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**Who Should Read This Insight:**
Financial professionals, policymakers, regulators

**Institute Research Agenda Topics:**
Understanding differences in consumer behavior and decision-making

Definitions of **bolded key terms** are at the end of this article.

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**Authors, Titles and Publication Dates of the Articles Addressed in the Insight**

*Sumit Agarwal and Bhashkar Mazumder. 2013. "Cognitive Abilities and Household Financial Decision Making." American Economic Journal: Applied Economics 5(1): 193–207. https://www.aeaweb.org/articles?id=10.1257/app.5.1.193*

*Sumit Agarwal, Souphala Chomsisengphet, and Cheryl Lim. 2017. "What Shapes Consumer Choice and Financial Products? A Review." Annual Review of Financial Economics 9: 127–46. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2875886*

# *Insight:* COGNITIVE ABILITY, IRRELEVANT INFORMATION, AND OTHER CONTRIBUTORS TO FINANCIAL MISTAKES

## IDEAS IN THE INSIGHT YOU CAN PUT INTO ACTION

These two articles outline the possibilities that researchers have explored to understand why consumers make suboptimal financial decisions. The articles find significant support for the hypothesis that cognitive ability, or general intelligence, plays an important role, as does the influence of social networks and other information that might seem to be irrelevant to financial decisions. The authors suggest that financial education often fails to promote better decision-making and that regulatory efforts have not succeeded in consistently improving decision-making, which complicates efforts by the government to help Americans achieve better financial outcomes.

## PRINCIPAL INSIGHTS

People often make financial decisions that consumer finance theory would consider to be suboptimal, with potentially wide-ranging effects on the US economy. While research has shown relationships between financial decision-making and factors such as math ability, financial literacy, age, psychological biases, and social networks individuals use, policymakers and regulators have thus far been unable to translate those findings into consistently effective financial regulation. This Insight describes much of the early research into what causes consumers to make suboptimal financial decisions and how these factors play out in a variety of financial situations.

A growing body of literature has linked financial mistakes to low cognitive ability, finding, for instance, a strong association between lower numerical ability and mortgage delinquency and default during the Great Recession. In "Cognitive Abilities and Household Financial Decision Making," Sumit Agarwal and Bhashkar Mazumder used data on military personnel in 1993—including Armed Forces Qualifying Test (AFQT) scores—and matched administrative data from financial institutions to contribute to this literature base. Those authors find that those with higher AFQT math scores were substantially less likely to make two specific debt-management mistakes: a credit card balance transfer mistake (BTM) and a home equity loan rate-changing mistake (RCM).

The first mistake, a BTM, occurs when consumers transfer their entire credit card balance from an existing account to a new card with a lower annual percentage rate

(APR) for balance transfers but then goes on to use the new card for convenience transactions (transactions they fully pay within the grace period). Since transactions on the new card incur a high APR, and payments on that card pay down the low-interest balance transfer first, a consumer behaving optimally will make all new convenience purchases on the old card until they repay all transferred balances on the new card.

To gauge the effect of cognitive ability on BTMs, the authors used data from a large financial institution on 480 consumers who were members of the US military in 1993. All members of the sample had received balance transfer offers between January 2000 and December 2002 and subsequently transferred their entire balance (exceeding $2,000 on average) from an existing credit card to the new card. The sample was reasonably representative of the general population, with deviations likely related to the younger average age of the sample.

All consumers who failed to identify the optimal **strategy** within the first six months had AFQT percentile scores under 70, and the majority of those with percentile scores under 50 failed to identify the optimal strategy. Using a linear probability model with no controls, the authors estimated that a one standard deviation increase in AFQT score increased the probability that a person identified the optimal strategy within six months by 23 percentage points. The effect increased to 24 percentage points in a model with demographic and financial controls such as FICO scores, income, and balance transfer APRs. The effect was entirely concentrated in the two AFQT math sections (arithmetic reasoning and math knowledge); the two verbal test scores had no effect.

About two-thirds of those identifying the optimal strategy did so immediately (i.e., did not make the BTM to begin with), while the remaining one-third learned the optimal strategy within the first six months. A one standard deviation increase in the AFQT scores was associated with a 1.5-month reduction in the time it took to achieve the optimal behavior.

The second mistake occurs among individuals who apply for a home equity loan or line of credit. The bank provides a pricing schedule to borrowers which shows how the APR for their loan will depend on the loan-to-value ratio (LTV) and asks borrowers to estimate their home's value. The bank separately estimates the value of the home, and if the borrower's estimate differs substantially from the bank's estimate, the bank may penalize the borrower by offering a higher APR than what the initial pricing schedule would have determined based on the bank's estimate of the home value. The authors refer to accepting this loan as a rate-changing mistake (RCM), since borrowers have sufficient information to know proceeding with the loan is suboptimal and could simply reapply for the loan to avoid the penalty.[1]

To evaluate the effect of cognitive ability on RCMs, Agarwal and Mazumder matched a sample of individuals who took out a home equity loan or line of credit from a particular lender between March and December 2002 to their military data set; their result yielded an experimental sample of 1,393 individuals. Members of the sample had higher FICO scores, longer job tenure, higher income, and higher home values and loan amounts, and paid lower APR than the full, pre-matched home loan sample of 75,000.

No sample members with an AFQT percentile score greater than 69 made an RCM; the authors found that a one standard deviation increase in the AFQT score lowered the probability that a borrower made an RCM by 10 to 11 percentage points (a decrease of more than 70 percent). Again, both AFQT math scores had large and significant negative effects on RCM likelihood

1. Before agreeing to the loan, these borrowers receive the full menu of prices (in the absence of a mistake) for each LTV category and their actual offered APR, providing "sufficient information to make them aware of their mistake at the time that they are presented with the APR for the loan and before they agree to the loan" (Agarwal and Mazumder 2017, 199). Penalized borrowers could avoid the penalty by reapplying for a loan from the same lender or a different lender equipped with an accurate estimate of their home value.

(around 5 percentage points each), but the word knowledge score also had an effect of around 3 percentage points. Importantly, the authors found no AFQT effect on APR for consumers who did not make an RCM, implying that cognitive ability affects loan pricing only through that mistake.

While the costs of BTMs are fairly small, RCMs have a clear financial impact. On average, an RCM increases a borrower's APR by 269 basis points, which would cost the borrower nearly $4,000 over the life of a typical loan.

Agarwal and Mazumder proposed two possible explanations for the effect of math ability on financial decision-making. Noting that the ability to be patient is strongly associated with higher AFQT math scores, the authors suggested that patience could explain the result, since the study focused on financial situations with time trade-offs. Alternatively, math ability might be directly influencing consumers' ability to understand financial concepts, analyze trade-offs that occur at different times, and make relevant calculations—three very important aspects of financial decision-making.

In "What Shapes Consumer Choice and Financial Products? A Review," Sumit Agarwal, Souphala Chomsisengphet, and Cheryl Lim reviewed the existing literature on a broader swath of financial decision-making. Delving into the factors that influence financial decisions, the authors highlighted the evidence from Agarwal and Mazumder (2013), and others, on cognitive limitations, while also exploring the impact of social networks and other factors. First, though, the review outlined the ways consumers make suboptimal financial decisions with regard to their credit cards, mortgages, investment and **retirement** decisions, and to their spending and consumption.

- **Credit Cards:** A 2004 study found that consumers preferred an introductory offer with a 4.9 percent interest rate for six months over an offer with a 7.9 percent interest rate over 12 months, even though they continued using the card after six months elapsed, making the latter offer better. A 2015 study found that around 40 percent of consumers faced with the choice between two credit card contracts—one with an annual fee but lower interest rate and another with no annual fee but a higher interest rate—chose the costlier **option** of the no-annual-fee card with a higher rate, with some households incurring hundreds of dollars of charges they could easily have avoided. A 2009 study found that most consumers taking out payday loans did so with substantial unused credit card liquidity, the interest rate for which is substantially less than payday loan rates. Relatedly, a 2002 study found that US households tend to hold credit card debt and liquid assets, such as cash in a savings account, simultaneously even though **returns** on a savings account are generally much lower than credit card debt interest. A 1991 study found that consumers are more likely to be attracted to a credit card's teaser interest rates and to disregard or overlook the rates that will come into play after the initial period.

- **Mortgages:** Studies in 2003 and 2015 found that borrowers care more about current and short-term interest rates than about the lifetime cost of a loan, resulting in the **spread** between a fixed-rate mortgage (FRM) and adjustable-rate mortgage (ARM); this spread has an outsized impact on the decision between the two options. Multiple studies also document suboptimal refinancing behavior, with one 2016 study estimating that 59 percent of borrowers refinance their mortgages suboptimally: 52 percent choose a suboptimal rate, 17 percent wait too long to refinance, and 10 percent make both rate and timing mistakes. A separate 2016 study found that around 20 percent of financially unconstrained households for whom refinancing was optimal had not done so, resulting in lost savings of a discounted present value of $11,500 per borrower.

- **Investment and Retirement Decisions:** Multiple studies demonstrate that automatic enrollment significantly increases saving within retirement accounts. A 2011 study of employees at seven companies found that 36 percent of employees older than 59.5 who were vested in their employer's 401(k) match and able to make penalty-free withdrawals for any reason, without a **withdrawal fee**, contributed less than the employer matching contribution threshold. This failure to access all possible employer matching contributions meant that the employees were forgoing profits that averaged 1.6 percent of their annual pay ($507). A survey educating employees about this mistake did not significantly increase contribution rates. Other research has shown that investors frequently fail to identify higher-tax assets such as bonds in tax-deferred accounts, and lower-tax assets such as equities in taxable accounts. As a result, their portfolios pay more taxes than they need to. A 2017 analysis of 11 companies found no significant reduction in total 401(k) contributions rates following the introduction of a Roth 401(k). This finding implies that simply adding a Roth 401(k) option led to lower take-home pay and increased retirement saving.

- **Spending and Consumption:** A variety of studies have associated increased consumer spending and lower savings rates with increased access to or use of credit cards, or with better mortgage or mortgage refinance terms. Many studies have also shown that positive income shocks temporarily increase consumption, and a 2015 study showed that even predictable monthly lump-sum payments led to temporarily higher consumption. Relatedly, a 2006 study found that, contrary to basic rational expectations hypotheses, household consumption is excessively sensitive to the receipt of paychecks even when the timing and amount of those paychecks are predictable.

Agarwal, Chomsisengphet, and Lim (2017) also summarized the existing research into what factors play into financial decision-making, dedicating much of that summary to cognitive ability and financial literacy. As Agarwal and Mazumder (2013) showed, a lack of general math aptitude is associated with suboptimal financial decisions, but so too is age, with multiple studies suggesting that aging improves financial decision-making until a person's mid-50s, at which point cognitive declines begin to offset the positive effects of life experience.

More broadly, many consumers simply lack financial literacy—both the specific knowledge about financial products and options as well as the more general ability to work with numbers that is required to understand financial concepts—and are thus ill prepared to meet their financial goals. Moreover, a 2014 meta-analysis of the relationship of financial literacy and of financial education to financial behaviors found that interventions to improve financial literacy have economically insignificant effects, suggesting that just-in-time financial education to promote specific outcomes would be more effective than more generic forms of financial education.

Research has also shown that social networks can play an important role in financial decision-making. Multiple studies on a variety of different contexts have shown that financial information travels through social networks and influences decisions such as whether to invest and, if so, in what to invest; and whether to use tax-deferred accounts. These social network effects are most pronounced among the least financially literate.

Finally, Agarwal, Chomsisengphet, and Lim explored how the design and marketing of financial products affects consumer financial decision-making and the consequences—both intended and unintended—of regulation. Research has shown, for instance, that aggressive prospecting for and marketing of loans results in worse consumer outcomes including more-expensive mortgages and higher rates of default. The extent and impacts of such predatory lending practices, however, are difficult to quantify.

Still, research indicates this problem is widespread, suggesting a role for regulation. Unfortunately, because it is not clear what causes consumers to make suboptimal financial decisions, the efficacy of government action is constrained. One study found that regulatory limits on credit card fees enacted in 2009 reduced overall borrowing costs by an annualized 1.6 percent of average daily balances, with savings of more than 5.3 percent for consumers with FICO scores below 660, and no evidence of an offsetting increase in interest charges or a reduction in the volume of credit. But a different provision of that same legislation had virtually no impact on repayment behavior: that provision requires credit card lenders to disclose information about the interest savings that could be achieved if the credit card holders were to pay off balances in 36 months rather than making minimum payments.

As the hit-or-miss results from regulatory efforts such as these illustrate, government entities need further research, experiments, and pilot programs to show the path toward rules and laws that will achieve those policies' intended outcomes.

**KEY TERMS** *indicated at first use with bold font*

**option:** A feature that can provide benefits or protection to you or your beneficiaries at an additional cost.

**retirement:** Where you are in terms of your financial priorities and needs; for instance, growing your money or drawing from your money later in life.

**return:** The change in the value of a portfolio over an evaluation period, including any distributions made from the portfolio during that period.

**spread:** An index crediting method where a pre-determined rate is subtracted from any percentage increase in the underlying index and the annuity is credited the difference.

**strategy:** What you use to pursue your specific financial goal.

**withdrawal fee:** An amount you pay if you withdraw a certain amount of money from your annuity before the end of a set time period. For example, your annuity may allow you to withdraw up to 10% of your income base within a period of time. If you withdraw more than 10% during this time, you would be charged a fee.

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