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Do You Have To Win It To Fix It? A Longitudinal Study of Lottery Winners and Their Health Care Demand

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Abstract
We exploit lottery wins to investigate the effects of exogenous changes to individuals' income on health care demand in the United Kingdom. This strategy allows us to estimate lottery income elasticities for a range of health care services that are publicly and privately provided. The results indicate that lottery winners with larger wins are more likely to choose private health services than public health services from the National Health Service. The positive effect of wins on the choice of private care is driven largely by winners with medium to large winnings (win category > $500 (or US$750); mean = $1922:5 (US$2,893.5), median = $1058:2 (US$1592.7)). For privately-insured individuals, larger winners are more likely to obtain private care for dental services and for eye, blood pressure, and cervical examinations. For individuals without private insurance, lottery wins have no effect on the choice of public or private care. We find that medium to big winners are more likely to have private medical insurance. Large winners are also more likely to drop coverage earlier, possibly after their winnings have been exhausted. The elasticities with respect to lottery wins are comparable in magnitude to the elasticities of household income from fixed effect models.

Keywords: Lottery wins, health care, income elasticity, public-private
JEL codes: H42; I11; D1

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1 Introduction

A substantial empirical literature has emerged on the relationship between income and health care demand following the seminal work by Grossman (1972). The interest stems from an attempt to understand the determinants of health expenditure and its share of household or national incomes. A fundamental question is the nature of health care as an economic good: the expectation that health spending would increase disproportionately more as income increases if health care is a luxury good and disproportionately less if it is a normal good. Numerous studies have examined this question by quantifying the income elasticity of health care (e.g., Gerdtham and Jönsson 2000; Getzen 2000; Costa-Font et al. 2011).

However, the empirical evidence remains subject to criticism. A main critique of the existing econometric work is that the estimates of the income–health spending relationship are not causal, because most studies are based on simple correlations between income, health expenditure, and health care use. The assumption that income is exogenous is likely to be violated as the income–health expenditure nexus is filtered by a variety of confounding effects. For example, the demand for health care is associated with health behaviors (e.g., smoking, exercise), which are affected by education, cognitive ability, and health knowledge (Cutler and Lleras-Muney 2010). These attributes are also correlated with income. Further endogeneity issues potentially arise when current income is used as a measure of household resources, because individuals in poor health may be less likely to participate actively in the labor market, but at the same time consume more health care. Omitted factors such as non-cognitive skills can further compound the endogeneity problem, for example, if individuals with higher perceived sense of control are more likely both to seek health care services and to earn higher incomes (Cobb-Clark et al. 2014).

A second critique is that the literature has largely been silent on the role of health care heterogeneity. Existing studies do not distinguish between preventive and curative health services, or between health care from the public and private sectors. It might be expected that the relationship between income and the demand for preventive care would be different from that of curative care. Preventive care is conceptualized as a human capital investment and is strongly influenced by education and income (Kenkel 2000; Wu 2003). Curative care behavior, in contrast, is driven by immediate need rather than choice, and hence, income is less likely

to be important. This is particularly true for public health systems where monetary barriers on access to health care, in principle, should not exist. However, access to health care in the private sector should be significantly determined by income, as with any other normal good.

This study addresses both issues simultaneously. First, to create a setting as close as possible to the idealized laboratory experiment, we use data of lottery winners to estimate the effect of income on the utilization of health care services in the United Kingdom, a country where 50% of the population play the lottery. We follow the same testing strategy as Gardner and Oswald (2007) and Apouey and Clark (2015), who use the British Household Panel Survey (BHPS) to study the effect of lottery wins on mental and physical health, and Lindahl (2005), who analyze the impacts on health status and mortality using Swedish data.

Our study contributes to the literature by investigating the effect of exogenous income on health care use in an institutional context where a private health sector coexist alongside a National Health System, and is often intermediated by private insurance schemes. In these health systems, a windfall of income might simply lead individuals to switch from publicly funded health care to private health care. Our paper complements a handful of related studies. A very recent paper by Cesarini et al. (2015) uses administrative data on lottery players in Sweden and finds that lottery wealth affects neither mortality nor health care utilization. A handful of studies from the US, which has a different health system from that of the United Kingdom, employ a variety of strategies to estimate causal effects of income on health care expenditures. For example, Acemoglu et al. (2013) use oil price shocks and variations in the dependency of economic subregions on oil to estimate the income elasticity of hospital spending. Three other studies exploit the Social Security benefit notch as a source of exogenous variation in incomes of senior citizens on prescription drug use (Moran and Simon 2006), long-term care services (Goda et al. 2011), and out-of-pocket medical expenditure (Tsai 2014).

Previewing our results, we find that lottery winners with larger wins are more likely to choose private health services as opposed to health services from the National Health Service. The positive effect of wins on the choice of private care is driven largely by winners with medium to large winnings (win category $> £500$ (or US\$750); mean $= £1922.5$ (US\$2,893.5), median $= £1058.2$ (US\$1592.7)). For privately-insured individuals, larger winners are more likely to obtain private care for dental services and for eye, blood pressure, and cervical examinations.

For individuals without private insurance, lottery wins have no effect on the choice of public or private care. We find that medium to big winners are more likely to have private medical insurance. Large winners are also more likely to drop coverage earlier, possibly after their winnings have been exhausted. The elasticities with respect to lottery wins are comparable in magnitude to the elasticities of household income from fixed effect models.

The remainder of the paper is organized as follows. In Section 2, we describe the data and discuss the estimation strategy. In Section 3, we discuss the results from the empirical analysis. In Section 4, we present the implied income elasticities of health care. Finally, Section 5 concludes with a discussion of the key findings in the paper.

2 Data and Methods

2.1 Data

The main data source used in the analysis is the BHPS, which is a nationally representative random sample of households, containing over 25000 unique adult individuals. The survey is conducted between September and Christmas of each year from 1991 (see Taylor et al. 2001). Respondents are interviewed in successive waves; households who move to a new residence are interviewed at their new location; if an individual splits off from the original household, the adult members of their new household are also interviewed. Children are interviewed once they reach 11 years old. The sample has remained representative of the British population since the early 1990s.

We study the use of health care services of a panel of lottery winners in the BHPS. Data on lottery wins were collected for the first time in 1997 and are available for 12 waves (Waves 7–18). In the survey, respondents were asked to state whether they received windfall income from lottery wins and the amount of winnings. We focus on all lottery winners at the year of winning the lottery. The complete case sample for analysis consists of 14205 observations (6520 individuals). Of those, 94.8% are small wins (£1–£499), and 5.2% are medium to large wins (£500+) (see Table A.1 in the Appendix). The average real lottery win (adjusted to consumer price index in 2000) is £157 (or US$236).[1] Many individuals won the lottery more than once

[1]The mean, and median, wins for each of the winning category are: £30.0, £18.9 (< £100); £163.1, £164.3 (£100–£250); £366.5, £369.3 (£250–£500); £1922.5, £1058.2 (> £500.)

in our panel. For example, from 1997, the average number of "years of winning the lottery" for the same person is 2.17, with a standard deviation of approximately 1.8 years. This implies that there are likely to be some individuals who play repeatedly.

Data on health service utilization have been collected in the BHPS since 1991 (Wave 1). In each year of the survey, individuals were asked whether they had been admitted into hospital as an inpatient and whether they had health checkups. The recall period is the 1st of September of the preceding year. The list of health checkups includes checks for blood pressure, chest X-ray, cholesterol, dental care, eye test, and for females, cervical and breast examinations. Individuals who reported having been hospitalized, or having had checkups, were asked if these were obtained through the National Health Service (NHS), the private sector, or both. For the purpose of analyzing the public or private type of the health service use, we combine the responses that indicate "use of private sector" and "use of both private and public sectors" into one category.

Table 1 presents the proportion of individuals who have used health care and, conditional on having used health care, the proportion that chose private (non-NHS) services. For example, 65% of lottery winners reported having used dental care, 9.3% had an overnight hospitalization, and 26% of all females received a cervical examination. Of those who had dental treatment, 29% obtained care from private providers; 8.3% of individuals who were hospitalized chose private hospital care.

The remaining explanatory variables that were used in the study can be classified into the following categories: demographic and socioeconomic characteristics (e.g., age, gender, education), household income, measures of health status (self-assessed health, presence of health problems), and metropolitan region identifiers. Of particular interest is whether individuals have private medical insurance (PMI). Respondents who are covered by the insurance in their own name (as opposed to through a family member) were asked whether the coverage had been paid for directly, deducted from wages, or paid by employer. The summary statistics for these explanatory variables in our sample of lottery winners are shown in Table A.1, with the sample characteristics of non-winners (at the year of the survey) shown in the same table for comparison. Lottery winners are more likely to have PMI (19.7%) compared to non-winners (14.8%). Additionally, winners have higher household income, are more likely to be males, and

are employed fulltime.

In the analysis of the effect of lottery wins on health care use, it would be desirable to control for any unobserved heterogeneity in participating in the National Lottery. A key reason why we focus on lottery winners at the year of winning is because the BHPS does not contain information about the number of times (if any) the individual has played the lottery. Hence, we cannot distinguish non-players from unsuccessful players.[2] Nevertheless, in Britain, as opposed to a number of other countries, many people play lotteries; a recent survey-based estimate by Wardle (2007) places the proportion of lottery players at two-thirds of the British adult population, with 57% playing the National Lottery (and almost 60% of these playing at least once a week). This explains why there is a considerable number of repeated lottery winners in the BHPS data compared with any other nationally representative data set.

2.2 Econometric strategy

We model the utilization of health care by using a two-part model that has been extensively used in the empirical analysis on the demand for health care. The first part is a binary outcome model that distinguishes between users and non-users of a given health care service. The second part is a separate binary outcome model that describes the distinction between users of private (non-NHS) health care versus NHS health care, conditional on being a user. The model is specified as follows:

$$y_{it} = \beta w_{it} + \mathbf{x}'_{it}\delta + \alpha_i + \epsilon_{it} \tag{1}$$

where y_{it} represents the health care utilization measure; w_{it} denotes the amount of lottery winnings; $\mathbf{x}'_{it}$ represents a vector of covariates; and β and δ are coefficients to be estimated.

In our primary analysis of lottery wins and health care use, we focus on lottery winners at the year of the survey instead of winners and non-winners to minimize the presence of unobserved heterogeneity that influences both the decision to participate in lotteries and health care behaviors. However, this strategy does not account for potential unobserved heterogeneity among lottery winners, which may arise if large winners play more lotteries, and if the difference

[2]The Swedish study by Cesarini et al. (2015) uses information on the number of lottery tickets lottery players bought where winners of a large prize are compared with similar individuals that did not win a large prize with an identical number of tickets.

in playing behavior is systematically related to the intensity of health care use. For example, some individuals may have an inherent characteristic that leads them to spend an invariably large proportion of their income on lottery tickets every week, and are therefore more likely to accumulate higher windfalls within the 12 months period than others. This is manifested in the model where the individual-specific effect, α_i, is correlated with covariates w_{it} and $\mathbf{x}'$. To eliminate this effect, we apply "within" transformation to Equation (1), which yields:

$$\tilde{y}_{it} = \beta \tilde{w}_{it} + \tilde{\mathbf{x}}'_{it}\delta + \tilde{e}_{it} \tag{2}$$

where the tilde denotes deviation from the sample averages. Equation (2) is commonly referred to as the fixed effects "within" estimator.[3]

To aid the interpretation of our results and to allow comparability across different types of health services, we standardize all our binary outcome variables across the entire sample to have a mean of 0 and a standard deviation of 1. This enables us to directly interpret the estimated coefficients as standard deviation changes in health service use and/or private versus NHS type.

In a secondary analysis, we investigate if lottery wins are systematically related to individuals propensity to take up PMI. For this analysis we use a sample of individuals who have won the lottery at least once in the panel, i.e. "ever winners". This is because the proportion with PMI among winners (19.5%) is uncharacteristically higher compared with the entire sample (12.0%) so we would not expect that uptake of PMI to be significantly different between winners with larger wins compared to smaller wins. We regress PMI status on various configurations of lottery wins among winners at the year of winning, namely "Any wins," large wins or "Wins $> £500$," and lottery win categories ("$< £100$," "$£100 - £250$," "$£250 - £500$," "$> £500$"). The reference category consists of individuals who have won the lottery at least once in the panel and are non-winners in a given year. The decision to use the "ever win" sample is justifiable on the ground that every individual in this sample can be considered as lottery players who, in the literature, are thought of as distinguishably different from permanently non-players.

We expect that the decision to purchase medical insurance is influenced by both observed characteristics (e.g. age, health status) and unobserved characteristics (e.g. risk aversion) and the latter aspect needs to be accommodated in the econometric modelling. As a result we

[3]All of the paper's results can be replicated with limited dependent estimators. However, as a pedagogical device and for ease of reading, we use standardized linear methods.

estimate a model of insurance status among the sample of ever winners using within estimation. This estimates the within-individual variation in PMI status, and has the interpretation of a change in insurance status.

As an auxiliary analysis we also examine whether lottery winners who take up PMI drop their insurance coverage more quickly. We discuss the findings of our econometric analyses in Section 3 below.

3 Results

3.1 Effect of lottery wins on utilization and private versus NHS care

Table 2 presents the coefficient estimates on lottery wins on whether lottery winners used health services in a given year, and whether users of health services chose to obtain private (non-NHS) or NHS services. As mentioned at the end of Section 2.2, the binary dependent variables are standardized to facilitate comparability across different types of health services. The coefficient estimates are interpreted as standard deviation changes in health service use and/or private versus NHS type for a 10% increase in lottery wins. We consider how our estimates on lottery winnings vary for different specifications of household income, which is added as a control variable, along with an extensive set of covariates described in Section 2. The different specifications are household income net winnings, lagged household income, and when household income is omitted from the regression.

The results in Table 2 indicate that lottery wins have little to no effect on the utilization of health care services. This is observed from columns (1), (3), and (5) whereby most of the coefficient estimates are not statistically significant from zero. These results indicate that winners with larger lottery wins are not more likely to use health services. Moving onto the effect of lottery wins and the choice between private versus NHS care (columns 2, 4 and 6), the results indicate that the probability of choosing private care is higher for individuals with larger wins. This is the case for health services such as dental care, blood pressure check, and cervical examination. The effect of lottery wins varies by the type of health service. For example, a 10% increase in winnings increases the probability of obtaining a private dental service by 0.15–0.20 of a standard deviation, whereas the effect is larger for cervical examination (0.74–0.81 of a standard deviation). The estimates demonstrate considerable stability across the different

specifications of household income.

We consider a different approach in which lottery wins enter the regression as separate dummy variables representing four win categories, with the reference category being a win of less than £100. The estimates are presented in Table 3. The coefficients on the variable for the largest win category (> £500; mean = £1922.5, median = £1058.2) in the regression on private and public choice are large and statistically significant for blood pressure and cholesterol checks and cervical exam. For these services, these results show that the positive effect of wins on the choice of private care is influenced to a great extent by winners with medium to large winnings. For health services such as dental care and breast exam, the effects of lottery wins arise from smaller wins of £100 − £250. We also observe that the coefficients on smaller wins of £100 − £250 is statistically significant in the utilization of any health care services for cervical exam, eye test, and overnight hospital care.

As a sensitivity check, we estimate the regressions reported in Table 2 using random-effects estimation.[4] We observed that the probability of choosing private care is higher for individuals with larger wins for both inpatient care (overnight hospital) as well as outpatient care (e.g. dental, blood pressure). As noted in Table 2, when time-fixed unobserved characteristics of individuals are accounted for in the FE specification, the effect of lottery wins for the choice of private overnight hospitalisation becomes small and insignificant from zero, but this is not the case for outpatient care. This indicates the importance of time-invariant individual heterogeneity in influencing the choice of private hospital care, which appears to play a smaller role for outpatient health services such as dental care or cervical examination. One plausible explanation may be individuals' risk aversion toward private hospital expenditure, which is larger and more uncertain than the cost of private health care in an outpatient setting.

3.2 Lottery wins, private medical insurance, and the choice of private versus NHS care

The effect of windfall income on health care behaviors is expected to differ depending on whether individuals have PMI. We investigate the effect of lottery wins on the choice between private and public health care by re-estimating the FE regression in Table 2, separating the sample into individuals with and without PMI. We focus on the choice between private and NHS care

[4]These results are available from the authors upon request.

because lottery wins have little effect on the utilization of health services, consistent with the findings in Table 2.

Table 4 shows the estimates of lottery wins on the choice of public and private care by PMI status. For privately insured individuals, the results indicate that the larger the lottery wins, the higher the probability of individuals choosing private care for dental, eye, and blood pressure checks, and cervical examination. One mechanism underlying these results may be that lottery winners are using their winnings to pay the associated copayments or the private expenses directly if their PMI contracts do not cover these services. On hospital care, the estimate of lottery wins on private overnight hospitalization is not statistically significant. This result is not unexpected for privately insured individuals given that expenditure on private hospital care is covered under PMI contracts, although the generosity of individual contracts may vary.

For individuals without PMI, the coefficient estimates are not statistically significant indicating that lottery wins have no effect on the choice of private versus NHS hospital care. We further consider if health care behaviours differ by income in that those without insurance are more likely to self-fund private health services than those with lower income. We do so by separating the non-privately insured sample into two groups, namely individuals with above-median and below-median incomes. The estimates from both groups are not statistically significant from zero.[5]

3.3 Lottery wins and private medical insurance

A potential mechanism by which lotteries may influence health care demand is if lottery wins are systematically related to individuals' propensity to have PMI or to switch into PMI. To investigate this more formally, we refer to Table 5 where we regress PMI status on lottery wins categories using FE estimation. As discussed in Section 2.2, our sample consists of "ever-winners" – individuals who have won the lottery at least once in the panel.

The results indicate that winners of medium to large wins ($> £500$) are more likely to have PMI. This is the case when the reference categories are winners of smaller wins ($\leq £500$) and non winners (shown in (B)), or only non winners (shown in (C)). It bears mentioning that our results are based on within-individual variation in PMI status. Hence based on the sample of "ever-winners", winners with medium to larger wins are more likely to take-up PMI.

[5]These results are available from the authors upon request.

3.4 Do lottery winners drop private medical insurance more quickly?

We consider the question of whether lottery winners who take up insurance coverage subsequently drop cover more quickly, and we investigate this by examining the relationship between lottery wins and the duration of insurance coverage. The principal outcome of interest is length of time (in years) that individuals maintain PMI from the year of insurance coverage commencement. Our sample consists of individuals who are observed to have taken up PMI at any time in the panel. We accommodate the right censoring of the outcome variable by including a variable that measures the number of years that individuals remain in the sample, in addition to an extensive set of covariates as in Table 2.

The results of the regression analysis are presented in Table 6. Those shown in columns (1)–(4) indicate that, of the individuals who pay for their private insurance coverage either directly or as a deduction from their wages, lottery winners winning more than £500 maintain coverage for a significantly shorter duration of time than non-winners and smaller winners. More specifically, large lottery winners drop private insurance coverage between approximately 10 and 11 months earlier, possibly after their winnings have been exhausted. A similar result is observed for individuals who pay for their insurance directly, because the size of the coefficients are relatively close to those of the former. However, these estimates are not statistically significant from zero, which is probably attributable to low statistical power because of the small sample size.

4 Implied elasticities of health care

A secondary question of this study is whether lottery wins offer plausibly exogenous variation in individuals' income from which we may be able to derive estimates of income elasticity of health care. To this end, we first estimate FE regressions where the dependent variables are binary and assume the value of 1 if an individual obtained public and private care and 0 if the individual did not obtain care for a given service. The estimates are then used to calculate the implied elasticities of public and private health care versus no care with respect to lottery wins.

The elasticity estimates of lottery wins are shown in columns (1) and (3) of Table 7 for public and private health care, respectively. For public care versus not using health care, the estimated elasticities are small and statistically insignificant for all the health services considered. In contrast, for private care versus not using health care, the elasticities are large and statistically

significant for overnight hospitalisation, chest X-ray, cholesterol test, and cervical exam. For example, a 1% increase in lottery wins raises the probability that an individual will choose private care rather than not obtain health care by 0.22% for an overnight hospitalization episode and by 0.82% for a private cervical examination.

For comparison, we also present in Table 7 the elasticity estimates with respect to household income for the whole sample consisting of winners and non-winners using FE regression. For public versus not obtaining care, as shown in columns (2) and (3), the elasticity estimates are positive for most outpatient services except dental care and negative for overnight hospitalisation. For some health services (e.g. hospital, blood pressure), the estimates are statistically significant from zero. For private care versus no care, the elasticities are broadly positive and large in magnitude. On the whole, the income elasticities appear to be similar in magnitude and direction to the elasticity of lottery wins, particularly for blood pressure, cholesterol test, eye-test, and cervical exam. For all types of health services considered in this study, our elasticity estimates indicate that these health care services are normal goods as opposed to luxury goods.

4.1 Inheritance income

As an additional analysis, we estimate the implied income elasticities on health care with respect to inheritance or bequest income by using a sample of over 3100 individuals who have reported receiving these types of windfall incomes. These estimates are reported in Table A.2. The income elasticities for public health care versus no care are small in magnitude and are statistically insignificant except for cervical examinations. These results are consistent with the elasticity estimates obtained from lottery winnings, as shown in Table 7.

For private health care, the estimated elasticities are larger in magnitude than those from public health care and are statistically significant for dental and eye examination services. Although there are some differences (e.g., chest X-ray, cervical) in the sizes of the elasticities compared with lottery wins, the estimates are generally consistent in both direction and magnitude.

5 Conclusion

This study exploits lottery wins as a source of exogenous changes in individuals' income to obtain causal estimates of lottery income elasticities for health care. We examined a longitudinal sample of over 14000 lottery winners in the United Kingdom to investigate the impact of lottery wins on health care demand for a range of health care services in an institutional context in which health care is provided in both public and private sectors. The results show that, although lottery wins have little to no effects on the probability that individuals use health care services, lottery winners with relatively large wins are significantly more likely to choose health care from the private sector than from the public sector. We find strong evidence supporting this behavior for health services such as dental care, blood pressure checks, and cervical examination.

The results also show that the effects of lottery wins differ depending on whether individuals have PMI. For individuals with PMI, larger winners are more likely to obtain private care for a range of outpatient services (e.g., dental, eye, cervical examination), suggesting that winners are using their winnings to afford the associated copayments that are not covered under their PMI contracts. For individuals without PMI, lottery wins have no effect on their health care seeking behaviours.

The estimates of the implied lottery income elasticities for public health care services are close to zero, indicating that positive income shocks do not influence the utilization of health care from the public sector. This is perhaps unsurprising given that financial barriers are not expected to be important in limiting access to health care provided by the NHS. A universal health care system does indeed seem to reduce income barriers to health care services yet other barriers might remain. Conversely, the implied lottery income elasticities for private health care are positive and in the range of 0 – 0.26 for most of the health services considered, and 0.82 for cervical examination. The FE estimates of household income elasticities are comparable to those from lottery income; they are in the range of 0.03–0.15, and 0.51 for cervical examinations.

Both sets of estimates are similar to those obtained by Kenkel (1994), who, using United States data, finds an income elasticity of preventive care of 0.06. Our estimates are smaller than those obtained in a recent meta-regression analysis, which finds that the income elasticity of demand for health care is between 0.4 and 0.8 (Costa-Font, Gemmill, and Rubert 2011). Finally, our results are consistent with evidence from microeconomic studies that support the

notion that health care is a necessity and not a luxury good.

Our results indicate that an expansion of income in developed countries is likely to increase the use of private and preventive health care but will leave the use of public health care largely unchanged.

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Table 1: Proportion using health care services and the choice of private (non-NHS) versus NHS service conditional on use.

	Overnight Hospital	Blood pressure	Chest X-ray	Cholesterol test	Dental	Eye test	Cervical exam	Breast exam
Whether used health services	0.093 (0.291)	0.492 (0.500)	0.140 (0.347)	0.181 (0.385)	0.650 (0.477)	0.408 (0.492)	0.260 (0.439)	0.124 (0.330)
N	14,205	14,205	14,205	14,205	14,205	14,205	6,146	6,146
Choice of private service conditional on use	0.083 (0.276)	0.067 (0.250)	0.069 (0.253)	0.076 (0.265)	0.294 (0.456)	0.373 (0.484)	0.015 (0.122)	0.037 (0.189)
N	1,309	6,960	1,987	2,558	9,205	5,758	1,599	755

Note: Standard deviation in parenthesis

Table 2: Estimates of lottery winnings on whether used health service, and the choice of private versus NHS service for different specifications of household income.

	HH Income Net Winnings		*HH Income: Omitted*		*Lagged HH Income*	
	Used Health Care	Private Choice	Used Health Care	Private Choice	Used Health Care	Private Choice
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Overnight hospital	-0.01	0.18	-0.01	0.19	0.01	0.10
	(0.09)	(0.52)	(0.09)	(0.52)	(0.09)	(0.54)
Blood pressure	-0.07	0.31**	-0.07	0.31**	-0.08	0.26*
	(0.09)	(0.14)	(0.09)	(0.14)	(0.09)	(0.15)
Chest X-ray	0.03	0.09	0.03	0.10	0.04	0.13
	(0.10)	(0.32)	(0.01)	(0.32)	(0.10)	(0.34)
Cholesterol test	0.02	0.13	0.02	0.12	0.02	0.02
	(0.09)	(0.21)	(0.09)	(0.21)	(0.09)	(0.22)
Dental	-0.04	0.20*	-0.05	0.20*	-0.03	0.15
	(0.07)	(0.11)	(0.07)	(0.11)	(0.08)	(0.11)
Eye test	0.06	0.14	0.06	0.14	0.11	0.15
	(0.09)	(0.16)	(0.09)	(0.16)	(0.10)	(0.16)
Cervical exam	-0.05	0.74**	-0.05	0.74**	-0.02	0.81**
	(0.16)	(0.32)	(0.16)	(0.32)	(0.02)	(0.34)
Breast exam	0.09	0.12	0.09	0.21	0.12	0.27
	(0.17)	(0.35)	(0.17)	(0.35)	(0.17)	(0.36)

Note: Significance: *** 1%; ** 5%; * 10%. Models are estimated using fixed effects estimation, with robust standard errors in parenthesis. Dependent variables are standardized for comparability across different types of health care services. Coefficient estimates are interpreted as standard deviation changes in health service use for a ten percent increase in lottery winnings and household income. Other covariates include age and squared-age, gender, education attainment, employment status, home ownership, marital status, self-assessed health, health problems, and region identifiers.

Table 3: Estimates of lottery winnings categories on health care use and the choice of private (non-NHS) versus NHS care

	Overnight Hospital	Blood pressure	Chest X-ray	Cholesterol test	Dental	Eye test	Cervical exam	Breast exam
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) Whether used health care								
Lottery wins categories (Reference £1-£100):								
$£100 - £250$	0.63*	0.04	0.01	-0.10	0.04	0.85**	1.13*	0.30
	(0.36)	(0.34)	(0.38)	(0.35)	(0.29)	(0.37)	(0.68)	(0.70)
$£250 - £500$	-0.11	-0.60	-0.20	-0.04	0.36	-0.17	0.55	1.08
	(0.49)	(0.46)	(0.52)	(0.48)	(0.40)	(0.51)	(0.91)	(0.93)
$> £500$	-0.20	-0.45	-0.13	0.19	-0.18	-0.30	0.80	0.88
	(0.52)	(0.49)	(0.55)	(0.51)	(0.42)	(0.54)	(0.98)	(1.00)
(B) Choice of private versus NHS care								
Lottery wins categories (Reference £1-£100):								
$£100 - £250$	-2.65	0.73	0.06	-0.18	0.90*	0.06	-1.16	3.36**
	(1.88)	(0.57)	(1.20)	(0.76)	(0.41)	(0.60)	(1.31)	(1.55)
$£250 - £500$	-2.76	0.48	-2.92*	0.20	0.92	-0.84	1.10	-0.24
	(2.53)	(0.76)	(1.49)	(1.06)	(0.56)	(0.87)	(1.84)	(1.74)
$> £500$	3.18	1.79*	-0.33	2.77**	0.29	1.30	9.59***	-0.57
	(3.09)	(0.83)	(1.70)	(1.17)	(0.61)	(0.92)	(2.06)	(2.58)

Note: Significance: *** 1%; ** 5%; * 10%. Models are estimated using fixed effects estimation, with robust standard errors in parenthesis. Outcome variables are standardized for comparability across different types of health care services. The estimates are interpreted as standard deviation changes in health service use for a ten percent increase in lottery winnings. Other covariates include age and squared-age, gender, education attainment, employment status, home ownership, household income net winnings, marital status, self-assessed health, health problems, and region identifiers.

Table 4: Estimates of lottery winnings on the choice of private versus NHS care by insurance status.

Outcome	Insurance = Yes	Insurance = No
Overnight hospital	0.96	-0.32
	(0.96)	(0.49)
Blood pressure	0.56*	0.00
	(0.32)	(0.14)
Chest X-ray	0.24	-0.21
	(0.71)	(0.27)
Cholesterol test	0.66	-0.22
	(0.52)	(0.17)
Dental	0.46***	0.09
	(0.17)	(0.12)
Eye test	0.56***	0.07
	(0.20)	(0.18)
Cervical exam	1.44**	0.37
	(0.69)	(0.27)
Breast exam	0.81	0.29
	(1.29)	(0.27)

Note: Significance: *** 1%; ** 5%; * 10%. Models are estimated using fixed effects estimation, with robust standard errors in parenthesis. Dependent variables are standardized and coefficient estimates are interpreted as standard deviation changes in health service use for a ten percent increase in lottery winnings. Other covariates include age and squared-age, gender, education attainment, employment status, home ownership, marital status, self-assessed health, health problems, and region identifiers.

Table 5: Private medical insurance (PMI) status and lottery wins by insurance types

	All types	Direct payment & deduct from wages
	(1)	(2)
(A) Any wins	0.003	0.003
	(0.003)	(0.002)
(B) Wins > £500	0.019*	0.005
	(0.010)	(0.008)
(C) Lottery wins categories:		
No wins (Ref)		
< £100	0.002	0.003
	(0.003)	(0.003)
£100 − £250	0.004	0.003
	(0.008)	(0.006)
£250 − £500	-0.003	-0.002
	(0.011)	(0.009)
> £500	0.019*	0.005
	(0.010)	(0.009)
Observations (N)	52,132	46,489

Note: Significance: *** 1%; ** 5%; * 10%. Results in columns (1) and (2) are estimated using fixed effects estimation. Private medical insurance types refer to how medical insurance is paid for. The sample comprises of individuals that won the lottery at least once in the panel, lottery players, and consist of both winners and non-winners in a given year. Covariates include age and squared-age, gender, education attainment, employment status, home ownership, marital status, self-assessed health, health problems, and region identifiers.

Table 6: Lottery wins and length of time individuals maintain private medical insurance coverage

	All Insurance Types (N=958)				Direct payment & deduct from wages (N=718)			
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(A) Wins > £500	-0.771**	-0.766**	-0.715**	-0.633	-0.869*	-0.809*	-0.678	-0.631
	(0.337)	(0.359)	(0.358)	(0.359)	(0.458)	(0.462)	(0.486)	(0.502)
(B) Lottery wins categories:								
No wins (Ref)								
< £100	0.159	0.182	0.201*	0.215*	0.020	0.0325	0.0655	0.111
	(0.119)	(0.118)	(0.118)	(0.119)	(0.146)	(0.150)	(0.149)	(0.152)
£100 − £250	-0.036	0.009	-0.009	0.031	0.114	0.159	0.143	0.248
	(0.229)	(0.231)	(0.229)	(0.231)	(0.376)	(0.387)	(0.389)	(0.381)
£250 − £500	-0.328	-0.215	-0.279	-0.329	0.350	0.400	0.282	0.150
	(0.320)	(0.329)	(0.334)	(0.343)	(0.411)	(0.410)	(0.408)	(0.438)
> £500	-0.739	-0.725**	-0.669*	-0.585	-0.854*	-0.788*	-0.653	-0.591
	(0.337)	(0.359)	(0.358)	(0.359)	(0.459)	(0.464)	(0.488)	(0.504)
Time left in sample	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographic	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Income, wealth	No	No	Yes	Yes	No	No	Yes	Yes
Health, geography	No	No	No	Yes	No	No	No	Yes

Note: Significance: *** 1%; ** 5%; * 10%. Standard errors are clustered at the level of the individual hence parenthesis reflect robust standard errors. The sample comprises of individuals that won the lottery at least once in the panel, lottery players, and consist of both winners and non-winners in a given year. The outcome variable is the number of years individuals maintain private medical insurance coverage after taking up medical insurance. *Time left in sample*: the total number of waves that individuals remain in the survey in the year they take up medical insurance; *Demographic*: age and squared-age, gender, marital status, education attainment, employment status; *Income, wealth*: household income, home ownership; *Health, geography*: self-assessed health, health problems, and region identifiers.

Table 7: Implied income elasticities of health care with respect to lottery winnings and household income

	Public vs. No Care		Private vs. No Care	
	Elasticity of winnings	Elasticity of income	Elasticity of winnings	Elasticity of income
	(1)	(2)	(3)	(4)
Overnight hospital	-0.012	-0.036*	0.220*	0.106
Blood pressure	-0.009	0.017*	0.050	0.104***
Chest X-ray	-0.004	0.018	0.260**	-0.001
Cholesterol test	-0.007	0.012	0.179*	0.150***
Dental	-0.004	-0.011**	-0.002	0.027***
Eye-test	0.014	-0.009	0.012	0.056***
Cervical exam	-0.016	0.013	0.821*	0.511***
Breast exam	0.021	0.043*	0.122	0.146

Note: Significance: *** 1%; ** 5%; * 10%. Models are estimated using fixed effects estimation. Statistical significant refers to the regression coefficient estimates. Estimates of income elasticities are calculated as percentage change in the proportion of individuals obtaining public or private care versus no-care given a one-percent increase in lottery winnings or household income.

A Appendix

Table A.1: Descriptive statistics of winners and non-winners samples

	Winners		Non-winners	
Dependent variable	Mean	Std. Dev	Mean	Std. Dev.
Log(real lottery win)	3.576	1.423		
Win category: $< £100$	0.809	0.393		
Win category: $£100 - £250$	0.091	0.288		
Win category: $£250 - £500$	0.048	0.213		
Win category: $> £500$	0.052	0.223		
Log(real household income)	9.126	0.655	9.022	0.711
Private health insurance	0.197	0.398	0.148	0.355
Age	45.342	17.112	45.718	18.424
Female	0.432	0.495	0.558	0.497
Primary	0.213	0.410	0.255	0.436
Secondary	0.018	0.132	0.012	0.110
Low-secondary, vocation	0.324	0.468	0.296	0.457
High-secondary, mid-vocation	0.128	0.334	0.124	0.329
High vocation	0.206	0.405	0.170	0.375
First degree	0.079	0.270	0.103	0.304
High degree	0.024	0.152	0.027	0.161
Education: Undefined	0.008	0.088	0.014	0.118
Employed full-time	0.590	0.492	0.502	0.500
Self-employed	0.075	0.264	0.070	0.256
Unemployed	0.022	0.146	0.035	0.184
Retired	0.180	0.3839	0.203	0.402
Maternity leave	0.004	0.060	0.005	0.070
Family care	0.052	0.221	0.076	0.265
Full-time student	0.034	0.180	0.053	0.224
Disabled	0.039	0.194	0.048	0.213
Government training	0.001	0.029	0.002	0.041
Other type of employment	0.004	0.065	0.007	0.082
Owns home	0.759	0.428	0.736	0.441
Married	0.699	0.459	0.644	0.479
Health: Excellent	0.226	0.418	0.234	0.423
Health: Good	0.481	0.500	0.456	0.498
Health: Fair	0.205	0.404	0.211	0.408
Health: Poor	0.067	0.249	0.078	0.268
Health: Very poor	0.021	0.142	0.022	0.146
Health problems: Arms, Legs etc	0.294	0.456	0.278	0.448
Health problems: Sight	0.050	0.218	0.052	0.222
Health problems: Hearing	0.092	0.289	0.083	0.276
Health problems: Skin conditions	0.141	0.348	0.117	0.321
Health problems: Chest	0.142	0.349	0.135	0.342
Health problems: Heart/Blood pressure	0.182	0.386	0.171	0.377
Health problems: Stomach	0.086	0.280	0.081	0.273
Health problems: Diabetes	0.038	0.191	0.038	0.192
Health problems: Anxiety, depression	0.069	0.253	0.087	0.282
Health problems: Alcohol, drugs	0.005	0.072	0.006	0.074
Health problems: Epilepsy	0.006	0.080	0.009	0.092
Health problems: Migraine	0.084	0.277	0.081	0.272
Health problems: Other	0.050	0.218	0.044	0.206
N	14,205		134,176	

Table A.2: Implied income elasticities of health care with respect to inheritance income

Dependent variable	Public vs. No Care	Private vs. No Care
Overnight hospital	0.039	0.138
Blood pressure	0.013	0.082
Chest X-ray	-0.006	0.769
Cholesterol test	0.010	0.033
Dental	0.012	0.058**
Eye test	0.008	0.143***
Cervical exam	0.044*	0.224
Breast exam	0.033	0.171

Note: $^{-a}$ Significance: *** 1%; ** 5%; * 10%. Statistical significance refers to the regression coefficient estimates, which are estimated using OLS. Estimates of income elasticities are calculated as percentage change in the proportion of individuals obtaining public or private care versus no-care given a one-percent increase in bequest income.

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