House value H, wealth W, $u(H+W)$

u concave

prob. p $\quad H \longrightarrow H' < H$

$$(1-p)\,u(H+W) + p\,u(H'+W)$$

insurance policy:

pay $q \cdot a$ receive a if reg. passed

$$\max_a (1-p)\,u(H+W-qa) + p\,u(H' + \cancel{(1-q)a} + W \cancel{-qa})$$

$$-(1-p)\cdot q \cdot u'(H+W-qa) + p\cdot(1-q)\cdot u'(H'+(1-q)a+W)$$

FOC: $\quad (1-p)\cdot q \cdot u'(H+W-qa) = p\cdot(1-q)\,u'(H'+(1-q)a+W)$

$p = q$

$\cancel{(1-p)\cdot p}\cdot u'(\quad) = \cancel{p\cdot(1-p)}\cdot u'(\quad)$

$$u'(H+W-qa) = u'(H'+W+(1-q)a)$$

$$H+W-qa = H'+W+(1-q)a$$

$$H - H' = a$$