CENTRE for ECONOMIC PERFORMANCE

CEP Discussion Paper No 1228

July 2013

Winning Big But Feeling No Better? The Effect of Lottery Prizes on Physical and Mental Health

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Abstract

We use British panel data to determine the exogenous impact of income on a number of individual health outcomes: general health status, mental health, physical health problems, and health behaviors (drinking and smoking). Lottery winnings allow us to make causal statements regarding the effect of income on health, as the amount won by winners is largely exogenous. Positive income shocks have no significant effect on self-assessed overall health, but a large positive effect on mental health. This result seems paradoxical on two levels. First, there is a well-known gradient in health status in cross-section data, and, second, general health should partly reflect mental health, so that we may expect both variables to move in the same direction. We propose a solution to the first apparent paradox by underlining the endogeneity of income. For the second, we show that lottery winnings are also associated with more smoking and social drinking. General health will reflect both mental health and the effect of these behaviors, and so may not improve following a positive income shock.

JEL Classifications*:* D1, I1, I3
Keywords*:* Income; self-assessed health; mental health; smoking; drinking

Conflict of interest: none declared.

This paper was produced as part of the Centre's Wellbeing Programme. The Centre for Economic Performance is financed by the Economic and Social Research Council.

Acknowledgements

Data from the British Household Panel Survey (BHPS) were supplied by the ESRC Data Archive. Neither the original collectors of the data nor the Archive bear any responsibility for the analysis or interpretations presented here. Financial support from the US National Institute on Aging (Grant R01AG040640) is gratefully acknowledged. We thank Christophe Chamley, Thierry Debrand, Brigitte Dormont, Fabrice Etilé, Pierre-Yves Geoffard, Hugh Gravelle, Florence Jusot, Nicolai Kristensen, Zeynep Or, Andrew Oswald, Lionel Page, Ronnie Schoeb, Hannes Schwandt, Jim Taylor and many seminar and conference participants for useful comments.

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Published by
Centre for Economic Performance
London School of Economics and Political Science
Houghton Street
London WC2A 2AE

1 Introduction

The relationship between individual income and health is the subject of what is by now a very substantial literature, with the broad finding that higher socio-economic status is associated with better health. This kind of relationship has now been identified in a large number of countries and for a wide variety of health variables (Deaton, 2010; Deaton and Paxson, 1999; Marmot and Bobak, 2000; Van Doorslaer et al., 1997; Winkleby et al., 1992).

While this association does indeed appear to be widespread, there is less common ground regarding its causal interpretation. That income, or socio-economic status more broadly, be correlated with health may indeed reflect a causal effect of the former on the latter. However, it is entirely possible that poor health also influence income, by reducing the ability to work for example. In addition, there are likely hidden common factors that affect both variables, such as the individual's genetic endowment, birth weight, or the quality of the school that she attended. In this case, income and health will be correlated, but not in any causal way.

The vast majority of the existing literature is not able to distinguish between these three alternative readings of the income-health correlation. Testing the causal impact of income on health requires exogenous movements in the former, which can be identified in an instrumental or experimental setting. This is the approach to which we appeal here, using lottery winnings as an exogenous source of income variation in a large-scale panel dataset.

Most existing work on this question has used general health as the dependent variable. We are here able to provide greater detail by assessing the impact of

exogenous changes in income on a number of different health measures: self-assessed overall health, a psychological measure of mental stress (the 12-item General Health Questionnaire, or GHQ-12), physical health problems, and health-related behaviors (smoking and drinking).

The effect of income on these different health variables is far from uniform. There is first no correlation between lottery winnings and overall health. However, this lack of a relationship actually masks statistically significant correlations in different health domains. Winning big does indeed improve mental health; however we uncover counteracting health effects with respect to risky behaviors. Those who win more on the lottery smoke more and engage in more social drinking, both of which are likely detrimental to health. The positive effect on mental health and the negative effect from risky behaviors may well sum to a negligible overall relationship between income and general health.

The remainder of the paper is organized as follows. The following section briefly summarizes the related literature and discusses our approach. Section 3 presents the data we use from the British Household Panel Survey, and Section 4 discusses the identification strategies to evaluate the effect of income on health. Section 5 then contains the main results, and Section 6 presents some additional findings. Last, Section 7 concludes.

2 Background

2.1 The Causal Effect of Income on Health

Some Intuition

It is commonplace to hypothesize that higher income causes better health. If we assume that individuals maximize a utility function defined over health and other goods subject to budget and time constraints, a positive shock to income will loosen the budget constraint and will thus yield better health, if health is a normal good. However, it seems unlikely that health will also be independent of the other elements of the utility function. We can in particular imagine certain "risky behaviors" or lifestyle choices which are positively correlated with utility (and which are themselves also normal goods), but which are negatively correlated with health. In this case, higher income will have an ambiguous effect on health, by increasing smoking, drinking, calorie consumption or other risky activities which are detrimental to general health.

Findings in the Previous Literature

The positive relationship between income and health for adults is open to a number of interpretations, as underlined by Smith (1999): the causality may run from income to health, from health to income, or both may be determined by hidden common factors. Below, we discuss the small number of papers that have investigated this relationship by appealing to exogenous changes in income.

Elesh and Lefcowitz (1977) look at the effect of the New Jersey-Pennsylvania Negative Income Tax Experiment on various health outcomes, including the num-

ber of chronic illnesses, hospital days and work days lost, and find no effect of the experiment on health outcomes. However, the sample they use is relatively small (732 households), and they do not make any distinction between the physical, mental, and behavioral components of health.

Ettner (1996) also estimates the effect of income on health using American data. The health variables she uses are self-assessed health, a scale of depressive symptoms, and daily limitations due to both physical and mental difficulties. The effect of income on physical and mental health is therefore not systematically separately evaluated. She addresses the problem of reverse causality via instrumentation, using the State unemployment rate, work experience, parental education, and spousal characteristics as instruments. A substantial impact of income on all of the health variables is found, although more recent research has questioned the validity of the instruments used (Kawachi et al., 2010).

Frijters et al. (2005) analyze the relationship between income and two health variables (health satisfaction and self-assessed health). They address both reverse causality and hidden common factors, by appealing to German reunification (which resulted in a rapid and exogenous rise in average real household incomes for East Germans, but not for West Germans). The model is estimated using an original method (an ordinal fixed-effects logit regression). They find that income has a positive but only very small effect on health satisfaction and self-assessed health.

More recent work by Gardner and Oswald (2007) explores the causality running from exogenous variations in income (from medium-sized lottery wins[1]) to changes

[1]Lottery winnings are an arguably under-exploited information source for the assessment of the effect of exogenous variations of income on health outcomes (Connor et al., 1999). One of the first systematic uses of which we are aware is Brickman et al. (1978), although in a small-

in mental health, as measured by the GHQ. They find that money has a positive significant effect on mental health.

Lindahl (2005) appeals to Swedish longitudinal data and also uses lottery prizes as an exogenous shock in income. He first constructs an overall health measure comprised of both the physical and mental aspects of health. He finds a positive and significant relationship between income and this general health measure. He then considers some of the different aspects of health separately and finds that lottery winnings have a positive and significant effect on mental health, and a non-significant effect on cardiovascular diseases, headaches, and overweight.[2] This paper is of interest in the context of our work here, as it is the first to provide robust estimates of the impact of income on a variety of health outcomes. However, the sample of lottery winners used here (626) is only relatively small. In addition, the models he estimates do not control for individual fixed effects (although there is a control for health status at baseline). Finally, Lindahl does not explore the impact of lottery winnings on health behaviors. In our article, we use a larger sample of winners, we try to address individual heterogeneity by including individual fixed effects, and we consider the impact of lottery winnings on a variety of different measures of health outcomes.

sample, and cross-sectional, context. Apart from work on health and well-being, described in this Section, they have also appeared in empirical Labour Economics. Henley (2004) considers the determinants of labor supply, and Lindh and Ohlsson (1996) and Taylor (2001) the decision to become self-employed, where lottery gains are supposed to relax liquidity constraints. Both Henley (2004) and Taylor (2001) use the same database as we do, the British Household Panel Survey. A separate literature has traced out the reaction of consumption and savings to exogenous movements in income. An early example is Bodkin (1959), using an unexpected National Service Life Insurance dividend paid out to World War II veterans in 1950; more recent examples include Imbens et al. (2001), who appeal to differences in winnings amongst major-prize winners of the Megabucks Lottery in Massachusetts between 1984 and 1988, and Kuhn et al. (2011), who appeal to differences in winnings in the Dutch postcode lottery.

[2]See his Table 4, column (5).

Both Meer et al. (2003) and Kim and Ruhm (2012) investigate the impact of wealth on health, using inheritances as a source of exogenous movements in the former. Meer et al. (2003) use the value of inheritances received over the last five years as an instrument for the change in wealth, and consider self-assessed health, and physical or nervous disabilities which limit the individual's ability to work. They find that wealth does not have any significant effect on health. Kim and Ruhm (2012) estimate reduced-form equations for the effect of inheritances on mortality, health status, and health behaviors in a sample of adults aged 51 and over. They find that bequests have no large health effects. One potential limitation of the use of inheritances in this context is that they likely often result from the death of a parent or close family member, and as such may well be correlated with the individual's own health if there is any common genetic or lifestyle component to health. It can also be argued that some inheritances are anticipated for some time beforehand (so that individuals may change their health behaviors before receiving the bequest).[3] As a result, the impact of wealth on health can be underestimated. In our approach here, lottery winnings, unlike inheritances, are unlikely to be anticipated in this sense. We are also able to consider health outcomes for adults of all ages, rather than the older only, for whom an income shock may be unlikely to produce large effects.

Finally, Van Kippersluis and Galama (2013) also provide empirical evidence on the impact of an income shock on health, after developing a theoretical model that explains why wealthier individuals would engage in healthier behaviors. They

[3]Kim and Ruhm (2011) explain that half of the individuals are able to predict future inheritances (see their footnote 15, p. 140).

estimate the impact of lottery winnings (in the British Household Panel Survey) and inheritances (in the Health and Retirement Study) on eating, smoking, and drinking behaviors. Compared to the previous literature, Van Kippersluis and Galama (2013) include individual fixed effects to account for individual heterogeneity. Their results are similar to ours: income shocks have a detrimental impact on lifestyles. They are also able to show that this income impact varies according to the individual's initial income and health.

Table I summarizes the findings presented above, and provides a one-line preview of our main results.

2.2 Our Approach

We appeal to monetary lottery wins to try to establish a causal link between exogenous movements in income and changes in a number of different health outcomes.

We do not construct a score bringing together the different aspects of health, as we would like to see whether these latter react differently to income shocks. As such we clearly distinguish mental from physical health. Our reason for doing so comes from the results in Ruhm (2000), which called into question the notion of one holistic concept of health, in particular in relation to the economic cycle. Ruhm (2000) considered various measures of both individual- and aggregate-level health, and tracked their movements over periods of booms and busts. His key finding is that different aspects of health move in different directions during recessions.

First, short-run recessions seem to be associated with better physical health.

The common belief that physical health declines during temporary economic contractions is wrong, and mortality is largely procyclical in US data. Regressions at the US-State level highlight that poor economic conditions are associated with lower death rates in general, and with reduced prevalence of a number of specific causes of death in particular (cardiovascular diseases, pneumonia, and motor vehicle accidents). This aggregate relationship is supported by evidence relating individual health outcomes to aggregate economic conditions. Using individual data from the Behavioral Risk Factor Surveillance System, Ruhm (2000, 2005) relates individual behaviors to the local unemployment rate (but not to the individual's labor-market status). He uncovers significant behavioral effects, in that individuals modify their lifestyles during short-term recessions: both tobacco consumption and BMI fall (so that individuals are more likely to have a healthier body weight), while regular physical activity increases. Physical health is therefore counter-cyclical, and this specifically seems to apply to the behavioral correlates of health.

However, this negative relationship is not found for all of the health measures. There is one cause of death that is higher during recessions: suicide. As Ruhm (2001) notes, there is "*some evidence that mental health is pro-cyclical*" (p. 2).

Some of these results have been confirmed in recent work by Adda et al. (2009), who use a structural framework to model the dynamics of income and health, which latter are considered as stochastic processes. They decompose income into transitory and permanent components. Adda et al. construct aggregate synthetic cohort data, and look at the effect of fluctuations in aggregate income (over the 1980s and 1990s), reflecting macro-economic factors, on health. They find that higher

permanent income has no significant effect on self-reported health, blood pressure or cardiovascular diseases. The effect of permanent income on mental health is either negative or insignificant. However, permanent income is positively correlated with the number of cigarettes smoked per day.

This existing macroeconomic evidence therefore suggests that physical health (particularly its behavioral elements) and mental health may not be associated with exogenous income movements in the same way. However, it has not yet been established whether the same results hold at the entirely microeconomic level, when we correlate different individual health measures with movements in exogenous individual income. This is what we do below, using data on lottery winnings from twelve waves of large-scale panel data.

3 Data

Our data come from the British Household Panel Survey (BHPS), the first wave of which appeared in 1991. This general survey initially covered a random sample of around 10 000 individuals in around 5500 different households in Great Britain; increased geographical coverage has pushed these figures to around 16 000 and 9000 respectively in more recent waves. We here make use of health data from waves 6 to 18 (1996-2008), and of lottery data from waves 7 to 18 (1997-2008), as harmonized lottery information is not available in earlier waves or more recent waves. The BHPS includes a wide range of information about individual and household demographics, mental and physical health, labor-force status, employment and values. There is both entry into and exit from the panel, leading to unbalanced data.

The BHPS is a household panel: all adults in the same household are interviewed separately. Further details of this survey are available at the following address: http://www.iser.essex.ac.uk/ulsc/bhps/.

The list of the variables used in our analysis of the income-health relationship appears in Table II; we describe the key ones in a little more detail below.

3.1 Health

The BHPS contains a large number of health variables; these allow us to investigate separately the relationships of income to general, mental and physical health. We have four main measures of individual health.

General Health Status

Our first health variable is the widely-used measure of self-assessed health. This comes from the question:

> *"Please think back over the last 12 months about how your health has been. Compared to people of your own age, would you say that your health has on the whole been...?"*, with the possible responses *"Excellent, Good, Fair, Poor, and Very Poor"*.

In our analysis, we use a dummy for whether the individual is in "excellent" health.

This question appears in all waves of the BHPS, except for wave 9, when a special module was introduced to calculate the SF-36 health index. This does include a

general self-reported health question (actually the first question in the module), which is however both differently worded (*"In general would you say your health is..."*), and uses different response categories (*"Excellent, Very Good, Good, Fair, and Poor"*). As such, we drop wave 9 of the BHPS from our empirical analysis.

Mental Health

To measure mental health, we use a score calculated from the General Health Questionnaire (GHQ). This latter is widely-used by psychologists, epidemiologists and medical researchers as an indicator of mental functioning. The BHPS contains the 12-item version of the GHQ, based on the following questions. BHPS respondents are asked:

> *"Here are some questions regarding the way you have been feeling over the last few weeks. For each question please ring the number next to the answer that best suits the way you have felt. Have you recently....*

(a) *been able to concentrate on whatever you're doing?*
(b) *lost much sleep over worry?*
(c) *felt that you were playing a useful part in things?*
(d) *felt capable of making decisions about things?*
(e) *felt constantly under strain?*
(f) *felt you couldn't overcome your difficulties?*
(g) *been able to enjoy your normal day-to-day activities?*
(h) *been able to face up to problems?*
(i) *been feeling unhappy or depressed?*
(j) *been losing confidence in yourself?*
(k) *been thinking of yourself as a worthless person?*
(l) *been feeling reasonably happy, all things considered?"*

Question (a) is answered on the following four-point scale:

1: *Better than usual*
2: *Same as usual*

3: *Less than usual*
4: *Much less than usual*

Questions (b), (e), (f), (i), (j), and (k) are answered as follows:

1: *Not at all*
2: *No more than usual*
3: *Rather more than usual*
4: *Much more than usual*

And the replies to questions (c), (d), (g), (h), and (l) are on the following scale:

1: *More so than usual*
2: *About same as usual*
3: *Less so than usual*
4: *Much less than usual*

The main mental-health variable used in this paper is the Likert GHQ score, which is the sum of the responses (recoded from 0 to 3 instead of 1 to 4). This count is then reversed so that higher scores indicate higher levels of well-being, running from 0 (all twelve responses indicating the worst psychological health) to 36 (all responses indicating the best psychological health).[4]

Physical Health - Health Problems

The data also contain a number of variables indicating the presence of specific health problems. Amongst these, we retain only those which describe specific physical problems.

(1) Arms, legs, hands, etc
(2) Sight
(3) Hearing
(4) Skin conditions/allergy
(5) Chest/breathing

[4]GHQ information from the BHPS has been used by Economists in a number of different contexts: see Clark and Oswald (1994), Clark (2003), Ermisch et al. (2004), Gardner and Oswald (2007), and Powdthavee (2009).

(6) Heart/blood pressure
(7) Stomach or digestion
(8) Diabetes.

Physical Health - Behaviors

We consider two separate risky behaviors: smoking and drinking. We have two distinct smoking variables. The first is a binary variable showing whether the respondent is a current smoker, and the second picks up the number of cigarettes smoked per day.

Drinking is measured via an ordinal variable for the frequency with which the respondent goes for a drink at a pub or club. This question is only asked every second year in the BHPS, with response codes as follows:

1: Never/almost never
2: Once a year or less
3: Several times a year
4: At least once a month
5: At least once a week

Figure 1 shows the distribution of these six health variables. Approximately 22% of the respondents report excellent health, and he GHQ score exhibits strong right skew. Around one-quarter of BHPS respondents are current smokers, and the modal category for social drinking is "At least once a week", although 25% never go out to pubs or clubs.

3.2 Lottery Wins

We are interested in the relationship between income and these different health measures. To try to identify this causal relationship, we appeal to two BHPS questions on lottery wins as a source of exogenous changes in income. These have appeared every year from 1997 onwards, and are worded as follows:

> *"Since September 1st (year before) have you received any payments, or payment in kind, from a win on the football pools, national lottery or other form of gambling?"*

If this question was answered in the positive, then the respondent was asked:

> *"About how much in total did you receive? (win on the football pools, national lottery or other form of gambling)"*

As such, we know both whether the individual won, and how much in total they received. We have a non-negligible number of observations on lottery winners. Over the twelve BHPS waves which we use here, 31.4% of observations refer to individuals who report some winnings over the past year (11 229 "winning" observations out of 107 160 observations in total). There is no obvious time trend in the percentage of winners. Panel analysis shows that these 11 229 winning observations refer to 6 434 different individuals (out of a total of 20 474 different individuals who appear in the eleven waves of BHPS data). The average win reported, expressed in real 2005 Pounds, is around £245. Six per cent of winning observations refer to sums greater than £500, and the largest win is over £200 000.

However, one potential weakness of the lottery data in the BHPS[5] is that it does not contain any direct information about the number of times (if any) that the individual has played the lottery. As such, we cannot distinguish non-players from unsuccessful players. A second point is that, both for lottery winners and playing non-winners, we do not know how much has been gambled.

On the other hand, there are significant advantages in using lottery winnings. First, as noted above, we can consider their receipt as being largely exogenous. Second, in Britain, as opposed to a number of other countries, many people play lotteries. A recent survey-based estimate (Wardle et al., 2007) is that over two-thirds of the British participate in some kind of gambling in a given year, with 57% of the population playing the National Lottery (and almost 60% of the latter playing at least once a week). The Camelot Group, who are the current National Lottery operators, report that just under £7 Billion was spent on the lottery in the 2012-2013 financial year (http://www.camelotgroup.co.uk/business/our-uk-national-lottery-operation/performance/). Consequently, there are a considerable number of lottery winners in the BHPS data.

Lottery winnings are adjusted for inflation via the consumer price index (see Appendix A) and are expressed in 2005 Pounds. In the empirical analysis, we will use the logarithm of lottery winnings, partly as income is very often entered in log form in the empirical analysis of health and well-being, and partly because the distribution of lottery winnings is, unsurprisingly, extremely right-skewed.[6] The

[5]Which weakness also appears in the Swedish lottery data used by Lindahl (2005), but not in the analysis of Kuhn et al. (2011), who are able to control for the number of lottery tickets purchased (although they do not consider health as an outcome).

[6]Experiments using a set of lottery-winnings dummies consistently produced qualitatively similar results to those using log of the prize.

distribution of the log of lottery winnings for winners is shown in Figure 2.

3.3 Control Variables

In line with the existing literature, our regressions include a number of fairly standard control variables: age, ethnicity, education, labor-market and marital status, household size, household income,[7] region, and wave.

4 Econometric Strategies

Section 3 above highlighted the exogenous income variables that are available in the BHPS. However, the way in which lottery winnings should be used in a causal regression framework merits some reflection. The underlying issue is that, while we suppose that winning the lottery is a random event, conditional on having played, the actual fact of playing the lottery may well itself be endogenous: non-players and players are likely to differ in both their observable and unobservable characteristics. As noted above, the BHPS does not include information on whether individuals play the lottery or not: we cannot distinguish players from non-players, only winners from non-winners.

One simple way of using lottery-winnings information would be to compare the health of those who have not won the lottery (which group consists of both non-players and unlucky players) to the health of winners. However, these two groups are

[7] Household income comes from a derived variable, "whhnyrde", supplied with the BHPS. This measures total household annual income, equivalized using the McClements before housing costs scale, and adjusted for the prices of the reference month.

not likely to be comparable, as the decision to play the lottery is endogenous, which poses serious problems for the interpretation of the coefficient on lottery winnings.

This phenomenon is illustrated in the Venn diagram in Figure 3. The first, larger, set consists of those who play the lottery. These players likely have different characteristics, both observed and unobserved, to non-players. The key issue in the BHPS data (which we believe is common to many datasets covering lottery winnings) is that this distinction between those who play and those who do not play is unobserved (which is why we have drawn the frontier of this set as a broken line). There is a second set, entirely contained within the first: this is the set of winners, all of whom by definition are players. This is the frontier that we do observe (which is represented as an unbroken line).

While the group of winners in Figure 3 might be fairly homogeneous, amongst non-winners we have both those who did not play, and those who did play but did not win. If playing the lottery is endogenous, individual characteristics will differ between the groups. It can of course be argued that we can condition on any observable differences, once we have identified them. However, non-players and players (and therefore non-winners and winners) may also differ fundamentally in other unobservable ways. For example, non-players (who are included in the group of non-winners) may well be more risk-averse, and as a result invest more in their own health capital. This seriously flaws any comparison of health between winners and non-winners. We use three different models, all of which include individual fixed effects to help correct the endogeneity issue. The fact that we appeal to fixed-effect

estimation means that all estimated coefficients are identified off of within-subject variation. In our first model below, for example, the effect of any lottery win is identified by comparing the health of the same individual in periods when they had not won the lottery to their health in periods when they had.

4.1 First Model: Winners vs. Non-Winners

We first compare winning to non-winning observations (within the same individual). The specification we use is the following:

$$H_{i,t} = \alpha + \beta_1 AnyWin_{i,t-k,t} + \gamma X_{i,t-k-1} + \nu_i + \epsilon_{it}, \text{ with } k \geq 0$$

where $H_{i,t}$ represents the health outcome at date t, $AnyWin_{i,t-k,t}$ is a dummy for winning any prize between $t-k$ and t, $X_{i,t-k-1}$ denotes the control variables, measured before the win, and ν_i is an individual fixed effect that captures any time-invariant characteristic, such as time preferences or risk aversion.

4.2 Second Model: Big vs. Small Wins

Second, following Gardner and Oswald (2007) and Van Kippersluis and Galama (2013), we compare larger to smaller lottery wins. The model is:

$$H_{i,t} = \alpha + \beta_1 AnyWin_{i,t-k,t} + \beta_2 BigWin_{i,t-k,t} + \gamma X_{i,t-k-1} + \nu_i + \epsilon_{it}, \text{ with } k \geq 0$$

where $BigWin_{i,t-k,t}$ is a dummy for the sum of the prizes received between $t-k$

and t being over £500; smaller wins are those between £1 and £500.

4.3 Third Model: The Amount Won

Our last specification directly includes the amount won on the lottery:

$$H_{i,t} = \alpha + \beta_1 AnyWin_{i,t-k,t} + \beta_3 Log(Prize)_{i,t-k,t} + \gamma X_{i,t-k-1} + \nu_i + \epsilon_{it}, \text{ with } k \geq 0$$

where $Log(Prize)_{i,t-k,t}$ denotes the log of the sum of the prizes received between $t-k$ and t.

4.4 Time and Consecutive Wins

In our specifications we regress health outcomes at t on the sum of prizes received between $t-k$ and t. We estimate the models for $k=0$, $k=1$, and $k=2$. When we use $k=0$, we are interested in the immediate effect of a lottery prize on health. When we use $k=1$ and $k=2$, we allow the effect of lottery prizes on health to take time, while taking into account the possibility that some individuals win in consecutive years.

We imagine that any health investments may take time to bear fruit.[8] A simple model to examine the delayed impact of a prize on health k years later, would be

[8]Oswald and Winkelmann (2008) find a delayed effect of lottery winnings on a measure of well-being. They use SOEP data to show that financial satisfaction is significantly positively correlated with the amount won by lottery winners, but only three years after the win. There is no significant effect one or two years after a win. They interpret their results as indicating deservingness: individuals only enjoy their winnings when they feel that they have deserved them. Deservingness is endogenous and can be created by the individual, but this costly investment takes time, which explains the lack of any significant effect immediately following the win. Equally, Kuhn et al. (2011) find no effect of the amount won in the Dutch postcode lottery on individual happiness six months later.

to regress health at date t on prize at $t-k$. However, the estimate on the prize in this simple model might be biased, since individuals who win at $t-k$ might also win at $t-k+1$, $t-k+2$,... and t. Our models, which include the sum of the prizes between $t-k$ and t, are thus likely preferable to this simple model.

All the health equations presented above are estimated using OLS with individual fixed effects.

5 The Effect of Income on Health Outcomes

We examine the effect of income on the different health outcomes listed above: self-assessed health, mental health, physical health problems, and smoking and drinking. The following sub-sections discuss the estimation results for these different health variables in turn.

5.1 General Health Status

The regression results for the most general of our dependent variables, self-assessed health, appear in Table III. Columns (1) to (3) report the impact of lottery wins received between $t-2$ and t on general health at t, columns (4) to (6) report that of lottery wins received between $t-1$ and t, and columns (7) to (9) that of lottery wins received at t. Columns (1), (4), and (7) contain the results of "model 1", whereas columns (2), (5) and (8) present those of "model 2", and columns (3), (6) and (9) those of "model 3".

The coefficients on any prize, big prizes, and on the the log prize are insignificant (and generally negative), and provide no evidence that exogenous income improves

general health. This is consistent with some of the previous results in the literature on the causal impact of income discussed in Section 2.1.

It is likely that self-assessed health reflect both physical and mental components. Following the well-known macro work of Ruhm (2000), it is possible that these move in opposite directions to produce an insignificant net effect of "better economic conditions" (i.e. higher income) at the individual level. With this distinction in mind, we now appeal to the separate measures detailed in Section 3 above to see whether physical and mental health do indeed have sharply different relationships with exogenous income. In line with Ruhm's macro-level results, we will pay particular attention to health behaviors.

5.2 Mental Health

The results for mental health appear in Table IV. There are two sets of GHQ results in this table. Those in Panel A are estimated using the full sample of observations, whereas those in Panel B refer to a restricted sample of observations for which self-assessed health and smoking are non-missing (so that the sample size in Panel B is identical to that for overall health in Table III, for example). In Panel A, the estimated coefficients on the logarithm of the lottery prize show that positive income shocks lead to better mental health. In addition, bigger lottery wins between $t-2$ and t also have a significant impact on well-being. The coefficients in Panel B are very similar to those in Panel A, but are less precisely estimated, probably due to the smaller sample size. These results are consistent with the findings of Gardner and

Oswald (2007) using the BHPS data. Our results in Table IV show that their finding is robust to additional waves of data (we here use twelve waves as compared to the two in Gardner and Oswald), to the inclusion of individual fixed effects, to the use of several time lags, and to a more complete set of individual-level control variables (we control in addition for household size and use more detailed marital status information). The findings in Table IV also represent a totally micro-econometric counterpart to the correlation between suicide and local economic activity presented in Ruhm (2000, 2001 and 2005).

The GHQ being a composite index, we can equally re-estimate the mental health equation for each of the twelve component questions listed in Section 3. The significant results are reported in Panels C to F. The positive effect of lottery winnings on well-being is particularly pronounced for the question referring to happiness (Panel F). There is also some evidence that lottery prizes affect the ability to concentrate (Panel C), sleep quality (Panel D), and the absence of pressure (Panel E).

We can confirm the effect of lottery winnings on this latter "hedonic" component of well-being by re-running our analysis using the single-item overall life satisfaction score available in the BHPS, which is measured on a one-to-seven scale. The regression results, presented in Panel G, show a significant correlation between the logarithm of the lottery winnings and overall life satisfaction.

It may appear somewhat paradoxical that income significantly improves mental health, but at the same time has only insignificant effects on general health (as found in a number of papers, including the present). The following sub-sections propose

to resolve this paradox by suggesting that income does not alleviate physical health problems, but may lead to unhealthy lifestyle outcomes.

5.3 Physical Health

To investigate the relationship between income and specific physical health problems, we carry out analogous regressions to those in Table IV, but replace GHQ by information on a series of physical health problems, as listed in Section 3.

The results in Table V generally reveal no relationship between lottery winnings and these physical health problems. This might be argued to be unsurprising: higher income may well not improve individuals' hearing, or alleviate heart and blood-pressure problems. However we find weak evidence that lottery wins have a negative influence on arms, legs, hands problems and on diabetes. The diabetes finding is consistent with the results in Van Kippersluis and Galama (2013) on eating behaviors.

However, one area where income might play a larger role is in the specific behaviors that individuals undertake (i.e. the way in which they live their lives), and their ensuing health effects. In the following, we specifically consider the relationship between lottery winnings, smoking and social drinking.

5.4 Health Behaviors

The hypothesis we test in this sub-section is that positive individual income shocks may have a detrimental effect on physical health via individual lifestyles. In what

follows, we specifically consider smoking and drinking.

Around 25% of our estimation sample of lottery winners report being current smokers. Panel A of Table VI models the probability that the individual be a smoker. The demographic control variables here (not shown) are the same as in Table V. The Panel reveals that positive income shocks do not have any significant effect on the probability of smoking.

In contrast, Panel B provides clear evidence that lottery winnings increase the probability of smoking a greater number of cigarettes.[9] We repeat our analysis for social drinking in Panel C of Table VI. The results indicate that the greater the lottery prize, the greater the probability of frequent social drinking.

Table VI therefore shows that, rather than producing better health, higher income is associated with more frequent behaviors that are commonly thought to be unhealthy. Much work has shown that, in general, higher income is associated with more favorable health outcomes. Our results here nuance this empirical fact. Positive individual income shocks produce changes in lifestyles which may well be prejudicial to health. This is entirely consistent with Ruhm (2000, 2001 and 2005), who considers the relationship between risky health behaviors and economic booms. Ruhm's approach is very similar to ours at one level: by relating individual (and aggregate) health outcomes to local labor market conditions, he is able to appeal to the exogeneity of the latter in determining individual health. Our results above can be read as the micro-econometric analogy of those in Ruhm. At the individual level also, exogenously higher income produces unhealthy living.

The correlations revealed by these exogenous movements are therefore largely

[9]Current non-smokers are dropped from this analysis.

contradictory to the commonly-noted positive link between health and social status. In reality positive (exogenous) income shocks seem to lead to lifestyle choices which are associated with worse health outcomes.[10]

6 Additional Findings

6.1 Net or Gross Winnings?

The BHPS question on lottery winnings asks individuals to report *"about how much in total did you receive"*. Although it is not made explicit, the most likely interpretation of this question is in terms of gross winnings. Playing the lottery costs money, and it is possible that some of our winners could have actually spent more on lottery tickets over the year than they ended up winning. In general, net winnings will be smaller than gross winnings. We are interested here in the effect of an individual's financial resources on their health and well-being. Our measure of (gross) lottery winnings then overstates the movement in the resources that they have available to them. As such, our estimated coefficient on lottery winnings is actually biased downwards. To explore this matter further, we re-estimate our third model, for prizes received between $t-2$ and t, introducing not only the amount of the lottery win, but also an interaction between winnings and the fact of winning at least £1000 (we imagine that with gross winnings of at least this amount were considerably less

[10]This is arguably also reflected in having an accident. The BHPS asks all respondents whether they had an accident over the 12 months preceding the interview. Using this variable as a health outcome, in the same way as in Table VI, produces some evidence of a positive correlation with the log of the lottery prize received in the two years before the interview: big winners are more likely to end up having an accident.

likely to be net losers). None of the coefficients on these interactions were close to significant, leading us to suspect that our main health results are robust.

6.2 Subgroup Analysis

To explore whether the impact of lottery winnings depends on socio-economic characteristics, we re-run our three specifications, for prizes received between $t-2$ and t, including interaction terms between lottery winnings and socioeconomic characteristics. Our results show that the effect of lottery prizes on general health and social drinking does not depend on gender. But the impact of lottery wins on the GHQ score and on the number of cigarettes smoked is greater for men than for women.

In addition, using a dummy for whether the individual is from a high-income household (i.e. his household income is above median income), we observe that the impact of winnings on general health, GHQ, the number of cigarettes smoked, and social drinking is the same for low- and high-income individuals.

Last, following Miller (2009), we consider the effects of lottery winnings according to labor-market attachment. We find that the impact of lottery winnings on general health does not depend on employment status. However, there is some evidence that the effect of winnings on mental well-being and on the number of cigarettes smoked is greater for the employed.

7 Conclusion

This paper has asked whether money makes individuals healthier. While it seems well-known that the rich enjoy better health, it is far more difficult to establish the

causality of this relationship. A small recent literature has appealed to exogenous movements in income, for example lottery winnings and inheritances, to reveal either small or negligible effects of income on general health. At the same time, lottery winnings have been shown to produce better mental health.

We have suggested resolving this apparent paradox by appealing to an entirely individual-level analogy of the well-known work of Ruhm (2000, 2001 and 2005), and distinguishing between physical and mental health. Ruhm showed that recessions are associated with healthier living but more suicides. Using data on lottery winnings, "better economic conditions", which at our micro level are picked up by greater lottery winnings, produce higher GHQ mental health scores, but also more smoking and social drinking.

The results presented here have more generally underlined three arguably central points in the analysis of health outcomes. The first is that it is unlikely that income is exogenous, so that instrumentation is essential for the understanding of causal relationships. Second, health is not a holistic concept, and we need to both be clear about what kind of health we are talking about, and be ready for the possibility that different types of health behave in very different ways. Last, the comparison of results from different levels of aggregation of both dependent and explanatory variables is a fruitful avenue of research in the economics of health and well-being.

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Appendix A. The Consumer Price Index

Table A.I. The Consumer Price Index for the UK

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
CPI	89.7	91.1	92.3	93.1	94.2	95.4	96.7	98.0	100.0	102.3	104.7	108.5

Source. http://www.statistics.gov.uk/statbase/TSDdownload2.asp

Table I. Findings in the Literature

Reference	Exogenous shock	General Health	Mental Health	Physical health	Health behaviors	Other outcomes
Ettner (1996)	Various instruments	+ Self-assessed health	+ Mental health (0 to 84 scale)		ns or + Scores for alcoholic behaviors	- Limitations in daily activities Work limitations
Meer et al. (2003)	Bequest	ns Self-assessed health and health satisfaction				
Frijters et al. (2005)	German reunification	+ but very small Health satisfaction Self-assessed health				
Lindahl (2005)	Lottery	+ General health score	+ Mental health (0 to 5 scale)	ns Cardiovascular diseases Headaches	ns Overweight	
Gardner and Oswald (2007)	Lottery		+ GHQ			
Kim and Ruhm (2012)	Bequest	ns Mortality Self-assessed health	ns Depression	ns ADL	ns Smoking Vigorous exercise Obese + Drinking # of drinks	ns IADL
Van Kippersluis and Galama (2013)	Lottery, bequests				+ Drinking out Sports ns or + Smoking # of cigarettes	+ Food expenditures
Our paper	Lottery	ns Self-assessed health	+ GHQ Ability to concentrate Sleep quality Absence of pressure Feeling happy, not depressed	ns or + Pbs Arms, legs, hands Pbs Sight Pbs Hearing Pb Skin conditions, allergies Pb Chest/breathing Pb Stomach Pb Diabetes	+ Drinking out # of cigarettes	+ Life satisfaction

Note: "+" stands for a positive and significant effect of income on the health variable, "-" for a negative and significant effect, and "ns" for no significant effect.

Table II. Definition of Analysis Variables

Health	
General health	
Self-assessed health	=1 if the individual reports excellent health
Mental health	
GHQ	=0 for worst mental health to =36 for best mental health
GHQ-A	=1 if the individual has been able to concentrate on whatever he is doing
GHQ-B	=1 if the individual does not lose sleep over worry
GHQ-E	=1 if the individual does not feel constantly under strain
GHQ-I	=1 if the individual feels happy, not distressed
Life Satisfaction	=1 if the individual reports low life satisfaction to =7 if the individual reports high life satisfaction
Physical health	
Health pb X	=1 if reports health problem X
Health Behaviors	
Smoking	=1 if the individual smokes
No. of cigarettes	No. of cigarettes smoked per day, conditional on smoking
Social drinking	=1 if the individual goes out for a drink to a pub or club never or almost never, to =5 if the individual goes out for a drink to a pub or club at least once a week
Lottery	
Any Win	=1 if the individual wins
Big Win	=1 if the individual has a big win
Log(Prize)	Logarithm of lottery prize
Control variables	
Age	Dummy variables for age groups: 16-19, 20-24, 25-29, 30-34,.... 75-79, 80+
White	*Reference*
Non-white	=1 if not white
Married	*Reference*
Divsep	=1 if separated or divorced
Widowed	=1 if widowed
Nvr mar	=1 if never married
No education	*Reference*
O-levels	=1 if has O-levels
A-levels	=1 if has A-levels
College degree	=1 if has a College degree
Uni degree	=1 if has a University degree
Employed	*Reference*
Unemp	=1 if unemployed
Retired	=1 if retired
NLF	=1 if not in the labor force
Log(hh size)	Logarithm of household size
Log(inc)	Logarithm of income (real annual household income, equivalized)
Region	Region dummies
Time	Time dummies

Table III. General Health at t (OLS-FE)

	Winning between $t-2$ and t			Winning between $t-1$ and t			Winning at t		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Any Win	-0.0032	-0.0025	0.0069	-0.0059	-0.0055	-0.0044	-0.0022	-0.0031	-0.0150
	(0.0045)	(0.0046)	(0.0100)	(0.0041)	(0.0041)	(0.0094)	(0.0042)	(0.0043)	(0.0104)
Big Win		-0.0099			-0.0053			0.0143	
		(0.0119)			(0.0119)			(0.0148)	
Log(Prize)			-0.0027			-0.0003			0.0035
			(0.0023)			(0.0022)			(0.0026)
Observations	81 557	81 557	81 557	97 735	97 735	97 735	107 160	107 160	107 160
No. of individuals	16 311	16 311	16 311	18 439	18 439	18 439	20 474	20 474	20 474

Notes. The models include controls for age, ethnicity, marital status, education, job market status, the logarithm of household size and income, and region and time dummies.
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table IV. Mental Health at t (OLS-FE)

	Winning Between $t-2$ and t			Winning Between $t-1$ and t			Winning at t		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Likert GHQ, Full Sample									
Any Win	0.0591	0.0296	-0.193	0.0830*	0.0761	-0.140	0.0700	0.0648	-0.190
	(0.0539)	(0.0548)	(0.119)	(0.0489)	(0.0499)	(0.113)	(0.0500)	(0.0510)	(0.123)
Big Win		0.408***			0.101			0.0919	
		(0.142)			(0.143)			(0.178)	
Log(Prize)			0.0670**			0.0598**			0.0722**
			(0.0281)			(0.0273)			(0.0312)
Observations	88 078	88 078	88 078	105 754	105 754	105 754	115 668	115 668	115 668
No. of individuals	16 645	16 645	16 645	18 640	18 640	18 640	20 582	20 582	20 582
Panel B. Likert GHQ, Restricted Sample									
Any Win	0.0773	0.0517	-0.0969	0.0810	0.0751	-0.0803	0.0536	0.0500	-0.167
	(0.0581)	(0.0592)	(0.128)	(0.0522)	(0.0533)	(0.120)	(0.0531)	(0.0542)	(0.131)
Big Win		0.351**			0.0837			0.0618	
		(0.152)			(0.151)			(0.187)	
Log(Prize)			0.0463			0.0431			0.0609*
			(0.0303)			(0.0290)			(0.0330)
Observations	81 557	81 557	81 557	97 735	97 735	97 735	107 160	107 160	107 160
No. of individuals	16 311	16 311	16 311	18 439	18 439	18 439	20 474	20 474	20 474
Panel C. GHQ-A, Ability to Concentrate									
Any Win	0.0004	-0.0002	-0.0006	-0.0005	-0.0013	-0.0188**	0.0041	0.0029	-0.0282***
	(0.00446)	(0.0045)	(0.0098)	(0.0040)	(0.0041)	(0.0093)	(0.0041)	(0.0042)	(0.0102)
Big Win		0.0093			0.0128			0.0202	
		(0.0117)			(0.0118)			(0.0148)	
Log(Prize)			0.0003			0.0049**			0.0089***
			(0.0023)			(0.0022)			(0.0025)
Panel D. GHQ-B, Sleep Quality - Not Losing Sleep Over Worry									
Any Win	-0.00272	-0.0049	-0.0260***	0.0057	0.0056	-0.0094	0.0049	0.0051	-0.0009
	(0.00453)	(0.0046)	(0.0099)	(0.0041)	(0.0041)	(0.0094)	(0.0041)	(0.0042)	(0.0103)
Big Win		0.0310***			0.0027			-0.0048	
		(0.0119)			(0.0120)			(0.0149)	
Log(Prize)			0.0061***			0.0041*			0.0016
			(0.0023)			(0.0022)			(0.0026)
Panel E. GHQ-E, Absence of Pressure - Not Feeling Constantly Under Strain									
Any Win	-0.0038	-0.0059	-0.0315***	0.0030	0.0034	-0.0067	0.0034	0.0048	-0.0053
	(0.0050)	(0.0051)	(0.0110)	(0.0045)	(0.0046)	(0.0105)	(0.0046)	(0.0047)	(0.0115)
Big Win		0.0286**			-0.0048			-0.0251	
		(0.0132)			(0.0133)			(0.0166)	
Log(Prize)			0.0073***			0.0026			0.0024
			(0.0026)			(0.0025)			(0.0029)
Panel F. GHQ-I, Feeling Happy, Not Depressed									
Any Win	0.0016	-0.0005	-0.0115	0.0020	0.0008	-0.0180*	0.0017	0.0001	-0.0157
	(0.0046)	(0.0047)	(0.0103)	(0.0042)	(0.0043)	(0.0097)	(0.0043)	(0.0044)	(0.0107)
Big Win		0.0294**			0.0168			0.0279*	
		(0.0123)			(0.0124)			(0.0154)	
Log(Prize)			0.0034			0.0053**			0.0048*
			(0.0024)			(0.0023)			(0.0027)
Panel G. Life Satisfaction									
Any Win	0.0142	0.0065	-0.0362	0.0109	0.0095	-0.0321	0.0122	0.0093	-0.0578**
	(0.0121)	(0.0123)	(0.0267)	(0.0112)	(0.0114)	(0.0259)	(0.0116)	(0.0118)	(0.0286)
Big Win		0.102***			0.0196			0.0532	
		(0.0316)			(0.0325)			(0.0416)	
Log(Prize)			0.0133**			0.0115*			0.0194***
			(0.0063)			(0.0062)			(0.0072)

Notes. The models include controls for age, ethnicity, marital status, education, job market status, the logarithm of household size and income, and region and time dummies.
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table V. Physical Health Problems at t (OLS-FE)

	Winning between $t-2$ and t			Winning between $t-1$ and t			Winning at t		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Pb Arms, legs, hands at t									
Any Win	-5.51e-05	-0.0011	-0.0208**	0.0009	4.76e-05	-0.0141	0.0096**	0.0088**	-0.0022
	(0.0043)	(0.0044)	(0.0096)	(0.0039)	(0.0039)	(0.0089)	(0.0039)	(0.0040)	(0.0097)
Big Win		0.0146			0.0129			0.0129	
		(0.0114)			(0.0113)			(0.0139)	
Log(Prize)			0.0055**			0.0040*			0.0032
			(0.0022)			(0.0021)			(0.0024)
Panel B. Pb Sight at t									
Any Win	0.0001	-0.0003	-0.0060	0.0024	0.0017	-0.0059	0.0031	0.0025	-0.0003
	(0.0026)	(0.0026)	(0.0057)	(0.0023)	(0.0023)	(0.0053)	(0.0023)	(0.0023)	(0.0057)
Big Win		0.0075			0.0090			0.0107	
		(0.0068)			(0.0066)			(0.0081)	
Log(Prize)			0.0016			0.0022*			0.0009
			(0.0013)			(0.0012)			(0.0014)
Panel C. Pb Hearing at t									
Any Win	0.0040	0.0042	0.0038	0.0033	0.0036	0.0082	0.0004	0.0001	0.0058
	(0.0025)	(0.0026)	(0.0056)	(0.0022)	(0.0023)	(0.0052)	(0.0023)	(0.0023)	(0.0056)
Big Win		-0.0030			-0.0051			0.0054	
		(0.0067)			(0.0066)			(0.0081)	
Log(Prize)			3.91e-05			-0.0013			-0.0014
			(0.0013)			(0.0012)			(0.0014)
Panel D. Pb Skin conditions, Allergy at t									
Any Win	0.0018	0.0015	0.0036	0.0033	0.0019	-0.0006	0.0045	0.0039	0.0062
	(0.0032)	(0.0033)	(0.0071)	(0.0029)	(0.0029)	(0.0067)	(0.0029)	(0.0030)	(0.0072)
Big Win		0.0041			0.0193**			0.0110	
		(0.0085)			(0.0084)			(0.0104)	
Log(Prize)			-0.0004			0.0010			-0.0004
			(0.0017)			(0.0016)			(0.0018)
Panel E. Pb Chest/Breathing at t									
Any Win	-5.17e-05	-0.0001	-0.0099	0.0004	0.0008	-0.0037	0.0020	0.0017	0.0017
	(0.0029)	(0.0029)	(0.0064)	(0.0026)	(0.0026)	(0.0060)	(0.0026)	(0.0027)	(0.0065)
Big Win		0.0010			-0.0060			0.0040	
		(0.0075)			(0.0076)			(0.0094)	
Log(Prize)			0.0026*			0.0011			6.55e-05
			(0.0015)			(0.0014)			(0.0016)
Panel F. Pb Heart/Blood pressure at t									
Any Win	0.0057*	0.0059*	0.0129*	0.0033	0.0025	0.0083	0.0030	0.0023	0.0015
	(0.0034)	(0.0035)	(0.0075)	(0.0030)	(0.0031)	(0.0070)	(0.0030)	(0.0031)	(0.0075)
Big Win		-0.0034			0.0117			0.0110	
		(0.0089)			(0.0088)			(0.0108)	
Log(Prize)			-0.0019			-0.0013			0.0003
			(0.0017)			(0.0017)			(0.0019)
Panel G. Pb Stomach at t									
Any Win	0.0009	0.0007	-0.0077	0.0019	0.0021	0.0004	0.0071***	0.0061**	0.0074
	(0.0030)	(0.0030)	(0.0066)	(0.0027)	(0.0027)	(0.0062)	(0.0027)	(0.0027)	(0.0067)
Big Win		0.0028			-0.0021			0.0170*	
		(0.0078)			(0.0078)			(0.0096)	
Log(Prize)			0.0023			0.0004			-7.44e-05
			(0.0015)			(0.0015)			(0.0017)
Panel H. Pb Diabetes at t									
Any Win	-0.0002	-0.0009	-0.0061**	0.0003	-0.0002	-0.0021	-6.48e-05	-0.0006	-0.0047
	(0.00140)	(0.0014)	(0.0030)	(0.0012)	(0.0013)	(0.0029)	(0.0012)	(0.0012)	(0.0030)
Big Win		0.0097***			0.0091**			0.0096**	
		(0.0036)			(0.0036)			(0.0044)	
Log(Prize)			0.0015**			0.0006			0.0012*
			(0.0007)			(0.0007)			(0.0007)
Observations	81 557	81 562	81 557	97 735	97 744	97 735	107 160	107 175	107 160
No. of individuals	16 311	16 311	16 311	18 439	18 439	18 439	20 474	20 474	20 474

Notes. The models include controls for age, ethnicity, marital status, education, job market status, the logarithm of household size and income, and region and time dummies.
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table VI. Health Behaviors at t (OLS-FE)

	Winning between $t-2$ and t			Winning between $t-1$ and t			Winning at t		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Smoking at t, Restricted Sample									
Any Win	0.0084***	0.0082***	0.0067	0.0022	0.0019	-0.0019	0.0004	0.0006	-0.0019
	(0.0025)	(0.0025)	(0.0055)	(0.0023)	(0.0023)	(0.0053)	(0.0024)	(0.0024)	(0.0059)
Big Win		0.0039			0.0049			-0.0034	
		(0.0066)			(0.0067)			(0.0085)	
Log(Prize)			0.0004			0.0011			0.0006
			(0.0013)			(0.0013)			(0.0015)
Observations	81 557	81 557	81 557	97 735	97 735	97 735	107 160	107 160	107 160
No. of identifiers	16 311	16 311	16 311	18 439	18 439	18 439	20 474	20 474	20 474
No. of Cigarettes at t, Conditional on Smoking									
Any Win	-0.135	-0.207	-0.681**	-0.0486	-0.139	-0.690***	-0.0232	-0.0642	-0.509*
	(0.136)	(0.138)	(0.291)	(0.119)	(0.122)	(0.267)	(0.116)	(0.119)	(0.282)
Big Win		0.935***			1.139***			0.645*	
		(0.341)			(0.328)			(0.386)	
Log(Prize)			0.145**			0.171***			0.133*
			(0.0684)			(0.0636)			(0.0700)
Observations	18 847	18 847	18 847	23 247	23 247	23 247	26 603	26 603	26 603
No. of identifiers	4878	4878	4878	5777	5777	5777	6626	6626	6626
Social Drinking at t, Years When Data is Available									
Any Win	0.0219	0.0196	-0.0497	0.0356***	0.0306**	-0.0480	0.0377**	0.0312*	-0.0901**
	(0.0159)	(0.0162)	(0.0352)	(0.0138)	(0.0141)	(0.0320)	(0.0159)	(0.0163)	(0.0394)
Big Win		0.0313			0.0714*			0.117**	
		(0.0417)			(0.0404)			(0.0571)	
Log(Prize)			0.0189**			0.0223***			0.0354***
			(0.0083)			(0.0077)			(0.0099)
Observations	45 808	45 808	45 808	54 971	54 971	54 971	54 754	54 754	54 754
No. of identifiers	15 787	15 787	15 787	17 312	17 312	17 312	19 075	19 075	19 075

Notes. The models include controls for age, ethnicity, marital status, education, job market status, the logarithm of household size and income, and region and time dummies.
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Figure 1. Distribution of Health Variables

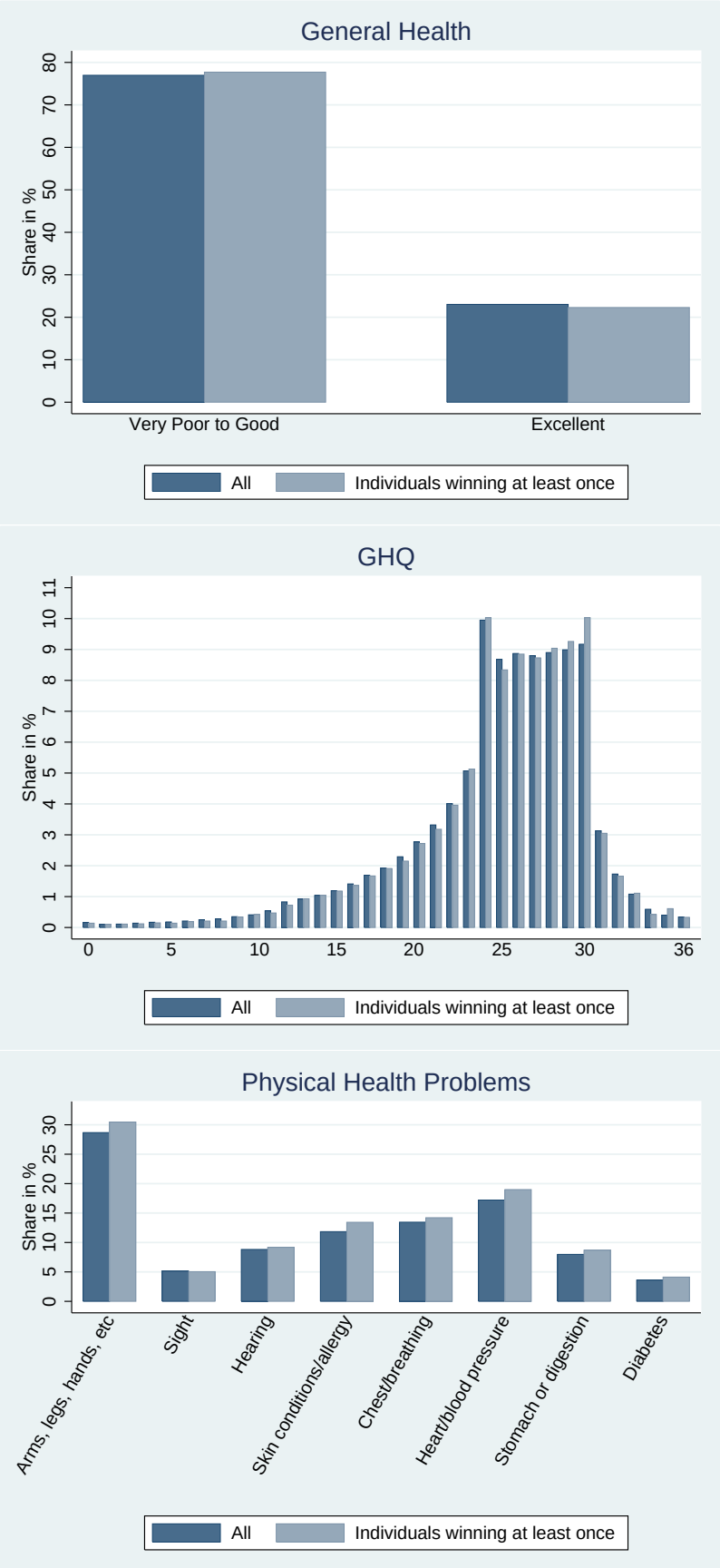


Figure 1: Distribution of Health Variables (Continued)

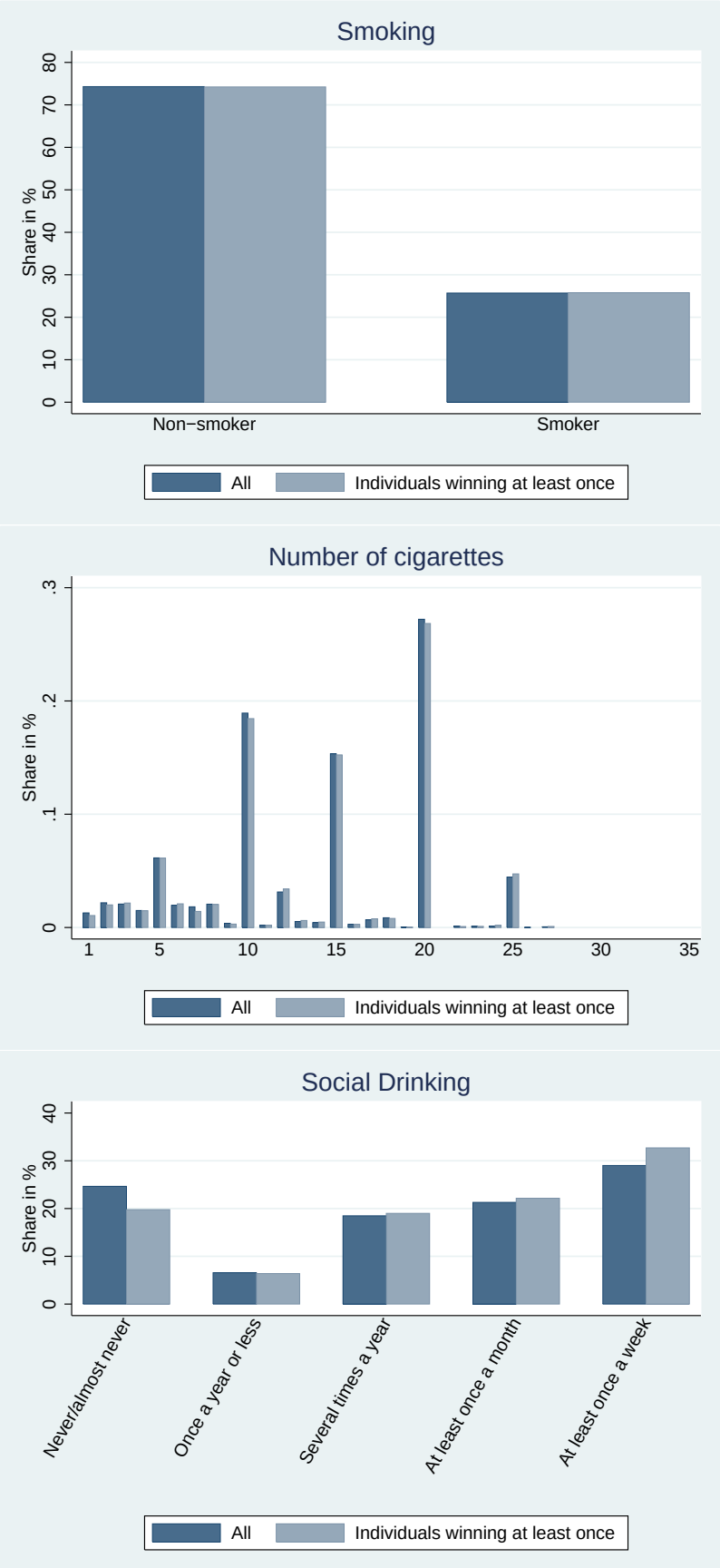


Figure 2. Distribution of the Logarithm of Prizes for Winners

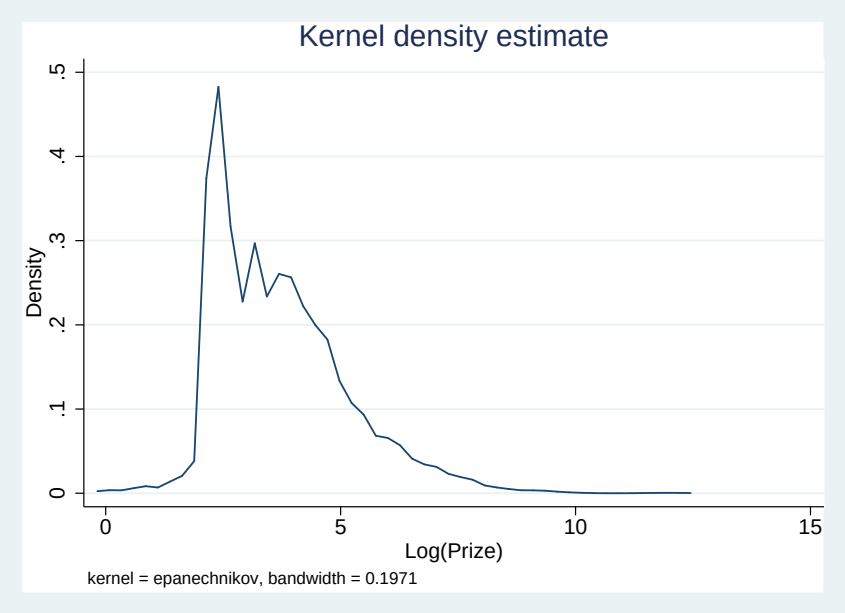
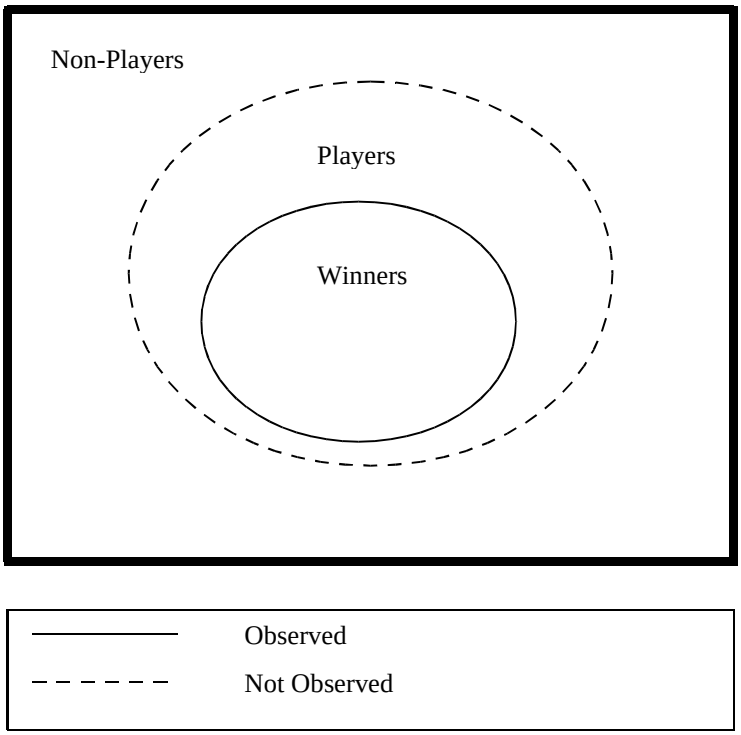


Figure 3. Non-Players, Players Who Do Not Win, and Winners



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