

People's subjective expectations about their own future health can teach us a great deal about their attitudes towards smoking.

Economic policymaking often depends on the ability to model how people evaluate the future consequences of the decisions that they make. Using data from a sample of nearly 13,000, Yang Wang investigates this by evaluating how people's decisions to smoke are affected by expectations of their own longevity. She finds that subjectively, individuals attach less weight to their health conditions and smoking choices and more weight to factors like age, race, and their parents' longevity. She also finds that adult smokers care more about their own health and tend to be more forward-looking than has been otherwise believed.



Expectations about future events are crucial to decision makers who consider the future consequences and implications of their current choices. For example, the potential for wage differentials affect young people's schooling, career choices, and expectations about future Social Security benefits and timing of retirement. How to model these expectations is therefore a fundamental issue in economics, especially when considering individual choices with broader public implications, such as the decision to smoke.

In the existing economics literature, the standard procedures for discerning individuals' preferences from observed choices are based upon suppositions about the formation of their subjective expectations (i.e. their opinions about what will happen in their future), the most common one among which is the rational expectations assumption. This states that economic actors use all the relevant information when anticipating future events and their predictions do not systematically differ from the realized outcomes. Put simply, although the future is not fully predictable, people do not make systematic mistakes when predicting it, and deviations from actual outcomes are only due to random errors.



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In reality, however, individuals' subjective expectations about the future might be categorically different from those estimated by economists using a rational expectations framework. In such cases, assuming rational beliefs when individuals actually make their decisions based on their personal expectations will result in misleading conclusions about individual preferences, with important implications for economic analyses of decision-making processes and evaluations of public policies.

By directly incorporating *subjective* expectations, I relaxed the rational expectations assumption into a dynamic discrete choice model (where people are able to choose from a set of potential actions based on their expectations about the future), to explain how adult smokers – current and former smokers above age 50 – decide

whether to quit smoking. The goal here is to infer individuals' preferences using information from their own smoking decisions and *subjective* longevity expectations.

Smoking is linked to a myriad of quality-of-life reducing health problems such as lung cancer and chronic obstructive pulmonary disease. Tobacco use has been responsible for about one fifth of total mortality in the US since the 1990s; it is considered the number one cause of premature deaths and the most important preventable risk to human health. Although there are considerable external factors—such as financial concerns—when choosing to smoke, adult smokers' decisions to quit smoking are determined mainly by longevity and health concerns. The availability of relevant data and the relatively few significant factors that go into the decision-making process make smoking an excellent testing ground for the impact of subjective expectations on individual choices.

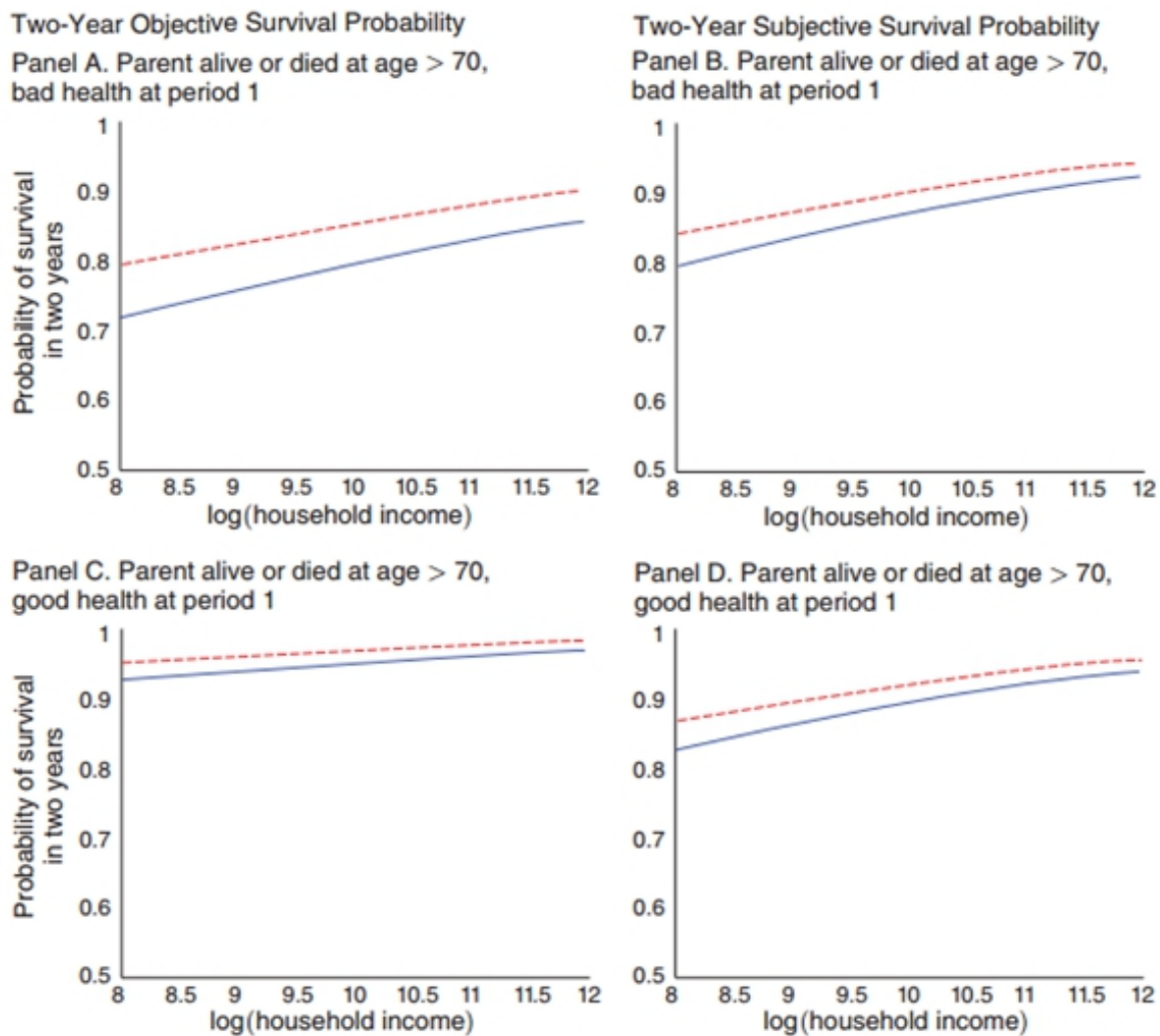
The data we use are from the Health and Retirement Study (HRS), a nationally representative biennial panel survey. The baseline interviews were conducted in 1992 with birth cohorts 1931 through 1941 and their spouses, if married. New birth cohorts have been added to the initial sample of nearly 13,000 people in more than 7,000 households, and the most recent available data are from year 2010. Subjective longevity expectations paper are obtained from survey responses to the following questions: "What is the percent chance that you will live to be 75 or more?" and "What is the percent chance that you will live to be 85 or more?"

We categorize the HRS respondents into current, former, and never smokers using their responses to the questions: "Have you ever smoked cigarettes?" and "Do you smoke cigarettes now?" Because smoking initiation among adult never smokers is virtually zero, we exclude never smokers from the analysis and focus on the decisions of those current and former smokers to quit or continue smoking.

Our results show that adult smokers indeed form their beliefs about longevity differently from what the rational expectations assumption predicts; and this difference lies mainly in the economic and statistical importance adult smokers attach to various determinants of their survival. For example, objectively (i.e., under the rational expectations assumption), having bad health is the largest threat to one's survival, having a long-lived parent can only "cancel out" half of the detrimental effect of smoking, and being a smoker is equivalent to being at least four years older in terms of its negative effects on survival. Subjectively, however, having bad health no longer matters the most for one's survival; it is actually similar in magnitude to having a long-lived parent, which in turn can "cancel out" more than half of the negative effect of smoking. And smoking, subjectively, is only equivalent to aging for about two years.

To illustrate the similarities and, more importantly, the differences between the subjective and the objective survival expectations, Figure 1 shows the two-year survival probabilities for white males with long-lived parents. The right two panels are based on estimated subjective survival probabilities, and the left two panels use objective estimates from the rational expectations model. We can see that both subjective and objective estimates suggest that survival probabilities increase with household income and are lower for current smokers.

Figure 1 – Two-Year Survival Probabilities for White Males



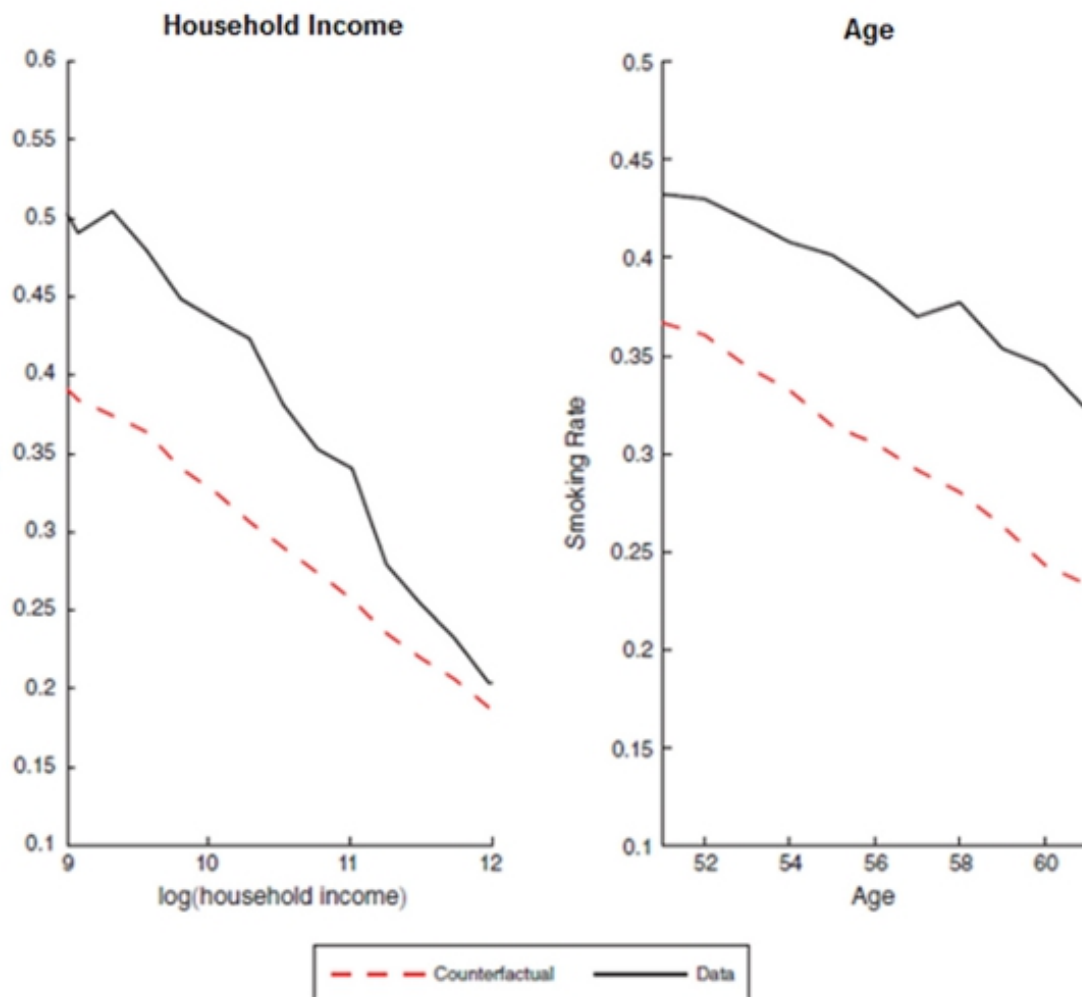
Notes: Probabilities of surviving another two years as a function of the household income by smoking status for white males. Left panels: objective estimation using observed mortality data. Right panels: subjective estimation using reported subjective expectations data.

However, for those who are currently in bad health (panels A and B), subjective survival probabilities are always higher than the objective ones, and the difference in two-year survival probabilities by smoking status is smaller for the subjective estimates than for the objective ones. For those who are currently in good health (panels C and D), the pattern is reversed: subjective survival probabilities are always lower than the objective ones, and the difference in two-year survival probabilities by smoking status is greater for the subjective estimates than for the objective ones.

This discrepancy in the formation of longevity expectations results in crucial differences in the estimates of utility and time preferences. For example, in both subjective and rational expectations frameworks, the utility loss from having bad health is greater when people choose to smoke. However, to rationalize the choice of smoking, given its negative health effect, the rational expectations framework requires a much larger gap in utility sensitivity (the expectation that smoking will lead to negative consequences) to health status between smoking and not smoking than the model with subjective expectations. We also find that adult smokers are more forward-looking than we would have concluded using the rational expectations framework.

We further consider a counterfactual experiment where adult smokers' subjective longevity expectations are set to be the same as those if they had rational expectations. In this case the average smoking rate would be eight percentage points lower than the level observed in our sample (see Figure 2).

Figure 2: Counterfactual experiment of smoking rates using subjective survival expectations



Note: These two panels show smoking rates from the data (Data) and those predicted by the counterfactual experiment which sets subjective survival expectations at the objectively observed levels (Counterfactual). Left panel: smoking rates as a function of household income; right panel: smoking rates as a function of age.

If we believe individuals have made systematic mistakes in their subjective expectations, then the reduction in smoking rates predicted shows what can be achieved by public policies aimed at further reducing smoking rates, such as an information campaign that matches individuals' subjective survival expectations with the objective ones. Actually, some simple back-of-the-envelope calculations show that this reduction in smoking rates could mean a gain in life years worth \$3.07 trillion. And this number does not yet include the costs of externalities associated with cigarette consumption, such as air pollution or second-hand smoking.

This article is based on the paper, '[Dynamic Implications of Subjective Expectations: Evidence from Adult Smokers](#)' in the *American Economic Journal: Applied Economics*.

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