Econometrics and the Notion of Ceteris Paribus

- Econometrics
- Econometrics: The Path from Cause to Effect
  - https://www.youtube.com/watch?v=WwW8y5dZs80
- Ceteris Paribus: Public vs. Private University
  - https://youtu.be/iPBV3BlV7jk?si=J8Nwhbm6XlKPl3jM
- Data

Probability Review

$$E(M) = [0 \times 0.8] + [1 \times 0.1] + \ldots + [4 \times 0.01]$$

$$= 0.35$$

Probability, expected value, and variance

	M (# comp. crash)				
	M=0	M=1	M=2	M=3	M=4
P(M)	0.8	0.1	0.06	0.03	0.01

$$V(M) = [(0-0.35)^2 \times 0.8] + \ldots + [(4-0.35)^2 \times 0.01]$$

$$= 0.6475$$

Probability Review (cont.)

Joint prob. : e.g. $P(A=0, M=0) = 0.35$

Marginal prob. : e.g. $P(A=0) = P(A=0, M=0) + \ldots + P(A=0, M=4) = 0.5$

Joint, marginal, and conditional probabilities

	M (# comp. crash)					
	M=0	M=1	M=2	M=3	M=4	Total
Old (A=0)	0.35	0.065	0.05	0.025	0.01	0.5
New (A=1)	0.45	0.035	0.01	0.005	0.00	0.5
Total	0.8	0.1	0.06	0.03	0.01	1

Conditional prob. : e.g. $P(M=0 \mid A=0) = \frac{P(M=0, A=0)}{P(A=0)} = \frac{0.35}{0.5} = 0.7$

Probability Review (cont.)

$E(M|A=0) = [0 \times P(M=0|A=0)] + \ldots + [4 \times P(M=4|A=0)]$

$E(M|A)$ depends on A.

$= 0.56$

Conditional expectation

	M (# comp. crash)					
	M=0	M=1	M=2	M=3	M=4	Total
Old (A=0)	0.35	0.065	0.05	0.025	0.01	0.5
New (A=1)	0.45	0.035	0.01	0.005	0.00	0.5
Total	0.8	0.1	0.06	0.03	0.01	1

$E(M|A=1) = [0 \times P(M=0|A=1)] + \ldots + [4 \times P(M=4|A=1)]$

$= 0.14$

Probability Review (cont.)

$V(M|A=0) = \left[(0 - E(M|A=0))^2 \times P(M=0|A=0)\right] + \ldots + \left[(4 - E(M|A=0))^2 \times P(M=4|A=0)\right]$

$V(M|A)$ depends on A.

Conditional variance

	M (# comp. crash)					
	M=0	M=1	M=2	M=3	M=4	Total
Old (A=0)	0.35	0.065	0.05	0.025	0.01	0.5
New (A=1)	0.45	0.035	0.01	0.005	0.00	0.5
Total	0.8	0.1	0.06	0.03	0.01	1

$= 0.99$

$V(M|A=1) = \left[(0 - E(M|A=1))^2 \times P(M=0|A=1)\right]$

$= 0.22 + \ldots + \left[(4 - E(M|A=1))^2 \times P(M=4|A=1)\right]$