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# The Determinants of Individual Saving and Investment Outcomes

Brigitte C. Madrian\*

Over the past 30 years, employer provided defined contribution (DC) savings plan largely have displaced traditional defined benefit (DB) pensions in the private sector. In 1975, there were 2.4 active defined benefit plan participants for each participant in a private sector defined contribution savings plan. By 2007, these proportions had almost reversed, with 3.4 active defined contribution savings plan participants for each defined benefit plan participant. As this shift puts more and more individuals in the position of having to self-manage the process of saving for retirement, a natural question is just how well are individuals doing, and what factors affect their retirement saving outcomes. My research over the past several years has tried to address these broad questions.

## Institutional Features and Savings Outcomes

Much of my recent research evaluates the effects of different institutional features on individual savings and investing outcomes. One example of such a feature is the default—that is, what happens if an individual does nothing? As an example, in a typical employer-sponsored savings plan, individuals are only enrolled if they *actively* elect to join the plan: the default is non-participation. Some companies, however, have a different default—they automatically enroll employees in their savings plan unless employees actively opt-out.

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My research with several different collaborators, most notably David Laibson, James Choi, Andrew Metrick, and John Beshears, shows that changes in the nature of savings plan defaults have a tremendous impact on realized outcomes. We examine savings plan participation rates for employees hired before and after several firms instituted automatic enrollment and find that participation is substantially higher under automatic enrollment.<sup>1</sup> One concern with automatic enrollment is that it may “coerce” employees into savings plan participation. If so, we would expect that many participants under automatic enrollment should eventually opt out of the savings plan. But we observe very low attrition rates under either an opt-in or an opt-out participation regime. High participation rates and low attrition rates under automatic enrollment suggest that most employees do not object to saving for retirement. In the absence of automatic enrollment, however, many simply delay joining their savings plan.

Interestingly, the impact of automatic enrollment on savings plan participation is not very dependent on the existence or generosity of an employer match.<sup>2</sup> This finding is significant because many extensions of automatic enrollment (for example, the recently adopted KiwiSaver program in New Zealand, or the Automatic IRA proposals in the United States) do not require an employer match but nonetheless allow individuals to opt out.

Automatic enrollment also affects savings plan contribution rates and asset allocations. In an opt-in regime, employees must choose a contribution rate and asset allocation when they enroll. Under automatic enrollment, the company specifies a default con-

tribution rate and asset allocation for employees who don't actively choose otherwise. In companies without automatic enrollment, the modal contribution rate tends to be the match threshold (the contribution rate at which employees receive the full employer match). In contrast, the modal contribution rate of participants hired under automatic enrollment is the automatic enrollment default chosen by the company (initial defaults of 2 percent or 3 percent of pay, usually below the match threshold, are typical). This shift in the modal contribution rate is driven not only by the increased participation generated by automatic enrollment (which moves people from zero to a positive contribution rate), but also by individuals who would have otherwise contributed at a higher rate but who instead remain at the automatic enrollment default.

Similar patterns hold with respect to asset allocation. A large fraction of savings plan participants stick with the employer-chosen default asset allocation under automatic enrollment, even when the default is an allocation that very few savings plan participants actively elected prior to automatic enrollment. Asset allocation defaults also matter outside the context of automatic enrollment; in companies that direct matching contributions to employer stock, very few employees actively change their allocation ex post, even when they have the ability to do so.<sup>3</sup>

Why do defaults have such a persistent effect on outcomes? One explanation is that the default is perceived as an endorsement of a particular outcome. There is some evidence consistent with this notion.<sup>4</sup> First, savings plan participants who were themselves not affected by automatic enrollment

are more likely to have an asset allocation that mirrors the automatic enrollment default in effect for more recently hired employee cohorts if they themselves did not elect savings plan participation until after automatic enrollment was adopted. Second, savings plan participants who were subject to automatic enrollment but who take action to move away from the automatic enrollment default have asset allocation outcomes that are closer to the default portfolio than do participants not affected by automatic enrollment—that is, their movement away from the default is complete.

A second explanation for the persistence of defaults is that opting-out of a default may be cognitively difficult. For example, initiating savings plan participation in the absence of automatic enrollment is a complicated choice that involves electing both a contribution rate and an asset allocation. Automatic enrollment simplifies this decision by decoupling participation from these other ancillary choices. Evidence that such complexity matters comes from two recent papers that evaluate a low-cost manipulation called “Quick Enrollment”. This intervention reduces the complexity of savings plan enrollment by allowing employees to elect participation at a contribution rate and asset allocation pre-selected by their employer.<sup>5</sup> At one company studied, Quick Enrollment tripled participation among new hires relative to a standard opt-in regime. When Quick Enrollment was made available to previously hired employees who were not participating in their savings plan at two different firms, the subsequent enrollment rates of these non-participants increased by 12 to 25 percentage points relative to what would have been predicted in the absence of the intervention.

In many settings, it is hard to avoid having a default outcome. One alternative, however, is to require individuals to make an active choice for themselves—an “active decision.” In the context of employer-sponsored savings

plans, such an approach also influences outcomes relative to the typical norm of non-participation. For example, research on a company that changed its savings plan enrollment regime from one that required employees to fill out a form either *affirmatively* electing or *affirmatively* rejecting savings plan participation to a “standard enrollment” (for example opt-in) regime finds that savings plan participation three months after hire declined from approximately 70 percent (when an active decision was required) to approximately 40 percent (when no active decision was required).<sup>6</sup>

Requiring an active decision has an impact on asset allocation outcomes as well. In a recent paper, Choi, Laibson, and I<sup>7</sup> study a company at which employer matching contributions were originally made in the form of employer stock, but with no restrictions on subsequent diversification. At some point, the firm decided to require employees instead to explicitly choose their own asset allocation for matching contributions upon enrollment in the plan (this allocation could differ from that chosen for employees’ own contributions). Because there were no constraints on trading out of employer stock before this active decision was required, savings plan participants could effect the same asset allocation for matching contributions under either regime. In practice, however, very few participants in the initial matching regime ever actively reallocated their match balances; in contrast, under the active decision regime, participants tended to choose an asset allocation for their matching contributions that largely mirrored that chosen for their own contributions, and overall exposure to employer stock fell dramatically as a result. In addition to highlighting the difference in outcomes that occurs under a default versus an active-decision-making regime, the results in this paper also suggest that individuals engage in mental accounting and narrow framing when making their asset allocation choices.

Compared to the effects of the different approaches to savings plan enrollment discussed above, standard economic incentives have a surprisingly *weak* impact on savings plan participation. Having an employer match *does* increase participation in a savings plan, but many eligible employees still fail to sign up in the absence of automatic enrollment even with such a match.<sup>8</sup> Choi, Laibson, and I examine a group of workers who face particularly strong financial incentives for savings plan participation: employees over the age of 59 ½ who are vested, who have an employer match, and who, by virtue of their age, can make unrestricted savings plan withdrawals with no tax penalty. Even for this group, we find that a sizeable fraction (20 percent to 60 percent in the seven firms we study) fail to fully exploit the employer match, either by not participating in the savings plan or by contributing less than the match threshold. We conclude that employer matching is less effective at increasing savings plan participation than other institutional approaches, such as automatic enrollment or requiring an active decision.

An employer match has its most significant effect on the *distribution* of contribution rates rather than on participation. Savings plan contribution rates are heavily influenced by the employer-chosen match threshold.<sup>9</sup> For example, in one firm that increased its match threshold from 5–6 percent of pay to 7–8 percent of pay, the fraction of new participants choosing to save 7–8 percent increased from 8 to 33 percent of participants, whereas the fraction of new participants choosing to save 5–6 percent of pay decreased from 43 to 19 percent.

## Information Provision and Savings Outcomes

Information provision and education also can be useful in influencing individual behavior, and the savings domain is no exception. In a series of papers with different collaborators, I

examine the impact of information on savings and investment outcomes. These papers find that information provision alone is often not very effective, and that sometimes individuals can respond to information in perverse ways.

In an analysis with Choi, Laibson, and Andrew Metrick of an employer-sponsored financial education initiative, we find that compared to non-attendees, employees who attend financial education seminars are more likely to sign up for their employer's savings plan, to increase their contribution rate, and to make changes to their asset allocation.<sup>10</sup> The magnitude of these effects, however, is small, both in an absolute sense, and compared to employees' intentions regarding their future behavior after attending the seminars.

In another study, Choi, Laibson, and I study the impact of information provision from the news media using a natural experiment: the media barrage on the risk of being over-invested in employer stock that followed the corporate accounting scandals and stock market decline of 2000–1 (and which has become relevant once again following the more recent market decline).<sup>11</sup> Three companies received particular attention over that time period: Enron, WorldCom, and Global Crossing. For example, the *New York Times* ran 1,364 stories on Enron during the last quarter of 2001 and the first quarter of 2002, of which 112 ran on the front page. We show that employer stock holdings in other companies' savings plans fell by only a small amount as a result of the newsmedia. Even in Houston — Enron's headquarters — where the *Houston Chronicle* ran 1,122 stories on Enron in the six months surrounding the firm's collapse, employees at other companies did not diversify their employer stock holdings. These results are consistent with individual inertia (as described above), and also with a mistaken perception on the part of individuals that their employer's stock is less risky other equity investments.

Investment prospectuses are another source of information for individual investors. In an investing experiment, Choi, Laibson, and I evaluate the impact of information salience on investment outcomes.<sup>12</sup> Subjects were asked to allocate a hypothetical \$10,000 across four S&P 500 index funds. Subjects were randomized across three information conditions: prospectuses only (control), prospectus plus a short summary of the fees charged by the mutual funds, or prospectus plus a short statement of the returns since inception attained by the mutual funds. The two treatment conditions reduce information gathering costs and increase the salience of either fees or returns since inception, because both of these variables are reported in the prospectus. Subject payments were tied to the actual performance of the chosen portfolio. Because payments were made by the *experimenters*, services like financial advice were effectively unbundled from portfolio returns. And, because all of the mutual funds in the choice set had the same objective, that is to mimic the returns of the S&P 500 index, the surest way to maximize returns was to choose the fund with the lowest fees. We find that subjects overwhelmingly failed to minimize index fund fees. When fees were made salient, average portfolio fees fell, but most subjects still did not minimize fees. In contrast, when returns since *inception* (an irrelevant statistic when comparing index funds with different inception dates) were made salient, subjects chased these returns. Overall, we find small effects from the salience manipulations in this experiment, although we find these effects both for information that should normatively matter, and for information that should not.

In a related experiment, Beshears and I evaluate the effect of providing investors with a traditional investment prospectus relative to the simpler and shorter summary prospectus recently approved by the SEC.<sup>13</sup> We find that the Summary Prospectus

does not meaningfully alter subjects' investment choices relative to the longer prospectus. Average portfolio fees and past returns are similar regardless of the type of prospectus participants received. We find some weak evidence, however, that providing the Summary Prospectus makes subjects feel more confident about their portfolio choices.

And in a very recent paper, the four of us and co-author Katherine Milkman evaluate the effect of providing individuals with information on their coworkers' behavior in an employer-sponsored savings plan. We find conflicting evidence on the impact of receiving peer information. For one sub-group of workers — non-unionized non-participants — peer information increases the likelihood of subsequent savings plan enrollment. But for another sub-group of workers — unionized non-participants — we find that peer information actually reduces subsequent enrollment. The effects of so-called social norms marketing are not as predictable as some of the previous literature has suggested.<sup>14</sup>

## Market Experience and Savings Outcomes

Finally, Choi, Laibson, Metrick, and I examine the impact of previous market experience on savings outcomes. In one paper, we study the relationship between employee allocations to employer stock and past employer stock returns. We find that high past returns induce participants to allocate more of their contributions to their employer's stock.<sup>15</sup> In a second paper, we show that past returns not only impact asset allocation, but also individual savings rates.<sup>16</sup> High unpredictable and idiosyncratic lagged equity returns in an individual's portfolio predict subsequent savings rate *increases*. This contradicts the relationship predicted by standard economic theory, but can be explained by extrapolative beliefs. When investors experience high *past* returns, they forecast



high future returns. This will lead to increased savings if their elasticity of intertemporal substitution is greater than one.

<sup>1</sup> B.C. Madrian and D. Shea, "The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior", NBER Working Paper No. 7682, May 2000, and *Quarterly Journal of Economics*, 2001, 116: pp.1149–87; J. J. Choi, D. Laibson, B.C. Madrian, and A. Metrick, "For Better or for Worse: Default Effects and 401(k) Savings Behavior", NBER Working Paper No. 8651, December 2001, and in *Perspectives on the Economics of Aging*, D. A. Wise, ed., Chicago, IL: University of Chicago Press, 2004, pp. 81–121; J. Beshears, J. J. Choi, D. Laibson, and B.C. Madrian, "The Importance of Default Options for Retirement Savings Outcomes: Evidence from the United States," NBER Working Paper No. 12009, February 2006, and in *Lessons from Pension Reform in the Americas*, S. J. Kay and T. Sinha, eds., New York, NY: Oxford University Press, 2008, pp. 59–87.

<sup>2</sup> J. Beshears, J. J. Choi, D. Laibson, and B.C. Madrian, "The Impact of Employer Matching on Savings Plan Participation Under Automatic Enrollment," NBER Working Paper No. 13352, August 2007, and in *Research Findings in the Economics of Aging*, D. A. Wise, ed., Chicago, IL: University of Chicago Press, 2010, pp. 311–327.

<sup>3</sup> J. J. Choi, D. Laibson, and B.C. Madrian, "Are Empowerment and Education Enough? Underdiversification in 401(k) Plans," *Brookings Papers on Economic Activity*, 2:2005, pp. 151–198; J. J. Choi, D. Laibson, and B.C. Madrian, "Mental Accounting in Portfolio Choice: Evidence from a Flypaper Effect," NBER Working Paper No. 13656, November 2007, and *American Economic Review*, 99(5), (2009), pp. 2085–95.

<sup>4</sup> B.C. Madrian and D. Shea, "The Power of Suggestion: Inertia in 401(k)

Participation and Savings Behavior", *op. cit.*; J. J. Choi, D. Laibson, B.C. Madrian, and A. Metrick, "For Better or for Worse: Default Effects and 401(k) Savings Behavior", *op. cit.*; J. Beshears, J. J. Choi, D. Laibson and B.C. Madrian, "The Importance of Default Options for Retirement Savings Outcomes: Evidence from the United States," *op. cit.*

<sup>5</sup> J. J. Choi, D. Laibson, and B.C. Madrian, "Reducing the Complexity Costs of 401(k) Participation Through Quick Enrollment," NBER Working Paper No. 11979, January 2006, and in *Developments in the Economics of Aging*, D. A. Wise, ed., Chicago, IL: University of Chicago Press, 2009, pp. 57–82; J. Beshears, J. J. Choi, D. Laibson, and B.C. Madrian, "Simplification and Saving," NBER Working Paper No. 12659, October 2006.

<sup>6</sup> G. Carroll, J. J. Choi, D. Laibson, B.C. Madrian, and A. Metrick "Optimal Defaults and Active Decisions: Theory and Evidence from 401(k) Saving," NBER Working Paper No. 11074, January 2005, and *Quarterly Journal of Economics*, 124(4), (2009), pp. 1639–74.

<sup>7</sup> J. J. Choi, D. Laibson, and B.C. Madrian, "Mental Accounting in Portfolio Choice: Evidence from a Flypaper Effect," *op. cit.*

<sup>8</sup> For evidence on the impact of the employer matching and savings plan participation in 401(k)-like savings plans, see J. J. Choi, D. Laibson, B.C. Madrian, and A. Metrick, "Defined Contribution Pensions: Plan Rules, Participant Decisions, and the Path of Least Resistance," NBER Working Paper No. 8655, December 2001, in *Tax Policy and the Economy*, Vol. 16, J. M. Poterba, ed., Cambridge, MA: MIT Press, 2002, pp. 67–113; J. J. Choi, D. Laibson, and B.C. Madrian, "\$100 Bills on the Sidewalk: Violations of No-Arbitrage in 401(k) Accounts," NBER Working Paper No. 11554, August 2005, and forthcoming in *The Review of Economics and Statistics*; and J. Beshears, J. J. Choi, D. Laibson, and B.C. Madrian, "The Impact

of Employer Matching on Savings Plan Participation Under Automatic Enrollment," NBER Working Paper No. 13352, August 2007, and in *Research Findings in the Economics of Aging*, D. A. Wise, ed., Chicago, IL: University of Chicago Press, 2010, pp. 311–327. Also, in G. Engelhardt and B.C. Madrian, "Employee Stock Purchase Plans," NBER Working Paper No. 10421, April 2004, and *National Tax Journal*, 57(2), 2004, pp. 385–406, we document very high levels of non-participation in employer stock purchase plans, despite the fact that the financial benefits available from participation in these plans are often non-trivial as well.

<sup>9</sup> J. J. Choi, D. Laibson, B.C. Madrian, and A. Metrick, "Defined Contribution Pensions: Plan Rules, Participant Decisions, and the Path of Least Resistance," *op. cit.*

<sup>10</sup> *Ibid.*

<sup>11</sup> J. J. Choi, D. Laibson, and B.C. Madrian, "Are Empowerment and Education Enough? Underdiversification in 401(k) Plans," *Brookings Papers on Economic Activity*, 2 (2005), pp. 151–98.

<sup>12</sup> J. J. Choi, D. Laibson, and B.C. Madrian, "Why Does the Law of One Price Fail? An Experiment on Index Mutual Funds," NBER Working Paper No. 12261, May 2006, and in *Review of Financial Studies*, 23(4), (2010), pp.1405–32.

<sup>13</sup> J. Beshears, J. J. Choi, D. Laibson, and B.C. Madrian, "How Does Simplified Disclosure Affect Individuals' Mutual Fund Choices?," NBER Working Paper No. 14859, April 2009, and forthcoming in *Explorations in the Economics of Aging*, D. A. Wise, ed., University of Chicago Press.

<sup>14</sup> J. Beshears, J. J. Choi, D. Laibson, B.C. Madrian, and K. Milkman, "The Effect of Providing Peer Information on Retirement Savings Outcomes."

<sup>15</sup> J. J. Choi, D. Laibson, B.C. Madrian, and A. Metrick "Employees' Investment Decisions About Company Stock," NBER Working Paper No. 10228, January 2004, and in *Pension Design and Structure*, O. S. Mitchell

and S. P. Utkus, eds., *New York, NY: Oxford University Press, 2004, pp. 121–36.*

<sup>16</sup> J. J. Choi, D. Laibson, B.C. Madrian, and A. Metrick, “Reinforcement Learning and Savings

*Behavior,” Journal of Finance, 64(6), (2009), pp. 2515–34.*

## Trends in Time Use in Twentieth Century America

Valerie A. Ramey\*

In his 1930 essay “Economic Possibilities for Our Grandchildren,” John Maynard Keynes looked beyond the pessimism surrounding the Great Depression and predicted that rapid productivity growth would result in abundant leisure and freedom from most economic needs within a hundred years.<sup>1</sup> He speculated that the little work left to do would be shared as widely as possible, so that each person could spend about fifteen hours per week doing a few meaningful tasks.

Keynes was not alone in his belief that a new era of rising leisure was beginning. As of the 1930s, the standard factory workweek had declined significantly over the previous hundred years, appliances were reducing the drudgery of housework, and the high unemployment rates of the Great Depression had led to “forced leisure.” Numerous scholarly articles during the 1930s examined various aspects of leisure, from teaching children how to use leisure time wisely to a variety of time diary studies that recorded how individuals used their leisure.

The extent to which societies respond to productivity growth by increasing their leisure time is fundamental to numerous economic questions. For example, the size of the response affects the foundations of growth models, assessments of standards of living,

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and forecasts of long-term labor supply behavior.

U.S. labor productivity rose eight-fold during the twentieth century. Did leisure time rise significantly in response? To answer this question, I gather detailed data on the main uses of time by major segments of the population during the twentieth century. Although there have been numerous studies of time use and hours of work conducted during the early twentieth century, most of them were focused on a particular segment of the population. Thus, the main challenge of my research was to understand the particular context of each of the earlier studies and then to combine the pieces into a mosaic that would reveal patterns in time use for the general population.

In “Time Spent in Home Production in the Twentieth Century United States: New Estimates from Old Data,” I compile information from virtually every time-use study conducted from 1912 to the present in order to estimate trends in time spent on “home production”—that is, unpaid household tasks, such as cooking, cleaning, laundry, and taking care of children.<sup>2</sup> Almost all of the studies use detailed time diaries. While most sample only a few hundred people, together they cover thousands of individuals across the United States. The most detailed data are for farmwives and housewives, but some of the studies also surveyed employed women, men, and children. Others compared time use across racial groups. Although the individual-level data no longer exist,

some of the early studies reported very detailed tabulations by characteristics, which I was able to use in cell-based regressions. I then used these estimates to make the averages more nationally representative and linked them to the available micro data from 1965 on.

I find that time spent in home production by housewives fell by only a few hours between 1900 and 1965, confirming earlier results by sociologists.<sup>3</sup> For all prime-age women, time spent in home production fell by only six hours per week from 1900 to 1965, but by an additional twelve hours between 1965 and 2005, with most of that decrease occurring between 1965 and 1975. These results are surprising because the main diffusion of appliances occurred before 1965, not after. Moreover, much of the decrease in time spent by women from 1900 to 2005 was countered by an increase in time spent by men.

Including all age groups, I find that average time spent in home production actually rose slightly over the century. The absence of a decline in the population overall was in part due to the decrease in the share of children (who do little home production), the increase in the share of the retired elderly (who do more home production than the employed), and the loss of economies of scale as households got smaller.

Interestingly, time spent in home production by prime-age individuals did not decrease after the mid-1970s, although the composition of tasks changed significantly. In particular, as Mark Aguiar and Erik Hurst demon-