Discrimination, Social Risk, and Portfolio Choice*

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Abstract

This study examines whether social discrimination affects the risk perceptions and, subsequently, the investment decisions of individual investors. We conjecture that minority groups such as gays/lesbians, African Americans, and women, who are more likely to experience discrimination, over-estimate their risk exposures (i.e., they experience social risk) and invest more cautiously. Consistent with our conjecture, we find that minorities with high social risk participate less in the stock market and allocate a lower proportion of their wealth to risky assets. These results indicate that non-financial risks, such as social risk, influence financial risk-taking behavior of U.S. households.

Keywords: Stock market participation, asset allocation, perceived discrimination, perceived risk, social risk, household finance.

JEL classification: J15, J16, D14, G11

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1 Introduction

Social discrimination can have lasting adverse effects on personality, well-being, and the economic welfare of individuals (Becker Gary 1957; Arrow et al. 1973; Blau and Graham 1989; Chiteji and Stafford 1999). In particular, discrimination and negative stereotyping may generate vulnerability among certain minority groups and can make them feel socially marginalized. Minorities may also perceive that there is greater discrimination against them due to the history of discrimination. In either instance, social discrimination leads to distress, anxiety, and depression (Pascoe and Richman 2009; Purnell, Peppone, Alcaraz, McQueen, Guido, Carroll, Shacham, and Morrow 2012). Consequently, discrimination can affect the decisions of minorities.

Despite the strong evidence of discrimination, there is little work on how it affects portfolio decisions. To fill this gap, we examine a consequence of discrimination that has not be explored by the household finance literature, i.e., bias in risk perceptions. We conjecture that the experience of discrimination can make individuals cautious, which can cause them to perceive risk differently. Specifically, we hypothesize that discrimination amplifies risk perceptions and we call the difference between perceived risk and actual risk, social risk. Similar to objective income risk (Angerer and Lam 2009), we expect that social risk would make individuals less likely to own stocks and also invest less in risky assets. To study the impact of social risk on investment decisions, we consider three minority groups (i.e., gays/lesbians, African Americans, and women) since these groups are known to be perceptible to discrimination.

Given limited data, it is difficult to quantify the level of social risk perceived by individuals. Therefore, we construct two proxies for social risk related to discrimination. Our first proxy is based on a poll conducted by the Los Angeles Times (LATP). The 2004 LATP data set is unique because it focuses on opinions about gay rights and it includes infor-

mation on sexual orientation and ownership of stocks. To our knowledge, the 2004 LATP is the only survey that includes information on both sexual orientation and ownership of stocks. We conjecture that gays/lesbians who reported support for more pro-gay laws are more likely to have experienced discrimination. Based on this assumption, our first proxy for the level of social risk for gays/lesbians is based on their opinions about the strength of existing pro-gay laws.

Our second social risk proxy is from the 1979 National Longitudinal Survey of Youth (NLSY). We use the NLSY because it includes questions related to discrimination. Specifically, when the respondents were 14 to 22 years old, they were asked whether they felt discriminated at the workplace. These discrimination questions are our second social risk proxy. Specifically, we posit that women and African Americans who felt discriminated at a young age are likely to have the highest social risk. There should be a connection between social risk and teenage experiences because experiences early in life have been shown to have a significant effect on individual preferences later in life (Krosnick and Alwin 1989).

In our empirical analysis, we use these two social risk proxies (i.e., support for pro-gay laws or discriminated in early life) to test if the perception of discrimination affects portfolio decisions. Specifically, we estimate probit market participation and Tobit asset allocation regressions. In our regression analysis, to ensure that the social risk proxies do not reflect actual income risk, we control for education, income or wealth, and age. These demographic variables are known to be related to income risk. Moreover, because the NLSY is a panel, we directly account for income risk using the standard deviation of income growth. The LATP is not a panel and we cannot compute a direct measure of income risk. Therefore, for the LATP sample, we impute the standard deviation of income growth (i.e., income risk) using the NLSY sample.

Our empirical results show that social risk affects portfolio decisions. Specifically, in the

LATP sample, our regression estimates indicate that gays/lesbians who support pro-gay labor laws have a 40% lower chance of owning stocks. In the NLSY sample, women and African Americans who felt discriminated against have a 4% and 8% lower probability of participating in the stock market, respectively. In economic terms, the impact of social risk is comparable to the economic impact of actual income risk on portfolio decisions. For example, in the NLSY sample, a one-standard-deviation increase in actual income risk is associated with a 3.6% decrease in the stock-market participation rate.

Social risk also affects asset allocation decisions. In the NLSY sample, based on Tobit regressions, we find that women and African Americans who felt discriminated allocate significantly less of their wealth to risky assets. Our estimates suggest that the equity share of women (African Americans) who believe they faced high job discrimination is 2.3% to 4.3% (8% to 9.2%) lower than other women (African Americans).

In our next two tests, we use the NLSY data and provide some direct evidence to support our conjecture that minorities have heightened perceptions of risk. These tests are motivated by evidence that exposure to risky environments can affect risk perceptions (Thaler and Johnson 1990; Post, Van den Assem, Baltussen, and Thaler 2008; He and Hong 2015). Interpreting this evidence within our context, we conjecture that minorities might feel they are exposed to a risky social environment due to the increased risk of harassment and discrimination. Thus, minorities might be very risk averse. To test this hypothesis, we use the NLSY survey and create an excess risk aversion measure.

We define excess risk aversion as the difference between the individual's reported willingness to take a risky job and the average willingness of a peer group. The peer group is based on gender, race, and education. We create a triple interaction term among race/gender, discrimination, and the excess risk aversion measure. We add this triple interaction term in our probit and Tobit regressions and find that they have negative and statistically signifi-

cant estimates. This evidence suggests that individuals who face social risk have heightened risk perceptions, which affects their market participation and asset allocation decisions.

In our next test, we use low education as a proxy of living in a risky social environment since individuals with low education face the highest unemployment rates. For instance, the Bureau of Labor statistics reports that during the Great Repression in 2009, unemployment was the highest for individuals with less than a high school diploma (14.6%), followed by high school graduates (9.7%). Because of high unemployment risk, less educated individuals might perceive having greater social risk. To examine the joint effects of discrimination and low education, we create triple interaction terms among race/gender, discrimination, and low education. Consistent with our expectations, the low education terms have negative and statistically significant estimates in our probit and Tobit regressions.

In our final two tests, we focus on income risk and provide evidence that minorities may have biased beliefs about income risk. For this analysis, we use the Survey of Consumer Finances (SCF) and an experimental study that we designed. Based on information in the SCF we create a proxy of perceived income risk (PIR). The proxy takes the value of one for respondents who reported feeling that their current income is lower than normal and also report that they do not have a good idea of their income level. Conditional on proxies of actual income risk, we find that women and African Americans who have high perceived income risk (i.e., PIR = 1) participate less and allocate less of their wealth in risk assets.

Finally, we conduct an online experiment designed to directly assess the effects of discrimination on the perception of income risk. Specifically, we elicit individuals' future income expectations using hypothetical series of income histories. We also identify participants who feel discriminated against using survey questions. Controlling for individuals' demographic and career characteristics, as well as overall job satisfaction, we find that individuals who feel discriminated provide lower future earnings forecasts. This effect is

especially strong for minorities (i.e., gays/lesbians, women, and African Americans) and it is weak for white heterosexual males. These experimental findings confirm our conjecture that discrimination alters the perception of risk.

Collectively, our results suggest that a new source of risk, i.e., social risk, affects household portfolio choices. Specifically, gays/lesbians, women, and African Americans who are more likely to experience discrimination act as if they are exposed to excess income risk. This amplified perception of risk induces them to take on less financial risk.

These findings contribute to the broader literature on income risk and incomplete markets. Theoretical models find that investors with greater uninsurable risk should reduce their exposure to risky assets.[1] Empirical studies confirm that investors with high income risk participate less and allocate less of their wealth to risky assets.[2] Complementing this evidence, we show that social risk, like actual income risk, affects portfolio decisions.

Our work is related to a growing body of evidence that personal experiences affect economic decisions. Kaustia and Knüpfer (2008) find that IPO participation depends on past IPO returns. Benjamin, Choi, et al. (2010) demonstrate that ethnic social norms affect preferences. Malmendier and Nagel (2011) show that individuals who experienced the Great Depression participate less in the stock market. Malmendier and Nagel (2016) find that individuals use past experienced inflation to form their inflation expectations. Cronqvist, Siegel, and Yu (2015) show that experiencing the Great Depression affects the preferences of Swedish investors towards value and growth stocks. Addoum, Korniotis, and Kumar (2015) relate high-school experiences to financial decisions in adulthood. Life-time experiences also affect investment bankers (Oyer 2008), mutual fund managers (Greenwood and Nagel 2009), and CEOs (Malmendier, Tate, and Yan 2011; Schoar and Zuo 2011;

[1] See Pratt and Zeckhauser (1987), Kimball (1993), Bertaut and Haliassos (1997), Koo (1998, 1999) Elmendorf and Kimball (2000).

[2] See Aiyagari and Gertler (1991), Guiso, Jappelli, and Terlizzese (1996), Heaton and Lucas (2000), Angerer and Lam (2009).

Bernile, Bhagwat, and Rau 2016). Finally, life-time experiences can impact views about economic policies (Alesina and Fuchs-Schündeln 2007; Giuliano and Spilimbergo 2014). Compared to these studies, the novel feature of our work is to show that the financial decisions of minorities are affected by their experiences with discrimination which alters their risk perceptions.

Furthermore, our work is related to the literature on how traumatic experiences can affect risk taking and overall decision making. Blattman and Annan (2010) find that exposure to war violence has a strong effect on income while Callen, Isaqzadeh, Long, and Sprenger (2014) document a connection between war violence and risk preferences. Bogan, Just, and Wansink (2013) find that combat experience reduces the probability of veterans participating in the stock market. Similarly, it has been shown that experiencing natural disasters affects subsequent behavior (Eckel, El-Gamal, and Wilson 2009; Page, Savage, and Torgler 2014; Bernile, Bhagwat, and Rau 2016). Social discrimination is not as traumatic of an event as being in a war zone. However, it has enduring effects that impact minorities for the duration of their lives.

The rest of this paper is organized as follows. Section 2 discusses evidence related to minorities and discrimination. Section 3 describes our data sets. Section 4 describes our baseline results. Section 5 provides additional evidence while Section 6 concludes the paper.

2 Workplace Discrimination and Social Risk

The main focus of our study is how discrimination affects financial decisions. We conjecture that discrimination affects portfolio decisions not only because it can lead to lower wealth or higher income risk and job uncertainty. We argue that discrimination has a subtle, yet enduring effect: it can alter the way we perceive risks. In particular, we argue

that victims of discrimination have a heightened perception of income risk. To support this argument, we discuss some prior evidence on workplace discrimination of gays/lesbians, African Americans and women.

To begin with, there is ample evidence that African Americans are discriminated at the workplace. Specifically, discrimination affects expectations about future career prospects, employment opportunities and income growth. For example, the perceived barriers for successful future careers by African American adolescents are significant (Constantine and Kindaichi 2005). The African Americans Life Today survey (NPR, Robert Wood Johnson Foundation, and Harvard School of Public Health 2013) finds that one-third of African Americans have negative experiences due to racism. Many of them reported worrying about losing their job and not having comprehensive health insurance. These findings are consistent with the evidence that perceived discrimination is related to mental and physical health outcomes (Pascoe and Richman 2009).

There is also evidence of discrimination against gays/lesbians.[3] The Center for American Progress (Burns and Krehely 2011) reports that 15 to 43 percent of the gay people interviewed have been discriminated or harassed at the workplace. About 17 percent of them reported of being fired or not hired because of their sexual identity. Sears and Mallory (2011) report that in a 2009 survey more than half of the lesbian, gay, and bi-sexual individuals that were interviewed reported that their colleagues made derogatory comments related to sexual orientation. Gay people fear unfair pay, loss of employment and housing, as well as violence. These fears are especially strong in small rural communities with fewer legal protections (D'Augelli and Garnets 1995; DiPlacido 1998). The discrimination, violence, and social stigmatization faced by gays/lesbians can lead to excessive stress about the future (Herek 1991).

[3]See Brause (1989), Badgett (1995, 2003), Clain and Leppel (2001), Sears and Mallory (2014).

Finally, women still face workplace discrimination. For example, the gender wage gap has been a pervasive problem in the labor market (Blinder 1973; Becker 1985) and it was only in 2009 that the Lilly Ledbetter Fair Pay Act was passed in an effort to address wage differences between men and women. Women also have increased risk of sexual violence, abuse, and harassment from colleagues at the workplace (Saha 2015). For instance, recent testimonies released by the U.S. Equal Employment Opportunity Commission indicate that approximately one out of every four working women has experienced sexual harassment (Graves 2015).

Collectively, the extant evidence suggests that gays/lesbians, African Americans and women are vulnerable at their workplace. Building on this evidence, we conjecture that minority groups might perceive being exposed to greater levels of job risk than they actually are. We do not claim that minorities do not face greater income risk. Our hypothesis is that workplace discrimination makes them feel that they face even *stronger* income risk. We label this increased perception of risk as *social risk*.

Much like objective income risk (Angerer and Lam 2009), we expect that social risk should also affect portfolio decisions. Specifically, social risk can make individuals extremely cautious amplifying their perception of actual income risk. Therefore, we expect that minorities who are exposed to high levels of social risk to participate less in the financial markets and to allocate less of their wealth to risky assets. This core hypothesis is the basis of our empirical analysis.

We acknowledge that measuring social risk is not easy. Therefore in our empirical study, we use proxies of social risk related to discrimination while controlling for various measures of actual/objective income risk (e.g., education and the volatility of income growth). Accounting for the objective measures of income risk, we interpret the conditional effects of discrimination as a relatively good measure of social risk.

3 Data Sources and Key Variables

In this section, we describe the data sets we use in our empirical analysis. In Appendix A.1, we also provide detailed definitions of all our variables.

3.1 LATP Data

The LATP survey is a poll designed to measure public attitudes on a number of issues. We focus on the 2004 survey because it was designed to address gay issues. In particular, it reports sexual orientation, stock ownership, and various household demographics. Even though the survey covers a small number of respondents, in Appendix B, we show that it is representative of the overall population in terms of market participation decisions. Unfortunately, the survey does not include any information on wealth and therefore we cannot examine asset allocation decisions.

Using the LATP, we construct our first social risk proxy. The LATP asks respondents whether they support gay rights and we use their responses to construct our first social risk proxy, called *Pro-gay rights*. The pro-gay rights variable takes the value of one if the respondent strongly/somewhat supports gay rights, and zero otherwise. We conjecture that individuals who have been exposed to discrimination would typically be more sympathetic to gay rights. Furthermore, gay individuals who support gay rights may be the ones that face/faced the highest discrimination and thus should have the highest social risk. We report summary statistics for the LATP in Panel A of Table 1. We see that only a small percentage of the sample reports being gay/lesbian, which is consistent with national statistics. We also find that about half of the sample supports gay rights.

3.2 NLSY Data

The NLSY survey is a representative panel of U.S. young adults. It includes information about wealth, income, financial decisions, and exposure to discrimination. The NLSY sample contains individuals who were 14 to 22 years old in 1979. The survey respondents were followed annually from 1979 to 1994 and biannually from 1996 onward. We use the data until 1994 because we want to compute annual income growth rates using consecutive annual income observations.

With the NLSY, we compute our second social risk measure. Specifically, the 1979 wave of the NLSY reports if respondents felt they faced "problems in getting a good job" due to race and/or gender. The responses to this question reveal if the respondent felt discriminated when they were young. Based on this question, we generate our second social risk proxy. It is a binary variable called *Job discrimination*. It takes a value of one if the respondent answers yes, and zero otherwise. We report summary statistics for the NLSY in Panel B of Table 1. We find that about 20% of the sample felt discriminated. Specifically, 12.7% and 19.8% of women and African Americans respectively perceived that they were discriminated. In contrast, only 5.0% of White men felt discriminated (see Table 2).

3.3 SCF Data

Finally, we use the Survey of Consumer Finances (SCF). The SCF is not a panel data set, and provides no information about actual income risk. However, it has information that we use to create a measure of perceived income risk. Specifically, respondents were asked a) whether they perceive their current income to be high or low compared to their normal income and b) whether they have a good idea of their next-year income. Using their responses, we generate an indicator variable, *PIR*, that takes a value of one if (i) current

income is perceived to be less than normal and (ii) if the respondent also does not have a good idea about next-year income. We interpret the PIR as a proxy of high perceived income risk. We use this measure to directly test our conjecture that social risk related to minority groups amplifies the perception of income risk.

For the SCF analysis, we use the 1995 to 2010 waves of the survey. Also, we restrict our SCF sample to include individuals who are at most 50 years old. We exclude older individuals to align the SCF sample with the NLSY sample, which focuses only on younger households. We report summary statistics for the SCF in Panel C of Table 1. We find that about 7% of the sample feels that they make less than they should and also cannot predict their future income.

4 Social Risk and Financial Decisions

In this section, we present our key empirical results. To set the stage, we provide graphical evidence of social risk. Then, we present our main estimation results.

4.1 Social Risk Across Different Demographic Groups

We start with the LATP survey where we measure social risk with opinions related to gay rights. If this is an appropriate social risk proxy, then groups that face discrimination should support pro-gay laws. Indeed, we find that the support for gay rights is high among gays/lesbians (84%), women (53%) and African Americans (58%). In contrast, only 39% of White men are sympathetic to gay laws. See Panel A of Table 2.

Similarly, we find that in the NLSY survey, our discrimination-based social risk proxy is the highest among women and African Americans. Specifically, in Panel B of Table 2, we report summary statistics for the two questions that we use to construct our discrimination variable. The first question is related to job discrimination on the basis of race, and the

second question is related to job discrimination on the basis of gender. We find that about 33.2% (28.4%) of African Americans report that their race (gender) can be a problem in getting a good job. In the case of women, only 3.7% of them report race discrimination while 10.6% of them report gender discrimination. In contrast, less than 3% of White males report that their race or gender might prohibit them from getting a good job.

As expected, when we combine the race and gender discrimination variables, we find that African Americans face the highest degree of discrimination. Figure 1 shows that about 20% of African Americans report gender and/or race discrimination. In the case of women, about 13% of them report gender and/or race discrimination. Only 5% of White males report discriminated. Overall, our social risk proxies seem reasonable because these estimates are the highest for the demographic groups that are known to experience discrimination.

4.2 Social Risk and Financial Decisions: Univariate Tests

Next, we examine if social risk affects people's financial decisions. To set the stage, we examine the relation between stock market participation and social risk graphically.[4] Figure 2, Panels A and B show the relation between financial decisions and social risk perception in the NLSY. On the X-axis, we report our discrimination variable. On the Y-axis in Panel A, we report the fraction of households who own stock. On the Y-axis in Panel B, we report the fraction of wealth allocated to risky assets.

The graphical evidence suggests that individuals with high social risk participate less in the stock market. We find that 16.9% of high social risk individuals participate in the stock market, whereas 20.9% of those who do not feel they face social risk participate in the market. The risky equity share for those who face social risk is 1.9%, whereas for those with

[4]For this graphical analysis we focus on the NLSY to conserve space.

no social risk, the risky equity share is 2.3%. Next, we consider evidence from multivariate regressions where we control for various demographic variables as well as measures of actual income risk.

4.3 Social Risk, Gays and Lesbians

In the next tests, we use the LATP survey to study the portfolio choices of gays/lesbians. Our objective is to illustrate the impact of sexual orientation and social risk on the decision to participate in the stock market. For this analysis, we present results based on probit stock market participation regressions. Our key variable in the regression specification is an individual's attitude toward potential laws that would enhance gay rights, which we denote as *Pro-gay laws*. We conjecture that individuals who support pro-gay laws might be more sensitive to the social risks faced by minorities. Therefore, being pro-gay rights may signal greater social risk perception.

Table 3 reports the marginal effects of probit estimation, where the dependent variable is a binary variable that takes the value of one if the individual owns stock, and zero otherwise. The independent variables include sexual orientation (a binary variable), race, gender, education, income and imputed income risk (see Appendix C for details on the imputation). The numbers in parentheses below the coefficient estimates is the z-statistics for the respective estimates. Additional details about the variables are available in Appendix A1.

The probit regression estimates show that, unconditionally, gays are 10% less likely to participate in the stock market (regression 1). When we add the pro-gay laws variable in regression 2, our proxy for social risk, the z-statistic of the gay indicator variable drops by about 35% indicating that social risk has a negative effect on market participation.[5] Next,

[5]It is important to mention that the low z-statistic in our regression is due to the fact that the fraction of gays in our sample, which reflects the national statistics, is only 3% of the population.

we examine the role of social risk among gays and lesbians. Our conjecture is that gays and lesbians who are sympathetic to pro-gay laws are more likely to feel that they face high social risk and, thus, participate less in the market. To test our social risk conjecture, in regression 3, we add an interaction terms between the gay and the pro-gay law indicator variables. Consistent with our hypothesis, the estimate of the interaction term between gays and the social risk proxy is negative.

To strengthen our results, we estimate multivariate regressions that control for income, age, education, gender, and imputed actual income risk. We present these regressions in columns 6 and 7 of Table 3. We find that, conditional on a host of control variables, those gay individuals who feel exposed to high social risk participate in the stock market about 40% less than other gay individuals. This effect is economically strong and shows that the social risk perception greatly influences the decision to participate in the stock market.

4.4 Social Risk, African Americans and Women

In this section, we examine the impact of social risk on financial decisions of women and African Americans using the NLSY data.

4.4.1 Stock Market Participation Decisions

We examine the impact of social risk on stock market participation with probit regressions, which we report in Table 4. The dependent variable in each of these regressions is a binary variable that takes the value of one if the respondent owns stocks, and zero otherwise. The independent variables are income risk (standard deviation of income growth, denoted by σ_{dy}), net worth, age, education (i.e., college graduate indicator), high risk aversion, race, and gender as well as a binary variable that measures perceived social risk (denoted by *Job discrimination*).

Our first finding is that individuals with greater social risk due to discrimination participate less in the stock market. Specifically, our estimates on the job discrimination variable are negative and statistically significant. The estimates suggest that individuals who felt discriminated when they were young participate 2.3% to 3% less in the stock market than the average household (regressions 2 and 3).

Next, we show that the impact of job discrimination on the market participation decision is significant only for women and African Americans. For this test, we add, in regressions 4 to 6, interaction terms between the job discrimination variable and the women and African American indicator variables. In the presence of the interaction terms, the job discrimination variable becomes insignificant. However, the estimates on the interaction terms are negative and statistically significant. This evidence indicates that high social risk decreases the propensity to participate in the stock market only among women and African Americans. We find that the drop in participation, driven entirely by an increased perception of job discrimination, is between 7.4% and 8% for African American and between 2.8% and 4% for women.

The economic effect of job discrimination on the participation decisions of women and African American is high and it is comparable to the economic effect of actual income risk, which we measure with the standard deviation of income growth. Specifically, the estimation results from multivariate regression (6) suggest that a one standard deviation increase in income risk (= 0.426) reduces participation by 3.6% (= -0.085 $\times$ 0.426 $\times$ 100).

4.4.2 Asset Allocation Decisions

We also examine the impact of social risk on asset allocation decisions. Specifically, in Table 5 we report Tobit estimation results. The dependent variable in these regressions is the fraction of wealth allocated to risky assets. The independent variables are income risk

(σ_{dy}), net worth, age, education, high risk aversion, race, gender, and our job discrimination measure.

We find that individuals who perceive being exposed to greater job discrimination allocate less of their wealth to risky assets. In regressions 2 and 3, the estimates on the job discrimination variable are negative and statistically significant. These estimates suggest that compared to investors with no perceived social risk, their equity shares are 1.6% to 2.4% lower.

Similar to the participation regressions, we interact the social risk proxy with demographic variables (see regressions 3 to 6). The interaction terms are African American with job discrimination (i.e., A.A $\times$ Dis) and female with job discrimination (i.e., Fem $\times$ Dis). The interaction terms have negative and statistically significant estimates. Further, in the presence of the interaction terms, the job discrimination variable also becomes insignificant. These results suggest that social risk predominantly influences the equity share decision of women and African Americans. For example, the equity share of women who believe they face high job discrimination is 2.3% to 4.3% lower than other women. The equity share of African Americans who have been discriminated is 8% to 9.2% lower than other African Americans.

Collectively, our results suggest that women and African Americans face greater social risk, which influences their portfolio decisions. We find that, conditional on actual income risk, women and African Americans participate less and have lower equity shares. In fact, in some cases, the results suggest that social risk has a greater influence on portfolio decision than actual income risk.

4.4.3 Impact of Excess Risk Aversion and Low Education

In this section, we provide some suggestive evidence that high perception of social risk might be the reason that minorities avoid investing in risky assets. This analysis is motivated by evidence that exposure to risky environments can affect risk perceptions (Thaler and Johnson 1990; Post, Van den Assem, Baltussen, and Thaler 2008; He and Hong 2015). Interpreting this evidence in our context, we conjecture that due to discrimination minorities live in riskier social environments and thus should be highly risk averse.

For this analysis, we interact the African American-Discrimination and Female-Discrimination interaction terms with a measure of excess risk aversion. We obtain excess risk aversion from a series of questions where the respondent chooses whether or not to take a risky job. Excess risk aversion is the difference between an individual's willingness to move to a risky job and the average willingness of a peer group to take the risky job. The peer group is based on race, gender, and educations.[6] Our conjecture is that if discrimination makes people extremely risk averse compared to their peers and, thus, more exposed to social risk, the triple interaction terms with excess risk aversion should have negative and statistically significant estimates in the probit and Tobit regressions.

We also use triple interactions with a low education variable. Low education is a dummy variable that takes the value of one for high-school graduates and lower. Our hypothesis is that individuals with no college education face higher unemployment risk and therefore live in risky social environments. Accordingly, low education individuals who have also been discriminated against should face high social risk. We expect the African American-Discrimination-Low Education and Female-Discrimination-Low Education interaction terms to have negative estimates in our probit and Tobit regressions.

We report the results with the triple interactions in Table 6. Regressions 1 to 3 are

[6] We describe in detail the risk aversion and excess risk aversion variables in Appendix A.1.

probit market participation regressions. Regression 4 to 6 are Tobit asset allocation regressions. In these regressions, we introduce separately the triple interaction terms related to excess risk aversion and low education. We do not include all the triple interaction terms in the same regression to avoid multicollinearity issues. The other control variables in the regressions are income risk (σ_{dy}), net worth, age, education, high risk aversion, race, and gender.

Overall, the results in Table 6 indicate that minorities that faced discrimination when they were young do become very risk averse. Specifically, the triple interaction terms with excess risk aversion have negative and statistically significant estimates for both females and African Americans. Moreover, these estimates are strong in the probit and Tobit regressions. For instance, in the probit regression (2) the estimate on the African American-Discrimination-Excess risk aversion term is -0.309 (t-statistic = -2.28) while the estimate on the Female-Discrimination-Excess risk aversion term is -0.030 (t-statistic = -2.09).

We also find that the low-education interaction term is negatively related to the market participation and asset allocation decision of African Americans that felt discriminated. For instance, in the probit regression (3) the estimate on the African American-Discrimination-Low education term is -0.191 (t-statistic = -5.61). This effect is not significant for women. For example, in probit regression (3) the estimate on the Female-Discrimination-Low education term is 0.042 (t-statistic = 1.02). The finding that low education is not significant for women suggest that there might be stronger education gap across racial lines than across gender.

Collectively, we provide evidence that discrimination is related to excessive risk aversion. This supports our hypothesis that social risk can lead discriminated individuals to avoid financial risk. Consistent with this hypothesis, our evidence also suggests that social risk might be especially strong for African Americans with low educational backgrounds.

5 Additional Evidence

Thus far, our findings are consistent with the hypothesis that minorities are likely to perceive greater social risk. To provide further support to our hypothesis, we show that minorities have heightened perceptions of income risk. For this analysis, we provide evidence from the Survey of Consumer Finances (SCF) and from an experiment that we conducted.

5.1 Perceived Income Risk: Evidence from the SCF

We use the SCF because it includes questions that can be used to compute a proxy for perceived income risk. Specifically, the SCF includes the following two questions: "Do you usually have a good idea of what your next year's income will be?" and "Is this income [i.e., current income] unusually high or low compared to what you would expect in a "normal" year, or is it normal?" With these two questions, we create an indicator variable that takes a value of one if the answer to the first question is "No" and the answer to the second question is "Low." We call this variable *Perceived Income Risk* (PIR). We use the PIR variable to examine whether minorities (i.e., African Americans and women) with high PIR participate less in the stock market and allocate less of their wealth to risky assets. We only focus on African Americans and women because the SCF has no information on sexual preferences.

5.1.1 Univariate Statistics

Before discussing our regression estimates, we present some univariate results that suggest that PIR is related to social risk. In particular, our main conjecture suggests that social risk and PIR should be strong for minorities. To test this hypothesis, in Panel C of Table 2, we report the fraction of respondents with high PIR (PIR=1) among female

and African Americans and compare it to the respective fraction for White males. White males is the control group that does not to face discrimination.

Consistent with our hypothesis, the results in column 1 indicate that, for African Americans, the PIR index is twice as high as that for White males. Specifically, 16.1% of African Americans perceive that their incomes are lower than normal and usually do not have a good idea about future income. Similarly, 17.35% of women report high PIR.

In the same sample, we also find that the stock market participation rates and equity shares of White males exceed those of women and African Americans. Specifically, about 21.0% of White male own stocks, whereas only 8.1% and 8.22% of women and African Americans, respectively, own stocks (see column 2). We find similar differences in the equity shares (see column 3).

Overall, theses summary statistics suggest that there is likely to be a negative relationship between PIR and portfolio decisions due to social risk faced by minorities. Next, we provide supporting evidence of this negative relation using multivariate probit and Tobit regressions.

5.1.2 Multivariate Regression Estimates

We present our multivariate regressions in Table 7. In columns 1 and 2, we report the estimates from probit market participation decisions. The dependent variable is a binary variable that takes the value of one if the respondent own stocks directly, and zero otherwise. The main independent variables are the PIR measure and the interaction terms between PIR and the gender and race variables. Additional control variables include an imputed measure of income risk, net worth, age, education, risk aversion, and binary variables for female and African Americans.

We impute income risk from the NLSY to the SCF because the SCF is a repeated cross

sectional data set and thus there is no income history that we can use to compute the standard deviation of income growth. The imputation methodology is based on demographic variables that are available in both the NLSY and SCF data sets (see Appendix C for the imputation exercise). We provide detailed descriptions of all variables in Section A.1 of the Appendix.

To set the stage, in regression 1, we consider only the PIR variable and exclude from the regressions the PIR interaction terms with race and gender. We find that the estimate on the PIR is negative and statistically significant (estimate = -0.04; t-statistic = -9.21). The economic significance of PIR is also high. Specifically, the probit estimates indicate that respondents with high PIR (i.e., PIR=1) are less likely to participate in the stock market by 4.0%.

Next, we focus on the interaction terms between race and PIR and gender and PIR. In regression 2, we find that the perceived income risk reduces the stock market participation decision of African Americans and females. Specifically, the estimates on the interaction terms are negative and statistically significant (A.A $\times$ PIR = -4.6%, Fem $\times$ PIR = -2.6%). Interestingly, in the presence of the interaction terms, the PIR variable loses half of its economic and statistical significance compared to regression 1 (PIR estimate in regression 2 = -0.026; t-statistic = -4.39). This evidence suggests that the income uncertainty effect captured by the PIR variables is highly concentrated on women and African Americans, who are the two minorities with the highest social risk.

Next, we estimate Tobit regressions and present the estimation results in columns 3 and 4 of Table 7. In these regressions, the dependent variable is the fraction of wealth allocated to risky assets. The key independent variables are again the PIR and the interaction terms of PIR with women and African Americans. In regression 3, which excludes the interaction terms, the PIR is economically and statistically significant (estimate = -0.071; t-statistic =

-6.01). We add the PIR interaction terms in regression 4. We find that the estimates of the PIR interaction terms are negative and statistically significant. These estimates suggest that the equity share of African American with high PIR is reduced by 13.5% and by 6.9% for female. Similar to the participation regressions, in the presence of PIR interaction terms with race and gender, the PIR variable loses much of its economic and statistical significance (PIR estimate in regression 4 = -0.028; t-statistic = -1.91).

Collectively, our findings using the SCF data suggest that females and African Americans, who report high perceived income risk, participate less in the stock market and allocate less on their wealth in risky assets. These results are consistent with our findings from the LATP and NLSY data sets.

5.2 Perceived Income Risk and Discrimination: Experimental Evidence

To complement the findings from the SCF, we design an experiment that directly tests whether discrimination in the workplace, our proxy for social risk, can bias perceptions of income risk.

5.2.1 Experimental Design

We utilize Amazon's Mechanical Turk (mTurk) website to conduct the experiment (Paolacci, Chandler, and Ipeirotis 2010; Kuziemko, Norton, Saez, and Stantcheva 2015).[7] The mTurk platform enables Requesters to post tasks which a large pool of Workers can access and perform online. Workers provide personal information to Amazon, including their address of residence and social security number for tax purposes, and are compensated for completing tasks. While Workers on mTurk are compensated less than in-person laboratory study participants, the quality of answers is not lower than in-person laboratory

[7]The Institutional Review Board at the university approved the procedures used in the study under UMIRB ID# 20160205.

studies (Casler, Bickel, and Hackett 2013).

We recruit a sample of 2,784 individuals living in the United States to complete the survey.[8] The survey lasted approximately twenty minutes and participants were compensated $1.50, a competitive pay rate given the duration of the task. To test our hypothesis, we collect standard demographic details about the subjects and identify three minority groups which are likely to experience discrimination in the workplace: (i) gay and lesbian individuals, (ii) females, and (iii) African Americans. We also identify a fourth group, White heterosexual males, that serves as a comparison group.

We present descriptive statistics for the participants in Panel A of Table 8. The participants are similar across the four demographic groups in terms of income, education level, and age. For instance, the average individual in the gay/lesbian sample earns approximately $52,525 per year, the average female earns $52,549, the average African American earns $54,536, and the average White male makes $58,820. Across the samples, participants report similar ratings on their frequency of job changes and on satisfaction levels with their current jobs.

5.2.2 Discrimination and Perceived Income Risk Measures

In the survey, we elicit individuals' perceptions of workplace discrimination. To do so, we do not directly ask whether our subjects feel discriminated at work in order to avoid priming their answers. Instead, we ask questions that are implicitly related to discrimination. Specifically, subjects were asked to rate their level of agreement, on a seven point scale, with two statements: "At my workplace, I feel I am treated fairly," and "At my workplace, I feel that my wages or salary may unexpectedly decrease." We equally-weight the responses to these two questions to construct an index, *Discrimination at Work*, which is our first

[8] To further address potential concerns that Workers may not adequately perform the task, we restrict participation to individuals who were positively rated by at least 90% of their previous Requesters.

measure of discrimination. Index values range from -3 (no discrimination) to 3 (strong discrimination) with zero being neutral.

In Panel A of Table 8, we see that the average participants in the minority groups (columns 1 - 3) reports being weakly non-discriminated against in the workplace. However, the average White, heterosexual male (column 4) reports slightly less workplace discrimination compared to minority group individuals. These relatively low levels of discrimination are not surprising since there are ample evidence of under-reporting of workplace discrimination (Sears and Mallory 2014; Graves 2015).

To measure the effects of discrimination more precisely, we construct a second measure of discrimination, *Strong Discrimination at Work*. Specifically, the measure is a binary variable which takes the value of one if the subject scores a one or above on the *Discrimination at Work* index, and zero otherwise. In Table 8 Panel A, we see that a higher proportion of individuals in the social minority groups report experiencing strong workplace discrimination compared to White heterosexual males. For example, 9.56% of gay and lesbian participants report strong discrimination experience while only 3.69% of the White heterosexual males report discrimination.

To assess perceptions of income risk, we also develop an experimental task to elicit participants' income expectations. First, participants were presented with a brief vignette to set the stage for the forecasting task. In short, participants were informed that a hypothetical individual received employment compensation composed of a salary and a bonus which fluctuated with company performance. Then, subjects were shown four series of income histories in random order. While viewing each income history, participants were asked to forecast the individual's most likely income during the next period. We include the vignette and income history scenarios in Figures D1 and D2, respectively. For each subject, we calculate *Forecasted Income* as the average forecasted income across the four

histories. *Forecasted Income* then serves as the main dependent variable in our analysis.[9]

5.2.3 Experimental Findings

We present in Panel B of Table 8 the results from multivariate regressions using our first measure of discrimination, *Discrimination at Work*. The estimates for *Discrimination at Work* are negative and strongly significant for the three minority samples (columns 1 - 3). That is, as participants in minority groups experience greater discrimination, they forecast lower future income levels. The estimated effects are also economically significant. For example, in the case of gays and lesbians, a one-standard deviation increase in the discrimination index leads to a lower income forecast of about \$1,620 ($1.22 \times 1.14 \times 100$). Interestingly, a similar effect, though only marginally significant, is found for the control group of white heterosexual males.

Next, we use our second measure of discrimination, *Strong Discrimination at Work*, to focus on individuals who report perceiving significant workplace discrimination. To set the stage, we graphically present the relationship between income risk and strong discrimination in Figure 3. We see that white heterosexual males report a lower frequency of experiencing strong workplace discrimination and provide higher income expectations. On the other hand, individuals in the minority samples report greater frequencies of strong discrimination and provide lower income forecasts.

Panel C of Table 8 reports estimates from multivariate regressions where the main independent variable is *Strong Discrimination at Work*.[10] The estimates for *Strong Discrimination at Work* are negative and significant for the three minority groups (columns 1 -

[9]The four income histories have similar distributions and the identified effects are consistent when analyzing each history independently. We also analyze forecasts in excess of the mean income of each history and find effects similar to those reported in Table 8, Panels B and C.

[10]The regressions use the same controls as in Panel B. The coefficients are similar and suppressed in the interest of space. Also, the standard errors of the estimates in Panels B and C are similar when clustering at the state and zip code levels.

3). The estimates also indicate that the effects are economically meaningful. For instance, the coefficients in column 1 imply that the income forecasts of the average gay or lesbian individual who has experienced strong workplace discrimination is reduced by approximately $4,154. This is a 7.78% reduction relative to the average income across the four scenarios in Figure D2. We also find that strong discrimination doesn't have a significant effect on white heterosexual males' income expectations. See column 4. This finding is not surprising since, as we report in Panel A of Table 8, only 3.7% of the white heterosexual males feel that they are strongly discriminated at work. In contrast, this percentage is 2 to 3 times larger for minorities (gay/lesbians = 9.56%, female = 7.96%, African American = 6.88%).

Overall, the experimental evidence confirms our conjecture that discrimination biases risk perceptions. In particular, our findings suggest that discrimination at work, our proxy of social risk, influences individuals' perceptions of future income levels. This effect is especially strong for minority members that feel strongly discriminated at work.

6 Summary and Conclusions

In this paper, we examine the economic consequences of discrimination. This in important issue because discrimination of minorities is one of the most enduring social problem of modern societies. We argue that discrimination can have subtle, yet enduring effects on people's decisions. Our innovation is to go beyond the known effects of discrimination on wealth accumulation and propose a new source of risk, social risk, which we relate to discrimination of minorities.

Social risk is a heighten perception of processing risk that might induce individuals that have been discriminated to overestimate their overall exposure to risk like income risk. Being a psychological concept, social risk is not easy to measure. Therefore, we use

multiple data sets, multiple proxies, and an experimental task to measure social risk and its effects on financial decisions. We acknowledge that our proxies are imperfect. However, all our findings are consistent with the key conjecture that minorities facing higher social risk participate less and allocate less of their wealth in risky assets.

Our findings are important and highlight that the internal consequences of discrimination on preferences can be equally damaging as the direct effects of discrimination. In particular, the negative experience of discrimination can have a lasting effect on how individuals perceive risk. Therefore, discrimination can create psychological barriers to taking on financial risk. Such barriers can also limit minorities from pursuing high paying professions that are inherently risky. Overall, psychological barriers created by discrimination can be as important as actual barriers that propagate the wealth differences across demographic groups.

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Figure 1: Demographic characteristics and social risk

This figure reports the fraction of individuals in the NLSY who perceive being discriminated against as a function of race and gender. The key variables are defined in Section 3, and the definitions of all variables are available in Appendix A1.

Figure 2: Social risk and financial decisions

This figure shows stock market participation rates and risky equity shares conditional on being discriminated or not. The data is from the NLSY. In panel A (B), we show the stock market participation rate (fraction of wealth allocated to risky assets) as a function of job discrimination. The key variables are defined in Section 3, and the definitions of all variables are available in Appendix A.1.

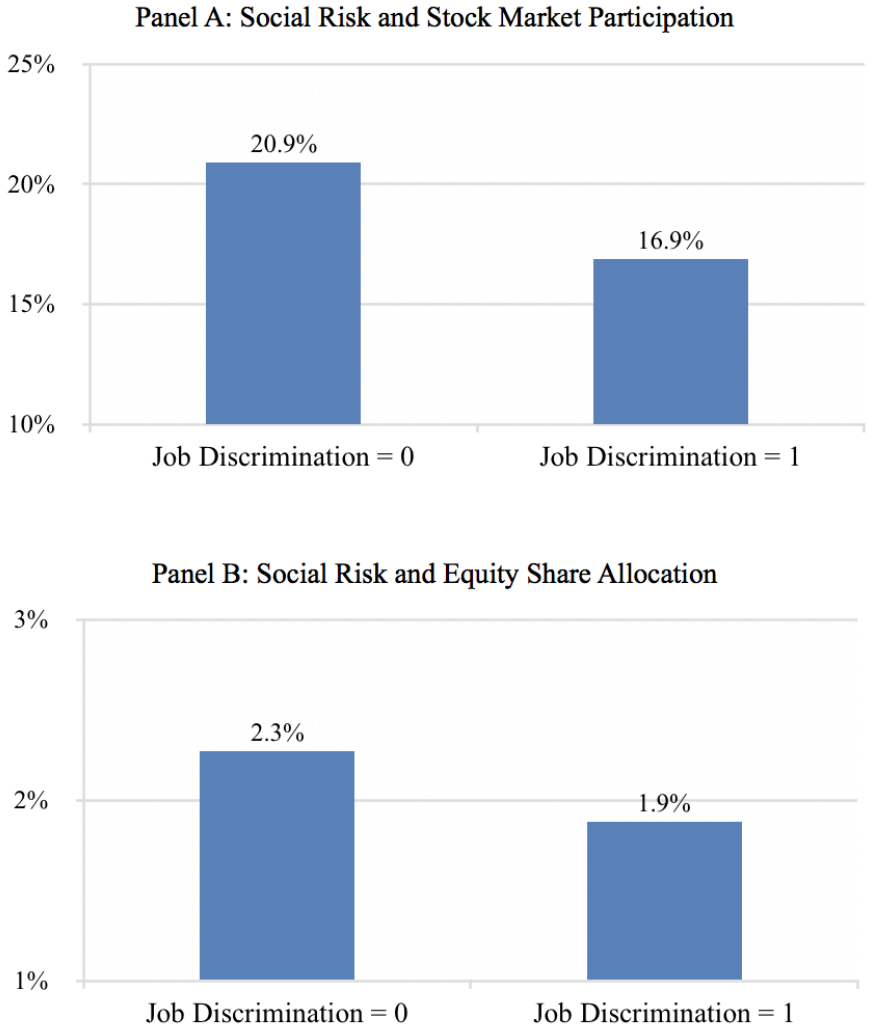

Figure 3: Income risk and discrimination

This figure shows results from the online experiment. Specifically, the Y-axis shows the average level of income forecasted across the four income history scenarios. The X-axis shows the percent of participants, in each social group, who report experiencing strong discrimination in the workplace. That is, the percent of individuals in each social group who score a one on the *Strong Discrimination at Work* variable. Therefore, each bubble indicates the average income expectation and the percent of individuals who are strongly discriminated against for the social group.

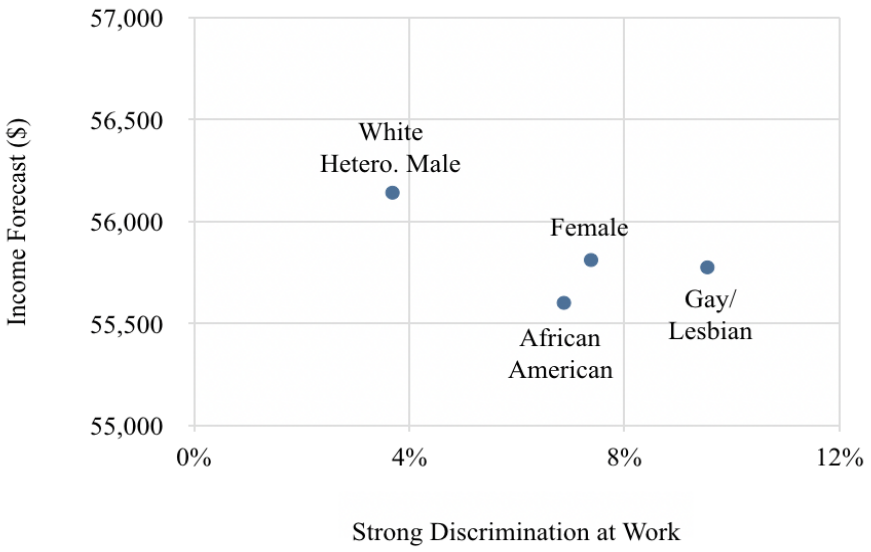

Table 1: Summary statistics

This table reports summary statistics including the mean, standard deviation, sample percentiles, and the number of observations. Panels A, B, and C report summary statistics for key variables from the LATP, the NLSY, and the SCF, respectively. Detailed variable descriptions are included in Appendix A.1.

Panel A: LATP 501 Sample

			Percentiles						
Variable	Mean	Std. Dev.	10th	25th	50th	75th	90th	95th	N
Owns stocks	0.469	0.499	0	0	0	1	1	1	1,616
Gay	0.021	0.145	0	0	0	0	0	0	1,598
Pro-gay laws	0.470	0.499	0	0	0	1	1	1	1,616
Age	44	17	22	30	42	56	71	76	1,598
White	0.767	0.422	0	1	1	1	1	1	1,616
Male	0.580	0.493	0	0	1	1	1	1	1,616
Education (years)	13	2.4	11	12	13	15	16	18	1,604
Income	0.063	0.044	0.015	0.035	0.055	0.0875	0.150	0.150	1,449

Panel B: NLSY Sample

			Percentiles						
Variable	Mean	Std. Dev.	10th	25th	50th	75th	90th	95th	N
WStkBondMF	0.023	0.089	0	0	0	0	0.048	0.141	60,079
OwnStkBondMF	0.210	0.407	0	0	0	0	1	1	60,079
Income risk (σ_{dy})	0.688	0.426	0.24	0.38	0.60	0.90	1.25	1.51	60,079
Income	15.929	14.945	1.5	5	12	22.5	34	42	60,079
Net worth	0.064	0.145	0.001	0.005	0.021	0.060	0.132	0.215	60,079
Age	31	3	26	28	31	33	35	36	60,079
College education	0.257	0.437	0	0	0	1	1	1	60,079
High risk aversion	1.219	0.799	0	1	1	2	2	2	60,079
Female	0.474	0.499	0	0	0	1	1	1	60,079
African American	0.052	0.221	0	0	0	0	0	1	60,079
Job discrimination	0.130	0.421	0	0	0	0	1	1	60,079

Panel B: SCF Sample

			Percentiles						
Variable	Mean	Std. Dev.	10th	25th	50th	75th	90th	95th	N
OwnStkBondMF	0.158	0.364	0	0	0	0	1	1	67,088
WStkBondMF	0.067	0.174	0	0	0	0.00	0.265	0.476	61,852
PIR	0.114	0.318	0	0	0	0	1	1	67,088
Net Worth	242,194	1,584,878	-1,924	5,303	45,219	177,547	476,476	813,310	67,088
Age	35.730	7.902	24	29	36	42	46	47	67,088
Education (years)	13.445	2.545	11	12	13	16	17	17	67,088
Risk aversion	0.051	0.220	0	0	0	0	0	1	67,088
Male	0.757	0.429	0	1	1	1	1	1	67,088
African American	0.305	0.460	0	0	0	1	1	1	67,088

Table 2: Perception of income risks among demographic groups

Panel A reports the responses to questions regarding the support of pro-gay laws across white male, female, African Americans and gays/lesbians. The data is from the LATP survey. Panel B reports the responses to questions regarding job discrimination. Specifically, the 1979 wave of the NLSY asked respondents if they faced problems with finding good jobs, because of race and/or gender discrimination. We report the percentage of respondents who answered yes for each of these choices for various demographic groups. Panel C reports the mean for the perceived income risk proxy (PIR) by demographic groups based on data from the SCF. The PIR variable takes the value of 1 for respondents who perceive their current income to be below normal and do not have a good idea of their future income. Columns 2 and 3 respectively report the fraction of households who own stocks directly and portion of wealth allocated to risky assets.

Panel A: LATP Sample				
	(1) White Male	(2) Female	(3) African American	(4) Gay/Lesbian
Support pro-gay laws	39.0%	53.0%	58.0%	84.0%
Panel B: NLSY Sample				
Discrimination based:	(1) White Male	(2) Female	(3) African American	
Race	2.8%	3.7%	33.2%	
Gender	2.9%	10.6%	28.4%	
Panel C: SCF Sample				
Demographic Group:	(1) PIR	(2) Own Stocks	(3) Equity Share	
White male	8.33%	21.02%	8.27%	
Female	17.35%	8.06%	4.67%	
African American	16.11%	8.22%	3.63%	

Table 3: Sexual orientation and stock market participation decisions: Evidence from LATP

This table reports marginal effects from probit stock market participation regressions, where the dependent variable is a binary variable that takes a value of 1 if the individual owns stocks directly or indirectly, and 0 otherwise. The independent variables include sexual orientation (Gay), income, age, education and imputed income risk. The variable "Pro-gay laws" is a binary variable which takes a value of 1 if the respondent strongly supports gay rights, and zero otherwise. The variable "Gay × Pro-gay laws" is the interaction between the Gay and the Pro-gay laws variables. The data are from the LATP for 2004. We use robust standard errors to measure statistical significance of the coefficient estimates and present z-statistic in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gay	-0.109	-0.085	0.085	-0.046	-0.131	0.171	0.171
	(-1.47)	(-1.09)	(0.60)	(-0.58)	(-1.59)	(1.25)	(1.24)
Pro-gay laws		-0.050	-0.044	-0.048	-0.011		-0.001
		(-1.91)	(-1.67)	(-1.69)	(-0.36)		(-0.04)
Gay × Pro-gay laws			-0.236			-0.402	-0.402
			(-1.46)			(-2.97)	(-2.94)
Income risk (σ_{dy})					-0.003	-0.003	-0.003
					(-7.14)	(-7.30)	(-7.30)
Income				3.099	9.003	9.219	9.220
				(8.12)	(10.47)	(10.63)	(10.63)
Age					0.038	0.039	0.039
					(8.69)	(8.81)	(8.81)
Education				0.143	0.200	0.201	0.201
				(4.42)	(6.15)	(6.18)	(6.17)
Male				0.061	0.045	0.050	0.050
				(2.13)	(1.50)	(1.68)	(1.65)
White				0.096	-0.002	-0.011	-0.011
				(2.94)	(-0.07)	(-0.31)	(-0.31)
Observations	1,602	1,480	1,480	1,348	1,347	1,347	1,347
Pseudo R^2	0.001	0.003	0.004	0.087	0.160	0.163	0.163

Table 4: Social risk and stock market participation decisions: Evidence from NLSY

This table reports the marginal effects from probit stock market participation regressions. The dependent variable in each of these regressions is a binary variable that takes a value of 1 if the respondent owns stocks and 0 otherwise. The independent variables are income risk (σ_{dy}), net worth, age, education, high risk aversion, race, gender and a binary variable that measures perceived social risk (denoted by "Job discrimination"). The variables A.A × Dis and Fem × Dis are the interaction terms between African American and female dummy variables with the job discrimination variable. The definitions of all variables are in Appendix A.1. The data are from the NLSY. The coefficients for Net worth have been multiplied by 100,000. We use robust standard errors to measure statistical significance of the coefficient estimates and present z-statistics in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
Job discrimination		-0.030	-0.023	-0.011		0.014
		(-2.99)	(-2.17)	(-0.96)		(0.76)
A.A × Dis				-0.075	-0.074	-0.080
				(-2.82)	(-2.90)	(-3.04)
Fem × Dis					-0.028	-0.040
					(-2.05)	(-1.96)
Income risk (σ_{dy})	-0.085	-0.088	-0.085	-0.085	-0.085	-0.085
	(-10.48)	(-10.84)	(-10.46)	(-10.46)	(-10.46)	(-10.46)
Net worth (x100,000)	0.038	0.040	0.038	0.038	0.038	0.038
	(17.86)	(18.55)	(17.85)	(17.83)	(17.84)	(17.85)
Age	0.002	0.003	0.003	0.003	0.003	0.003
	(2.43)	(2.53)	(2.67)	(2.65)	(2.71)	(2.63)
College education	0.193	0.197	0.193	0.193	0.193	0.193
	(29.63)	(30.21)	(29.47)	(29.53)	(29.53)	(29.55)
High risk aversion	-0.004	-0.004	-0.004	-0.005	-0.005	-0.005
	(-1.08)	(-1.14)	(-1.15)	(-1.20)	(-1.21)	(-1.20)
Male	-0.004		-0.005	-0.004	-0.007	-0.008
	(-0.58)		(-0.77)	(-0.68)	(-1.08)	(-1.18)
African American	-0.081		-0.079	-0.068	-0.069	-0.068
	(-8.49)		(-8.17)	(-6.31)	(-6.36)	(-6.30)
Observations	48,945	48,945	48,945	48,945	48,945	48,945
Pseudo R^2	0.0836	0.0806	0.0838	0.0841	0.0842	0.0843

Table 5: Social risk and asset allocation decisions: Evidence from NLSY

This table reports Tobit regressions estimates. The dependent variable in each of these regressions is the fraction of risky assets as a portion of total wealth. The independent variables are income risk (σ_{dy}), net worth, age, education, high risk aversion, race, gender, and a binary variable that measures perceived social risk (denoted by "Job discrimination"). The variables A.A × Dis and Fem × Dis are the interaction terms between African American and female dummy variables with the job discrimination variable. All variables are defined in Appendix A.1. The data are from the NLSY. The estimates for Net worth have been multiplied by 100,000. We use robust standard errors to measure statistical significance of the coefficient estimates and present t-statistics in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
Job discrimination		-0.024	-0.016	-0.004		0.021
		(-2.58)	(-1.66)	(-0.41)		(1.32)
A.A × Dis				-0.086	-0.080	-0.092
				(-2.86)	(-2.80)	(-2.99)
Fem × Dis					-0.023	-0.043
					(-1.90)	(-2.20)
Income risk (σ_{dy})	-0.064	-0.068	-0.064	-0.064	-0.064	-0.064
	(-9.13)	(-9.74)	(-9.12)	(-9.12)	(-9.12)	(-9.13)
Net worth (x100,000)	0.019	0.020	0.019	0.019	0.019	0.019
	(15.47)	(16.45)	(15.50)	(15.46)	(15.47)	(15.50)
Age	0.001	0.001	0.001	0.001	0.001	0.001
	(1.07)	(1.15)	(1.25)	(1.23)	(1.33)	(1.20)
College education	0.164	0.166	0.164	0.164	0.164	0.164
	(26.40)	(26.65)	(26.28)	(26.32)	(26.32)	(26.34)
High risk aversion	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
	(-1.92)	(-2.23)	(-1.99)	(-2.02)	(-2.05)	(-2.03)
Male	0.009		0.008	0.009	0.007	0.005
	(1.73)		(1.56)	(1.65)	(1.18)	(0.95)
African American	-0.074		-0.073	-0.059	-0.060	-0.059
	(-6.69)		(-6.48)	(-4.91)	(-4.97)	(-4.90)
Observations	48,967	48,967	48,967	48,967	48,967	48,967
Pseudo R^2	0.1193	0.1104	0.1176	0.1185	0.1187	0.1188

Table 6: Social risk and stock market participation decisions: Triple interactions in the NLSY

This table reports probit participation regressions (regressions 1 to 3) and Tobit asset allocation regressions (regressions 4 to 6). The main dependent variables are triple interaction terms between race/gender, discrimination and other investor's traits (excess risk aversion, low education). The excess risk aversion is the difference between the individual's risk aversion and the mean risk aversion. The low education dummy takes the value of 1 for individuals with high-school and lower education. The other independent variables are income risk (σ_{dy}), net worth, age, education, high risk aversion, race, and gender (to conserve space, we omit the estimates of these variables from the table). The data are from the NLSY and all the variables are defined in Appendix Table A.1. We use robust standard errors to measure statistical significance of the coefficient estimates and the numbers in parentheses are z- and t-statistics.

	Probit			Tobit		
	(1)	(2)	(3)	(4)	(5)	(6)
A.A. × Dis × Excess RA		-0.309			-1.278	
		(-2.28)			(-2.37)	
Fem x Dis × Excess RA		-0.030			-0.115	
		(-2.09)			(-2.06)	
A.A. x Dis × Low Edu			-0.191			-1.370
			(-5.61)			(-2.77)
Fem × Dis × Low Edu			0.042			0.166
			(1.02)			(1.16)
A.A × Dis	-0.097	0.279	0.099	-0.465	0.920	0.387
	(-2.55)	(1.40)	(0.80)	(-2.69)	(1.60)	(1.02)
Fem × Dis	-0.032	-0.031	-0.057	-0.132	-0.140	-0.255
	(-1.89)	(-1.86)	(-2.10)	(-1.85)	(-1.93)	(-2.20)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,165	13,165	13,165	13,300	13,165	13,165
Pseudo R^2	0.085	0.086	0.086	0.062	0.062	0.062

Table 7: Perceived income risk and market participation decisions: Evidence from SCF

This table reports marginal effects from stock market participation probit (regressions 1 and 2) and estimates from Tobit regressions (regressions 3 and 4). The dependent variable in regressions 1 and 2 is a binary variable that takes a value of 1 if the respondent owns stocks, and 0 if otherwise; whereas the dependent variable in regressions 3 and 4 is the fraction of total wealth allocated to risky assets. The main independent variable is a binary variable that measures perceived income risk denoted by PIR. The variables A.A × PIR and Fem × PIR are the interaction terms between the African American and female dummy variables with the PIR variable. All variables are defined in Appendix A.1. The data are from the 1995 to 2010 SCF waves. The coefficients for Income risk and Net worth have been multiplied by 100,000. We use robust standard errors to measure statistical significance of the coefficient estimates and present z- and t-statistics in parentheses.

	Probit		Tobit	
	(1)	(2)	(3)	(4)
PIR	-0.040	-0.026	-0.071	-0.028
	(-9.21)	(-4.39)	(-6.01)	(-1.91)
A.A × PIR		-0.046		-0.135
		(-4.86)		(-4.56)
Fem × PIR		-0.026		-0.069
		(-2.24)		(-2.23)
Income risk (σ_{dy}) (x100,000)	-0.601	-0.569	-0.875	-0.859
	(-14.27)	(-15.85)	(-2.40)	(-2.35)
Net worth (x100,000)	0.003	0.003	0.002	0.002
	(33.53)	(32.84)	(25.60)	(25.67)
Age	0.002	0.002	0.004	0.004
	(10.14)	(10.18)	(10.69)	(10.69)
Education	0.036	0.035	0.075	0.075
	(53.46)	(52.74)	(53.59)	(53.51)
Risk tolerance	0.058	0.055	0.090	0.091
	(7.71)	(7.49)	(8.30)	(8.31)
Male	0.075	0.071	0.156	0.15
	(25.07)	(22.88)	(19.86)	(18.40)
African American	-0.059	-0.055	-0.154	-0.144
	(-18.98)	(-16.93)	(-20.85)	(-18.91)
Observations	67,088	67,088	64,984	64,984
Pseudo R^2	0.144	0.144	0.134	0.135

Table 8: Experimental evidence

This table reports results from the online experiment. Panel A presents descriptive statistics of experiment participants. Panel B reports estimates from OLS regressions of the effects of discrimination at work on income expectations for the full range of responses. Panel C reports estimates of the effects for individuals who report perceiving discrimination at work. Panel D of Table A1 provides definitions of the variables used in the analysis. T-statistics are calculated using robust standard errors and are presented in parentheses.

Panel A: Summary Statistics				
	(1) Gay/Lesbian	(2) Female	(3) African American	(4) White Hetero. Male
Forecasted Income ('000s)	55.77	55.82	55.61	56.14
	(10.04)	(10.77)	(13.65)	(10.13)
Discrimination at Work	-1.14	-1.24	-1.17	-1.43
	(1.33)	(1.26)	(1.25)	(1.14)
Strong Discrimination at Work (%)	9.56	7.39	6.88	3.69
Income	52,525	52,549	54,536	58,820
	(40,709)	(38,664)	(41,183)	(40,127)
Education Group	4.22	4.26	4.21	4.46
	(1.45)	(1.52)	(1.51)	(1.57)
Age Group	3.48	4.16	3.77	4.33
	(1.74)	(2.20)	(1.94)	(2.30)
Female (%)	57.99	100	55.24	0.00
Changed Jobs Frequently	3.50	3.18	3.31	3.06
	(1.79)	(1.77)	(1.78)	(1.71)
Job Satisfaction	3.70	3.55	3.66	3.47
	(1.85)	(1.85)	(1.83)	(1.83)

Table 8: Experimental Evidence - cont'd.

Panel B: Continuous Scale				
	(1) Gay/Lesbian	(2) Female	(3) African American	(4) White Hetero. Male
Discrimination at Work	-1.220	-0.798	-1.606	-0.946
	(-4.48)	(-3.37)	(-3.43)	(-2.01)
Income	0.012	0.003	-0.008	-0.019
	(1.17)	(0.32)	(-0.59)	(-1.63)
Education Group	-0.052	-0.203	-0.096	0.587
	(-0.23)	(-1.16)	(-0.28)	(2.10)
Age Group	0.334	0.355	0.294	-0.106
	(2.09)	(2.86)	(1.09)	(-0.65)
Race	0.198	-0.183		
	(0.96)	(-0.87)		
Female	0.067		-0.543	
	(0.11)		(-0.59)	
Change Jobs Frequently	-0.237	-0.208	-0.356	0.596
	(-1.30)	(-1.29)	(-1.17)	(2.37)
Job Satisfaction	0.069	0.048	0.251	0.099
	(0.43)	(0.34)	(0.92)	(0.47)
Observations	1,089	1,827	870	595
R^2	0.038	0.017	0.026	0.026
Panel C: Experienced Discrimination at Work				
	(1) Gay/Lesbian	(2) Female	(3) African American	(4) White Hetero. Male
Strong Discrimination at Work	-4.154	-2.370	-3.940	0.645
	(-3.51)	(-2.25)	(-1.88)	(0.27)
Controls	Yes	Yes	Yes	Yes
Observations	1,089	1,827	870	595
R^2	0.032	0.014	0.014	0.013

Appendix

A Variable Definitions

In this appendix, we provide detailed definitions of our variables.

Table A1: Variable definitions

The table presents definitions of the variables used in the analysis. Panel A reports variables from the Los Angeles Times Poll while Panel B reports those from the National Longitudinal Survey of Youth. Panel C presents variables from the Survey of Consumer Finance. Finally, Panel D reports variables from the online experiment.

Panel A: Los Angeles Times Poll - LATP	
Variable	Description
Owns stocks	1 if owns stocks directly or indirectly (through mutual funds), 0 otherwise.
Sexual orientation	1 if the respondent reports not being heterosexual, 0 otherwise.
Pro-gay laws	1 if strongly/somewhat supportive of laws to protect gays, 0 otherwise.
Income	The LATP asks households about last year's total income (1999): "What was your total family income from all sources, before taxes?" 1. Less than \$10,000 2. \$10,000 to under \$20,000 3. \$20,000 to under \$30,000 4. \$30,000 to under \$40,000 5. \$40,000 to under \$50,000 6. \$50,000 to under \$75,000 7. \$75,000 to under \$100,000 8. \$100,000 or more We take the averages in each bracket. We set income to \$150,000 for those who choose 8. We divide income by 1,000,000.
Income risk (σ_{dy})	Impute standard deviation of income growth based on demographic variables. See Appendix C.
Age	Years old.
Gender	1 if male, 0 if otherwise.
Race	1 if white, 0 if otherwise.
Education (years of schooling)	The LATP ask households: "What is the last grade or class that you completed in school?" 1. None, or grades 1-8 2. High school incomplete (Grades 9-11) 3. High school graduate (Grade 12 or GED certificate) 4. Business, Technical, or vocational school after high school 5. Some college, no 4-year degree 6. College graduate (B.S., B.A., or other 4-year degree) 7. Post-graduate training or professional schooling after college (e.g., toward a Master's Degree, Ph.D., law, medical school) We transform this variable into years of schooling. For answer 1 and 2, we take the average in each bracket. We set a value of 12 for option 3; a value of 13 for option 4; a value of 14 for option 5; a value of 15 for option 6; and a value of 17 for option 7.

Table A1: Variable definitions - cont'd.

	Panel B: National Longitudinal Survey of Youth - NLSY
Variable	Description
WStkBondMF	Fraction of wealth allocated to risky assets.
OwnStkBondMF	1 if own stocks, 0 otherwise.
Income risk (σ_{dy})	Standard deviation of income growth.
Net worth	Assets minus liabilities.
Age	Years old.
College education	1 if graduated from college, 0 otherwise.
Low education	1 if respondent has high school degree or less, 0 if otherwise.
Risk aversion	The risk aversion proxy is based on three hypothetical lotteries. In the first lottery (lottery 1), the respondents are given a 50/50 chance to double their family income or reduce their family income by one-half. If they accept lottery 1, they are offered a riskier lottery (lottery2) with a 50/50 chance they can double their family income or reduce their family income by one third. If they reject lottery 1, they are offered a less risky lottery (lottery 3) with a 50/50 chance they can double their family income or reduce their family income by 20%. Based on these responses, we generate a risk aversion proxy that takes a value of two if the respondent rejects lotteries 1 and 3; a value of one if she accepts lottery 1 but rejects 2 or rejects 1 but accepts 3; and a value of zero if she accepts lotteries 1 and 2.
High risk aversion	1 if risk aversion is in the top 75th pctl, 0 otherwise.
Excess RA	Difference between investor's risk aversion and mean risk aversion. The mean risk aversion is based on gender, race, and education.
Female	1 if female, 0 otherwise.
African American	1 if African American, otherwise.
Job Discrimination	1 if respondent faced job discrimination (i.e., reported in the 1979 wave that she/he thinks he cannot get a good job due to race and/or gender), 0 otherwise.

Table A1: Variable definitions - cont'd.

Panel C: Survey of Consumer Finance - SCF	
Variable	Description
Own Stocks	1 if the individual owns stocks (directly or indirectly), 0 otherwise.
PIR	1 if respondent perceives that her current income is below her normal. income and does not have a good idea about next-year income, 0 otherwise.
Women	1 if respondent is a woman, 0 if otherwise.
African American	1 if respondent is black, 0 if otherwise.
Age	Years old.
Male	1 if the individual is male and 0 if otherwise.
Education	Years of schooling.
Risk Tolerance	Self-reported risk preference. 1 "Not willing to take any financial risks"; 2 "Take average financial risks expecting to earn average returns"; 3 "Take above average financial risks expecting to earn above average returns"; 4 "Take substantial financial risks expecting to earn substantial returns."
Net worth	Respondent's net-worth (assets-debts) in millions.
Income	Individual income in millions.
Income risk (σ_{dy})	Impute standard deviation of income growth based on demographic variables. See Appendix C.

Table A1: Variable definitions - cont'd.

Panel D: Online Experiment	
Variable	Description
Income Forecast	The equally-weighted average of the participant's four income forecasts in thousands of dollars. See Appendix D for a detailed description of these question.
Discrimination at Work	An equally-weighted index composed of participants' responses to the questions: "At my workplace, I feel I am treated fairly," and "At my workplace, I feel that my wages or salary may unexpectedly decrease." Responses were: 1. Strongly Disagree (coded as -3); 2. Disagree (coded as -2); 3. Somewhat Disagree (coded as -1); 4. Neutral (coded as 0); 5. Somewhat Agree (coded as 1); 6. Agree (coded as 2); 7. Strongly Agree (coded as 3)
Strong Discrimination at Work	1 if the participant scores a 1 or above on the Discrimination at Work index from above.
Gay/Lesbian	Participants are denoted to the Gay/Lesbian subsample if they report "Yes" to "Do you consider yourself to be LGBTQ?"
Income	Self-reported annual income.
Education Group	Self-reported education level. 1. Less than high school; 2. High school; 3. Some college; 4. Two-year degree; 5. Four-year degree; 6. Professional degree; 7. Graduate/Master's degree; 8. Doctorate
Age Group	Self-reported age group. 1. 18-20; 2. 21-25; 3. 26-30; 4. 31-35; 5. 36-40; 6. 41-45; 7. 46-50; 8. 51-55; 9. 56-60; 10. 61-65; 11. 65+
Race	Self-reported response to "What race do you identify with?" 1. White; 2. African American; 3. Am. Indian or Alaska Native; 4. Asian; 5. Native Hawaiian or Pac. Islander; 6. Other; 7. Latino. Participants are assigned into the African American subsample if they report an answer of 2.
Change Jobs Frequently	Self-reported response to the question "I have changed jobs frequently." 1. Strongly Disagree; 2. Disagree; 3. Somewhat Disagree; 4. Neutral; 5. Somewhat Agree; 6. Agree; 7. Strongly Agree
Job Satisfaction	Self-reported response to the question "I am not happy at my current job." 1. Strongly Disagree; 2. Disagree; 3. Somewhat Disagree; 4. Neutral; 5. Somewhat Agree; 6. Agree; 7. Strongly Agree. Responses were recoded on a reverse scale for analysis.

B Representativeness of LATP

The NLSY and SCF are representative samples by construction. Next, we consider the representativeness of the LATP survey. Specifically, we compare the LATP and SCF with regard to stock market participation across different demographic groups. Table A.2 summarizes the stock market participation rates across the two data sets (i.e., the LATP and 2004 wave of the SCF). The participation rates between the data sets are similar. For example, stock market participation in the LATP is about 46.99%. This estimate is close to the participation rate in the SCF and consistent with the evidence in Hong, Kubik, and Stein (2004) and Bertaut and Starr-McCluer (2001).

We also break down the participation rates by age, education gender, race, and income, and we find that the distribution of the participation rates is similar between the LATP and SCF. For example, the whites (minority) participation rate is approximately 53.80% (24.56%) in the LATP and roughly 56.68% (25.95%) in the SCF. Furthermore, for households below the age of 45, the stock market participation in the LATP is 43.71%, whereas in the SCF is 45.83%. These estimates suggest that the LATP survey is representative of the U.S. households in terms of stock market participation, which is our variable of interest.

Table B1: Stock market participation rates

This table includes average stock market participation rates, in percent, in the LATP and SCF for various demographic groups.

Group	LATP	SCF 2004 wave
All	46.99	48.57
Age		
<= 45	43.71	45.83
46 - 65	58.32	56.83
65+	41.22	40.32
Education (years of schooling)		
< 12	16.20	13.60
= 12	40.91	39.74
> 12	60.21	63.44
Race		
White	53.80	56.68
Minority	24.56	25.95
Gender		
Male	56.54	54.43
Female	33.79	33.28
Income		
<= 50,000	27.45	28.25
> 50,000	62.25	74.92

C Imputation Models

We impute the income risk from the NLSY to the SCF and LATP. The SCF and LATP surveys are panel data sets. Thus, we cannot directly measure overall income risk with the standard deviation of income growth. Therefore, we compute a proxy of income risk based on the standard deviation of income growth from the NLSY. Our income risk imputation model is as follows:

$\sigma_{dy} =$	-0.00002 Income	+ 1.78e-10 Income^2	- 0.12 Male	+ 0.064 Minority
	(-38.93)	(29.24)	(-3.95)	(6.98)
	+ 0.12 Education	+ 0.08 Age	- 0.0013 Age^2	- 0.291
	(19.50)	(5.36)	(-5.26)	(-1.26)

D Income Forecast Task

In this section, we present the income forecasting task used in the online experiment. Specifically, Figure D1 shows the brief vignette used to characterize the experimental setting. Figure D2 presents the four income histories. For each history, participants were asked to report the most likely income for the hypothetical individual in the next period. The offset potential order effects, the display order of the income histories was randomized at the participant level.

Figure D.1: Income forecasting task vignette

This figure presents the vignette used to characterize the forecasting scenario.

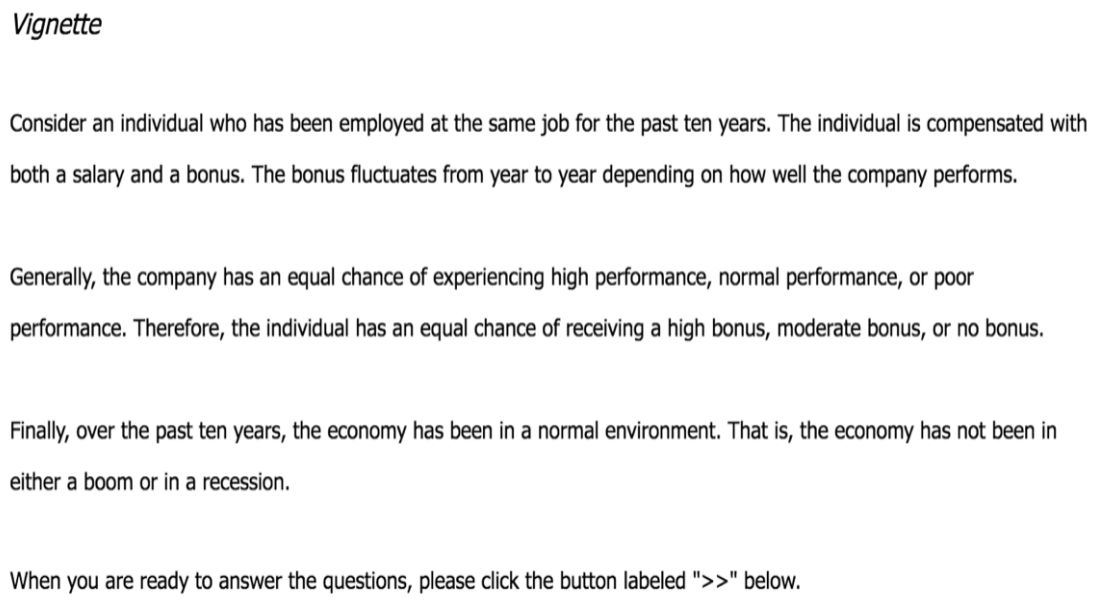

Figure D.2: Income histories

This figure shows the four income histories which participants used to forecast the hypothetical individual's next period income.

Below is the total income history of the individual over the past ten years (in thousands of $).

Year	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Total Income	48	61	22	58	43	57	11	48	35	28

Below is the total income history of the individual over the past ten years (in thousands of $).

Year	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Total Income	58	62	51	65	42	34	41	65	43	67

Below is the total income history of the individual over the past ten years (in thousands of $).

Year	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Total Income	31	92	48	67	105	81	21	45	127	72

Below is the total income history of the individual over the past ten years (in thousands of $).

Year	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Total Income	67	86	56	68	89	8	0	57	6	71