

Impact of Lotteries and Inheritance on Savings, Consumption, and Labor Behavior: Evidence from U.K. 2001 - 2008

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The paper provides empirical evidence about behavioral responses to inheritance and lottery winnings. Using the British Household Panel Survey for the years 2001 to 2008, we estimate a one-way fixed effects model and Tobit-like model for censored data. I find that inheritances decrease labor supply and increase expenditure on groceries, with a potentially heterogeneous responses on the latter across age groups.

0. Introduction

How much do people consume and save from unearned income (such as inheritance, lottery winnings, and government welfare checks)? Do individuals and households respond to different types of unearned income in different ways? Do people change their labor market participation based on unearned income? These questions have important policy implications for multiple dimensions of the economy, such as growing socioeconomic inequality, wealth accumulation, labor market outcomes, and household liquidity cushions. And yet, relatively little is known on these issues, as previous research provides little consensus in their wide-ranging answers.¹ This paper will examine behavioral responses to two specific sources of unearned income, inheritance and lottery winnings, in a novel setting, the U.K., adding to existing threads of research.

Answers to the above questions have important implications for the macroeconomy, financial markets, and socioeconomic issues. Most notably, there has been a renewed interest in the role of inheritance in exacerbating wealth inequality². Capitalizing on access to administrative data on

¹ To be discussed further in the literature review section.

² On Feb 23, 2022, the Washington Post Editorial Board wrote an Op-Ed urging tougher inheritance taxes, calling it “the most obvious policy tolls still sitting on the shelf.”

tax returns, Saez and Zucman (2016) demonstrate that wealth inequality has risen significantly in the U.S. from 1978 to 2012, with the wealth share of the top 0.1% rising from 7% to 22%; Piketty (2011) demonstrates a similar trend in post-World War II France. However, contrary to popular belief, previous literature finds that inheritance decreases relative wealth inequality and improves the Gini coefficient (Wolff, 2002; Boserup et al., 2016; Elinder et al., 2016). Unfortunately, research shows that the equalizing impact of inheritance is reduced when behavioral responses are accounted for (Elinder et al., 2016). Potential behavioral explanations could be that the marginal propensity to consume from inheritance is higher for less wealthy heirs or that wealthier heirs obtain higher returns to savings and investment (Druehl and Martinello, 2020; Anderson and Neilson, 2010, as cited in Elinder et al., 2016). As demonstrated, in understanding how unearned income influences the growing wealth gap, it is important to understand the typical behavioral responses associated with receipt of unearned income.

Behavioral response to unearned income also has important implications for individual and household level well-being. The ability to save unearned income has been shown to provide households with liquidity cushions that reduce the chances of housing foreclosure, bankruptcy filing, and credit card defaults (Collins, 2007; Moorman and Garasky, 2008). Furthermore, it can close deficits in the children's college fund and the parents' retirement fund. There are significant financial implications resulting from whether households primarily save to improve future economic outcomes or largely boost current period consumption. (Zagorsky, 2012)

Given such importance, I investigate the above questions utilizing British Household Panel Survey (BHPS) for the period 2001 to 2008. The panel structure of BHPS allows me to

(partially) overcome endogeneity issues and estimate a fixed-effects model as well as Tobit-like models when the dependent variable is censored. I estimate that the marginal propensity save from lottery and inheritances are approximately 15% and 12% respectively, though it is likely an underestimate. Furthermore, for every £10,000 increase in inheritance, I find that labor supply decrease by 9.4 hours per year and consumption of grocery increase by £84, generally in line with recent studies, despite their coming from different settings.

1. The Lifecycle Model / Permanent Income Hypothesis

More than six decades of academic interest in the Lifecycle / Permanent Income Hypothesis (LC/PIH) has given a theoretical basis for predicting individual consumption and savings responses to both an expected and unexpected windfall. Given individuals get utility from the consumption of goods and services at a decreasing rate (“diminishing marginal utility”), individuals are predicted to smooth their consumption profile over their entire lifetime. Moreover, LC/PIH³ implies that individual consumption behavior should respond to changes to one’s expected lifetime income or permanent shocks rather than to transitory shocks that are small relative to expected lifetime income.

The LC/PIH framework gives the following predictions regarding behavioral response to inheritance and lottery winnings. The consumption response to unanticipated transitory shocks, such as lottery winnings, should be small relative to anticipated shocks. Hence, lottery winning should translate to high (precautionary) savings behavior. However, in contrast, if inheritance can be anticipated and reflected accurately on one’s expected lifetime income before its arrival,

³ LC/PIH assumes individuals are rational and forward-looking. This economic agent can tell apart transitory income shocks from more permanent shocks.

the impact of future inheritance should already be internalized. This means the consumption profile should not change upon receipt and is expected to translate to high savings or potentially to be used to pay off the earlier dissaving. However, any discrepancy in anticipated and actual inheritance may result in a consumption response like that of unanticipated transitory shocks.⁴

2. Literature and Contribution

There is a relatively large body of literature that has been concerned with estimating the marginal propensity to consume as well as labor response to various forms of unearned income. More specifically, a flurry of empirical evidence has given some understanding of behavioral responses to lottery and inheritance in the past two decades. However, the results have been mixed and wide-ranging. The discrepancy in results likely stems from (1) different limitations of each data source and (2) differences in the settings under which the questions are analyzed. To briefly illustrate, it is unlikely that the savings response to the same level of inheritance would be the same in two countries with vastly different pension systems or net pension replacement rates. Similarly, the labor response likely depends on labor market flexibility. Hence, additional evidence from a different setting and improved data sources may contribute to a better consensus or understanding of how different national conditions influence individual responses to inheritance and lottery winnings.

2.1. Previous Literature on Behavioral Response to Inheritance

⁴ U.K. wealth management company, Charles Stanley, reports that only one in five families discuss inheritance plans and that parents secretly plan to leave a far more considerable inheritance to their children than they expect (Jefferies, 2020). In the LC/PIH framework, this suggests that there should be discrepancies in anticipated and actual inheritance, resulting in a consumption response upon receipt. Note, this survey finding is from 2020, whereas the data analyzed is from 2001 to 2008, and hence might not be directly applicable.

The first smaller strand of research attempts to follow the trails of inheritance and trace the estimates of consumption, savings, and labor response to inheritance. The smaller number of previous research is likely due to a lack of access or adequate micro-data. Furthermore, the earliest studies from the 1980s and 1990s mostly rely on cross-sectional variation, causing concerns over endogeneity issues between the size of inheritance and the behavioral response. For example, if inheritance amount is positively correlated with unobserved income potential, studies utilizing cross-sectional data could overestimate (upward bias) labor response. More recent studies tend to capitalize on the greater availability of panel data.

This thread of literature finds a surprisingly wide range of behavioral responses after receiving the inheritance, even if we disregard the studies that employ data on only very wealthy heirs. First, Zargosky (2012) utilizes the National Longitudinal Survey of Youth 1979 (NLSY79) to trace the response of U.S. individuals in their 20s, 30s, and 40s from 1988 to 2000. It reports that about half the inheritance is saved, while the other half is consumed, donated, or lost through investing. Second, using the Michigan Panel Study of Income Dynamics from 1984 to 1989, Joulfaian and Wilhelm (1994) find that for every \$10,000⁵ of inheritance, annual consumption goes up by a mere \$14.00, and labor supply decreases by only 2.4 hours annually. Finally, Elinder et al. (2012) employ Swedish panel data from 2000 to 2008 to estimate that the marginal propensity to earn labor income after receipt of inheritance ranges from -0.04 for younger heirs to -0.09 for older heirs. Furthermore, they find a significant increase in capital income after receiving an inheritance. While the above studies solve the endogeneity problem by using panel data, another problem presents itself if individuals are internalizing inheritances years before

⁵ All dollar amounts are discounted and measured in 1989 levels using the GNP price inflator.

their arrival. In this case, the individual fixed effects would likely pick up on these internalized individual responses, and the estimates would likely underestimate the actual effect on behavior.

The second strand of research attempts to untangle the importance of anticipation in individual response to inheritance, utilizing unexpected deaths and birth as a source of plausibly exogenous variation. The Lifecycle Model / Permanent Income Hypothesis (LC/PIH) predicts that individuals should respond to changes in the expected lifetime income. Lundberg (2020) puts LC/PIH to the test by leveraging the fact that individuals are legal heirs to childless siblings in Sweden. In this setting, an unexpected birth⁶ of a niece or nephew from a childless sibling signifies an event where one's expected lifetime income significantly decreases. Exploiting the variation in the expected inheritance loss, the author finds that individuals tend to internalize the shock after the event (unexpected birth of nephew/niece) by increasing savings. In terms of consumption and labor response, this study finds no statistically significant changes to consumption and labor effort overall. However, women seem to adjust their labor supply – for every 100 SEK loss in potential inheritance, the yearly labor income increases by 0.158 SEK

2.2. Previous Literature on Behavioral Response to Lottery

The final strand of existing research on the behavioral response to lottery prizes is more straightforward. The winning prize amounts are randomly assigned, and anticipation need not be accounted for. Imbens et al. (2001) analyze large lottery winners in Massachusetts from 1984 to 1988 and find the following results. The marginal propensity to save is 16%. The marginal

⁶ Birth of nephew or niece in most cases are likely anticipated. However, Lundberg (2020) assumes that, for biological and social reasons, once the sibling passes a certain age, he or she is unlikely to get a first biological child.

propensities to consume on cars and housing are 1.4% and 3.7%, respectively. The marginal propensity to consume leisure and reduce labor hours (intensive margin) is 11%; a heterogeneous effect demonstrates that effects are larger for those aged 55-65. Picchio et al. (2017), utilizing panel data of Netherlands State Lottery players from 2005 to 2008, find that substantial lottery winnings cause a significant impact on the labor supply; on the intensive margin, labor supply declines by 11% to 17%. However, they find the null impact on the extensive margin, the probability of being employed.

While the two studies produce similar estimates regarding labor responses on the intensive margin to lottery winnings, the above results should be approached with caution in terms of external validity and interpretation. Both studies utilize a sample that consists of lottery winners that are over-representative of middle-aged people with very large winnings. In the case of Imbens et al. (2001), the sample mean and median of winnings are \$1,104,000 and \$635,000 respectively, in 1986 dollars. The behavioral response to a smaller unexpected windfall may be very different at the general population level. Furthermore, Picchio et al. (2017) describe that the labor market in the Netherlands is highly flexible, where employees can easily adjust the hours worked (on the intensive margin). Hence, a similar analysis in a different country with more rigid work flexibility or higher unemployment may result in vastly different estimates.

2.3. Contribution

This paper's contribution to the savings, consumption, and labor supply literature is twofold. First, it adds to the existing literature new evidence from an understudied country, the United Kingdom. Most of the previous literature repeatedly analyzes the responses of heirs and lottery

winners from the United States, Sweden, and the Netherlands. Given the differences in labor market conditions, pension schemes, and other factors, it is reasonable to expect a different intensity of responses to unearned income in other settings. Second, all previous research referenced above focuses on a single type of unearned income. The consequence is that the response to inheritance and lottery becomes potentially incomparable if each estimate comes from different countries at vastly different points in time. This paper, by utilizing a single panel dataset that contains variables on both inheritance and lottery, allows responses to two types of unearned incomes to be compared directly.

3. Data

The paper draws information from the British Household Panel Survey (BHPS). The BHPS follows a nationally representative sample of individuals and households annually from 1991 through 2008. For the purpose of this paper, the key variables of interest (i.e., lottery winnings and inheritances) were tracked from 2001 to 2008; hence, this paper only utilizes the above relevant eight years of data.

Table 1: Number of Participants by Year

Year	2001	2002	2003	2004	2005	2006	2007	2008
Net Increase	-	76	66	83	65	41	26	0
Total Participants	22,296	22,306	22,372	22,455	22,520	22,561	22,587	22,587

Table 1 outlines the number of individual participants by year for the relevant years of interest. It is useful to note that, when BHPS began in 1991, the panel consisted of 5,500 households and 12,718 members. However, the number of participants interviewed and enumerated in 1991 was smaller at approximately 10,300 individuals. The discrepancy arises from minors under the age

of 16 in the BHPS tracked households not being interviewed until they reach the age of 16, among other reasons.

By 2001, the sample had grown to more than twenty-four thousand individuals for two reasons. First, from 1997 through 2001, BHPS surveyed a sub-sample of and provided data for the UK European Community Household Panel (ECHP). These individuals are excluded from the analysis and are not accounted for in Table 1, as they do not provide sufficient overlap with years in which variables of interest were included in the survey. Furthermore, in 1999, BHPS recruited an additional sample from Scotland and Wales to increase their sample sizes such that independent analyses of the two countries could be made possible. Despite these intricacies, BHPS sample “should remain broadly representative of the population of Britain as it changes through the 1990s” (BHPS User Manual A) Finally, in 2001, a sub-sample from Northern Ireland was added, making the panel this paper utilizes broadly representative of the United Kingdom.

Finally, Table 1 demonstrates that each year the number of participants increases slightly. The sources of these changes are mainly as follows. In each successive year, the same individuals from the original sample households are re-interviewed. Should an original member split off from the original household, members of the new household (for instance, through marriage, childbirth, or new living companions) are newly incorporated into BHPS, and new adult members are interviewed. The relative change in the number of participants from 2001 to 2008 is small. Hence, in the hopes of simplifying the method in which households are tracked as well as to get closer to a balanced sample, the sample this paper follows will be locked into the 2001 roster and exclude a small number of newly entering members.

3.1. Basic Summary Statistics

Given the panel data set-up, I provide basic, cross-sectional summary statistics for respondents in BHPS using 2001 variables. In Table 2, the first column gives the sample means for the entire sample. Columns 2 and 3 split the sample into heirs and non-heirs, where the heir refers to individuals who inherit any non-zero inheritance from 2001 to 2008. The non-heir sample is the complement, meaning individuals who have zero inheritance during the eight-year period. Finally, columns 4 and 5 splits the sample showing whether one has any non-zero lottery winnings⁷ during the eight-year period.

Table 2 demonstrates that the average respondents' age in 2001 is 38.3 years old. The group of heirs and lottery winners has a slightly higher average age, in line with the intuition that the probability of inheriting generally increases with age for those aged under 60. Furthermore, it suggests that the group of lottery players is higher than non-players or that amount of cash invested into playing the lottery increases with age, which increases the probability of joining the winner's sample. Across the four sub-samples, there are many similarities in demographic measures, such as HHD size and labor intensity, as well as food expenditures. However, some striking yet unexplained patterns emerge in labor incomes and monthly savings. The two measures seem to be higher on average in 2001 for the two groups that would go on to be heirs and relatively small lottery winners from 2001 to 2008. A further examination using labor income and monthly savings variable for 1997 confirms a similar pattern. This suggests there are potentially unobserved differences between complementary groups, such as income potentials, in correlation with the probability of getting a positive inheritance and so on.⁸

⁷ Non-zero winnings could be as small as £2.

⁸ This issue warrants a further review before final submission of paper.

Table 2: Sample Means (Standard Deviations): 2001 Variables

Variable	All	Heirs	Non-heirs	Winners	Non-Winners
Inherited	0.098 (0.296)	1.000 (0.000)	0.000 (0.000)	0.148 (0.355)	0.078 (0.268)
Wins	0.269 (0.444)	0.412 (0.492)	0.254 (0.435)	1.000 (0.000)	0.000 (0.000)
Age	38.340 (18.848)	41.145 (15.648)	38.041 (19.135)	41.372 (17.280)	37.224 (19.275)
Male	0.529 (0.499)	0.575 (0.494)	0.524 (0.499)	0.486 (0.499)	0.531 (0.497)
Married	0.539 (0.499)	0.595 (0.491)	0.530 (0.499)	0.586 (0.493)	0.515 (0.500)
HHD Size	1.528 (0.933)	1.513 (0.873)	1.530 (0.942)	1.475 (0.857)	1.555 (0.969)
Full Time*	0.767 (0.423)	0.761 (0.427)	0.768 (0.422)	0.801 (0.399)	0.747 (0.435)
Self Employed*	0.121 (0.326)	0.135 (0.342)	0.119 (0.323)	0.112 (0.315)	0.127 (0.333)
Hours Per Week*	33.033 (0.423)	32.911 (11.635)	33.054 (11.927)	33.907 (11.317)	32.525 (12.173)
Labor Income	16,131 (21,332)	21,838 (24,575)	15,323 (20,705)	19,439 (22,545)	14,539 (20,533)
Non-Labor Income	6,135 (9,968)	6,113 (10,638)	6,138 (9,858)	5,947 (9,823)	6,233 (10,042)
Monthly Savings	103.92 (309.70)	153.82 (437.14)	96.58 (285.51)	123.76 (326.43)	94.05 (300.60)
Exp: Durable Goods	357.819 (764.85)	458.354 (940.31)	347.052 (742.831)	398.939 (779.618)	342.674 (759.801)
Weekly Exp on Food	124.35 (59.81)	123.15 (59.06)	124.50 (59.90)	120.339 (57.52)	126.05 (60.67)
Observations	24216	3812	20404	7711	16505

* Conditional on Working

3.2. Distribution of Total Prizes and Inheritances / Potential Limitations

The paper aims to draw conclusions on the impact of lottery winnings and inheritance on consumption, savings, and labor behavior. Of 18 years of BHPS surveys, the data on the exact amount of lottery winnings and inheritance were collected only in the years 2001 through 2008.

Table 3 describes the distribution of total lottery winnings aggregated across years for each participant. Note, all monetary variables were discounted to 2008 British pounds using U.K. consumer price inflation time-series provided from U.K. Office for National Statistics.

Compared to previous literature that utilizes a dataset that solely focuses on large lottery winners, BHPS records only a small number of large lottery winners. While this is certainly more representative of the public, the downside is that most lottery winning amounts are surely too small to generate meaningful savings or labor response. Furthermore, lack of variable recording lottery spending prevents us from controlling for its impact.

Table 3: Distribution of Prizes

Prizes	Freq.	Percent
0	16,507	73.09
(0, £500]	5,878	26.01
(£500, £5,000]	189	0.84
(£5,000, £25,000]	12	0.05
(£25,000, £100,000]	2	0.01
(£100,000, £500,000]	2	0.01
> £500,000	0	0.00
Total	22,269	100.00

Table 4 describes the distribution of total inheritance aggregated across years for each participant. We observe that during the eight-year period, only about ten percent of participants incur an inheritance. However, there are much higher numbers of inheritances with significantly larger amounts compared to the lottery. Hence, the data is more likely to identify significant behavioral responses to inheritance than that of lottery.

Table 4: Distribution of Inheritance

Inheritance	Freq.	Percent
0	20,404	90.34
(0, £500]	733	3.25
(£500, £5,000]	875	3.87
(£5,000, £25,000]	461	2.04
(£25,000, £100,000]	104	0.46
(£100,000, £500,000]	7	0.03
> £500,000	1	0.00
Total	22,585	100.00

4. Empirical Strategy

As previously discussed, a simple cross-sectional study is likely to produce a biased estimate of the behavioral response to inheritance and lottery if the following holds: individuals vary on unobservable dimensions such as preferences for leisure, patience, income potential, and desire for precautionary savings, depending on the levels of expected inheritance or willingness to partake in the lottery.

This paper partially solves the above omitted variable bias by capitalizing on the panel structure of BHPS and estimating models with individual fixed effects. Furthermore, it is natural to consider utilizing time-fixed effects to effectively control for unobserved time trends, such as macroeconomic factors and general population-level changes in preferences. However, to investigate the heterogeneous response to inheritance and lottery by age group, the model includes age and interaction terms and forgoes time-fixed effects. Instead, the macroeconomic control variables, such as unemployment rate, GDP per capita, and others provided by the Office of National Statistics, are included.

Given the above discussions, the paper relies on regressing the one-way fixed-effect model to analyze the labor response to inheritance and lottery winnings:

$$y_{it} = \sum_{t=\tau-1}^{\tau} \beta_1 Lottery_{it} + \sum_{t=\tau-1}^{\tau+1} \beta_2 Inheritance_{it} + \delta_1 X_{it} + \delta_2 \gamma_t + \theta_i + \epsilon_{i,t} \quad (1)$$

where y_{it} is household i 's expenditure on durables, food/grocery bill, labor hours and labor income in year t . The main independent variables are lottery winnings, $Lottery_{it}$, and inheritance amount, $Inheritance_{it}$. In one specification, both a lead and lag inheritance variable are added to see if individuals internalize impending inheritance or if individuals react to inheritance only once received. Since lottery winnings cannot be anticipated, only lag variable is added. Though not shown in the general version of the estimating equation, in one specification, lottery and inheritance amount are interacted with indicators for the age group to test for a heterogeneous response. The vector X_{it} includes controls for potentially time-varying individual or HHD

characteristics such as an indicator for marriage, number of household members, and income.

The vector γ_t captures macroeconomic conditions. θ_i signifies household fixed effects. Finally, idiosyncratic error ϵ_{it} is assumed to be uncorrelated with included independent variables.

Finally, when evaluating the impact of inheritance and lottery on savings behavior, another problem arises: mass-point of zeroes (approximately 38 % of households each year) on the dependent variable. It is reasonable to believe that savings amount is censored, with both zero savings and dissaving showing up as zeroes. Hence, I implement Honoré's method for estimation of the censored regression model (Tobit-like model that allows for individual FE) with code available through the author's website.⁹ For this specification, the same estimating equation can be re-written with y_{it}^* representing the latent variable with a lower bound of zero.

5. Results

This section depicts the results for each outcome separately. All estimates are obtained from estimating equation (1), utilizing either one-way fixed effects regression or Honoré's method/panel Tobit model with fixed effect. For each response variable, this paper starts by estimating the simplest model with only inheritance and lottery variables and individual fixed effects. Then, it will progressively try more complex specifications that might give a more nuanced understanding of individuals' or households' responses to unearned income.

5.1. Savings Response

⁹ <https://www.princeton.edu/~honore/stata/pantob/pantob.sthlp>

The Lifecycle/Permanent Income Hypothesis (LC/PIH) posits that unanticipated windfall or lottery winnings should translate to high precautionary savings behavior, occurring at the time of receipt. Implications of anticipated inheritance are similar. However, this assumes a simple model in which individuals can only either (dis)save or consume. Empirical results would differ if individuals may gift or invest portions of the windfall. Previous literature suggests marginal propensity to save among large lotteries winners in the U.S. are around 16% and around 50% for inheritances among U.S. individuals in their 20s, 30s, and 40s (Imbens et al., 2001; Zagorsky, 2012).

Employing the Tobit model (Honoré's method), Table 5 demonstrates the Household's savings response to inheritance and lottery. Column (1) embodies the simplest model with inheritance and lottery variables and household fixed effects. For a £1,000 increase in inheritance received, savings increase by approximately £130; however, savings response to lottery seem indistinguishable from zero. In column (3), after time-varying household controls and macroeconomic controls are added, the two coefficients on inheritance and lottery become statistically significant, albeit at different levels. A simple chi-squared test of equality between the two coefficients cannot reject the null that two coefficients are equal ($p\text{-value} = 0.64$). Hence, we do not find clear evidence that differences in the source of unearned income lead to different savings responses.

Table 5: Savings Decision - Panel Tobit Honores Method

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Savings (£):	Ind FE	+ Ind Cont	+ Macro Cont	+ Lead/Lag	Poor HHDs	Rich HHDs	By Age Group
Inheritance (t-1)				4.36 (4.64)	6.25 (4.29)	4.35 (5.02)	1.08 (41.18)
Inheritance (£1,000)	130.48*** (23.04)	117.13*** (20.11)	117.20*** (20.12)	127.16*** (23.47)	84.49*** (27.25)	130.18*** (24.80)	
Inheritance (t+1)				-2.24 (5.01)	1.79 (4.64)	-2.66 (5.40)	
Inheritance * 1(Age 36 - 55)							45.85 49.75
Inheritance * 1(Age 56 & Over)							78.62 (131.94)
Lottery (t-1)				-319.93 (269.78)	29.51*** (3.69)	-490.73 (628.66)	
Lottery (£1,000)	358.62 (223.03)	156.08* (82.72)	155.23* (83.04)	331.96 (222.74)	33.30 (29.92)	315.46 (232.00)	160.23 (218.26)
Lottery * 1(Age 36 - 55)							-114.90 (219.47)
Lottery * 1(Age 56 & Over)							234.57 (354.64)
HHD FE	V	V	V	V	V	V	V
HHD Cont. (Time Varying)		V	V	V	V	V	V
Macro Controls			V	V	V	V	V
Observations	111636	111636	111636	93030	56290	36740	111636

In column (4), lead and lag variables are added for inheritance; a lag variable is added for lottery. Lottery winning is found to have a null effect on savings behavior; however, this is likely driven by the fact that most lottery winnings recorded in this dataset are too small to affect savings behavior. For inheritance, the increase in savings behavior is only observed the same year inheritance is received and does not lead to dissaving the period prior nor additional savings in the following year. Interpretation of this result, in terms of whether this signifies lack of internalization of expected inheritance, is deferred as it can be more easily made with consumption and labor behaviors.

Overall, the marginal propensity to save from inheritance of 8% ~ 13% grossly underestimates the 50% reported in Zargosky (2012). One potential explanation is the measurement error that may arise from yearly recall to lottery winnings and inheritances, especially from those who received small amounts, which may lead to attenuation bias. However, I suspect that the main cause is differences in the phrasing of the question. Whereas Zargosky (2012) utilizes data from a household finance-specific survey that can more directly track how savings account totals are changing, BHPS only asks households what their average savings per month were in the past 12 months. Hence, it is possible that one-time receipt of inheritance and transfer into savings account were not considered a regular monthly savings act over which the respondents were asked to report the average.

Heterogeneity. In columns (5) and (6), we further test the idea that poorer and richer households respond differently. After controlling for household income, we see that rich households demonstrate a slightly higher marginal propensity to save from inheritance; however, this is

statistically insignificant ($p\text{-value} = 0.52$). Furthermore, the poor household seems to save more the period following a lottery winning; however, despite statistical significance, the absolute magnitude is too small to be economically meaningful. Finally, in column (7), we test whether there exists heterogeneous response across age groups. However, we do not find any evidence to suggest that savings response is heterogeneous across age groups nor income levels.

5.2. Labor Response

In Table 6, labor response to inheritance and lottery is examined. Columns (1) and (2) demonstrate that for a £10,000 increase in inheritance received, hours worked per week decreases by approximately 0.17 hours, equivalent to a decrease of 9.35 hours per year. This is approximately in line with results from Joulfaian and Wilhelm (1994) which finds that for every \$10,000 of inheritance, the annual labor supply decreases by only 2.4 hours annually. However, the labor response to the lottery is statistically insignificant, again likely driven by small sums of lottery winnings observed in this dataset.

In column (3), lead and lag variables test the idea of whether labor response is internalized just before receipt of unearned income and whether the impact lasts. We find no evidence of inheritance expectation being updated a year prior to receipt of inheritance and it leading to labor response. Note, this does not disprove anticipation effect nor LC/PIH.

Heterogeneity. In column (4), we test for heterogeneous labor response across age groups and generally find null effects. The only statistically significant coefficient suggests that middle-aged individuals are more likely to reduce labor hours in response to lottery winnings. However,

again, given small sums of lottery winnings present in the dataset, interpretation on response to lottery should be made with caution.

Table 6: Labor Hours Per Week - Panel One-way Fixed Effects Model

Dependent Variable:	(1)	(2)	(3)	(4)
Labor Hours (per week):	Ind FE + Cont.	+ Macro Cont	+ Lead/Lag	+ By Age Group
Inheritance (t-1)			-0.0123 (0.0085)	
Inheritance (£1,000)	-0.0175** (0.0069)	-0.0168** (0.0067)	-0.0131* (0.0073)	-0.0052 (0.0103)
Inheritance (t+1)			-0.0024 (0.0066)	
Inht x 1(Age 36 - 55)				-0.0184 (0.0136)
Inht x 1(Age 56 & Over)				-0.0021 (0.0287)
Lottery (t-1)			-0.0046 (0.0428)	
Lottery (£1,000)	0.0804 (0.0942)	0.0762 (0.0871)	0.0491 (0.0849)	0.2957 (0.1874)
Lott x 1(Age 36 - 55)				-0.3096* (0.1878)
Lott x 1(Age 56 & Over)				0.0905 (1.2072)
HHD FE	V	V	V	V
HHD Cont. (Time Varying)	V	V	V	V
Macro Controls		V	V	V
Observations	80112	80112	66760	80088

5.3. Consumption Response

The Lifecycle/Permanent Income Hypothesis (LC/PIH) posits that consumption response to unanticipated transitory shocks should be small. Further, consumption should not respond to inheritance if it is perfectly anticipated.

Table 7 demonstrates one type of consumption response to lottery and inheritance, where the dependent variable of interest is annual grocery bills, imputed from weekly spending on groceries. Overall, the grocery bill shows no change from lottery winnings. However, it is unclear if this null effect is due to data limitations on the small distribution of lottery winnings or due to alignment with LC/PIH predictions. However, columns (1) through (3) demonstrate that a £10,000 increase in inheritance received corresponds to approximately £84 increase in annual grocery spending. This is a larger response than one found in Joulfaian and Wilhelm (1994), which finds that for every \$10,000 of inheritance, annual consumption goes up by a mere \$14.00. Furthermore, a simple chi-squared test of equality between the two coefficients from inheritance and lottery in column (2) confirms that response to lottery and inheritance are statistically different at 99% confidence level (p-value 0,0043). There is also statistically significant evidence that grocery bill responds to a smaller extent prior to receipt of an inheritance, suggesting individuals may be upwardly updating their likelihood of receiving larger inheritances; however,

Table 7: Annual Grocery Bill - Panel One-way Fixed Effects Model

Dependent Variable:	(1)	(2)	(3)	(4)
Grocery Bill (Annual £):	Ind FE + Macro Cont.	+ HHD Cont	+ Lead/Lag	+ By Age Group
Inheritance (t-1)			0.417 (0.419)	
Inheritance	8.531*** (0.381)	8.472*** (0.378)	8.385*** (0.397)	9.459*** (0.780)
Inheritance (t+1)			0.824** (0.396)	
Inht x 1(Age 36 - 55)				-0.149 (0.934)
Inht x 1(Age 56 & Over)				-3.549*** (1.078)
Lottery (t-1)			6.558* (3.557)	
Lottery	-0.040 (2.975)	-0.099 (2.951)	1.115 (2.948)	-4.989 (6.695)
Lott x 1(Age 36 - 55)				6.122 (7.575)
Lott x 1(Age 56 & Over)				4.974 (11.026)
HHD FE	V	V	V	V
HHD Cont. (Time Varying)		V	V	V
Macro Controls	V	V	V	V
Observations	78962	78943	68298	78943

Heterogeneity. In column (4), we test for heterogeneous consumption response across age groups. In response to inheritance, the youngest group, aged 16 to 31, increase grocery spending the most, while the eldest group, aged 56 and over, respond to a lesser extent. This is in line with general patterns of consumption in which consumption declines after retirement; however, this

might also be an artefact of our focusing on grocery bills and other consumption categories might reflect opposite heterogeneity.¹⁰

6. Conclusion

In this paper, I attempt to examine various behavioral responses to lottery winnings and inheritance receipts. Using British Household Panel Data, I estimate a one-way fixed-effect model and Honoré's Tobit-like model to evaluate the marginal propensity to save and consume goods and leisure in response to lottery winnings and inheritance. Given the small distribution of lottery winnings in the dataset, I find little behavioral response to the lottery, apart from the marginal propensity to save of 15% from relatively small-sized lottery winnings.

With more significant sums of inheritance occurrences, I find that marginal propensity to save from inheritance of approximately 12%, though there exist many reasons to believe this is an underestimate. Furthermore, labor supply decreases with inheritance, by 9.4 hours per year for every £10,000 in inheritance. Finally, £10,000 increase in inheritance received is expected to lead to approximately £84 annual increase in grocery spending, with grocery consumption being the only category in which I find some evidence of heterogeneous response across the age groups. These results on labor and consumption response to inheritance generally confirm estimates found in recent literature; however, this paper fall short of making anticipated contribution of comparing the behavioral response to lottery winnings with that of inheritance, due to small distribution of lottery winnings.

¹⁰ The goal for final version is to include consumption response on durable goods.

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