Time discounting, Risk Preferences, Cognitive Ability, and Cancer Screening Uptake: Evidence from the English Longitudinal Study of Ageing

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Extended Abstract (citations excluded but available) version Jan 8th 2025

Background

Cancer screening programmes play a crucial role in early detection and improved outcomes. Economists have long been interested in the role of time and risk preferences for a range of decisions, including engaging in health behaviours to prevent or limit the consequence of serious illnesses. The socially perceived nature of cancer and its high health burden make the decision to participate to screening programmes a particularly interesting one to study. The evidence in support of population-wide screening programmes varies deepening on the screening modality and cancer targeted. I focus on two tumor types: breast and colorectal cancers. Colorectal cancer screening using fecal occult blood tests or - more recently – fecal immunochemical tests (followed by further confirmatory tests) has been found to provide modest reductions in mortality with limited adverse effects. On the other hand, the evidence in support of mammography as a screening test for breast cancer is much less clear, with evidence of overdiagnosis and overtreatment. Besides time discounting of costs and benefits and risk preferences, screening uptake decisions should crucially depend upon available information on the cost-benefit profile of the test. However, this is contingent on the individuals' ability to understand the trade-offs involved. Interestingly, the NHS-run screening programmes for colorectal and breast cancer are both very popular and similar uptake rates (between 64 and 68%).

Objective

This paper uses data from the English Longitudinal Study of Ageing (ELSA) to investigate the joint influences of time discounting and risk preferences on participation decisions for colorectal and breast cancer screening of survey participants aged 50 or older in England. I also leverage experimental questions from ELSA to explore whether time and risk preferences are domain agnostic, contrasting analyses based on questions that measure general, financial and health-specific risk aversion and time discounting rates. Finally, I examine the mediating role of cognitive abilities on balancing risks and benefits of in the presence of organized population.

Theoretical Framework

The study is couched in established economic theories of decision-making under uncertainty. Time preferences, such as present bias and future discounting, significantly impact health behaviors with delayed benefits. Risk preferences, including risk aversion and risk-seeking tendencies, influence how individuals perceive and weigh the potential benefits and harms associated with screening procedures. Cognitive abilities are crucial for individuals to understand the benefits and costs underpinning the decision to participate to the screening programme. I hypothesize that individuals with stronger present bias and higher levels of risk aversion are less likely to participate in screening. In the two cases analysed (colorectal and breast cancer), the risk-benefit profiles of the screening programmes should imply that individuals with higher cognitive abilities are more likely to participate to colorectal cancer screening, and less likely to participate to breast cancer screening.

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Data

I employ data on about 5,000 individuals surveyed by the English Longitudinal Study of Ageing (ELSA). ELSA collects data from people aged over 50 to understand all aspects of ageing in England. Alongside a wealth of individual characteristics, ELSA's wave 8 (collected between 2016 and 2017) included a set of experimental (self-assessed) questions that explored time and risk preferences across different domains. These questions were tested as simpler alternatives to running expensive rewarded games with a small sample of respondents to assess their time and risk preferences. Waves 7 to 9 also include detailed questions on cancer screening participations. Cognitive function is measured by combining scores from numerical-based tests and recall tasks.

Empirical Strategy

In the preliminary version of this work, I use Probit models on the cross-section of ELSA participants in wave 8 to explore the influence of time discounting and risk attitudes on the probability of participating to colorectal and breast cancer screening. I then test whether cognitive abilities mediate the role of time and risk preferences by estimating an interacted model. I focus on sub-populations eligible for the two well-established and popular population-wide screening programmes for colorectal and breast cancer in England, both run universally by the National Health Service. In 2016/2017, the colorectal cancer screening programme invited all individuals registered with a GP aged 60 to 74. During the same period, the breast cancer screening programme invited all women aged 50 to 71. In the next iteration of this work, I will strengthen the analysis in three ways. Firstly, I will explore a dynamic setting looking at individual decisions over time in a panel setting. Secondly, I will explore household decision-making by linking partners' decisions. Thirdly, I will assess the role of bias due to unobserved confounding instrumenting time discounting and risk aversion with health shocks amongst family members. Throughout all analyses, I condition on a comprehensive set of sociodemographic, socioeconomic, and health-related covariates. Standard errors are

Preliminary findings

Firstly, screening participation decisions only respond to health-specific time and risk preferences, and not to preferences framed in generic or financial settings.

Secondly, the estimated coefficients are aligned with theoretical predictions.

- For colorectal cancer screening, patience and risk tolerance coefficients are positive and significant. A one-SD increase in either the time discounting or the risk preference scales results in about 1.35 percentage points higher probability of screening uptake. Cognitive abilities independently and significantly increase screening uptake.
- For breast cancer screening, patience is not related to screening participation, whilst risk tolerance increases participation by about 1.3 percentage points for a one-SD increase in the risk preferences scale. Cognitive abilities do not mediate the role of time and risk preferences. However, contrary to colorectal cancer, the estimated coefficient for cognitive abilities is null.

Conclusion

The findings suggest that English men and women over 50 as rational agents when deciding on cancer screening participation. The results confirm predictions of simple expected utility theory in relation to the role of time and risk preferences. The findings are also consistent with the idea that higher cognitive abilities increase individuals' ability to incorporate the available information on the cost-benefit profiles of different screening programmes (positive for FOBT/FIT-based colorectal cancer screening, less so for mammography-based breast cancer screening).

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