

## Complexity and sophistication

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As financial instruments proliferate, consumers need to make saving, credit, and insurance choices in an increasingly complex environment. Adding options should improve wellbeing, but the additional complexity likely makes optimisation more difficult, and may thus reduce the quality of financial decisions.

These pitfalls of complexity might be avoided at low cost, however, if individuals are sophisticated and know when they should choose simple options rather than solve complex problems. If, for example, a worker knows he will struggle to make a good choice from the whole set of retirement saving rates and plans, and if he feels confident that his firm's default rate and portfolio are close to optimal, then he can accept the default and avoid both the costs of considering all his options, and the risk of making a badly suboptimal choice.

To test the effects of complexity on financial choices and to evaluate the sophistication of individuals to know when they are better off taking a simple option instead of solving a complex problem, 700 US participants with diverse socio-economic characteristics were each asked to make 25 incentivised investment portfolio choices. The complexity of the investment problems was randomly assigned, and determined by the number of assets in which the participant could invest. Importantly, as the number of assets changed, the real investment opportunities did not. The additional assets did not replicate those in the simple problem, but they were redundant – any distribution of payoffs that was feasible in a simple problem was also feasible in a complex problem, and vice versa. We therefore interpret the treatment as isolating the influence of complexity separate from other, more or less standard effects of adding options to an opportunity set.

Participants were also randomly assigned the opportunity to take a deterministic outside option rather than make an active portfolio choice. The payoff from the outside option varied randomly and was sometimes greater than the payoff associated with a "risk-free portfolio" in the investment problem – that is, an asset allocation with a deterministic return. These outside options are meant to capture investment opportunities, such as default saving rates and portfolios, target-date retirement saving plans, or age-based college saving plans, that require less consideration or management on the part of the individual, but may not be well-tailored to her particular objectives.

The results show that, when they are required to make an active portfolio decision, respondents spend on average much more time on complex problems and choose allocations with moderately lower expected returns and lower risk. We also tested whether these effects of complexity on choices are due to changes in well-behaved preferences or

instead due to a decline in decision-making quality. We found that several normatively desirable properties of choice are eroded by complexity.

Complexity has substantial, and varied effects on the decision to opt out of a portfolio choice. When offered the opportunity to take a deterministic outside option rather than make an active portfolio choice, participants opt out 22% of the time. This decision to avoid the portfolio is correlated in expected ways with the relative value of the outside option – but, on average, is uncorrelated with the complexity of the problem. This average relationship between complexity and avoidance masks heterogeneity, however. Those with the lowest levels of numeracy, financial literacy, and consistency with utility maximisation in another experiment (financial decision-making skills) avoid the portfolio choice more often, even when it is simple, and are much more likely to avoid the problem when it is complex.

Given the time participants spent solving complex portfolio problems and the lower returns they achieved, the decision to avoid them may be sophisticated, especially for those with the fewest financial decision-making skills. Those who take the outside option may know they are better off by avoiding the costs of contemplating a complex portfolio problem and the risk of making a badly misguided choice.

To the contrary, however, the results show that taking the outside option has an importantly negative effect on expected payoff, that this effect is especially large for those with the fewest decision-making skills, and that opting out does not help these participants avoid suboptimal choices in the complex portfolio problem. When they had the option to avoid the portfolio problem, on average, participants' choices roughly tripled the expected payoff penalty associated with complexity. This penalty associated with avoiding complexity is especially large among those with the least decision-making skills. When they have the option to avoid complexity, their expected payoff decline by more than 20%. Importantly, these declines in expected payoffs are almost exclusively due to the choice to opt out, and not to any effects of having the option (and not taking it) on actual portfolio choices. Moreover, those with the least decision-making skills more often violated basic notions of consistency in their choices of when to avoid complexity – they thus revealed less ability to identify when even simple options are good choices.



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