SIEPR Discussion Paper No. 08-19

Taste-based Discrimination: Empirical Evidence from a Shock to Preferences during WWI

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January 2009

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January 25, 2009

A significant challenge to empirically testing theories of discrimination has been the difficulty of identifying taste-based discrimination and of distinguishing it clearly from statistical discrimination. This paper identifies taste-based discrimination through a two-part empirical test. First, it constructs quantitative measures of revealed preferences, which establish that World War I created a persistent change in ethnic preferences that switched the status of German Americans from a mainstream ethnicity to an ethnic minority until the late 1920s. Second, the paper uses this shock to preferences to identify the effects of taste-based discrimination at the example of traders at the New York Stock Exchange (NYSE). A new data set of more than 5,000 applications for membership in the NYSE reveals that the War more than doubled the probability that applicants with German-sounding names would be rejected (relative to Anglo-Saxons).

[*] I wish to thank Janet Linde and Steve Wheeler at the New York Stock Exchange for making it possible to use archival records at the NYSE and Eric Hilt and Antoinette Schoar for helping me to collect the price data for this paper. I am grateful to David Autor, Raj Chetty, Stan Engerman, Erik Eyster, Claudia Goldin, Michael Greenstone, Avner Greif, Bob Margo, Marc Weidenmier, Eugene White, and seminar participants at Berkeley, Davis, the NBER, Stanford and UBC for helpful comments. Ellyn Boukos, Joseph Goldschmid, Diana Eastman, Kimon Ioannides, Irina Issakova, Paul Ma, Sameer Riaz, Irina Talis, Anjani Trivedi, Alessandra Voena, Maisy Wong, Sui Lin Yap, and Mimi Xue provided valuable research assistance. I thank the Hoover Institution at Stanford for its generous financial support through the National Fellows Program.

Although empirical tests of discrimination have shown that minorities are disadvantaged in hiring decisions (e.g., Goldin and Rouse, 2000; Bertrand and Mullainathan 2004)[1] it has proven difficult to establish whether such differences result from biased preferences and thus reflect taste-based discrimination (Becker 1957). Taste-based discrimination is especially hard to distinguish from statistical discrimination (Phelps, 1972; Arrow 1973; and Aigner and Cain, 1977, Coate and Loury, 1993), where ethnicity serves as a signal for unobservable productivity differences. Existing empirical tests have exploited detailed performance data on athletes (Khan and Sherer, 1988; Nardinelli and Simon 1990; Price and Wolfers 2008) and taken advantage of the ability to randomly assign players to ethnicities in experimental settings (e.g., Fershtman and Gneezy, 2001).[2] There is, however, only limited evidence for taste-based discrimination in real-life labor markets. Empirical evidence is especially scarce at the level of high-level professional jobs, where glass ceilings still appear to obstruct the entry of minorities and women (e.g., Blau and Devaro 2007, Arfken, Bellar, and Helms 2008).

This paper exploits an exogenous shift in preferences during World War I to identify taste-based discrimination in a high-level professional labor market, traders at the New York Stock Exchange (NYSE). First, it shows that World War I (1914-1918) created a lasting shock to ethnic preferences, which effectively switched the status of German Americans from a well-assimilated mainstream ethnicity to an ethnic minority. Quantitative measures of revealed preferences show that this change in preferences persisted until the late 1920s, nearly a decade after the end of the war. The second part of the analysis takes advantage of this persistent change in preferences to identify the effects of taste-based discrimination at the example of applicants to the NYSE.

Applications to the NYSE provide an ideal setting for testing the effects of changes in ethnic preferences over time. Traders at the Exchange have been selected by the same process since 1883, when the NYSE began to record detailed information on its admissions decisions. The NYSE also shares an important feature of the hiring process with modern-day professional firms: Decisions on admissions and on price are made independently of each other. Co-workers

[1] Goldin and Rouse (2000) show that gender discrimination limits the hiring of female musicians in major orchestras. Bertrand and Mullainathan (2004) find that applicants with black-sounding names are less likely to be invited for job interviews. Charles and Guryan (2008) show that wage differentials between black and white workers are larger in more racially integrated states.

[2] See Kahn (1991 and 2000) for comprehensive surveys of this literature, and List (2004) for an empirical study of both types of evidence. More recently, empirical tests have used data on television game shows, such as the *Weakest Link*, to identify bias against minorities, the elderly, and women (e.g. Levitt 2004).

select applicants based on personal characteristics, while applicants negotiate the price of admissions with a current member who wants to leave the Exchange.[3]

World War I created a shock to preferences that allows me to identify taste-based discrimination in applications to the NYSE. Three quantitative measures of revealed preferences establish that the war created a persistent shock to ethnic preferences. The first measure is constructed from the program notes of nearly 2,000 performances at the Metropolitan Opera in New York. These data reveal that the share of operas by German-language composers fell from 50 to less than 10 percent at the beginning of the war, and did not recover until the late 1920s. The second measure is constructed from the names of newborn boys in the U.S. Census. These data show that the frequency of German-sounding names dropped dramatically after the beginning of the war. The third measure relates to the consumption of ethnic foods. It reveals, for example, that the consumption of *sauerkraut* declined to almost zero after the beginning of the war, and that *hamburgers* were advertised as "liberty steaks" until the late 1920s.

The empirical strategy uses this persistent change in tastes to estimate a simple difference-in-differences regression of admissions decisions on ethnicity variables, time variables, and controls. Following Bertrand and Mullainathan (2004), the analysis uses names as a proxy for ethnicity, such that *German Americans* are defined as U.S. citizens with German-sounding names.[4] Detailed data on veto votes and on rejection rates for more than 5,000 applications between 1883 and 1936 show that applicants with German-sounding names (compared with Anglo-Saxons) were twice as likely to be rejected while the preference shock persisted. In regressions of rejection rates on ethnicity variables and a variety of controls, interaction terms between World War I and German-sounding names are consistently large, positive, and significant. Jewish applicants with German-sounding names are also affected by the shock to preferences. At the same time, the data show no significant effect of the war on other, non-German ethnic groups. Results are robust to controls for stock market conditions through time-fixed effects.

A natural concern with the empirical strategy is that World War I lowered the real or perceived productivity of Americans with German-sounding names. For example, German

[3] Another setting that shares key features with the NYSE's process of admissions is the sale of apartments in co-operatively owned buildings: Prospective buyers negotiates price directly with a current owner, but the sale is conditional on the approval of a co-op board, which represents the interests of other owners.
[4] For example, U.S. baseball legend Lou (Ludwig) Gehrig would be counted as German American.

Americans may have been feared as a security threat during the war. Alternatively, their productivity as NYSE traders may have been compromised by the war, if they were more dependent on business with Europe. Productivity effects, however, cannot explain why the effect on rejections persisted throughout the 1920s. Instead, the timing of changes in admissions matches the war's lasting effects on ethnic preferences.

As an additional informal test for productivity effects, I examine declassified records of the Bureau of Investigation (today's FBI) and archival sources at the NYSE. Such sources yield little evidence that German Americans were more affected by the war than other traders. FBI documents show that no German American members were suspected of unpatriotic activities between 1908 and 1921, while members of other ethnicities were implicated. Trading records from the NYSE archive similarly reveal that German Americans were no more likely to conduct foreign business than were other traders. A variety of additional validity tests bolster the paper's main findings. For example, there is no evidence that German Americans were more likely to fail in business during World War I than were other Germans, and the war had no significant effect on applications by German American traders.

Despite significant effects on admissions decisions, the NYSE data yield no evidence that German Americans paid higher prices to enter the Exchange. This difference in impact is most likely to arise from the institutional characteristics of NYSE's process of admissions. Minority applicants negotiate the price of admissions with traders who want to leave the Exchange. It is, however, a committee of remaining traders, and not the exiting trader, who decide on each admission. These remaining traders do not benefit from higher prices, but, if he is admitted, they expect to interact with the applicant for many years. Thus, institutional characteristics of the NYSE's admissions process does not allow applicants to compensate future co-workers, who are most affected by their personal traits, for biased preferences. Selection processes that share this feature of the NYSE's admissions process may help to explain the persistence of glass ceilings in high-level professional jobs.

The rest of this paper is organized as follows. Section I presents three alternative measures of revealed preferences to measure the strength and persistence of the war's effects on ethnic preferences. Section II describes the NYSE's process of admissions. Section III introduces the data on admissions and on ethnic-sounding names. Section IV presents empirical results from difference in differences tables and logit regressions of rejection rates on ethnicities

and controls. Section V examines evidence on productivity along with other robustness checks. Section VI presents regressions for seat prices and section VII concludes.

I. World War I as a Shock to Preferences

Historical evidence suggests that German Americans were well-integrated in the United States before the war

> Repeatedly, older Americans praised them as law-abiding, speedily assimilated, and strongly patriotic….In 1908, a group of professional people, in rating the traits of various immigrant nationalities, ranked the Germans above the English and in some respects judged them superior to the native whites. (Higham 1998, p.196)

When Germany attacked neutral Belgium on August 4, 1914, however, news of German atrocities began to arrive in the United States.

> Towns were sacked and burned, homes were pillaged; in many places portions of the population, men, women, and children, were massed in public squares and mowed down by *mitrailleuses*, and there were countless individual instances of an amazing and shameless brutality… children were shot down, by military order, in cold blood.… infants in their mothers' arms were shot down without mercy (Letter of Brand Whitlock, U.S. Ambassador to Belgium to the Secretary of State, 12 September 1917, in Horne, 1923)

In response to such news, respect for German Americans gave way to hostility. On April 5, 1918, *The St. Louis Globe-Democrat* reported the lynching of Robert Praeger: "German Enemy of U.S. hanged by mob."[5] Milder types of abuse, including tarring and feathering, occurred dozens of times. Frank Brocke, a German American farmer, recalls

> I would say you suffered more for the fact if you were of German descent more than anything else (sic). …It was just that there was a lot of hatred against the Germans and if you were German, you were a little bit tinted, I guess. (Oral history project of the *Latah County Historical Society*, http://users.moscow.com/lchs/)

Mothers lobbied to prohibit German lessons, and in 1919, it became illegal to teach German in Ohio, Iowa, and Nebraska (Wittke 1936, pp.179-190). These prohibitions remained in place until 1923, when the Supreme Court ruled them to be unconstitutional (*Meyer vs. State of Nebraska*, 262 U.S. 390, 1923).[6]

[5] Hickey 1969. Also see *Chicago Daily Tribune* (April 5, 1918) and *New York Times* (April 4, 1918).

[6] The war's effect on the use of the German language persisted well into the 1920s. In 1916, 13,800 students studied German in Cincinnati; by 1917, this number had fallen to 7,000. Germans were barred from many social clubs that they had previously dominated. In New York, the Chemists' Club, the Lamb Club, and the New York Athletic Club expelled all German-born members, and banned the use of German on their premises (*New York Times*, April 11, 20, and May 5, 1918).

A. The Share of German-language Operas at the Met

Quantitative measures of ethnic preferences make it possible to assess the strength and persistence of such changes in tastes. The first measure counts the share of operas by German-language composers. In the early years of the 20th century, German-language composers dominated the repertoire of the Metropolitan Opera (Figure 1). In 1910, 19 in 44 operas were by German-language composers.[7] Nine of these were by Richard Wagner, with strong Germanic themes, including *Lohengrin*, *Tannhäuser*, and *Tristan und Isolde*. From 1910 until early 1917, half of the Met's operas were German. In 1917 however, the share of German-language operas declined from 9 in 10 operas prior to the declaration of war to 4 in 33 afterwards. This change is especially dramatic considering that it can take several years to prepare an opera.[8] In fact, 2 of the 4 German-language operas, Wagner's *Meistersinger* and *Tristan und Isolde*, were performed within a week after the declaration of war. In 1918, only 3 in 40 operas were by German composers.

Recitals of German-language music continued to decline for several years after the Armistice on November 11, 1918. In 1919, only 7 percent of the Met's repertoire featured German-language composers. Shares stayed low, at 10 percent in 1920, 12 percent in 1921, and 13 percent in 1922. It took until 1923 for the share of German operas to recover to 25 percent of the Met's repertoire.

Opera data also confirm the observation of social historians, that World War II did not have a similar effect on German Americans in the United States. Historical accounts indicate that U.S. enmity during World War II focused on Asia, and that, at the time, Americans perceived Japan as more atrocious than Germany (e.g., Dower 1996, p. 169). Changes in the share of German opera are consistent with this observation; after a small drop in 1939, the share

[7] Data are collected from historical schedules of performances in the online archives of the *Metropolitan Opera* in New York. German composers include Carl Maria von Weber, Engelbert Humperdinck, Friedrich Handel, Friedrich von Flotow, Giacomo Meyerbeer, Hermann Goetz, Jacques Offenbach, Ludwig van Beethoven, Max von Schillings, Peter Cornelius, Richard Strauss, and Richard Wagner. German-language composers further include Austrian composers Wolfgang Amadeus Mozart, Ernst Krenek, Franz von Suppé, Johann Strauss Jr. and Franz Schubert and the Bohemian Christoph von Gluck. Composers are assigned to ethnicities based on their country of birth, which means that Beethoven and Handel are counted as German, even though Beethoven was also active in Vienna and Handel in London. Multiple performances of the same opera are counted as one. In addition to opera houses, concert halls and radio stations also avoided German music, and musicians who performed German pieces risked violent protest (*New York Times*, October 3 and 19, 1919).

[8] E.g., *New York Times*, January 20, 2008, citing *Opera America.* The librettos of the two remaining German operas, Gluck's *Iphigenie* and Flotow's *Martha*, were translated into Italian.

of German-language operas continues to increase and reaches 46 percent of the Met's repertoire in 1945 (Figure 1).[9]

B. Newborn Boys Named Wilhelm or Otto

Another measure of ethnic preferences can be derived from naming practices, which have been found to reflect attitudes towards ethnicities (Lieberson 2000). To construct these data, I count newborn boys named Otto or Wilhelm between 1910 and 1919 (*United States Census* 1920). Both Otto and Wilhelm have strong ethnic connotations: Otto von Bismarck was Prussia's Prime Minister from 1862 to 1890 and German Chancellor from 1867 to 1890. Bismarck's namesake was Otto I, King of the Germans from 936 to 973, who was succeeded by a long line of Ottos. Wilhelm II was German Emperor at the beginning of the war; he had succeeded his grandfather Wilhelm I (1797 – 1888) to the German throne.

U.S. census data show that the number of newborn boys named Otto and Wilhelm declined sharply after 1914 (Figure 2). From 1915 to 1916, Otto dropped by 34.7 percent, from 2,133 to 1,394, and Wilhelm declined by 35.0 percent from to 140 to 91. At the same time, the number of boys named William, as the English equivalent to Wilhelm, increased by 3 percent from 2,269 to 2,345.[10]

C. Ethnic Foods

Data on the consumption of ethnic foods yield additional evidence for a persistent change in ethnic preferences. U.S. consumption of *sauerkraut* – a traditional German dish of fermented cabbage – declined by 75 percent between 1914 and 1918, causing New York's grocers to complain that "There is enough sauerkraut in stock at the present time to feed a good-sized German army" (*New York Times*, April 25, 1918, p.10).[11] As late as 1928, the Department of Agriculture found it necessary to argue that sauerkraut was not of German origin: "It is known to

[9] Music historians similarly observe that "The War – in marked contrast to World War I – has not interfered with the production of opera in German. One of the marked highlights of last season was the complete presentation of Wagner's 'Ring,' so successful that the whole circle had to be repeated." (Heinsheimer 1945, p.8)

[10] As a further robustness check, I have compared the number of boys named Heinrich and Henry in the U.S. Census of 1910, 1920, and 1930. These data confirm the results for Wilhelm versus William. While the number of Heinrichs declines between 1910 and 1920 and recovers only after 1920, the number of Henrys continues to increase during World War I.

[11] Reports made to the Bureau of Agricultural Economics confirm this drop in the production of sauerkraut. Production by large manufacturers dropped from 124,849 tons in 1917 to 116,500 tons in 1918 to 47,900 tons in 1919, 67,100 tons in 1920, and 64,900 tons in 1921 (U.S. Department of Agriculture 1928, p.3).

have been made at an early date in Alsace, now a part of France, and also in Holland, where the manufacture of sauerkraut is still an important industry" (United States Department of Agriculture 1928, p.1). Pretzel manufacturers similarly argued that pretzels originated in an Italian cloister, and cheese merchants demonstrated that limburger came from Belgium (Wittke 1936, p.186). Other ethnic German foods were renamed to rescue sales. Butchers marketed hamburgers as "liberty steaks" throughout the 1920s.[12]

Thus evidence from opera performances, baby names, and ethnic foods indicate that the war created a strong shift in preferences, which persisted throughout the 1920s. The second part of this paper exploits this shift in preferences to identify the impact of taste-based discrimination, using the example of applicants to trade at the NYSE.

II. The NYSE's Process of Admissions

To trade at the NYSE, applicants apply to purchase one of 1,375 "seats."[13] Francis L. Eames, President of the Exchange from 1894 to 1898, describes the basic requirements of membership:

> Any person, at least twenty-one years of age, and a citizen of the United States, may buy a membership in the Stock Exchange from any member desiring to sell, subject to the approval of the Committee of Admissions. (Eames 1894, p.68)

In the first step of the admissions process, applicants negotiate a price with an incumbent trader who wants to leave the Exchange. Eighty percent of all seat sales between 1883 and 1936 were negotiated directly between seat owners and applicants. The remaining 20 percent were sold in an anonymous auction, which was administered by the Committee of Admissions. Typically, the Committee stepped in for a trader who had died, failed in business, or been expelled. Then, "his membership may be sold by the Committee, creditors who are members of the Exchange having

[12] For example, the New Hotel Rosslyn in Los Angeles offered liberty steaks until 1927 (*Metropolitan News Corporation*, January 15, 2004). Similarly, cities abandoned their German-sounding names so that Kaiser Street in Portland, Oregon, became Marne Way. Berlin, Iowa, was christened Lincoln and East Germantown, Indiana, became Pershing (*New York Times*, June 2, 1918; Wittke 1936, p.184). The circulation of German-language publications also decreased after 1914 even though the number of mother-tongue publications increased among 13 major ethnic groups (Kirschbaum 1986, p.72; Wittke 1936, p.115).

[13] The first mention of the New York Stock Exchange occurred in *The Diary* or *Loudon's Register* in March 1792. Only two months later, on May 17, traders agreed to deal exclusively with each other. By 1879, the Exchange included 1,100 traders. The first membership was sold in 1869 for 8,000 dollars (ca. 100,000 dollars in 2005). Seats *within* the Exchange had become saleable eight years earlier, in October 1861 (Eames 1894, pp.13, 14 and 43). Membership remained constant until 1929, when the NYSE granted every member the right to sell one quarter of a new membership during the Quarter Dividend Sale, which increased the number of seats to 1,375. Seats became available for lease in 1978.

a first lien upon the proceeds" (Eames 1894, p.68).[14] In both types of sales, the NYSE receives a fixed initiation fee from the buyer, which is independent of the purchase price. This fee remained stable at around 20,000 year 2005 dollars.

In the second step, the NYSE's 15-member Committee of Admissions evaluates each applicant's "personal and financial integrity" (Eames 1894, p.51). An anonymous trader explains why personal characteristics matter to the applicant's future co-workers.

> Character is essential to the Stock Exchange member. He buys and sells in a milling, excited crowd around a trading post, and his contracts are oral. None is written and he must stand by his word of today, even though his transaction will show him a loss tomorrow. (*New York Times*, August 24, 1924)

Typically, the Committee meets every two weeks, and interviews two to three applicants. Each applicant is sponsored by two existing members who recommend him "in every way as a proper person to be admitted to the Exchange." Sponsors vouch for applicants' financial integrity in a very tangible way. They declare that they would "accept (the applicant's) uncertified check for $20,000 if he were alone in business and a member of the Exchange" (*Minutes of the Committee of Admissions* 1904); this is equivalent to accepting a personal check for 2.8 million 2005 U.S. dollars.[15] At its next meetings, the Committee takes an anonymous vote. Until 1936, ballots are recorded as white balls in favor of an applicant and black balls against. An applicant is rejected, if more than one third of votes are black balls.[16]

III. The NYSE Data

The data consist of 5,097 applications from January 3, 1883 when the NYSE began to keep detailed records of its admissions decisions, to September 24, 1936, when it stopped recording the black ball data. Each observation includes the applicant's name, the seller's name, the price of the seat, the numbers of black balls and white balls, the admissions decision, and the date of the decision.[17] The data also include annotations that reveal whether a seat was auctioned by the Committee of Admissions, whether a seller had died or been expelled from the

[14] I use male pronouns because there were no female applicants until 1967, when Muriel Siebert entered the NYSE.
[15] Prices are converted to real prices using nominal GDP per capita (Williamson 2007).
[16] To vote, the Committee required a quorum of 10 members.
[17] These data expand on existing data sets, which typically include only the price and the date of each seat sale. For example, Schwert (1977), Jarrell (1984), Golbe (1986), Keim and Madhavan (2000), and Davis, Neal, and White (2007) explore the effects of trading volumes and stock prices on the price of NYSE seats.

Exchange, and whether a seat was transferred for a nominal price, typically within a family or firm.[18]

Voting data show that about three percent of all applicants were rejected across all years; rejection rates increased from 3 percent before the war to 4 percent during, and returned to 3 percent afterward (Table 1). Between 1883 and 1936, the average real price of a seat was 1.6 million dollars. Prices increased from 420,000 dollars in 1883 to 5.2 million dollars in 1929 and declined sharply thereafter (Figure 3).[19]

B. Names as a Proxy for Ethnicities

Similar to Bertrand and Mullainathan (2004), this paper uses names as a proxy for applicants' ethnicities. Specifically, the analysis compares election outcomes for applicants with German-sounding names with outcomes for applicants with Anglo-Saxon names. As a first cut, names are matched with ethnicities by a commercial algorithm that takes advantage of linguistic rules and location-specific naming practices.[20] For example, surnames ending in "dda" or "ddo" are assigned to Sardinia and therefore Italy. This algorithm creates unique ethnicity matches for 84.2 percent of applicants. Ethnicities are combined into four groups, *German*, *Anglo-Saxon*, *Jewish*, and *Other Ethnicities*, where *Other Ethnicities* includes the unmatched data.. *German* includes names that sound German, Austrian, and Swiss-German; *Anglo-Saxon* includes names that sound English, Scottish, and Irish. *Other Ethnicities* combines Dutch, Italian, Russian names, along with smaller ethnic groups. *Other Ethnicities* also includes Anglicized German names, which will make it harder to identify an effect of the war on German Americans.

Name data suggest that the NYSE was dominated by Anglo-Saxons throughout the sample (Figure 4). In 1890, nearly two-thirds of NYSE traders were Anglo-Saxons; by 1930, Anglo-Saxons continued to account for half of all traders. The share of German Americans increased gradually from 6.1 percent in 1890 to 7.7 percent in 1900, 7.8 percent in 1910, 8.0 in 1920, and 8.4 percent in 1930. The share of Jewish Americans declined from 8.6 percent in 1890 to 7.5 percent in 1920 and 7.6 percent in 1930.

[18] The share of nominal transfers increased from 11 percent before the war, to 17 percent during, and 21 percent after the war (Table 1). Since nominal transfers typically occurred within firms, they may have been subject to less stringent reviews by the NYSE, which will make it harder to detect discrimination.

[19] In 2005 U.S. dollars. With the close of the market on December 30, 2005, the NYSE stopped selling seats in anticipation of becoming a publicly traded company.

[20] See List Service Direct, Inc. (LSDI) at http://listservicedirect.com/ethnic_religious.html for a detailed description of the matching algorithm.

The matching algorithm combines German and non-German Jews in the Jewish variable. German Jews, however, may have been affected by changes in preferences. To identify the potential effect on German Jews, I match each Jewish applicant with his most likely country of origin, based on the passenger lists of immigrant ships that arrived at the port of New York. Such data are available because the Steerage Act of 1819, which Congress passed in response to a surge in immigration after the British-American War of 1812, required captains to submit complete lists of all passengers and ports of origins (Page 1911). The resulting records, including *Passenger Lists of Vessels Arriving at New York, New York 1820-1897,* make it possible to assign each Jewish applicant to his most likely country of origin. [21]

For example, Arthur Schiff applied to the NYSE on December 15, 1932, and is identified as *Jewish* by the matching algorithm. Shipping records show that 111 of 228 Schiff families came from Germany, 55 from Russia, 19 from Hungary, 17 from Poland, 13 from Austria, and 13 from Hessia (which is a German state). Thus, Jewish applicants with the last name Schiff are assigned to the new ethnicity variable *German Jewish*.

C. Potential Weaknesses of the Data

The biggest weakness of the data is that the ethnic connotation of names is a noisy and potentially biased measure of ethnicity. Algorithms that assign names to ethnicities are optimized to match current-day naming practices; this will make it harder to detect discrimination between 1914 and 1929. Expectations of discrimination may also discourage the use of ethnic-sounding names (Bertrand and Mullainathan 2004; Levitt and Fryer 2004, p.770). Census data, compiled for this paper, have shown that the war reduced the popularity of German first names such as Otto or Wilhelm. Similarly, Germans may have anglicized their last names to avoid discrimination. For example, the *New York Times* reports that "Loyal citizens who possess German forms of the patronymic are striking them out" (*New York Times*, June 2, 1918).

Most importantly, German American applicants with anglicized names are counted as *Anglo-Saxon* or *Other Ethnicities*. This means that some applicants in the control group will also be affected by the changes in tastes, which imply that the estimates of the war's effect will be downward biased. For example Arthur Rittmaster applied to the NYSE in 1924 and was

[21] Arrival records are available at *ancestry.com*. *Ancestry's* database combines the passenger lists of ships arriving at the Port of New York from 1851 to 1891 and from 1935 to 1938 with the passenger lists of vessels entering through Castle Garden from 1855 to 1890.

rejected. Rittmaster is an anglicized version of the German name Rittmeister, which means "cavalry captain." The matching algorithm assigns Rittmaster to *Other Ethnicities*, though his contemporaries may have recognized the name as German-sounding.

Similarly, the German Jewish variable may be subject to measurement error if a ship's port of departure differs from a family's country of origin. Specifically, the variable may be biased towards countries that are closer to the United States, and particularly towards Britain. For example, a ship could pick up an immigrant in Hamburg and make another stop in London before setting sail for the United States. Thus, some German Jews are classified as Anglo-Saxon, which implies that changes in tastes will also affect Anglo-Saxons. This also implies that estimates of the effect of World War I will be downward biased.

D. Three Time Periods: pre-War, War, and post-War

To examine the effect of World War I, the data are divided into three periods: *pre-War*, *War*, and *post-War*. The *pre-war* period begins with the first recorded sale of a NYSE seat on January 3, 1883, and extends to June 28, 1914, when Archduke Franz Ferdinand was assassinated in Sarajevo. The NYSE closed for business a few days after the Archduke's death and remained closed until November 28, 1914. By that time, Germany had invaded neutral Belgium. In this paper, the *War* period is defined to include the 1920s because measures of ethnic preferences indicate that the war's effect on preferences persisted through this decade. The *post-War* period begins with the first Quarter Dividend Sale on February 13, 1929. This final period includes the stock market crash on Black Thursday, October 24, 1929 and the Great Depression. The data end on October 1, 1936, when the NYSE stopped recording black balls.[22]

IV. Changes in Admissions to the NYSE

Applications data show that rejection rates for applicants with German-sounding names nearly doubled after the beginning of the war (Table 1). Before World War I, 4 percent of

[22] During the war period, the NYSE faced significant competition, which is likely to have mitigated the effects of discrimination (e.g., Becker 1957, Higgs 1977, Fishbeck 1989, Black and Strahan 2001). For example, the NYSE competed with an active curb market, the Consolidated Stock Exchange, the Coal Hole, the New York Gold Exchange, and the Open Board of Stock Brokers in New York, in addition to many regional exchanges (Eames 1894, p.43). Until 1926, the Consolidated alone held nearly a quarter of the market and employed up to 2,000 traders (Brown, Mulherin, and Weidenmier 2008).

German Americans were rejected on grounds of "personal and financial integrity." After 1914, 7.7 percent of German Americans were rejected.

A. Differences in Differences

Simple two-by-two tables compare changes in rejection rates for German Americans with changes in rejection rates for Anglo-Saxons (Table 2). In years between 1914 and 1929 rejection rates for German Americans were 3.7 percent higher than before the war, while rejection rates for Anglo-Saxons stayed roughly constant, with a slight decrease of 0.5 percent (Table 2, Panel A). The difference across German Americans and Anglo-Saxons in these differences between pre-war and war rejection rates is 4.2 percent (with a p-value of 0.068), which is slightly larger than the pre-war rejection rate for German Americans.

Under the assumption that the change in rejection rates for German and Anglo-Saxons would not have been systematically different in the absence of the war, this difference in differences can be interpreted as the causal effect of the war. Thus, differences in differences suggest that the war more than doubled rejection rates for German Americans.

Similarly, German Americans received on average half an additional black ball between 1914 and 1929 compared with pre-war years, while Anglo-Saxons received slightly fewer black balls (a 0.459 increase for German Americans compared with a slight -0.002 decrease for Anglo-Saxons, Table 2, panel B). The difference across Germans and Anglo-Saxons in these differences across black balls after 1914 and before is 0.461 (with a p-value of 0.058). This difference in differences implies that the war added about half a black ball to be cast against the average German American applicant.

Equivalent tests for Jewish Germans suggest that Jewish Germans were also affected by the war. Rejection rates for Jewish Germans were 6.3 percent higher after 1914 compared with before, while rejections rates for Anglo-Saxons stayed roughly constant (a 0.063 increase for Jewish Germans compared with a slight -0.005 decrease for Anglo-Saxons, Table 2, Panel A). The difference across Jewish Germans and Anglo-Saxons in these differences between pre-1914 and post-1914 rejections is 6.8 percent (with a p-value of 0.016), more than double the pre-war rejection rates for Jewish Germans. Jewish Germans received on average half an additional black ball after 1914 compared with before, while Anglo-Saxons received slightly fewer black balls (a 0.499 increase for Jewish Germans compared with a slight -0.002 decrease for Anglo-

Saxons, Table 2, panel B). The difference across Jewish Germans and Anglo-Saxons in these differences between pre-1914 and post-1914 years is approximately half a black ball (0.501, with a p-value of 0.089), which is almost identical to the difference-in-differences estimate for other Germans.

Thus, differences in differences suggest that World War I had a substantial negative effect on admissions for applicants with German-sounding names. The data also show that both Jewish and non-Jewish Germans were affected by changes in ethnic preferences. OLS and logit regression in the next section expand on these tests by controlling for factors in addition to the ethnicity that may have influenced admissions.

B. Regressions of Rejections on Ethnicities and Controls

To improve on the difference-in-differences results above, regression analyses include additional controls for other characteristics of individual applications (Table 3). As a robustness check, an extra set of the regressions include year-specific fixed effects to control for changes in stock market conditions and other unobservable factors, such as potentially unobservable changes in the admissions process of the NYSE (Tables 4).[23]

In the most basic regressions, four ethnicity variables distinguish *Anglo-Saxon*, *German*, *Jewish*, and *Other Ethnicities*. Anglo-Saxons are the omitted control group because they constitute the largest and socially dominant ethnicity. Regressions separately estimate the effects of German-sounding names for years before and after 1914; the pre-1914 and post-1914 periods are compared with a third control period for years after 1929 when the war's effects on ethnic preferences had faded. Time-ethnicity interactions such as *War * German* estimate differences in differences over time and across ethnicities.

$$\begin{aligned}\text{Rejected} &= \beta_0 + \beta_1 \cdot \text{German} + \beta_2 \cdot \text{Jewish} + \beta_3 \cdot \text{Other Ethnicity} \\ &+ \beta_4 \cdot \text{Pre-WWI} + \beta_5 \cdot \text{Pre-WWI} \times \text{German} + \cdots + \beta_7 \cdot \text{Pre-WWI} \times \text{Other Ethnicity} \\ &+ \beta_8 \cdot \text{WWI} + \beta_9 \cdot \text{WWI} \times \text{German} + \cdots + \beta_{11} \cdot \text{WWI} \times \text{Other Ethnicity} \\ &+ \beta_{12} \cdot \text{Nominal} + \beta_{13} \cdot \text{Quarter Dividend Sale} + \beta_{14} \cdot \text{Committee of Admissions} \quad (1)\end{aligned}$$

[23] The ideal test would compare applications that were processed on the same day. The number of transactions, however, is too small to allow for time fixed effects below the level of years. Bi-annual fixed effects could compare a larger number of sales, but are less effective as control for stock market conditions. Regressions with bi-annual fixed effects yield the same qualitative results with smaller standard errors.

Regressions also control for *Nominal* transactions, *Quarter Dividend Sale*s, and sales by the *Committee of Admissions*. Intuitively, each of these variables may affect rejection rates. First, nominal sales may be less likely to be rejected because such sales typically occurred within firms and may therefore be subject to less interference by the NYSE. Second, the Quarter Dividend Sale may have increased rejection rates if the sudden increase in the supply of memberships lowered the quality of marginal applicants to the NYSE. Third, rejection rates may be lower for sales that were administered by the Committee of Admissions if the Committee picked applicants that it preferred instead of selling to the highest bidder as intended by the NYSE rules.

Logit regressions confirm that the war had a significant effect on admissions of applicants with German-sounding names (Tables 3 to 6).[24] In regressions with time period dummies, the coefficient for the time-ethnicity interaction *War * German* is large and positive at 2.0 to 2.2 (Table 3, significant at 5 percent). In comparison, the coefficient for *pre-War * German* stays between 1.1 and 1.3 (Table 3, not statistically significant). These results confirm the findings of difference-in-differences comparisons that World War I more than doubled rejection rates for German Americans. Specifically, the NYSE data indicate that the war raised rejection rates for German Americans from 6 to more than 13 percent.[25]

Results are robust to controlling for stock market conditions and other unobservable changes over time with annual fixed effects: Coefficients for *War * German* are significantly larger than coefficients for *pre-War * German* (1.8 to 2.0 at 5 percent, Table 3). Time-ethnicity interactions are not significant for any ethnicity except for applicants with German-sounding names.[26]

Coefficients for the control variables yield intuitive results. Nominal sales are significantly less likely to be rejected than other sales (Tables 3 to 6), confirming that the NYSE

[24] Linear probability and probit regressions yield qualitatively and quantitatively very similar results; World War I has a strong effect on German applicants and but no effect on other ethnicities. Data for nine years are dropped from regressions with annual fixed effects because no applicant was rejected in those years.

[25] Marginal probabilities are calculated from the coefficients at the sample means. For example, the effect of being German on the probability of rejection is: $G(\beta o + \beta_{German}X_{German} + \beta_{Jewis}X_{Jewish} + \ldots + \beta_{Nominal}X_{Nominal}) - G(\beta o + \beta_{Jewish}X_{Jewish} \ldots + \beta_{Nominal}X_{Nominal})$, where $G(.)$ is the cumulative probability function of the logistic distribution. Chunrong Ai and Edward C. Norton (2003) show that these effects are approximate. Their correction focuses on interactions between two continuous variables, whereas regressions in the current paper examine interactions between binary variables. I use Ai and Norton's algorithm to measure the size of the bias. It can handle only a single interaction variable, and I estimate a restricted model with *War*German* as the only interaction variable to match this constraint. In that model, differences between the approximate calculation and Ai and Norton's corrected method are negligible.

[26] These results are robust to separating *Other Ethnicity* into more finely-grained ethnic categories, including Italian, Russian, and Dutch.

was less likely to interfere with seat transfers that occurred within families or firms. Applicants during the Quarter Dividend Sale were no more likely to be rejected than other applicants, suggesting that the NYSE was able to attract large numbers of quality applicants, even as it expanded the number of seats.[27] Finally, applicants in sales that were administered by the Committee of Admissions were no less likely to be rejected as other applicants, confirming that the Committee sold to the highest bidder, as intended by the NYSE rules.

Logit regressions also confirm that both Jewish and non-Jewish Germans were affected by the war. The data show that Jewish applicants faced higher rejection rates across all years (coefficients of 0.7 to 0.8, significant at 10 percent in Tables 3 and 4, implying rejection rates from 2 to 3 percent rates for Anglo-Saxons), suggesting that traders may have been biased against Jewish applicants as early as the 1880s, and that World War I amplified an existing bias against Jewish applicants. To measure these effects, logit regressions in Tables 5 and 6 repeat the analysis of Tables 3 and 4, separating Jewish Germans from other Jewish applicants. In these regressions, the interaction variable *War * German Jewish* carries a large positive coefficient (2.3 to 2.4, significant at 5 percent, Table 5), which implies a 19 percent increase in rejections. This increase is especially substantial compared with a much smaller effect for pre-war years (3 percent based on a coefficient of 0.7 to 0.8 in Table 5, not statistically significant). Regressions with annual fixed effects further strengthen these results (Table 6).

C. Regressions of Black Balls on Ethnicities and Controls

Regression analyses of black ball data confirm that changes in tastes had a significant effect on applicants with German-sounding names.. Ordinary least squares regressions in Tables 7 and 8 re-estimate the logit regressions in Tables 3 and 4 with black balls instead of rejections as the dependent variable. Regression results confirm the implication of difference-in-differences comparisons that World War I added about half a black ball against the average German American. Coefficients on the time-ethnicity interaction for German applicants increase from 0.3 and 0.4 for *pre-War * German* (not statistically significant, Table 7) to 0.7 and 0.8 for *War * German* (significant at 1 percent, Table 7). Regressions with annual fixed effects further strengthen these results (Table 8, with an increase from 0.3 and 0.4 for *pre-War * German*, not

[27] This result confirms the findings of Davis, Neale, and White (2007), which suggest that the Quarter Dividend Sale occurred in response to an increase in the demand for trading.

statistically significant, to 0.7 for *War * German*, significant at 1 to 5 percent). Separating Jewish applicants into *German Jewish* and *Other Jewish* indicates that black balls against *German Jewish* increase by 0.7 to 0.8 (significant at 1 percent) in regressions with time dummies, and by 0.6 to 0.7 (significant at 1 percent) in regressions with annual fixed effects. Thus, the black ball data confirm that World War I significantly worsened admissions prospects for both Jewish and non-Jewish applicants with German-sounding names.

D. Changes in the Ethnic Composition of the Committee of Admissions

In addition to influencing admissions, ethnic preferences may also have limited promotions for German American traders within the Exchange. To measure these effects, I examine changes in the ethnic composition of the Committee of Admissions. Any observed effects will be gradual because rules and regulations that were in place from 1869 until the reorganization of the Exchange in 1938 prevented sudden changes in the ethnic composition of the Committee; each May, its three longest-serving members were replaced (Eames 1894, pp.74-75).

Committee data confirm that the war limited the promotion of German American traders to key positions within the Exchange; between 1914 and 1929 no German Americans (Jewish or not) were elected.[28] In 1880 the 15-member Committee included three German Americans and one Jewish trader (Figure 6). Between 1913 and 1915, the number of German Americans declined to two; by 1921, only one German American remained. It took until 1930, when measures of revealed preferences suggest that taste effects had faded, for another German American to be elected to the Committee.[29]

Thus, data on internal elections further strengthen the evidence from admissions and black ball data that a shift in ethnic preferences significantly worsened the prospects of applicants with German-sounding names. These findings are a strong indicator of taste-based discrimination.

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[28] Committee members were identified from the *Minutes* of the Committee of Admissions (1904), Eames (1894), and the *New York Stock Exchange Directory* (1906, 1909, 1913-15, 1920, and 1930).

[29] Together with the black ball data, data on membership in the Committee of Admissions also indicate that changes in rejections after 1914 reflected a broad-based change in voting patterns rather changes in a small number of votes. During the war, only one applicant was rejected by less than a two-third majority: On March 13, 1919, George Shaskan was rejected with three black balls. Shaskan does not appear to have been rejected based on his ethnicity; his response to the 1920 Census reveals that he had arrived from Russia in 1891, and that his naturalization was still pending.

V. Robustness Checks

This section presents a variety of robustness checks for the empirical results. Most importantly, it examines whether significant changes in admissions might be due to changes in the (real or perceived) productivity of traders with German-sounding names. For example, other traders may have been loath to admit applicants with German-sounding names because they were more likely to threaten the security of the Exchange. Alternatively, traders with German-sounding names may have been more likely to fail in business if they were more dependent on business in Europe.

Crucially, such productivity changes cannot explain the persistence of changes in the treatment of German Americans throughout the 1920s. Moreover, evidence from declassified FBI records and the archives of the NYSE yield little evidence that the productivity of German American traders was more affected by the war compared with other traders.

A. No German Americans were Suspected as Spies by the FBI

FBI case files on potential pro-German activity between 1908 and 1921 include 12 references to the NYSE (*Investigative Reports of the Bureau of Investigation 1908-1922*, National Archives). In only two cases existing NYSE traders were suspects of the investigation; more frequently NYSE members acted as informants or as witnesses for the Bureau. One of the cases involved traders with an Anglo-Saxon firm, who were suspected of bribing officials to protect their sons from the draft (case number 8000-217574). The other case concerned Frederick W. Pelzer, of B. H. & F. W. Pelzer, 12 Broadway, New York City (case number 123,027). Even though Pelzer was a German American, the Bureau only investigated him after he had applied for a passport to visit Cuba. Following a quick background check, the Bureau dropped its investigation and recommended that Peltzer's request for a passport should be granted.

> If the Department does not object to people traveling for pleasure only, there is no reason, as far as I can see, why their application for a passport should not be granted, as all information I have been able to get speaks very highly for both Mr. and Mrs. Pelzer." (Chief Bielaski, January 16, 1918, *Investigative Reports of the Bureau of Investigation 1908-1922*, National Archives)[30]

[30] Additional evidence comes from the FBI's list of "enemy alien firms." At the time, the Bureau was also responsible for investigating any firms were partially owned by "enemy persons", defined as "All persons of whatever nationality, including partnerships and corporations, residing or doing business in the territory of enemy

Thus, FBI records yield no evidence that traders with German-sounding names were more likely to be perceived as a security threat than were other traders.

B. German Americans Traders were not more likely to do Foreign Business

There is also no evidence that German Americans were more likely to conduct business with Europe, which would have made them more vulnerable to trade disruptions as a result of World War I. In 1911, the NYSE created the *Special Committee on Foreign Business* to "investigate and report upon the foreign of arbitrage business and trading" (New York Stock Exchange, 1911). To ensure that its traders adhered to regulations on commissions in their foreign transactions, the Committee gathered testimony from "every firm doing a foreign business at the so-called Arbitrage Rail on the floor of the Exchange" (New York Stock Exchange, 1911).[31]

The minutes of *Special Committee* record that testimony was delivered by 37 members of the NYSE. Only four of these traders - Benjamin W. Loeb, H.P. Goldschmidt, John D. Probst, and William J. Ehrich – were German Americans. Thus, the share of German traders among those doing foreign business at the NYSE (11.4 percent) was only slightly higher than the share of German traders among the general membership of the Exchange (8 percent, Figure 4).

C. No Increase in Business Failures for Traders with German-sounding Names

Finally, business failures, as an extreme measure of changes in profitability, yield no evidence that differential productivity effects might explain the changes in admissions. To protect other traders, those who failed in business were immediately expelled from the Exchange, and their seats were auctioned off to satisfy their creditors. Between 1915 and 1918, the number of expulsions increased from zero to seven, but only two of the expelled were German American (Figure 7). This share is particularly low considering that changes in ethnic

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nations, or in the territory occupied by the armed forces of the enemy" (Alien Property Custodian 1919, p. 7). This investigation produced a list of 286 firms with enemy interests and secured "millions of property which had been skillfully concealed by its enemy owners" (Alien Property Custodian 1919, p.19). Enemy firms included two NYSE firms: William Schall & Co. (Report Number 7099, Alien Property Custodian 1919, p. 369) and B.F. Schwartz & Co. (Report Number 6737, Alien Property Custodian 1919, p. 374). William Schall had entered NYSE a quarter century before the beginning of the war on April 19, 1891. Benjamin Schwartz was accepted to the NYSE on February 6, 1919, with zero black balls.

[31] I thank Janet Linde at the NYSE Archives for guiding me towards the records of this Committee.

preferences may have made German Americans more vulnerable to expulsion. In fact, a second spike in expulsions in 1922 is most likely an effect of anti-German sentiments. In that year, the NYSE witnessed six expulsions, including those of three German Americans. At the time, trading restrictions with Germany had been removed, but the war's effect on ethnic preferences continued to be substantial.

Data on voluntary exits also yield no evidence that the War lowered the productivity of German American traders. Such data offer a less extreme measure for a potential decline in productivity, as they capture traders who voluntarily resigned from trading. Archival records indicate that spikes in German American exits occurred well before the war. In 1898, the share of German Americans among all sellers increased from less than 9 to almost 16 percent (Figure 8). During World War I there was no increase in the share of German Americans. From 1900 to 1923 the share of German American exits fluctuated between 6 and 12 percent. The only significant increase occurred in 1924, five years after the end of the war.[32]

In sum, archival records from the FBI and the NYSE suggest that potential changes in real or perceived productivity alone cannot explain differences in admissions. The next and final section examines whether ethnic preferences had a similar effect on the price that German Americans paid to be admitted.

VI. Did Changes in Taste Affect the Price of Admission?

Although admissions react strongly to changes in tastes, it is not obvious that the price of admissions should respond with similar intensity. Prices were set in negotiations between applicants and incumbent traders who planned to leave the Exchange. Unlike other NYSE traders, whose interests were represented by the Committee of Admissions, sellers only had to deal with a minority applicants for as long as it took them to agree on a price, and sums in the

[32] An additional check compares applications across ethnicities and over time: If World War I lowered the productivity of German Americans it may have discouraged German American applicants relative to other ethnicities. NYSE data, however, suggest that the share of German American applicants *increased* during the war, from 7.6 before 1914 to 9.1 percent during the war. As a further robustness check, demographic data from the U.S. Census of 1920 suggest that the "quality" of German applicants – measured by age, marital status, and home ownership – stayed roughly constant for applicants between 1883 and 1914 compared with applicants between 1914 and 1929.

order of two million dollars were at stake. Anti-German sentiments, however, were strong, and sellers may have acted on them, despite the brevity of interactions.[33]

To measure the effects of changes in tastes on the price of admissions, the analysis replicates regressions for rejection rates, with two additional controls. A dummy variable for *Same Ethnicity* tests whether sellers favored applicants of their own ethnicity, and a dummy for *Rejected* checks whether sellers may have anticipated rejections and charged higher prices to compensate themselves. As above, annual fixed effects control for stock market conditions and other unobservable changes in admissions over time.

$$\begin{aligned} ln(\text{Price}) &= \beta_0 + \beta_1 \cdot \text{German} + \beta_2 \cdot \text{Jewish} + \beta_3 \cdot \text{Other Ethnicity} \\ &+ \beta_4 \cdot \text{Pre-WWI} + \beta_5 \cdot \text{Pre-WWI} \times \text{German} + \cdots + \beta_7 \cdot \text{Pre-WWI} \times \text{Other Ethnicity} \\ &+ \beta_8 \cdot \text{WWI} + \beta_9 \cdot \text{WWI} \times \text{German} + \cdots + \beta_{11} \cdot \text{WWI} \times \text{Other Ethnicity} \\ &+ \beta_{12} \cdot \text{Nominal} + \beta_{13} \cdot \text{Quarter Dividend Sale} + \beta_{14} \cdot \text{Committee of Admissions} \\ &+ \beta_{15} \cdot \text{Same Ethnicity Buyer and Seller} + \beta_{16} \cdot \text{Rejected} \end{aligned} \quad (2)$$

In contrast to data on admissions, there is only limited evidence that changes in ethnic preferences affected the price of admissions. Coefficients for the variable in Table 9 indicate that WWI raised the price for German applicants by approximately 3 percent (11 to 14 percent for *War * German*, compared with 9 to 11 percent for *pre-War * German*), but this effect disappears in regressions that control for stock market conditions. With annual fixed effects the coefficient for *War * German* is close to zero and not statistically significant (Table 10, *pre-War * German* is also close to zero).[34]

There is also little evidence that German sellers favored applicants of their own ethnicity. Without fixed effects, a coefficient of -0.13 on the interaction *German Buyer and Seller * War* implies a price reduction of 13 percent (Table 9). This effect, however, is not statistically significant and disappears with the inclusion of time fixed effects.[35] Rejected applicants offer on average 9 percent less for a seat (Table 9), but this effect also disappears with the inclusion of time fixed effects (Table 10).

There is, however, some evidence that Jewish applicants paid slightly higher prices during World War I. With annual fixed effects, coefficients for *War * Jewish* indicate that

[33] For example, car dealers quote higher prices to minority buyers even though their interactions are very brief (e.g., Ayres and Siegelman 1995).
[34] Separating German Jews from other Jews does not show a price increase for German Jews.
[35] The corresponding variable *Jewish Buyer and Seller * War* shows no significant effect.

Jewish applicants paid a 5 to 7 percent markup during the war, which, compared with a 2 to 4 percent markup before 1914, implies a price increase of 3 percent (Table 10). Regressions with period dummies suggest a markup of 16 to 22 percent after 1914 and 5 to 12 percent before, which implies a price increase of 10 percent (Table 9).

The data also show that seats, which were auctioned by the Committee of Admissions, sold at a discount (nearly 13 percent, Table 9). This discount, however, disappears with the inclusion of time fixed effects (Table 10). This result is intuitive: the Committee auctioned the seats of traders who had died, been expelled, or failed in business. Business failures (and thereby Committee sales) were more likely in poor market conditions, when seats sold for lower prices.[36]

The most significant price effect occurs for applicants who purchased their seats as part of the Quarter Dividend Sale. In such transactions, applicants negotiated with four sellers instead of one. The NYSE data show that these applicants paid on average 9 percent more than they would have paid in a regular sale at the same time (Table 9). [37] Thus, regression results yield only limited evidence for taste-based discrimination in the price of admissions. When traders sold their memberships, financial rewards appear to have trumped even the most substantial changes in ethnic preferences.

VII. Conclusions

Quantitative measures of ethnic preferences based on German-language operas, naming practices, and food purchases establish that World War I resulted in a strong and persistent shift in ethnic preferences, which effectively converted German Americans to an ethnic minority until the late 1920s. This paper has analyzed a new data set on more than 5,000 applicants to the NYSE to test whether this shift in preferences affected the prospects of German Americans to secure a high-profile professional job. Admissions data reveal that changes in preferences as a result of the war more than doubled rejection rates for Germans (relative to Anglo-Saxons).

Despite the strong effect on rejections, the data yield no evidence that Germans paid a premium to enter the Exchange. The reason for this divergence is likely to lie in the institutional

[36] There is no evidence that the Committee favored certain ethnicities in its own sales. Interactions between ethnicity variables and the Committee of Admissions yield no statistically significant coefficients.

[37] Another interesting feature of the Quarter Dividend Sale is that, in contrast with regular sellers, Quarter Dividend sellers expected to trade with the applicant in the future. The Quarter Dividend Sale, however, occurs in 1929, when the effect of World War I on ethnic preferences had already lost its force.

characteristics of the admissions process: An applicant to the NYSE negotiates a price with a member who plans to exit the Exchange. It is, however, not the seller, but a committee of remaining members, who evaluate his application. Remaining members do not benefit from higher prices, but they expect to trade with the applicant for many years, if he is admitted. Thus, the NYSE's admissions process does not allow applicants to compensate their future co-workers, who are most affected by their personal characteristic, for discriminatory preferences.

Similar set-ups of separated decision-making are present in many labor market settings where co-workers may hold discriminatory tastes. For instance, minority applicants may be willing to accept lower wages in their negotiations with the human resource manager of a law firm or investment bank, but their prospective co-workers, and not human resources, decide whom to admit. Similarly, minority buyers can offer higher prices to the owner of a condo, but the condo board, and not the seller, decides on applications. Across the United States, more than 1.2 million families live in co-ops; in New York, co-ops account for 85 percent of apartments. Personal preferences appear to play an important role in the decisions of co-op boards, and issues of class discrimination have been raised in court.[38] Empirical estimates from this paper suggest that taste-based discrimination will persist in such settings, even if regulation ensures equal prices and equal wages.

More broadly, the results of this paper suggest that news of wars and ethnic violence have important effects on people with ethnic-sounding names. Thus, news of atrocities like the 1995 massacre in Srebrenica and the attacks of September 11 are likely to create significant shocks to ethnic preferences in the United States and other countries that are not directly affected by the killings. No current-day data are available to assess the strength and persistence of such changes and measure their effects in labor markets. Empirical results from this paper, however, indicate that changes in tastes persist long after news of atrocities come in and that the resulting changes in tastes create substantial effects in labor markets.

[38] Most recently, an exclusive co-op on Boston's Beacon Hill is reported to have paid 2.2 million dollars to prevent litigation with an Irish American cosmetics mogul, who claimed that he had been rejected because he was not a "blue blood." In response to this case, the Massachusetts State House passed a bill that would have forced co-ops to admit anyone who can afford to pay. Massachusetts Governor Deval Patrick, however, vetoed the bill to uphold co-ops' right to veto sales (*Boston Globe*, August 31, 2008 and September 10, 2008).

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TABLE 1 – APPLICATIONS FOR MEMBERSHIP AT THE NEW YORK STOCK EXCHANGE – SUMMARY STATISTICS

	1883 to 1914 (Pre-War)	1914 to Dividend Sale (War)	Dividend Sale to 1936 (Post-war)	All years
ANGLO-SAXON				
Applications	1,207	707	1,085	2,999
Rejected	2.9%	2.4%	2.5%	2.6%
Nominal	11.0%	19.2%	23.00%	17.3%
GERMAN				
Applications	149	117	169	435
Rejected	4.0%	7.7%	1.2%	3.9%
Nominal	4.0%	12.0%	19.5%	12.2%
JEWISH				
Applications	147	105	173	425
Rejected	3.4%	10.5%	5.2%	5.9%
Nominal	10.2%	17.1%	12.1%	12.7%
OTHER				
Applications	467	309	462	1,238
Rejected	3.0%	5.2%	3.5%	3.7%
Nominal	11.3%	13.9%	18.8%	14.8%
ALL ETHNICITIES				
Applications	1,970	1,238	1,889	5,097
Rejected	3.0%	4.3%	2.9%	3.3%
Nominal	10.5%	17.0%	20.7%	15.9%

Notes: Data on the identities of applicants and admissions decisions were collected from the NYSE Archives. Names were matched to ethnicities by a commercial algorithm that uses linguistic rules and location-specific naming practices.

TABLE 2 – MEANS OF REJECTION RATES AND BLACK BALLS BY ETHNICITY, PRE-WAR VERSUS WAR

	Panel A: Rejections						Panel B: Number of Blackballs					
	Non-Jewish German			Jewish German			Non-Jewish German			Jewish German		
	War	Pre-War	Difference	War	Pre-War	Difference	War	Pre-War	Difference	War	Pre-War	Difference
German American	0.077	0.040	0.037	0.087	0.024	0.063	0.966	0.507	0.459	0.809	0.310	0.499
	(0.016)	(0.014)	(0.021)	(0.020)	(0.018)	(0.027)	(0.170)	(0.150)	(0.230)	(0.210)	(0.190)	(0.280)
Anglo-Saxon	0.024	0.029	-0.005	0.024	0.029	-0.005	0.317	0.319	-0.002	0.317	0.319	-0.002
	(0.006)	(0.005)	(0.008)	(0.006)	(0.005)	(0.008)	(0.070)	(0.050)	(0.980)	(0.070)	(0.050)	(0.080)
Difference	0.053	0.011	0.042	0.063	-0.005	0.068	0.649	0.188	0.461	0.492	-0.010	0.501
	(0.017)	(0.015)	(0.023)	(0.021)	(0.019)	(0.028)	(0.180)	(0.159)	(0.240)	(0.220)	(0.196)	(0.290)

Notes: German American refers to all U.S. citizens with German-sounding names. Names are matched to ethnicities by a commercial algorithm that takes advantage of linguistic rules and location-specific naming practices. This algorithm groups Germans Jews together with other Jewish Americans. German Jews may, however, be subject to the same bias as other German Americans. To identify German Jews, I have assigned Jewish applicants to a country of origin based on the most frequent country of origin for immigrants with their last name. Standard errors in parentheses are based on a linear probability regression of rejection probabilities on ethnicities. The p-value for the difference in differences in rejection rates is 0.068 for non-Jewish German Americans and 0.016 for Jewish German Americans. The p-value for the difference in differences in blackballs is 0.058 for non-Jewish German Americans and 0.089 for Jewish German American. Data on admissions decisions were collected from the NYSE Archives.

TABLE 3 – LOGIT REGRESSIONS; 1883-1936, WITH TIME DUMMIES: COEFFICIENTS
DEPENDENT VARIABLE IS 1 FOR REJECTED APPLICANTS, 0 FOR ACCEPTED

	I	*II*	*III*	*IV*	*V*
German	-0.723	-0.788	-0.785	-0.787	-0.757
	[0.739]	[0.738]	[0.738]	[0.738]	[0.738]
Jewish	0.721	0.674	0.673	0.679	0.766
	[0.397]+	[0.395]+	[0.395]+	[0.395]+	[0.394]+
Other Ethnicity	0.353	0.31	0.313	0.307	0.341
	[0.324]	[0.322]	[0.322]	[0.321]	[0.321]
Pre-war	0.017	0.112	0.124	0.061	0.157
	[0.333]	[0.330]	[0.330]	[0.260]	[0.260]
Pre-war * German	1.292	1.071	1.073	1.075	1.097
	[0.876]	[0.865]	[0.865]	[0.865]	[0.864]
Pre-war * Jewish	-0.27	-0.519	-0.514	-0.521	-0.601
	[0.643]	[0.627]	[0.627]	[0.627]	[0.626]
Pre-war * Other Ethnicity	-0.14	-0.279	-0.276	-0.27	-0.306
	[0.468]	[0.455]	[0.455]	[0.454]	[0.454]
War	-0.127	-0.02	-0.004	-0.067	-0.035
	[0.378]	[0.374]	[0.373]	[0.314]	[0.313]
War * German	2.163	1.958	1.95	1.951	1.975
	[0.861]*	[0.852]*	[0.852]*	[0.852]*	[0.851]*
War * Jewish	1.117	0.881	0.876	0.87	0.792
	[0.581]+	[0.565]	[0.565]	[0.565]	[0.563]
War * Other Ethnicity	0.594	0.445	0.442	0.449	0.455
	[0.493]	[0.480]	[0.480]	[0.479]	[0.478]
Nominal	-1.166	-1.16	-1.179	-1.192	-
	[0.350]**	[0.350]**	[0.349]**	[0.347]**	-
Quarter Dividend Sale	0.12	0.116	0.094	-	-
	[0.300]	[0.299]	[0.297]	-	-
Committee of Admissions	0.504	0.126	-	-	-
	[0.271]+	[0.198]	-	-	-
Constant	-3.605	-3.577	-3.554	-3.49	-3.668
	[0.285]**	[0.287]**	[0.284]**	[0.197]**	[0.195]**
Committee Ethnicity Interactions	Yes	No	No	No	No
Observations (Applications)	5,097	5,097	5,097	5,097	5,097
Pseudo R-squared	0.034	0.032	0.031	0.031	0.02

Notes: Data were collected from the Archives at the New York Stock Exchange. Names are matched to ethnicities by a commercial algorithm that uses linguistic rules and location-specific naming practices. The category *Jewish* includes German Jewish applicants. During the Quarter Dividend Sale, each existing member received one additional quarter of a membership which he could sell. These applications are treated as four separate transactions since they involve different sellers and prices. + denotes significance at 10 percent, * at 5 percent, and ** at 1 percent.

TABLE 4 – LOGIT REGRESSIONS; 1883-1936, WITH ANNUAL FIXED EFFECTS: COEFFICIENTS
DEPENDENT VARIABLE IS 1 FOR REJECTED APPLICANTS, 0 FOR ACCEPTED

	I	*II*	*III*	*IV*	*V*
German	-0.747	-0.795	-0.796	-0.784	-0.752
	[0.741]	[0.740]	[0.740]	[0.740]	[0.739]
Jewish	0.761	0.722	0.721	0.749	0.831
	[0.399]+	[0.397]+	[0.397]+	[0.396]+	[0.395]*
Other Ethnicity	0.369	0.336	0.336	0.338	0.387
	[0.324]	[0.323]	[0.323]	[0.323]	[0.322]
Pre-war * German	1.615	1.371	1.37	1.356	1.379
	[0.890]+	[0.872]	[0.872]	[0.871]	[0.871]
Pre-war * Jewish	-0.267	-0.477	-0.477	-0.506	-0.561
	[0.654]	[0.636]	[0.636]	[0.635]	[0.635]
Pre-war * Other Ethnicity	-0.188	-0.326	-0.328	-0.331	-0.377
	[0.478]	[0.461]	[0.461]	[0.461]	[0.460]
War * German	1.98	1.786	1.789	1.763	1.776
	[0.861]*	[0.852]*	[0.852]*	[0.850]*	[0.848]*
War * Jewish	0.968	0.777	0.779	0.727	0.659
	[0.578]+	[0.562]	[0.562]	[0.557]	[0.554]
War * Other Ethnicity	0.489	0.348	0.348	0.333	0.31
	[0.488]	[0.473]	[0.473]	[0.471]	[0.469]
Nominal	-1.09	-1.091	-1.085	-1.125	-
	[0.353]**	[0.353]**	[0.351]**	[0.349]**	-
Quarter Dividend Sale	0.376	0.371	0.376	-	-
	[0.413]	[0.414]	[0.413]	-	-
Committee of Admissions	0.3	-0.041	-	-	-
	[0.281]	[0.207]	-	-	-
Committee Ethnicity Interactions	Yes	No	No	No	No
Groups (Years)	45	45	45	45	45
Observations (Applications)	4,653	4,653	4,653	4,653	4,653
Pseudo R-squared	0.034	0.031	0.031	0.031	0.019

Notes: Data were collected from the Archives at the New York Stock Exchange. Names are matched to ethnicities by a commercial algorithm that uses linguistic rules and location-specific naming practices. The category *Jewish* includes German Jewish applicants. During the Quarter Dividend Sale, each existing member received one additional quarter of a membership which he could sell to a new applicant. These applications are treated as four separate transactions because they involve different sellers and prices. + denotes significance at 10 percent, * at 5 percent, and ** at 1 percent.

TABLE 5 – LOGIT REGRESSIONS; 1883-1936, WITH TIME DUMMIES: COEFFICIENTS
DISTINGUISHING GERMAN JEWISH FROM OTHER JEWISH NAMES
DEPENDENT VARIABLE IS 1 FOR REJECTED APPLICANTS, 0 FOR ACCEPTED

	I	***II***	***III***	***IV***	***V***
German	-0.723	-0.788	-0.786	-0.787	-0.757
	[0.739]	[0.738]	[0.738]	[0.738]	[0.738]
German Jewish	-0.994	-0.996	-0.996	-0.994	-0.927
	[1.026]	[1.024]	[1.024]	[1.024]	[1.024]
Other Jewish	1.515	1.454	1.452	1.459	1.573
	[0.427]**	[0.425]**	[0.425]**	[0.424]**	[0.422]**
Other Ethnicity	0.352	0.309	0.312	0.307	0.341
	[0.324]	[0.322]	[0.322]	[0.321]	[0.321]
Pre-war	0	0.096	0.109	0.061	0.157
	[0.333]	[0.330]	[0.329]	[0.260]	[0.260]
Pre-war * German	1.291	1.072	1.074	1.075	1.097
	[0.876]	[0.865]	[0.865]	[0.865]	[0.864]
Pre-war * German Jewish	0.706	0.743	0.752	0.749	0.712
	[1.295]	[1.261]	[1.261]	[1.261]	[1.261]
Pre-war * Other Jewish	-0.499	-0.891	-0.891	-0.899	-1.041
	[0.759]	[0.749]	[0.749]	[0.749]	[0.747]
Pre-war * Other Ethnicity	-0.139	-0.277	-0.275	-0.27	-0.306
	[0.468]	[0.455]	[0.455]	[0.454]	[0.454]
War	-0.145	-0.036	-0.019	-0.067	-0.035
	[0.377]	[0.373]	[0.372]	[0.314]	[0.313]
War * German	2.162	1.959	1.95	1.951	1.975
	[0.861]*	[0.852]*	[0.852]*	[0.852]*	[0.851]*
War * German Jewish	2.35	2.334	2.328	2.325	2.279
	[1.157]*	[1.137]*	[1.137]*	[1.137]*	[1.136]*
War * Other Jewish	0.906	0.445	0.441	0.434	0.306
	[0.707]	[0.691]	[0.690]	[0.690]	[0.686]
War * Other Ethnicity	0.595	0.447	0.444	0.449	0.455
	[0.493]	[0.480]	[0.480]	[0.479]	[0.478]
Nominal	-1.168	-1.158	-1.177	-1.186	-
	[0.351]**	[0.351]**	[0.349]**	[0.347]**	-
Quarter Dividend Sale	0.093	0.094	0.071	-	-
	[0.301]	[0.301]	[0.299]	-	-
Committee of Admissions	0.501	0.13	-	-	-
	[0.271]+	[0.199]	-	-	-
Constant	-3.587	-3.563	-3.539	-3.491	-3.668
	[0.285]**	[0.286]**	[0.283]**	[0.198]**	[0.195]**
Committee Ethnicity Interactions	Yes	No	No	No	No
Observations (Applications)	5,072	5,097	5,097	5,097	5,097
Pseudo R-squared	0.044	0.038	0.038	0.038	0.027

Notes: Data were collected from the Archives at the New York Stock Exchange. As a first step, names are matched to ethnicities by a commercial algorithm that uses linguistic rules and location-specific naming practices. Then, German Jewish last names are identified based on the most frequent country of origin in the arrival records of ships that entered New York between 1850 and 1950. During the Quarter Dividend Sale, each existing member received one additional quarter of a membership which he could sell to a new applicant. These applications are treated as four separate transactions because they involve different sellers and prices. + denotes significance at 10 percent, * at 5 percent, and ** at 1 percent.

TABLE 6 – LOGIT REGRESSIONS; 1883-1936, WITH ANNUAL FIXED EFFECTS: COEFFICIENTS DISTINGUISHING GERMAN JEWISH AND OTHER JEWISH NAMES
DEPENDENT VARIABLE IS 1 FOR REJECTED APPLICANTS, 0 FOR ACCEPTED

	I	***II***	***III***	***IV***	***V***
German	-0.742	-0.789	-0.79	-0.78	-0.747
	[0.741]	[0.740]	[0.740]	[0.740]	[0.739]
German Jewish	-0.947	-0.934	-0.934	-0.928	-0.86
	[1.027]	[1.025]	[1.025]	[1.025]	[1.024]
Other Jewish	1.575	1.502	1.502	1.546	1.651
	[0.433]**	[0.430]**	[0.430]**	[0.426]**	[0.425]**
Other Ethnicity	0.37	0.34	0.34	0.342	0.392
	[0.324]	[0.323]	[0.323]	[0.323]	[0.323]
Pre-war * German	1.608	1.363	1.361	1.35	1.372
	[0.890]+	[0.872]	[0.872]	[0.871]	[0.871]
Pre-war * German Jewish	0.785	0.878	0.876	0.869	0.85
	[1.305]	[1.268]	[1.268]	[1.268]	[1.268]
Pre-war * Other Jewish	-0.627	-0.989	-0.988	-1.032	-1.135
	[0.778]	[0.765]	[0.765]	[0.763]	[0.761]
Pre-war * Other Ethnicity	-0.188	-0.33	-0.332	-0.334	-0.381
	[0.478]	[0.461]	[0.461]	[0.461]	[0.460]
War * German	1.968	1.775	1.778	1.757	1.767
	[0.861]*	[0.852]*	[0.851]*	[0.850]*	[0.848]*
War * German Jewish	2.073	2.095	2.096	2.075	2.033
	[1.157]+	[1.137]+	[1.137]+	[1.136]+	[1.134]+
War * Other Jewish	0.913	0.58	0.582	0.508	0.389
	[0.720]	[0.698]	[0.698]	[0.688]	[0.683]
War * Other Ethnicity	0.484	0.342	0.341	0.328	0.302
	[0.488]	[0.472]	[0.472]	[0.470]	[0.468]
Nominal	-1.098	-1.095	-1.089	-1.121	-
	[0.353]**	[0.353]**	[0.352]**	[0.349]**	-
Quarter Dividend Sale	0.274	0.294	0.3	-	-
	[0.413]	[0.413]	[0.411]	-	-
Committee of Admissions	-0.742	-0.789	-0.79	-0.78	-0.747
	[0.741]	[0.740]	[0.740]	[0.740]	[0.739]
Committee Ethnicity Interactions	Yes	No	No	No	No
Groups (Years)	45	45	45	45	45
Observations (Applications)	4,653	4,653	4,653	4,653	4,653
Pseudo R-squared	0.046	0.04	0.04	0.04	0.028

Notes: Data were collected from the Archives at the New York Stock Exchange. As a first step, names are matched to ethnicities by a commercial algorithm that uses linguistic rules and location-specific naming practices. Then, German Jewish last names are identified based on the most frequent country of origin in the arrival records of ships that entered New York between 1850 and 1950. During the Quarter Dividend Sale, each existing member received one additional quarter of a membership which he could sell to a new applicant. These applications are treated as four separate transactions because they involve different sellers and prices. + denotes significance at 10 percent, * at 5 percent, and ** at 1 percent.

TABLE 7 – OLS REGRESSIONS; 1883-1936, WITH TIME DUMMIES
DISTINGUISHING GERMAN JEWISH AND OTHER JEWISH NAMES
DEPENDENT VARIABLE IS NUMBER OF BLACK BALLS (VOTES OPPOSING AN APPLICATION)

	I	***II***	***III***	***IV***	***V***
German	-0.083	-0.107	-0.106	-0.106	-0.096
	[0.173]	[0.172]	[0.172]	[0.172]	[0.173]
German Jewish	-0.312	-0.314	-0.314	-0.315	-0.293
	[0.216]	[0.215]	[0.215]	[0.215]	[0.215]
Other Jewish	0.772	0.734	0.733	0.732	0.772
	[0.253]**	[0.252]**	[0.252]**	[0.252]**	[0.252]**
Other Ethnicity	0.153	0.136	0.137	0.138	0.15
	[0.116]	[0.116]	[0.116]	[0.115]	[0.115]
Pre-War	-0.139	-0.109	-0.101	-0.096	-0.064
	[0.109]	[0.108]	[0.108]	[0.087]	[0.087]
Pre-War * German	0.36	0.272	0.273	0.273	0.284
	[0.257]	[0.249]	[0.249]	[0.249]	[0.249]
Pre-War * German Jewish	0.29	0.289	0.294	0.294	0.283
	[0.331]	[0.316]	[0.316]	[0.316]	[0.317]
Pre-War * Other Jewish	-0.072	-0.333	-0.333	-0.332	-0.381
	[0.382]	[0.368]	[0.368]	[0.368]	[0.368]
Pre-War * Other Ethnicity	-0.095	-0.149	-0.148	-0.149	-0.162
	[0.166]	[0.162]	[0.162]	[0.161]	[0.162]
War	-0.121	-0.09	-0.081	-0.077	-0.066
	[0.119]	[0.118]	[0.118]	[0.100]	[0.100]
War * German	0.81	0.739	0.735	0.735	0.745
	[0.273]**	[0.269]**	[0.269]**	[0.269]**	[0.269]**
War * German Jewish	0.814	0.802	0.798	0.799	0.785
	[0.344]*	[0.338]*	[0.338]*	[0.338]*	[0.338]*
War * Other Jewish	0.85	0.604	0.602	0.603	0.569
	[0.446]+	[0.436]	[0.436]	[0.436]	[0.436]
War * Other Ethnicity	0.149	0.099	0.097	0.096	0.097
	[0.187]	[0.184]	[0.184]	[0.183]	[0.184]
Nominal	-0.269	-0.27	-0.279	-0.278	-
	[0.082]**	[0.082]**	[0.082]**	[0.080]**	-
Quarter Dividend Sale	0.002	0.005	-0.007	-	-
	[0.101]	[0.101]	[0.100]	-	-
Committee of Admissions	0.213	0.078	-	-	-
	[0.101]*	[0.077]	-	-	-
Constant	0.433	0.437	0.451	0.447	0.383
	[0.094]**	[0.094]**	[0.093]**	[0.066]**	[0.063]**
Committee Ethnicity Interactions	Yes	No	No	No	No
Observations (Applications)	4,998	4,998	4,998	4,998	4,998

Notes: Data were collected from the Archives at the New York Stock Exchange. Votes are by members of the NYSE's Committee of Admissions; the Committee has 15 members and votes when at least 10 members are present. Black balls were recorded until 1936. As a first step, names are matched to ethnicities by a commercial algorithm that uses linguistic rules and location-specific naming practices. Then, German Jewish last names are identified based on the most frequent country of origin in the arrival records of ships that entered New York between 1850 and 1950. During the Quarter Dividend Sale, each existing member received one additional quarter of a membership which he could sell to a new applicant. These applications are treated as four separate transactions because they involve different sellers and prices. + denotes significance at 10 percent, * at 5 percent, and ** at 1 percent.

TABLE 8 – OLS REGRESSIONS; 1883-1936, WITH ANNUAL FIXED EFFECTS
DISTINGUISHING GERMAN JEWISH AND OTHER JEWISH NAMES
DEPENDENT VARIABLE IS NUMBER OF BLACK BALLS (VOTES OPPOSING AN APPLICATION)

	I	***II***	***III***	***IV***	***V***
German	-0.089	-0.114	-0.113	-0.106	-0.097
	[0.173]	[0.172]	[0.172]	[0.172]	[0.172]
German Jewish	-0.278	-0.278	-0.278	-0.274	-0.253
	[0.215]	[0.214]	[0.214]	[0.214]	[0.214]
Other Jewish	0.769	0.732	0.731	0.756	0.794
	[0.252]**	[0.252]**	[0.252]**	[0.251]**	[0.251]**
Other Ethnicity	0.169	0.154	0.155	0.156	0.174
	[0.116]	[0.116]	[0.116]	[0.116]	[0.116]
Pre-War * German	0.442	0.352	0.352	0.344	0.357
	[0.257]+	[0.249]	[0.249]	[0.249]	[0.249]
Pre-War * German Jewish	0.285	0.299	0.300	0.295	0.288
	[0.331]	[0.316]	[0.316]	[0.316]	[0.316]
Pre-War * Other Jewish	-0.092	-0.342	-0.342	-0.367	-0.411
	[0.381]	[0.368]	[0.368]	[0.367]	[0.368]
Pre-War * Other Ethnicity	-0.123	-0.171	-0.170	-0.172	-0.189
	[0.166]	[0.162]	[0.162]	[0.162]	[0.162]
War * German	0.738	0.665	0.664	0.650	0.657
	[0.272]**	[0.268]*	[0.268]*	[0.268]*	[0.268]*
War * German Jewish	0.699	0.696	0.695	0.683	0.669
	[0.343]*	[0.337]*	[0.337]*	[0.337]*	[0.337]*
War * Other Jewish	0.902	0.664	0.664	0.620	0.585
	[0.446]*	[0.436]	[0.436]	[0.435]	[0.435]
War * Other Ethnicity	0.105	0.059	0.059	0.052	0.046
	[0.186]	[0.182]	[0.182]	[0.182]	[0.183]
Nominal	-0.247	-0.246	-0.249	-0.267	-
	[0.083]**	[0.083]**	[0.082]**	[0.081]**	-
Quarter Dividend Sale	0.204	0.208	0.206	-	-
	[0.143]	[0.143]	[0.143]	-	-
Committee of Admissions	0.144	0.019	-	-	-
	[0.102]	[0.078]	-	-	-
Constant	0.312	0.334	0.339	0.388	0.341
	[0.057]**	[0.056]**	[0.053]**	[0.040]**	[0.038]**
Committee Ethnicity Interactions	Yes	No	No	No	No
Groups (Years)	54	54	54	54	54
Observations (Applications)	4,998	4,998	4,998	4,998	4,998

Notes: Data were collected from the Archives at the New York Stock Exchange. Black balls are cast by the NYSE's Committee of Admissions; the Committee has 15 members. Black balls were recorded until 1936. As a first step, names are matched to ethnicities by a commercial algorithm that uses linguistic rules and location-specific naming practices. Then, German Jewish last names are identified based on the most frequent country of origin in the arrival records of ships that entered New York between 1850 and 1950. During the Quarter Dividend Sale, each existing member received one additional quarter of a membership which he could sell to a new applicant. These applications are treated as four separate transactions because they involve different sellers and prices. + denotes significance at 10 percent, * at 5 percent, and ** at 1 percent.

TABLE 9 – OLS REGRESSIONS; 1883-1936, WITH TIME DUMMIES
DEPENDENT VARIABLE IS LOG PRICE OF A SEAT IN YEAR 2000 US DOLLARS

	I	*II*	*III*	*IV*	*V*	*VI*
German	0.012	0.013	0.013	0.009	0.007	-0.012
	[0.048]	[0.048]	[0.045]	[0.044]	[0.045]	[0.048]
Jewish	-0.064	-0.067	-0.061	-0.062	-0.061	-0.012
	[0.046]	[0.046]	[0.043]	[0.042]	[0.043]	[0.046]
Other Ethnicity	0.026	0.025	0.02	0.023	0.02	-0.029
	[0.033]	[0.033]	[0.030]	[0.030]	[0.030]	[0.033]
Pre-war	-0.978	-0.977	-0.977	-0.978	-0.989	-1.479
	[0.029]**	[0.029]**	[0.029]**	[0.029]**	[0.029]**	[0.024]**
Pre-war * German	0.108	0.106	0.102	0.091	0.087	0.106
	[0.064]+	[0.064]	[0.064]	[0.062]	[0.062]	[0.067]
Pre-war * Jewish	0.118	0.121	0.112	0.105	0.1	0.051
	[0.065]+	[0.065]+	[0.065]+	[0.062]+	[0.062]	[0.067]
Pre-war * Other Ethnicity	0.014	0.014	0.014	0.021	0.019	0.068
	[0.042]	[0.042]	[0.042]	[0.041]	[0.041]	[0.045]
War	-0.613	-0.612	-0.612	-0.613	-0.629	-1.119
	[0.032]**	[0.032]**	[0.032]**	[0.032]**	[0.032]**	[0.029]**
War * German	0.143	0.138	0.121	0.113	0.12	0.138
	[0.073]+	[0.073]+	[0.070]+	[0.069]	[0.069]+	[0.075]+
War * Jewish	0.218	0.212	0.209	0.203	0.207	0.158
	[0.072]**	[0.072]**	[0.072]**	[0.070]**	[0.070]**	[0.076]*
War * Other Ethnicity	0.015	0.012	0.012	0.019	0.022	0.071
	[0.048]	[0.048]	[0.048]	[0.047]	[0.047]	[0.051]
Quarter Dividend Sale	0.699	0.698	0.698	0.697	0.72	-
	[0.027]**	[0.027]**	[0.027]**	[0.027]**	[0.027]**	-
Committee of Admissions	-0.127	-0.129	-0.129	-0.127	-	-
	[0.025]**	[0.025]**	[0.025]**	[0.019]**	-	-
German Buyer and Seller * War	-0.127	-0.132	-	-	-	-
	[0.183]	[0.183]	-	-	-	-
Rejected	-0.09	-	-	-	-	-
	[0.045]*	-	-	-	-	-
Constant	14.357	14.355	14.36	14.361	14.338	14.828
	[0.028]**	[0.028]**	[0.025]**	[0.025]**	[0.025]**	[0.018]**
Committee Ethnic. Interact.	Yes	Yes	Yes	No	No	No
Same Ethnicity Interactions	Yes	Yes	No	No	No	No
Observations (Applications)	4,210	4,210	4,210	4,210	4,210	4,210
R-squared	0.67	0.67	0.67	0.67	0.66	0.6

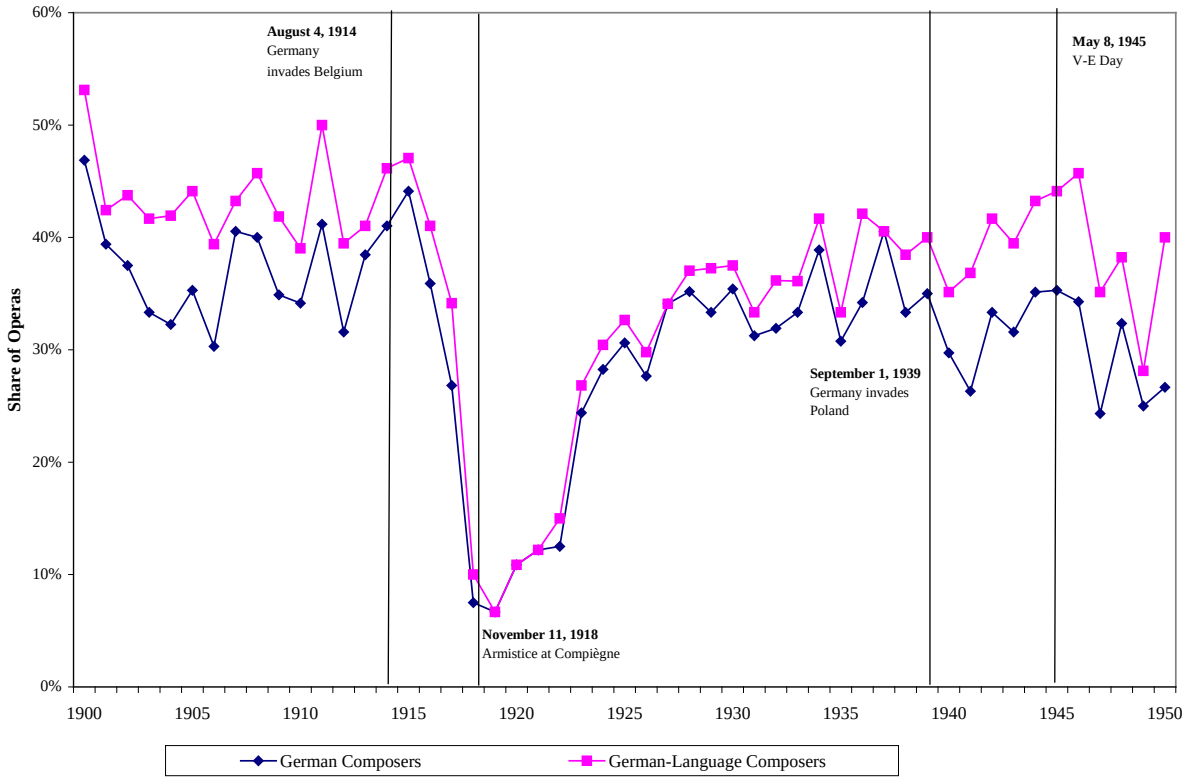
Notes: Data were collected from the Archives at the New York Stock Exchange. Names are matched to ethnicities by a commercial algorithm that uses linguistic rules and location-specific naming practices. The category *Jewish* includes German Jewish names, following the original classification. During the Quarter Dividend Sale, each existing member received one additional quarter of a membership which he could sell to a new applicant. These applications are treated as four separate transactions because they involve different sellers and prices. + denotes significance at 10 percent, * at 5 percent, and ** at 1 percent.

TABLE 10 – OLS REGRESSIONS; 1883-1936, WITH ANNUAL FIXED EFFECTS
DEPENDENT VARIABLE IS LOG PRICE OF A SEAT IN YEAR 2000 US DOLLARS

	I	*II*	*III*	*IV*	*V*	*VI*
German	0.003	0.003	0.002	0.001	0.001	0.003
	[0.014]	[0.014]	[0.013]	[0.013]	[0.013]	[0.013]
Jewish	-0.022	-0.022	-0.023	-0.025	-0.025	-0.018
	[0.013]+	[0.013]+	[0.012]+	[0.012]*	[0.012]*	[0.012]
Other Ethnicity	0.027	0.027	0.025	0.025	0.025	0.025
	[0.010]**	[0.010]**	[0.009]**	[0.009]**	[0.009]**	[0.009]**
Pre-war * German	0.009	0.009	0.008	0.003	0.003	0.001
	[0.019]	[0.019]	[0.019]	[0.018]	[0.018]	[0.018]
Pre-war * Jewish	0.036	0.035	0.035	0.026	0.026	0.02
	[0.019]+	[0.019]+	[0.019]+	[0.018]	[0.018]	[0.018]
Pre-war * Other Ethnicity	-0.017	-0.017	-0.017	-0.017	-0.017	-0.017
	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]
War * German	0.009	0.009	0.011	0.007	0.007	0.003
	[0.021]	[0.021]	[0.020]	[0.020]	[0.020]	[0.020]
War * Jewish	0.066	0.066	0.066	0.058	0.058	0.047
	[0.021]**	[0.021]**	[0.021]**	[0.020]**	[0.020]**	[0.020]*
War * Other Ethnicity	-0.016	-0.015	-0.016	-0.016	-0.016	-0.018
	[0.014]	[0.014]	[0.014]	[0.014]	[0.014]	[0.014]
Quarter Dividend Sale	0.093	0.093	0.093	0.093	0.093	-
	[0.011]**	[0.011]**	[0.011]**	[0.011]**	[0.011]**	-
Committee of Admissions	0.005	0.006	0.005	0.001	-	-
	[0.007]	[0.007]	[0.007]	[0.006]	-	-
German Buyer and Seller * War	0.017	0.017	-	-	-	-
	[0.053]	[0.053]	-	-	-	-
Rejected	0.008	-	-	-	-	-
	[0.013]	-	-	-	-	-
Constant	13.939	13.939	13.941	13.942	13.943	13.964
	[0.006]**	[0.006]**	[0.004]**	[0.004]**	[0.004]**	[0.003]**
Committee Ethnicity Interactions	Yes	Yes	Yes	No	No	No
Same Ethnicity Interactions	Yes	Yes	No	No	No	No
Groups (Years)	54	54	54	54	54	54
Observations (Applications)	4,210	4,210	4,210	4,210	4,210	4,210

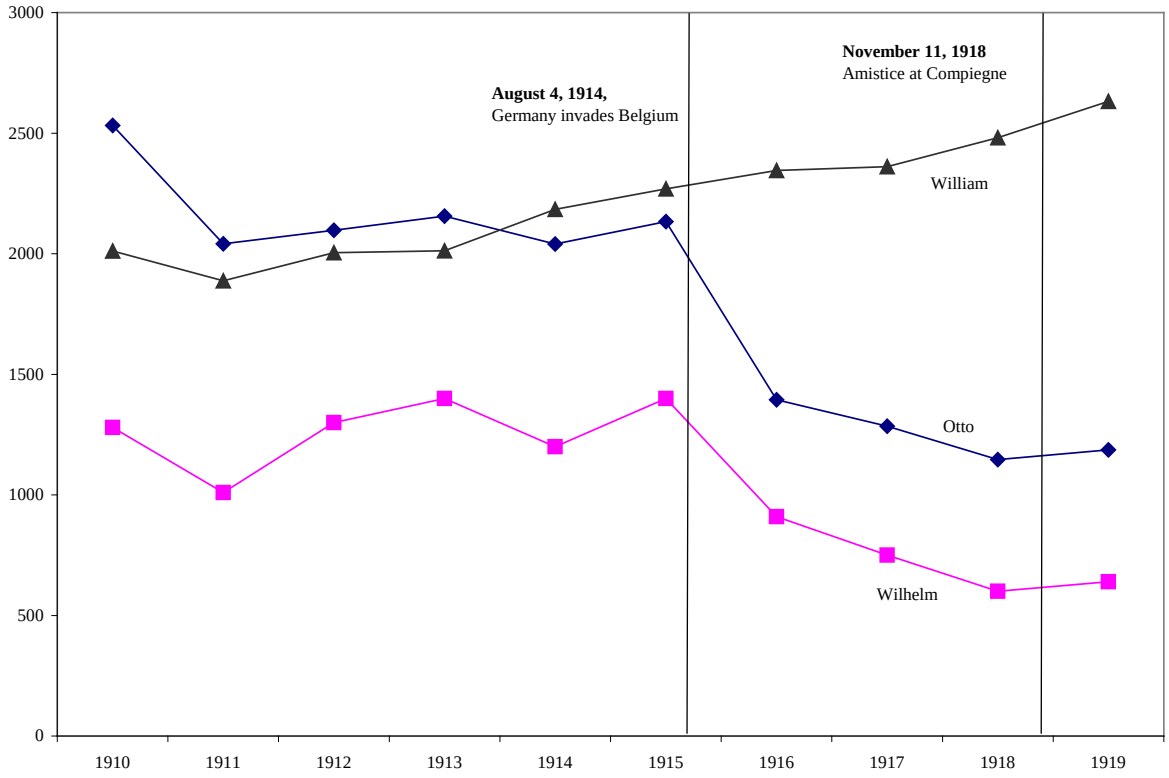
Notes: Data were collected from the Archives at the New York Stock Exchange. Names are matched to ethnicities by a commercial algorithm that uses linguistic rules and location-specific naming practices. The category *Jewish* includes German Jewish names, following the original classification. During the Quarter Dividend Sale, each existing member received one additional quarter of a membership which he could sell to a new applicant. These applications are treated as four separate transactions because they involved different sellers and prices. Prices for these transactions are multiplied by a factor of four. + denotes significance at 10 percent, * at 5 percent, and ** at 1 percent.

FIGURE 1 – THE SHARE OF GERMAN-LANGUAGE OPERAS FROM 1900 TO 1950



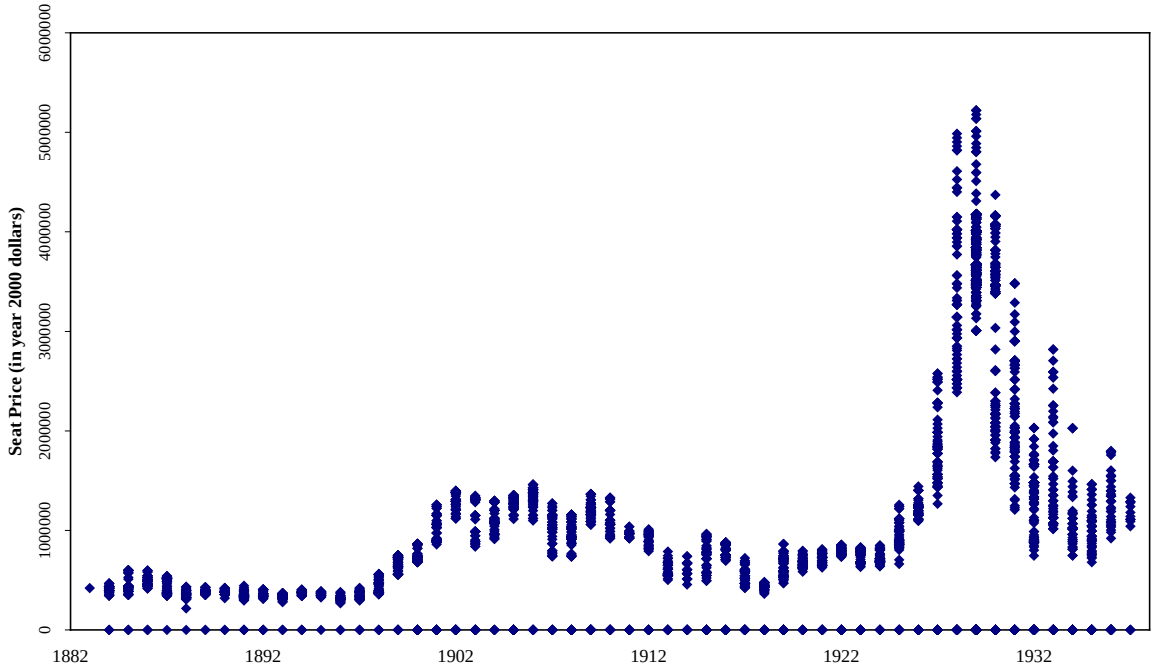
Notes: Data on operas are collected from historical schedules of performances in the online archives of the Metropolitan Opera in New York. German-language composers include Austrian and Bohemian composers.

FIGURE 2 – BOYS NAMED OTTO, WILHELM, AND WILLIAM FROM 1911 TO 1919



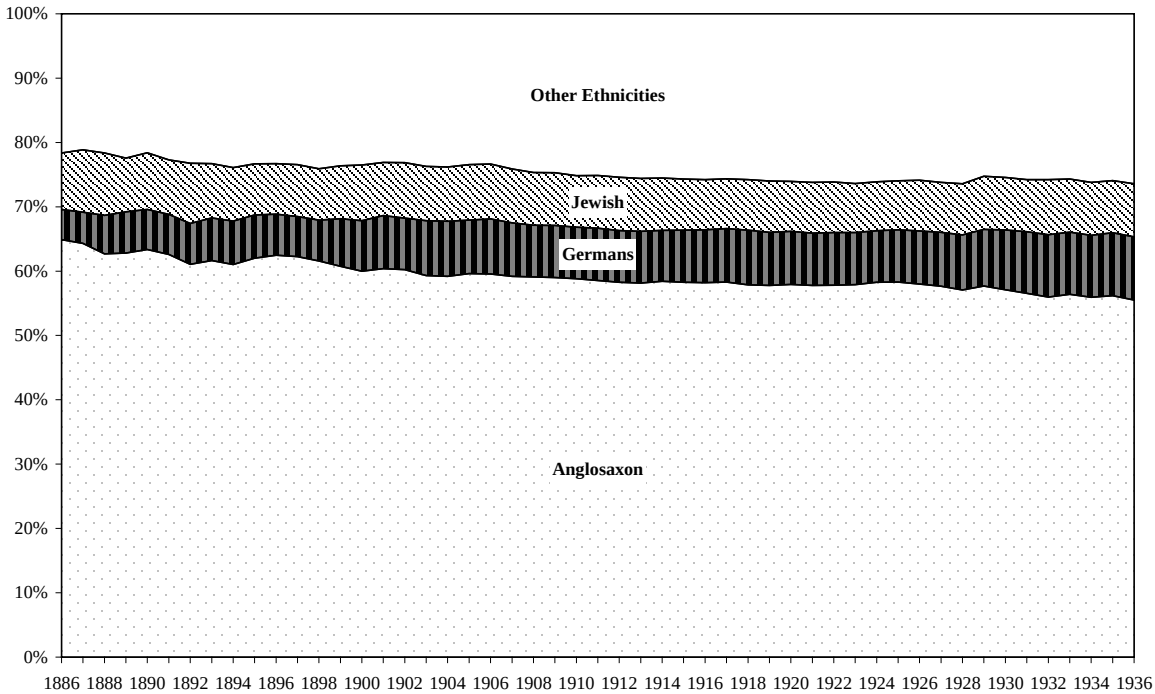
Notes: Data are constructed by counting the number of children with the name Otto or Wilhelm born between 1911 and 1919 and recorded in the United States Census of 1920. To scale the series in one graph, the number of Ottos is multiplied by 10 and the number of Williams is divided by 20.

FIGURE 3 - NYSE SEAT PRICES, 1883-1936



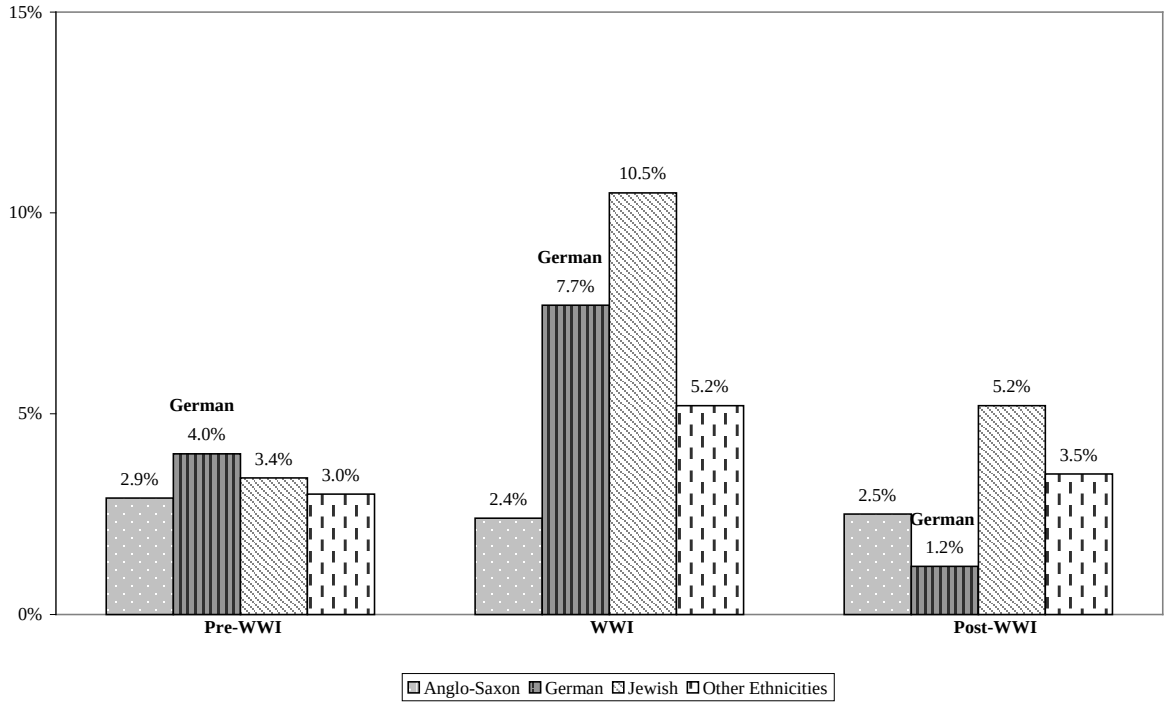
Notes: Price data are collected from the ledgers of transactions at the Archives of the NYSE.

FIGURE 4 –ETHNIC COMPOSITION OF THE NYSE FROM 1886 TO 1936



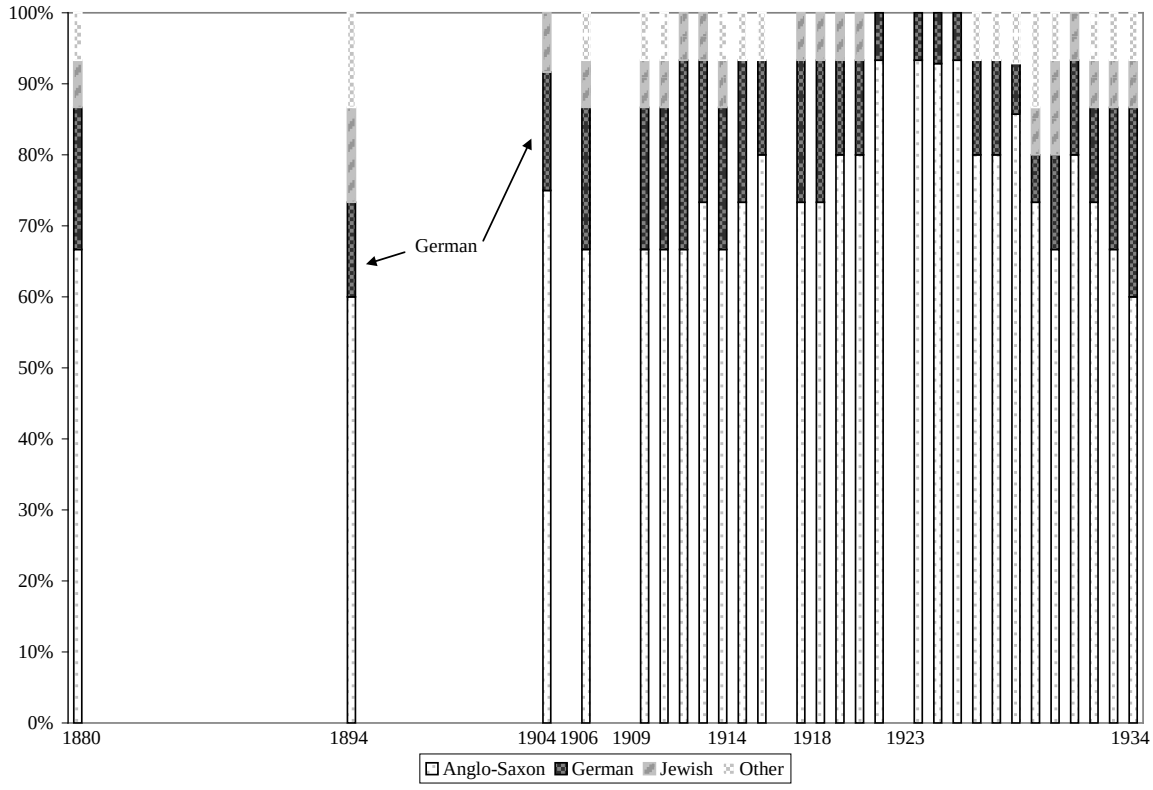
Notes: The ethnic composition is computed by adding buyers to the stock of existing members and subtracting sellers. Buyers' and sellers' names are collected from the ledgers of transactions in the archives of the NYSE. Names are matched to ethnicities by a commercial algorithm that uses linguistic rules and location-specific naming practices.

FIGURE 5 - REJECTED APPLICANTS BY ETHNICITY, 1883-1936



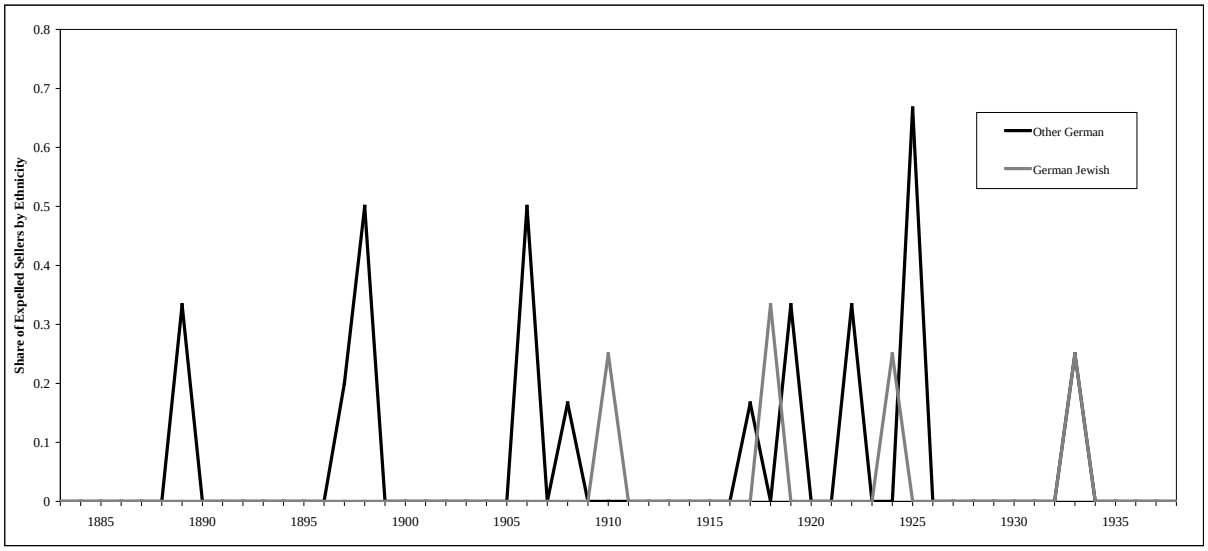
Notes: Data on names and election outcomes are collected at the archives of the NYSE. Names are matched to ethnicities by a commercial algorithm that uses linguistic rules and location-specific naming practices.

FIGURE 6 – ETHNIC COMPOSITION OF THE COMMITTEE OF ADMISSIONS



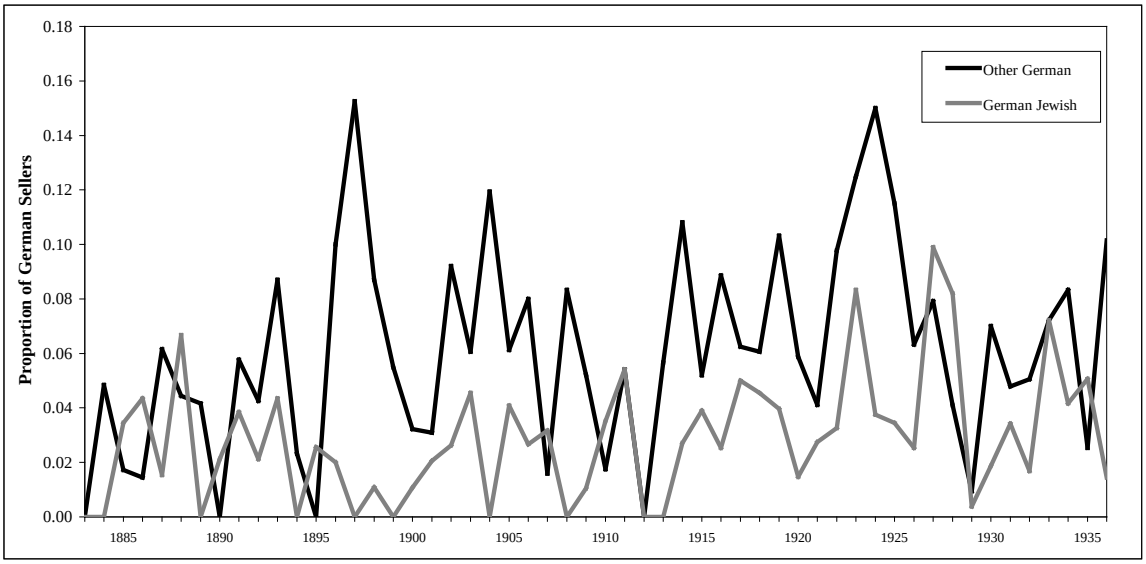
Notes: The Committee of Admissions had 15 members, whose names are drawn from the *Minutes* of the Committee of Admissions (1904), Francis Eames (1894), and the *New York Stock Exchange Directory*. Members are matched to ethnicities by a commercial algorithm that uses linguistic rules and location-specific naming practices; this information was supplemented with information from obituaries in the *New York Times* and census records.

FIGURE 7 – EXPULSIONS FROM THE NYSE, 1883 TO 1936



Notes: Names of expelled members are collected from annotations in the ledgers of transactions at the NYSE archives. German and Jewish members are identified by a commercial algorithm that uses linguistic rules and location-specific naming practices. German Jews are distinguished from other Jews using passenger lists of immigrant ships that arrived at the port of New York between 1850 and 1950 (available at ancestry.com).

FIGURE 8 – SELLERS OF NYSE SEATS, 1883 TO 1936



Notes: Sellers' names are collected from the ledgers of transactions at the NYSE archives. German and Jewish members are identified by a commercial algorithm that uses linguistic rules and location-specific naming practices. German Jews are distinguished from other Jews using passenger lists of immigrant ships that arrived at the port of New York between 1850 and 1950 (available at ancestry.com).