Data and Modeling Considerations for Hedonic Wage Analysis

Implications for VSL Estimation

Steven Major

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Value of a Statistical Life (VSL)

- People regularly choose between improved safety and other uses of income
  - Some cars are safer than others
  - People often knowingly consume food that is less healthy than available alternatives
  - Some forms of employment are more dangerous than others

- The value of a statistical life (VSL) is the willingness to pay to reduce the likelihood of death so that on average 1 fewer person dies.

VSL in policy analysis

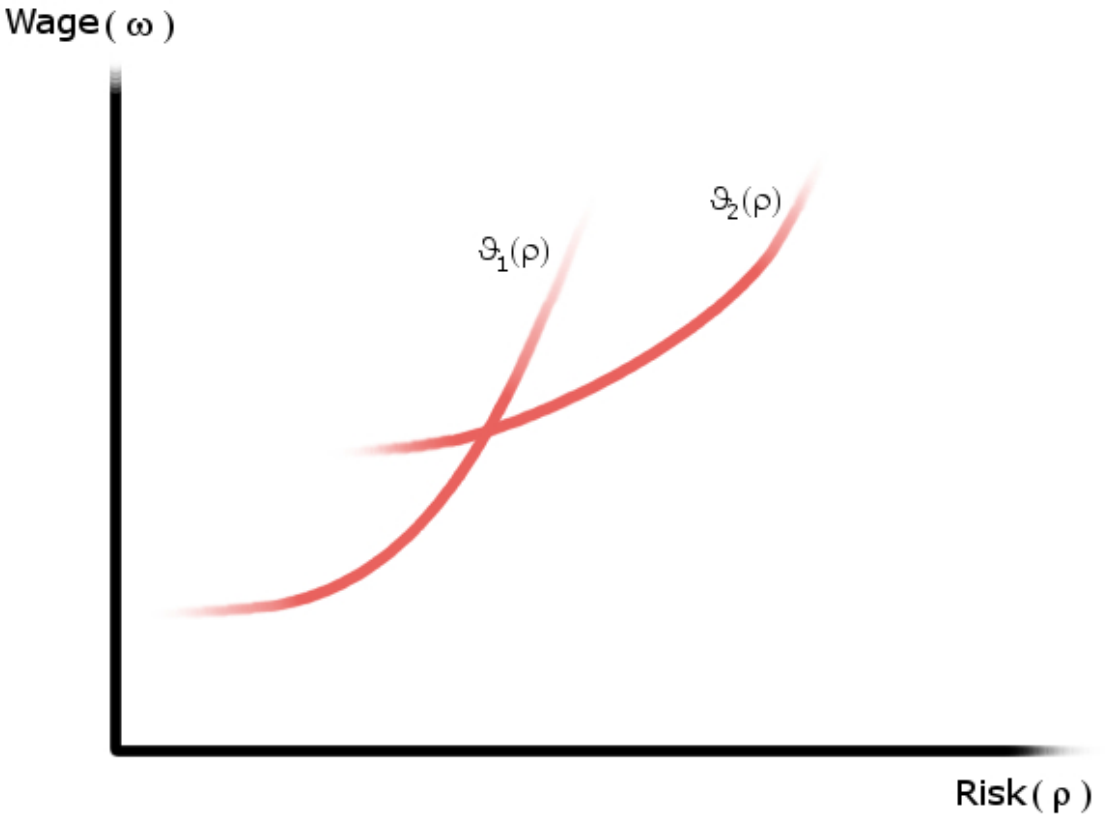
- Mortality reductions are a major benefit to many public policies.
  - The EPA estimates that the clean air act prevented 200 thousand premature deaths (mean), valued at 4.8 million dollars each.
  - VSL accounted for 90% of estimated benefits from the EPA's 2000 diesel sulfur regulations.
- Varying estiamtes of VSL lead to large variablility in estimates of benefits
- Benefits of the clean air act from VSL were estimated to be between \$2 trillion and \$43 trillion.

VSL in the Literature

- Over 50 papers published that measure VSL.
- Estimates range from below $100,000 to over $25 million.
- Many approaches - focus on compensating wage equations (wage hedonics).

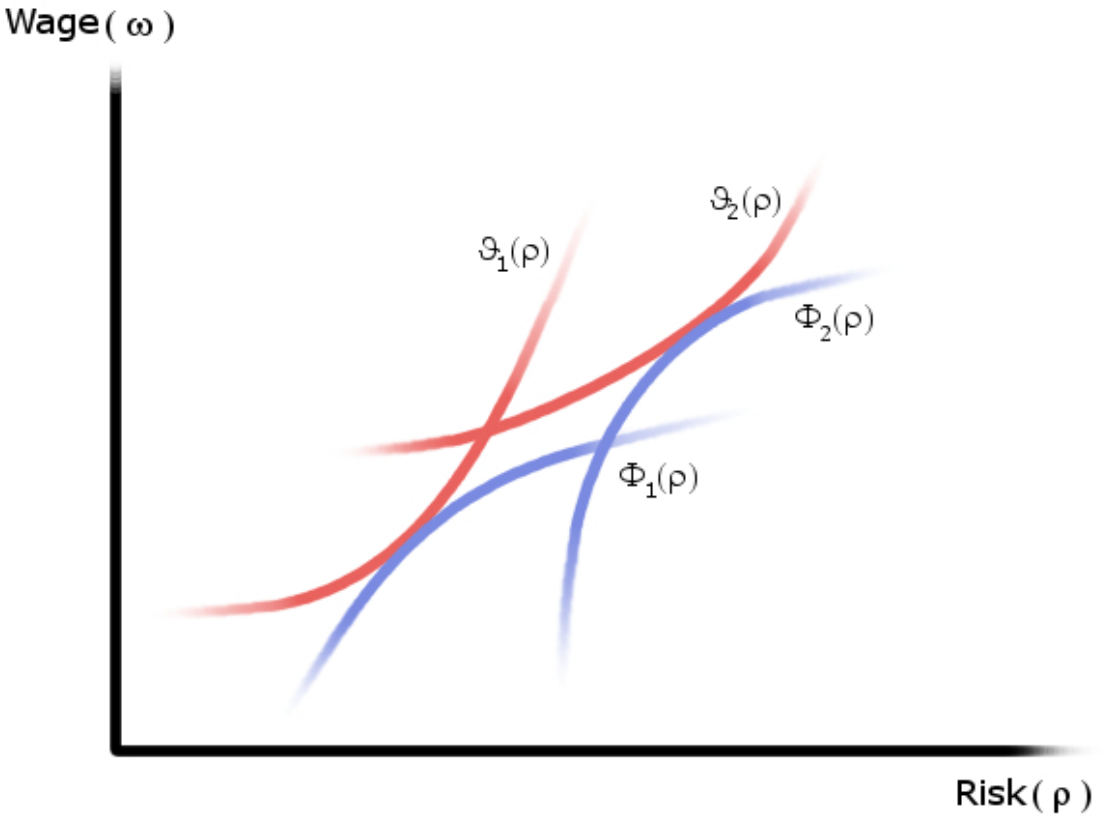
The mortality risk bid Curves

Worker bid curves for wage-risk bundles (indifference curves)



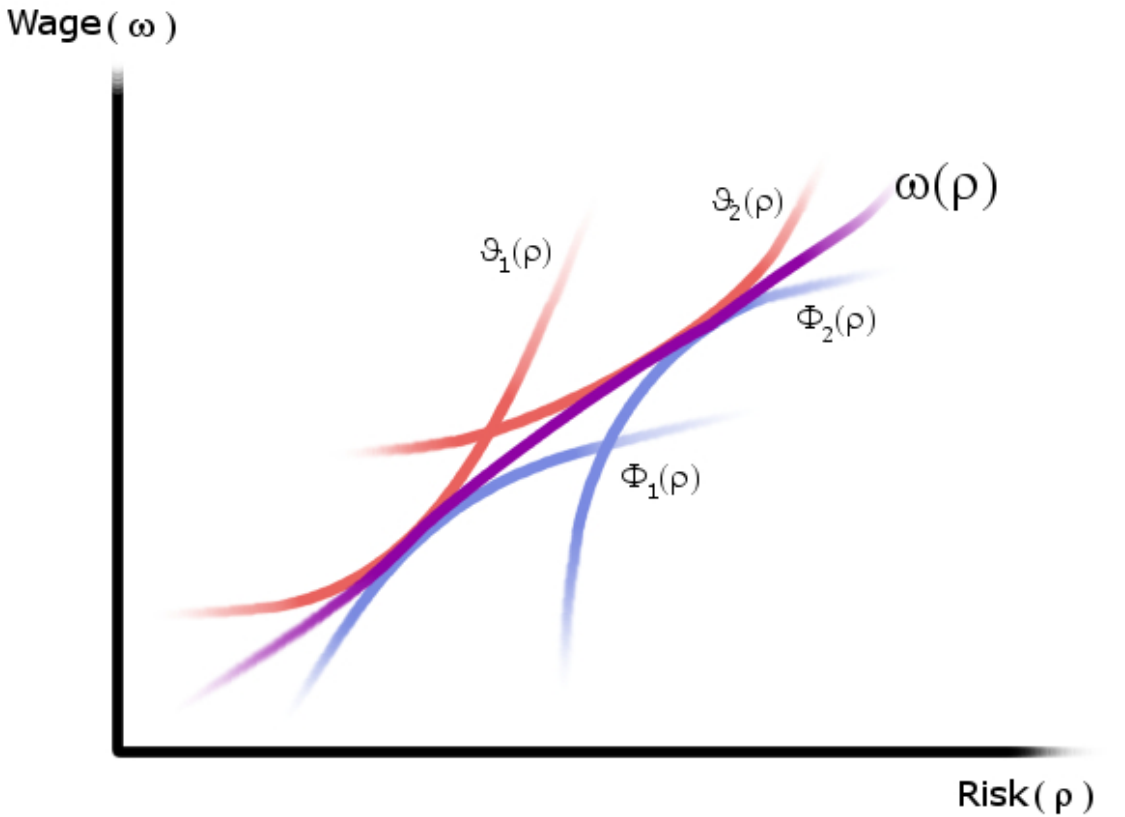
The mortality risk offer curves

Firms' wage-risk offer curves (isoprofit curves)



The Hedonic Surface

Equilibrium defines the hedonic surface



The hedonic model

A linear specification

$$log(W_i) = \alpha + \beta_D R_i^D + \beta_I R_i^I + \sum_{m=1}^{M} \lambda_m C_i^m + \sum_{n=1}^{N} \gamma_n D_i^n + \epsilon_i \ ,$$

where

- W_i is the wage paid to worker i,
- R_i^D is the likelihood that worker i experiences a fatal injury,
- R_i^I is the likelihood that a worker at firm i experiences a non-fatal injury,
- C_i^m are characteristics of worker i,
- D_i^n are workplace characteristics.

Standard estimation of workplace risks

- Jobs are defined by industry / occupation pairs (sometimes just industry).
- Risk of of death is estimated as the number of reported deaths for a given job divided by employment for that job.
- Risk of injury is similarly estimated.
- These risks are matched to worker data, for example from the Current Population Survey (CPS).

Established Estimation Concerns

There are some well understood difficulties:

1. Unobserved worker skill
2. Measured risk vs Subjective risk
3. Risks by industry and occupation - clustered standard errors

Other Concerns - Truncation

We only observe wages that lie above the minimum wage. Attenuation Bias.

Other Concerns - Selection Bias

We only observe wages that lie above the reservation wage. Direction on bias uncertain.

Addressing Truncation and Selection

- If we assume normal errors, then there are known approaches.
  - Heckman covers many cases
  - More recently M-estimators developed
- For selection bias, can model labor force participation

Moving Forward

- To what degree do these issues affect VSL?
- Robustness - how much do our modeling assumptions drive the result?
- Apply to non-public BLS data