How Different are Smokers? An analysis based on personal finances

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Abstract: We study the association between smoking status and individual decisions, focusing on outcomes in the domain of personal finance. The study draws information on demographic variables, various financial outcomes including individual credit scores, time and risk preferences, and personality traits, from both population data and experimental data. The results suggest that smokers make poor decisions and experience worse outcomes with personal finances vis-à-vis non-smokers. This relationship is robust to controlling for a myriad of variables, including characteristics that are known to be correlated with smoking. Thus, smoking status contains more precise information about individuals that are not fully captured by available noisy economic and psychological measures. Since available estimates of personality traits have substantial measurement error, smoking status may effectively capture residual information.

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1. Introduction

There is ample evidence in the literature to support the view that smokers are different from non-smokers along multiple inherent characteristics that are relevant for economic decisions, such as time preference, risk preference, and impulsivity.[1] There are likely psychological factors related to smoking as well that would also be related to decision-making. Some researchers have linked smoking directly to risky behaviors, such as taking jobs with a greater chance of injury or a greater potential for job loss (Hersch and Pickton, 1995; Hersch and Viscusi, 1990, 2001). Others have gone as far as to use smoking status as an instrument with regard to human capital investments (Fersterer and Winter-Ebmer, 2003) and sorting into jobs with high chances of separation (Green and Heywood, 2011). To our knowledge, no study has determined whether the association between smoking and decision making runs through these known economic parameters or whether smoking itself contains information that makes it a valuable proxy for decision-making. In this paper, we look for such evidence by analyzing the association between smoking status and decisions and outcomes in the domain of personal finance.

Our goal here is not to establish a causal link running from smoking status to individuals' behaviors in the domain of finance. Rather, we aim to determine whether the association between

[1] For example, Fuchs (1982) found that time preference is positively correlated with years of smoking. A number of studies in experimental psychology (e.g., Bickel et. al 1999; Mitchell 1999; Reynolds 2006) similarly conclude that smokers discount future values at a higher rate than non-smokers or former smokers. Khwaja et. al (2007) report that those who are more impulsive and plan less for the future are more likely to smoke. In a more recent study Scharff and Viscusi (2011) conclude smokers have higher rates of time preference with respect to years of life. Barsky et. al. (1997), using data from the Health and Retirement Study, conclude that "individuals who have ever smoked are more risk tolerant than those who never smoked and those who smoke now are more risk tolerant than those who do not smoke now" (pp 551).

these two decisions are the manifestation of the differences between smokers and non-smokers in terms of a standard set of measurable characteristics (e.g, time preference, propensity toward risks, and/or major personality traits), as has been suggested by the literature, or smoking status contains valuable information about individuals that are not fully captured by standard economic and psychological measures. The latter would suggest that smoking should be included as a useful right-hand variable as a proxy for unobserved factors that lead to poor decision. We use information contained in two very different data sets containing information on demographics, preference and personality traits of smokers and non-smokers, together with information on individuals' personal finance outcomes.

Our focus on personal finance is not arbitrary. In the personal finance domain, individual decisions have a much larger role to play than in a job environment where additional factors such as health costs considerations, health externalities, and even a-priori beliefs and attitudes of employers and co-workers towards smokers are likely to influence outcomes. In addition, there exist theory-based guidelines predicting how individual characteristics are likely to show up in personal finance decisions and outcomes.[2] Keeping these in mind, we examine the association between financial outcomes and smoking status by first looking at a set of data that is drawn from a large-scale behavioral economics field study with 1,069 trainee truck drivers, combined with information about the behavior of subjects on the job for up to two years. A primary advantage of

[2] For example, an individual with a higher time discount factor and/or a higher tolerance toward risk will optimally choose a higher consumption path and will assign higher weight to current consumption, the effect of which is likely to be picked up by a higher use of available credit and/or by a lower debt repayment rate and a high debt-income ratio. The same outcome will transpire due to the lack of future planning or due to impulsive behavior towards consumption, as indicated in applications of the quasi-hyperbolic model of discounting. Collectively, these behaviors can be detrimental to perceived creditworthiness of the individual**.** In fact there is recent evidence (Arya et.al 2010) based on exploratory surveys that individuals' credit scores are correlated with measures of impulsivity and time preference.

these data are that they provide us with an opportunity to match smoking status with the actual outcome of financial decisions through credit scores (FICO-98 purchased from the Fair Isaac Corporation). Credit scores are based on a wide array of factors including individuals' payment habits, default histories, the frequencies of loan applications and approval rates, the credit use as a percentage of available credit, etc. In addition to providing a broad proxy for personal financial decisions, the data on truck drivers contain information which presents us with a rare opportunity to take the analysis beyond the conceptual framework of classical decision theory, which relies primarily on the differences in risk preferences and discount rates, to a broader conceptual framework offered by personality theory. Personality theory offers five (not necessarily orthogonal) broad dimensions governing human behavior that may also influence smoking and economic decision-making. These are neuroticism, extraversion, openness/intellect, agreeableness and conscientiousness. There is strong evidence that these personality traits perform equally, if not better, than socioeconomic status and IQ in predicting various life outcomes such as mortality, divorce and marital stability, educational and occupational attainments (Roberts et.al. 2007; Burks et.al 2009; Almlund et al. 2011; Becker et al. 2012).

Using these experimental data, we find that smoking is negatively correlated with willingness to delay rewards and conscientiousness. It is also positively correlated with willingness to take risks. These traits are also correlated with credit score. Naturally, we consider a model where latent variables, which measure these traits and preferences, affect both credit risk and smoking. Controlling for these variables does not exhaust the explanatory power of smoking status and there remains strong evidence that the residual information in smoking status is significant and substantial in predicting poor credit score. This could be due to the failures of survey based

estimates in capturing true preferences and personality traits. Alternately, it could be the case that smoking status may contain unexplored information on individuals that is not fully captured by standard economic and psychological measures. In either case, the results suggest that observed smoking behavior can be potentially useful to predict financial decision making if no or only imperfect measures of the deep determinants of financial decision making are available.

We supplement the above results on the basis of voluntarily disclosed information about smoking status and financial behaviors of individuals as reported in the National Longitudinal Survey of Youth (NLSY79). To our knowledge, this is the first attempt to use population survey data in linking smoking status to financial outcomes. Our analysis relates smoking to being denied credit, which is a proxy for poor financial health. We also test whether smoking is related to an unequivocally shortsighted and risky financial decision—missing a payment on a credit card or other bills. We also test whether smoking is related to carrying maximum balances on credits cards, as well as ultimately filing for bankruptcy. The evidence is again highly suggestive that smokers are different than non-smokers in terms of financial outcomes and financial decisions. This result remains robust after controlling for factors affecting both financial decisions and the decision to smoke.

The rest of the paper proceeds as follows. Section 2 describes the data used in the study. In Section 3, we present evidence of the link between smoking habit and poor financial decisions based on two sources of information. Section 4 concludes with some remarks.

2. Data

2.1 Truckers and Turnover Project (TTP) data and measurement of key variables

The Truckers and Turnover project is a statistical case study of a single large trucking firm and its driver employees yielding information on demographics, risk and loss aversion, time preference, non-verbal IQ, and a Multidimensional Personality Questionnaire (MPQ, Tellegen 1982) personality profile. The experimental design and data set are presented in detail in Burks et. al. (2009). Data were gathered between December 2005 and August 2006 from 1,069 truck driver trainees at a Midwestern training facility with participation rate of 91 per cent. Some of these data were collected using choice tasks where participants took part in two separate two-hour sessions in group sizes ranging from 18-30. Participants had monetary incentives in all of the experimental components and were paid a show-up fee of $10 at the beginning of each of the two sessions. Subjects earned between $21 and $168 in total over the two sessions, with an average of $53. In Table 1 we present the correlation between some of the key variables that are included in the TTP data.

Smoking Habit

The TTP data do not rely on the voluntarily disclosed information about smoking habit. Instead, the data contain information on whether the driver trainee is a smoker by keeping track of the room reservation made by subjects at the hotel in the city where the training took place. We classify the subject as a smoker if he/she chose a "smoking" room, and as a non-smoker if a "non-smoking" room was chosen; a missing observation is created in all other cases. As before, we use an indicator of smoker as our key variable of interest.

Credit Score

One primary advantage of TTP data is that it provides us with an opportunity to match smoking status with the actual outcome of financial decisions through credit scores (FICO-98, purchased from the Fair Isaac Corporation). This information is available because each trainee signed a legal agreement committing to pay back the commercial cost of the training if they do not complete one year of service after training. The data contain credit score information of 942 trainees distributed over nearly the full nominal range of possible scores (407 to 821 out of a nominal range of 300 to 850), with a mean of 588.4, SD = 93.2, median = 567. The national median value was around 723 at the time of the data collection (Board of Governors, 2007). The distribution of credit score approximately fits the log-normal distribution.

Economic preferences: Delay and Risk parameters

We extract information on the attitude towards risk from choices made in a laboratory experiment where subjects were presented with four blocks of choices. In each block, the subjects were asked to choose six times between a lottery giving two outcomes with equal probability and a certain amount. In two ``gains'' blocks the lottery outcomes were both positive whereas in the other two ``loss'' blocks the outcomes were one positive and one negative. Lottery outcomes were 2 and 10 dollars in one gains block, and 1 and 5 in the other. Equivalent amounts were 5 and -1, and -5 and 1 dollar in the loss blocks. The certain amount varied between a low amount larger than the worse outcome and a higher amount, slightly larger than the expected value of the lottery. After all subjects made their decisions, a random draw determined one of the 24 lotteries and the win-lose criteria based on which the payments were made to the subjects.

To estimate time preferences, subjects were asked to choose seven times between an earlier smaller payment and a later larger payment. The choices were today vs. tomorrow, today vs. six days from today, two days from today vs. six days from today, and two days from today vs. four weeks and two days from today. Two subjects in each experimental session were selected at random and paid for one of their randomly selected choices. At the time of payments, subjects were at the training school except for the longest-delayed payments, so the payment could be made at the appropriate time on site; this fact substantially reduces a possible confound introduced by the cost to collect payment for options with non-immediate payment. We recognize the possibility of using various measures of risk and discount in our analysis. These measures are examined and discussed in Burks et. al. (2009). Here we use a measure that relies in a minimal way on assumptions on preferences of subjects. Specifically, *Risk Acceptance* is defined as the number of times the subject chose a lottery over the certain amount in the gain choices; *Delay Acceptance* is the number of times the subject choose a delayed payment over an immediate payment. The difference between these measures of attitude to risk and the other possible measures are small. For example, the correlation between Risk Acceptance and the Coefficient of Risk Aversion is $r = -0.968$, ($p < 0.0001$).

Choices made by subjects may be more or less consistent with basic rationality requirements; for instance they may fail to satisfy transitivity. To measure the deviations from transitivity we constructed two measures of inconsistency, one for choices under risk and the other for time choices; they both take value in the unit interval. For each block of the risky choices, we order the safe amount in increasing values, and we compute an index which is one if and only if the subject switches between the safe and risky option at most once, and zero

otherwise. Risk consistency is the average value of such index over the four blocks. The Time consistency index is constructed similarly for the time choices.

The average value of the Risk consistency is 0.952, and for Time consistency is 0.954. As expected, the two indices are correlated ($r = 0.378$, $p < 0.0001$) , and they are correlated with the Cognitive Skill index we describe below ($r = 0.21$, $p < 0.0001$ for the Risk, and $r = 0.19$, $p < 0.0001$ for the Time). [3]

Personality Traits

For personality traits, we use the short form of the Multidimensional Personality Questionnaire (MPQ), which consists of 11 trait scales (Tellegen 1982; Tellegen and Waller 2008). A more widely used categorization of personality traits is one based on the Big Five factors, namely Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. It is now well established that the MPQ scales can be mapped onto the Big Five; indeed, a factor analysis of the MPQ along with four other personality inventories (only one being a purpose-built Big Five instrument) revealed that the Big Five structure underlies all of these inventories (Markon et al., 2005). Thus, we derive our Big Five personality trait measures from the MPQ along lines that are by now standard, with the exception of the two subscales for the Proactive and Inhibitive sides of Conscientiousness. The Conscientiousness index we use here is an average obtained by combining

[3] Adding the time inconsistency and risk inconsistency as controls to our analyses do not seem to add independent information beyond what is already captured by other variables (such as Cognitive Skills). The results are available upon request.

scores in the Control MPQ scale and several other related survey questions. We first construct a score for the Inhibitive side of Conscientiousness (obtained as the sum of the scores of five MPQ Control scale items) and a score for the Proactive side index (obtained as the sum of seven items, two from the MPQ Achievement scale, one from the MPQ Validity scale and four from a Risk and Impatience scale.). We then combine the two with equal weight.

A higher value of the Conscientiousness index is associated with higher degree of top-down control and an ability to follow rules and pursue non-immediate goals. The Neuroticism scale is the score on the questions on the Stress Reaction MPQ-trait. A higher value on this scale is associated with higher reactivity to threats and punishments. We derive the Agreeableness scale as a reverse of the Aggression scale in MPQ, where a higher score is associated with a higher cooperation versus exploitation of the others. The Extraversion scale is derived as the sum of the Social Potency and the Social Closeness MPQ scales, where a higher value represents higher sensitivity to rewards. Finally we use an index of cognitive skills based on Raven matrices (Raven et. al., 2000) as our measure of the Openness/Intellect trait. This measure, based on a task rather than a survey, is more precise than the one based on survey questionnaires (DeYoung, 2011). The five personality trait measures fit the normal distribution approximately, with slight negative skew and a mean between 0.4 and 0.7, and standard deviation between 0.11 and 0.30.

Cognitive skills (CS) were measured in three different tasks. The first was a subset of Raven's Standard Progressive Matrices (SPM), a measure of non-verbal IQ (Raven et. al., 2000). Subjects were required to choose, out of a set of small patterned shapes, the one that matches a gap in a larger patterned shape. The second task was part of a standard test for adults of quantitative literacy, or "numeracy," from the Educational Testing Service where subjects were asked to

interpret text and diagrams containing numerical information and to do arithmetic calculations for answering the questions. For these two exercises, two subjects in each group were selected at random and were paid for the correct answers. The third measure was constructed from a simple game, called Hit 15, which the subjects played against the computer using alternative moves. The subjects' goal in the game was to reach a total of 15 from a varying initial number less than 15, to which the player or the computer had to add between 1 and 3 points on each round. In this task, all subjects were paid for each round they won. We construct the Cognitive Skill Index (CSI) as the first factor in the factor analysis of the Raven's score, the Numeracy score, and the score in the Hit 15 game.[4]

There is wide agreement in the literature that personality measurements are noisy; this is true in particular for variables (such as those we collect with the MPQ) that are based on surveys, as compared to those based on performance in a task with appropriate incentives (such as the measurements of cognitive skills (Raven and Hit 15). If we view smoking as a measurement next to others, providing information on personality traits, preferences and skills, then this variable is probably less noisy than the others.

[4] As an alternative, we have also included these three measures separately as controls. The analysis does not yield results that are significantly different from what we present in the paper. The results are, however, available upon request.

Other Controls

The TTP data contain detailed information about various demographic characteristics of the subjects. Among these, we include information on gender, age, ethnicity, marital status, education and income. For ethnic background and for marital status, we use 'White' and 'Married' as the omitted categories, respectively. The information on education is represented by the following dummy variables: 'Less than high school', 'Some college', 'College (graduate) or more', with 'high school' being the omitted category. Finally, 'Other Income' measures the income that the subjects made outside the prospective job at the firm.

2.2 NLSY79 Data and measurement of key variables

We also employ the National Longitudinal Survey of Youth (NLSY79) for additional analyses. The NLSY79 is a stratified ongoing multistage nationally representative sample that was started in 1979 by the US Department of Labor. This sample has tracked lives of thousands of young men and women who were 14-22 years old when they were first surveyed in 1979. A brief description of the variables used in the analyses is given below.

Smoking Status

In the years 1992, 1994, and again in 1998, NLSY79 respondents were asked if they had smoked at least 100 cigarettes throughout their lives. This is self-reported, rather than observed through choice of a smoking run in the TTP. If they stated yes, they were asked if they smoked on a daily basis. Based on the responses, we divide our sample into two distinct groups— daily smokers and non-smokers. The non-smokers are those who in 1998 reported not ever smoking or smoking

fewer than 100 cigarettes during their life time. We classify daily smokers as those who reported smoking on a daily basis in all the three years.[5] Table 2 summarizes the variables in our analysis separated by smoking status. We remove variables for which insufficient information exists for smoking and the variables described below and use the NLSY79 sampling weights in all estimations. We are left with 484 smokers and 1,587 non-smokers. We use an indicator of smoker as our key variable of interest in most specifications.

Financial Outcomes and Behavior

We look at four variables that can be considered measures of either personal finance decision-making or outcomes. We first look at whether one was denied credit in the previous five years. Specifically, in 2004 respondents were asked whether in the last five years, a lender or a creditor turned down the respondents' and/or their spouse/partner's request for credit or not given as much credit as they applied for. Also, they were asked whether during the same period, the respondents and/or their spouse/partner thought about applying for credit, but changed their mind because they thought that they might be turned down. Based on the responses, we create a dummy variable with a value equal to 1 when a respondent answers "yes" to either of the two questions. For our other summary measure, we construct a dummy variable based on individuals' responses in the 2004

[5] We have also explored another category – occasional smokers – as those who reported smoking occasionally. Unfortunately, there are less than 50 cases where an individual has reported such status in all the three years. As an alternative, we classified an individual as an occasional smoker if the individual has reported smoking occasionally during at least one of the three survey years. Not surprisingly, the results for this group is no different from the non-smoker category and we do not report the results for occasional smokers separately. However, the results are available upon request.

survey about whether they or their spouse/partners have ever declared bankruptcy. Both credit denial and bankruptcy show a high degree of correlation with smoking status in Table 2.

Recognizing that these outcomes might be the result of a number of factors within and outside of the control of respondents, we also utilize additional information available in the NLSY79 concerning particular behaviors with regard to personal finances. Specifically, in the year 2004, respondents were asked if in the last five years, they have completely missed a payment or been at least two months late in paying any of their bills. We use responses to this question to construct a dummy variable. We think that failure to pay a credit card or other bill is likely one of the most questionable behaviors one can take with their personal finances. One trades the admittedly small inconvenience of missing a payment with the extreme penalties associated with credit score reductions. It also increases the probability of being unable to obtain credit at a later date, thereby exposing oneself to risk. Table 2 shows that 31% of smokers miss payments, but less than 16% of non-smokers miss payments.

In the same year, respondents were asked in how many credit cards they owe the maximum amount allowed by the credit card company. Based on these responses, we create a dummy variable that assumes value equal to one when individuals report having at least one credit card on which the balance has reached the maximum allowable credit limit. Maintaining the maximum balance on a credit card bares risk and could be the result of an impulsiveness decision and/or higher preference towards current consumption. At the same time, we recognize that some people strategically use the limits on their credit cards as a part of their financial planning. These countervailing effects are exhibited in the raw data as 14% of smokers carry the maximum on their credit cards relative to 9% of nonsmokers, a smaller gap than was the case with missed payments.

Measurement of basic demographic control variables

Our basic control variables include age, age-squared, gender, and race (black and other race vs. non-white). We also include a control for cognitive ability, as measured by one's percentile score on the Armed Services Qualification Test (AFQT), which was administered to all NLSY79 respondents in 1980 when they were between the ages of 15 and 23. The AFQT is a composite measure of word knowledge, paragraph competition, mathematical knowledge, and paragraph comprehension. The measure has been widely used by economists.[6] In fact, Agarwal and Mazumder (2012) recently showed that those with lower AFQT scores make poorer household financial decisions. We use the AFQT percentiles based on revised 1989 Department of Defense testing. We also adjust the percentiles by age since some previous evidence suggests an age-gradient in AFQT scores.[7] We suspect this variable to be exogenous should it measure some innate cognitive ability prior to an individual beginning smoking or handling his or her own finances.

Other Control Variables

The remaining controls listed in Table 2 are likely important determinants of financial health, but are also likely endogenous. Arguably the least problematic are employment shocks, which we construct from the work histories of NLSY79 respondents. We measure employment shocks by using information on unemployment, which is available for the entire history of the survey. We

[6] See, for example, Belley and Lochner (2007) and Bhattacharya and Mazumder (2011), for recent examples.
[7] See Cascio and Lewis (2006) for a more detailed discussion.

define an individual experiencing an employment shock if he is unemployed just for a year during his life span and if the duration of this unemployment status is between 26 and 52 weeks.

Among the other control variables, we include current health status, average annual income, educational attainment, and marital status. Our measure of health status is an indicator for a respondent being in fair or poor health, as opposed to being in good, very good, or excellent health. The correlation between self-reported health and smoking status in Table 2 is strong. Information on family income is available throughout the sample period. In the income measure, we include the log of average net family income for the period 1984-2003 calculated in 2005 dollars. Income is higher among non-smokers according to Table 2. For the education variable, we use information about the highest grade completed in years as of May 2004 and create two dummy variables–one representing completion of 16 years (approximating a college education) and the other representing 17 or more years (approximating an advanced degree). Information regarding respondents' marital status—single, married, divorced, or separated—are available throughout the history of the survey. Based on this information, we create two dummy variables representing divorced and separated status. In each case, the variable assumes a value equal to one if a respondent has experienced the corresponding status at least once during the entire history of the survey. Table 2 shows that smokers are less educated and the frequency of divorce and separation is more among the smokers.

Although these variables may be linked to smoking decision and financial outcomes through subjective discount rates, the propensity to take risk, or other unobservable traits of smokers, they

may not completely capture these parameters.[8] With this in mind, we add risk and time preference measures to our analysis. During 1993 wave of interviews, individuals were asked about their preference regarding switching from a job with a certain current income to another job which with a 50-50 chance will double their income or will lower their income by a third. Depending on the initial responses, the percentage losses were then set at either 20% or 50%. Based on the responses, we classify individuals into four different categories of risk preferences.[9] Category 1 represents individuals with least affinity toward risk. Whereas, category 4 includes individuals with highest propensity toward risk taking. Similarly, during 2006 wave of interviews, individuals were presented with a task of choosing an amount for which they are indifferent between receiving $1000 today versus receiving the asked amount in a month time or in one year into the future. From these responses, we follow Courtemanche et al. (2014) to construct variables reflecting long-run patience (δ) and time-inconsistent impulsivity and present bias (exhibited by $\beta < 1$).

3. Results

3.1 Estimates of the relationship between smoking and personal finance decisions: TTP Data

As a first pass, we regress smoking status on an individual's credit score after controlling for a variety of factors such as gender, race, marital status, age, education, and income. The results based on the TTP data indicate a significant negative association between credit score and smoking status. Naturally, this result could be due the presence of latent variables that in some combination

[8] For example, health investments are expected to be highly negatively correlated with discount rates and risk taking (Grossman 1972). Educational investments could be more likely among those with low discount rates. Also, risk taking and impulsivity could be factors underlying the decisions to divorce or separate.
[9] Please refer to Spivey (2010) for a similar treatment.

capture traits or preferences affecting both credit risks and smoking habits. The TTP data include direct measures of a large set of preference and trait variables and therefore present us with a rare opportunity to identify and control these latent variables in a more direct and precise manner. The Table 1 correlation matrix suggests a common set of factors (e.g. income, delay acceptance, and conscientiousness), which are significantly correlated with both smoking habit and finance outcomes. We include these controls and others in various combinations and report the results in Column 2 of Table 3. The results indicate that the effect of smoking on credit score is significant ($p < 0.001$ in all models) even after controlling for a large set of variables that seem naturally associated with credit scores. To make the interpretation of the effect size easier, we also considered the regression with dependent variable equal to the raw credit score (rather than the log transform as shown in Table 3)) in the sample. The credit score in the sample of subjects for whom it is available has mean 588.1 and standard deviation of 93.2. The effect of being a smoker is a reduction of approximately 35 points of the total score in all models. The effect is large, especially if one considers that the effect of an additional one thousand dollars in income on credit score is three tenth of one percentage point.

To isolate the effects of smoking on credit score more clearly, we compare the results in in the first two columns to the case where we exclude smoking status as a control. The comparison yields some noteworthy observations. For example, including smoking as a control in table 3 does not cause any noticeable change in the signs, sizes and the significance of the demographic variables. The same holds for most of the traits and preference variables such as cognitive skills, neuroticism, risk, and the delay acceptance. We observe some changes in either sizes and/or significance in the case of the extraversion and conscientiousness variables indicating a possibility

that these traits could be mediating the association between the smoking status and financial outcomes. However, the stability of the smoking coefficient across Columns 1 and 2 of the Table 3 convinces us otherwise.

We recognize that the measures of economic preferences and (to an even larger extent) personality traits estimated with surveys are usually noisy. Therefore, it is quite possible that the robust effects of smoking status throughout the analysis is due to the smoking habit variable capturing information on those characteristics which economic and psychological measures intend to capture, but have failed to do so. If this is true, then for the purpose of providing predictions, smoking habit is likely to give useful information and its informal use in personnel decisions might be justified. A different possibility is that there are important unexplored characteristics of stable individual behavior that are expressed in smoking, as well as in financial performance, which are not captured by available standard personality and economic preferences measures. Ultimately which of the two possibilities is true will be resolved when more precise measures of personality traits will be available and will be based on actual behaviors rather than of self-reports in surveys.

3.2 Estimates of the relationship between smoking and personal finance decisions: NLSY79 Data

NLSY79 covers a representative sample of the population that allows us to average out idiosyncrasies and control for variables (e.g., unemployment shocks) whose construction requires time variant information. At the same time we recognize that it has its shortcomings and leaves several questions open. In particular, the financial variables in the NLSY79 are admittedly narrow proxies for the health of one's personal finances. Reliability of the voluntarily disclosed

information about financial behaviors could also be a concern. Given these, we present results in this section only as an additional support to previous results obtained using the TTP data.

We use a probit model, first controlling for fixed demographic characteristics which are predetermined with regard to the smoking decision. After adding these controls, we control for cognitive ability, which perhaps influences smoking and economic decision making. The results in the first two columns of Table 4 suggest a positive and significant effect of smoking on credit denials. The marginal effects, evaluated at sample means, in the bottom row show a 14.9-19.2 percentage point increase in the likelihood of being denied credit, depending on whether AFQT controls are included. This corresponds to nearly a doubling of credit denials for smokers compared with non-smokers. The effect of cognitive ability on decision making is consistent with the recent work of Agarwal and Mazumder (2012) as those with lower cognition are more likely to exhibit poorer financial health.

In Column (3) we add the controls that likely to vary with smoking status but also likely to play a role in financial decisions. Specifically, controls for log of average earnings over the sample period, self-reported poor health, marital status and education are added, which we suspect are highly related to both smoking and financial decisions. We also add the variable for employment shock.[10] Each variable behaves as expected, and the effect of smoking is cut in half. Again, we suspect much meaningful variation is held constant once these variables are added. For example, education and income likely are related to discount rates. In Columns (4) we include risk and discount variables directly in the specification with no significant change in the smoking

[10] We also constructed a measure of assets using the NLSY79, but the loss of sample size caused by missing data could not justify inclusion of these in the main results. We do, however, note that the inclusion of this information did not substantively alter the conclusions of the paper.

coefficient. Columns (3) and (4) offer support to our earlier results that that smoking habit contains information that is not captured by variables which commonly are used to predict financial decisions. Note also that risk has a positive effect on credit denials. The variable capturing the time-inconsistent impulsivity (low β) has a negative effect on credit denials. That is, impulsive people are denied credit more often.

In Table 4 we also provide estimates of the effect of smoking on alternative outcomes. The first alternative financial outcome we explore is a dummy variable indicating a missed credit card or bill payment. The pattern of results for this financial variable follows that for being denied credit closely. The final financial variable in the NLSY79 that we use is an indicator of the respondent having filed for bankruptcy. In all cases, the probit results are largely in line with the results for being denied credit. Together, these results offer evidence in support of the fact that smokers make poorer personal finance decisions. Indeed, part of this relationship is somewhat explained by adding controls that are likely to capture information about individual characteristics including discount rates and risk preferences. Still, smoking status continues to play important role in explaining all financial outcomes. Significantly, this pattern prevails even when the explanatory powers of other covariates (e.g. income, marital status, health etc.) vary across different categories of financial outcomes.

6. Conclusion

Today, in addition to facing health risks, smokers face a stigma that is growing rapidly against them in society (Stuber et. al 2008, 2009). There is evidence suggestive of differential treatment in work environments through reduced wages (Levine et. al 1997; Auld 2005; Grafova and

Stafford 2009) and lower perceptions of job performance (Gilbert et.al 1998). There is even a growing trend among employers to adopt policies that make smoking a reason to turn away job applicants. For example, hospitals in a number of states including Florida, Georgia, Massachusetts, Ohio, Pennsylvania, Tennessee and Texas stopped hiring smokers and more are openly considering the option.[11] There are a number of direct explanations for this differential treatment of smokers including well-publicized negative health externalities through second hand smoke, higher rates of disability, higher rates of absenteeism (Halpern et al 2001; Bunn et al. 2006.), higher cost of health of health insurance, etc. It is also possible that the differential treatment of smoker is partly due to manifestation of a belief that an individual's decision to smoke indicates poor decisions (in the health domain) driven by a set of underlying characteristics which make poor decisions likely in other spheres of life, including in the work environments. Here we offer evidence that smoking status is indeed correlated with poor outcomes in the domain of personal finance where individual decisions play a significant role.

In our analysis, we consider the potential role of various personality traits and economic preferences as driving both smoking status and individual financial health. Our main conclusion is that smoking habit has an important and independent ability to predict behavior even after we control for variables that might be considered the true source of the poor performance in personal finances. After controlling for economic preferences and personality traits we find that there is residual information in smoking status that can help predict credit score, and the size of this residual information is substantial. We supplement this result with information drawn from the

[11] "Hospitals Shift Smoking Bans to Smoker Ban" The New York Times, February 10, 2011.

widely used NLSY79 data set. Collectively, the results indicate that smoking status contains more precise information on individuals than what is available in the standard economic and psychological measures. This is either due to the noise in the available data or it is due to a possibility that there may exist important unexplored characteristics of stable individual behavior that are expressed in smoking, as well as in financial performance, but are not captured by standard personality and economic preferences measures. If the latter is true then determining the identity of these factors and how their effects are channeled through smoking is important to understand, and we leave this as our future research agenda.

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Table 1
TTP Data: Correlation among Smoking habit and personality traits.

Note: The correlations are only reported for individuals for whom Credit Score is available; we report in parenthesis the p-value.

	Credit Sc.	**Smoking**	**O. Income**	**Cog. Skills**	**Extrav.**	**Neurot.**	**Consc.**	**D. Acc.**
Smoke	-0.2441	1						
	(0.000)							
Other Income	0.1057	-0.0897	1					
	(0.0012)	*(0.0309)*						
Cognitive Skills	0.0906	-0.0213	-0.0179	1				
	(0.0111)	*(0.6363)*	*(0.617)*					
Extraversion	-0.0861	-0.0222	0.0893	0.0057	1			
	(0.0082)	*(0.5939)*	*(0.006)*	*(0.8735)*				
Neuroticism	0.0378	0.0149	-0.0567	-0.063	-0.3288	1		
	(0.2453)	*(0.7192)*	*(0.0815)*	*(0.0774)*	*(0.000)*			
Conscientiousness	-0.0823	-0.0795	0.0193	-0.0669	0.2891	-0.4193	1	
	(0.0129)	*(0.0582)*	*(0.5604)*	*(0.0644)*	*(0.000)*	*(0.000)*		
Delay Acceptance	0.2002	-0.1544	0.0127	0.2246	-0.0155	-0.0135	-0.0124	
	(0.000)	*(0.0002)*	*(0.6972)*	*(0.000)*	*(0.633)*	*(0.6782)*	*(0.7073)*	
Risk Acceptance	-0.0119	0.0628	-0.008	-0.0273	-0.0283	-0.0307	-0.0345	0.0443
	(0.7161)	*(0.1302)*	*(0.8062)*	*(0.4439)*	*(0.3845)*	*(0.3448)*	*(0.2965)*	*(0.173)*

Table 2
NLSY79 Data: Summary statistics for relevant variables

	Daily Smokers	Non-smokers
Financial variables:		
Denied credit	0.410	0.235
Filed for bankruptcy	0.270	0.136
Missed payment on credit card	0.301	0.157
Maxed out a credit card	0.145	0.092
Basic exogenous controls:		
Age	41.04	40.94
Black	0.099	0.110
Other race (non-white)	0.026	0.044
Female	0.512	0.487
Cognitive ability controls:		
Lowest age-adjusted AFQT quartile	0.227	0.121
Second age-adjusted AFQT quartile	0.312	0.195
Third age-adjusted AFQT quartile	0.299	0.283
Highest age-adjusted AFQT quartile	0.162	0.402
Other potentially endogenous controls:		
Log of average annual earnings	10.58	11.00
Currently in fair or poor health	0.306	0.191
Sixteen years of education	0.076	0.205
Seventeen or more years of education	0.020	0.209
Employment shock	0.050	0.040
Never married	0.109	0.085
Separated	0.371	0.184
Divorced	0.468	0.281
Economic parameters		
Risk preference	2.12	2.18
Beta	0.783	0.812
Delta	0.709	0.753
Sample size	484	1587

Note: Reported are the weighted means or proportions of the sample variable. The sample consists of daily smokers (those smoking daily in the 1992, 1994, and 1998 supplements) and non-smokers (those who have smoked fewer than 100 cigarettes in their lifetime).

Table 3
TTP Data: Determinants of log of credit score, including smoking habit

	(1)	(2)	(3)	(4)
Smoke	-0.0644***	-0.0598***		
	(1.36e-07)	(1.18e-05)		
Female	-0.0113	-0.00831	0.000375	-0.00454
	(0.556)	(0.688)	(0.981)	(0.786)
African-American	-0.111***	-0.0765***	-0.101***	-0.0793***
	(2.94e-09)	(0.000485)	(0)	(2.59e-06)
Native American	-0.0437	-0.0272	-0.0370	-0.0450
	(0.245)	(0.546)	(0.237)	(0.216)
Asian	-0.0505	-0.0729	-0.0555	-0.0636
	(0.433)	(0.401)	(0.280)	(0.329)
Latino	-0.00419	0.0357	-0.00331	0.0143
	(0.909)	(0.390)	(0.919)	(0.713)
Multiethnic	-0.112	-0.0574	0.0135	0.00750
	(0.118)	(0.519)	(0.760)	(0.901)
Separated	0.00865	0.0214	-0.0320	-0.0152
	(0.792)	(0.548)	(0.190)	(0.589)
Divorced	-0.0326*	-0.0331*	-0.0298**	-0.0359**
	(0.0602)	(0.0788)	(0.0269)	(0.0137)
Never married	0.0113	0.0183	0.0122	0.0171
	(0.439)	(0.262)	(0.316)	(0.207)
Age	0.00213*	0.00202	0.00192**	0.00183*
	(0.0560)	(0.102)	(0.0341)	(0.0703)
Age-squared	5.88e-05	7.39e-05	9.92e-05**	0.000104**
	(0.227)	(0.170)	(0.0107)	(0.0138)
Some College	0.0134	-0.00669	0.0163*	-4.62e-05
	(0.277)	(0.650)	(0.0998)	(0.997)
College or more	0.0740***	0.0418	0.0790***	0.0509**
	(0.00163)	(0.105)	(1.28e-05)	(0.0110)
Other Income	7.17e-07**	5.16e-07	6.05e-07**	5.67e-07**
	(0.0125)	(0.102)	(0.0102)	(0.0279)
Cognitive Skill		0.0659		0.0523
		(0.110)		(0.110)
Extraversion		-0.0841		-0.124**
		(0.175)		(0.0120)
Neuroticism		-0.0196		-0.0545
		(0.680)		(0.154)
Conscientiousness		-0.0621		-0.0974**
		(0.225)		(0.0158)
Agreeableness		0.00224		0.0264
		(0.961)		(0.478)
Delay Acceptance		0.0657***		0.0593***
		(0.00426)		(0.00107)
Risk Acceptance		0.00761		-0.00703
		(0.803)		(0.765)
Observations	577	484	942	763
R-squared	0.199	0.211	0.160	0.191

Note: Each column is from a separate regression, with coefficient and p-values reported in parentheses. ***, **, and * represent significance at the .10, .05, and .01 level, respectively.

Table 4
NLSY79 Data: Determinants of Financial outcomes

	Being denied a credit card				Missed a	Maxed a	Filed for
	(1)	(2)	(3)	(4)	a payment	credit card	bankruptcy
Daily smoker	0.547***	0.430***	0.174**	0.172**	0.2837***	0.1830*	0.2976***
	(0.000)	(0.000)	(0.043)	(0.046)	(0.001)	(0.077)	(0.001)
Basic exogenous controls:							
Age	-0.734	-0.688**	-1.089*	-0.994	0.228	-0.017	-1.125*
	(0.201)	(0.024)	(0.076)	(0.106)	(0.772)	(0.980)	(0.078)
Age-squared	0.009	0.008	0.004*	0.012	-0.002	0.000	0.013*
	(0.219)	(0.261)	(0.083)	(0.113)	(0.714)	(0.995)	(0.084)
Black	0.889***	0.645***	0.561***	0.539***	0.388***	0.228**	0.351***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.038)	(0.000)
Other race (non-white)	0.542***	0.395***	0.335***	0.329**	0.248**	0.407***	0.194
	(0.000)	(0.001)	(0.009)	(0.011)	(0.046)	(0.003)	(0.214)
Female	-0.031	-0.054	-0.223***	-0.218***	0.656	0.036	-0.228
	(0.652)	(0.442)	(0.003)	(0.004)	(0.391)	(0.689)	(0.776)
Cognitive ability controls:							
Lowest age-adjusted AFQT quartile		0.675***	0.198	0.174	0.141	0.033	0.116
		(0.000)	(0.147)	(0.210)	(0.342)	(0.841)	(0.445)
Second age-adjusted AFQT quartile		0.443***	0.143	0.127	0.241**	0.077	0.170
		(0.000)	(0.225)	(0.283)	(0.045)	(0.594)	(0.190)
Third age-adjusted AFQT quartile		0.129	-0.055	-0.058	0.053	-0.221*	0.083
		(0.183)	(0.600)	(0.583)	(0.628)	(0.087)	(0.482)
Other potentially endogenous controls:							
Average annual earnings			-0.475***	-0.470***	-0.238***	-0.0588	-0.039***
			(0.000)	(0.000)	(0.002)	(0.486)	(0.625)
Currently in fair or poor health			0.373***	0.379***	0.362***	-0.068	0.252***
			(0.000)	(0.000)	(0.000)	(0.536)	(0.008)
College graduate			-0.082	-0.088	0.053	-0.248	-0.160
			(0.477)	(0.453)	(0.661)	(0.104)	(0.213)
Advanced degree			-0.102	-0.103	-0.195	-0.081	-0.266*
			(0.434)	(0.428)	(0.151)	(0.582)	(0.065)
Employment shock			0.146	0.140	-0.160	0.337*	-0.163
			(0.390)	(0.415)	(0.409)	(0.081)	(0.419)
Never married			0.169	0.154	-0.204	-0.065	-0.211
			(0.177)	(0.214)	(0.121)	(0.673)	(0.181)
Separated			0.283***	0.297***	0.145	0.138	0.224**
			(0.004)	(0.003)	(0.139)	(0.252)	(0.034)
Divorced			0.258***	0.244***	0.026	0.060	0.345***
			(0.006)	(0.009)	(0.786)	(0.585)	(0.000)
Economic parameters							
Risk preference				0.075**	0.045	0.037	-0.010
				(0.013)	(0.142)	(0.036)	(0.752)
Beta				-0.369**	-0.258	-0.407**	0.036
				(0.029)	(0.115)	(0.027)	(0.848)
Delta				-0.056	-0.078	-0.085	0.028
				(0.604)	(0.481)	(0.514)	(0.806)
Pseudo R-squared	0.068	0.091	0.158	0.164	0.094	0.048	0.090
Marginal effects of smoking	0.192	0.149	0.057	0.056	0.077	0.033	0.074

Note: Each column is from a separate regression with 2,071 observations. NLSY79 sampling weights are used. Coefficients and p-values are reported, with marginal effects of smoking evaluated at sample means and reported in the final row. ***, **, and * represent significance at the .10, .05, and .01 level, respectively.