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WEALTH, FINANCIAL LITERACY AND SCHOOLING

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EXECUTIVE SUMMARY

This paper discusses new analysis that reveals a stronger and larger effect of financial literacy on wealth than previously estimated. The analysis uses a new household dataset and an empirical method designed to isolate the causal effects of financial literacy and schooling on wealth. Prior studies have associated financial literacy and schooling with positive financial outcomes, but typically do not account for unobserved factors that might shape financial literacy and schooling, as well as wealth outcomes. Nor do they account for possible measurement error in financial literacy and schooling. The estimates presented here indicate that financial literacy is at least as important as schooling, if not more so, in affecting household wealth and pension contributions. These results are relevant for financial education policy since they suggest that enhanced financial literacy can make a significant difference in financial behavior, even after controlling for schooling. The estimates of the impact of financial literacy imply that investments in financial literacy could have high payoffs in terms of enhanced household wealth.

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INTRODUCTION

Survey evidence indicates that fewer than half of U.S. workers have even attempted to estimate how much money they might need in retirement, and many older adults face significant retirement saving shortfalls. While several explanations for these shortfalls have been suggested, the empirical literature exploring such factors thus far has been unable to account for much of the observed differentials in wealth. Recent work (Behrman et al. 2010), of which this is an excerpt, investigates whether people who find it difficult to understand their financial environment are also less likely to accumulate wealth. Specifically, it examines the links between financial literacy, i.e., the ability to process economic information and make informed decisions about household finances, and wealth accumulation and pension contributions.

Prior studies have indicated that financial literacy is positively associated with asset accumulation and retirement planning, prompting policymakers to support efforts to enhance household wealth accumulation and welfare through increasing financial literacy. Despite support for programs to boost financial literacy, however, questions have been raised about whether these associations reflect causality or if the relationship between financial literacy and wealth is simply due to some underlying factor that is likely unobserved. For example, individuals who fail to save and are financially illiterate may also be more impatient, making it difficult to assess whether boosting financial education would, in fact, enhance household wealth accumulation. Moreover, financial literacy could also simply be another measure for an individual's overall education, leaving efforts focused on financial education less effective. Finally, survey measures of financial literacy are also likely to have considerable measurement error that is likely to bias the estimated impacts of financial literacy downward.

The research discussed here employed an empirical strategy called instrumental variable or IV that accounts for both unobserved factors and measurement error that may distort the estimated relationship between financial literacy and household wealth. Furthermore, measures of individual schooling level were included in the analysis to control for the possibility that financial literacy proxies for general education. The study draws on a unique dataset, the Chilean Social Protection Survey, that includes extensive information on household wealth as well as individual and household characteristics for a representative sample of prime-age adults, permitting implementation of the IV approach and also evaluation of the effects of financial literacy using a richer range of ages and schooling than previously available.

DATA AND METHODOLOGY

The primary data source is the Social Protection Survey (Encuesta de Proteccion Social, EPS) administered in collaboration with the Microdata Center of the University of Chile. This survey is comparable to the U.S. Health and Retirement Study (HRS) that provides a nationally-representative, stratified random survey of respondents over the age of 50, covering their wealth, schooling, financial literacy, work history, childhood background, and selected personality traits. In contrast to the HRS, however, the EPS covers all adults, not just respondents over age 50. The analysis discussed here is focused on 13,054 prime-age respondents surveyed in 2006, namely men age 24-65 and women age 24-60 (since in Chile the legal retirement age is 60 for women but 65 years for men). These data have been linked to information on policies, markets and macroeconomic conditions at critical junctures in respondents' lives.

WEALTH AND PENSION CONTRIBUTION OUTCOMES

Outcomes of interest are components of net wealth, drawing on four EPS measures (all measured in 2006 US dollars):

- *Pension wealth* averages $38,600, or 54 percent of total net wealth, with considerable variance across respondents; about one-quarter of respondents having zero pension wealth. In 1981, the Chilean government terminated the old insolvent pay-as-you-go retirement system and replaced it with a national, mandatory defined contribution scheme known as the AFP system. This reform required all new formal sector employees to contribute at least 10 percent of their salaries to one of several licensed defined contribution pension funds. Pension wealth is likely to be relatively accurately reported in Chile because respondents receive annual statements from the government summarizing their defined contribution pension system accruals.

- *Net housing wealth* averages $22,100, or 31 percent of total wealth, again with considerable variance across respondents; 26 percent of respondents report none and 1 percent report negative net housing wealth.
- *Other net wealth* averages $10,600, or 15 percent of total net wealth, with greater variance across respondents than either pension or housing wealth but again with about a quarter of respondents reporting zero and more (31 percent) reporting negative values.
- *Total net wealth* averages $71,500, with greater variance and greater range than the other wealth measures just described. Total net wealth is the sum of the three components above.

In addition to these wealth measures, two possible channels are also explored via which financial literacy and schooling might affect wealth, particularly pension wealth. The first is the "density of pension contributions." This concept refers to the fraction of months each individual contributed to the pension system, from age 18 to the survey date, and therefore is indicative of how attached the worker is to the pension saving system. On average respondents report that they contributed to their pension almost half the time they were eligible to do so, though there is again wide dispersion over the sample. The second channel explored is a retirement planning indicator of whether the individual has attempted to calculate the money he or she needs for retirement. A variable is created for planning in which 1 indicates a 'yes' response, and 0 represents a negative response.

EXPLANATORY VARIABLES: SCHOOLING AND FINANCIAL LITERACY

Key explanatory variables used in the analysis are schooling attainment and financial literacy. *Schooling* is measured in a fairly conventional manner, with primary school referring to grades 1-8, secondary school to grades 9-13, and post-secondary school to grades beyond that, to a maximum of 20+. Average schooling attainment in our sample is 10.4 grades, and about one percent of the respondents has no schooling, while about the same fraction has the maximum of 20+ years.

Financial literacy is measured using a rich set of 12 questions. The first three 'core' questions cover basic economics and finance, including an understanding of risk and simple interest; the second more 'sophisticated' set of three pertains to more elaborate financial concepts; and a third set of six covers knowledge of retirement system rules, including the legal retirement age and how to calculate AFP pension benefits. The "core" first three financial literacy queries were developed and implemented in the HRS; they have also been adopted by several other international surveys. They are as follows:

- If the chance of catching an illness is 10%, how many people out of 1000 would get the illness?
- If 5 people share winning lottery tickets and the total prize is 2 million pesos, how much would each receive?
- Assume that you have $100 in a savings account and the interest rate you earn on this money is 2% a year. If you keep this money in the account for 5 years, how much would you have after 5 years? [more than $120, exactly $120, less than $120]

The second more sophisticated set of three questions has also been fielded in a special HRS module intended to measure more complex concepts such as compound interest, inflation and risk diversification. The specific questions are:

- Assume that you have $200 in a savings account and the interest rate that you earn on these savings is 10% a year. How much would you have in the account after 2 years? [exact number]
- Assume that you have $100 in a savings account and the interest rate that you earn on these savings is 1% a year. Inflation is 2% a year. After one year, if you withdraw the money from the savings account you could buy more/less/the same?
- True/False: Buying shares in one company is less risky than buying shares from many different companies with the same money.

The third set of questions is specific to the EPS and touches on some key aspects of the Chilean retirement system, focusing on the mandatory contribution rate, the legal retirement age for women and men, how pension benefits are computed in the defined contribution system, whether people are aware of the government's welfare benefit for the elderly, and whether people know they can contribute to the Voluntary Pension system even when they are not in covered-sector jobs. The specific wording of these questions is:

- Do you know what percentage of income is (has been or would be) deducted monthly for pension system contributions? [yes/no]
- Do you know the legal retirement age for women? [60]
- Do you know the legal retirement age for men? [65]
- Do you know how to calculate pensions in the AFP? [yes, by balance of individual account and other elements such as age of retirement]
- Do you know whether there is a minimum state guaranteed old age pension for people aged 65 and over? [yes/no]
- Have you heard of the Voluntary Pension Savings system introduced in 2002? [yes/no]

Table 1 lists all 12 financial literacy questions along with a summary of how individuals in the sample answered them. As is clear from Column 1, only half of the respondents knew the correct answer to the core questions (1-3), and fewer knew the sophisticated financial literacy questions (4-6). While people did score relatively well on the risk diversification question, they could have been guessing as only a true/false response was required. Patterns are more variable for questions regarding knowledge of pension system benefit rules and provisions; most knew the legal retirement ages, but only about one-third knew the mandatory contribution rates and only 10 percent could say how benefits are computed. Approximately one-half of the sample knew about both the guaranteed minimum benefit and the Voluntary Savings Plan.

TABLE 1
FINANCIAL LITERACY QUESTIONS: PERCENT CORRECT AND PRIDIT WEIGHTING SCHEME

	QUESTION	CORRECT (%)	PRIDIT WEIGHTS
Concepts of basic economics and finance			
	Main HRS questions:		
(1)	If the chance of catching an illness is 10%, how many people out of 1000 would get the illness?	50%	0.64
(2)	If 5 people share winning lottery tickets and the total prize is 2 Million pesos, how much would each receive?	44%	0.59
(3)	Assume that you have $100 in a savings account and the interest rate you earn on this money is 2% a year. If you keep this money in the account for 5 years, how much would you have after 5 years? [over $120, exactly $120, less than $120]	50%	0.59
	Additional questions:		
(4)	Assume that you have $200 in a savings account, and the interest rate that you earn on these savings is 10% a year. How much would you have in the account after 2 years? [exact number]	2%	0.29
(5)	Assume that you have $100 in a savings account and the interest rate that you earn on these savings is 1% a year. Inflation is 2% a year. After one year, if you withdraw the money from the savings account you could buy more/less/the same?	26%	0.42
(6)	T/F: Buying shares in one company is less risky than buying shares from many different companies with the same money.	46%	0.44
Knowledge of benefit rules and institutions			
(7)	Do you knows what percentage of income is (has been or would be) deducted monthly for pension system contributions? [yes/no]	37%	0.54
(8)	Do you know the legal retirement age for women? [60]	79%	0.44
(9)	Do you know the legal retirement age for men? [65]	84%	0.41
(10)	Do you know how to calculate pensions in the AFP? [yes, by balance of individual account and other elements such as age of retirement]	10%	0.37
(11)	Do you know there is a minimum state guaranteed old age pension for people aged 65 and over? [yes/no]	53%	0.42
(12)	Have you heard of the Voluntary Pension Savings system introduced in 2002? [yes/no]	55%	0.58

Note: The PRIDIT financial literacy score is calculated using the 12 financial literacy questions in the 2006 EPS. Column 1 lists the % of people that answered the question correctly; Column 2 provides PRIDIT weights for each question (see Behrman et al. 2010).

ESTIMATION IMPROVEMENTS

Previous research has measured financial literacy by selecting one or two key questions and reporting whether respondents answered each one correctly. With such a rich set of financial literacy measures available in the EPS, however, it is inefficient to limit analysis to a question or two; instead, all information contained in the dozen questions is used. A conventional way to aggregate responses would be to assign one point to each question answered correctly and calculate an overall percentage correct score. This approach has the disadvantage of weighting each question equally and hence does not allow distinctions among questions either in difficulty or information.

A more sophisticated approach to measuring financial literacy employs a weighted scoring mechanism first designed to deal with difficult-to-observe outcomes where indicator variables that proxy for the variable of interest (financial literacy here) are binary or categorical. This technique is used to develop financial literacy scores and highlight which questions are the most informative indicators of financial literacy. The technique first determines which questions are more difficult – ones that few people answer correctly – and then gives more credit to particularly difficult questions.

The second step applies an analysis that evaluates how "informative" a given question is regarding financial literacy relative to other questions. So, hypothetically, if answering question 8 (the legal retirement age of men) correctly means most people tend to answer question 9 (the legal retirement age of women) correctly as well, we would not consider answering question 9 correctly to provide much more information about an individual's financial literacy. However if question 1 tends to be a question that distinguishes answers among people, then question 1 likely captures a different aspect of financial literacy not captured by question 8 and 9. The last column of Table 1 reports weights for each question that are indicative of how "informative" a given question is regarding the underlying latent variable, financial literacy, relative to other questions based on both of these criteria. The 'core' HRS financial literacy questions receive the greatest weight, compared to the other financial literacy questions included in the EPS. Next most informative are the queries on pension system knowledge.

The resulting measures indicate how financially literate an individual is in relation to the population average and to specific questions asked. This score is used to measure financial literacy in the analysis.

EFFECTS OF FINANCIAL LITERACY

The empirical strategy first replicates the sort of analysis found in previous studies by estimating a simple relationship between financial literacy and wealth without accounting for underlying unobserved factors or measurement error. Results for the estimated associations between financial literacy and schooling and the wealth, pension density and retirement planning outcomes may be summarized as follows:

- When schooling is omitted, financial literacy is positively associated with all four wealth measures. It is also positively associated with the density of pension contributions and the retirement planning variable. The estimates are both statistically significant and quantitatively important. In other words, consistent with previous studies, those who are more financially literate are also more likely to have accumulated greater wealth, contributed more frequently to their pension fund, and calculated the money needed for retirement.
- When the relationship between overall schooling attainment and wealth is measured while omitting financial literacy, schooling is also found to be positively and significantly associated with all four wealth measures, the density of pension contributions, and retirement planning.

- To see whether financial literacy is simply capturing the association between schooling and wealth, both schooling and financial literacy are then included in the analysis; the estimated association of financial literacy drops by a quarter for the density of pension contributions, a half for total wealth, and two-thirds for housing wealth. The estimates for schooling also decline, though by less. Nevertheless when accounting for the associations with both schooling and financial literacy, the estimates remain positive, significant and fairly large in magnitude for both. Thus, the results suggest that financial literacy is representing an association separate from schooling and not simply another measure for overall education.

But, as explained, these estimates do not account for unobserved factors or measurement error that could bias the estimated causal impact of financial literacy on wealth. Using IV estimation to account for these potential biases, financial literacy proves to be a powerful determinant of wealth and pension contribution density. Specifically, the IV estimates imply that a 0.2 standard deviation increase in financial literacy would, on average, raise net wealth by $13,800, broken down into about a $5,200 boost in pension wealth, a $1,600 rise in net housing wealth and a gain of $6,900 in other wealth. The same increase in financial literacy would also boost the density of pension contributions by an average of 3 percent and the probability of calculating retirement funds needed by an average of 0.5 percent. In other words, increased financial literacy can have relatively large payoffs in wealth, particularly pension and other wealth, but less so in terms of housing wealth.

IV estimation also finds that schooling has a small and insignificant impact, indicating that it is financial literacy that actually matters, rather than increased general education. Thus, ignoring the effect of financial literacy leads to rather misleading estimates of the impact of schooling on household wealth accumulation.

In summary, prior studies have associated financial literacy and schooling with positive financial outcomes, but they usually do not account for unobserved factors that might shape financial literacy and schooling, as well as wealth outcomes, nor do they account for possible measurement error in financial literacy and schooling. Estimates that isolate the causal effects of financial literacy and schooling on wealth outcomes indicate even stronger effects of financial literacy on wealth than suggested by conventional models, while the opposite is true for schooling. There is no significant positive effects of schooling attainment, conditional on financial literacy, though the effect is positive when interacted with financial literacy. In other words, prior studies that associate financial literacy and schooling but do not account for measurement error or unobserved underlying factors are likely to yield misleading estimates. The results discussed here indicate that financial literacy is at least as important as schooling, if not more so, in explaining variation in household wealth and pension contributions.

DISCUSSION AND IMPLICATIONS

This research contributes to a growing body of knowledge on the factors influencing peoples' behavior and financial security. The finding that financial literacy enhances peoples' likelihood of contributing to their pension saving suggests that this is a valuable pathway by which improved financial literacy can build household net wealth. And households that build up more net wealth, particularly via the pension system, may be better able to smooth consumption in retirement and thus enhance risk-sharing and well-being in old age. These results are relevant for financial education policy since they suggest that enhanced financial literacy can make a significant difference in financial behavior, even after controlling for schooling. Indeed the estimates of the impact of financial literacy imply that investments in financial literacy could well have high payoffs in terms of enhanced household wealth. The results also confirm that some components of financial literacy are important than others in this regard.

REFERENCE

Behrman, Jere R., Olivia S. Mitchell, Cindy Soo, and David Bravo. 2010. "Financial Literacy, Schooling, and Wealth Accumulation." Pension Research Council Working Paper. Wharton School, Univ. of Pennsylvania.

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