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Do you have to be smart to be rich? The impact of IQ on wealth, income and financial distress

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Abstract

How important is intelligence to financial success? Using the NLSY79, which tracks a large group of young U.S. baby boomers, this research shows that each point increase in IQ test scores raises income by between $234 and $616 per year after holding a variety of factors constant. Regression results suggest no statistically distinguishable relationship between IQ scores and wealth. Financial distress, such as problems paying bills, going bankrupt or reaching credit card limits, is related to IQ scores not linearly but instead in a quadratic relationship. This means higher IQ scores sometimes increase the probability of being in financial difficulty.

Keywords: IQ; Intelligence; Personal wealth; Net worth; Income; Finances

1. Introduction

How important is intelligence to success in life? Success is a multi-dimensional concept but one key component for many individuals is how well they do financially. It is still not well understood why some people are rich and others are poor. Previous research, discussed below, has investigated the relationship between intelligence and income and found individuals with higher IQ test scores have higher income. Income alone is not a complete measure of financial success. This research completes the picture by investigating if there is a relationship between IQ scores and wealth and if there is a relationship between IQ scores and financial difficulty.

What are the differences between these three financial measures? Income is the amount of money earned each time period, such as a weekly paycheck. It is the stream of money off which people live. Wealth is the difference between a person's assets and liabilities. It is the reserve or cushion that people fall back upon to meet large expenditures, unexpected emergencies and periods when income is expected to be low. Financial difficulty is getting into a situation where a respondent's credit is adversely impacted such as not paying bills or charging a credit card to the maximum limit. These situations prevent or reduce the ability of individuals to borrow money in the future. Financial success for most people is a combination of all three measures; having a steady income stream, a stock of wealth to buffer life's storms, and not worrying about being close to or beyond their financial limits.

Previous research has focused on intelligence's impact on income and found a positive relationship.

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Wachtel (1976) found this relationship by studying a large group of World War II veterans who had been given the U.S.'s military ability tests. The same relationship was found by Brown and Reynolds (1975) who examined people who served in the Korean conflict. Later research broadened the investigation to check if race was also an important component. Johnson and Neal (1998) examined the relationship between intelligence, wages and race. They found black women earned 5% more per hour than similarly aged white women with the same IQ test score. Nyborg and Jensen (2001) found, after holding IQ test scores constant, black middle aged veterans have similar income or job status to whites.

An opposite tack was taken by Herrnstein and Murray (1994) who related general intelligence to poverty in *The Bell Curve*. Instead of showing that income and intelligence were positively related, they showed that few people with high IQ test scores are in poverty. Cawley, Heckman, Conneely, and Vytlacil (1996), Cawley, Conneely, Heckman, and Vytlacil (1997) reexamined these conclusions by constructing a more general measure of cognitive ability and found this measure was a poor predictor of wages for any race or gender.

Other researchers have used pairs of sibling to understand the relationship of intelligence and income. Sibling comparisons ensure factors like the resources available during childhood, the impact of growing up in particular neighborhoods and genetic predispositions are all controlled, without explicitly adding these variables to the research. Rowe, Vesterdal, and Rodgers (1999) took into account whether people were full siblings or half-siblings and found a tight link between intelligence and income. Bound, Griliches, and Hall (1986) found that the relationship between intelligence and wages is stronger for sisters than it is for brothers.

Lynn and Vanhanen (2002) published a book entitled "IQ and the Wealth of Nations," which uses Gross Domestic Product (GDP) as a proxy for national wealth. They studied 185 countries from 1820 to 1998 and state "the intelligence of the populations has been a major factor responsible for the national differences in economic growth and for the gap in per capita income between rich and poor nations." Barber (2005) expanded on this research by including data on secondary education and illiteracy. Barber's work suggests increasing education boosts intelligence which means education improves not only individual outcomes but also national economies. Dickerson's (2006) expansion showed the relationship between IQ and GDP was exponential, not linear, which means increases in intelligence impact GDP even more than originally reported. Whetzel and McDaniel (2006) found even stronger results by updating the time period to 2002, truncating IQ scores at 90 and using a curvilinear model.

Unfortunately, this strand of research does not investigate wealth because GDP tracks national income, not wealth. Lynn and Vanhanen (2002) recognize this since the above quote states "per capita income" not per capita wealth. Moreover, the official definition (United Nations, 2003, p. 5) shows GDP does not track wealth. GDP is calculated three ways; first by adding together everything produced for final consumers, second adding all money spent by final consumers, and third adding all the income earned in a country. Since all three methods produce the same number, GDP can not track wealth, because none of the methods measures net worth.

While almost all of the above research suggests finances and intelligence are linked, Stanley and Danko (1996), in the best-selling financial book "The Millionaire Next Door," believe intelligence is not related to wealth. They write, "It is seldom luck or inheritance or advanced degrees or even intelligence that enables people to amass fortunes." However, while this idea is stated, no data are presented to back up this statement.

This research has three goals. First, it expands on previous research by examining the relationship between income and intelligence for U.S. young baby boomers. Second, since income is not the sole determinant of financial success, this investigation goes beyond previous research by quantifying the relationship between wealth and intelligence to see if Stanley and Danko (1996) are correct. Finally, it explores a new area, which is the relationship between intelligence and financial difficulty.

It is important to note that this research can not explain why a particular individual does well or poorly financially. Luck, timing, parents, choice of spouse and many other factors play important roles in shaping an individual's circumstances. Moreover, this research uses IQ test scores as an indicator of general intelligence, but an individual's score is impacted by their health, motivation and other factors that occurred on the testing day. Nevertheless, by combining scores from a large randomly selected group with monetary indicators it is possible to show whether broad relationships exist between intelligence and measures of personal finance.

2. Method

To understand the relationship between intelligence and financial status this research analyzes publicly available data (www.bls.gov/nls) that were gathered as part of the National Longitudinal Survey of Youth 1979 cohort (NLSY79).

2.1. Participants

The NLSY79 is a very large randomly selected nationally representative U.S. panel survey that is primarily funded by the government's Bureau of Labor Statistics. The survey has questioned the same group of young baby boomers 21 times between 1979 and 2004. Young baby boomers are individuals born between 1957 and 1964 and are the tail end of the spike in births that began after World War II. General details about the survey are found in Zagorsky (1997). While NLSY79 data start in 1979, this research focuses on the 2004 survey which contains both the latest financial data and the first fielding of financial distress questions.

This research uses as its base 7403 respondents who both answered the 2004 survey and have an IQ test score from earlier rounds. In 2004 these respondents ranged in age from 33 to 41 years old, with the average being almost 37. The sample was split almost evenly between men (50.7%) and women (49.3%). Like the U.S. population, the majority of the sample was white (79.5%) but both African-Americans (14.2%) and Hispanics (6.3%) are represented.

2.2. Measures

Four key measures were used in this research; IQ test scores, income, wealth and financial difficulty.

2.2.1. IQ test scores

The measure of general intelligence is adjusted Armed Services Vocational Aptitude Battery (ASVAB) test scores. Among all NLSY79 respondents, 94% took the ASVAB during the summer and fall of 1980. The high completion rate was achieved by providing a $50 honorarium for completing the test and by arranging over 400 testing sites.

The ASVAB consists of ten tests; general science, arithmetic reasoning, word knowledge, paragraph comprehension, numerical operations, coding speed, auto and shop information, math knowledge, mechanical comprehension, and electronics knowledge. While all tests are related to intelligence, the Department of Defense (DOD) uses only four tests to calculate an individual's overall score. This overall score, called the Armed Forces Qualification Test (AFQT), is based on; word knowledge, paragraph comprehension, math knowledge, and arithmetic reasoning. The DOD uses AFQT scores to rank the trainability of each enlistment candidate. Since AFQT scores are highly correlated with general intelligence, *g*, the research community has used AFQT as a proxy for intelligence even though the DOD states the ASVAB only measures trainability (Center for Human Resource Research, 1992, p. 42).

While the AFQT is a good indicator of general intelligence, some of its subtests measure the amount of learned knowledge, not just natural intellectual ability. Because older respondents had more time to acquire knowledge, there is a positive correlation (0.20, $p<0.01$) between AFQT scores and age. Since respondents spanned an 8 year age range when they took the exam, AFQT scores must be adjusted so that younger respondents are not considered less intelligent than older.

There are primarily two adjustments used in the literature. The first adjustment uses a regression framework with a set of age dummy variables (Blackburn & Neumark, 1995; Gardecki & Neumark, 1998; Rowe et al., 1999). The alternative adjustment (Herrnstein & Murray, 1994, Appendix 2) splits the sample into separate groups based on age and standardizes separately for each age group, which avoids the need to do regression analysis. Since both methods produce a very similar set of IQ values (correlation = 0.99) and since the regression framework has wider usage, it is the method adopted by this research.

The specific steps used to calculate an IQ score were to start with NLSY79 variable R0618300 and subtract points based on the respondents age when they took the test (13.7 points for ages 20 or 21; 10.5 points age 19; 9.2 points age 18; 8.0 points age 17; 5.2 points age 16; and 3.0 points age 15). The results were then standardized so that the series' mean was 100 and the standard deviation was 15 points.

Then to ensure a maximum sample size, a two-step process filled in some missing IQ values. First, thirty-six respondents took the ASVAB in non-standard conditions, such as at home or in jail. While no official AFQT score was created for tests taken under non-standard conditions, examination of the raw data suggests at least 18 cases have valid raw data which can generate an AFQT score. Second, among those not taking the ASVAB, data are available to estimate some IQ scores. During 1980 the NLSY79 staff contacted respondents' schools and collected slightly more than one-thousand transcripts. Many transcripts contain IQ test scores such as the Stanford–Binet Intelligence Test and the Otis–Lennon Mental Ability Test. Transcripts provided IQ test scores for an additional 115 respondents. Using both transcript data and scores for those who took the ASVAB under non-standard conditions increase the number with an IQ test score to 95%. Running the statistical tests reported below with and without the extra cases only slightly impacted the regression coefficient's statistical significance.

2.2.2. Income

Income data for 2004 were calculated from all responses to the NLSY79 income module. The NLSY79 income module asked respondents four sets of questions. The first set asked respondents questions that determine before-tax income from wages, salaries, tips, and self-employment. The second set asked for details about government transfers and welfare payments. The third set asked about private transfers such as child support, alimony and gifts. Finally, respondents listed income from other sources such as scholarships, interest, dividends and rent. For the most important items, such as wages, the questions are asked once about the respondent's income and then repeated a second time to capture income for a spouse or partner. For less important items, such as interest or dividends, a single question asks how much money both the respondent and spouse, if one exists, received.

Using Eq. (1), family income was created by summing the various components of the 2004 survey's income module. If the respondent was married in 2004 then the total income value was divided by two so that all results reported in this research are on a per-person basis. Not dividing by two biases the results toward characteristics of married individuals and away from the single, divorced or widowed. Readers are cautioned that a particular dollar amount of income may not accurately measure how satisfied a person feels about their financial situation.

$$\begin{aligned}\text{Family Income} = {} & \text{Military Pay} + \text{Wages} \\ & + \text{Net Business Profits} \\ & + \text{Alimony} + \text{Child Support} \\ & + \text{Education Grants} \\ & + \text{Other Income} + \text{Gifts} \\ & + \text{Welfare} + \text{Food Stamps} \\ & + \text{Unemployment Insurance} \\ & + \text{Worker Compensation.}\end{aligned} \tag{1}$$

2.2.3. Wealth

Wealth data were calculated from the 2004 NLSY79 wealth module. The NLSY79 has fielded 13 wealth modules from 1985 to 2004. Each module asked respondents to report details about their assets and liabilities such as the current market value of their home, mortgage, savings, possessions, stocks and bond holdings. Compared to earlier modules, the 2004 module asks respondents more details about their wealth. For example, in 2004 respondents reported separately the market value of up to 15 different vehicles, instead of one summary figure.

Eq. (2) was used to calculate total net worth. More details on response rates, handling of missing values and accuracy of the NLSY79 wealth data are found in Zagorsky (1999). As with income, if the respondent is married the total net worth figure is divided by two so that results are in per-person terms.

$$\begin{aligned}\text{Net Worth} = {} & \text{Home Value} - \text{Mortgage} - \text{Property Debt} \\ & + \text{Cash Saving} + \text{Stock/Bond} \\ & \text{/Mutual Funds} + \text{Trust} + \text{Business} \\ & \text{/Farm/RE Equity} - \text{Business/Farm} \\ & \text{/RE Debt} + \text{Car Value} - \text{Car Debt} \\ & + \text{Possessions} - \text{Other Debt} + \text{IRA} \\ & + \text{401K} + \text{CD.}\end{aligned} \tag{2}$$

2.2.4. Financial distress

Financial distress is living beyond one's means. Knowing just an individual's income or wealth does not reveal if an individual is in distress since some people with high income and wealth live beyond their means, while others with little money are able to save. The 2004 survey added questions that enable researchers to create three Boolean (true/false) indicators of distress.

The first indicator tracked current financial stress. The survey asked if the respondent, and/or spouse, currently have any credit cards on which they owe the maximum amount allowed. This question showed that 9% of young boomers currently had one or more cards "maxed out." Among those at the maximum, half reported having multiple cards at the limit.

The second indicator tracked stress over a longer time frame by asking respondents "in the last 5 years, have you completely missed a payment or been at least 2 months late in paying any of your bills?" Almost one-fifth (18.2%) of young boomers reported this problem. This question captured a different group than the first question since just one out of five respondents who reported a bill paying problem also reported being currently "maxed out" on a credit card.

The third and most severe stress indicator is bankruptcy. Respondents were asked if they or their spouse had ever declared bankruptcy and, if yes, the type. Results show that 13.4% of young baby boomers or their spouses filed. Of these, approximately two-thirds (67.3%) declared Chapter 7, in which wealth is liquidated to pay off as much debt as possible. Almost, one-third (28.3%) filed under Chapter 13, which allows individuals to keep their assets in exchange for a multi-year repayment plan that discharges debts over time. The rest (4.4%) filed under Chapter 11, which handles business reorganizations.

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2.2.5. Other explanatory factors

Regression results shown below include a number of other explanatory factors. All regressions include age since both income and wealth rise with age prior to retirement. Black and Hispanic Booleans are included to adjust for the NLSY79's over-sampling of these groups. Education is included and tracks the highest grade the respondent has completed in school. Divorce, inheritance and food spending are all key measures of spending and income transfers.

Some regressions include additional variables to see if specific aspects of a person's labor market experiences, family structure or personal characteristics impact the relationship between finances and intelligence. Examples of these variables are a Boolean flag that indicates if the respondent is currently self-employed, if they were a full time worker, their current occupation, the number of siblings, wealth at age 28, and if they were a smoker.

Three psychological variables are included to test if a respondent's personality impacts income or wealth. The first is Rotter's (1990) locus of control variable, which tracks if a person believes their life's outcomes are based on their behavior or personal characteristics or if they believe life is a function of luck, chance or fate. The second is Rosenberg's (1989) self-esteem scale, which tracks how much a person believes they are capable, satisfied and proud versus how much they view themselves as useless or a failure. The third is Pearlin, Lieberman, Menaghan, and Mullan (1981) mastery scale, which tracks how much an individual feels they are a master of their own life. Diener and Seligman's (2004) research shows these factors, which track well-being, have some relationship to economic variables, like income and wealth.

All variables used in this research are shown in Table 1. The table's left side contains the mean and standard deviation for each variable. The right side

Table 1
Mean, standard deviation and key correlation of variables

Variable	Mean	SD	Correlation with IQ test score	Correlation with income	Correlation with net worth
IQ test score	100	15	1.00	0.30	0.16
Income	$43,699	$47,709	0.30	1.00	0.39
Net worth	$145,837	$447,814	0.16	0.39	1.00
Age	36.7	2.3	0.00	0.02	0.04
Black	13.9%	0.3	−0.35	−0.12	−0.09
Hispanic	6.1%	0.2	−0.16	−0.05	−0.03
Born In USA	95.7%	0.2	0.08	0.01	−0.01
Siblings	3.3	2.3	−0.28	−0.12	−0.06
Education	13.4	2.7	0.62	0.32	0.17
Ever married	81.6%	0.4	0.07	0.02	0.00
Ever divorced	21.7%	0.4	−0.08	−0.06	−0.05
Number children	1.7	1.4	−0.11	−0.03	−0.03
Heavy smoker	19.5%	0.4	−0.16	−0.11	−0.08
Light smoker	35.1%	0.5	−0.08	−0.03	−0.03
Manager	14.0%	0.3	0.18	0.16	0.11
Professional	6.0%	0.2	0.17	0.05	0.03
Skilled	10.6%	0.3	0.13	0.07	0.01
Service	9.2%	0.3	−0.15	−0.11	−0.07
Sales	6.8%	0.3	0.02	0.01	0.03
Clerical	10.5%	0.3	−0.01	−0.06	−0.04
Self-employed	7.2%	0.3	0.01	0.05	0.05
Health insured	61.4%	0.5	0.14	0.19	0.10
Number jobs	10.5	6.4	0.01	−0.06	−0.04
Weeks work	30.3	24.7	0.10	0.12	0.02
Full time work	53.1%	0.5	0.11	0.13	0.02
Wealth at 28	$54,398	$216,226	0.10	0.11	0.13
Times inherit $	1.1	1.9	0.32	0.18	0.20
Amount inherit	$22,225	$153,565	0.08	0.08	0.18
2 Earners	28.6%	0.5	0.12	0.09	0.02
Prime earner	44.4%	0.5	0.06	0.02	0.00
Food spend	$1,993	$1,352	0.18	0.24	0.16
Rotter control	0.05	1.0	0.25	0.12	0.07
Self-esteem	0.05	1.0	0.24	0.17	0.11
Pearlin mastery	0.07	1.0	0.31	0.18	0.12

contains the Pearson correlation of each variable with the three most important factors; IQ score, income and net worth.

2.3. Procedure

All data were extracted from the public use file and then analyzed using SAS. Since the NLSY79 is a multi-stage clustered random sample that over-sampled blacks and Hispanics the data must be properly weighted and adjusted to ensure survey respondents are a representative sample. The data were adjusted following the recommendations in Zagorsky (1997, chapter 3.9). To check if the initial sample design and initial clustering of respondents impacted results, regressions were rerun using non-public data and the Suddan 9.0 program. Results using these non-public data and more sophisticated statistical techniques were extremely similar to the results found using the publicly available data and SAS. Since the findings were almost the same, all reported results use only public data and SAS calculations.

3. Results

Results are shown in four sections; graphical analysis, descriptive statistics, net worth and income regressions, and financial distress analysis.

3.1. Graphical analysis

The basic findings are summarized in two graphs that chart IQ test scores versus finances. Figs. 1 and 2 plot IQ on the horizontal *x*-axis and financial data on the vertical *y*-axis. Each dot represents a single individual. To keep the dots from blurring together the financial data range is a quarter of a million dollars. While the very rich are not shown in these two figures, their data are included in all other results' sections. To keep the graphs simple no correction is made for the over-sampling of black and Hispanic respondents. Graphs which correct for over-sampling look similar.

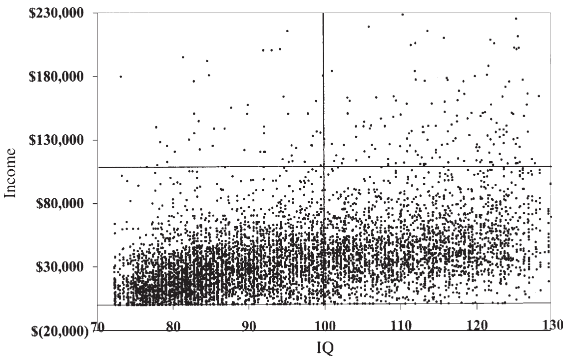

Fig. 1.

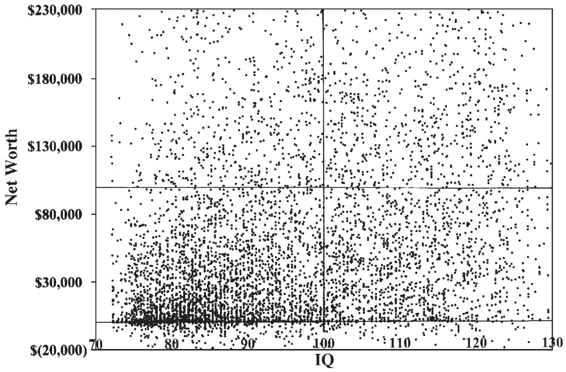

Fig. 2.

Visual inspection of Fig. 1 shows the mass of points rising slightly to the right. This means that IQ scores and income increase together, but the relationship is not very strong. Fig. 2 shows the mass of points is neither rising nor falling. This suggests that when IQ scores increase there is no tendency for net worth to increase. The two plots suggest IQ test scores are linked with income, but not with wealth.

A second point to notice is the number of dots in each quadrant of Figs. 1 and 2. Comparing the number of points in the upper right quadrant of Fig. 1 (162 respondents) to the upper left quadrant (55) shows there are relatively few points in the upper left corner of the income graph. The ratio shows people with above-average IQ scores (>100) are three times as likely as below-average IQ individuals to have a high (>$105,000) income.

Fig. 2, which tracks net worth, is quite different. Here the upper right quadrant (623 respondents) has almost the same number as the upper left (517). The ratios show people with above-average IQ scores are only 1.2 times as likely as individuals with below-average IQ scores to have a comparatively high net worth. Simply put, there are few individuals with below-average IQ scores who have high income but there are relatively large numbers who are wealthy.

3.2. Descriptive statistics

In 2004 the typical young baby boomer had an overall median net worth of $55,250 and a median income of $35,918. The mean figures (overall net worth $145,842; income $44,986), which are affected by the presence or absence of a few rich people, are roughly three times higher for net worth and 25% higher for income than the medians.

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Table 2 shows the median income and net worth held by young baby boomers broken down by IQ scores. The numbers suggest that IQ scores are directly related to both income and wealth. Comparing individuals in the bottom of the IQ score distribution to those in the highest shows their net worth is over twenty three times lower, while their income is 3.6 times lower.

The table also shows that the median boomer has relatively little net worth no matter what their IQ score. Typical wealth holdings equal just 18.6 months of income. This means if a boomer lost their income they could live off their savings for less than 2 years. Individuals in the lowest IQ score group (75 and below) have less than a 5-month cushion of savings while those in the highest scoring group (125 and above) have slightly more than 2 years of income saved (28.8 months). Given many boomers are expecting long retirements and many are now putting their children through college, no IQ group has built up a significant financial cushion.

Correlation analysis also shows how IQ scores and finances are connected. The Pearson correlation between IQ score and net worth is roughly half (0.156, $p<0.01$) the correlation between IQ score and income (0.297, $p<0.01$). This reveals a weaker relationship between IQ scores and wealth than between IQ scores and income. The correlations between IQ scores and the three measures of financial difficulty are maxed credit cards −0.07 ($p<0.01$), missed payment −0.11 ($p<0.01$) and bankruptcy −0.09 ($p<0.01$). These numbers show a small negative relationship and suggest higher IQ scores are related to lower financial stress.

3.3. Net worth and income regressions

While graphs, tables, and correlation analysis suggest a relationship, these methods do not hold other important factors constant and also do not determine the precise connection. To determine the specific impact, two sets of regressions and four different techniques were used. Numerous regressions are reported to show that the results are robust to both changes in explanatory factors and statistical technique.

One set of regressions, found in Table 3, uses a limited number (9) of explanatory variables. The other set, found in Table 4, uses an extensive number (34) of variables to check if the results change by adding more explanatory factors. Each set used four different regression techniques to analyze the data. Multiple techniques were used because financial data are highly skewed and adding or subtracting a few very rich or very poor individuals often impacts results. Because there are numerous regressions, each is identified by a number in parentheses at the top of the table to facilitate the discussion.

Ordinary Least Squares (OLS) results, found in regressions (1) and (2), are used because this is the simplest and most commonly used technique. Robust regression (Huber, 1973) results are shown in (3), (4), (9) and (10). This technique, invented to ensure very large or small observations do not bias results, gives less weight to the extremely rich and the deeply indebted. Results were produced using SAS's "robustreg" command using the M estimation technique and the Huber weight option, which follows the method outlined in Huber's (1973) work.

Results using OLS with trimmed outliers are seen in regressions (5) and (6). This technique first removes all respondents with very large income or wealth values and then reruns OLS. The cut offs used were the top half of 1% which eliminated all respondents with a per-person net worth more than $1,540,000 or income more than $260,000. Tests using a variety of other cutoffs are not reported but give similar results.

The fourth regression technique is two stage least squares (2SLS) whose results are seen in (7), (8), (11) and (12). This model estimates two equations simultaneously and allows income and net worth to influence each other. This feedback is potentially important to model because some individuals derive a large portion of their income from sources like dividends and interest, which are a function of wealth. Additionally, many people build their wealth by saving a portion of their income. For researchers interested in replicating the results, the first stage instruments in the 2SLS estimation were income reported in the 2002 survey, net worth in the 2000 survey and the respondent's AFQT shop component score.

In the top section of Table 3 net worth is the dependent variable while the bottom part of the table uses income. The coefficients in Table 3 show how changing one of the nine explanatory factors by one unit impacts either net

Table 2
Median income and net worth of young baby boomers by IQ test score

IQ test score	Net worth	Income
75 & below	$5775	$15,020
80	$10,500	$18,467
85	$24,250	$27,700
90	$37,500	$30,881
95	$52,500	$34,985
100	$57,550	$36,826
105	$83,918	$40,628
110	$71,445	$40,884
115	$94,500	$45,675
120	$127,500	$48,681
125 & above	$133,250	$55,555
Overall	$55,250	$35,918
Correlation	0.156	0.297

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Table 3
Financial regressions using IQ score and a limited number of explanatory variables

Technique	OLS		Robust regression		Trimmed OLS		2 least squares	
	Net worth (1)		Net worth (3)		Net worth (5)		Net worth (7)	
Intercept	−$162,390	**	−$85,689	***	−$163,605	***	−$1476	
IQ score	−$435		$83		$78		−$1365	***
Income	$2.72	***	$2.06	***	$2.40	***	$4.21	***
Age	$4141	**	$1600	***	$3434	***	$2277	***
Black	−$40,074	***	−$20,197	***	−$33,283	***	−$35,224	***
Hispanic	−$13,986		−$6744	***	−$8889	**	−$12,811	**
Education	$2243		$1133	***	$2258	***	−$617	
Ever divorced	−$28,356	***	−$9945	***	−$15,960	***	−$16,096	***
Times inherit $	$22,081	***	$6323	***	$9596	***	$9920	***
Food spend	$18	***	$4	***	$7	***	$3	*
R^2	0.156		0.202		0.320		0.236	
	Income (2)		Income (4)		Income (6)		Income (8)	
Intercept	−$59,883	***	−$41,941	***	−$39,914	***	−$41,994	***
IQ score	$405	***	$346	***	$354	***	$616	***
Net worth	$0.03	***	$0.06	***	$0.08	***	$0.16	***
Age	$350	*	$220	**	$184		−$106	
Black	−$2182	*	−$1626	***	−$772		$7634	***
Hispanic	$736		$826		$1159		$4440	***
Education	$2657	***	$2001	***	$1886	***	$414	
Ever divorced	−$732		−$552		$437		$2701	***
Times inherit $	$12		−$290	**	−$462	***	−$1784	***
Food spend	$5	***	$2	***	$2	***	$0	
R^2	0.241		0.276		0.382		0.196	
Number of respondents	7041		7042		6977		6195	

Notes: *** Significant at 0.01 or greater level; ** at 0.05 level; ** at 0.1 level. The table's top part uses net worth as the dependent variable, the bottom part uses income. Income, Net worth, and Food spending are all monetary variables and their coefficients show the impact of a one dollar change on the dependent variable. Age and Education are in years and show the impact of one more year of life or learning. Black, Hispanic, and Ever divorced and show the impact of the variable changing from false to true. Times inherit $ tracks the number of times from zero to thirteen that a person received a large gift or inheritance.

worth or income. For example, in regression (1) the $2243 coefficient on Education means that one additional year of schooling, holding all other factors constant, is related to more than a two-thousand dollar increase in wealth. The minus $28,356 coefficient on Ever Divorce, shows divorced respondents have almost thirty thousand dollars less wealth than those always married or single.

The key coefficients are the two lines which start with the word IQ Score. In the top of the table these coefficients are on the second line. Two of the IQ coefficients are negative (OLS −$435; 2SLS −$1365), two are positive (Robust $83; Trimmed $78) and three out of four coefficients are not statistically distinguishable from zero.

If accurate, the two negative coefficients suggest a higher IQ is associated with lower net worth. The two positive coefficients suggest a higher IQ is associated with higher net worth, but the relationship is not quantitatively important. Using the largest coefficient shows two individuals with similar characteristics except for a 10 point IQ score difference would have at most an $830 wealth difference. Since median net worth in 2004 is $55,250, this represents just a 1.5% difference. Combining this information suggests the impact of IQ scores on net worth after accounting for other factors is either zero or close to zero.

The results in the bottom part of the table show the impact on income. The key line in this section is again labeled IQ Score and is found two-thirds of the way down. All four of the IQ coefficients are positive (OLS $405; Robust $346; Trimmed $354; 2SLS $616), roughly similar and all four coefficients are statistically distinguishable from zero. These coefficients indicate that after holding other factors constant, a higher IQ is associated with higher income. For example, two individuals with similar characteristics except for a 10 point IQ difference would have between $3500 and $6100 a year income difference. Since median income is $35,918 this represents between a 9.7% and 17% difference.

Table 4 shows that increasing the number of explanatory variables from nine to thirty-four did not qualitatively change the results. This suggests important variables were not missing from the simpler regressions.

Table 4
Financial regressions using IQ score and extensive number of explanatory variables

Technique	Robust regression		Robust regression		2 stage least squares		2 stage least squares	
	Net worth (9)		Income (10)		Net worth (11)		Income (12)	
Intercept	−$35,283	**	−$23,310	***	$13,387		−$30,931	***
IQ test score	−$19		$202	***	−$564		$339	***
Income	$1.90	***			$4.08	***		
Net worth			$0.05	***			$0.16	***
Age	$1141	***	$59		$2043	***	−$156	
Black	−$20,194	***	−$952	*	−$29,683	***	$5351	***
Hispanic	−$11,349	***	$706		−$17,277	***	$3799	***
Born In USA	−$13,573	***	−$836		−$25,974	***	$2848	*
Siblings	$578	*	−$203	***	$1125		−$176	
Education	$1251	***	$1328	***	−$1165		$777	***
Ever married	$6805	***	−$2646	***	$7668		−$1927	*
Ever divorced	−$9618	***	−$554		−$13,453	***	$2176	***
Number children	$394		$284	**	−$651		$317	
Heavy smoker	−$10,623	***	−$2029	***	−$15,750	***	$1731	*
Light smoker	−$2240		−$378		−$4541		$968	
Manager	$6417	***	$3775	***	−$201		$1001	
Professional	−$6524	**	$1097		−$13,785	*	$839	
Skilled	−$5472	**	−$1117	*	−$3327		−$567	
Service	$777		−$3224	***	$7779		−$2615	***
Sales	$2657		−$283		$2066		−$295	
Clerical	−$4310	*	−$1969	***	−$2920		−$980	
Self-employed	$10,893	***	−$395		$17,469	***	−$1513	
Health insured	$5511	***	$6515	***	−$4091		$3529	***
Number jobs	−$884	***	−$123	***	−$739	***	$43	
Weeks work	−$52		$118	***	−$477	***	$115	***
Full time work	−$4851		$2851	***	−$4788		$2125	
Wealth at 28	$0.2	***	$0	***	$0.1	***	$0	***
Times inherit $	$3655	***	−$197		$7158	***	−$1245	***
Amount Inherit	$0.1	***	$0		$0.1	***	$0	***
2 earners	−$6872	***	$7362	***	−$24,605	***	$5235	***
Prime earner	−$9333	***	$593		−$9179	**	$685	
Food spend	$5	***	$2	***	$2		$1	**
Rotter control	$1402	*	$439	**	$2355		−$417	
Self-esteem	$3351	***	$548	***	$4671	**	−$390	
Pearlin mastery	$1198		$1031	***	$23		$233	

Notes: *** Significant at 0.01 or greater level; ** at 0.05 level; ** at 0.1 level. Additional monetary factors not discussed in Table 3's notes are Wealth at age 28 and the Amount inherited, both coefficients show the impact of a one dollar change. Siblings, Number of children, Number of jobs ever held, and Weeks worked in the past year all show the impact of a one unit change. The Rotter locus of control, Self-esteem scale, and the Pearlin mastery scale are all *z*-scores and their coefficients show the impact of being one standard deviation from the average. Born In USA, Ever married, Ever divorced, is a Heavy smoker, is a Light smoker, is a Full time worker, 2 income earners in the family, is the Prime earner, is Self-employed, has Health insurance, and the six variables which track type of occupation all are binary variables and show the impact of the variable changing from false to true.

Coefficients in Table 4 also show the impact of changing an explanatory factor by one unit. For example, in regression (9) the $1141 coefficient on Age means that being 1 year older is associated with an additional thousand dollars of wealth. For binary variables like Black, the minus 20,194 coefficient means that blacks have twenty thousand dollars less wealth on average than non-blacks. For space reasons, Table 4 only reports results of the robust regression and 2SLS coefficients.

Columns 9 and 11 show the impact of adding additional explanatory variables to the net worth regressions. These extra variables result in IQ coefficients that are even closer to zero (−$19, −$564) than found in Table 3. The statistical significance of the IQ coefficients with additional variables is indistinguishable from zero.

On the income side, the IQ coefficients are still statistically significant, but are smaller ($202, $339) than in Table 3. In general, adding more explanatory factors moves both wealth and income coefficients slightly closer to zero but does not qualitatively change the results seen using the more limited set of variables.

The extended regressions also show that the three psychological variables (locus of control, self-esteem and

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mastery scale) all have a positive relationship with wealth, and some show a positive relationship to income. This means that individuals who believe they have more control or mastery over their life have more wealth and possibly more income.

This supports Ryff (1989) who found a strong positive relationship between self-rated financial status and both the locus of control and self-esteem. It also supports Krause, Jay, and Liang (1991) who showed among U.S. and Japanese elderly, financial strain results in a loss of control feeling; and supports Perry and Morris's (2005) finding that individuals who believed they controlled their own destiny were more likely to actively manage their finances. These results do not agree with Johnson and Krueger (2006) who showed income and assets are immaterial to life satisfaction when a locus of control variable is added.

Because of the potential feedback from income to wealth and from wealth to income, 2SLS was used to estimate the equations. However, comparing the 2SLS results with the other regression methods shows qualitatively similar results. This suggests that adjusting for feedback is not important and that circularity is not a key force in the model. Nevertheless, results from 2SLS models are dependent on using good instruments for the first stage regressions. Good instruments meet two criteria. First the instrument must be highly correlated with IQ. Second, the instrument must not directly impact a respondent's wealth or income.

Are the 2SLS results caused by using a bad instrument? The key instrument for IQ in Tables 3 and 4 was the respondent's ASVAB shop test score. Bound et al. (1986) used sibling IQ score as an instrument when investigating intelligence and wages. This might be a better choice because siblings have similar intelligence. The NLSY79's correlation for sibling IQ is 0.66 ($p<0.001$). It is rare for a person's intelligence to directly impact their sibling's finances. Last, because 46% of the NLSY79 sample have at least one sibling in the survey, there are many data points. Rerunning the 2SLS regressions, excluding respondents without siblings and using sibling IQ score, sibling highest grade, lagged wealth, and lagged income as instruments resulted in relatively similar coefficients to those found in Tables 3 and 4. This suggests using the ASVAB shop test score was a good choice.

3.4. Financial distress analysis

Table 5 reports the amount of financial distress for various IQ test score categories. The table shows the relationship is not a simple linear one but instead it goes up and down across the spectrum. For example, among those who maxed out their credit cards, the percentage rises from 7.7% with an IQ of 75 and below to a peak of 12.1% among those with an IQ of 90. Then the percentage falls in an irregular pattern to 5.4% among those with an IQ of 115, before rising again. This irregular pattern is also seen among the bankrupt and people who missed payments.

Table 6 uses logistic equations to estimate the impact various characteristics have on the probability of being financially stressed. In each logistic regression the dependent variable is a Boolean, which indicates whether the respondent did or did not report a particular financial difficulty. On the right-hand-side of each logistic equation are the same explanatory variables used earlier. To compute the overall probability that a respondent was in financial distress (Pindyck & Rubinfeld, 1998) each coefficient is first multiplied by a particular characteristic, the results are summed and the sum is then inserted into the equation [sum/(1+sum)].

The regressions use the list of explanatory variables presented earlier, except that IQ is entered into the equation as a cubic polynomial, which means there are three terms; IQ, IQ squared and IQ cubed in each regression. A cubic was included for two reasons. First, by using Excel's chart trend-line function, a polynomial of order 3 visually best fits the data series shown in Table 5. Second, a common way of ranking competing logistic models is comparing their Akaike's information criteria (AIC) (Akaike, 1974). The model with the smallest AIC fits the data best. Starting from a linear model the AIC falls until IQ cubed is added, but then it rises sharply once IQ raised to the fourth power is included.

Table 6 contains two columns for each measure of distress. The left hand column contains the regression results and the right hand column contains the odds ratio. The odds ratio shows the chance of how a factor impacts completion rates. For example the 2.05 in column (13b)

Table 5
Relationship between IQ test score and financial stress

IQ test score	Maxed credit card (%)	Missed payment (%)	Declared bankruptcy (%)
75 & below	7.7	17.5	14.5
80	11.7	25.4	14.4
85	11.7	23.3	18.6
90	12.1	23.5	16.9
95	12.0	20.4	18.7
100	8.6	18.5	13.7
105	10.0	15.2	11.8
110	6.3	17.0	11.8
115	5.4	12.2	11.4
120	6.3	12.5	9.1
125 & above	6.1	11.8	5.0
Average	9.0	18.1	13.5

Table 6
Logistic regressions and odds ratio for chance of financial distress

	Maxed credit (13)	Odds ratio (13b)	Missed payment (14)	Odds ratio (14b)	Bankrupt (15)	Odds ratio (15b)
Intercept	−63.855***		−31.997***		−29.524***	
IQ test score	1.7649***	5.84 (2.6–14.2)	0.8751***	2.40 (1.3–4.4)	0.7393*	2.09 (0.86–5.1)
IQ^2	−0.0171***	0.98 (0.97–0.99)	−0.0082***	0.99 (0.99–1.0)	−0.0066	0.99 (0.98–1.0)
IQ^3	0.0001***	1.00 (1.0–1.0)	0.0000**	1.00 (1.0–1.0)	0.0000	1.00 (1.0–1.0)
Income	0.0001	1.00 (1.0–1.0)	−0.0084***	0.99 (0.99–1.0)	0.0001	1.00 (1.0–1.0)
Net worth	−0.0014*	1.00 (1.0–1.0)	−0.0009	1.00 (1.0–1.0)	−0.0020	1.00 (1.0–1.0)
Age	0.0458***	1.05 (1.01–1.08)	0.0165	1.02 (0.99–1.04)	0.0380**	1.04 (1.0–1.07)
Black	0.2899***	1.34 (1.09–1.63)	0.5358**	1.71 (1.43–2.04)	0.0332	1.03 (0.84–1.28)
Hispanic	0.7198***	2.05 (1.64–2.57)	0.2481**	1.28 (1.06–1.55)	−0.1212	0.89 (0.69–1.14)
Education	0.0277	1.03 (0.99–1.07)	−0.0354***	0.97 (0.94–1.0)	−0.0207	0.98 (0.95–1.01)
Ever divorced	0.2036***	1.23 (1.06–1.42)	0.1979***	1.22 (1.05–1.42)	0.6182***	1.86 (1.56–2.2)
Times inherit $	−0.0072	0.99 (0.93–1.05)	0.0199	1.02 (0.98–1.06)	−0.0414*	0.96 (0.92–1.01)
Food spend	−0.0520	0.95 (0.88–1.03)	−0.0248	0.98 (0.93–1.03)	−0.0417	0.96 (0.9–1.02)
Number Obs.	6951		6994		7008	

Notes: *** Significant at 0.01 or greater level; ** at 0.05 level; ** at 0.1 level. Numbers in parenthesis below the odds ratio are the 95% confidence interval. The dependent variables Maxed credit, Missed payments and went Bankrupt are true–false indicators which track if a financial difficulty was reported. The odds ratio coefficients show how increasing the explanatory factor by one unit impacts the chance a particular problem occurs.

in the line “Hispanic” signifies that Hispanic respondents have twice the chance of maxing out at least one credit card compared to non-Hispanics, but the 0.89 in column (15b) shows they have only a 90% chance of declaring bankruptcy as compared to whites.

Since it is difficult to interpret the table directly, the impact of changes in IQ test scores on the probability of being in financial distress is shown in Table 7. This table uses as a baseline a 40-year-old respondent with an income of $45,000, net worth of $75,000, who is not black, not Hispanic, had 12 years of schooling, is not divorced, has not inherited and spends $2000 per-person a year on food. Using different baseline characteristics changes the exact probabilities but not the pattern traced out by the table.

Looking at Table 7 shows if the baseline individual had an IQ score of 90 then they would have a 10% chance of maxing out their credit cards. If the baseline individual had an IQ score ten points higher, however, the probability they would max out a credit card drops to 8.3%.

Table 7 shows some important findings as IQ scores change. First, as IQ score increases the chance of someone getting into financial distress increases for individuals below-average IQ score (100) after taking into account other explanatory factors. The probability someone with an IQ score of 90 has financial distress compared to someone with an IQ score of 80 is about one-quarter more. Second, this finding of increasing financial distress occurs again among smarter individuals. For example, the probability someone missed a payment increases as IQ scores rise above 120. Only among people slightly above-average does an increasing IQ score lead to a reduced chance of financial distress. Running a regression with just IQ score and no higher order terms shows the probability of missing a payment rises for all IQ scores. This means the results in Table 7 are not caused by using a third degree polynomial.

The survey provides no data to explain why this occurs. One explanation is that higher IQ score individuals might be busier and less focused on routines like paying bills. Another explanation is those with a higher IQ score might lead a life-style that is closer to the financial precipice because they feel they are smart enough to calculate and understand all relevant factors. A third explanation is that smarter people have a better memory and are more likely to remember mistakes. Without more information, these and other explanations are speculation.

All regressions were rerun with the extensive list of explanatory variables described earlier. Since similar results were found, these tests are not reported but they suggest key variables are not missing from the regressions.

4. Discussion

This research asked if intelligence impacts personal finances. The results confirm other researchers' findings that IQ test scores and income are related. Depending on the method of analysis used and specific factors held constant, each point increase in IQ test scores is associated with $202 to $616 more income per year. This means the average income difference between a person with an IQ score in the normal range (100) and someone in the top 2% of society (130) is currently between $6000 and $18,500 per year.

Table 7
Probability baseline respondent has financial distress for various IQ score levels

IQ test score	Maxed credit card (%)	Missed payment (%)	Bankrupt (%)
70	2.6	7.6	7.9
80	7.6	14.2	15.2
90	10.0	17.9	20.0
100	8.3	17.6	20.7
110	5.8	15.5	18.5
120	4.6	13.8	15.7
130	5.7	14.1	13.9
140	14.2	18.8	14.1

Note: Baseline respondent defined in the text.

While income and IQ test scores are related, results do not suggest a link between IQ scores and wealth. Regression results range from a negative to a small positive relationship depending on the specific analysis done. Moreover, since most of the statistical results are not distinguishable from zero, this suggests IQ test scores and net worth are not connected.

This research contains many statistics and coefficients. If two numbers are needed to estimate the impact of IQ test scores on income and wealth, the author's preferred estimates are from robust regressions (3) and (4). These regressions, which systematically take into account the very rich and highly indebted, show a one point increase in IQ test scores is related to an income increase of $346 per year and a net worth increase of at most $83, but probably zero.

The results that track the relationship between IQ test scores and financial distress present a mixed picture since the chance of not paying bills, going bankrupt or reaching credit card limits is not associated with IQ scores linearly. This means higher IQ test scores do not always lower the probability of being in financial difficulty. Financial distress is least for people with an IQ score slightly higher than average (100). Among those in the lower and upper portion of the IQ test score distribution, a higher IQ score increases distress.

The title asks, "Do you have to be smart to be rich?" If IQ test scores are an accurate measure of intelligence and if intelligence is relatively fixed from teen years to adulthood then the results indicate the answer is no. Being more intelligent does not confer any advantage along two of the three key dimensions of financial success. Since intelligence is not a factor for explaining wealth, individuals with low intelligence should not believe they are handicapped in achieving financial success, nor should high intelligence people believe they have an advantage.

Future research needs to investigate other psychological factors that could be driving material wealth accumulation. Factors such as a person's desire for immediate or deferred satisfaction, tolerance or intolerance for taking risks, and ability to reject or accept social influence could all be key reasons. Caveats must be attached to these findings. The results are just for 2004 and focus on a single U.S. cohort. Results may be different for individuals living in countries with higher savings rates, such as Japan; living in countries with different pension structures, such as Germany; and for other U.S. cohorts and time periods. Future research will show if these findings are broadly applicable or apply just to U.S. young baby boomers.

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