

**MINORITIES AND THE NEW YORK STOCK EXCHANGE:  
DISCRIMINATION AND NETWORK EFFECTS**

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## Introduction and Motivation

Throughout history, discrimination has occurred against minorities. From the poor treatment of the Native Americans by the colonists to the interment of Japanese-Americans during World War II, ethnic preconceptions and stereotypes cause animosity towards minority ethnic groups. By studying the membership records of the New York Stock Exchange from 1883 to 1974, a period during which a large number of immigrants came to the shores of the United States, I seek to answer the question of whether minorities were discriminated against while trying to become members of the Stock Exchange, as such discrimination would provide barriers to entry to the world of finance, as membership is required for trading securities, a vital practice for any large financial institution or brokerage. I also look for evidence of network effects through transfers of seats, that could potentially be used to circumvent discrimination.

Jacob Riis' seminal book, How the Other Half Lives, captured the attitudes towards minorities during the early twentieth century, a period this study covers. Remarking on various ethnicities, Riis noted, "the Italian and the poor Jew rise only by compulsion... The Irishman's genius runs to public affairs rather than domestic life; wherever he is mustered in force the saloon is the gorgeous center of political activity. The German struggles vainly to learn his trick; his Teutonic wit is too heavy."<sup>1</sup> The popularity of Riis' novel and the attitudes displayed within show what was thought of minorities of New York during the late nineteenth and early twentieth century. Studying the New York Stock Exchange data provides a unique test of discrimination to see whether such attitudes towards minorities permeated the New York Stock Exchange.

Using the New York Stock Exchange data over a period of 91 years can also show the change in the treatment of ethnic groups over time. Membership in the New York Stock Exchange is a necessary position in the world of finance, as membership entails "access to the NYSE... (i.e., only members are actually allowed to trade securities on the exchange floor)."<sup>2</sup> The responsibilities of a trader include buying and selling securities on behalf of clients, or for the trader's own company. Large financial institutions and brokerage houses become members of the Stock Exchange so that they can execute client orders without having to go through a middle man, who would presumably charge a fee for his services. The right to trade is the most important motivation behind becoming a member of the Stock Exchange. The number of seats is constant at 1,366 and has been since 1953. A major expansion of seats occurred in 1929, when

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<sup>1</sup> Riis, Jacob. How the Other Half Lives, New York: C. Scribner's & Sons, 1903, pg. 25

<sup>2</sup> Bradley, Edward and Richard Teweles. The Stock Market. New York: John Wiley & Sons, 1998, pg. 133

all existing member were given quarter seat dividends, effectively increasing the number of seats from 1,100 to 1,375. There is an open market in the sale of seats, as they are classified as “personal salable property.”<sup>3</sup> However, an attempt to become a member still requires that a certain set of membership criteria be met, including sponsorship by two current members, no history of felonies or violations of securities law, and, as the New York Stock Exchange notes, “high standards of personal and financial integrity.”<sup>4</sup> The Committee on Admissions reviews each application, and can choose to reject it, if the prospective member does not match the committee’s standards of “integrity.” Testing the effect of ethnicity on the membership of the New York Stock Exchange acts as a barometer towards the penetration of ethnic groups into commercial and financial sectors, as any firm would need membership to execute trades and attract clients. Negative discrimination would essentially act as a barrier to entry to the financial sector for minorities, creating exclusivity and limiting the number of minorities. Also, due to the component of application review by the Committee on Admissions during the membership process, using the New York Stock Exchange data may help reflect larger societal attitudes towards ethnicities.

I find three main results related to my hypothesis on discrimination and network effects. During the rise of the Nazi party in Germany and World War II, Jewish buyers pay less, on average, than other ethnicities. During World War I, German buyers are much more likely to have potential transactions rejected by the Committee on Admissions, while Jewish buyers are more likely to be rejected by the Committee of Admissions while attempting to buy a seat. Also, German and Jewish buyers are much more likely to have intra-ethnic nominal transactions, or transfers of seats. These results suggest taste-based discrimination in the Stock Exchange until the end of World War II. Exogenous events such as World War I and World War II, which have no effect on the trading ability of German members, cause shifts in preferences as can be evidenced by price differentials and the increased likelihood of rejection. In the case of the first World War, buyers of German origin, a war enemy of the United States, are much more likely to be rejected; while in the case of the rise of the Nazi party and the persecution of Jewish people, Jewish buyers pay, on average, 5% less for seats, showing that the events leading up to World War II are associated with a shift in preferences in favor of Jewish buyers. Also, the analysis of nominal transactions leads to the conclusion that there are strong network effects between certain

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<sup>3</sup> Bradley and Teweles, pg. 116

<sup>4</sup> New York Stock Exchange website.

<<http://www.nyse.com/Frameset.html?displayPage=/glossary/1042235995786.html>>

minorities, indicating that this may be a way to circumvent any existing discrimination. These three results show that the Stock Exchange reflected societal attitudes towards ethnicities, with certain ethnicities suffering more due to pervasive preconceptions.

### Previous Literature

There has been an enormous amount of discussion regarding discrimination in economic literature. Becker (1957) introduces a preference based model of discrimination, in which preferences regarding race or gender enter into utility functions of employers in the scenario of a labor market, for example. Discrimination is associated with tastes, and if there were enough non-discriminating employers discrimination would disappear. Most economic studies, however, focus on a model of statistical discrimination, developed by Phelps (1972) and Arrow (1973). This model is based on the differential reliability of ability and performance indicators among separate groups, causing discrimination through the quality of indicators, rather than through utility preferences. Race and gender can be used as these indicators, as Aigner and Cain (1977) note, using the specific example of race, “In light of known premarket discrimination against blacks, the assumption by employers of unequal average abilities is realistic.”<sup>5</sup> In this example, preconceived notions about certain ethnicities are used by employers as evidence of ability. Recent work on discrimination has included Bertrand and Mullainathan (2004), which used an experimental design to test discrimination in the labor market. Assigning ethnic-sounding names to resumes, Bertrand and Mullainathan found that African-American names received fewer call-backs for employment positions, implying different treatment by race. A recent study by Levitt (2003) on discrimination in the television show *The Weakest Link*, shows evidence of statistical discrimination against Hispanic competitors because of perceptions of lower ability, as well as preference based discrimination against elder contestants. Levitt analyzed the voting practices of competitors who voted each other off at the end of each competition, and found no evidence of discrimination against women and African-Americans. Considering that all the competitors have comparable ability, the evidence of discrimination against Hispanic competitors is surprising.

Analysis of the New York Stock Exchange seat prices has been mainly done through the view of the seat as a capital asset which reflects sentiments regarding future expectations of the

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<sup>5</sup> Aigner, Dennis J and Glenn Cain. “Statistical Theories of Discrimination in Labor Markets.” Industrial and Labor Relations Review, January 1977, 30(1), pg. 185

market. Keim and Madhavan (2000) find that increased trading in seats is associated with lower volatility of the S&P 500 index. Davis, Neal, and White (2003) analyze the effect of the quarter dividend of 1929 on seat prices. The quarter dividend was a one time dividend that gave all members an extra quarter of a seat in an effort to increase the membership seats on the stock exchange, as demand was high after the economic boom of the 1920's. Employing a generalized autoregressive conditional heteroskedasticity model, Davis, Neal and White find that monthly volume and the level of the Dow Jones Industrial Average determine significant components of seat prices. They also note that the quarter dividend increased the value of the New York Stock Exchange in expectation of increased efficiency, as well as the opportunity by members to make personal gains off sales.

This paper examines another component of seat prices other than their predictive power or the effect of volume traded on the stock exchange. Using fixed effects estimators, I wish to determine the relationship between stock prices and ethnicities, taking on a completely different approach than previous work done. The role of this research is also different – while previous work on seat prices has attempted to answer the relationship between seat prices and market sentiment – this research wishes to answer whether seat prices acted as barriers to entry into the financial world for minorities. This analysis combines work on discrimination and seat prices, answering questions separate from the ones that Keim and Mudhavan & Davis, Neal, and White attempted to answer.

### Theoretical Model

Two types of models deal with discrimination: models of taste-based discrimination, in which certain groups are preferred over other ones, such as those developed by Becker (1957); and a model of statistical discrimination, in which differential indicators of ability drive discrimination, such as the one developed by Aigner and Cain (1977). In the context of the New York Stock Exchange, the taste-based model of discrimination seems a more natural method of approaching the problem, because attitudes towards certain groups and their presence on the exchange would be best ascertained by the preferences and views of existing members. There are no strict prerequisites or tests of ability required for successful membership in the Exchange, making the model of statistical discrimination not as relevant in this case. Taste-based discrimination can be tested through the existence of price differentials, as the less preferred

group would have to pay a higher price, or in a labor market scenario, the less preferred group would be paid a lower wage. The higher price (or lower wage) arises from the fact that less preferred groups must compensate for the loss in utility by an employer.

One criticism of the taste-based model of discrimination is the fact that discrimination can be competed away by non-discriminating agents, especially in competitive markets, sometimes making it hard to quantify the discrimination. However, in the case of the New York Stock Exchange, there is only one firm to consider, and the Committee on Admissions can choose to reject an application during review for any reason.

### Data Description

The data set comes from the New York Stock Exchange and records buyer and seller transactions from 1883 to 1974. The data set contains buyer and seller names, the date of the transaction, the price paid, the type of transaction, and the outcome. There can be two types of transactions: a regular transaction or a nominal transaction, where a seat is transferred to the potential member for a nominal price. This usually occurs between families or as a result of the execution of wills and can include intra-firm transfers of a seat. There are also two outcomes: the Committee on Admissions can either accept or reject the transaction. All the prices are normalized to year 2000 prices obtained using a GDP deflator.<sup>6</sup> As an example, \$1 from 1930 would be worth \$8.67 in 2000. This is a time series data set, with observations across weeks. The Committee on Admissions only used to meet once a week, and so the date of the transaction is noted as this date.

The buyer and seller names were matched to ethnicities using a process by List Service Direct, Inc. (LSDI), a marketing company that specializes in matching names to specific ethnicities, using a variety of factors. Out of 9750 transactions, 85.5% of the buyer names were matched by LSDI, while 85.2% of the seller names were matched. The ethnic coding system used by LSDI combines the use of unique first names with a dictionary of ethnic last name. The unique first names imply that each name has a distinct ethnicity associated with it. Beyond that, LSDI uses linguistic and geocentric rules, as well as specific suffix and prefix rules to find the ethnicity and religious identity of a name. If a first name, such as Anthony, can belong to more than one ethnicity, then LSDI uses the last name as well as the linguistic rules of prefixes and

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<sup>6</sup> “Economic History Resources – What was the GDP Then?” <<http://www.eh.net/hmit/gdp/>>

suffixes to find the specific ethnicity of the name, instead of relying on a first name that could belong to numerous ethnicities. For example, Italian origin surnames ending in “Dda” or “Ddo” would mean a person is originally from Sardinia. These Sardinian surnames then would easily be categorized as Italian. Such rules make it easier to match names to ethnicities.<sup>7</sup>

The main advantage that arises from using unique first names, as well as linguistic rules, is that each name can only have one ethnicity match. However, various biases may arise. Firstly, LSDI uses current census data to find out the proportion of certain ethnicities in a given location. This would be a problem in historical data sets, as current census data would be applied in the coding system. However, since the data set given to the company did not specify a location, this is not a factor to worry about. Secondly, LSDI mainly provides services to marketing companies that wish to make use of ethnic and religious data to provide targeted services and ads to consumers. Because of its role as a service provider to marketing companies, LSDI may focus more on implied income differences due to ethnicity, and thus may have more accurate estimates for groups of ethnicities that have higher wages, rather than focusing on a specific ethnic group, creating measurement error. The third source of bias can be the fact that immigrants may change their last names to assimilate and integrate into society better.<sup>8</sup> This would obviously cause us to underestimate the number of minorities in the data, since they would give up their ethnically identifying names in favor of more common names that favored assimilation into society.

Table 1 presents the summary statistics for the data set. The statistics are grouped into the time periods of interest: 1883-1913, 1914-1918, 1919-1929, 1929-1933, 1933-1945, and 1946-1974. The final column presents statistics for the combined period covering the data set, 1883-1974. The percentages of buyer ethnicities are presented, as well as the minimum, mean, and maximum price paid for a seat during each period. The bottom rows present the number and percentage shares of nominal and rejected transactions, and the final row presents the average weekly S&P 500 returns.

As can be seen from the table, the percentage of English buyers, the majority on the Exchange, declines over time, from a maximum of 49.79% in 1883-1914, to only 29.18% in 1946-1974. The ethnic composition of buyers is increasing over time, as is evident by the example of Irish buyers, who constitute only 5.42% of the buyers from 1883-1914, and 13.55%

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<sup>7</sup> List Service Direct, Inc. website. <[http://listservicedirect.com/ethnic\\_religious.html](http://listservicedirect.com/ethnic_religious.html)>

<sup>8</sup> Smith, Marian L. “American Names / Declaring Independence.” <<http://uscis.gov/graphics/aboutus/history/articles/NameEssay.html>>

from 1946-1974. Similarly, Jewish buyers only constitute 9.24% of the sample in 1883-1913, but are 12.95% of the sample in 1946-1974.

The middle rows give statistics on prices paid for seats. Prices rose in value from 1883, when the highest price for a seat in nominal terms was \$30,000, reaching a peak in the 1929-1933 period, which coincided with the quarter dividend. In nominal terms, the highest price paid in this period was \$625,000. After the fall of prices during the Great Depression, prices began to rebound during the late 1960's, reaching highs of \$450,000 in 1967, as can be seen in Figure 2. The average real price for the whole data set was \$1,231,231. Currently, a seat sells for around \$2,400,000.<sup>9</sup>

The bottom rows give the statistics of nominal and rejected transactions. Only 131 transactions out of the sample of 9,750 were rejected, and 39% of these rejected transactions occur between 1883 and 1913. On the other hand, there are 2,143 nominal transactions, with such transactions increasing over time. This may occur as larger firms become members of the Stock Exchange, bringing about a need to have more intra-firm transfers of seats.

The final row gives the average of the weekly S&P 500 returns for all the time periods. As we can see, the average returns are increasing over time, with the notable exception of World War I (1914-1918). The average weekly returns for the whole sample are 0.433%.

### Econometric Models

There are three analyses done in this paper to examine the effect of ethnicity on membership. The first analysis examines the effect of ethnicity on the price of seats, while the last two analyses use logit probability models to examine the effect of ethnicity on the probability of being rejected or having a nominal transaction.

#### *Fixed Effects Model*

The first analysis examines the effect of ethnicity on prices. The Committee on Admissions met once a week to review potential members, so we have a number of observations per week. On average, there are 2.4 observations per week and the maximum number of observations is 60. As this is a time-series data set, using OLS would cause problems with serial

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<sup>9</sup> New York Stock Exchange website.  
< <http://www.nyse.com/Frameset.html?displayPage=/press/1022834145706.html> >

correlation. This is especially true because seat prices are related to the profitability of the market, and including weekly S&P 500 returns would cause serial correlation. Using a fixed effects estimator would get rid of this issue, as any fixed effect across a week, such as the S&P 500 returns, would be eliminated. If we take:

$$(1) y_{it} = \alpha_i + \beta X_{it} + u_{it}, t = 1, 2, \dots, T$$

$$(2) \bar{y}_i = \alpha_i + \beta \bar{X}_i + \bar{u}_i$$

where  $y_{it}$  signifies the log of seat price and  $X_{it}$  is a set of covariates, and (2) is the average over time of (1), then subtracting (2) from (1) yields:

$$(3) \check{y}_{it} = \beta \check{X}_{it} + \check{u}_{it}$$

where (3) is the fixed effects estimator across  $t$ . In this case,  $t$  is 1 week, so (3) would be the weekly fixed effects estimator, with  $\alpha_i$ , the weekly fixed effect subtracted away. One of the assumptions of the fixed effects estimator is that each variable in the vector  $X_{it}$  changes over time. As was noted earlier, this assumption is true because the ethnic composition of the buyers is changing over time. From Table 1, we also see that other control variables, such as the S&P 500 returns, are also changing over time.

### *Logit Model*

The second and third approach employs logit regressions. A logit regression is a binary response model that overcomes the limitations of the traditional linear probability model, in which the fitted results can be less than 0 or greater than 1. A logit model takes the form:

$$(4) P(z = 1 | X) = F(\alpha + \beta X)$$

where  $z$  is the outcome, such as a transaction being rejected or being nominal,  $\alpha$  is a fixed effect, and  $X$  is a set of covariates.  $F(x)$  is the logistic function:

$$(5) \frac{e^x}{1 + e^x}$$

A fixed effects technique can be applied to (4), as is done by Freeman (1978)<sup>10</sup>, by taking the difference between time periods, which results in a multinomial model when there are more than

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<sup>10</sup> See Freeman, Richard B. "A Fixed Effect Logit Model of the Impact of Unionism on Quits." NBER Working Paper 280, for a more detailed explanation.

two time periods. By using this fixed effects logit model, we can test the effect of ethnicity of probability of positive outcomes for both rejected and nominal transactions.

The logit estimator gives us  $P(z = 1 | X)$ , which is a conditional probability. To find the joint probability of  $z$  and  $X$  occurring, we can use Bayes' rule:

$$(6) P(z | X) P(X) = P(z \& X)$$

This would give us the true probability of being a rejected buyer of a certain ethnicity since we remove the conditional statement.

## Empirical Results

### *Fixed Effects Results*

The first analysis consists of fixed effects estimates of the association between ethnicity and the log of seat price. To test the change in the hypothesized discrimination, many event and ethnicity interactions are used, to test the effect of events such as the rise of the Nazi party in Germany or World War I on prices charged to buyers of German ethnicities. These interactions allow us to test for the effect of exogenous events, such as the rise of the Nazi party (to continue the example), on discrimination, and whether these shocks caused a change in preferences regarding German buyers. Table 2 presents the fixed effects estimates of ethnicity on the log of seat prices. Column 1 only includes the ethnicity variables and an interaction variable, which is a Bernoulli variable with a positive outcome whenever a buyer is the same ethnicity as the seller. Column 2 includes ethnicities interacted with the Great Depression, the rise of the Nazi party interacted with German and Jewish buyers and dummy variables for World War I, from 1914 to 1918, and World War II, from 1939 to 1945, interacted with buyers who have names originating from war enemy countries (Italy and Germany). Column 3 includes a pre World War I dummy interacted with ethnicities. Columns 4 and 5 mirror the regressions reported in columns 2 and 3, but include a dummy for the quarter dividend sales of 1929-1932 and ethnicity interactions rather than with the Great Depression. The quarter dividend was given to members right before the Great Depression, and sales of quarter seats lasted through the early 1930's, providing a positive relationship with the Great Depression variables. There were 1,056 quarter dividend sales, and a total of 1,597 transactions during the years of the Great Depression. Columns 2-6 also include ethnicity variables interacted with weekly S&P 500 returns. This is included partly to control for

the movement of seat prices with market returns, and also to see whether minorities were charged different prices when seats were more attractive.

The ethnicity dummies have no significant results across the different models run, other than Dutch and Jewish buyers. The Jewish buyer dummy is significant at 5% in columns 1 and 5, and is about 1% in magnitude. This means that on average, Jewish buyers paid around 1% less for seat prices. If a seat was selling for \$1,000,000, then Jewish buyers would pay \$10,000 less. Dutch buyers also pay 1% less on average, as can be seen from column 6. This result can be expected, as the Dutch are often recognized as being members of the New York elite, and it would not be surprising to see them receiving a discount. The most robust result throughout all the specifications is the discount Jewish buyers receive during the period of Nazi rule in Germany (1933-1945). On average, Jewish buyers pay 5% less, (or \$50,000 less for a seat selling for \$1,000,000) everything else held constant. This is significant at a 5% level in columns 2-5, and at a 10% level in column 6. In the framework of a taste based discrimination model, this price differential suggests that the effect of the Nazi persecution of Jewish people was a positive change in preferences towards Jewish buyers at the Stock Exchange. The coefficient on the quarter dividend dummy significant and positive throughout, consistent with the result of Davis, Neal, and White (2005), who find that the quarter dividend increased prices of membership seats.

The S&P 500 weekly returns and ethnic interactions are significant for German, Irish, and Jewish buyers. However, the results do not have a large effect on price once we consider the average S&P 500 weekly returns, which were 0.433% for the whole data set. If we take the S&P 500 Weekly Return \* Irish coefficient from column 2, then we see that the effect of multiplying the average return, 0.433%, by the coefficient, 0.41, would result in a price change of 0.18%, or a change of \$1800 for a seat price of \$1,000,000.

### *Logit Results*

The analyses of nominal and rejected transactions require the use of a fixed effects logit estimator. A rejected transaction can be viewed as a transaction with such a high price demanded that the buyer is unwilling to pay it. Under taste-based discrimination, the probability of rejection would be high for members of ethnicities that are not preferred by existing members; this would be analogous to demanding an extremely high price to compensate for the disutility of

having a member of this ethnicity on the Exchange. The large concentration of rejected transactions during 1883-1913 may provide accurate estimates of discrimination during this period as any result would reflect the attitudes of the Committee on Admissions. Table 3 presents the estimates of the fixed effects logit regressions with rejected transactions as the binary outcome. Column 1 presents the estimates of ethnicities and the buyer seller ethnicity interaction, while Column 2 adds the S&P 500 Weekly returns interacted with ethnicities, the Nazi party interactions, and the World War I interaction. Column 3 adds the Great Depression interactions, and Column 4 adds the pre-World War I ethnicity interactions. Due to the small size of the data set, a regression model including both Great Depression and the quarter dividend interactions could not be run.

Columns 2 shows that German buyers are less likely to be rejected, with the estimate significant at a 10% level and the *ceteris paribus* estimate of rejection being with both estimates significant at a 10% level and the *ceteris paribus* estimate of the conditional probability of rejection being 20%. Using Bayes' rule, the probability of being a rejected German buyer is simply 20% multiplied by the proportion of German buyers in the sample, which is 10.6%. This makes the probability 2.12%. The World War I and German buyer interaction shows that German buyers were much more likely to be rejected during World War I, with a *ceteris paribus* estimate of the conditional probability of rejection being 95%, and the joint probability being 11.3%. This result is suggestive of taste-based discrimination, as the exogenous effect of World War I, which was not caused by, and should have no effect on the trading abilities of, German buyers, was an increase in the probability that such buyers were rejected by the Exchange. In the framework of taste-based discrimination, this would suggest that preferences had presumably changed to discriminate against them. Columns 1-4 also show that Jewish buyers were much more likely to be rejected. In Column 3 the *ceteris paribus* estimate of the probability of being rejected being 83.75%, with the coefficient for this estimate significant at a 5% level. The probability of being a rejected Jewish buyer is 7.5%. This result is surprising since the regressions on price show that Jewish buyers receive a slight discount, while this analysis shows that Jewish buyers were much more likely to be rejected.

Table 4 presents the logit regressions with nominal transactions as the dependent variable. The nominal transaction can be viewed as more in the light of network effects that can be used to circumvent discrimination. As network effects are now being measured, specific buyer and seller ethnicity interactions are included rather than the general interaction variable, to

capture the existence of network effects. Column 1 presents the estimates with the ethnicities and ethnicity buyer/seller matches, while Column 2 and 3 include the Great Depression interactions and pre-World War I interactions, respectively. Columns 4 and 5 mirror the regressions in Columns 2 and 3, except with the quarter dividend dummy and interactions instead of the Great Depression interactions. Columns 2-5 also include the interactions between the S&P 500 weekly returns and ethnicities.

In Column 1, it can be seen that German and Jewish buyers are less likely to take part in nominal transactions, while Scottish buyers are more likely to. The Jewish effect remains in columns 2, 4, and 5, and the Scottish effect remains in column 5. The German and Jewish result could be explained by a mix of hypothesized discrimination, as well as the low number of these ethnicities in the Stock Exchange. As there were not many members of these two ethnicities on the Stock Exchange, there may have been a limit on the number of nominal transactions they could participate on. From columns 2-5, we can see that the buyer seller ethnicity match for both German and Jewish buyers is significant. The German interaction is significant at 1% in columns 2-3, and at 5% in columns 4-5. In column 3, the *ceteris paribus* estimate of the conditional probability of participating in a nominal transaction conditional on having a German seller and buyer is 77%, while the joint probability is 1.1%, as calculated from Bayes' rule. The Jewish interaction is significant at 5% in columns 2-3, and at 10% in columns 4-5. In column 3, the *ceteris paribus* estimate of the conditional probability of participating in a nominal transaction given that there is a Jewish buyer and seller is 76%, and the joint probability is 0.8%. This means that the probability of a German buyer and seller entering into a nominal transaction was 1.1% and for a Jewish buyer and seller it was 0.8%. German buyers and sellers were also 77% more likely to enter into nominal transactions than other ethnicities, all else equal; Jewish buyers were 76% more likely to enter into nominal transactions than other ethnicities, all else equal. Through these nominal transactions, Jewish and Irish buyers may have been able to circumvent discrimination through higher probabilities of rejection, or been able to build their presence in the Stock Exchange gradually, increasing their presence through nominal transfers. As expected, the quarter dummy has a negative effect on nominal transactions. This is because the gains from sales were more attractive during this period because of artificially higher prices, increasing rents for members who chose to sell, especially in light of the future market crash and the subsequent decline in seat prices.

## Conclusion

Using the New York Stock Exchange transaction data from 1883-1974, I estimate the effect of ethnicity on becoming a member of the New York Stock Exchange through three measures: seat prices charged, the number of rejected transactions, and the number of nominal transactions. I find that any evidence of price discrimination occurs during periods of exogenous events, such as World War I and World War II, and there seems to be no evidence of systematic discrimination with regards to price differentials. However, the pool of rejected observations shows evidence of discrimination towards Jewish buyers and German buyers during World War I. This result is the most suggestive of taste based discrimination, as it shows that the Committee on Admissions, the review board of the Stock Exchange, had a significantly higher probability of rejecting Jewish and German buyers. I also find that during the rise of the Nazi party in Germany and World War II, Jewish buyers receive a 5% discount, on average, on membership seats. Also, there is strong evidence of network effects between German buyers and sellers and Jewish buyers and sellers. It was highly likely for these groups to enter into nominal transactions, effectively keeping seats within a given ethnicity. This may have been a method to ensure entrance of minorities into the Stock Exchange while circumventing discrimination, highlighting the importance of “network effects” in this scenario.

The results from the models estimated for rejected transactions show a different result regarding discrimination than do the price differentials. Jewish buyers are much more likely to be rejected, compared to other ethnicities, yet the regressions on price show these buyers receiving discounts on seat prices. This may occur because the rejected transactions are concentrated in an earlier period and may reflect attitudes that changed over time.

This study shows that the effects of discrimination existed on the Stock Exchange, but that such discrimination may not have been systematic but associated more with certain events. This is an interesting result as it highlights the impact of certain events, while showing that, on average, minorities were not charged higher prices. A natural extension of this study would be to examine the relationship between the ethnic composition of New York and the ethnic composition of the Stock Exchange, looking for the relative penetration of minorities at the Stock Exchange, and construct regressions that measured large increases in immigration, to see if there were any potential discriminatory backlashes against minorities.

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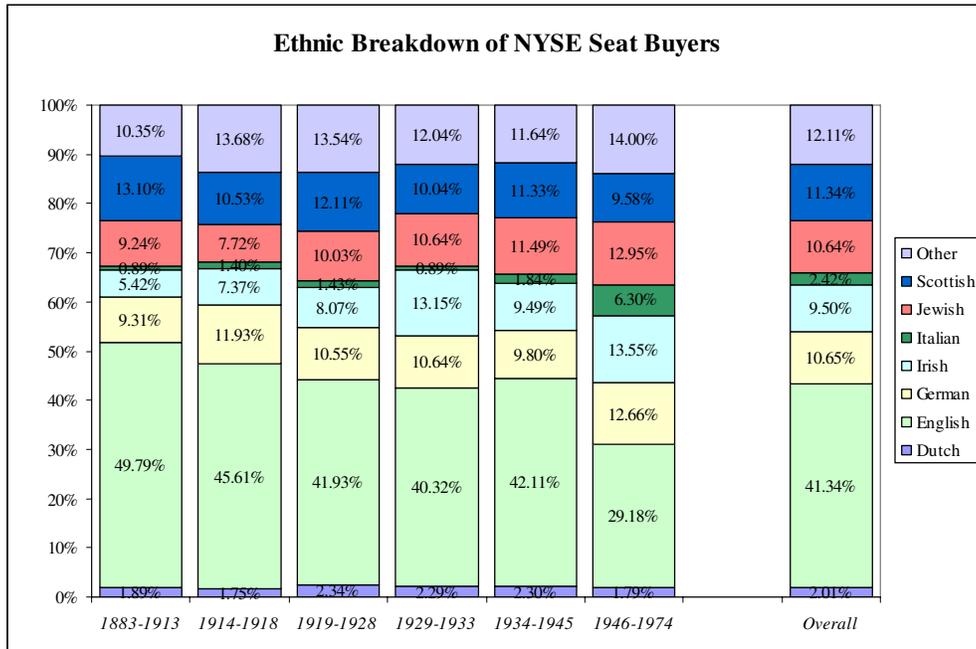
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TABLE 1 – SUMMARY STATISTICS OF NEW YORK STOCK EXCHANGE DATA

<i>Year</i>	1883-1913	1914-1918	1919-1928	1929-1933	1934-1945	1946-1974	1883-1974
Dutch	1.89%	1.75%	2.34%	2.29%	2.30%	1.79%	2.01%
English	49.79%	45.61%	41.93%	40.32%	42.11%	29.18%	41.34%
German	9.31%	11.93%	10.55%	10.64%	9.80%	12.66%	10.65%
Irish	5.42%	7.37%	8.07%	13.15%	9.49%	13.55%	9.50%
Italian	0.89%	1.40%	1.43%	0.89%	1.84%	6.30%	2.42%
Jewish	9.24%	7.72%	10.03%	10.64%	11.49%	12.95%	10.64%
Scottish	13.10%	10.53%	12.11%	10.04%	11.33%	9.58%	11.34%
Other	10.35%	13.68%	13.54%	12.04%	11.64%	14.00%	12.11%
Lowest Price Paid	\$197,368	\$453,704	\$528,455	\$386,847	\$150,709	\$213,816	\$150,709
Average Price Paid	\$703,505	\$715,322	\$1,278,044	\$3,269,297	\$655,543	\$696,351	\$1,231,231
Highest Price Paid	\$1,666,667	\$1,043,724	\$5,042,373	\$5,221,387	\$3,297,759	\$2,067,443	\$5,221,387
Nominal Transactions	356	61	147	301	266	1012	2143
	12.71%	21.40%	19.14%	22.23%	40.74%	50.22%	27.21%
Rejected Transactions	51	12	13	19	2	-	97
	1.82%	4.21%	1.69%	1.40%	0.31%	-	1.23%
<i>Observations</i>	2802	285	768	1354	653	2015	7877

*Notes:* Ethnic origins of names determined by the ethnic coding system List Service Direct Inc. (LSDI). Transaction data from New York Stock Exchange Archives. All Prices are expressed in terms of year 2000 \$.

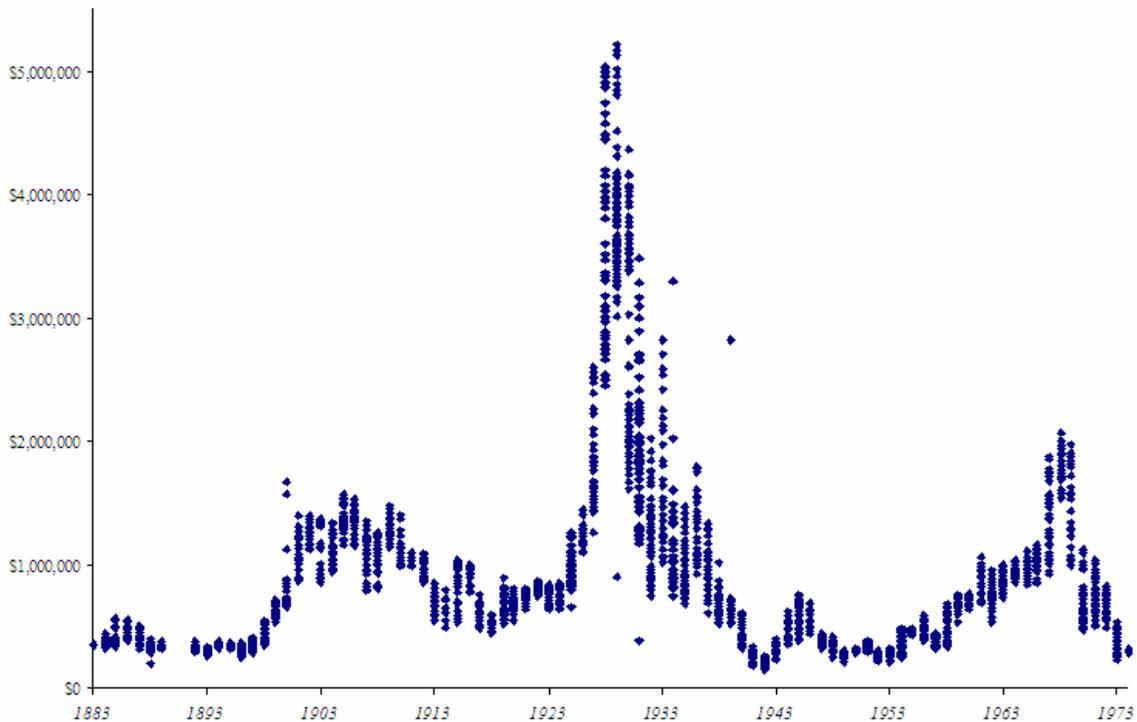
FIGURE 1 - ETHNIC COMPOSITION OF NEW YORK STOCK EXCHANGE MEMBERSHIP SEAT BUYERS



Notes: Data comes from New York Stock Exchange Transaction Records. Ethnic matches come from ethnic coding system of List Service Direct, Inc. (LSDI)

FIGURE 2 - NEW YORK STOCK EXCHANGE MEMBERSHIP SEAT PRICES, 1883-1974

Price of New York Stock Exchange Seats, 1883-1974



Notes: Information on prices comes from New York Stock Exchange Transaction Records.

TABLE 2 – EFFECT OF ETHNICITY ON SEAT PRICES

<i>Dependent Variable: Log Seat Price</i>						
	(1)	(2)	(3)	(4)	(5)	(6)
Dutch	-0.003 [0.003]	-0.007 [0.005]	-0.006 [0.005]	-0.001 [0.005]	-0.004 [0.005]	<b>-0.013</b> <b>[0.007]+</b>
German	0.001 [0.008]	0.002 [0.012]	0.014 [0.018]	0.001 [0.012]	0.011 [0.018]	0.013 [0.018]
Irish	-0.004 [0.003]	0.002 [0.004]	0.01 [0.006]	-0.004 [0.003]	-0.007 [0.006]	0.01 [0.006]
Italian	-0.005 [0.003]	-0.001 [0.004]	0.004 [0.007]	-0.001 [0.004]	0 [0.006]	0.003 [0.007]
Jewish	<b>-0.008</b> <b>[0.003]*</b>	-0.001 [0.004]	0 [0.006]	-0.005 [0.004]	<b>-0.011</b> <b>[0.006]*</b>	-0.001 [0.006]
Scottish	-0.011 [0.007]	-0.004 [0.009]	-0.013 [0.013]	-0.006 [0.008]	-0.017 [0.012]	-0.014 [0.013]
Buyer/Seller Ethnicity Interaction	0.002 [0.005]	0.002 [0.005]	0.002 [0.005]	0.002 [0.005]	0.002 [0.005]	0.004 [0.005]
World War I * German	-	-0.007 [0.016]	-0.011 [0.016]	-0.007 [0.016]	-0.009 [0.016]	-0.011 [0.016]
NSDAP * German	-	0.019 [0.024]	0.018 [0.024]	0.013 [0.024]	0.01 [0.025]	0.016 [0.025]
NSDAP * Jewish	-	<b>-0.055</b> <b>[0.023]*</b>	<b>-0.054</b> <b>[0.023]*</b>	<b>-0.057</b> <b>[0.023]*</b>	<b>-0.051</b> <b>[0.023]*</b>	<b>-0.044</b> <b>[0.023]+</b>
S&P 500 Weekly Returns * Dutch	-	<b>-0.527</b> <b>[0.315]+</b>	-0.5 [0.315]	-0.527 [0.317]	-0.507 [0.318]	-0.5 [0.314]
S&P 500 Weekly Returns * German	-	<b>-0.197</b> <b>[0.113]+</b>	<b>-0.195</b> <b>[0.114]+</b>	<b>-0.194</b> <b>[0.114]+</b>	<b>-0.19</b> <b>[0.115]+</b>	<b>-0.191</b> <b>[0.115]+</b>
S&P 500 Weekly Returns * Irish	-	<b>0.41</b> <b>[0.130]**</b>	<b>0.41</b> <b>[0.130]**</b>	<b>0.418</b> <b>[0.130]**</b>	<b>0.413</b> <b>[0.130]**</b>	<b>0.463</b> <b>[0.129]**</b>
S&P 500 Weekly Returns * Italian	-	0.304 [0.553]	0.235 [0.556]	0.284 [0.554]	0.239 [0.557]	0.208 [0.550]
S&P 500 Weekly Returns * Jewish	-	<b>-0.241</b> <b>[0.113]*</b>	<b>-0.238</b> <b>[0.113]*</b>	<b>-0.246</b> <b>[0.114]*</b>	<b>-0.25</b> <b>[0.114]*</b>	<b>-0.317</b> <b>[0.113]**</b>
S&P 500 Weekly Returns * Scottish	-	-0.063 [0.114]	-0.069 [0.114]	-0.031 [0.113]	-0.031 [0.113]	-0.178 [0.114]
PreWWI * Ethnicities	No	No	Yes	No	Yes	Yes
Quarter Dummy	No	No	No	Yes	Yes	Yes
Quarter Dummy * Ethnicities	No	No	No	Yes	Yes	Yes
Great Depression * Ethnicities	No	Yes	Yes	No	No	Yes
<i>Observations</i>	5922	5264	5264	5264	5264	5264

*Notes:* Each column reports results from a weekly fixed effects regression where the dependent variable is the log of the seat price. The regressions are run on the New York Stock Exchange Data Set with the ethnic name matches by LSDI, from 1883-1934. The pre-World War I dummy is from 1883-1913, the World War I dummy is from 1914-1918, the Great Depression dummy from 1929-1933, the NSDAP (Nazi Party) dummy from 1933-1945, and the Quarter Dummy for all quarter dividend transactions. + significant at 10% level; \* significant at 5% level; \*\* significant at 1% level

TABLE 3 – EFFECT OF ETHNICITY ON PROBABILITY OF REJECTION

<i>Dependent Variable: Rejected Transactions</i>				
	(I)	(II)	(III)	(IV)
Dutch	-0.228 [0.703]	-0.033 [0.762]	0.069 [0.778]	-0.714 [1.350]
German	-0.257 [0.501]	<b>-1.385</b> <b>[0.804]+</b>	-1.178 [0.805]	-0.769 [1.765]
Irish	-0.614 [0.602]	-1.103 [0.758]	-0.61 [0.856]	-1.632 [1.269]
Italian	1.045 [0.959]	0.943 [1.029]	1.808 [1.744]	-14.64 [3,328.833]
Jewish	<b>0.969</b> <b>[0.431]*</b>	<b>1.523</b> <b>[0.619]*</b>	<b>1.64</b> <b>[0.652]*</b>	<b>1.983</b> <b>[0.877]*</b>
Scottish	0.603 [0.456]	0.8 [0.485]	0.658 [0.568]	1.238 [0.742]
Buyer/Seller Ethnicity Interaction	-0.099 [0.713]	-0.062 [0.809]	0.007 [0.837]	-0.302 [0.865]
World War I * German	-	<b>3.177</b> <b>[1.638]+</b>	<b>2.945</b> <b>[1.620]+</b>	2.639 [2.191]
NSDAP * German	-	15.946 [1,361.369]	18.059 [4,463.789]	15.824 [1,752.916]
NSDAP * Jewish	-	-0.3 [1.527]	-0.072 [1.645]	-0.575 [1.626]
S&P 500 Weekly Returns * Ethnicity	No	Yes	Yes	Yes
PreWW1*Ethnicity	No	No	No	Yes
Great Depression * Ethnicity	No	No	Yes	No
<i>Observations</i>	<i>441</i>	<i>416</i>	<i>416</i>	<i>416</i>

*Notes:* Each column reports results from a weekly fixed effects logit regression where the dependent variable is the rejected transactions dummy. The regressions are run on the New York Stock Exchange Data Set with the ethnic name matches by LSDI, from 1883-1934. The World War I dummy is from 1914-1918, the Great Depression dummy from 1929-1933, the NSDAP (Nazi Party) dummy from 1933-1945, and the Quarter Dummy for all quarter dividend transactions. + significant at 10% level; \* significant at 5% level; \*\* significant at 1% level.

TABLE 4 – EFFECT OF ETHNICITY ON NOMINAL TRANSACTIONS

<i>Dependent Variable: Nominal Transactions</i>					
	(I)	(II)	(III)	(IV)	(V)
Dutch	-0.201 [0.344]	0.849 [0.621]	1.008 [0.893]	0.572 [0.508]	0.602 [0.653]
German	<b>-0.3</b> <b>[0.163]+</b>	-0.24 [0.249]	-0.33 [0.343]	-0.264 [0.229]	-0.353 [0.295]
Irish	-0.008 [0.154]	0.106 [0.267]	0.076 [0.321]	0.069 [0.238]	0.047 [0.271]
Italian	-0.047 [0.252]	-1.182 [0.799]	-1.27 [0.935]	<b>-1.295</b> <b>[0.759]+</b>	-1.279 [0.928]
Jewish	<b>-0.516</b> <b>[0.175]**</b>	<b>-0.581</b> <b>[0.258]*</b>	-0.618 [0.320]	<b>-0.546</b> <b>[0.247]*</b>	<b>-0.567</b> <b>[0.298]+</b>
Scottish	<b>0.405</b> <b>[0.154]**</b>	0.18 [0.216]	0.465 [0.300]	0.246 [0.206]	<b>0.542</b> <b>[0.274]*</b>
Dutch Buyer/Seller	12.068 [682.945]	-	-	-	-
German Buyer/ Seller	0.574 [0.350]	<b>1.179</b> <b>[0.448]**</b>	<b>1.206</b> <b>[0.453]**</b>	<b>1.126</b> <b>[0.447]*</b>	<b>1.169</b> <b>[0.456]*</b>
Italian Buyer / Seller	-0.27 [1.055]	1.685 [1.429]	14.74 [649.410]	2.02 [1.406]	15.611 [997.196]
Jewish Buyer / Seller	0.611 [0.346]	<b>1.089</b> <b>[0.439]*</b>	<b>1.161</b> <b>[0.453]*</b>	<b>1.195</b> <b>[0.447]**</b>	<b>1.222</b> <b>[0.457]**</b>
Scottish Buyer / Seller	0.192 [0.356]	0.428 [0.412]	0.463 [0.417]	0.424 [0.415]	0.467 [0.420]
NSDAP * German	-	0.84 [1.279]	0.934 [1.288]	0.883 [1.285]	1.113 [1.294]
NSDAP * Jewish	-	-0.408 [1.243]	-0.353 [1.239]	-0.564 [1.238]	-0.5 [1.246]
Quarter Dummy	-	-	-	<b>-2.317</b> <b>[0.409]**</b>	<b>-2.305</b> <b>[0.413]**</b>
Return Week * Ethnicities	No	Yes	Yes	Yes	Yes
PreWWI * Ethnicities	No	No	Yes	No	Yes
Great Depression * Ethnicities	No	Yes	Yes	No	No
Quarter Dummy * Ethnicity	No	No	No	Yes	Yes
WW2 * Italian	No	No	Yes	Yes	Yes
<i>Observations</i>	2555	1789	1789	1789	1789

*Notes:* Each column reports results from a weekly fixed effects logit regression where the dependent variable is the nominal transactions dummy. The regressions are run on the New York Stock Exchange Data Set with the ethnic name matches by LSDI, from 1883-1974. The pre-World War I dummy is from 1883-1913, the World War I dummy is from 1914-1918, the Great Depression dummy from 1929-1933, the NSDAP (Nazi Party) dummy from 1933-1945, and the Quarter Dummy for all quarter dividend transactions. + significant at 10% level; \* significant at 5% level; \*\* significant at 1% level