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The Wealth Effect In Equity And Fixed Income

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Abstract
Individual consumption and saving decisions are integral to aggregate economic growth, demonstrated in economic theories such as the exogenous growth model. Behavioral economists have posited that a "wealth effect" plays a factor in individual consumption patterns. In this paper, I use the 1999-2007 cohorts of the Panel Survey of Income Dynamics to explore evidence of a wealth effect in stock equity and fixed income. Using panel data estimation techniques, I find no evidence of a wealth effect stemming from equity or fixed income gains among individuals with concentrated financial wealth.

Keywords
wealth effect, stock, bonds, fixed income, consumption, savings, exogenous growth

Cover Page Footnote
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THE WEALTH EFFECT IN EQUITY AND FIXED INCOME

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I. Introduction

In April of 1982[1], the United States Department of Commerce reported that the personal savings rate in American households had reached a peak of 12% of disposable income.[2] [3] Economists have long trumpeted that the rate of gross domestic product growth is inextricably linked to the savings rate. In 1956, the economist Robert Solow published a paper in which he developed an exogenous growth model, commonly known as the Solow model. He theorized that capital accumulation, and thereby economic growth, would increase as the savings rate increased.[4] The more individual households saved the more money that banks could lend to corporations, entrepreneurs, and other households, who would invest the money in capital assets, which in turn created a systemic economic multiplier effect. After the United States catapulted to the top of the financial and economic worlds after the Bretton-Woods conference in 1944, other countries began focused efforts to increase personal savings rate, trying to emulate US economic growth. During the miracle of the four "East Asian Tigers," savings rates reached upwards of 30% as those countries experienced unprecedented gross domestic product growth.[5]

In April of 2005, the US personal savings rate was reported to be 0.8%, down approximately 99% from the high of 1982.[6] Since 1999 alone, the savings rate dropped from 4% to 1.7% in 2007. Concurrently, US GDP growth has slowed considerably. In a 2005 speech, Federal Reserve Chairman

[1] The recession of 1980-1982 undoubtedly increased the savings rate. However, the savings rate was still above 10% throughout 1984, when full recovery began.
[2] U.S. Department of Commerce: Bureau of Economic Analysis, A Guide to the National Income and Product Accounts of the United States (NIPA) - (http://research.stlouisfed.org/fred2/data/psavert.txt).
[3] Note that the Commerce Department defines the savings rate as disposable personal income less personal outlays. Personal outlays are personal consumption expenditures, personal interest payments and personal transfer payments.
[4] See Solow, Robert M. "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics,* The MIT Press 70 (1): 65–94. (1956)
[5] See Mankiw, N. Gregory. *Macroeconomics*. [6E] Worth: New York, 2007. 248-249.
[6] U.S. Department of Commerce: Bureau of Economic Analysis, A Guide to the National Income and Product Accounts of the United States (NIPA) - (http://research.stlouisfed.org/fred2/data/psavert.txt).

Alan Greenspan called for an increase in personal savings rate in order to boost US growth and diminish reliance on foreign debt.[7] Why had the US savings rate depleted so much and so rapidly? Following the empirical revelation of the decreased savings rate, a concept in behavioral economics, called the wealth effect, began to draw research interest during the stock market boom from the early 1990s through 2001. The wealth effect is a theoretical psychological phenomenon in which an increase in perceived wealth will lead to higher levels of consumption. For example, consistently rising housing prices induces an individual to consume more due to a perceived expectation of increased personal disposable income.

Similarly, rising stock and other financial instrument prices can change an investor's perception of personal wealth. As most non-money market financial assets are not entirely liquid, the increases in wealth from rising prices will not be realized in personal income until a later time. In this study, I examine the effect of increases in financial wealth on an individual's personal savings. The existing literature has demonstrated evidence of a wealth effect in housing markets, showing that increases in housing prices leads to increased consumption. However, the literature surrounding the wealth effect in financial instruments is less clear and often conflicting. Additionally, the existing literature lacks repeated studies that use panel data on individuals living in America in order to estimate the wealth effect, instead focusing on differences in country level estimates throughout the world. My research fits into the literature by using the Panel Study of Income Dynamics, 1999-2007, to investigate evidence of the wealth effect from increases in financial wealth.[8] I attempt to directly estimate the effect on the savings of individual households, while previous studies focus on empirical estimates of consumption. Ultimately, I find no conclusive evidence of the wealth effect from financial instruments on savings. In one model, I estimate that a 1% increase in an individual's equity-driven wealth leads to a 0.0525% increase in savings, on average, *ceteris paribus.* This result is primarily attributed to bias in the financial variables

[7] The Federal Reserve Board, "Remarks by Chairman Alan Greenspan: Stability and Economic Growth: The Role of the Central Bank.," November 14, 2005.
http://www.federalreserve.gov/boarddocs/speeches/2005/20051114/default.htm

[8] In this study, financial wealth is constrained to stocks, bonds, and retirement account funds.

due to survey reporting of the variables as stocks, instead of flows,[9] and the large skew in the dataset from individuals with zero financial wealth. In another model, controlling for the skew in the data, I find no statistically significant evidence of the wealth effect from financial wealth.

The structure of the paper is as follows. Section II reviews the relevant literature. Section III outlines the economic theory of the behavior I am investigating. Section IV describes the data. Section V describes my empirical model and hypotheses. Section VI presents and analyzes the regression results and discusses econometric problems, and Section VII concludes. The appendix and bibliography follow, respectively.

II. Literature Review

Formal empirical investigations of the wealth effect can be traced back to Ando and Modigliani (1963), who used country-wide aggregate wealth to investigate a housing wealth effect. The authors note that the use of aggregate consumption and wealth functions would possibly diminish the credibility of estimates of household wealth, due to heteroskedastic standard errors and other econometric issues. As expected, the authors did not find a significant wealth effect from housing. However, since the late 1980s and the advent of rapidly rising housing prices, research interest in the wealth effect from housing markets has sparked and provided more reliable and conclusive evidence. Skinner (1989), similar to my study, used the Panel Study of Income Dynamics to investigate the effect of housing capital gains on aggregate household saving. Controlling for demographic variables such as age, race, gender, income, education, and family size, Skinner (1989) finds a small but significant wealth effect from increases in housing capital gains when using a cross sectional regression approach. However, when using panel estimation approaches by including entity and time fixed effects, the author finds no evidence of the housing wealth effect.

[9] Note that "stock" in this case does not mean a financial "stock," but rather the economic term that describes how variables are measured in their relation to aggregation and time.

Case (1992) used a unique data set of aggregate housing data in the state of Massachusetts from 1981 to 1987, during which that state experience a rapid turnaround of unemployment and personal income. The author finds a statistically significant and large increase in consumption from the real estate boom in Massachusetts during 1984 to 1987. Similarly, Greenspan and Kennedy (2005), Case, Quigley, and Shiller (2005), Sierminska and Takhtamanova (2007) and Greenspan and Kennedy (2007), also estimate statistically significant increases in consumption from increase housing equity. Greenspan and Kennedy (2005, 2007) find that increased spending cash extracted from home equity increases explains approximately $66 billion, or one percent of total personal consumption expenditures. Sierminska and Takhtamanova (2007) find that a 1% increase in housing wealth leads to an increase of 10 to 12% in consumption expenditures, depending on the country of analysis. Additionally, Chen, Guo, and Zhang (2010) find a huge elasticity of housing asset increases to household consumption expenditures of 0.51 in Chinese markets.

However, the literature surrounding the wealth effect from financial assets such as stocks is less conclusive. Ludvigson and Steindel (1999) find that consumption responses to stock market swings are inconsistent. Furthermore, the authors find no aggregate statistical significance to the financial wealth effect on consumption, but find that increases of overall wealth by 1 cent will increase consumption expenditures by 3 to 5 cents. Case, Quigley, and Shiller (2005) find weak evidence of equity wealth effects on consumption, estimating that a 10% increase in equity wealth leads to a 0.4% increase in consumption expenditures. However, the authors note that the results differ with varying econometric techniques (using cross sectional data versus panel data, fixed effects, and lagged financial variables), so the results should be considered unreliable. Sierminska and Takhtamanova (2007) also confirm that financial wealth impacts on consumption are less significant than those of housing. This consensus is consistent across the vast majority of the literature.

Another body of literature claims more direct and conclusive evidence of the effects of equity wealth increases and consumption. Poterba (2000) shows that households that control a high percentage of equity wealth respond to large upward swings in the stock market with increased consumption, while

households of modest wealth do not respond to market swings. Mehra (2001) estimates that a 1 cent increase in equity wealth leads to a 3 to 4 cent increase in consumption. Furthermore, Dynan and Maki (2001) use the Consumer Expenditure Survey to estimate that households with moderate financial holdings will respond to a $1 increase in wealth with a 5 to 15 cent increase in consumption.

III. Economic Model

Every individual must choose how to allocate personal consumption, spending, and therefore, investment. In this paper, I develop a model to describe the relationship of the wealth effect on individual saving. The basis for the model is the intertemporal choice model.[10] To understand the relationship, we must first consider the variables that theoretically influence the wealth effect itself, as shown by the following function:

$$(1)\ WealthEffect = f(R_I, P, C, Y_D, X)$$

The wealth effect is a function of R_I, the return on individual investment[11], individual preferences P, consumption C, personal disposable income Y_D, and demographic characteristics X. The function has several important implications. Consider the function that describes the disposable income an individual faces in a given period of time:

$$(2)\ Y_D = Y - C - T$$

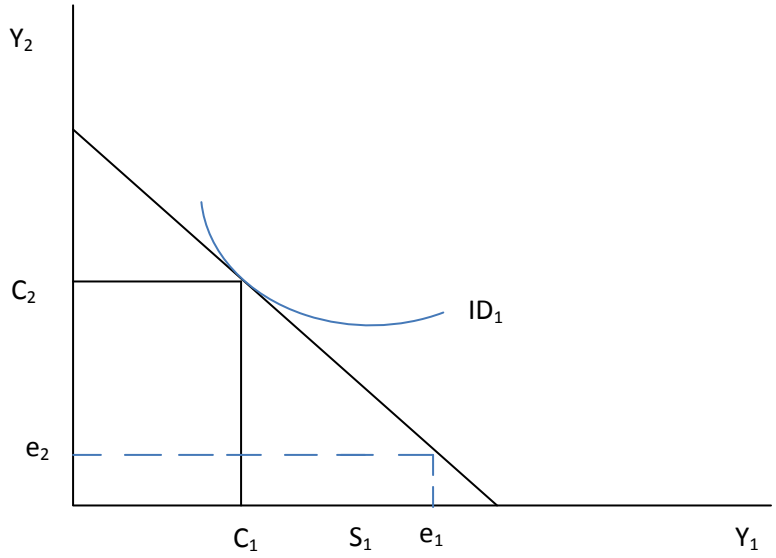
For a given time period, income is assumed to be constant, ceteris paribus. Thus, the level of disposable income is dependent on income (Y), the amount consumed by an individual (C), minus taxes (T). The amount that an individual chooses to consume can be graphically depicted with a budget constraint and

[10] See Varian, Hal. *Intermediate Microeconomics: A Modern Approach*. WW. Norton and Compay, New York: 2010. 183-186.

[11] In this paper, investment is any non-money market assets such as stocks, bonds, pension funds, ETFs, mutual funds, or other alternative assets. Thus, each individual will face a different utility functions based on personal risk profiles and aversion.

indifference curve. Figure 1 shows the indifference frontier faced by an individual between two given time periods.

FIGURE 1



The intersection on the X and Y axes are the present and future values of the endowment[12], discounted by the interest rate *r*. ID is the indifference curve, optimized on the parameters of the budget constraint and personal preferences for consumption (P). Graphically, savings (S) is the difference between the endowment and consumption. Thus, the personal saving of the individual is:

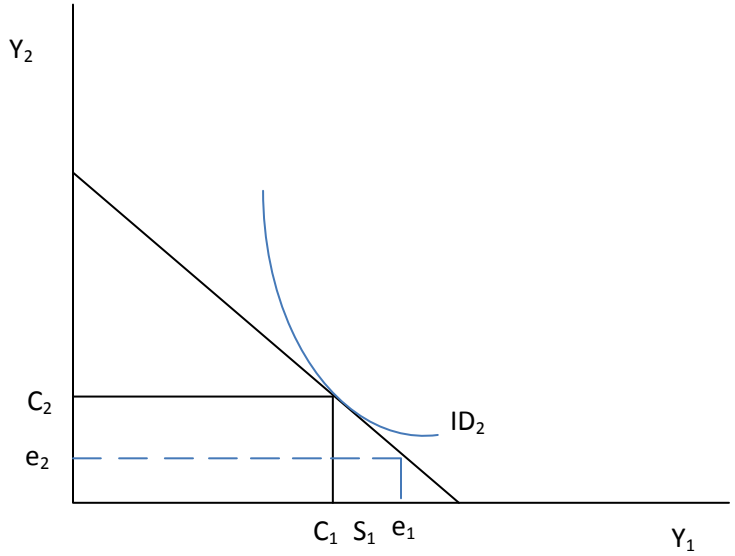
$$(3)\ S = Y_{D1} - C_1*(P*r_I)$$

Given function (1), what is the impact of the wealth effect on an individual's decision of how much to consume or save? As in function (2), income is assumed constant. Therefore, the budget constraint faced by an individual will not shift or change as a result of the wealth effect. The wealth effect is a preference-

[12] The endowment is the constant income faced by an individual.

shifter. As r_I increases, the interaction term P*r will increase, and consumption will increase[13]. Figure 2 shows the change in the curvature of the indifference curve due to the wealth effect.

FIGURE 2



The positive impact of the wealth effect is shown to make the indifference curve ID_2 steeper than ID_1.[14] The individual's taste for consumption for the current period increases as an effect. Notice that the amount of saving an individual faces as a result changes. Using the savings function (3), as consumption increases, savings decreases. Therefore, the following correlation between the wealth effect and saving is predicted:

$$(4) \quad -\rho(WealthEffect, S)$$

As the wealth effect increases in its impact on consumption, the savings rate an individual faces will decrease.

[13] For an increase in the return on investment, P is theoretically for a rational individual, thereby increasing consumption.
[14] Here, this is an increase in the marginal rate of substitution between consumption in period 1 and period 2.

IV. Data

I use the 1999 through 2007 survey collections of the Panel Survey of Income Dynamics (PSID) for my analysis of the wealth effect. The PSID began in 1968 and follows a cohort of over 9,000 family units, obtaining data on aspects of social and economic behavior.[15] For the years 1999 to 2007, data was collected every other year, providing data from 1999, 2001, 2003, 2005, and 2007. PSID employees collect the information over the phone and input the various data into computer-based instruments. The longitudinal nature of the data, combined with the vast array of socio-economic variables collected, make the PSID a useful research tool.

For the purposes of my research, I extracted numerous financial variables, which are the main variables of interest. The dependent variable in five of the six empirical models is the natural log of savings. In model (4), the dependent variable is savings. All of the financial variables of interest – savings, income, stock, bonds, and retirement account value – are adjusted for inflation using Consumer Price Index adjustments. All dollar amounts are in 2007 dollars. Demographic control variables that are standard to the literature were also extracted. The variable married is a dummy variable created by grouping response values in the survey so that married is 1 if the household head is married and 0 otherwise. Variables Pacific, North, South, West, and Midwest are created dummy variables equal to 1 if a household respondent lives in a state located within the respective United States Census region, and equal to 0 otherwise. See the appendix for a map of the states located within each specific Census region. The variable finwealth is a created variable that is sum of the stock, bonds, and retire variables. This variable is intended to provide a measure of total non-housing financial wealth for the household. I created the variable risk, which describes the distribution of financial assets that are stocks, or risky assets. It is constrained by the bounds 0 and 1, with the amount of risky assets increasing as the value approaches 1. A value of 1 represents total financial wealth distribution in stocks, and 0 represents either no value in stocks or no financial wealth. Variables dsw, dsr, and dbw (see Appendix) are created

[15] The original 1968 study started with 4,800 families, and has since grown to nearly 9,000 families reporting.

dummy variables equal to 1 if the present value of the variable is greater than the lagged value of the variable and equal to 0 otherwise. Table 1 presents the summary statistics for the data set. For descriptions of every variable extracted from the survey, reference Tables 6.1 – 6.2 in the Appendix.

TABLE 1 - SUMMARY STATISTICS

Variable	Mean	Median	Maximum	Minimum	Standard Deviation	N
income	66217.21	48001.25	5839124.42	-1094629.41	92354.06	38516
savings	16417.38	1500	4683049.12	-424.66	82749.34	35855
stock	30396.91	0	46830491.25	0	477087.94	37138
retire	22574.93	0	24890996.40	0	181891.76	37072
bonds	8174.59	0	12445498.20	0	99646.70	37091
gender	0.70	1	1	0	0.46	38516
children	0.89	0	9	0	1.17	38516
hsgrad	0.33	0	1	0	0.47	36420
colgrad	0.14	0	1	0	0.35	36420
married	0.51	1	1	0	0.49	38511
age	44.93	43	101	16	16.12	38504
finwealth	59825.15	0	47044740.75	0	548109.10	35092
risk	0.31	0	1	0	0.40	11921

Author's Calculations
All financial variables are inflation-adjusted USD

There are several aspects of the data to note from the summary results. First, each of the financial variables has a huge standard deviation; in most cases, it is larger than the mean of the variable. Most of the financial wealth within the survey respondents is contained within a small percentage of households, thus creating a large standard deviation. Second, there is a very large number of missing values for variables in the entire study. Several explanations for this can be offered. Missing values were assigned

if the respondent did not know to answer to the question being asked or preferred not to answer. While this may be plausible, inconsistency in response most likely explains the large amount of missing values. Many households would respond to the survey for several years in a row, and then fail to fill out the survey for one or two time periods. In panel data estimation, frequent missing values causes the data to become an unbalanced panel. Although estimation techniques do not change or are not affected, a balanced panel is preferred to add credibility to the robustness of results.

The variables gender, age, hsgrad, and colgrad are demographic variables standard to the literature. One of the drawbacks of panel estimation is the inability to estimate the effects of variables that vary by the same amount over the same time period. For example, during each survey round from 1999 to 2007, the age of the household head can only vary by two years, unless the head was replaced by another individual. The same holds for an individual's gender, which does not vary. The education variables hsgrad and colgrad describe whether the household head graduated from high school or college, respectively. Ultimately, these variables could not be included in the estimation due to lack of variation during the years reported. The lack of variation renders the variables as perfectly multicollinear with the intercept, which violates the classical assumptions. Therefore, these variables were dropped from estimation outside of providing demographic background in summary statistics. As will be discussed in the next section, panel estimation techniques allow for me to still control for but not estimate the effects of these variables.

An important aspect of the data to note is the significant right-skew of the financial variables stock, bonds, and retire. Table 2 shows the frequency distribution and cumulative percent of the variables.

TABLE 2 - FREQUENCY DISTRIBUTION OF FINANCIAL VARIABLES

Variable	Value	Frequency	Cumulative Percent
stock	0	30,941	83.31
	> 0	6,197	16.69
retire	0	28,709	77.4
	> 0	8,363	22.6
bonds	0	32,325	87.15
	> 0	4,766	12.85

Author's Calculations

The variable retire has a value of 0, meaning the respondent has no retirement account value, for 77.4% of the sample. The variables stock and bonds show a value of 0 for a staggering 83.31% and 87.15%, respectively. The vast majority of financial wealth among respondents is concentrated among a small portion of the sample. The estimation of the effects of these variables will control for person-specific characteristics, allowing full-sample estimation. Further discussion is in the next section.

Another fascinating final observation from the data is worth discussion. As the data shows a significant amount of financial wealth distributed amongst a small percentage of individuals, I calculated the mean of savings for each year in the sample, controlling for financial wealth. Table 3 shows the results.

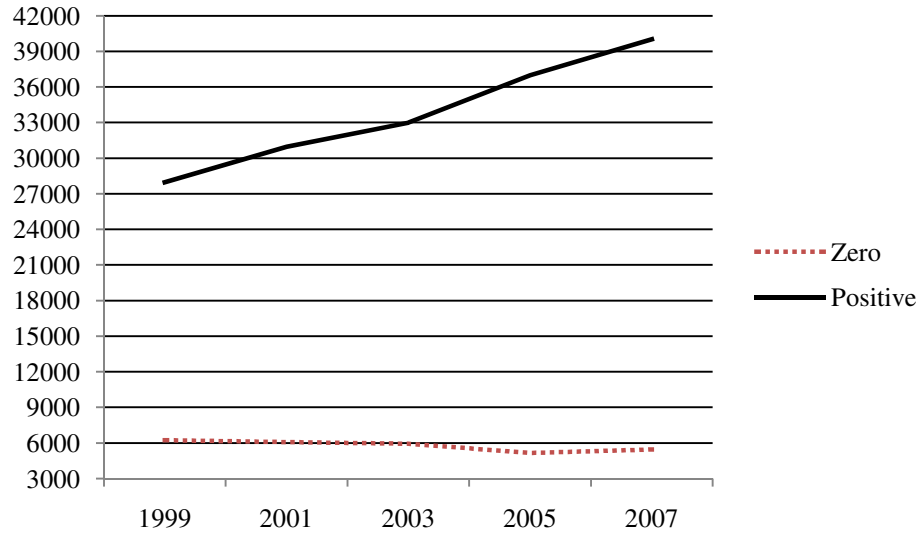
TABLE 3 - HOUSEHOLD SAVINGS BY YEAR

Year	Value of *finwealth*	Mean
1999	0	6,217.74
	> 0	27,973.24
2001	0	6,079.06
	> 0	30,966.26
2003	0	5,936.77
	> 0	32,989.63
2005	0	5,161.83
	> 0	36,968.69
2007	0	5,453.72
	> 0	40,023.99

Author's Calculations
Value of savings rate is inflation-adjusted USD

For individuals that hold zero financial wealth, the average amount of savings they possess decreases nearly 13%, from $6,217.74 to $5,453.72. For individuals that hold some value of positive financial wealth, the average amount of savings *increases* from $27,973.24 to $40,023.99, approximately a 57% spike! Figure 3 graphically depicts this interesting finding.

FIGURE 3 - HOUSEHOLD SAVINGS BY FINANCIAL WEALTH



This raises an important question about financial wealth and savings. If the individuals who have zero financial wealth were given increasing dollars of financial wealth, would they exhibit the same savings behavior as those who currently have financial wealth? There is one factor that is undoubtedly introducing bias in the actual values of the financial variables, including savings, stock, bonds, and retire. Each of these variables is measured as a stock, instead of a flow. That is, the values are assumed to be the aggregate balance over time, rather than the amounts within a constrained, specific time period. For example, an individual who has leftover savings from year 1 (i.e., he or she did not consume the full value of personal disposable income), counts those leftover savings into savings in year 2. The same can be assumed for the other financial variables. Thus, a positive upward bias can be reasoned in the measurement of the financial variables. The bias should not be confused with bias in the estimates of the variables in regression analysis due to econometric problems. Rather, the reader should keep the measurement of the variables as a stock in mind when evaluating the credibility of the results.

V. Empirical Model

Using a generalized linear model to produce OLS estimates, six separate empirical equations in this paper are specified. The primary regression equation is

(1)

$$\log(savings_{it}) = \beta_1 \log(stock_{it}) + \beta_2 \log(bonds_{it}) + \beta_3 \log(retire_{it}) + \theta\chi_{it} + \alpha_i + \lambda_t + u_{it}$$

where $\log(savings_{it})$ is the dependent variable and is the natural log of the dollar amount of savings a household possesses, where i corresponds to individual households and t corresponds to years. $\log(stock_{it})$, $\log(bonds_{it})$, and $\log(retire_{it})$ represent the natural log of the dollar value of each financial variable. According to the intertemporal choice model described in the theoretical model section, the expected sign of the financial variables is negative. For example, increases in equity wealth would lead to a decrease in savings. X_{it} is a vector of demographic controls, α_i is household-entity fixed effects, and λ_t is year-fixed effects. The inclusion of entity and time fixed effects allow panel techniques for estimation.

Undoubtedly, there are omitted variables that cannot be accounted for in standard regression analysis. These omitted variables can introduce bias into the coefficient estimates, rendering the interpretation unreliable. However, due to the structure of the PSID data as a panel, I can control for fixed effects that do not vary over entities and time. For example, there are inherent personal characteristics of individuals, such as risk aversion, than cannot be reliably measured. Assuming that the personal characteristic does not vary over time, the use of a fixed effect will control for the variation across entities. Similarly, there are variables that can vary through time, but not across entities. For example, external forces that affect stock market performance cannot be accurately measured, but can be controlled for using fixed effects. Both α_i and λ_t are unobservable, but using an entity-demeaning estimation approach, can be controlled for.

Equations (2) through (4) are variations of equation (1).

(2)
$$\log(savings_{it}) = \beta_1 \mathrm{dsw}_{it} + \beta_2 \mathrm{dbw}_{it} + \beta_3 \mathrm{drw}_{it} + \theta\chi_{it} + \alpha_i + \lambda_t + u_{it}$$

(3)
$$savings_{it} = \beta_1 risk_{it} + \theta\chi_{it} + \alpha_i + \lambda_t + u_{it}$$

(4)
$$\log(savings_{it}) = \beta_1 \log(finwealth_{it}) + \theta\chi_{it} + \alpha_i + \lambda_t + u_{it}$$

(2) uses the variables dsw_{it}, dbw_{it}, and drw_{it} as the primary variables of interest. All three variables will theoretically negatively impact the savings rate. If an individual has more financial wealth today than yesterday, he or she will consume more, thereby reducing savings. (3) uses $\mathrm{savings}_{it}$ as the dependent variable and the variable risk_{it} as the variable of interest. Again, the coefficient on risk is expected to be negative. If an individual moves a greater distribution of financial wealth into risky assets, such as stocks, the high returns on these instruments are expected to increase consumption and decrease savings. (4) uses $\mathrm{finwealth}_{it}$ as the main variable of interest. The purpose of this equation is to evaluate whether overall increases in financial wealth, instead of individual categories of financial wealth, will decrease savings. As in model (1), models (2) through (4) all control for the demographic vector χ and the fixed effects α_i and λ_t.

In order to test for any differences in coefficient estimates between the dichotomous groups of households that have no financial wealth and those that have positive financial wealth, models (5) and (6) are estimated from a condensed data set. I omitted any observations of entities exhibiting zero financial wealth throughout the sample. After doing so, the number of observations N was cut to 1,115. The variables $\log(stck_{it})$, $\log(bnds_{it})$, and $\log(rtr_{it})$ are the natural logs of the values of the financial variables for the households only with positive financial wealth. Model (6) uses one-year lagged values of the same financial variables. Models (5) and (6) both control for the demographic vector χ and the fixed effects α_i and λ_t.

(5)
$$\log(savings_{it}) = \beta_1 \log(stck_{it}) + \beta_2 \log(bnds_{it}) + \beta_3 \log(rtr_{it}) + \theta\chi_{it} + \alpha_i + \lambda_t + u_{it}$$

(6)
$$\log(savings_{it}) = \beta_1 \log(stck_{it-1}) + \beta_2 \log(bnds_{it-1}) + \beta_3 \log(rtr_{it-1}) + \theta\chi_{it} + \alpha_i + \lambda_t + u_{it}$$

VI. Results

Table 4 presents the full-sample OLS estimates.[16] Contrary to my hypotheses, the sign on $\log(stock_{it})$, $\log(bonds_{it})$, and $\log(retire_{it})$ are positive. Additionally, they are significant at the 1% level. The interpretation is that a 1% increase in stock will lead to a 0.079% increase in savings, on average, *ceteris paribus*. Similarly, the variable log(finwealth) is also positive and significant at the 1% level, contrary to theory. The overall increase in savings from total financial wealth is estimated to be 0.0525% from a 1% increase in finwealth. Variables dsw and drw are both significant at the 1% level and positive. The last financial variable, $\log(income_{it})$, is significant at the 1% and is positive, as expected. Increases in income will generate more personal disposable income. Assuming that an individual's personal consumption preferences do not shift dramatically from small percentage increases in income, he or she

[16] Econometric tests were run to check for multicollinearity. The Pearson correlation coefficients are presented in Table 7 in the Appendix.

will have more savings from an increase in income. The interpretation of income is that a 1% increase in income will lead to a 0.20% increase in savings, on average, *ceteris paribus*. In Model (4) the interpretation of income is that a $1 increase in income will lead to a 5 cent increase in savings. The only demographic control variable that is significant is $marriage_{it}$ in models (1) and (2). It is positive and significant at the 1% level. If married is equal to 1, then savings will increase 44% or 49%, respective to models (1) and (2). This increase is assumed to be due to the absorption of the spouses' income into savings. As will be seen in models (5) and (6), which control for high income, high financial wealth individuals, the effect of marriage is larger. High financial wealth individuals will not experience drastic preference shocks from small additions to income, such as a spouses' income. Thus, savings will absorb the additional income. In Models (1) and (2), the R^2 is 0.701 and 0.698, respectively.

TABLE 4 - FULL-SAMPLE RESULTS, N=38,511

Variable	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)
(Model) Dependent Variable	(1) log(savings)	(2) log(savings)	(3) log(savings)	(4) savings
REGRESSOR	OLS	OLS	OLS	OLS
Log(stock)	0.07940** (0.00648)			
Log(retire)	0.07713** (0.00572)			
Log(bonds)	0.04399** (0.006181)			
Log(income)	0.20547** (0.01936)	0.21855** (0.01945)	0.25111** (0.04758)	
income				0.05255** (0.01084)
dsw		0.21020** (0.05133)		
dbw		-0.03295 (0.04989)		
drw		0.31304** (0.04761)		
Log(finwealth)			0.05545** (0.02343)	
risk				-3822.80778 (3597.98233)
Married	0.44816** (0.08873)	0.49767** (0.08926)	0.12318 (0.15384)	4673.68727 (6386.95783)
Children	-0.00942 (0.02882)	0.00913 (0.02902)	0.00058 (0.05390)	-1996.03021 (2249.40444)
Pacific	-0.13401 (0.66949)	-0.03387 (0.67321)	1.61499 (0.92935)	32168.26990 (38353.35499)
West	0.02919 (0.22590)	0.04412 (0.22715)	-0.08076 (0.34854)	-13916.24496 (14430.78349)
South	-.03287 (0.19059)	-.00620 (0.19164)	-0.51772 (0.30569)	-13305.88603 (12714.84525)
North	0.03260 (0.28233)	0.10995 (0.28393)	-0.48021 (0.41472)	-40267.62084 (17271.07574)
R^2	0.701401	0.698057	0.697498	0.649874

Author's Calculations

Note:

+ denotes significant at 10% level.

**denotes significant at the 1% level.

*denotes significant at the 5% level

Table 5 presents the partial-sample OLS estimates for models (5) and (6). In model (5), none of the financial variables are found to be significant, but are signed as hypothesized (for equity). In model (6), the financial variables of interest are signed according to theory, but are not significant. The R^2 in the models is 0.769 and 0.767, respectively.

TABLE 5 - PARTIAL-SAMPLE RESULTS, N=1,115 (5), N=903 (6)

Variable	Coefficient (SE)	Coefficient (SE)
(Model) Dependent Variable	(5) log(savings)	(6) log(savings)
REGRESSOR	OLS	
$Log(stck)_{t;\ t-1}$	-0.05764 (0.06672)	-0.01737 (0.12311)
$Log(rtr)_{t;\ t-1}$	0.08611 (0.08544)	0.13512 (0.15101)
$Log(bnds)_{t;\ t-1}$	0.14526 (0.06716)	-0.10133 (0.11842)
Log(income)	0.08904 (0.14229)	0.16319 (0.21716)
Married	0.98410** (0.48802)	1.43379^{+} (0.81472)
Children	-0.00161 (0.20110)	0.28353 (0.46538)
Pacific	1.68064 (2.09180)	-1.00192 (3.93463)
West	-0.35370 (1.22439)	0.88855 (1.71044)
South	-0.08178 (1.05590)	0.95818 (1.71377)
North	0.42484 (1.25396)	1.03835 (2.08034)
R^2	0.769295	0.767148

Author's Calculations
Note:
+ denotes significant at 10% level.
**denotes significant at the 1% level.
*denotes significant at the 5% level

As discussed above, $married_{it}$ is the only demographic variable that is significant in either model. When controlling only for individuals who have positive financial wealth, the positive bias from the skew in the data in models (1) through (4) disappears. The condensed sample, while using fewer degrees of freedom

and fewer observations, is seen as more reliable than the full-sample results. Individual households that have positive financial wealth are more likely to respond to changes in equity markets and financial policy than households with no financial wealth. Thus, I conclude that this study has yielded no evidence of the wealth effect in equity, fixed income, and other non-housing financial wealth.

However, there are numerous issues with the data that may be causing unreliable econometric estimation. First is the possibility of reporting error by individuals in the study. Psychologically, individuals might be prone to overestimate the amount they save to conform to a societal or pressure norm. However, other issues are more prevalent. As seen in Figure 3, savings has risen on average for the sample over the years 1999 to 2007. Recall that the Commerce Department reports that the savings rate has decreased from 4% to 1.8%. Thus, we can hypothesize that the individuals in the sample do not accurately represent the United States as a whole. The unbiased panel could also play a role. With such a large amount of missing values, a balanced panel could yield better results. Additionally, there is a lack of variation in the sample among education variables. A sample that introduced more variation could lead to interesting estimations about the effects of education pertaining to the wealth effect and saving.

More pressing is the measurement of savings and the other financial variables as stocks instead of flows. There seems to be positive upward bias in measurement of savings. Therefore, one could argue that the disposable income and savings identities presented in section III are not accurately represented in the data. That is, savings in the identity is described by income minus personal outlays and the wealth effect interaction term, but savings in the data is biased by accumulated measurement over time and does not reflect the savings identity term. Therefore, data that accurately represents the savings rate and consumption as a year to year flow is needed for reliable estimation. Finally, while the econometric models in this study use the techniques and variables standard to the literature, there always lurks the possibility of an omitted variable not controllable by fixed effects. Such a variable would introduce bias into the beta coefficients and render the results unreliable.

VII. Conclusion

In this study, I utilize the 1999 to 2007 surveys of the Panel Survey of Income Dynamics to investigate evidence of the wealth effect on savings. The wealth effect is the increase in consumption, or decrease in savings, that accompanies increases in wealth. While there seems to be a consensus in the literature about the wealth effect in housing markets, the literature surrounding the wealth effect in financial wealth is confliction and inconclusive. I attempt to use household level panel data to estimate the wealth effect from financial wealth. Ultimately, I find no conclusive evidence to support or refute the wealth effect theory. The primary shortcoming of the study is the survey measurement of savings and financial wealth as a stock versus a flow. This introduces bias in the actual measurements of the variables and decreases the reliability of OLS to produce correctly signed and statistically significant coefficient estimates. Additionally, it casts doubt on whether savings in the survey accurately represents the savings macroeconomic identity.

Future research on the wealth effect stemming from increases in financial wealth should be pursued. The research has very important policy implications. As the Federal Reserve continues to attempt to push investors into riskier assets through interest rate incentives and quantitative easing, the effects of more individuals distributing financial wealth into equities should be considered. The evidence could demonstrate whether a waning savings rate is the culprit in the slowdown of GDP growth in the United States. Or, it could show that the decrease in savings was overpowered by the positive growth from increased consumption. In both cases, I recommend the use of a panel data set that can accurately measure the savings rate and consumption patterns across individuals.

APPENDIX

TABLE 6.1 – LIST OF VARIABLES AND DESCRIPTIONS

Variable	Description
income	The total family income of the household. Includes income of the head, spouse's income, transfer payments, and other contributing incomes in the household.
savings	The aggregate amount of savings an individual holds in bank savings accounts or Treasury notes.
stock	The actual realized profit of selling the individual's non-IRA stock holdings.
retire	The actual realized value of the individual's IRA or annuity.
bonds	The actual realized profit of selling the individual's non-government bonds.
gender	The gender of the head of the household.
children	The exact number of children residing in the household.
Nohs	A dummy variable equal to 1 if the individual did not graduate from high school.
hsgrad	A dummy variable equal to 1 if the individual graduated from high school.
colgrad	A dummy variable equal to 1 if the individual graduated from college.
postgrad	A dummy variable equal to 1 if the individual completed any post-graduate work.
married	A dummy variable equal to 1 if the head of the household is married, equal to 0 otherwise.
age	The exact age, in years, of the head of the household.
finwealth	The sum of stock, bonds, and retire variables.
Risk	A variable constrained by 0 and 1. The value is the total value of stock wealth divided by total financial wealth (*finwealth*).
Pacific	A dummy variable equal to 1 if the individual resides in a state within the Pacific Census region, equal to 0 otherwise.
North	A dummy variable equal to 1 if the individual resides in a state within the North Census region, equal to 0 otherwise.
South	A dummy variable equal to 1 if the individual resides in a state within the South Census region, equal to 0 otherwise.
West	A dummy variable equal to 1 if the individual resides in a state within the West Census region, equal to 0 otherwise.
Midwest	A dummy variable equal to 1 if the individual resides in a state within the Midwest Census region, equal to 0 otherwise.

Note: All data is from the Panel Study of Income Dynamics

TABLE 6.2 – LIST OF VARIABLES AND DESCRIPTIONS, CONTINUED

Variable	Description
stck	The actual realized profit of selling an individual's non-IRA stock holding for values greater than 0.
bnds	The actual realized profit of selling the individual's non-government bonds for values greater than 0.
rtr	The actual realized value of the individual's IRA or annuity for values greater than 0.
D1999	A dummy variable equal to 1 if the year is equal to 1999.
D2001	A dummy variable equal to 1 if the year is equal to 2001.
D2003	A dummy variable equal to 1 if the year is equal to 2003.
D2005	A dummy variable equal to 1 if the year is equal to 2005.
D2007	A dummy variable equal to 1 if the year is equal to 2007.
Dsw	A dummy variable equal to 1 if the current year value of stock is greater than the 1-year lagged value of stock.
Drw	A dummy variable equal to 1 if the current year value of retire is greater than the 1-year lagged value of retire.
Dbw	A dummy variable equal to 1 if the current year value of bonds is greater than the 1-year lagged value of bonds.

Note: All data is from the Panel Study of Income Dynamics

TABLE 7.1 – CORRELATION COEFFICIENTS

The SAS System
The CORR Procedure

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	North	South	West	children	risk	married
lnincome	0.23169	0.40003	0.25836	0.04202	0.08712	0.40587
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	56135	56135	56135	38516	11921	38511
Pacific	-0.01392	-0.02716	-0.01606	-0.02461	-0.01173	0.00649
	0.0010	<.0001	0.0001	<.0001	0.2003	0.2030
	56135	56135	56135	38516	11921	38511
North	1.00000	-0.20568	-0.12159	-0.03040	0.01898	0.03798
		<.0001	<.0001	<.0001	0.0382	<.0001
	56135	56135	56135	38516	11921	38511
South	-0.20568	1.00000	-0.23725	0.01925	-0.02138	-0.05381
	<.0001		<.0001	0.0002	0.0196	<.0001
	56135	56135	56135	38516	11921	38511
West	-0.12159	-0.23725	1.00000	0.00949	0.04862	0.03495
	<.0001	<.0001		0.0624	<.0001	<.0001
	56135	56135	56135	38516	11921	38511
children	-0.03040	0.01925	0.00949	1.00000	-0.04193	0.14145
	<.0001	0.0002	0.0624		<.0001	<.0001
	38516	38516	38516	38516	11921	38511
risk	0.01898	-0.02138	0.04862	-0.04193	1.00000	-0.01694
	0.0382	0.0196	<.0001	<.0001		0.0645
	11921	11921	11921	11921	11921	11919
married	0.03798	-0.05381	0.03495	0.14145	-0.01694	1.00000
	<.0001	<.0001	<.0001	<.0001	0.0645	
	38511	38511	38511	38511	11919	38511

TABLE 7.2 – CORRELATION COEFFICIENTS

The CORR Procedure
Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	lnsavings	lnstock	lnbonds	lnretire	lnincome	Pacific
North	0.20723	0.12267	0.08003	0.14118	0.23169	-0.01392
	<.0001	<.0001	<.0001	<.0001	<.0001	0.0010

	56135	56135	56135	56135	56135	56135
South	0.13827	0.01712	0.03413	0.02223	0.40003	-0.02716
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	56135	56135	56135	56135	56135	56135
West	0.20595	0.10908	0.04996	0.11096	0.25836	-0.01606
	<.0001	<.0001	<.0001	<.0001	<.0001	0.0001
	56135	56135	56135	56135	56135	56135
children	-0.11647	-0.08898	-0.05026	-0.09992	0.04202	-0.02461
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	38516	38516	38516	38516	38516	38516
risk	0.11693	0.78935	-0.26689	-0.32717	0.08712	-0.01173
	<.0001	<.0001	<.0001	<.0001	<.0001	0.2003
	11921	11921	11921	11921	11921	11921
married	0.27104	0.17250	0.13836	0.22722	0.40587	0.00649
	<.0001	<.0001	<.0001	<.0001	<.0001	0.2030
	38511	38511	38511	38511	38511	38511

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	North	South	West	children	risk	married
lnsavings	0.20723	0.13827	0.20595	-0.11647	0.11693	0.27104
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	56135	56135	56135	38516	11921	38511
lnstock	0.12267	0.01712	0.10908	-0.08898	0.78935	0.17250
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	56135	56135	56135	38516	11921	38511
lnbonds	0.08003	0.03413	0.04996	-0.05026	-0.26689	0.13836
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	56135	56135	56135	38516	11921	38511
lnretire	0.14118	0.02223	0.11096	-0.09992	-0.32717	0.22722
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
	56135	56135	56135	38516	11921	38511

TABLE 7.3 – CORRELATION COEFFICIENTS

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	lnsavings	lnstock	lnbonds	lnretire	lnincome	Pacific
lnsavings	1.00000	0.41670	0.30291	0.47218	0.64886	0.04476
		<.0001	<.0001	<.0001	<.0001	<.0001
	56135	56135	56135	56135	56135	56135
lnstock	0.41670	1.00000	0.26523	0.46855	0.28171	0.00658
	<.0001		<.0001	<.0001	<.0001	0.1191
	56135	56135	56135	56135	56135	56135
lnbonds	0.30291	0.26523	1.00000	0.28296	0.23146	0.01720
	<.0001	<.0001		<.0001	<.0001	<.0001
	56135	56135	56135	56135	56135	56135
lnretire	0.47218	0.46855	0.28296	1.00000	0.33331	0.02226
	<.0001	<.0001	<.0001		<.0001	<.0001

	56135	56135	56135	56135	56135	56135
lnincome	0.64886	0.28171	0.23146	0.33331	1.00000	0.03239
	<.0001	<.0001	<.0001	<.0001		<.0001
	56135	56135	56135	56135	56135	56135
Pacific	0.04476	0.00658	0.01720	0.02226	0.03239	1.00000
	<.0001	0.1191	<.0001	<.0001	<.0001	
	56135	56135	56135	56135	56135	56135

FIGURE 4 – UNITED STATES CENSUS REGIONS MAP

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