Do the Rich Save More?*

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Abstract

The answer to the age-old question of whether the rich save more than other economic groups is still debated. In order to answer this question, we define the average propensity to consume (APC) out of remaining lifetime net resources, i.e., lifetime private and human wealth minus net taxes. We use a detailed life-cycle consumption-smoothing program TFA to calculate human wealth and net taxes, based on the Health and Retirement Study data. Because of potential consumption behavioral factors that are linked to the ability to accumulate wealth, we construct wealth luck instruments to resolve the endogeneity issue. We identify a strong negative relationship between APC and lifetime net resource and divide households into five quintile groups by resources. The predicted APC of the highest resources cohort is about 0.01, three standard deviations smaller than that of the lowest resource cohort. Our findings show that the rich consume less and save more. Testable implications of models indicate that bequest motives explain why the rich save more. The results do not change if we consider heterogeneous borrowing constraints among households. Breakdown of resources into four components, including liquid and illiquid assets, human wealth, and net taxes, shows that consumption rate does not decrease when liquid assets increase.

Keywords: average propensity to consume, remaining lifetime net resources, bequest motives, heterogeneity

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1 Introduction

In this paper, we ask the question of whether the rich save more than other economic groups out of their *remaining lifetime net resources*. We define remaining lifetime net resources (also referred to as net resources or resources) as the sum of private and human wealth, deducting lifetime net taxes. The answer to this question is crucial to important issues in economics and sociology. First, it has important implications for intergenerational mobility because, if the rich do save more and leave a bequest to their children, the next generation of the rich will have access to more resources, making them more likely to maintain their social status and making intergenerational mobility low. This may lead to such negative consequences as human wealth misallocation and macroeconomic inefficiency. Second, since the distribution of wealth is serially correlated, it becomes harder to reduce inequality. Third, the distribution of wealth can affect aggregate consumption and savings through heterogeneous household behavior, influencing the growth of the economy.

Another motivation for our paper is that a number of popular and influential models only generate constant consumption and saving rates. In these models, wealth inequality is exclusively generated by wage inequality. However, empirical evidence in the U.S. (Straub, 2018) shows that wage inequality is not enough to generate wealth inequality. Straub (2018) showed that, in an Aiyagari (1994) model, the consumption and saving rates are independent of changes in labor income shares. Thus, any redistribution of permanent incomes cannot affect consumption and saving rates, indicating constant consumption and saving rates. Models with precautionary-savings motives, in general, induced by different types of frictions, such as idiosyncratic risk (Aiyagari, 1994), liquidity constraints (Carroll, 1997), and labor income uncertainty (Gourinchas and Parker, 2002), all generate a constant saving rate. Although precautionary-savings models produce decreasing consumption rates in current income, they generate constant consumption rates in permanent income. Firm-side assumptions could also be flexible. Models with monopolistic competition also have the constant saving rate feature, just as the perfect competition models do.

We start by checking the consumption rate generated by a standard macroeconomic model. In the standard model, a representative agent works to earn a constant stream of nontaxable wage incomes each period and saves in one asset, paying a constant interest rate with no tax. We assume a CRRA utility function without uncertainty or idiosyncratic shocks. Also, there is no heterogeneity in interest rate, impatience factor, and risk tolerance. We define remaining lifetime resources to be the sum of asset value and the present value of future earnings in the model. Then, the consumption rate out of remaining lifetime resources is constant and the same across all households. It is determined only by interest rate, impatience factor, and risk tolerance and, not influenced by household remaining lifetime resources. So the standard model could not generate a decreasing consumption rate. As we mentioned before, even a wider range of models have constant consumption and saving rates results.

Instead, we propose two models that could generate heterogeneous consumption rates. One is a model with heterogeneous interest rates, impatience factors, and risk tolerances. The other is a model with bequest motives where the bequest utility function has a smaller coefficient of relative risk aversion than the utility function. Other assumptions in the two models are the same as in the standard model. The different implications of the two models are that, when there is an unexpected small exogenous shock to resources, the consumption rate in the model with heterogeneity would not change but would change in the model with bequest motives.

Next, we use the 2014 wave of Health and Retirement Study (HRS) and the 2015 wave of Consumption and Activities Mail Survey (CAMS) for regression analysis. The first step is to measure remaining lifetime net resources or household resources over the life cycle, including all relevant items. The credibility of our study relies on such precise measurement. Using HRS data and *The Fiscal Analyzer* (TFA), a detailed life-cycle consumption-smoothing program that incorporates borrowing constraints, we estimate each part of the remaining lifetime net resources.

The present value of private wealth is the sum of the market value of assets. To measure human wealth, we use the earnings history of households, included in the restricted HRS data, to forecast future earnings. We group households into different cells in each wave by age, sex, and education, and use successive waves to estimate annual earnings growth rates by age and year for individuals in each sex and education cell. We project future earnings for each particular cell until age sixty-seven (when we assume individuals claim retirement benefits) by using average historical growth rates by age, net of average overall earnings growth plus an assumed future annual real growth rate of one percent. Heterogeneity within cells is generated by a random walk process of permanent component and a serially uncorrelated transitory component. We calculate the present value of future earnings as human wealth. The discount factors we use are capital returns, calculated cell by cell using a similar procedure. The finely calculated future earnings and discount factors, based on earnings history and referring to comparable peers, lead to more reliable results.

We calculate net taxes as taxes deducting transfers to household resources. It is a big challenge to include all major federal and state tax and transfer programs and most previous studies failed to do this. However, TFA includes information about thirty tax and welfare programs, each containing the tax rate for every bracket at state and federal level and specific eligibility and benefits for welfare programs, depending on the economic situation and demographics of individual households. We have access to the restricted data of HRS that enables us to know the geographical location of households, which is also crucial to calculating their exact net taxes.

Once we have the measure of resources, we can check the relationship between consumption rates and resources. OLS regression suffers from the endogeneity issue that consumption behavioral factors may be connected with the ability to accumulate wealth. We calculate large return rates by changes in values of total assets as the wealth luck instrument. Then, we use eight waves of the HRS and the CAMS data from the year 2000 to 2014 to construct a panel data of household total private assets. Abnormally large return rates causally increase resources and we assume households receive large return rates because of pure luck. Our key result is that consumption rates decrease in resources in the IV regression. The average propensity to consume (APC) decreases significantly and economically from 0.09 for the bottom 20% resources quintile to about 0.01 for the top 20% resources quintile. The difference is about 3 standard deviations. By testable implications in the model part, we conclude that bequest motives can explain why the rich save more. The Durbin-Wu-Hausman test shows that there is a systematic difference in IV and OLS estimators. This is not necessarily caused by heterogeneity. First, there may be measurement errors in resources. Second, most reasonable cases of heterogeneity would predict a downward OLS bias. Thus, heterogeneity plays little role in explaining why the rich save more. Our conclusion is that, the rich save more and bequest motives can explain why.

Then we run some robustness checks. First, we constructed borrowing constraint indicator by taking the inverse of the number of years before the first jump in consumption. Our main results remain the same. We also break net resources into its three main components: private wealth, human wealth, and net taxes, or further breaking private wealth into liquid assets and illiquid assets. The consumption rate is irresponsive to liquid assets and decreasing in all others.

The rest of the paper is organized as follows. Section 2 reviews the related literature. Section 3 describes three models and checks the model-generated consumption rate. Section 4 introduces key definitions and the software TFA, sets up the reduced form, and introduces the regression strategy. Section 5 summarizes the data we use. Section 6 shows the OLS and IV regression results and some robustness checks. Section 7 concludes with results and future plans.

2 Literature Review

Our paper relies on the theory of the saving rate and consumption function, and, more specifically, on consumption as a function of lifetime resources. The pioneering work of Friedman (1957) empirically tested the permanent income hypothesis (PIH), showing that consumption is a linear function of permanent income. But there is no consensus on the relationship between consumption and permanent income. Mayer (1966, 1972) showed that the marginal propensity to consume is not equal to average propensity, thus requiring special hypotheses to reconcile with the permanent income hypothesis (PIH) and leading the PIH to be invalid. The disagreement partly results from measurement errors and data quality issues. Little research on these issues has appeared after the upsurge in the 1950s and 1960s.

The relatively new work of Dynan et al. (2004) addressed the question do the rich save more and showed a strong positive relationship between saving rates and current income. The relationship still holds when income is instrumented by lagged or future income or education. The biggest problem of their work is, although they have proxies for permanent income (lifetime net resources in our paper), they did not measure it directly. We seriously doubt the credibility of their results because of the measurement errors and this is one of the reasons why the question is still debated. High current income does not necessarily indicate high lifetime net resources. The four proxies that Dynan et al. (2004) use can only partially resolve the issue because they are all instruments on earnings and not on private wealth or net taxes, the measurement of which are complicated and crucial. Therefore, their proxies for human wealth cannot explain earnings completely. In addition to education, ability is another important determinant of labor earnings. Our methodology, comparatively, is much stronger because it directly and accurately measures every component of lifetime net resources.

Straub (2018) estimated the elasticity of consumption to permanent income from a simultaneous equations model, inspired by results from an overlapping generations (OLG) model with endogenous bequest distribution. The estimated elasticity is about 0.7, so consumption is concave in permanent income. Straub (2018) successfully reduced measurement errors by computing permanent income as the symmetric average over log residualized incomes from one of the simultaneous equations and proposing two instrumental variables. But we think our paper pioneers the direct measurement of lifetime net resource, a major contribution to this literature.

Kaplan and Violante (2014) showed large liquid assets holders have small propensities to consume out of additional transitory income, and large illiquid assets holders have small propensities to consume out of news about future income. The different roles of liquid and illiquid assets intrigue us and, in order to study them separately, we break private wealth in lifetime net resources into two components and check their relationship with consumption separately.

Although the answer to the question of whether the rich save more is still debated, some research has assumed yes is the answer and asked why. Carroll (1998) argued that the rich save more because wealth is luxury goods or could generate a flow of services such as power. Dynan et al. (2004) tested different models and found that hyperbolic preferences and bequest motives could explain why the rich save more but uncertainty could not.

Our paper is also broadly linked to consumption and saving studies of the elderly. Hurd and Rohwedder (2003, 2006, 2008) resolved the retirement consumption puzzle using the Health and Retirement Study (HRS) and the Consumption and Activities Mail Survey (CAMS), the same data sets we use. They found low-wealth households with poor health conditions are forced to retire early. The decline rate of consumption for this small group of people is high, but the decline rate is small at the population level. Hurd and Rohwedder (2013) investigated the age pattern of saving, also using the HRS and the CAMS. They showed that singles dissave after age 65, and couples actively save to keep wealth unchanged. Resolving the puzzle and investigating the pattern rely on their knowledge of the data and we make use of it from their work.

3 Model Explanations

In this section, we build a canonical model in which we incorporate bequest motives and heterogeneous parameters, such as impatience factor, risk tolerance, and assets return. The model collapses into the following three types of models under certain restrictions: a standard model, a model with bequest motives, and a model with heterogeneous parameters. We explore the relationship between consumption rate and lifetime resources in the models and compare them with the data.

Time is continuous, and there is no uncertainty or aggregate risk. Households earn wage income w and save through one asset a. We assume a CRRA utility function with coefficient of relative risk aversion σ_i. Households die with probability p at each age for simplicity. The utility from bequeathing $V^B(a)$ is CRRA with a smaller coefficient of relative risk aversion $\sigma_i^B < \sigma_i$, i.e. $V^B(a) = \dfrac{a^{1-\sigma_i^B} - 1}{1-\sigma_i^B}$. Impatience factor ρ_i and assets return r_i are heterogeneous. Households Hamilton-Jacobi-Bellman equation is presented as follows:

$$\rho_i V(a) = \max_{a,c} \frac{c^{1-\sigma_i} - 1}{1-\sigma_i} + V'(a)(r_i a + w - c) + p(V^B(a') - V(a')) \tag{1}$$

We define the lifetime resources x in this model as the sum of physical wealth and present value of wage earnings.

$$x = a + w/r_i \tag{2}$$

3.1 Standard Model

In the standard model without bequest motives and heterogeneity, where $\sigma_i^B = \sigma_i = \sigma$, $\rho_i = \rho$, and $r_i = r$, the Euler equation is given by

$$\frac{\dot{c}}{c} = \frac{r-\rho}{\sigma} \tag{3}$$

Combining the Euler equation and the dynamics of physical wealth, we can show that consumption rate c/x is the same for each household, not depending on resources.

$$\frac{c}{x} = r + \frac{\rho - r}{\sigma} \tag{4}$$

One thing to notice is that the constant consumption and saving rate result in the standard model above could be applied to wider contexts with discrete time, finite horizon, other utility forms, uncertainty, or borrowing constraint.

3.2 Explanation One: A Model with Heterogeneous Parameters

With heterogeneous parameters and without bequest motives, i.e., $\sigma_i^B = \sigma_i$, the model could generate heterogeneous consumption rate.

$$\frac{c}{x} = r_i + \frac{\rho_i - r_i}{\sigma_i} \tag{5}$$

The model with heterogeneous parameters provides an ex-ante explanation of why the rich save more. For example, if the agent with large lifetime resources is born to be more patient with a smaller ρ_i, the consumption rate would be smaller for this agent. When there is unanticipated exogenous small shock to resources, households consumption rates would not change in this economy.

3.3 Explanation Two: A Model with Bequest Motives

With bequest motives and without heterogeneous parameters, i.e., $\rho_i = \rho$, $r_i = r$, and $\sigma^B < \sigma_i = \sigma$, the model could generate consumption rates that change with lifetime resources.

$$\frac{c}{x} = r - \frac{\dot{a}}{x} \tag{6}$$

where a is one solution of the differential equation,

$$\rho V(a) = \frac{[(1-p)V'(a) + pa^{-\sigma^B}]^{\frac{\sigma-1}{\sigma}-1}}{1-\sigma} + [(1-p)V'(a)+pa^{-\sigma^B}]\{ra+w-[(1-p)V'(a)+pa^{-\sigma^B}]^{-\frac{1}{\sigma}}\} \tag{7}$$

This model provides an ex-post explanation of why the rich save more. When there is an unanticipated small exogenous positive shock to resources, consumption rates would decrease for each household in this economy.

We notice that the testable implications of the above two models are different. Suppose the null hypothesis is that there is no heterogeneity. We construct the wealth luck instrumental variable as a proxy of resources shock to check which model is true, implicated by data. We will discuss how to make use of the implications and interpretations in the IV methodology section 4.5.

4 Methodology

In this section, we talk about our methodology in the empirical analysis, introducing some key concepts and definitions and the software program we use to compute some of the variables. Then, we formulate baseline regressions based on the reduced forms. Finally, we discuss the need for instrument variables and the strategy.

4.1 Concepts and Definitions

We define the average propensity to consume (APC) out of remaining lifetime net resources, in contrast to other studies that define the propensity to consume out of current disposable income or wealth. We define remaining lifetime net resources through two equations: (1) remaining lifetime net resources, R, is defined to be remaining lifetime gross resources, R^G, minus the present value of remaining lifetime net taxes (taxes paid less transfer payments received), T, as

$$R = R^G - T \tag{8}$$

and (2) remaining lifetime gross resources is composed of human wealth, H, and private net wealth, W, as

$$R^G = H + W \tag{9}$$

where human wealth is the present value of lifetime earnings and private net wealth is the market value of all assets.

4.2 The Fiscal Analyzer

We use The Fiscal Analyzer (TFA) to compute the remaining lifetime net resources and all its components for each of the households in the Health and Retirement Study (HRS). As described in Kotlikoff (2019), TFA is a detailed life-cycle consumption-smoothing program that incorporates borrowing constraints. TFA calculates remaining lifetime net taxes and remaining lifetime spending, along all survival trajectories, and then converts them to present values. TFA includes all federal and state income and sales tax provisions in effect as well as all federal and most state-specific transfer programs.

The specific list of tax and transfer programs included in our calculations are outlined in the Table 1:

4.2.1 TFA's Consumption-Smoothing Dynamic Program

TFA's lifetime consumption smoothing procedure begins with the reading of household demographic and economic data. The demographic data includes marital status, birth dates of each spouse/partner, maximum ages of life of spouse/partners, birth dates of children, and ages at which children will leave the household. The economic data includes detailed measures of earnings and assets (for both the past and the future).[1] TFA assumes inflation

[1]These include past Social Security covered labor earnings, current labor earnings and projected future labor earnings, regular (non-retirement account) assets, 401(k) and other deductible retirement account

Table 1: List of Tax and Transfer Programs Included in TFA

Taxes	Personal Income Tax (federal and state) Corporate Income Tax (federal and state) FICA Tax (federal) Sales Taxes (state) Medicare Part B Premiums (federal) Estate and Gift Tax (federal)
Transfer Programs	Earned Income Tax Credit (federal and state) Child Tax Credit (federal) Social Security Benefits (federal) Supplemental Security Income (SSI) (federal) Supplemental Nutritional Assistance Program (SNAP) (state) Temporary Assistance for Needy Families (TANF) (state) Medicaid Medicare (federal) The Affordable Care Act (ACA) (state) Section 8 Housing Vouchers (state and county) Childcare Assistance (state and county)

and rates of return on regular and retirement account assets, household debts, and current primary home data.[2] Preferences about the desired degree of consumption smoothing are also included (i.e., the preferred age-living standard path).[3] The degree and timing of future changes in Social Security benefits, federal taxes, state taxes, and payroll taxes, are also incorporated into the calculations.

TFA's default assumption, which can be changed, is that the household seeks to have the same living standard per household member through time. The program obeys the

assets, Roth retirement assets, current and projected future contributions to each type of retirement account, retirement-account withdrawal choices (start and end date, annuitization and order of withdraws as between Roth and 401(k)-type accounts), Social Security benefit collection choices, defined benefit pensions, and information on retirement income from non-Social Security-covered employment (this triggers Social Security WEP and GPO provisions).

[2]Rent, mortgage amounts, mortgage lengths, mortgage payments, property taxes, condo fees, homeowners insurance, maintenance, etc. are included, as well as up to two future changes in the primary home, symmetric data on the current vacation home data and up to two changes in the vacation home and other real estate properties.

[3]Other items included are funeral expenses, desired bequests, current life insurance (face and cash values), preferences about maintaining living standards of survivors, contingent plans (e.g., what survivors will earn and how they will change their housing), and the maximum amount the household can borrow.

specified desired standard of living profile to the extent possible without violating the household's borrowing constraint. The program simultaneously calculates not just the household's smoothest living standard path, but also its time-varying demands for life insurance (and, thus, the living insurance premiums it will pay each year) and each of the above-referenced taxes and transfer payments.[4]

4.2.2 Imputing Past and Future Earnings Based on the Health and Retirement Study

The restricted section of the Health and Retirement Study contains data on respondents' past earnings histories. We have access to this data and use it to calculate Social Security benefits. To forecast future earnings using past waves of the Current Population Survey through 2013, we follow the methodology used in Auerbach et al. (2016, 2018). Future mortality of household members, assumed to begin at age 55 and end with certain death at age 100, is also projected using the method described in Auerbach et al. (2016, 2018). And, as in that study, the present value of human resources, spending, and net taxes are calculated as probability-weighted averages of their outcomes for all possible survivor paths for either a single person or married couple. Kotlikoff (2019) provides details of updates to TFA subsequent to the Auerbach et al. (2016, 2018) studies.

4.3 Reduced Form

We define the average propensity to consume (APC) out of remaining lifetime net resources:

$$a_i = \frac{C_i}{R_i} \tag{10}$$

where C_i is consumption of household i at year 2014, R is remaining lifetime net resources of household i, and a_i is the APC of household i. Notice that a_i is not defined when remaining

[4]The precise algorithm is proprietary to Economic Security Planning, Inc., which uses it in its commercial lifetime financial planning tools. But its details are available to academic researchers upon receipt of a request emailed to www.kotilkoff@gmail.com, subject to the signing of a non-disclosure agreement.

lifetime net resources is zero.

We assume APC to be a function of a vector of variables Z:

$$a = f(Z) \tag{11}$$

where Z in standard theory includes interest rate, impatience factor, and utility function parameters. In our analysis, we suggest that Z may also include remaining lifetime net resources R itself. APC may also be affected by other individual characteristics, such as age, health condition, size of the family, etc. To summarize, we propose $Z = (\text{interest rate}, \text{impatience factor}, \text{utility function parameters}, R, \text{age}, \text{health condition}, \text{size of the family}, ...)$.

Suppose the f function has the following linear form:

$$a_i = \beta + \gamma R_i + \Gamma X_i \tag{12}$$

where the constant term β includes the impact of interest rate, impatience factor, coefficient of risk aversion, etc. X_i includes all other impact factors except the net resources, including demographic variables.

According to equation 10 and 12, consumption could be expressed as a function of the net resources and all other variables X_i as follows:

$$C_i = \beta R_i + \gamma R_i^2 + \Gamma R_i X_i \tag{13}$$

where consumption C_i is not defined when remaining lifetime net resources is zero.

We formulate our baseline regressions according to equation 12 and 13.

4.4 Baseline Regression

4.4.1 Baseline Regression One

We propose two regression forms in our analysis. Based on the reduced form in equation 12, we suggest the baseline regression on APC and show results in both log resources and level of resources:

$$a_i = \beta + \gamma R_i + \Gamma X_i + \mu_i \tag{14}$$

The parameter of interest is γ. If γ is negative, consumption rate is decreasing, and the rich save more.

$$\gamma = \frac{\partial a_i}{\partial R_i} < 0 \tag{15}$$

4.4.2 Baseline Regression Two

Based on the reduced form in equation 13, we suggest the following baseline regression on consumption:

$$C_i = \alpha + \beta R_i + \gamma R_i^2 + \Gamma R_i X_i + \mu_i \tag{16}$$

where we include a constant term for flexibility purpose, even it does not show up in the reduced form. Compared with the first baseline regression, we allow the definition of consumption when resources are zero. The average propensity to consume a_i of household i based on the above regression 16 is

$$a_i = \alpha / R_i + \beta + \gamma R_i + \Gamma X_i \tag{17}$$

If the APC is decreasing, the rich save more and consume less.

$$\frac{\partial a_i}{\partial R_i} = \gamma - \frac{\alpha}{R_i}\frac{1}{R_i} < 0 \tag{18}$$

Since α is the consumption when resources are zero, $\frac{\alpha}{R_i} < 1$ for most households. Thus $\frac{\alpha}{R_i}\frac{1}{R_i}$ is small enough and we should expect $\gamma < 0$ in most cases.

4.5 IV Regression

4.5.1 Why We Need IV

According to our baseline regressions, we can get an unbiased estimate of γ if we can measure remaining lifetime net resources precisely and choose the right group of control variables such that all independent variables are uncorrelated with the error term.

The exogeneity assumption could be violated easily here. We are concerned that potential behavior factors that could affect resources accumulation may also be linked with preferences towards saving or consumption. For example, a hard worker could also be more patient. Thus, there are the households which gain more human wealth as well as net resources and also save more. We have shown that risk tolerance, impatience factor, and investment ability could affect consumption rate, as shown in the model. If there is no heterogeneity, they are shown in the constant term β in the baseline regression one. If there is heterogeneity, they enter into the error term as omitted variables and correlate with resources. Because of restrictions in HRS data which does not contain that information on households, lifetime net resources may just be picking heterogeneity.

Suppose the true population model is

$$a = \beta + \gamma R + \Gamma X + \Sigma_j \phi_j B_j \tag{19}$$

and we are omitting the individual behavioral factors $B_j's$. The relationship between B_j, R and X is

$$B_j = \psi_j + \omega_j R + \Omega_j X \tag{20}$$

Then, the OLS regressor is biased and

$$\text{plim}_{N\to\infty}\widehat{\gamma}^{OLS} = \gamma + \Sigma_j \phi_j \omega_j \tag{21}$$

We summarize the impact of different individual behavioral factors on the OLS regressor in Table 2. If $\omega_j > 0$, the specific behavior B_j increases the ability to gain resources. If $\phi_j > 0$, the specific behavior B_j increases the preference for consumption. There are examples of both upward and downward bias of a behavior. Whether the OLS estimator is upward biased or downward biased depends on the aggregate effect of those behavioral factors. Most reasonable behavioral factors would predict a downward bias in the OLS coefficient.

Table 2: Bias Caused by Behavioral Factors B_j in the OLS Estimator

Bias	Formula	Example
Upward	$\phi_j\omega_j$>0	Better investors spend money more extravagantly.
Downward	$\phi_j\omega_j$<0	Hard workers are more patient. Better investors are more risk averse. Highly-educated people are better at investment.

4.5.2 Construct Wealth Luck Instruments

As we discussed in the model section, if there is an unanticipated small exogenous positive shock to resources, we can distinguish between the heterogeneity and bequest motives explanation. An ideal instrument would be a free lottery. But because of data limitation, we try the following way instead. First, we calculate the return of total assets of households and define households with abnormally high positive/negative return as having good/bad luck. We define the wealth luck indicators as follows.

Step 1: Compute annualized total assets return rate from year t to t+2 (wave n to n+1):

$$r^a_{it} = 0.5 * [a_{i,t+2}/(a_{it} + 2w_{it} - 2c_{it}) - 1] \tag{22}$$

where a_{it}, w_{it}, and c_{it} are total assets, wage income, and consumption of household i at year t.

Step 2: Define the two-sided luck indicator for household i at year t

$$\mathrm{Z}_{it} = \begin{cases} -1 & r^a_{it} < -i\% \\ 0 & -i\% \leqslant r^a_{it} \leqslant i\% \\ 1 & r^a_{it} > i\% \end{cases} \tag{23}$$

where i = 5, 10, 15, 20, 25, 30. For robustness check, we also try the one-side good luck indicator and the one-side bad luck indicator where

$$\mathrm{Z}^{good}_{it} = \begin{cases} 0 & r^a_{it} \leqslant i\% \\ 1 & r^a_{it} > i\% \end{cases} \tag{24}$$

$$\mathrm{Z}^{bad}_{it} = \begin{cases} -1 & r^a_{it} < -i\% \\ 0 & -i\% \leqslant r^a_{it} \end{cases} \tag{25}$$

Step 3: Define assets-weighted luck for household i using luck indicators from all years for household i

$$\mathrm{Z}_i = \Sigma_t \overline{a^i_t} \mathrm{Z}_{it} \tag{26}$$

$$\overline{a^i_t} = \Sigma_{j \in age_i} a_{jt}/N \tag{27}$$

where $\overline{a^i_t}$ is the average assets of households who have the same age as household i.

We also try the unweighted luck indicator defined as follows:

$$\mathrm{Z}_i = \Sigma_t \mathrm{Z}_{it} \tag{28}$$

4.5.3 Assumptions

The null hypothesis is that there is no heterogeneity $H_0 : \rho_i = \rho, r_i = r, \sigma_i = \sigma$. The relevance assumption is that the wealth luck instrument has a causal effect on lifetime net resources. And the assumption is satisfied by construction since the wealth luck instrument represents large positive or negative returns which increase or decrease wealth as well as lifetime net resources.

The exclusion restriction is that the wealth luck instrument should affect consumption rate only through resources and cannot be correlated with the error term in the baseline regression. One concern about the validity of our instrument is that we do not consider the possibility of different portfolios. If the null hypothesis is true, we can expect there would be no difference in household portfolios. The portfolio risks are the same, and the return rates calculated using changes in total private assets in equation 22 do not need to be adjusted for risks. If we construct the wealth luck IV by using risk-adjusted returns, the null hypothesis is rejected by considering heterogeneous portfolios. Another concern is that large returns may not only be caused by luck. People can persistently earn high returns, not because of luck, but, for example, because they make better investment decisions. If this reason is true, the null hypothesis is rejected because there are households not experiencing persistent high returns, meaning the ability to invest is heterogeneous. Persistent high returns could also be caused by less risk aversion. Households with less risk aversion can systematically earn higher market returns. Again, this rejects the null hypothesis. The third concern is that we are comparing returns with some certain cutoffs. This does not take the changes in the market environment into account. It can be resolved by also comparing how many standard deviations are household returns away from the average returns at the same time. We will incorporate this tactic into the next version. To summarize, we assume that both abnormally high and infrequent return are of pure luck. The wealth luck instrument is not correlated with risk tolerance, impatience factor, or investment ability that we are concerned about. Thus, the instrument is exogenous.

We summarize the testable implications of the two explanations in table 3. As long as the OLS and IV results are systematically different, heterogeneity exists. As long as the IV coefficient of resources is negative and significant, there is a causal effect of wealth on consumption rate and bequest motives explain why the rich save more.

Table 3: Testable Implications of the Two Explanations

model		implications	
heterogeneity	bequest motives	$\gamma < 0$ and significant	OLS and IV
yes	no	no	different
no	yes	yes	same
yes	yes	yes	different

4.5.4 2SLS

Because the second baseline regression on consumption requires multiple instruments and is demanding, we focus on the IV strategy for the first baseline regression on APC which requires only one instrument. We use the log form of resources for interpretation purposes. The first stage of the IV regression is

$$log(R_i) = \delta + \Theta Z_i + \Lambda X_i + \mu_i \tag{29}$$

The second stage of the IV regression is

$$APC_i = \beta^{IV} + \gamma^{IV} \widehat{log(R_i)} + \Gamma^{IV} X_i + \mu_i \tag{30}$$

where $\widehat{R_i}$ is the predicted value of the net resources from the first stage.

5 Data

5.1 Data Overview

We use the household-level financial data from the Health and Retirement Studies (HRS) and consumption data from the Consumption and Activities Mail Survey (CAMS) ans also use the 2014 HRS and 2015 CAMS data to run the baseline and IV regressions. To construct the instruments, we are using eight waves of the HRS from 2000 to 2014 and the CAMS from 2001 to 2015. Our calculation of remaining lifetime net resources is based on the HRS using the TFA. The HRS data also provides us the group of control variables.

5.2 2014 Health and Retirement Study

The HRS is a national longitudinal survey of individuals over the age of 50 and their spouses or partners and is conducted every two years. It contains information on demographics, income, assets, health, cognition, family structure, health care, housing, job, expectations, and insurance. The first wave was conducted in 1992 and we are using the latest 2014 wave. In the 2014 wave, the HRS interviewed 18,747 respondents belonging to 12,746 households. In this paper, we are working with the household-level data.

Table 4 shows average demographic statistics by remaining lifetime net resources quintile. The age(s) of the main and second respondents, if any, are about the same, around 60s to 70s. Households with higher net resources tend to have more adults and children. Disability is an indicator variable which equals one if the respondent is disabled and zero if not. Households with higher net resources are less likely to be disabled. Education is an indicator variable, which equals zero if the respondent has less than high school education, one if high school education, and two if some college or more education. The average education level for the main respondent in all groups is above high school. The second respondent has an average education level lower than the main respondent. The education level of both respondents increases as net resources increase. The race as an indicator variable is equal to one if

Table 4: Demographics by Net Resources Quintile

	Lowest	Second	Third	Fourth	Highest	Top 5%	Top 1%
Age (Respondent 1)	72.80	68.37	64.84	62.73	61.67	61.72	62.94
Age (Respondent 2)	77.21	70.95	65.15	63.25	61.85	63.09	63.12
Child Count	0.04	0.09	0.16	0.28	0.27	0.22	0.17
Adult Count	1.20	1.62	1.72	1.79	1.89	1.90	2.00
Household Count	1.24	1.71	1.88	2.07	2.15	2.12	2.17
Disability (Respondent 1)	0.16	0.22	0.14	0.11	0.07	0.02	0.05
Disability (Respondent 2)	0.08	0.18	0.15	0.12	0.06	0.05	0.00
Education (Respondent 1)	1.24	1.36	1.58	1.72	1.83	1.94	1.96
Education (Respondent 2)	0.70	0.85	0.95	0.95	0.99	1.00	1.00
Race (Respondent 1)	1.13	1.08	1.07	1.04	1.02	1.02	1.02
Race (Respondent 2)	1.13	1.06	1.06	1.04	1.01	1.02	1.02
Health (Respondent 1)	3.05	2.84	2.69	2.47	2.19	1.90	2.12
Health (Respondent 2)	3.12	3.07	2.71	2.57	2.34	2.07	1.91
Cash Constrained	0.33	0.20	0.14	0.08	0.04	0.03	0.03

the respondent is White and zero if Black. If there is a second respondent, the race of the two respondents is the same in most cases. Most respondents are White. Health is a self-rated indicator variable valued from 1 to 5, where 1 represents excellent health, and 5 represents poor health. In general, respondents with higher net resources would rate themselves healthier, the second respondent feels better about their health condition than the first respondent, and there is not much difference in the two respondents' health rating. The cash-constrained indicator is the indicator of the severity of cash constraint. We will talk about the procedure of constructing it in section 6.3. The larger the indicator number is, the more severe the cash constraint is for the particular household. Households with higher net resources are less constrained.

5.3 2015 Consumption and Activities Mail Survey

A random sample of 8,039 households from HRS 2014 was asked to participate in the 2015 wave of CAMS and 5,423 responded. CAMS has three main topics: Part A is about activities or uses of time; Part B collects data on spending, including anticipations and realizations about changes in spending at retirement; and Part C asks for information about marital status and labor force participation.

CAMS questions are about household *spending*. However, for the purposes of this paper, we are interested in household *consumption*. Consumption is different from spending on items like durables (e.g., automobile, television, computer, etc.) and housing in which the purchase occurs in one period, but the item provides utility for more than one period. Specifically, we distinguish between durables spending and consumption; transportation spending and consumption; and housing spending and consumption. Nondurables spending and consumption are the same since utility is obtained immediately after the purchase and there is no element of savings.

Total consumption is a sum of four components: durables, nondurables, transportation, and housing. Durables goods include refrigerators, washing machines and dryers, dishwashers, televisions, computers, and furnishings. Nondurable goods include clothing, gasoline, groceries, utilities such as electricity, and entertainment or services such as dining and trips/vacations. We follow RAND and calculate the transportation consumption as a flow of services which comes from the total value of vehicles observed in the HRS. The consumption of housing is the sum of the rental equivalent of the owned house, property tax, homeowners' insurance, plus any actual rent the household pays for additional properties. For renters, housing consumption is identical to housing spending and equal to the rent.

Table 5 shows total consumption in the year 2014 and all subcategories of consumption as a fraction of remaining lifetime resources. For total consumption and each category of consumption, the rich consume more at an absolute level but less as a fraction of net resources. Households consume nondurable goods most, accounting for about 60% of all consumption,

Table 5: Average Consumption by Net Resources Quintile

	Lowest	Second	Third	Fourth	Highest	Top 5%	Top 1%
Total Consumption	32520.05	45287.95	54968.62	67161.07	90431.53	125782.10	141310.23
Consumption (% of Net Resources)							
Total	8.537	6.779	5.678	4.637	3.006	2.185	1.412
Durables	0.050	0.050	0.032	0.036	0.025	0.017	0.004
Nondurables	5.068	4.134	3.261	2.581	1.688	1.296	0.920
Housing	1.625	1.248	1.165	0.986	0.684	0.500	0.353
Transportation	1.795	1.348	1.220	1.033	0.609	0.371	0.135

and durable goods least, accounting for less than 1%. Housing and transportation hold the same proportion of consumption for the group with the lowest net resources. But the richer households consume more housing than transportation.

5.4 Variables from TFA

We apply TFA to each household in the 2014 HRS to project future net taxes and human and nonhuman wealth and calculate their present values. Human wealth is the present value of all future earnings. Nonhuman (or private) wealth includes all financial assets (stocks, bonds, mutual funds, checking and saving accounts) and real estate assets minus the value of all liabilities. Net taxes include federal and state taxes that households have to pay minus the transfer payments it receives. All variables from TFA represent discounted present values.

Table 6 shows net resources and each category of resources as the percentage of net resources by remaining lifetime net resources quintile. The big differences in net resources are mostly generated by private wealth inequality. Since they are deducted from gross resources, net taxes decrease the inequality in net resources and occupy a larger share when net resources increase. The inequality in human wealth first increases and then decreases as net resources increase. The inequality in private wealth is always larger than that in human wealth.

Table 6: Average Resources by Net Resources Quintile

	Lowest	Second	Third	Fourth	Highest	Top 5%	Top 1%
Net Resources	396352.32	672796.33	970941.55	1450357.50	3382358.83	6189685.59	10381832.34
Resources (% of Net Resources)							
1. Private Wealth	24.29	30.27	35.61	45.25	67.85	87.44	100.33
(1) Regular Assets	7.66	8.88	12.91	17.46	32.97	53.52	70.27
(2) Primary Home Equity	15.32	18.31	16.27	15.75	12.21	10.20	7.68
(3) Other Real Estate Assets	0.65	1.31	1.97	3.69	4.37	6.86	12.25
(4) Retirement Account	0.66	1.77	4.46	8.35	18.30	16.85	10.13
2. Human Wealth	7.20	9.95	22.75	32.93	34.49	25.15	10.81
(1) Employment Income PV	5.51	7.51	18.14	27.53	30.00	22.56	9.96
(2) Self-Employment Income PV	0.08	0.10	0.07	0.01	0.52	0.52	0.00
3. Net Taxes	-68.51	-59.78	-41.64	-21.81	2.34	12.59	11.14
(1) State Taxes PV	0.07	0.13	0.46	0.94	1.64	1.38	0.96
(2) Federal Taxes PV	0.36	0.61	1.85	4.03	8.23	8.80	5.36

5.5 Data Set Construction

Data is constructed in several steps. First of all, data from the CAMS is merged with the data from the HRS and then with results of the TFA. Second, we remove all non-responses and drop observations with negative or zero total income and with remaining lifetime net resources less than 5000. Table 7 shows how many observations we are losing at each step.

Table 7: Data Cleaning

	N of Observations
Original HRS-2014	12,746
Merging with CAMS-2015	6,523
Merging with TFA Results	3,250
Remove Non-Responses	3,043
Remove Total Income ≤ 0	3,052
Remove Remaining Lifetime Net Resources < 5000	2,717

6 Empirical Results

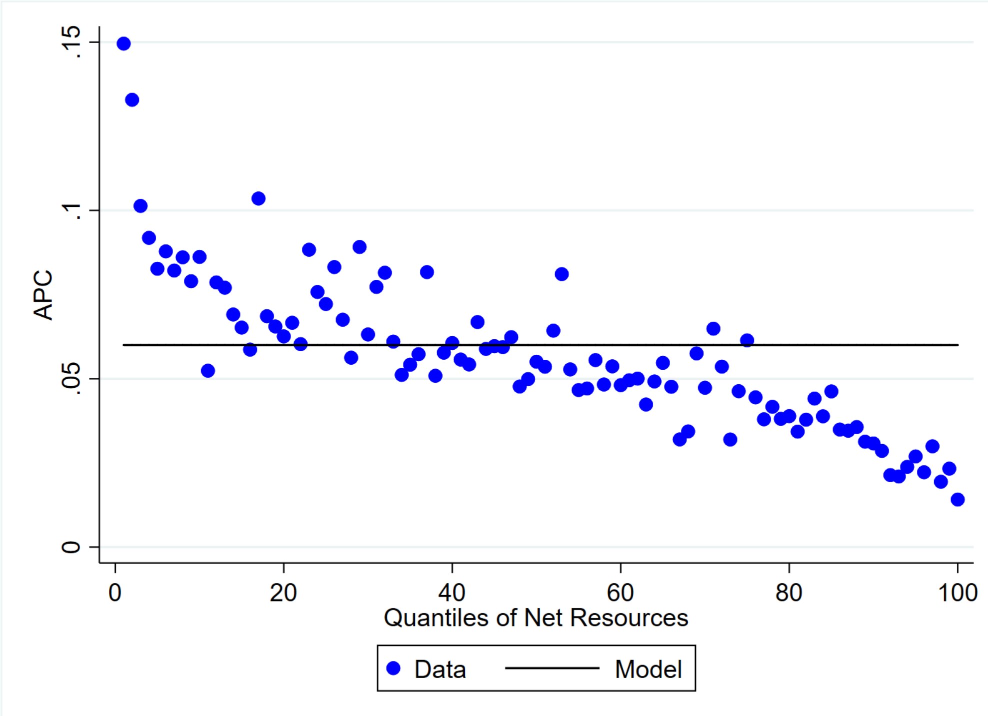
6.1 Baseline Results

6.1.1 Baseline Regression One

In figure 1, we plot consumption rate on quintiles of lifetime net resources using both predictions of the standard model and data-generated items. The decreasing pattern still holds clearly whether we use level or log forms of resources. The standard model predicts that the consumption rate is a horizontal line. Our data shows that the consumption rate is decreasing as lifetime net resources increase. The standard model fails to generate facts consistent with the data. Now the model leaves us with two possible explanations: bequest motives and heterogeneity. If heterogeneity is the reason for decreasing APC, each point in the graph is generated by different return rates, impatience factors, and risk aversion. The rich are born to be more patient, better at investment, and more risk averse. A poor person who becomes rich because of a lottery game would be an outlier and spend much more than his or her peers. A random redistribution of resources would destroy the decreasing pattern. If the rich save more because of bequest motives, the decreasing pattern will remain after a random redistribution of resources because, with more resources, marginal utility in consumption decreases faster than marginal utility in bequeathing. It is optimal to leave a greater proportion of resources to descendants.

We discussed our baseline regression in section 4.4. We include the following key demographic variables in control variables X in our baseline regression: child count, adult count, age, disability, and health. The regression result on APC is represented in Table 8. Coefficients of resources are negative and significant in all forms and groups. Thus, consumption rate is decreasing in resources. The average APC for the full sample is 0.057, which means an average household spends 5.7% of its lifetime resources today. The full-sample results with log resources show that when net resources increase 1%, APC decreases by 0.0003, which is about 0.5% of the sample average APC. If lifetime net resources of household A

Figure 1: Average Propensity to Consume on Resources



are twice that of household B, household A will keep 3% of its resources in its pocket rather than spending 100% more. As the HRS and TFA computed data indicates, there is huge inequality in resources. One household's resources could be 2^n times that of another and n is up to 7. Thus, the extra resources kept in the pocket are huge. Lifetime net resources are presented in millions for results with levels. The full-sample results with the level of resources show that, when net resources increase by one million which is about the average resources of the third quintile, APC decreases by 0.01, about 1/6 of the sample average APC. The coefficients of control variables are not consistent in the log and level forms in the full sample.

To demonstrate how quickly APC decreases, we divide households by resources into five quintile groups. Table 9 shows the predicted APC decreases quickly when net resources increase. For all regressions, the average APC for the lowest group is about 0.08. The average APC for the highest group is about 2 standard errors smaller, around 0.03.

The key coefficients of the worker and retiree groups seem to be different in Table 8. We

Table 8: Baseline Regression on APC for the Full Sample, Workers and Retirees

	C/R					
	Full Sample		Workers		Retirees	
	(1)	(2)	(3)	(4)	(5)	(6)
	log	level	log	level	log	level
R	-0.0308***	-0.0109***	-0.0229***	-0.00840***	-0.0354***	-0.0133***
	(-18.23)	(-11.99)	(-10.37)	(-8.44)	(-14.63)	(-9.02)
$nchild$	0.00367	0.00224	-0.0000968	-0.00140	0.0106**	0.01000**
	(1.63)	(0.95)	(-0.04)	(-0.64)	(2.34)	(2.11)
$nadult$	0.00750***	-0.00263	0.00663**	-0.000650	0.00704**	-0.00404
	(3.27)	(-1.17)	(2.21)	(-0.23)	(2.14)	(-1.23)
age	0.0000432	0.000398***	0.000421**	0.000597***	-0.000118	0.000186
	(0.39)	(3.57)	(2.52)	(3.54)	(-0.60)	(0.92)
$disability$	-0.00595**	-0.00391	-0.00642*	-0.00531	-0.00709	-0.00536
	(-2.11)	(-1.34)	(-1.88)	(-1.53)	(-1.61)	(-1.16)
$health$	-0.00261**	-0.000269	0.000130	0.00212	-0.00376**	-0.00182
	(-2.11)	(-0.21)	(0.08)	(1.32)	(-2.13)	(-0.99)
N	2169	2169	929	929	1240	1240
R^2	0.1588	0.0900	0.1432	0.1119	0.1611	0.0763

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Estimated average APC (%) from Table 8

Regression	s.e.	Lowest	Second	Third	Fourth	Highest	Top 5%	Top 1%
(1) Full, log	2.06	8.18	6.77	5.81	4.75	2.66	0.68	-0.96
(2) Full, level	1.70	7.14	6.53	6.08	5.51	3.36	0.31	-4.25
(3) Workers, log	1.78	8.03	6.78	5.89	4.96	3.34	1.84	0.70
(4) Workers, level	1.53	7.10	6.48	6.00	5.43	3.72	1.33	-2.10
(5) Retirees, log	2.33	8.42	6.84	5.85	4.74	2.34	0.07	-1.89
(6) Retirees, level	1.96	7.34	6.75	6.39	5.86	3.29	-0.42	-6.06

use the following regression to test whether the two groups are statistically different.

$$a_{it} = \beta + \gamma R_{it} + \Gamma X_{it} + \kappa \mathbb{1}(\text{retired}) + \delta \mathbb{1}(\text{retired}) R_{it} + \Delta \mathbb{1}(\text{retired}) X_{it} + \mu_{it} \tag{31}$$

where $\mathbb{1}(\text{retired})$ is an indicator of retiree group. The coefficients and t-stats of retiree group indicator and interaction terms are shown in table 10. The joint p-values show that the two groups are statistically different and that the difference between the two groups is economically significant. The consumption rate in the retiree group decreases at about 1.5 times the worker group speed as resources increase.

Table 10: Test the Differences between Workers and Retirees

	C/R	
	(1)	(2)
	log	level
$retired$	0.215***	0.0500**
	(3.97)	(2.21)
$R * retired$	-0.0125***	-0.00490***
	(-3.55)	(-2.69)
$nchild * retired$	0.0107**	0.0114**
	(2.20)	(2.27)
$nadult * retired$	0.000416	-0.00339
	(0.09)	(-0.73)
$age * retired$	-0.000539**	-0.000411
	(-1.97)	(-1.46)
$disability * retired$	-0.000669	-0.0000552
	(-0.11)	(-0.01)
$health * retired$	-0.00389	-0.00395
	(-1.51)	(-1.50)
N	2169	2169
R^2	0.1673	0.0975
Joint p-value	0.0025	0.0129

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Coefficients of R and X are not reported.

6.1.2 Baseline Regression Two

We include the same set of key demographic variables as the first baseline regression to interact with resources as control variables. The regression result on consumption is represented in Table 11. Resources are in millions. The coefficients of the square term of remaining lifetime net resources are negative and significant for all groups, indicating that the rich have smaller APC and save more. Because it is difficult to recognize the impact of resources on APC directly from the table, we show the estimated APC from each regression in Table 12. The APC decreases quickly as resources increase. For all regressions, the average APC for the lowest group is about 0.10. The average APC for the highest group is about 2 standard errors smaller, around 0.03. The estimated APC is of the same magnitude as the estimated APC of the first baseline regression for each quintile cohort.

The number of children does not matter significantly. In this HRS data, most of the households are about to retire or already retired, as suggested by summary statistics of age in Table 4. The child-rearing expenses including housing, food, care, and education for those older parents would be much smaller than that for younger parents, who are not in our sample, because major parental expenses made on children are from birth through early adulthood. The number of adults would significantly affect consumption. The three groups of regressions show that with one more adult in a family with one million resources in total, the consumption would increase by 5631 for the current year. Elderly households consume more in the worker group and less in the retiree group. Disabled households consume less in the worker group and more in the retiree group. The effect of age and disability is not significant for the full sample. Health condition is only significant for the full sample. Households with worse health conditions consume less and save more for the bad conditions precautionarily.

We formally test the difference between the worker and retiree group by the following

Table 11: Baseline Regression on Consumption for the Full Sample, Workers and Retirees

	Full Sample	Workers	Retirees
	(1)	(2)	(3)
	Current Consumption		
R	21233.6***	4760.2	28085.2***
	(4.43)	(0.58)	(3.77)
R^2	-1480.9***	-1654.8***	-861.8***
	(-9.69)	(-7.12)	(-3.92)
$nchild * R$	743.7	182.9	1965.7
	(0.80)	(0.15)	(1.15)
$nadult * R$	5630.7***	4171.7*	5322.1***
	(4.10)	(1.83)	(3.15)
$age * R$	-28.31	268.3***	-190.7**
	(-0.56)	(2.94)	(-2.18)
$disability * R$	-465.0	-4182.9**	4250.0*
	(-0.32)	(-2.05)	(1.79)
$health * R$	-1852.7***	-860.2	-1437.9
	(-2.78)	(-0.82)	(-1.63)
Constant	28451.9***	30705.8***	28561.1***
	(19.92)	(11.06)	(18.11)
N	2169	929	1240
R^2	0.2591	0.2318	0.2608

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Estimated APC (%) from Table 11

	s.e.	Lowest	Second	Third	Fourth	Highest	Top 5%	Top 1%
(1) Full	2.54	9.70	6.49	5.23	4.28	3.15	2.26	1.46
(2) Workers	2.95	10.88	7.14	5.65	4.54	3.25	2.26	1.40
(3) Retirees	2.46	9.43	6.33	5.11	4.20	3.16	2.41	1.83

specification.

$$C_{it} = \alpha + \beta R_{it} + \gamma R_{it}^2 + \Gamma R_{it} X_{it} + \theta \mathbb{1}(\text{retired}) + \kappa \mathbb{1}(\text{retired}) R_{it} + \delta \mathbb{1}(\text{retired}) R_{it}^2 + \Delta \mathbb{1}(\text{retired}) R_{it} X_{it} + \mu_{it} \tag{32}$$

The results are shown in table 13. The two groups are significantly different. The coefficient of the interaction term of retiree indicator and square term of resources are positive and significant. The consumption for the worker group decreases quickly as resources increase, which is opposite to the group difference test result of the first baseline regression on APC. Age and disability play different roles in the worker and retiree group.

Table 13: Test the Differences between Worker and Retiree Group

	C
$retired$	-2144.7
	(-0.71)
$R * retired$	23325.0**
	(2.11)
$R^2 * retired$	793.0**
	(2.47)
$nchild * R * retired$	1782.8
	(0.81)
$nadult * R * retired$	1150.4
	(0.42)
$age * R * retired$	-459.0***
	(-3.61)
$disability * R * retired$	8433.0***
	(2.63)
$health * R * retired$	-577.7
	(-0.42)
N	2169
R^2	0.2764
Joint p-value	0.00

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

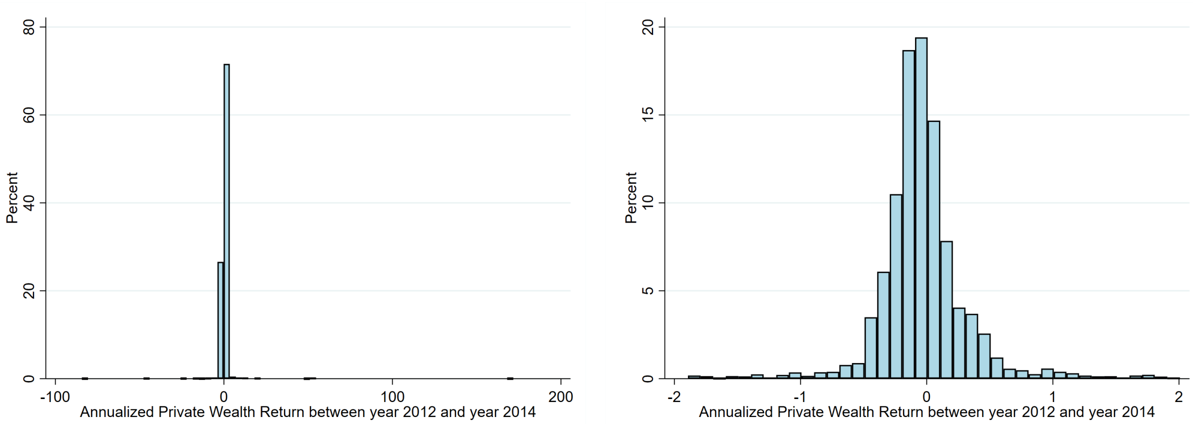
Coefficients of R, R^2 and RX are not reported.

6.2 Wealth Luck as IV

We talked about how we construct the wealth luck instruments in section 4.5. The wealth luck indicators are strongly correlated with lifetime net resources by construction. We assume high return is pure luck, and thus the wealth luck instrument is not correlated with risk tolerance, impatience factor, and investment ability. The instrument is exogenous. We use past waves of HRS to construct panel data of household private wealth (total assets).

Figure 2 shows the histogram of annualized private wealth return from the year 2012 to the year 2014. The return of private wealth varies a lot in the sample and ranges from -85 to 172. Over eighty percent of the return is within [-2, 2]. About fifty percent of the households have wealth returns larger than 20% or less than -20%. Figure 3 shows the histogram of wealth luck indicators.

Figure 2: Histogram of Annualized Total Assets Return



(a) Full Histogram

(b) Histogram with Return Ranged from -2 to 2

Table 14 shows the first stage results of the two-sided assets-weighted luck IV regressions with different cutoffs. The validity of the instrument is robust to different cutoffs of luck definition. Wealth luck indicator is positively correlated with resources. An agent with one million in net resources and one more year of luck in investment increases net resources by 7.57% if we set the luck cutoff to be 20%.

Table 15 shows the main IV results of the two-sided assets-weighted luck IV regres-

Figure 3: Wealth Luck IV with 20% Threshold

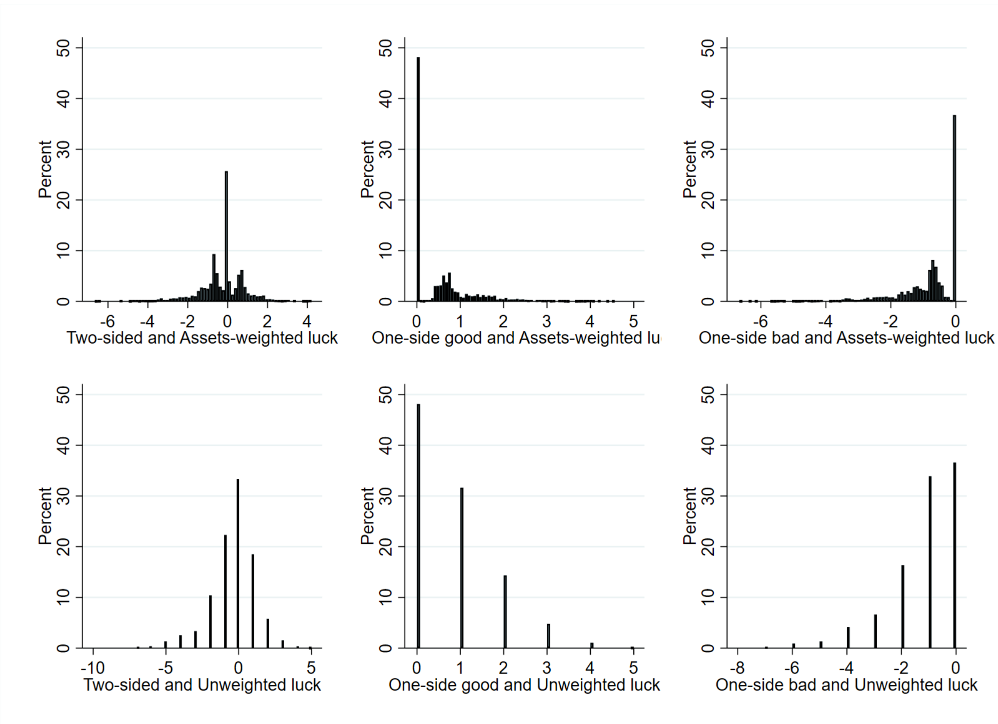


Table 14: First Stage IV Regression by Total Assets with Two-sided and Assets-weighted luck

	(1)	(2)	(3)	(4)	(5)	(6)
Cutoff	5%	10%	15%	20%	25%	30%
Z	0.0418***	0528***	0.0612***	0.0793***	0.0863***	0.0841***
	(5.168)	(5.903)	(6.278)	(7.475)	(7.492)	(6.730)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
N	2,105	2,105	2,105	2,105	2,105	2,105
R^2	0.326	0.329	0.330	0.336	0.336	0.332
IV F-stat	26.71	34.84	39.42	55.88	56.13	45.30

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

sions with different cutoffs. Using wealth luck as an instrument, APC is still decreasing in resources. If there is only heterogeneity, the main IV results would predict a constant consumption rate. According to the testable implications summarized in table 3, we conclude that the relationship between resources and consumption rate is casual. Bequest motives explain why the rich save more. The coefficient is about 1.7 times the OLS coefficient in table 8 full-sample log regression (1). When net resources increase 1%, APC decreases by 0.0005, which is about 1% of the sample average APC. If lifetime net resources of household A are twice that of household B, household A will keep 5% of its resources in the pocket rather than spending 100% more.

We use the Durbin-Wu-Hausman test to check whether the IV and OLS regressors of resources are different. The null hypothesis is that there is no systematic difference in γ^{IV} and γ^{OLS}. Under the null hypothesis, the following statements are true and equivalent: (1) γ^{OLS} is efficient and consistent, (2) there is no endogeneity issue, and (3) there is no heterogeneity if there is no measurement error in resources. The p-value of the test is 0.02649, which is smaller than 0.05. Thus, we can reject the null hypothesis. It is still too early to conclude whether heterogeneity plays a role or not. First, the bias in OLS could be caused by measurement errors in resources, not heterogeneity. We can use another measure of resources as an instrument; for example, future or lagged resources can eliminate measurement error. We will include the result in the next version. Second, the upward biased OLS regression result is consistent with the case where people who are better at investment also spend extravagantly. But the most reasonable forms of heterogeneity would predict a downward bias in OLS, as we discussed in table 2. So there seems to be little role for heterogeneity in abilities to invest, impatience factors, and risk tolerances. The coefficients of all control variables keep the same sign and level of significance. We show the first stage and main IV results of other definitions of luck in the Appendix. These results also support both bequest motives and heterogeneity explanations.

We present the estimated APC with different cutoffs in table 16. The APC decreases

Table 15: IV Regression by Total Assets with Two-sided and Assets-weighted luck

Cutoff	(1) 5%	(2) 10%	(3) 15%	(4) 20%	(5) 25%	(6) 30%
log(R)	-0.0550***	-0.0580***	-0.0530***	-0.0515***	-0.0540***	-0.0515***
	(0.0154)	(0.0137)	(0.0126)	(0.0106)	(0.0107)	(0.0117)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
N	2,105	2,105	2,105	2,105	2,105	2,105
R^2	0.061	0.036	0.075	0.086	0.068	0.086
Durbin pval	0.0759	0.0233	0.0460	0.0265	0.0133	0.0459

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

quickly. The APC of the highest resources group is about 3 standard deviations smaller than that of the lowest resources group.

Table 16: Estimated average APC (%) from IV regressions in Table 15

Cutoff	s.e.	Lowest	Second	Third	Fourth	Highest	Top 5%	Top 1%
5%	3.41	9.22	7.26	5.83	4.12	0.57	-2.88	-5.78
10%	3.59	9.36	7.34	5.84	4.05	0.31	-3.33	-6.39
15%	3.30	9.13	7.22	5.83	4.17	0.73	-2.60	-5.40
20%	3.21	9.05	7.18	5.82	4.21	0.87	-2.37	-5.08
25%	3.35	9.17	7.24	5.83	4.15	0.65	-2.74	-5.58
30%	3.21	9.05	7.18	5.82	4.21	0.87	-2.37	-5.08

6.3 Borrowing Constraints

The baseline and IV regression control for some key demographic variables. Besides the demographic factors that may be linked to consumption behavior, borrowing constraints exercise important influence on household consumption behavior. When a borrowing condition is binding, households are constrained at their borrowing limit, although without it they might consume more. Thus, constrained households have a lower propensity to consume out of their lifetime net resources.

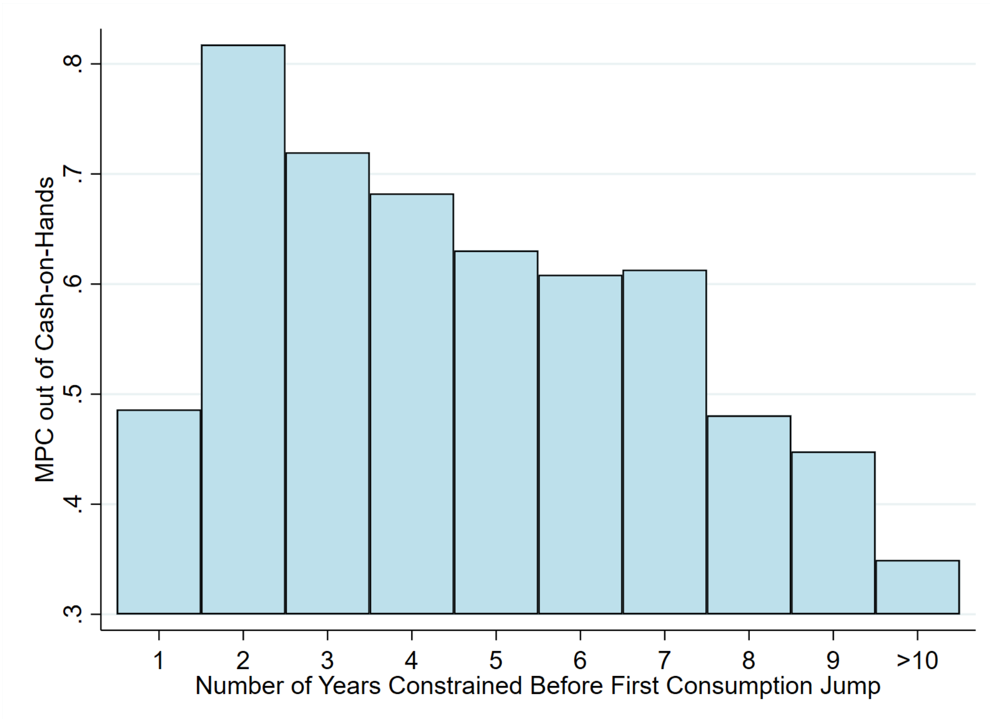
6.3.1 The Borrowing Constrained Indicator

We identify borrowing-constrained households and construct a borrowing-constrained severity indicator, using the TFA. We calculated it using the following procedure. First, we use the TFA to calculate the standards of living through the household lifetime. If households are not borrowing-constrained for their full life, their consumption is totally smoothing. Otherwise, there is a jump in their consumption at some time. During the years before the jump, households are borrowing-constrained. Then, we calculate the number of years before the standard of living rises for the first time. Cash-constrained indicator is the inverse of the number of years. Therefore, the higher the indicator number is, the fewer years a particular household is constrained for and, thus, more severe is the cash constraint because fewer resources are available during those years. Through our way of constructing the cash-constrained indicator, we are not able to distinguish between the households who are either never constrained or forever constrained because there would be no jump in consumption in those cases. We are still working on this issue case by case.

Before analyzing the impact of borrowing constraints on consumption, it would be helpful to understand the borrowing-constraint indicator better. We analyze the indicator by net lifetime resource percentiles and by age groups and compare constraints among workers and retirees.

First, we check the relationship between the borrowing-constrained indicator and the MPC out of cash-on-hand. We define cash-on-hand as the sum of total household annual income, checking accounts, savings accounts, and value of financial assets, including stocks, bonds, and CDs. The resources that are available to cash-constrained households are cash-on-hand plus some amount of money they can borrow, usually a small fraction of their wealth. Thus, the marginal propensity to consume out of cash-of-hand approaches one for those households. Figure 4 plots the median MPC out of cash-on-hand on the number of years for which households are constrained before the first consumption jump. The least severely constrained group, with the number of years constrained larger than 10 and borrowing constrained indicator valued 0 - 0.1, has the lowest MPC out of cash-on-hand, which is consistent with the definition of being borrowing-constrained.

Figure 4: MPC out of Cash-on-Hand

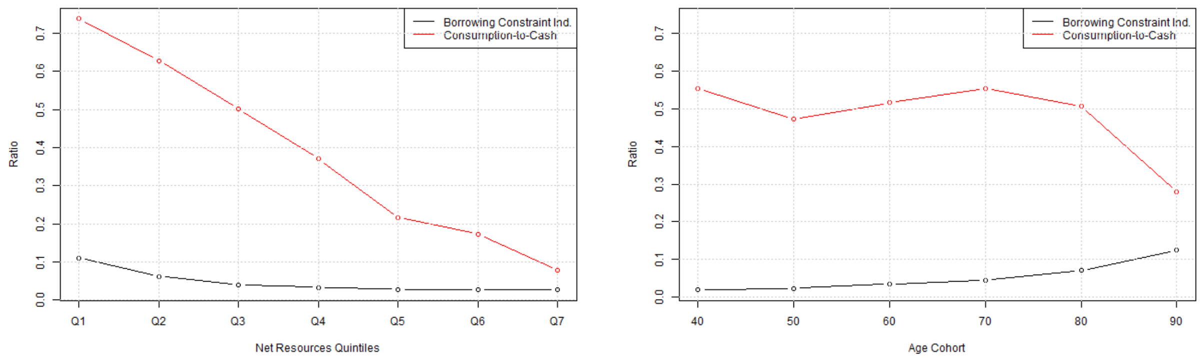


Then, we calculate the median borrowing constrained indicator and median consumption to the cash-on-hand ratio for each net resource quintile group. As we can see from Figure 6(a), the borrowing constraints are the most severe for the first quintile, and the first quintile has the highest MPC out of cash-on-hand.

Next, we calculate the same values for each age cohort. Figure 6(b) illustrates that borrowing constraints are the most severe for the elderly and the MPC out of cash-on-hand falls significantly with age.

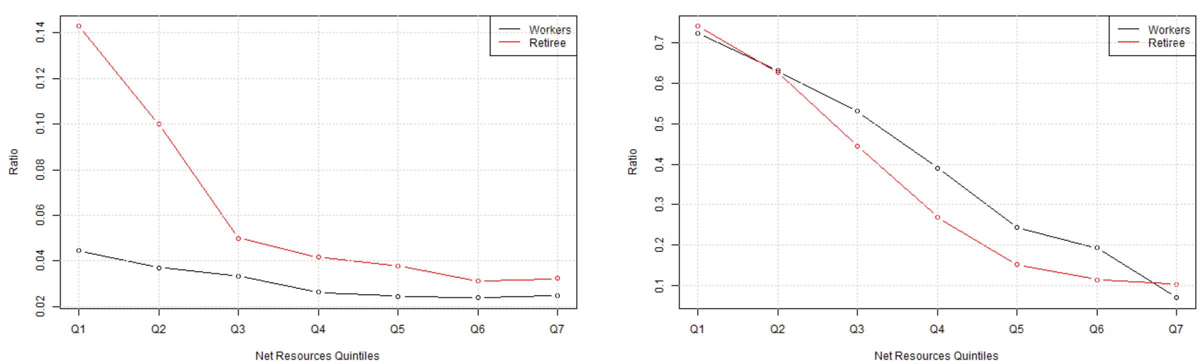
Finally, we examine the difference in these values across retirees and workers. Figure 6 shows that the borrowing constraints are more severe for retired people in each of the net resource percentiles while the ratio of consumption to cash on hand is smaller for retired people in each of the net resource percentiles.

Figure 5: Breakdown of Borrowing Constrained Indicator



(a) Breakdown by Net Resource Quintiles (b) Breakdown by Age Cohort

Figure 6: Comparison between Retirees and Workers



(a) Borrowing Constrained Indicator (b) Consumption to Cash-on-Hands Ratio

6.3.2 Borrowing Constrained Indicator and Consumption Rate

Based on the first baseline and IV regression with a two-sided and assets-weighted luck instrument generated by total assets, we add cash-constrained indicator as one of the control variables. The results are presented in Table 17 and Table 18 correspondingly. In the IV regression, households which are constrained for 1 year have a 1.4% lower consumption rate than households that are constrained for 10 years. More importantly, our key result still holds. APC is decreasing with net resources and the coefficient has the same magnitude as previous regressions. The IV regression coefficient is larger in absolute value than the OLS coefficient. By considering heterogeneous borrowing constraints, we still arrive at the result that both heterogeneous impatience factors or risk tolerance or investment ability and bequest motives explain why the rich save more.

Table 17: OLS Regression with Cash-Constrained Indicator

	C/R					
	Full Sample		Workers		Retirees	
	(1) log	(2) level	(3) log	(4) level	(5) log	(6) level
R	-0.0311***	-0.0104***	-0.0240***	-0.00857***	-0.0357***	-0.0124***
	(-17.48)	(-11.28)	(-10.66)	(-8.55)	(-13.84)	(-8.23)
$cashconstrained$	-0.00176	0.0101***	-0.0191**	-0.0111	-0.00137	0.0116**
	(-0.50)	(2.84)	(-2.37)	(-1.36)	(-0.30)	(2.58)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
N	2169	2169	929	929	1240	1240
R^2	0.1589	0.0934	0.1484	0.1137	0.1611	0.0813

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Based on the second baseline OLS regression, we add cash constrained indicator interacting with net resources as one of the control variables. The results are presented in Table 19. Again, our key result still holds. The coefficient of the square term of net resources is negative and significant. APC is decreasing in net resources, and the rich consume less and save more. The net resources have a similar impact on APC quantitatively as the baseline

Table 18: IV Regression with Cash-Constrained Indicator

	C/R					
	Full Sample		Workers		Retirees	
	(1)	(2)	(3)	(4)	(5)	(6)
	log	level	log	level	log	level
R	-0.0527***	-0.0497***	-0.0536***	-0.0318***	-0.0479***	-0.0748*
	(-4.75)	(-3.42)	(-3.92)	(-3.32)	(-3.00)	(-1.81)
cashconstrained	-0.0154**	-0.0182	-0.0391***	-0.0341**	-0.00839	-0.0295
	(-2.03)	(-1.61)	(-3.06)	(-2.43)	(-0.81)	(-1.05)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
N	2105	2105	894	894	1211	1211
R^2	0.0869	.	.	.	0.1390	.

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

regression. All other control variables have the same interpretation and the quantitative impact is similar to the baseline regression. Because we just have one instrument, we are not able to run IV regression for this specification.

For the full sample, the more severely constrained households consume less. Households which are borrowing-constrained for one year consume 7557 dollars less than households which are borrowing-constrained for over ten years if both of them have one million resources. This is quantitatively large, about 13% of the average consumption. For some reason, the worker group and retiree group separately are not significantly affected by cash constraint. The result for the full sample is intuitive.

6.4 Breaking Down the Households' Wealth

In this section, we break net resources into the three main parts, i.e., private wealth, human wealth, and net taxes. We want to know whether the consumption rate is decreasing in each part of net resources. We see that consumption rate is decreasing in net resources, private wealth, human wealth, and net taxes from Figure 7. To check more rigorously by controlling other demographic characteristics, we perform regression analysis. Here we

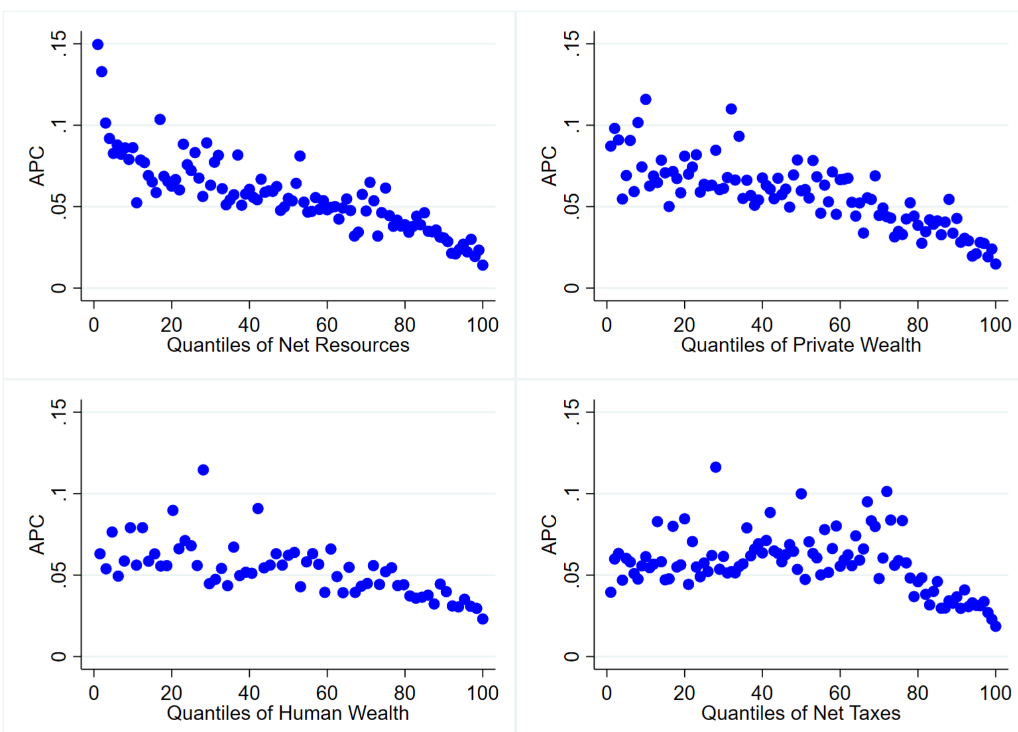
Table 19: OLS Regression with Cash-Constrained Indicator for the Full Sample, Workers and Retirees

	Full Sample	Workers	Retirees
	(1)	(2)	(3)
	Current Consumption		
R	20347.0***	4517.7	27790.9***
	(4.23)	(0.55)	(3.73)
R^2	-1466.6***	-1669.8***	-854.9***
	(-9.59)	(-7.19)	(-3.88)
$cashconstrained * R$	-7556.5**	-13292.3	-2847.8
	(-2.02)	(-1.63)	(-0.72)
Other Control Variables	Yes	Yes	Yes
N	2169	929	1240
R^2	0.2605	0.2340	0.2611

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 7: Average Propensity to Consume on Resources



are only able to show the OLS regression results because IV regression requires multiple instruments.

Based on the first baseline regression, we propose the following regression:

$$a_{it} = \beta + \gamma_w W_{it} + \gamma_h H_{it} + \gamma_t T_{it} + \Gamma X_{it} + \mu_{it} \tag{33}$$

The results are shown in Table 20. Coefficients of each part of net resources are significant and negative; thus, APC is decreasing in private wealth, human wealth, and negative net taxes, i.e., net transfers. We do not show results in log forms because many households have negative net taxes and would provide few observations. APC does increase as the level of net taxes increases. Although the tax system is sophisticated, with roughly 30 tax-transfer programs, with different rules households are able to figure out the direct impact of taxes on consumption. This result is important to our contribution to measuring net taxes precisely. Consumption rate increases significantly as net taxes increase; thus net taxes play an important role and cannot be neglected.

Table 20: Breakdown of the Remaining Lifetime Net Resources

	C/R	
	(1)	(2)
W	-0.0140***	-0.0136***
	(-12.01)	(-11.53)
H	-0.0234***	-0.0223***
	(-6.63)	(-6.32)
T	0.0403***	0.0395***
	(6.20)	(6.08)
$cashconstrained$		0.00977***
		(2.76)
Other Control Variables	Yes	Yes
N	2169	2169
R^2	0.0987	0.1019

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Another way to check whether the consumption rate is responsive to each part of the three main components is to instrument net resources with each part. The coefficient of net resources by instrumenting represents the contribution of each part. The results are shown in Table 21. We get results consistent with Table 20. APC responds to each part of net resources.

Table 21: Instrument Net Resources with Private Wealth, Human Wealth, and Net Taxes

	C/R		
	(1)	(2)	(3)
Instrument R with	W	H	T
R	-0.00985***	-0.00955***	-0.00610***
	(-10.25)	(-2.94)	(-3.94)
cashconstrained	0.0105***	0.0107**	0.0131***
	(2.95)	(2.56)	(3.58)
Other Control Variables	Yes	Yes	Yes
N	2169	2169	2169
R^2	0.0933	0.0930	0.0842

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

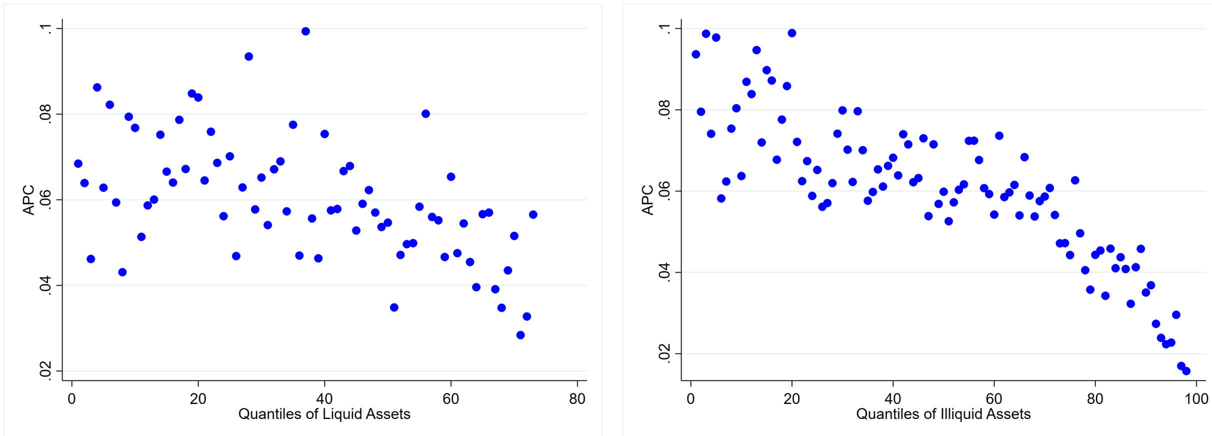
We further categorize private wealth into liquid assets and illiquid assets. We define liquid assets to be the sum of cash, checking, savings, money market accounts, and mutual funds, stocks, bonds, and T-Bills. The rest of private wealth are illiquid assets, including housing net of mortgages and home equity loans, retirement accounts, life insurance, etc. We plot the consumption rate on liquid and illiquid assets in Figure 8. The consumption rate on illiquid assets is clearly decreasing. We use a formal regression result to check the observations with the graph. The regression specification is

$$a_{it} = \beta + \gamma_L A_{it}^{L} + \gamma_{IL} A_{it}^{IL} + \gamma_h H_{it} + \gamma_t T_{it} + \Gamma X_{it} + \mu_{it} \tag{34}$$

where A^L and A^{IL} are liquid and illiquid assets correspondingly.

The results are shown in Table 22. Again, we only show results in levels because by taking logs many observations would drop because of negative net taxes, liquid assets, and illiquid assets. APC does not change with liquid assets and decreases with illiquid assets.

Figure 8: Breakdown of Private Wealth into Liquid Assets and Illiquid Assets



(a) Liquid Assets (b) Illiquid Assets

One possible reason is that there is a significant number of hand-to-mouth households which consume their liquid assets and the MPC is always close to one out of liquid assets. APC still decreases as human wealth increases and net taxes decrease. Interpretations of control variables are consistent with the baseline results.

We apply the same experiment for the second baseline regression on consumption and show the two sets of regression results in Table 23. APC is decreasing in private wealth, human wealth, and illiquid assets. APC does not respond to net taxes, which contradicts the result regressing on consumption rate. The magnitude of the estimated APC is consistent with the baseline regression. Interpretations of control variables are consistent with the baseline results.

7 Conclusion

This paper empirically answers the long-debated question of whether the rich save more than other economic groups. We use the software *The Fiscal Analyzer* (TFA) to precisely measure remaining lifetime net resources. The main challenge is estimating human wealth and net taxes. We have access to the restricted data of HRS and forecast future earnings based on the earnings history of households. We calculate accurate net taxes, based on the

Table 22: Further Breakdown of Private Wealth

	C/R	
	(1)	(2)
A^L	-0.000798	-0.000569
	(-0.55)	(-0.39)
A^{IL}	-0.0153***	-0.0148***
	(-11.31)	(-10.88)
H	-0.0204***	-0.0194***
	(-5.87)	(-5.56)
T	0.0335***	0.0329***
	(5.29)	(5.19)
$cashconstrained$		0.0106***
		(3.00)
Other Control Variables	Yes	Yes
N	2169	2169
R^2	0.0926	0.0964

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 23: Breakdown of the Household Resources

	Consumption			
	(1)	(2)	(3)	(4)
R	24516.7***	23622.3***	22699.4***	21794.3***
	(4.65)	(4.47)	(4.32)	(4.13)
$W * R$	-1503.3***	-1491.3***		
	(-6.64)	(-6.59)		
$A^L * R$			-25.28	-13.12
			(-0.07)	(-0.04)
$A^{IL} * R$			-1679.5***	-1668.3***
			(-7.18)	(-7.13)
$H * R$	-2137.5***	-2128.9***	-1450.6**	-1443.6**
	(-2.92)	(-2.91)	(-1.98)	(-1.97)
$T * R$	1707.8	1711.0	438.2	445.1
	(1.27)	(1.27)	(0.33)	(0.33)
$cashconstrained * R$		-7543.3**		-7653.2**
		(-2.02)		(-2.05)
Other Control Variables	Yes	Yes	Yes	Yes
N	2169	2169	2169	2169
R^2	0.2599	0.2613	0.2647	0.2662

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

geographic location of households. And we construct wealth luck as an instrument to resolve the endogeneity issue caused by consumption behavioral factors that are also linked with the ability to accumulate wealth. The IV regression result shows that the consumption rate decreases significantly quickly when lifetime net resources increase. Thus the rich save more and the relationship is causal.

We show that a standard model could only generate a constant consumption rate. Thus we consider two alternatives: a model with bequest motives and a model with heterogeneity. Testable implications of the two models show that the rich save more because of bequest motives. The upward bias in OLS regression indicates that there is little role for heterogeneity. The statistically and economically significant IV coefficient shows that bequest motives play a role.

One direction worth exploring is to investigate the quantitative impact of decreasing consumption rates on inequality and intergenerational wealth distribution. It is still unclear whether the influence is economically meaningful. Welfare analysis should be conducted as well we policy analysis, accordingly.

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Appendix A. Robustness Checks

7.1 First and Second Stage Results with Other Definitions of Wealth Luck IV

Table 24: First Stage by Method 1 with One-side bad luck and Assets-weighted luck

VARIABLES	(1) 5%	(2) 10%	(3) 15%	(4) 20%	(5) 25%	(6) 30%
Luck	0.0414***	0.0614***	0.0766***	0.0967***	0.114***	0.117***
	(4.166)	(5.834)	(6.818)	(8.075)	(8.848)	(8.219)
Observations	2,105	2,105	2,105	2,105	2,105	2,105
R-squared	0.389	0.394	0.397	0.402	0.406	0.403
IV F-stat	17.36	34.03	46.48	65.20	78.29	67.55

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 25: Second Stage by Method 1 with One-side bad luck and Assets-weighted luck

VARIABLES	(1) 5%	(2) 10%	(3) 15%	(4) 20%	(5) 25%	(6) 30%
log(R)	-0.0511***	-0.0563***	-0.0516***	-0.0529***	-0.0565***	-0.0540***
	(0.0197)	(0.0144)	(0.0121)	(0.0103)	(0.00958)	(0.0102)
Observations	2,105	2,105	2,105	2,105	2,105	2,105
R-squared	0.096	0.062	0.094	0.085	0.061	0.078
Durbin pval	0.251	0.0462	0.0553	0.0160	0.00237	0.0102

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7.2 Quintile Dummies

Instead of including the quadratic term, we can explore whether the quadratic function is concave by including the net resource quintile dummies. We divide the full sample into 7 net lifetime resource quintile (0-19%, 20-39%, 40-59%,60-79%,80-95%,95-99% [top 5%] ,99-100%

Table 26: First Stage by Method 1 with Two-sided luck and Unweighted luck

VARIABLES	(1) 5%	(2) 10%	(3) 15%	(4) 20%	(5) 25%	(6) 30%
Luck	0.0379***	0.0438***	0.0520***	0.0649***	0.0692***	0.0640***
	(6.396)	(6.807)	(7.401)	(8.499)	(8.360)	(7.051)
Observations	2,105	2,105	2,105	2,105	2,105	2,105
R-squared	0.396	0.397	0.399	0.404	0.404	0.398
IV F-stat	40.91	46.34	54.77	72.24	69.89	49.71

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 27: Second Stage by Method 1 with Two-sided luck and Unweighted luck

VARIABLES	(1) 5%	(2) 10%	(3) 15%	(4) 20%	(5) 25%	(6) 30%
log(R)	-0.0526***	-0.0569***	-0.0537***	-0.0523***	-0.0553***	-0.0500***
	(0.0129)	(0.0124)	(0.0113)	(0.00981)	(0.0101)	(0.0117)
Observations	2,105	2,105	2,105	2,105	2,105	2,105
R-squared	0.087	0.058	0.080	0.089	0.069	0.102
Durbin pval	0.0601	0.0176	0.0226	0.0134	0.00602	0.0652

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 28: First Stage by Method 1 with One-side bad luck and Unweighted luck

VARIABLES	(1) 5%	(2) 10%	(3) 15%	(4) 20%	(5) 25%	(6) 30%
Luck	0.0495***	0.0631***	0.0748***	0.0903***	0.101***	0.0990***
	(5.875)	(7.450)	(8.479)	(9.697)	(10.11)	(8.978)
Observations	2,105	2,105	2,105	2,105	2,105	2,105
R-squared	0.394	0.400	0.404	0.410	0.412	0.407
IV F-stat	34.52	55.50	71.89	94.03	102.1	80.60

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 29: Second Stage by Method 1 with One-side bad luck and Unweighted luck

VARIABLES	(1) 5%	(2) 10%	(3) 15%	(4) 20%	(5) 25%	(6) 30%
log(R)	-0.0481***	-0.0524***	-0.0495***	-0.0503***	-0.0535***	-0.0477***
	(0.0139)	(0.0111)	(0.00974)	(0.00858)	(0.00834)	(0.00917)
Observations	2,105	2,105	2,105	2,105	2,105	2,105
R-squared	0.113	0.088	0.105	0.101	0.082	0.115
Durbin pval	0.163	0.0298	0.0309	0.0103	0.00204	0.0378

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[top 1%]). Next, we estimate the following regression:

$$c_i = \gamma_0 + \sum_{k=1}^{7} \gamma_{1k} \times NR_i \times I_i^k + \omega(X \times R)_i + \epsilon_i \tag{35}$$

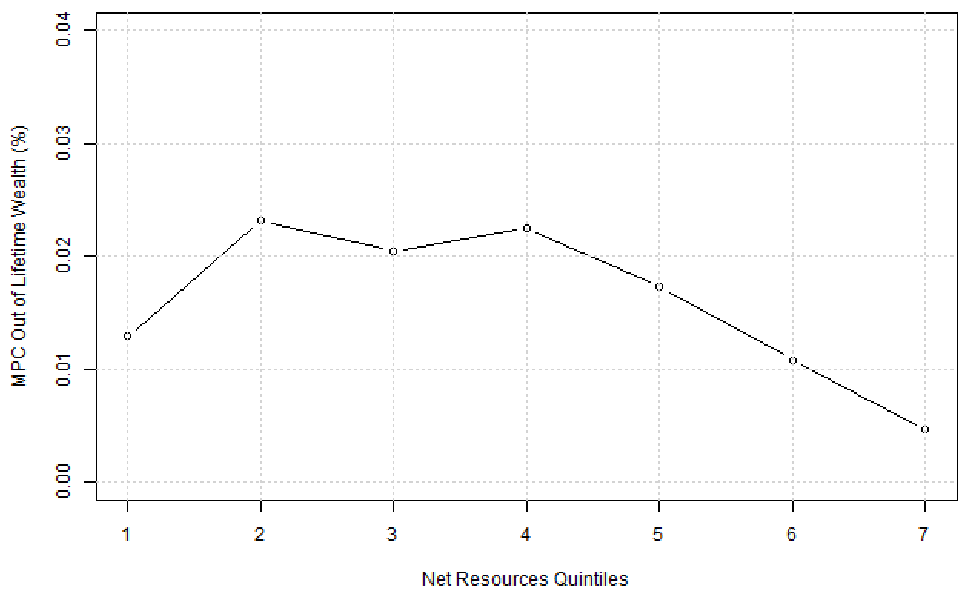
Where I_i^k is a dummy variable which equal to 1 when the household i belongs to a specific net resource quintile. X is a matrix of control variables (same as before) which I interact with the net resources. We estimate equation 35 using the full sample. Table 30 provides the results.

Table 30: Regression of Consumption on Net Resources with Dummies

	C
$netres \times q1$	0.0013*
	(1.42)
$netres \times q2$	0.0023***
	(3.54)
$netres \times q3$	0.0025***
	(3.79)
$netres \times q4$	0.0023***
	(4.78)
$netres \times q5$	0.0017***
	(4.11)
$netres \times q6$	0.001***
	(2.66)
$netres \times q7$	0.0005*
	(1.15))
Controls	Yes
R^2	0.405
N	2,104

Figure 9 plots the estimated marginal propensity to consume out of net lifetime resources.

Figure 9: MPC out of Net Lifetime Resources by Quintiles



We can observe an interesting pattern. MPC is increasing with net lifetime resources initially but then declines and, for households within 5th, 6th and 7th quintiles, it is significantly lower.