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Effects of mortality risk on risk-taking behavior

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Abstract

This paper studies how an exogenous mortality risk affects an individual's risk-taking behavior elsewhere. We find that individuals will respond to the new mortality risk by increasing their exposure to financial and other mortality risks.

Keywords: Mortality risk; Financial risk; State-dependent utility function

JEL classification: D81; G11; I12

…I went skydiving
I went rocky mountain climbing
I went two point seven seconds on a bull named Fu Man Chu…
—from the song *Live Like You Were Dying* by Tim McGraw.

Folklore suggests that individuals facing an immediate mortality risk tend to take more risks elsewhere. For example, it is believed that during wartime soldiers are more likely to engage in gambling and risky personal behavior. Likewise, terminal illness diagnoses are thought to trigger new hobbies for a dangerous sport or activity. Yet, economic analyses of how a given mortality risk affects an individual's risk-taking

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behavior elsewhere are still scarce. This is especially peculiar since, in contrast to what is predicted by folklore examples about the effect of mortality risks, exogenous financial shocks have been shown, under plausible conditions on the utility function, to cause individuals to reallocate their portfolios towards less in risky assets (Kimball, 1993; Eeckhoudt et al., 1996; Gollier and Pratt, 1996; Keenan and Snow, 2003).

There is some empirical evidence supporting the folklore predictions about how background mortality risks affect risk-taking behavior. Nyman et al. (2006) found that less healthy individuals tend to gamble more. Ganz (2000) found that external risks, such as neighborhood danger, are positively correlated to the incidence of smoking.

In this note, we provide a formal theoretical analysis of how an exogenous and uninsurable mortality risk affects an individual's endogenous exposure to both financial and other mortality risks. We find that, under standard conditions, an increase in the exogenous mortality risk will induce an individual to take more of an independent mortality risk. The increase in the exogenous mortality risk is also likely to induce the individual to invest a larger portion of his wealth in high-return but risky assets.

The effects of an exogenous and uninsurable mortality risk have been studied in the context of the willingness to pay for mortality risk reduction or the value of a statistical life (e.g., Jones-Lee, 1974; Weinstein et al., 1980; Eeckhoudt and Hammitt, 2001). The present paper complements those previous studies by investigating an individual's endogenous responses to an exogenous mortality risk in terms of his risk-taking behavior elsewhere.

1. The basic framework

The basic framework follows Jones-Lee (1974) and Eeckhoudt and Hammitt (2001), in which a representative individual faces a mortality probability of m. The individual's utility derived from wealth, w, is state-dependent, denoted as $L(w)$ when alive and $D(w)$ when dead, respectively. It is standard to assume that $L'>0$, $L''<0$, $D'\geq 0$ and $D''\leq 0$ (therefore $D(w)\equiv 0$ is allowed). These assumptions simply say that the individual is non-satiated and risk-averse (risk-neutrality is allowed in the state of death) with respect to wealth in each state. Also following Jones-Lee and Eeckhoudt and Hammitt, we assume $L(w)>D(w)$ and $L'(w)>D'(w)$ for all w. That the individual always prefers life to death is quite natural although counter examples surely exist. It also seems natural to assume that the marginal dollar generates more satisfaction in the state of life than in the state of death.[1]

2. Effects of an exogenous mortality risk on the exposure to other mortality risks

Suppose that, in addition to the exogenous mortality risk (say, a war time situation or a life-threatening disease) represented by the death probability m, there is another risky activity (say, a dangerous sport), the level of which is denoted as A, in which the individual can engage. The risky activity generates a death probability of $p(A)$ that is independent of m, where $p'>0$ and $p''>0$. As a result of the independent risky activity, the probability of being alive is $(1-m)[1-p(A)]$, and the probability of death is one minus that. The risky activity also generates a utility benefit, which is additive to the expected utility from wealth. In

[1] Pratt and Zeckhauser (1996) have argued that the assumption $L'>D'$ is valid as long as one is not too altruistic towards one's heirs. See Viscusi and Evans (1990) and Sloan et al. (1998) for the empirical evidence supporting this assumption.