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# Who Benefits from Public Health Spending and How Long Does it Take: Estimating Community-Specific Spending Effects

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## Estimating Community-Specific Spending Effects

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# Acknowledgement



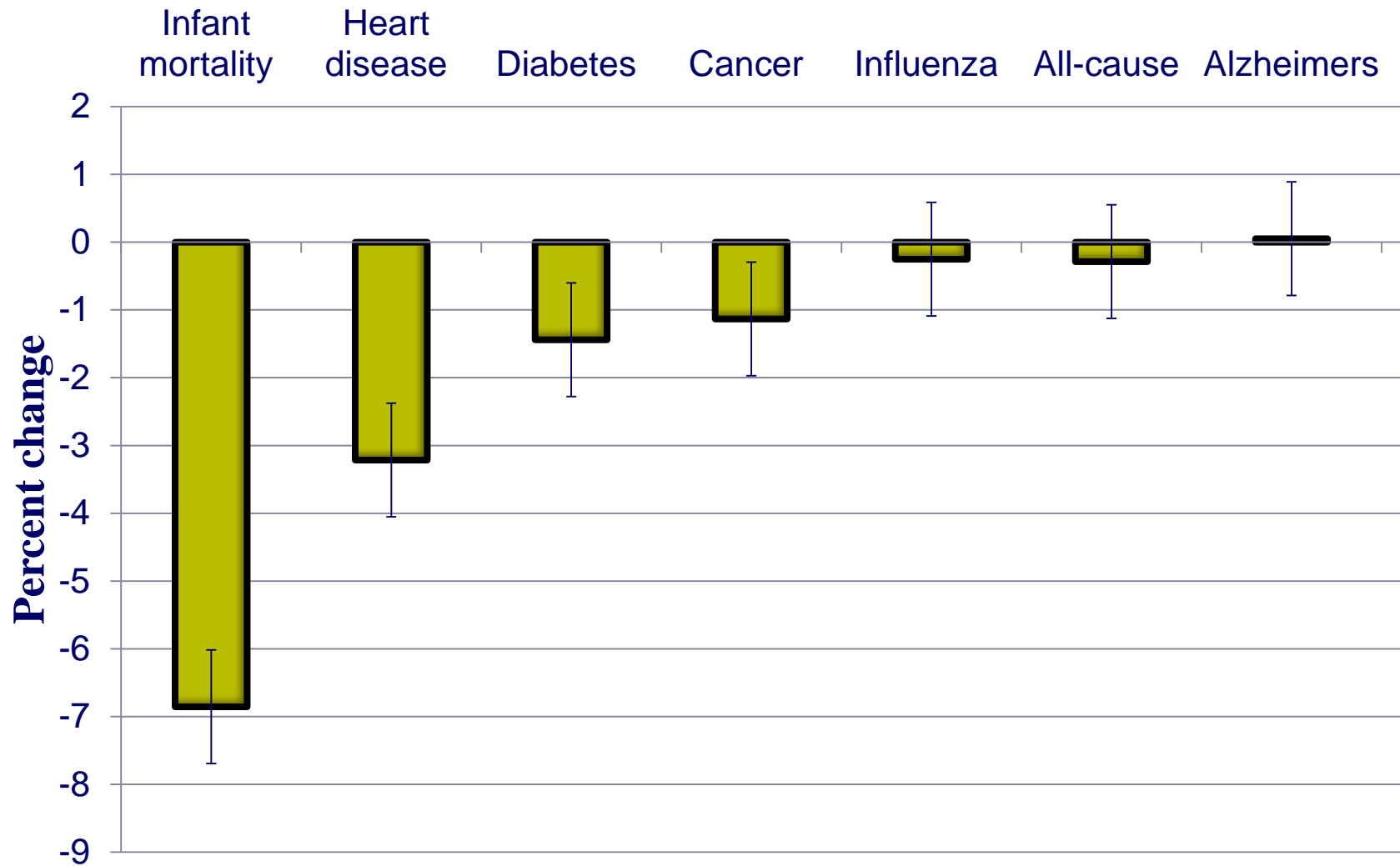
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by the Robert Wood Johnson Foundation

# Questions of interest

- Do the effects of public health investments vary across communities based on health needs, vulnerabilities and risks?
- Do the effects of public health investments vary based on the scope and scale of activities supported with these resources?
- Can we achieve larger and more equitable impacts from public health investments through enhanced targeting of resources?

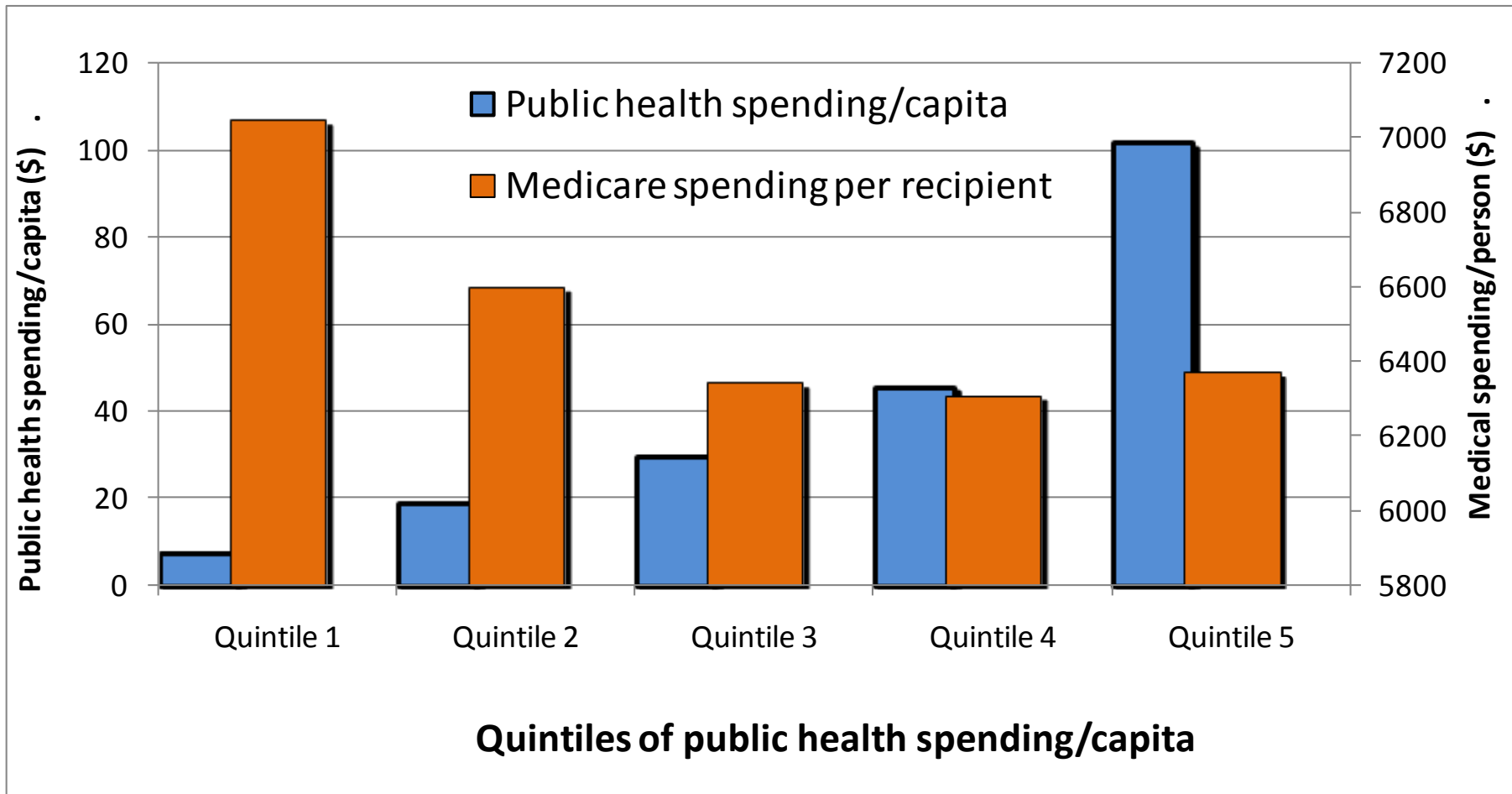
# Prior Research: Mortality reductions attributable to local public health spending, 1993-2008



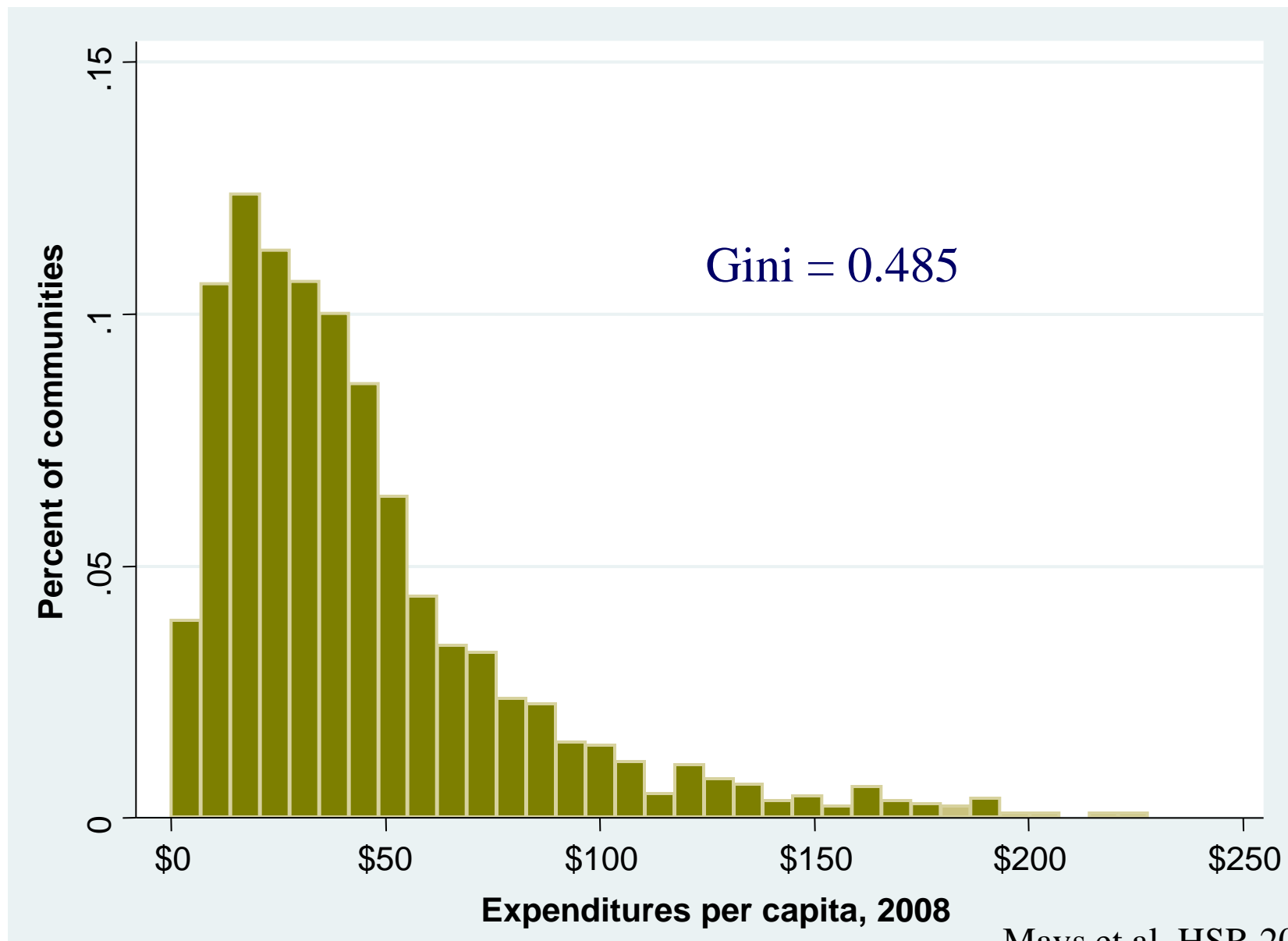
Hierarchical regression estimates with instrumental variables to correct for selection and unmeasured confounding

# Prior Research: Medical cost offsets attributable to local public health spending 1993-2008

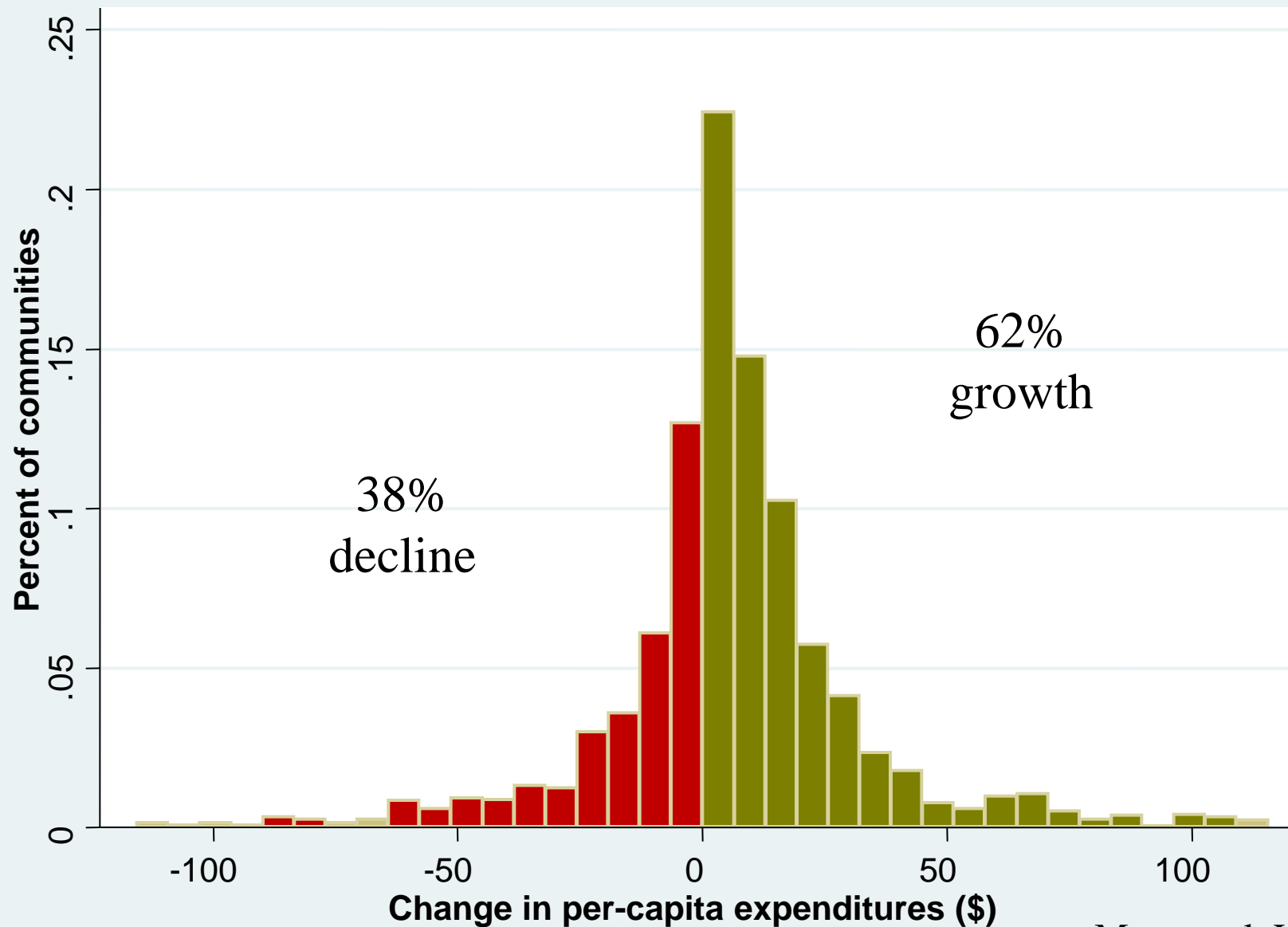
**Offset elasticity =  $-0.088$**



# Variation in Local Public Health Spending

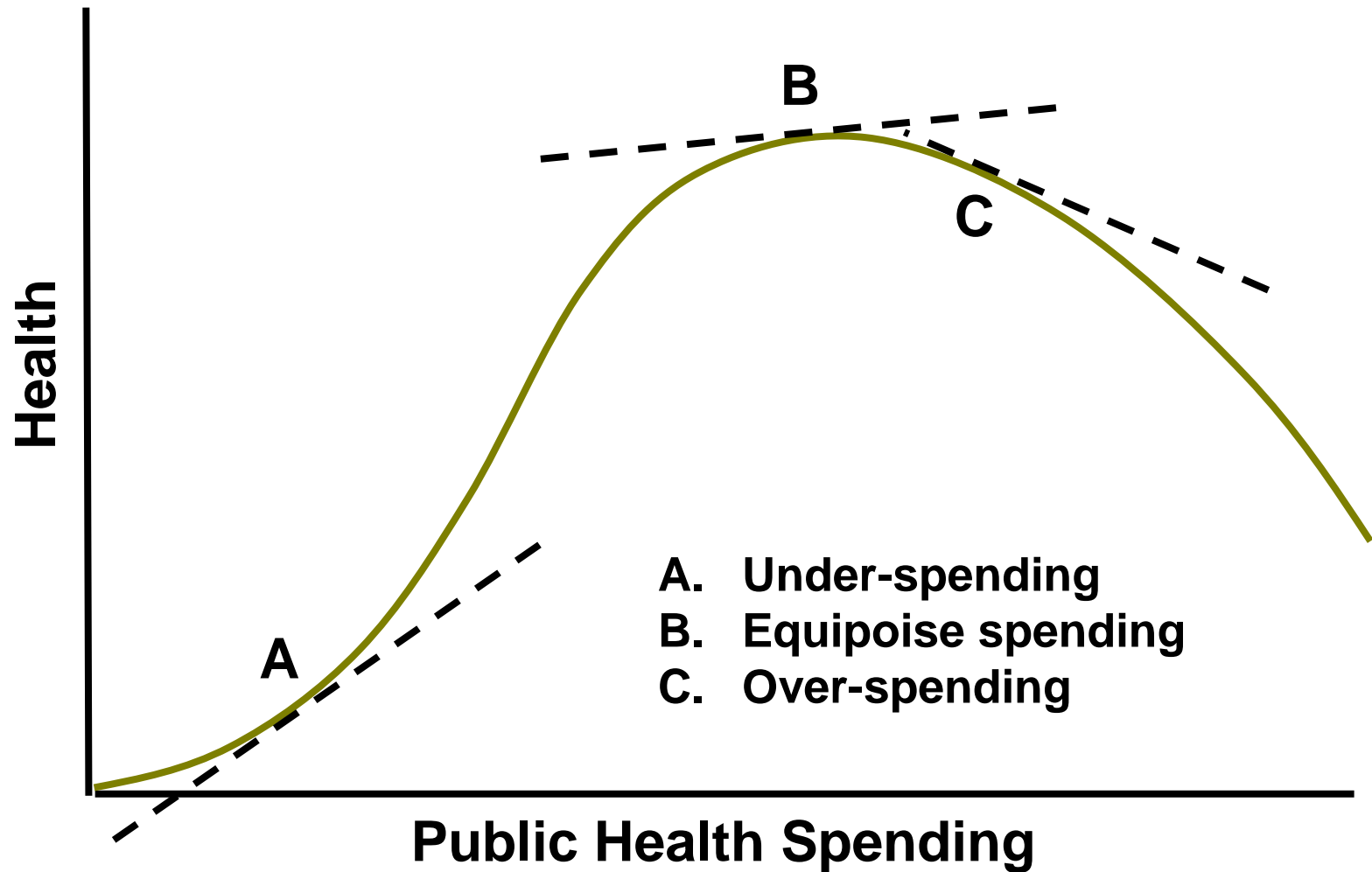


# Changes in Local Public Health Spending 1993-2008





# Value of an additional dollar in public health



# Analytic Approach

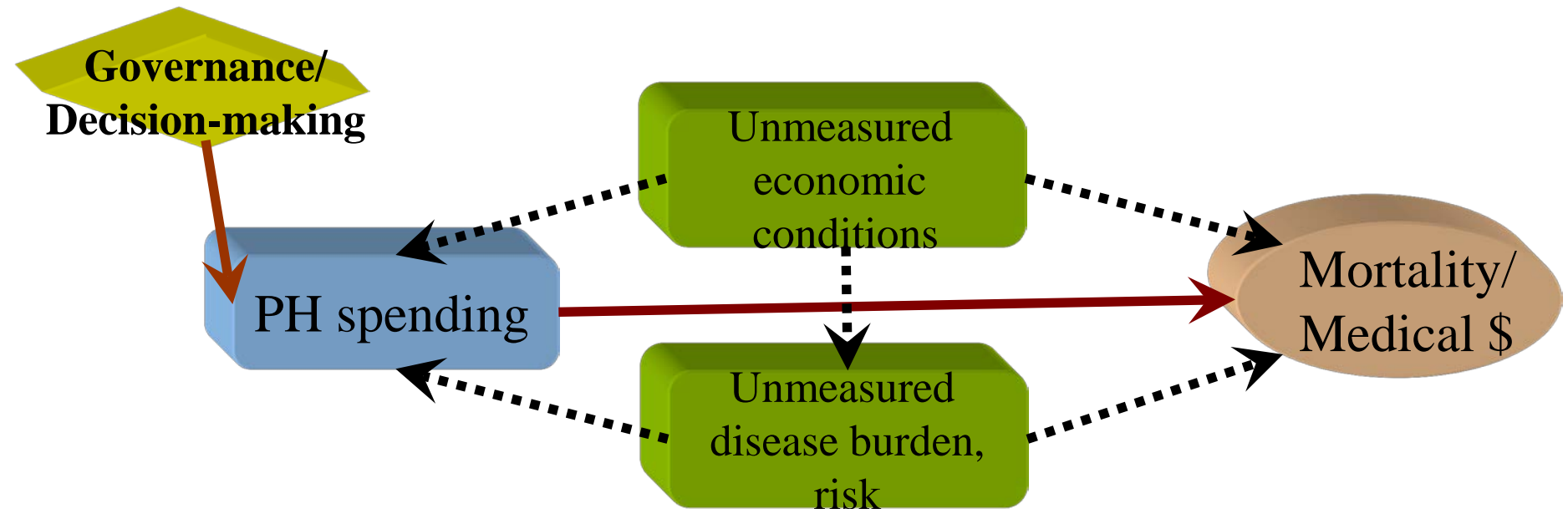
- Use the technique of local instrumental variables (LIV) estimation to estimate **community-specific effects** of public health spending
- Compare the health & economic impact of increases public health spending between:
  - Low-income vs. higher-income communities
  - Agencies that deliver broad vs. narrow scope of public health activities

Heckman JJ, Vytlacil EJ. 1999. Local instrumental variables and latent variable models for identifying and bounding treatment effects. *Proceedings of the National Academy of Sciences USA* 96(8): 4730–4734.

Basu A. 2013. Estimating person-centered treatment (PET) effects using instrumental variables. *Journal of Applied Econometrics*, in press.

# Analytical approach: IV estimation

- ◆ Identify exogenous sources of variation in spending that are unrelated to outcomes
  - Governance structures: local boards of health
  - Decision-making authority: agency, board, local, state
- ◆ Controls for unmeasured factors that jointly influence spending and outcomes



# Data used in empirical work

- **NACCHO Profile**: financial and institutional data collected on the national population of local public health agencies (N≈2800) in 1993, 1997, 2005, 2008, 2010
- Residual state and federal spending estimates from US **Census of Governments** and **Consolidated Federal Funding Report**
- Community characteristics obtained from Census and **Area Resource File** (ARF)
- Community mortality data obtained from CDC's **Compressed Mortality File**
- Medical care spending data from **CMS and Dartmouth Atlas** (Medicare claims data, HSA-level)

# Data used in empirical work

## National Longitudinal Survey of Public Health Systems

- Cohort of 360 communities with at least 100,000 residents
- Followed over time: 1998, 2006, 2012
- Measures reported by local public health officials:
  - **Scope**: availability of 20 recommended PH activities
  - **Intensive Margin**: effort contributed by the local PH agency
  - **Extensive Margin**: other organizations contributing to PH
  - **Quality**: perceived effectiveness of each activity
- Linked with secondary data on agency and community characteristics

# Determinants of Local Public Health Spending Levels: IVs

<u>Governance/Decision Authority</u>	<u>Elasticity Coefficient</u>	<u>95% CI</u>
Governed by local board of health	0.131**	(0.061, 0.201)
State hires local PH agency head†	-0.151*	(-0.318, 0.018)
Local board approves local PH budget	0.388***	(0.576, 0.200)
State approves local PH budget†	-0.308**	(-0.162, -0.454)
Local govt sets local PH fees	0.217**	(0.101, 0.334)
Local govt imposes local PH taxes	0.190**	(0.044, 0.337)
Local board can request local PH levy	0.120**	(0.246, 0.007)

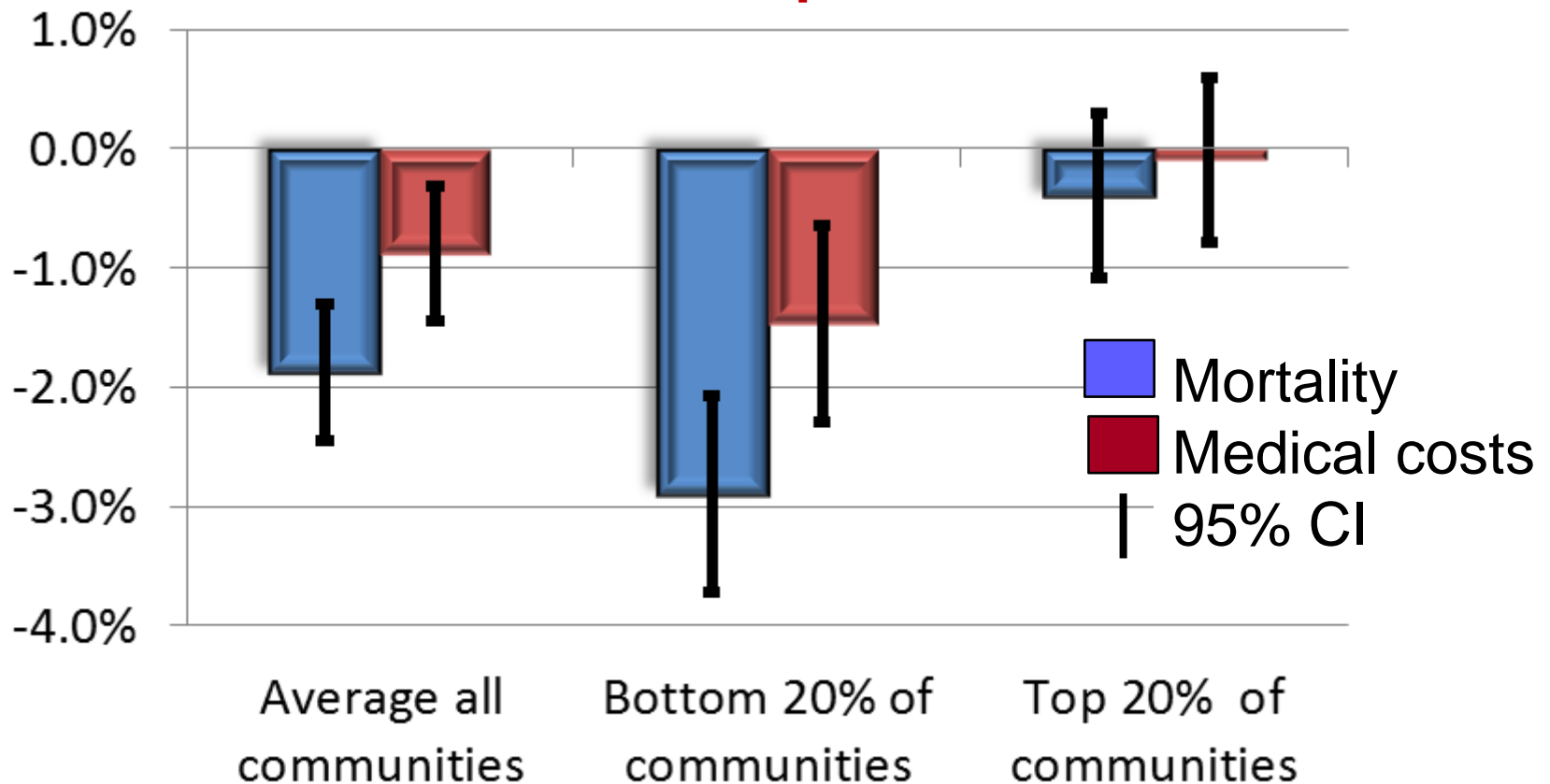
F=16.4 p<0.001

log regression estimates controlling for community-level and state-level characteristics. \*p<0.10 \*\*p<0.05 \*\*\*p<0.01

†As compared to the local board of health having the authority.

# Community-specific estimates of public health spending on heart disease mortality

Impact of 10% Increase in Public Health Spending/Capita  
**Based on Income Per Capita in Communities**

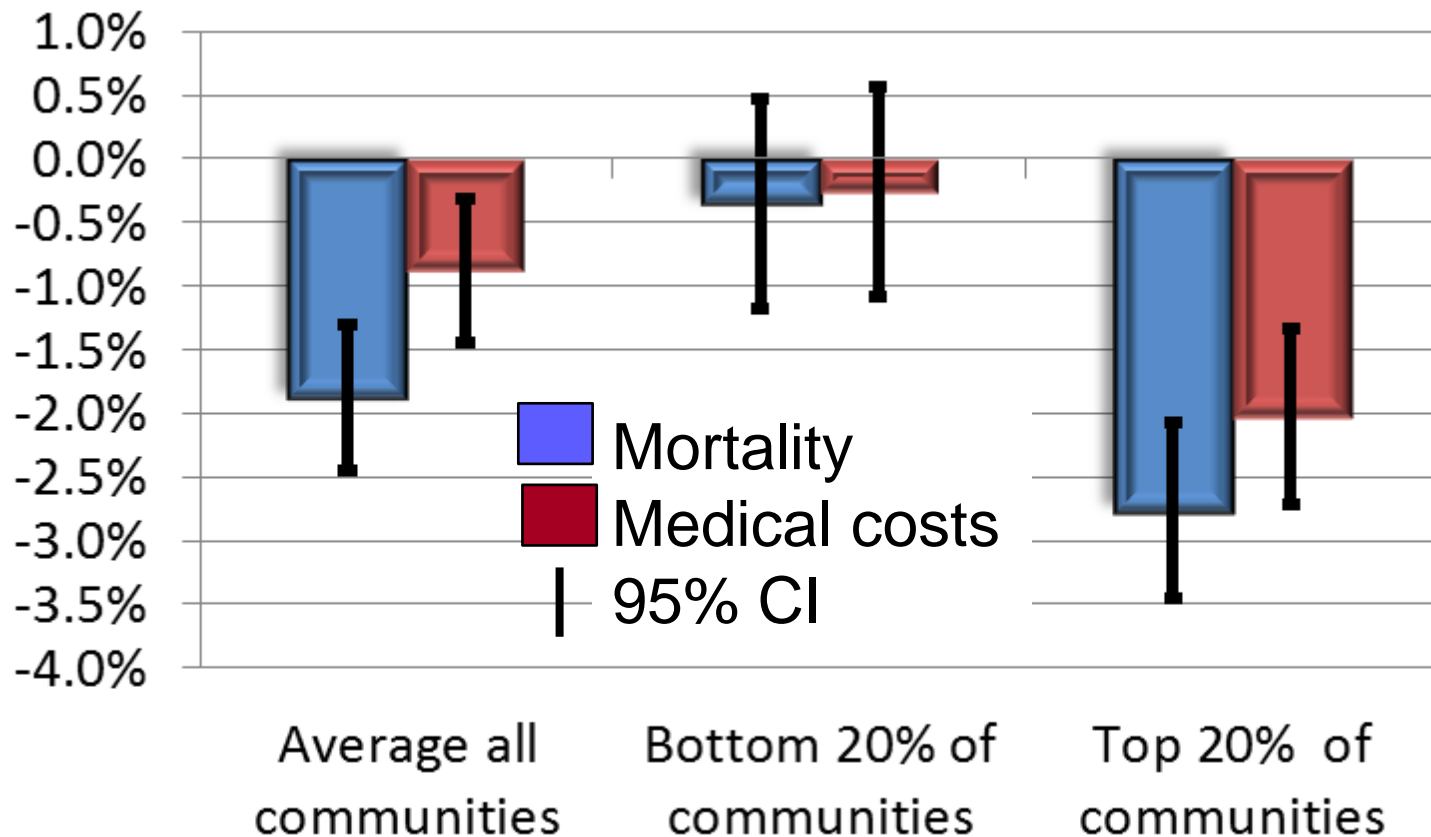


Log IV regression estimates controlling for community-level and state-level characteristics

Mays et al. forthcoming 2013

# Community-specific estimates of public health spending on heart disease mortality

Impact of 10% Increase in Public Health Spending/Capita  
**Based on Scope of Public Health Services Delivered**

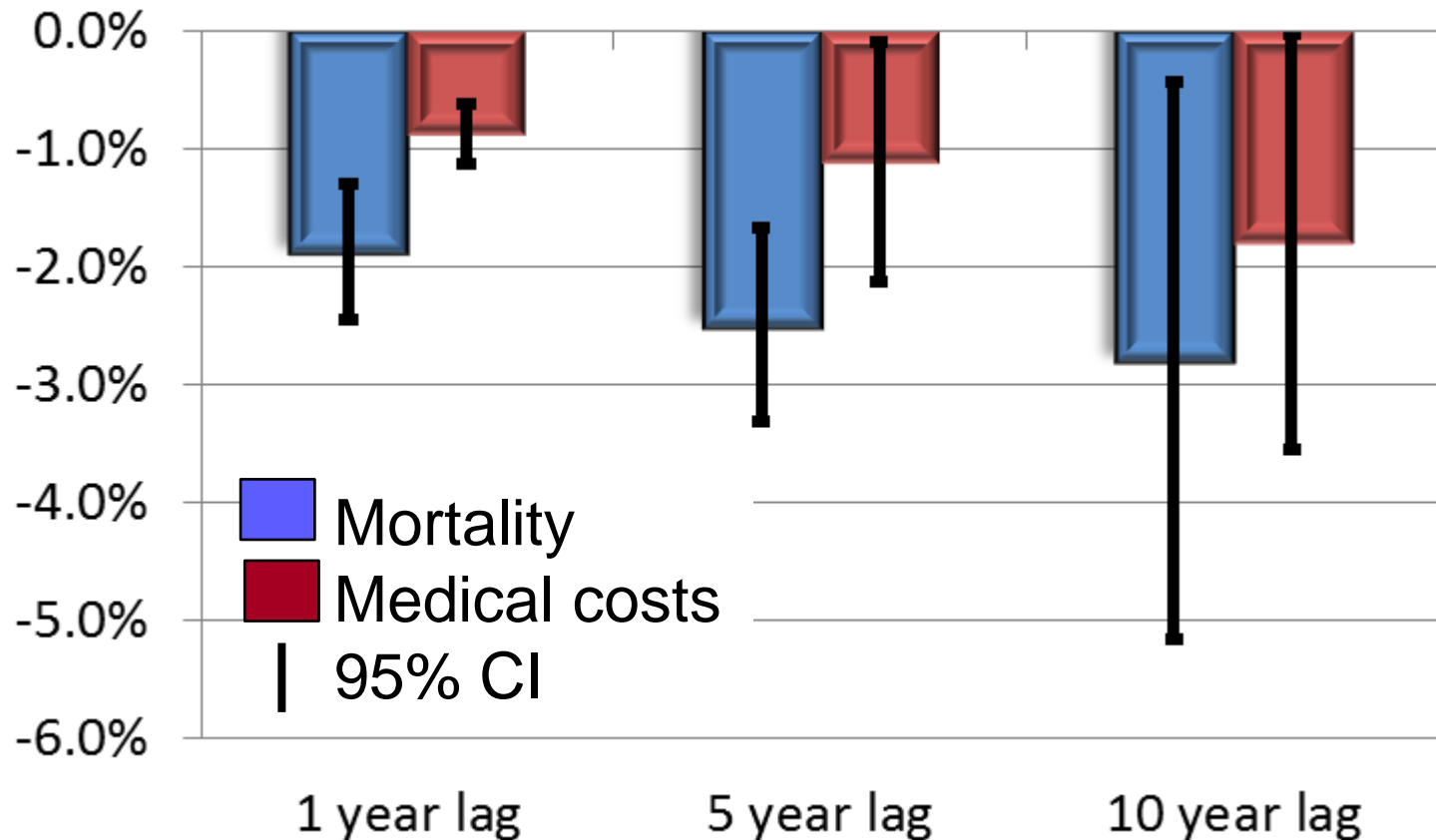


Log IV regression estimates controlling for community-level and state-level characteristics



# How long does it take: Cumulative effects of public health spending

**Changes in Mortality and Medical Care Spending Attributable to 10% Increase in Public Health Spending /Capita**



Log IV regression estimates controlling for community-level and state-level characteristics

Mays et al. forthcoming 2013

# Conclusions

- Sizable health & economic gains are attributable to local public health expenditures
- Gains are 21-44% larger in low-income communities
- Gains are 17-38% larger for communities that invest in a broad range of activities
- Cumulative effects over 10 years are nearly twice as large as short-term effects
- No evidence of over-spending

# Implications for policy & practice

Increase the value of public health investments through:

- ***Enhanced targeting***: low-resource, high-need communities
- ***Enhanced infrastructure***: broad scope of core public health activities
  - Accreditation standards
  - Minimum package of services

# For More Information



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