Excluded Losses and the Demand for Insurance

SCC-76

March 19-21, 2009

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Small Losses

Independent Losses

Excluded Losses
Homeowner’s Insurance: damage due to flood

Life insurance: death due to suicide

Product warranty: damage caused by tampering

Crop insurance: “not following good agricultural practices"
Two properties

1. unreimbursed

2. When an excluded loss occurs, a covered loss does not occur, and vice versa
Let $x_1$ denoted a cover loss and $x_2$ an excluded loss

$$
g(x_1, x_2) = \begin{cases} 
\alpha \cdot f_1(x) & \text{for } (x_1, x_2) = (x, 0) \text{ for all } x \in [0, b] \\
(1 - \alpha) \cdot f_2(x) & \text{for } (x_1, x_2) = (0, x) \text{ for all } x \in [0, b] \\
0 & \text{for } (x_1, x_2) = \text{all other values in } [0, b] \times [0, b]
\end{cases}
$$
\[ g(x_1, x_2) = h_1(x_1) \cdot h_2(x_2) \]
\[ W = W_0 + V - x_1 + \theta(I(x_1) - P) \]

\[ Eu(W) = \int_0^b u(W_0 + V - x_1 + \theta(I(x_1) - P))f_1(x_1)dx_1 \]
\[ W = W_0 + V - x_1 - x_2 + \theta(l(x_1) - P) \]
\[ Eu(W) = \int \int_{0 \leq x_1 \leq b, \, x_2 = 0} u(W + V - x_1 - x_2 + \theta(I(x_1) - P))g(x_1, x_2) \]

\[ + \int \int_{0 \leq x_2 \leq b, \, x_1 = 0} u(W + V - x_1 - x_2 + \theta(I(x_1) - P))g(x_1, x_2) \]

\[ + \int \int_{0 < x_1, \, 0 < x_2} u(W + V - x_1 - x_2 + \theta(I(x_1) - P))g(x_1, x_2) \]
\[ Eu(W) = \int_0^b u(W_0 + V - x_1 + \theta(I(x_1) - P)) \alpha \cdot f_1(x_1) dx_1 \]

\[ + \int_0^b u(W_0 + V - x_2 - \theta \cdot P)(1 - \alpha)f_2(x_2) dx_2 \]
\[
\frac{dE_u(W)}{d\theta} = \int_0^b u'(W_0 + V - x_1 + \theta(I(x_1) - P))(I(x_1) - P)(\alpha \cdot f_1(x_1))dx_1 \\
+ \int_0^b u'(W_0 + V - x_2 - \theta \cdot P)(-P)(1 - \alpha)f_2(x_2)dx_2 = 0
\]
Theorem 1: When excluded risks are present and full insurance is offered at an actuarially fair price, all risk averse decision makers choose less than full insurance.

Theorem 2: When excluded risks become larger, that is as $\alpha$ decreases, the decision maker chooses less insurance.