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Kris Gerardi of the Atlanta Fed's research department discusses financial literacy and the subprime mortgage crisis in an interview. On frbatlanta.org, select "Podcasts."



The Importance of Financial Literacy

The causes of the subprime mortgage crisis, which led to the worst financial and macroeconomic crisis in the United States since the Great Depression, have been a topic of much research in the academic housing literature. I have contributed to this literature during the past few years, mainly focusing on the effects of the collapse of the housing price bubble. Others have concentrated on the expansion of mortgage credit and especially on the relaxation of underwriting standards by mortgage lenders. One of the areas not receiving as much attention from economic researchers, however, is how the capacity of borrowers to understand basic finance and mathematical concepts may have contributed to the mortgage crisis.

Why should we expect financial literacy or mathematical ability to have an impact on mortgage market outcomes? Because over the past few decades, mortgage credit has been made available to a segment of our population that had traditionally been denied the opportunity to own a home.

The emergence of subprime

Through the subprime mortgage, individuals with little wealth and checkered credit histories were given access to homeownership. In general, these same

people—whom we might expect to have relatively low levels of education and thus low levels of financial literacy—were more likely to take out subprime loans. In addition, the number and complexity of mortgage products available to these borrowers have rapidly expanded during the past decade. To be sure, many of the most complicated mortgage products, like optional-payment adjustable-rate mortgages, interest-only mortgages, and hybrid adjustable-rate mortgages, have existed for a long time. However, for most of their history, they were almost exclusively targeted toward borrowers with good credit histories and stable income prospects who were purchasing homes in the most expensive housing markets.

An emerging body of research literature in economics explores the effects of financial literacy on individual decision making, and empirical studies in this literature have found some alarming effects. For example, the inability to perform simple mathematical calculations correlates with lower levels of saving, less planning for retirement, and poorer comprehension of consumer credit terms. While this finding suggests that researchers might expect to find similar effects in mortgage markets, no direct empirical evidence has been found to date. In an effort to fill this gap

in the literature, I collaborated with two behavioral economists from Switzerland, Lorenz Goette and Stephan Meier, to try to measure the impact of financial literacy and cognitive ability on mortgage repayment behavior.

Surveying the survey

To gather some insight into this issue, we designed and conducted a 20-minute telephone survey of about 350 subprime mortgage borrowers in Connecticut, Massachusetts, and Rhode Island who had obtained their mortgages in 2006 and 2007. We focused on these three states because we had access to detailed administrative data on subprime mortgage characteristics and performance for them. We chose our sample of subprime mortgage borrowers from the data in a random fashion and designed our survey to focus on three broad categories: financial literacy and cognitive ability, demographics and income, and mortgage choice.

Our financial literacy questions included four simple mathematical calculations (an example: In a sale, a shop is selling all items at half price. Before the sale, a sofa costs \$300. How much will it cost in the sale?) and a slightly more complicated question about how interest compounds. In addition, we asked two questions about inflation in an attempt to measure that person's level of economic literacy. We also included a test measuring an individual's cognitive ability: "In the next 90 seconds, name as many animals as you can think of. The time starts now." This exercise is highly correlative with various measures of IQ.

The questions about demographics included information about race, sex, age, marital status, household size, citizenship, language proficiency, and education. We also asked detailed questions about mortgage characteristics for comparison with our administrative data to determine how much borrowers actually know about their mortgages.

Armed with the answers to the math questions and the compounding interest question, we formed what we refer to as a

numerical ability index, which we view as one component of financial literacy. Our administrative mortgage data allowed us to form three different measures of the extent of mortgage delinquency: fraction of payments missed, fraction of months behind on mortgage payments, and whether the lender had initiated foreclosure proceedings. We then measured the correlation between our financial literacy measures and our measures of mortgage delinquency, while controlling for numerous borrower- and mortgage-related variables using information from our survey.

Reading the results

Our estimation shows that borrowers scoring low on the math questions and compounding interest questions were more likely to have a delinquent mortgage or to default. In addition, the estimates are quantitatively important: a full 20 percent of the borrowers in the bottom quartile of the numerical literacy index had experienced foreclosure, compared with only 5 percent of those in the top quartile. Furthermore, borrowers in the bottom quartile of the index were behind on their mortgage payments 25 percent of the time, on average, while those in the top quartile were behind about 10 percent of the time.

The negative correlation appears to be highly specific to the numerical ability questions, as the extent of mortgage delinquency is not correlated with the answers to our economic literacy questions or cognitive ability question. Most surprising to us was the fact that we did not find an important role for the choice of the mortgage product or the choice of other characteristics of the mortgage contract that one might think could explain the correlation between those who are financially literate and those who default on their mortgage. For example, many mortgage market commentators have suggested that financially unsophisticated borrowers were more likely to take on more debt—higher payment-to-income ratios and higher loan-to-value ratios—and to choose (or to be steered toward)

more complicated mortgage products like adjustable-rate mortgages. However, our data did not demonstrate any role for these variables in explaining the strong, negative relationship between financial literacy and mortgage delinquency.

While poor financial literacy in the form of numerical ability may not have much influence on the choice of mortgage characteristics, it may affect mortgage delinquency in a more direct manner by preventing borrowers from performing and understanding the basic calculations necessary to maintain a household budget or to calculate whether or not monthly mortgage payments are affordable over a medium-to-long horizon. This interpretation is consistent with the picture that emerges from survey evidence linking poor financial literacy to higher consumption, less saving, and out-of-control credit usage.

While we believe the results of our study should raise some concerns about the role of financial literacy and mathematical ability in the success of mortgage outcomes and the sustainability of homeownership, we are reluctant to make any broad policy proposals. Since we conducted a survey and are not able to randomize through a controlled experiment, there is always the possibility that some other unobserved factor may be causally responsible for the variation in mortgage delinquency in our data and also correlated with our measure of financial literacy. Further research on this topic is necessary, especially for other segments of the mortgage market and other areas of the country, and we hope our study may provide the motivation for such research to occur. ■