# Actuarial Mathematics II
# MTH5125

## Multiple Decrement Models

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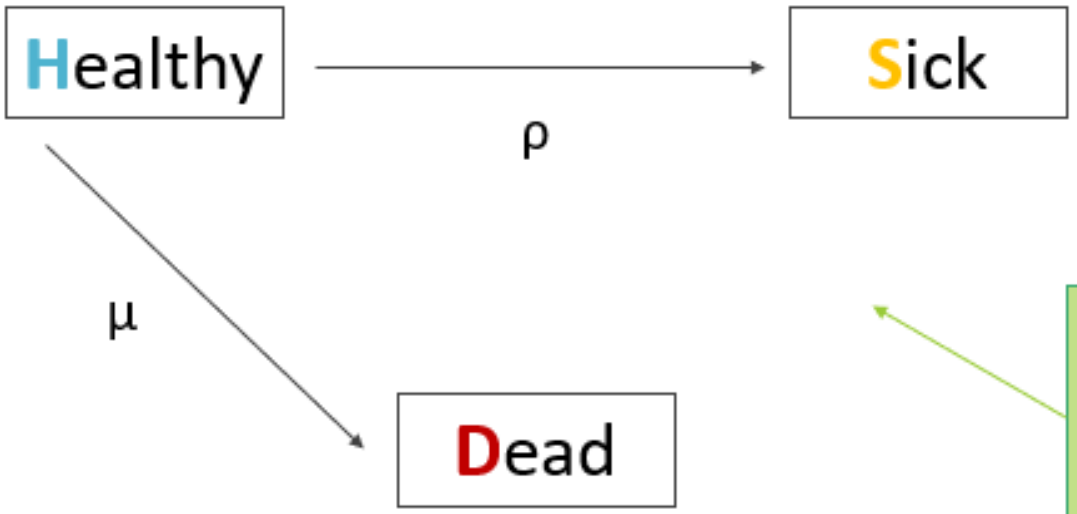
# Life and Health Insurance Example




This is the same model as before except now we have the additional assumption that the transition intensities are constants and do not vary with age (so we have $\mu$ instead of $\mu_x$

# Developing Multiple Decrements Probabilities

$$ {}_tp_x^{HH} \equiv {}_t(ap)_x = \exp\left(-(\mu+\rho)\,t\right) $$

$$ {}_tp_x^{HD} \equiv {}_t(aq)_x^{D} = \frac{\mu}{\mu+\rho}\left(1-\exp\left(-(\mu+\rho)\,t\right)\right) $$

$$ {}_tp_x^{HD} \equiv {}_t(aq)_x^{S} = \frac{\rho}{\mu+\rho}\left(1-\exp\left(-(\mu+\rho)\,t\right)\right) $$

# Independent Probabilities

$$q_x^{*S} = 1 - \exp\left(-\rho\right)$$

$$q_x^{*D} = 1 - \exp\left(-\mu\right)$$