Yes		Yes		Yes
Number of Observations	12710	12710	12710	12710	12710	12710
Number of Firms	655	655	655	655	655	655
R^2	0.566	0.582	0.566	0.582	0.566	0.583

Notes: The dependent variable is the natural logarithm of the stock price. Stock prices are averaged in a plus-minus 10-day window around January 10th and July 10th of each year. The first main explanatory variable measures the fraction of Jewish managers in 1932 at firm *i*. The second main explanatory variable measures the (weighted) average fraction of Jewish managers in 1932 in all other firms in the same industry. The third main explanatory variable measures the (weighted) average fraction of Jewish managers in 1932 in all other firms in the same region. The three main explanatory variables are interacted with an indicator for the months after January 1933. We weight firms by nominal capital to calculate the average fraction of Jewish managers in all other firms in the same industry or region. For this weighting, we winsorize nominal capital at the 99.5th percentile, to ensure the three largest firms do not bias the average values excessively. The results are similar when we include unweighted measures of the average fraction of Jewish managers in the same industry or region in the regressions. The control variables include: an indicator for any connections to the Nazi Party, an indicator for whether the firm published its 1932 financial statement in January, firm age in 1932, firm nominal capital in 1932, and industry fixed effects. All controls are interacted with a full set of time fixed effects. The data include the months January and July for the years from 1929 to 1943. Standard errors are clustered at the firm level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

B Online Data Appendix

B.1 Information on Managers

The data on senior managers of all firms listed on the Berlin Stock exchange in 1932 come from four editions of the *Handbuch der deutschen Aktiengesellschaften (1928, 1932, 1933, and 1939)*, which is a compilation of annual reports of all joint stock firms in Germany (see Figure B.1 for a sample page). Until 1933, the *Handbuch* included amendments, so that the list of senior managers reflects the status at the end of the respective years (1928, 1932, and 1933). In 1939, the *Handbuch* did not publish amendments so that the list of senior managers reflects the status at the time of the publication of the annual report. We therefore refer to the relevant years as 1928, 1932, 1933, and 1938.

Figure B.1: Example Page from *Handbuch der deutschen Aktiengesellschaften* 1932

Bayerische Motoren-Werke, Akt.-Ges.

in **München,** Lerchenauer Strasse 76.

Gegründet: 19./2., 20./2. u. 2./3. 1916; eingetr. 8./3. 1916 unter der Firma Bayer. Flugzeugwerke (bis 4./7. 1922). Zweigniederl. in Eisenach.

Zweck: Herstell. u. gewerbsmässiger Vertrieb von Motoren u. allen damit ausgestatteten Fahrzeugen, deren Zubehör, sowie allen Erzeugnissen der Maschinen-, Metall- u. Holzindustrie. Zur Zeit befasst sich die Ges. mit der Herstellung von Flugzeugmotoren sowie von Motorrädern u. Automobilen.

Entwicklung: Die Ges. erwarb 1922 die gesamten Einricht., Patente u. Konstruktionen sowie alle aus dem Motorenbau stammenden Rechte u. Pflichten, ferner auch den Namen der damaligen Firma Bayerische Motoren Werke, A.-G., den sie seit dieser Zeit führt. Die

Kurs: In Berlin: Ende 1926—1930: 180, 200.75, 232, 81, 54%; 1931 (30./6.): 48.75%. In München Ende 1926—1930: 181, 198, 232.50, 81, 52.50%; 1931 (30./6.): 46%. Zulassung von RM. 5 000 000 Akt. in Berlin u. München Juni 1926 genehmigt. Zulassung von RM. 5 000 000 Em. v. April 1927 im Juni 1927 in Berlin u. München. Zulassung von RM. 6 000 000 Akt. (Em. v. Juli 1928) im Sept. 1928 in Berlin u. München. Sämtl. Aktien sind zugelassen.

Dividenden: 1924—1931: 10, 10, 12, 14, 14, 7, 0, 0%.

Vorstand: Dipl.-Ing. F. J. Popp, Max Friz, Franz Klebe, Fritz Klopfer, München.

Prokuristen: Dr. Franz Brenner, München; Ingobert Starke, München; L. C. Grass, Eisenach; Curt Ebersbach, Eisenach; Albert Kandt, Eisenach.

Aufsichtsrat: Vors. Bank-Dir. Dr. E. G. von Stauss; Stellv. Bankier Karl Hagen, Stellv. Dir. Max H. Schmid, Louis Hagen jr., Bank-Dir. Dr. Wilhelm Kleemann, Berlin; Dir. Wilhelm Kissel, Stuttgart; Dipl.-Ing. Hans Noris, München; Justizrat Dr. h. c. Albert Pinner, Bankier Max von Wassermann, Berlin; Bankdir. Ludwig Weil, München; vom Betriebsrat: R. Vigier, F. Ifland.

Notes: The figure displays the entry for Bayerische Motoren-Werke (BMW) from the 1932 edition of the *Handbuch der deutschen Aktiengesellschaften*, pp 435-437.

B.1.1 Harmonizing Manager Names

We manually harmonize the spelling of thousands of manager names. This allows us to match managers across firms in the same volume of the *Handbuch* and/or across different volumes of the *Handbuch.* For example "Philipp Heineken" is sometimes abbreviated as "Phil. Heineken" or "Ph. Heineken." The harmonization also allows us to match managers to sources on Jewish managers.

B.1.2 Measuring Manager Characteristics

Tenure and Experience

After harmonizing the spelling of manager names, we merge the list of all managers who were present 1932 to the list of managers who were present in 1928. This allows us to measure tenure and experience as senior managers since 1928.

University Degree

We classify managers as managers with a degree if the *Handbuch* lists them with the following characteristics:

1. Professor title (Prof.)
2. PhD (Dr.)
3. Professions that require a university degree (for example Diplomingeneur, Rechtsanwalt, Architekt, Chemiker)
4. Civil service positions that require a university degree (for example Justizrat, Ministerialdirektor, Finanzrat)

Sometimes, the same manager reports a characteristic (for example a Dr. degree) in the annual report of one firm but does not report the characteristic in the annual report of another firm. If a characteristic is reported at least once for a manager in a certain volume of the *Handbuch* we classify the manager as holding that characteristic (for example a university degree) for all firms in that year.

Number of Supervisory Board Positions in Other Firms

For each of the four years 1928, 1932, 1933, and 1938 we count the number of supervisory board positions in other firms of our Berlin sample using the manager name (after harmonizing the spelling of manager names) and additional information about the manager (for example whether he holds a PhD degree or information on his place of residence).

B.1.3 Information on the Jewish Origin of Managers

As described in the main text, we consult multiple sources to identify Jewish managers.

1. Münzel (2006)
   Münzel (2006) analyses Jewish board members in the 300 largest joint stock firms. We extract all Jewish board members from his book.
2. Windolf (2011)
   For the research published in Windolf (2011), Windolf compiles a list of Jewish board members in German firms. We use Windolf's list to identify additional Jewish board members.

3. *Biographisches Handbuch der deutschsprachigen Emigration nach 1933*
   The *Biographisches Handbuch* contains short biographies of Jewish business people who emigrated from Nazi Germany. We extract all individuals who are listed under the business heading.

4. Köhler (2008)
   Studies private bankers of Jewish origin. We extract all Jewish private bankers from his book.

5. *World Biographical Information System* (WBIS)
   The database combines biographical information from various collections of biographies, for example *Deutsches Biographisches Archiv* (DBA) and *Jüdisches Biographisches Archiv* (JBA). We search the WBIS for all managers who did not appear in sources 1 to 4 to check whether they were of Jewish origin. Jews are identified if they appear in the *Jüdisches Biographisches Archiv* (JBA), Ekkehard (1929), Lowenthal (1981), Tetzlaff (1982), Walk (2014) or if they list their religion as Jewish in any other source. The following example provides an overview of the procedure.

   Example World Biographical Information System (WBIS)

   The 1932 edition of the *Handbuch der deutschen Aktiengesellschaften* lists Alfred Zielenziger as manager of *Deutsche Hypothekenbank AG* and *Schultheiss-Patzenhofer Brauerei AG*. Since Zielenziger is not listed among the managers in sources 1 to 4 we follow a manual search through *World Biographical Information System* (WBIS). We find three entries in *Deutsches Biographisches Archiv* (DBA) and two entries in *Jüdisches Biographisches Archiv* (JBA). Figure B.2 reports the respective entries from the DBA. The entries from JBA are identical to entries (b) and (c) from DBA and therefore not reported. We identify Alfred Zielenziger as Jewish because he appears in Lowenthal (1981) and Walk (2014), which are biographical sources on Jews in Germany.

Figure B.2: Example of Alfred Zielenziger

(a) Wenzel (1929)

ZIELENZIGER ALFRED, Bankier; Inh. d. Fa. Alfred Zielenziger & Co., Bankgesch., Produktenhandel, Berlin W 8, Taubenstr. 25 / Berlin-Charlottenburg 2, Bismarckstr. 106 / Früher Vorstmitgl. d. Getreide-Kredit-Aktiengesellschaft, Bankgeschäft, Berlin. — Stellv. Vors. d. AR. d. Getreide-Kreditbank AG., Berlin; Mitgl. d. AR. d. Berliner Dampfmühlen-AG., Ostwerke AG., Berlin; Deutsche Hypothekenbank (AG.), Berlin. Union-Bauges. Berlin, Herz Ölfabriken AG. Bis 28 Vors. d. AR. d. Getreide-Ind. & -Commission AG., Berlin. — Mitgl. d. I. u. HK. Berlin; Aussch.-Mitglied d. Bezirksgr. Berlin d. Reichsverb. d. Deutsch. Groß- u. Überseehandels e. V.; Vors. d. Berliner Börsenvorst., Abt. Produktenbörse; 29 1. Stellv. d. Vors. d. Gesamtbörsenvorst. Vors. d. Vereins Berliner Getreidehändler E. V. Mitgl. d. Landeseisenbahnrats Berlin d. Deutsch. Reichsbahn; stellv. Mitgl. d. Reichs-Eisenbahnrats. — KomRat.

Deutscher Wirtschaftsführer. Bearb. von Georg Wenzel. 1929 (363)

(b) Lowenthal (1981)

ZIELENZIGER, Alfred
Geb. 1861 (Frankfurt/Oder); Kaufmann (Getreidehandel: Firmen S. & M. Simon, Siegfried Elton & Co., Berliner Getreidebank), 1929-1933 Erster Vorsitzender der Berliner Produktenbörse, Stellv. Vorsitzender des Gesamtvorstandes der Berliner Börse.

Lowenthal, Ernst G.: Juden in Preussen. 1981

(c) Walk (2014)

134. Walk, Joseph: Kurzbiographien zur Geschichte der Juden 1918-1945. Hrsg. vom Leo Baeck Institute, Jerusalem. München, New York, London, Paris: Saur 1988. XVIII, 452 S.

Zielenziger, Alfred
geb. 1861 Frankfurt/Oder, gest. ?, Kaufmann

Inh. Firma Siegfried Elton Co.; Berliner Getreidebank; seit 1900 Mitgl. des Börsenvorst.; seit 1905 Mitgl. der Industrie- und Handelskammer, Berlin; 1929-33 Vors. der Berliner Produktenbörse; stellvertr. Vors. des Gesamtvorst. der Berliner Börse.

BN: Kaznelson, S. 735; Feder, S. 431; Lowenthal, Preußen, S. 250.

Notes: The figure displays the entries for Alfred Zielenziger from *World Biographical Information System (WBIS)* based on Wenzel (1929), Lowenthal (1981), and Walk (2014).

6. Internet Search

   Finally, we hand-check all managers who do not appear in sources 1 to 5 by conducting an internet search to find information on their religion. For example, for managers based in Berlin, we look up *Jüdisches Addressbuch für Großberlin, 1931* (available at: https://digital.zlb.de/viewer/resolver?urn=urn:nbn:de:kobv:109-1-2414417) and verify whether they can be matched by name and address with an entry in the address book. The following example provides an overview of the procedure.

   Example Internet Search

   The 1932 edition of the *Handbuch der deutschen Aktiengesellschaften* lists Dr. Felix Warschauer as manager of *Hermann Meyer & Co. AG.* Since Dr. Warschauer is not listed among the managers in sources 1 to 4 we follow a manual search through WBIS. We find one entry in *Deutsches Biographisches Archiv* (DBA). The entry in Wenzel (1929) lists Dr. Warschauer with an address in Berlin (Berlin-Schöneberg, Bayerischer Platz 9, see Figure B.3), but does not contain information on his religion. The Berlin address allows us to check for an entry in the *Jüdisches Addressbuch für Großberlin, 1931* which lists addresses of Jews in Berlin. We find Dr. Felix Warschauer with the same address in the *Jüdisches Addressbuch für Großberlin, 1931* (see Figure B.3) and hence classify him as a Jew.

Figure B.3: Example of Dr. Felix Warschauer

(a) Wenzel (1929)

WARSCHAUER FELIX, Rechtsanwalt; Dir., Vorstmitgl. d. Hermann Meyer & Co. AG., Herstellg. u. Vertrieb v. Spirituosen, Likören, Fruchtweinen, Konserven, Marmeladen, Berlin N 31, Wattstr. 11/12 / Berlin-Schöneberg, Bayerischer Platz 9 / Stud. u. Prom. z. Dr. jur.

Deutscher Wirtschaftsführer. Bearb. von Georg Wenzel. 1929 (363)

(b) Jüdisches Adressbuch für Großberlin, 1931

Warschauer, Eugen, Sanitätsrat, W 35, Potsdamer Str. 118c
Warschauer, Dr. Felix, Schöneberg, Bayerischer Platz 9
Warschauer, Frieda, S 59, Kottbusser Damm 63
Warschauer, Dr. phil. Fritz, SW 61, Belle-Alliance-Platz 3
Warschauer, Georg, N 58, Wolliner Str. 18/19
Warschauer, Henriette, Charlottenburg 2, Schillerstr. 6

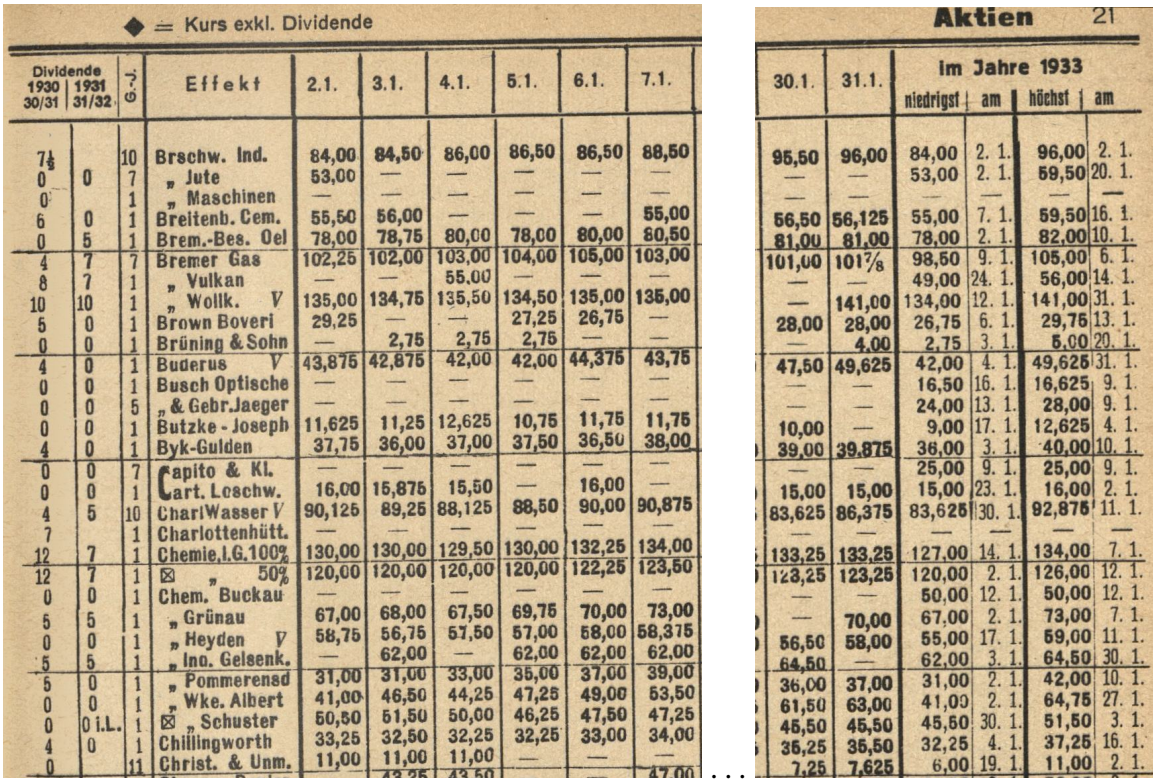
Notes: The left subfigure displays the entries for Dr. Felix Warschauer from *World Biographical Information System (WBIS)* based on Wenzel (1929). The right subfigure displays the entry for Dr. Felix Warschauer from *Jüdisches Adressbuch für Großberlin, 1931, p. 420.*

B.2 Information on Firms

B.2.1 Stock Price Data

We manually digitize all stock prices for January and July of each year between 1929 and 1943 from historical listings (called *Börse und Wirtschaft*, later *Monatskursblatt Berliner Börse*) of the Berlin Stock Exchange. Figure B.4 provides an example of page 21 from the January 1933 edition. Because of the German banking crisis in 1931/1932 the Berlin Stock Exchange was closed in January 1932. We therefore collect stock prices for April and October for 1932.

Figure B.4: Example Page from *Börse und Wirtschaft*, later *Monatskursblatt Berliner Börse*



◆ = Kurs exkl. Dividende

Dividende 1930/31	Dividende 1931/32	G.?	Effekt	2.1.	3.1.	4.1.	5.1.	6.1.	7.1.
7½		10	Brschw. Ind.	84,00	84,50	86,00	86,50	86,50	88,50
0	0	7	„ Jute	53,00	—	—	—	—	—
0		1	„ Maschinen	—	—	—	—	—	—
6	0	1	Breitenb. Cem.	55,50	56,00	—	—	—	55,00
0	5	1	Brem.-Bes. Oel	78,00	78,75	80,00	78,00	80,00	80,50
4	7	7	Bremer Gas	102,25	102,00	103,00	104,00	105,00	103,00
8	7	1	„ Vulkan	—	—	55,00	—	—	—
10	10	1	„ Wollk. V	135,00	134,75	135,50	134,50	135,00	135,00
5	0	1	Brown Boveri	29,25	—	—	27,25	26,75	—
0	0	1	Brüning & Sohn	—	2,75	2,75	2,75	—	—
4	0	1	Buderus V	43,875	42,875	42,00	42,00	44,375	43,75
0	0	1	Busch Optische	—	—	—	—	—	—
0	0	5	„ & Gebr. Jaeger	—	—	—	—	—	—
0	0	1	Butzke - Joseph	11,625	11,25	12,625	10,75	11,75	11,75
4	0	1	Byk-Gulden	37,75	36,00	37,00	37,50	36,50	38,00
0	0	7	Capito & Kl.	—	—	—	—	—	—
0	0	1	Cart. Leschw.	16,00	15,875	15,50	—	16,00	—
4	5	10	CharlWasser V	90,125	89,25	88,125	88,50	90,00	90,875
7		1	Charlottenhütt.	—	—	—	—	—	—
12	7	1	Chemie, I.G. 100%	130,00	130,00	129,50	130,00	132,25	134,00
12	7	1	☒ „ 50%	120,00	120,00	120,00	120,00	122,25	123,50
0	0	1	Chem. Buckau	—	—	—	—	—	—
5	5	1	„ Grünau	67,00	68,00	67,50	69,75	70,00	73,00
0	0	1	„ Heyden V	58,75	56,75	57,50	57,00	58,00	58,375
5	5	1	„ Ing. Gelsenk.	—	62,00	—	62,00	62,00	62,00
5	0	1	„ Pommerensd	31,00	31,00	33,00	35,00	37,00	39,00
0	0	1	„ Wke. Albert	41,00	46,50	44,25	47,25	49,00	53,50
0	0 i.L.	1	☒ „ Schuster	50,50	51,50	50,00	46,25	47,50	47,25
4	0	1	Chillingworth	33,25	32,50	32,25	32,25	33,00	34,00
0		11	Christ. & Unm.	11,00	11,00	11,00	—	—	—

Aktien 21

30.1.	31.1.	Im Jahre 1933 niedrigst	am	höchst	am
95,50	96,00	84,00	2. 1.	96,00	2. 1.
—	—	53,00	2. 1.	59,50	20. 1.
—	—	—	—	—	—
56,50	56,125	55,00	7. 1.	59,50	16. 1.
81,00	81,00	78,00	2. 1.	82,00	10. 1.
101,00	101⅞	98,50	9. 1.	105,00	6. 1.
—	—	49,00	24. 1.	56,00	14. 1.
—	141,00	134,00	12. 1.	141,00	31. 1.
28,00	28,00	26,75	6. 1.	29,75	13. 1.
—	4,00	2,75	3. 1.	5,00	20. 1.
47,50	49,625	42,00	4. 1.	49,625	31. 1.
—	—	16,50	16. 1.	16,625	9. 1.
—	—	24,00	13. 1.	28,00	9. 1.
10,00	—	9,00	17. 1.	12,625	4. 1.
39,00	39,875	36,00	3. 1.	40,00	10. 1.
—	—	25,00	9. 1.	25,00	9. 1.
15,00	15,00	15,00	23. 1.	16,00	2. 1.
83,625	86,375	83,625	30. 1.	92,875	11. 1.
—	—	—	—	—	—
133,25	133,25	127,00	14. 1.	134,00	7. 1.
123,25	123,25	120,00	2. 1.	126,00	12. 1.
—	—	50,00	12. 1.	50,00	12. 1.
—	70,00	67,00	2. 1.	73,00	7. 1.
56,50	58,00	55,00	17. 1.	59,00	11. 1.
64,50	—	62,00	3. 1.	64,50	30. 1.
36,00	37,00	31,00	2. 1.	42,00	10. 1.
61,50	63,00	41,00	2. 1.	64,75	27. 1.
45,50	45,50	45,50	30. 1.	51,50	3. 1.
35,25	35,50	32,25	4. 1.	37,25	16. 1.
7,25	7,625	6,00	19. 1.	11,00	2. 1.

Notes: The figure displays the top left and top right of page 21 of the January 1933 edition of *Börse und Wirtschaft*, later *Monatskursblatt Berliner Börse*. The columns of the left panel report (from left to right) the dividend in 30/31, the dividend in 31/32, the reporting period, the stock name, and the stock prices of the trading days indicated as column titles. The columns of the top left panel (from left to right) report additional stock prices and the lowest (niedrigst) and highest (höchst) stock price and the respective dates in the calender year 1933.

Name Changes: We track stocks even if they change names (for example *Krauß & Comp.* changed its name to *Lokomot. Krauß* in July, 1934). In most cases, the reported highest and lowest stock prices over the calendar year reveal that the stocks changed names. For example, in July 1934 *Lokomot. Krauß* reported a lowest stock price over the calendar year of 67 for January 19, 1934, which exactly matches the stock price of *Krauß & Comp.* on that day. In addition, we verify all name changes by consulting the narrative information in the *Handbuch der deutschen Aktiengesellschaften*.

Stock Consolidations: Between 1929 and 1943, the stocks of some firms were consolidated. For example, *Dresdner Bank* stocks were consolidated on August 4, 1932 at an old-stock:new-stock ratio of 10:3. As a result, the reported stock price increased by 333 percent. We account for these consolidations by dividing all stock prices by the consolidation ratio (3.333 in our example) after each consolidation.

The exact dates of stock consolidations are indicated in the monthly publications of *Börse und Wirtschaft*, later *Monatskursblatt Berliner Börse*. To obtain consolidation ratios we exploit informa-

tion on adjustments to the highest and lowest stock prices that are reported in *Börse und Wirtschaft*, later *Monatskursblatt Berliner Börse.*[43] After a consolidation, the highest and lowest stock prices are adjusted to reflect the consolidation. This allows us to calculate exact consolidation ratios. For example the highest and lowest stock price for *Dresdner Bank* were reported as $18\frac{1}{2}$ and 24 in July 1932 but the reporting changed to $61\frac{2}{3}$ and 80 in August 1932 (*Dresdner Bank* stocks were consolidated on August 4, 1932).

In exceptional cases, the highest *and* lowest stock price changes in the same month as the consolidation. In those cases, we use the change in the stock price on the date of the consolidation to infer the consolidation ratio. For example, *Brown Boveri* stocks were consolidated on January 4, 1935. As the consolidation happened early in the year, highest and lowest stock prices were reported only after the consolidation and we can therefore not observe adjustments in the reporting of highest and lowest stock prices. We therefore use the ratio of stock prices on the last trading day before the consolidation (January 3, 1935, stock price:$14\frac{3}{4}$) and the stock price on the day of the consolidation (January 4, 1935, stock price: 74). The consolidation ratio is therefore 5.02 (74/14.75) in this example.

Deduction of Subscription Rights Between 1929 and 1943 some firms issued new stocks and offered existing shareholders a subscription right to prevent stock dilution. Starting from the day this subscription right is executed, the monthly publications of *Börse und Wirtschaft*, later *Monatskursblatt Berliner Börse* report stock prices ex subscription right. For example, *Deutscher Eisenhandel AG* issued new stocks in 1936 and offered existing shareholders a subscription right. The subscription right is valued 6.5 percent and deducted starting from August 10, 1936. As a consequence, the stock price drops mechanically from 138.50 on August 8, 1936 to 132 on August 10, 1936. We adjust for these deductions by multiplying all subsequent stock prices by an adjustment factor, defined as the ratio of the old price with subscription right divided by the old price minus the subscription right.[44] In the case of *Deutscher Eisenhandel AG* this adjustment factor is given by 1.049 ($\frac{138.50}{138.50-6.50}$).

B.2.2 Dividend Data

The historical listings (called *Börse und Wirtschaft*, later *Monatskursblatt Berliner Börse*) of the Berlin Stock Exchange report dividend payments for the sample firms (see Figure B.4 for an example). As stocks that get delisted early in the year do not report the latest dividend payment, we augment the data from the Berlin exchange with information on dividend payments from the *Handbuch der deutschen Aktiengesellschaften (1935 and 1941).*

Dividends are generally reported in percent of nominal capital. Insurance firms, however, report dividends in Reichsmark (RM) per stock. To obtain a consistent database we convert the latter into percent of nominal capital.

[43] Highest and lowest stock prices are reported for the calendar year.

[44] This adjustment is standard practice in the construction of long-run stock indices. It assumes that the value of the subscription right is re-invested into the same stock to prevent stock dilution (Ronge 2002, p. 58).

B.2.3 Stock Price Adjustments for Dividend Payments

For Appendix Figure A.2, we compute stock prices by taking into account that investors receive annual dividend payments in addition to capital gains. We collect dividends and their payment dates from *Monatskursblatt Berliner Börse* and augment dividend payments with data from *Handbuch der deutschen Aktiengesellschaften 1925 and 1941.* To compute stock prices that reflect total returns, we adjust stock prices for price changes that are entirely due to dividend payments (following standard practice as outlined in Ronge 2002). After a dividend payment, we multiply the stock price by an adjustment factor, which is defined as the ratio of the pre-payment price divided by the pre-payment price minus the dividend. We use the last observed price in our dataset prior to the dividend payment as the pre-payment price. In some cases, the exact dividend payment date is missing in the *Monatskursblatt Berliner Börse.* As the average firm in our sample pays the dividend between May and June (but closer to June 1), we use June 1 as the pre-payment price for dividend payments with missing dates.

B.2.4 Return on Assets

We digitize data on profits and assets from the 1932 and 1941 editions of the *Handbuch der deutschen Aktiengesellschaften.* The 1932 edition of the *Handbuch der deutschen Aktiengesellschaften* reports the income statements and balance sheets for the year 1931, while the 1941 edition reports the years 1936 and 1940. The return on assets is the ratio of profits before interest payments and taxes (calculated from the income statement) to total assets (from the balance sheet). To calculate profits before interest payments and taxes, we use the book value of profits and subtract the profit carryforward from the previous year, subtract the net income from the sale of own stocks, subtract the net income from payments out of reserve funds, add depreciation, add taxes, and add interest payments.

Many of the 655 firms in our estimation sample do not report the income statement and balance sheet items that are required for the calculation of the return on assets. As a result, the data allow us to calculate the return on assets for 289 firms in at least one year (1931, 1936, or 1940). Two firms do not report values in 1936 or 1940, so we use the 1937 and 1939 values, respectively. Dropping these observations from the sample does not affect the results.

B.2.5 Firm Age, Nominal Capital, Reporting Period, Industry

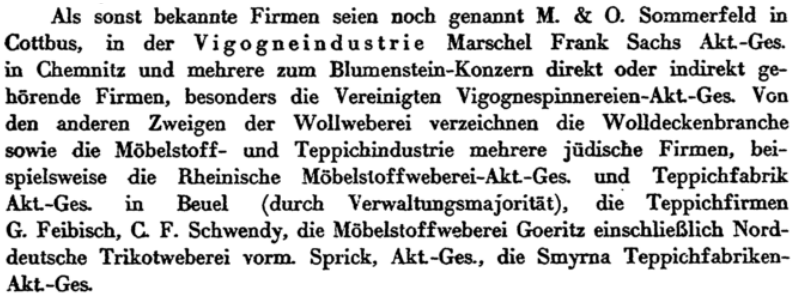
We collect data on firm age, nominal capital and the industry of the firm from *Handbuch der deutschen Aktiengesellschaften (1932).* We collect data on the period during which the balance sheet is reported from *Monatskursblatt Berliner Börse.*

B.2.6 Information on Jewish Firms

We consult historic sources that identify Jewish firms (Bruer 1927; Landsberg 1927a,b; Priester 1927; Mosse 1987). We extract all firms that are listed as Jewish in at least one of the sources. Figure B.5

provides an example from Landsberg (1927b). The author describes the historical development of the textile industry and lists Jewish firms in various sub-industries, for example the furniture and carpet industry. In the excerpt, Landsberg lists among other firms *G. Feibisch* and *Nordeutsche Trikotweberei AG*, which are listed on the Berlin Stock Exchange.

Figure B.5: Example from *Landsberg (1927b)*



Als sonst bekannte Firmen seien noch genannt M. & O. Sommerfeld in Cottbus, in der Vigognеindustrie Marschel Frank Sachs Akt.-Ges. in Chemnitz und mehrere zum Blumenstein-Konzern direkt oder indirekt gehörende Firmen, besonders die Vereinigten Vigognespinnereien-Akt.-Ges. Von den anderen Zweigen der Wollweberei verzeichnen die Wolldeckenbranche sowie die Möbelstoff- und Teppichindustrie mehrere jüdische Firmen, beispielsweise die Rheinische Möbelstoffweberei-Akt.-Ges. und Teppichfabrik Akt.-Ges. in Beuel (durch Verwaltungsmajorität), die Teppichfirmen G. Feibisch, C. F. Schwendy, die Möbelstoffweberei Goeritz einschließlich Norddeutsche Trikotweberei vorm. Sprick, Akt.-Ges., die Smyrna Teppichfabriken-Akt.-Ges.

Notes: The figure displays an excerpt from page 108 of Landsberg (1927b).

B.2.7 Identifying Jewish Shareholders

We collect information on all large shareholders of the 655 firms listed on the Berlin Stock Exchange from the 1932 edition of the *Handbuch der deutschen Aktiengesellschaften.* We match the list of these large shareholders with our lists of Jewish managers and Jewish firms. For shareholders that are not listed in these sources we conduct an internet search to find further information on the respective individual or firm. The following example provides an overview of the procedure.

Example Internet Search

One example of a firm listed on the Berlin Stock Exchange is *Baroper Walzwerk AG*. The firm reports Wolf *Netter & Jacobi-Werke KGaA* as one of its large shareholders. We first check whether *Wolf Netter & Jacobi-Werke KGaA* appears in sources about Jewish firms (see Section B.2.6). After not finding it in these sources, we conduct an internet search for *Wolf Netter & Jacobi-Werke KGaA*. We find *Wolf Netter & Jacobi-Werke KGaA* in the database *Jewish Businesses in Berlin 1930-1945* (available at: https://www2.hu-berlin.de/djgb/www/find?language=en_US), which is based on the research of Kreutzmüller (2017). This allows us to classify *Wolf Netter & Jacobi-Werke KGaA* as a large Jewish shareholder of *Baroper Walzwerk AG*.

B.3 Further Details on Measures of Lower-Level Jewish Employees

We collect measures of lower-level Jewish employees from publications of the German statistical agency (*Statistik des Deutschen Reichs*) that are based on the German census of 1933. The publications report the number of Jews by occupational level (for example workers, blue collar workers and white collar workers), sector (manufacturing or services), and region (for example East Prussia without Königsberg) or large city (for example Berlin, Hamburg, Breslau, or Königsberg). When-

ever we are able to use the city-level information, we do so (for about 33 percent of the sample). Otherwise, we use the regional information. We also obtain similar information for all German workers and then calculate the share of Jews among blue collar workers (category "l" in the census data) and lower-level white collar workers (category "a" in the census data).