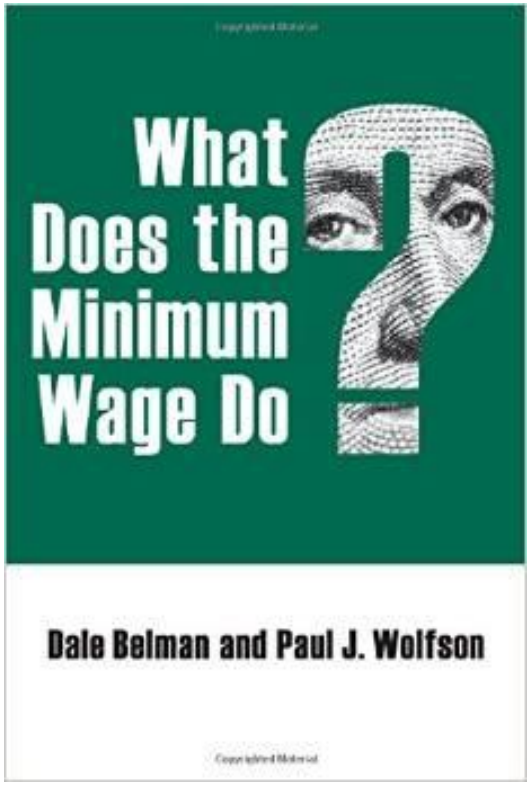
Does Employment Respond to the Minimum Wage?

A Meta-analysis of Recent Results in the New Minimum Wage Research

Dale Belman and Paul Wolfson

The Congress finds that the existence, in industries engaged in commerce or in the production of goods for commerce, of labor conditions detrimental to the maintenance of the minimum standard of living necessary for health, efficiency, and general well-being of workers.

-preamble, Fair Labor Standards Act (1937)


What
Does the
Minimum
Wage Do
Dale Belman and Paul J. Wolfson

Recent Work

- Summary of effects of the MW for sub-populations: *"Who Does the Minimum Wage Effect?"*
  - Women, single women, teens, low education, low wage industries, low wages and low income families
- Updating and improving meta-analysis of employment effects.
- Estimating the effect of the MW on family income
  - Interesting if disconcerting differences between data sets.

New Minimum Wage Research

- Last 2 decades of research
- Inspired by 1991 conference at Cornell
- Most famous study - Card & Krueger (1994)
  - fast food employment in New Jersey & Pennsylvania
- More heterogeneous than earlier research

Data sources
Data structures
Econometric techniques

Measurement of Variables
Groups & Sectors studied
Issues studied

Meta-Regression As A Means of Reconciling Estimates

- Collect point estimates and standard errors from studies
- Estimate a regression model in which the point estimates of prior studies are the dependent variable. In simplest form:

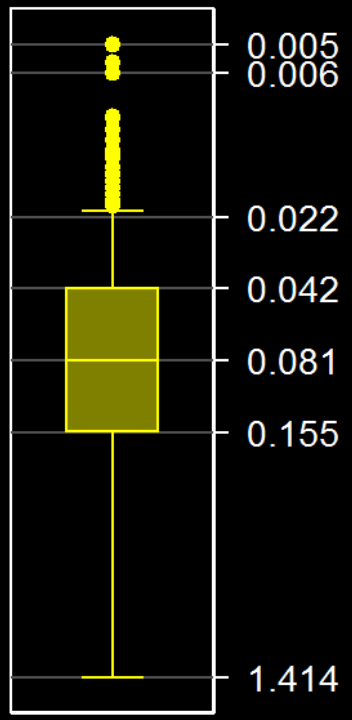
$$Effect_k = \overline{Effect} + u_k = b_0 + u_k$$

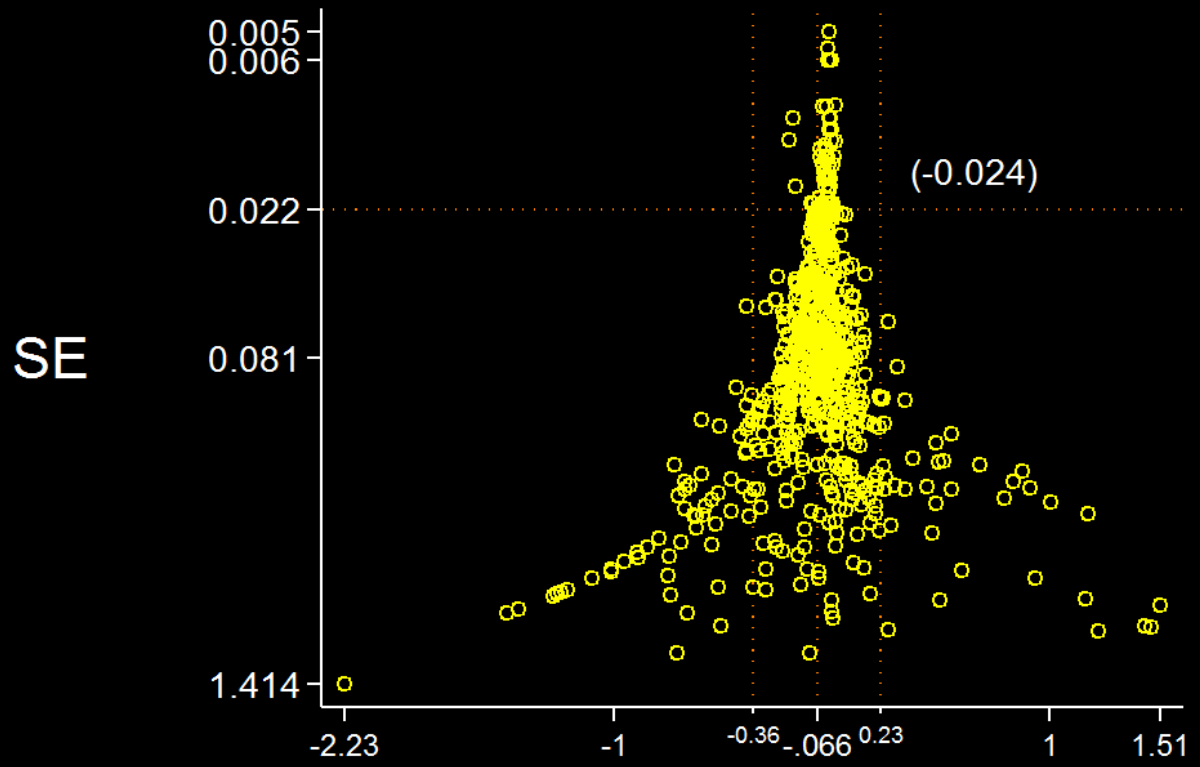
  - b_0 *is the average effect across estimates (articles)*

Our Data

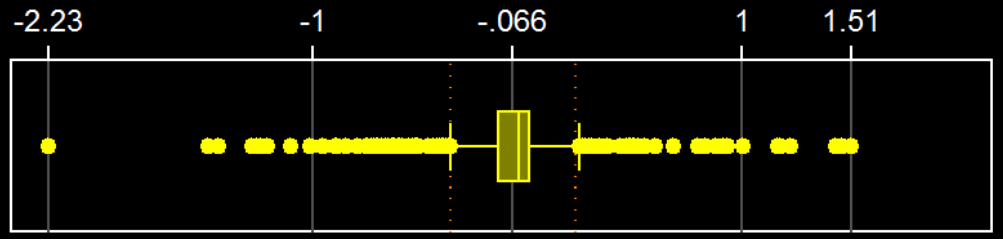
- Begin with 57 studies of U.S. data since the AER 2000 exchange between Neumark & Wascher and Card & Krueger
  - Focus has been: *is there a statistically significant effect?*
  - Not all studies report results in standard units
- Able to gather (elasticity, SE) pairs from 34 studies
- From these, 705 observations
  - Ranging from 1 observation to 100+ per study

Employment and Hours Elasticities vs. 1/SE (Precision)





N = 705
Elasticity Q3: 0.018
Elasticity Q2: -0.038
Elasticity Q1: -0.132



Metaregression
(Stanley & Doucouliagos 2012)

- 3 issues to consider before estimating a reliable mean effect size
  - Heteroscedasticity
  - Sample selection bias
  - Heterogeneity

Heteroscedasticity

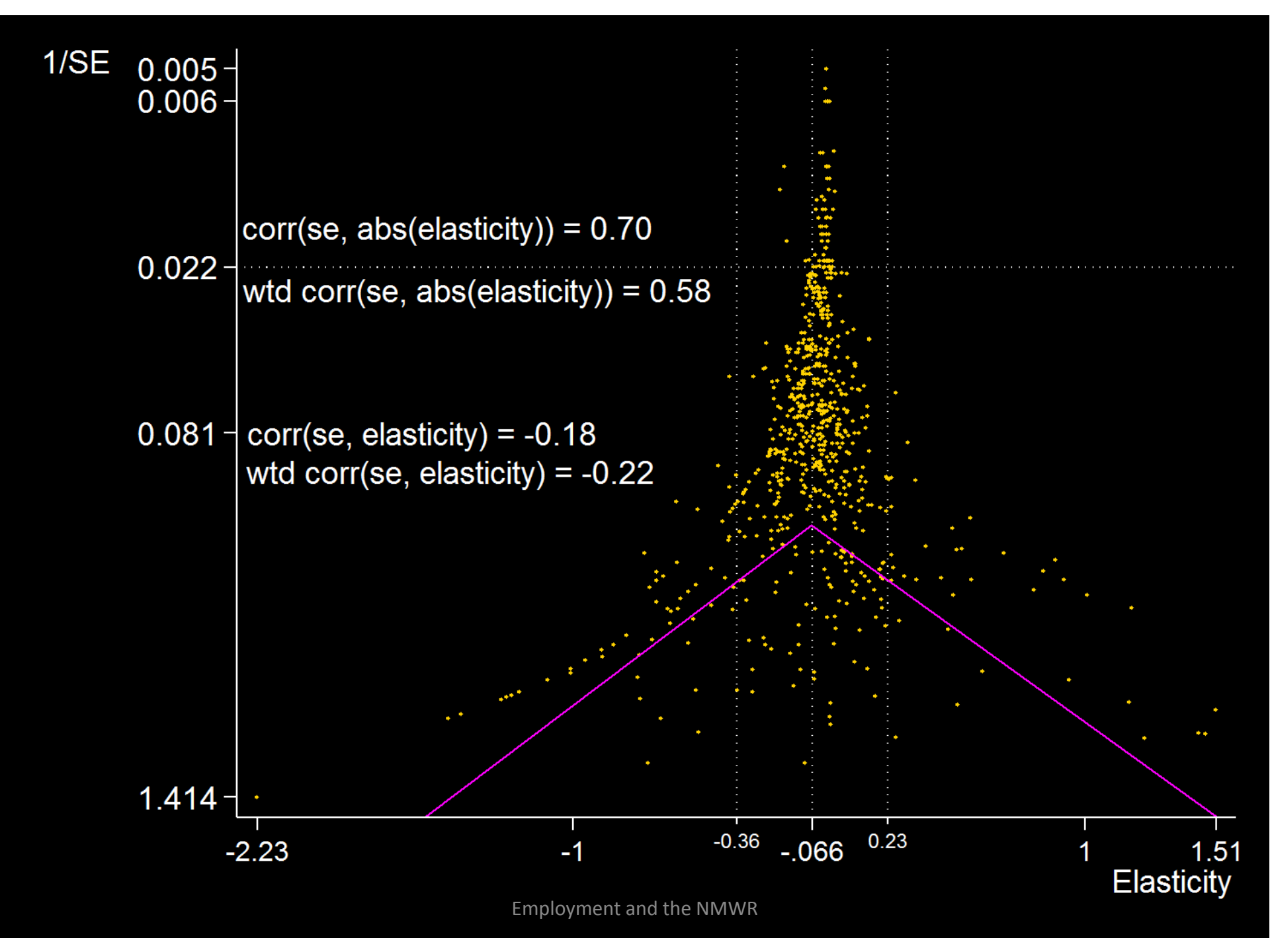
$$Effect_k = \overline{Effect} + u_k = b_0 + u_k$$

$$u_k \sim N\left(0, se_k^2\right)$$

Sample Selection Bias

- Desire for statistically significant result
- Desired outcome
  - Sign
  - Size

  → asymmetric or truncated distribution
- How well do different world views co-exist?
  - Economic
  - Statistical


1/SE
0.005
0.006
corr(se, abs(elasticity)) = 0.70
0.022
wtd corr(se, abs(elasticity)) = 0.58
0.081
corr(se, elasticity) = -0.18
wtd corr(se, elasticity) = -0.22
1.414
-2.23
-1
-0.36
-.066
0.23
1
1.51
Elasticity

Heterogeneity

- Dependence among estimates from same study
- Study design
- Dataset / Data sources
- Period covered
- Other Factors

Solutions - Heteroscedasticity

$$Effect_k = b_0 + u_k \ , \ u_k \sim N\left(0, se_k^2\right)$$

- Weight each observation by se_k^{-2}

Solutions – Sample Selection Bias (1)

- Canonical Heckman Correction
  - Prob(Selected | Z) = $\Phi(Z\gamma)$
  - $Y = X\beta + u$, $u \sim N\left(0, \sigma_u^2\right)$
  - $E(Y \mid X \& \text{Selected}) = X\beta + (\sigma_u \rho)\lambda(Z\gamma)$
    - $\lambda(Z\gamma)$ – inverse mills ratio
    - $\sigma_u \rho$: estimated coefficient on IMR
      - ρ – correlation between u and error term of selection equation

Solutions – Sample Selection Bias (2)

- Meta-analysis
  - Only selected observations observed at all!
    - Cannot estimate IMR
  - However, se_k is an estimate of $\sigma_{u,k}$
  - Include it in Metaregression
    - Assume constancy of $\rho\lambda$

$$Effect_k = b_0 + b_1 se_k + u_k$$

    - Assume $\rho\lambda \sim se_k$

$$Effect_k = b_0 + b_1 se_k^2 + u_k$$

Solutions - Heterogeneity

- After correcting for heteroscedasticity, the error terms should each have equal variance
- Cochrane's Q test
  - Estimate $\frac{Effect_k}{se_k} = t_k = \frac{b_0}{se_k} + v_k, \;\; v_k = \frac{u_k}{se_k}$
  - SSR ~ $\chi^2(K-1)$ under the null (homogeneity)
  - If reject, incorporate other explanatory variables into the equation

Results (First Cut)

- Heteroscedasticity & Sample Selection

	$elasticity_k = b_0 + b_1 se_k + u_k$	$elasticity_k = b_0 + b_1 se_k^2 + u_k$
b_0	-0.015	-0.023
se	0.008	0.007
p	0.059	0.002
b_1	-0.500	-0.874
se	0.214	0.634
p	0.025	0.178

- WLS estimates
- SEs calculated by clustering within studies
- Cochran's Q=2269: for the χ^2_{704}, p < 0.001

MRA - Procedure

- General to Specific (p-value target – 0.5)
- Explanatory variables (General)
  - Targets
  - Geographic Reach
  - Employment Measure
  - Data Frequency, Source, Type, Date
  - Other
- Breusch-Pagan for study effects strongly indicated
  - 1st: Effects x precision
  - 2nd: Effects
- Hausman test (RE vs. FE) problematic, so FEs

Point MetaEstimates

WLS: elasticity	Coef.	Clustered Std. Err.	t
precision	-0.064	0.008	-8.0
INTERACTED WITH precision (1/se)			
quasi_exp	0.024	0.009	2.8
Female	-0.013	0.016	-0.8
NoHS	-0.167	0.016	-10.6
teen	-0.049	0.016	-3.1
Pd_Annual	-0.019	0.011	-1.67
Pd_Monthly	-0.321	0.044	-7.3
Y2003	-0.177	0.011	-16.6
Y2009	0.180	0.008	22.4
Y2010	-0.260	0.014	-18.8

Linear Combinations of Interest

WLS: elasticity	Coef.	Std. Err.	t
Teens	-0.11	0.02	-5.8
Teens, Quasi-Experiment	-0.09	0.02	-4.8
Female	-0.08	0.02	-4.1
Female, Quasi-Experiment	-0.05	0.02	-2.7
No HS	-0.23	0.02	-12.1
No HS, Quasi-Experiment	-0.21	0.02	-11.6

Conclusions

- Work in Progress- results are provisional
- Strong evidence of publication bias
  - Most apparently due to reluctance to publish statistically insignificant results
- MRA has allowed for elasticity estimates purged of publication bias
- Teens: effect is small but not so small as in other recent work
- Restaurants: no distinct effect detectable, thus –0.064.

Some Additional Observations

- Research on the minimum wage is the only research in economics in which we care about elasticities of -0.1
- Given the regular movement in and out of employment by low wage workers, we are more likely to be in a world in which individuals realize the tradeoff between wages and employment implied by the small negative elasticity.