# Market Reform in New Jersey and its Effect on Mortality for Inpatient Medical Conditions

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# Effects of market reforms on quality of care

- More than 30 states had some form of hospital rate regulation in the 1970s and 1980s
- All states except Maryland have dissolved these systems in favor of price competition based on evidence that price competition lowers health costs
- Little is known about how such reforms have affected quality of care

# What is known about price competition and quality of care

- Reduces amount of care provided to the uninsured
- Associated with better mortality for AMI patients
- Little is known about effects for patients with different conditions or in different policy contexts

# Why might price competition affect quality of care?

- Increase in size of discounting puts pressure on hospital profit margins necessitating cost cutting
- In contrast to price, outcome-enhancing technical quality is not easily observed or measured
- Uncompensated care is financed largely out of hospital margins, making it vulnerable to cuts in costs

# New Jersey Health Care Reform Act

- Gave insurers new ability to negotiate price discounts with hospitals beginning 1993

- Reduced charity care subsidy

| | |
|---|---|
| $700 million | 1992 |
| $400 million | 1994 |
| $300 million | 1996 |

# Series of 4 studies about the New Jersey Health Care Reform Act

- Impact on quality of care of AMI patients (Volpp K et al. Health Services Research 2003)
- Impacts on outcomes for patients with 7 different conditions and based on market competitiveness
- Impact on outcomes by race
- Impact on hospital financial health

# Study #1: Effect of HCRA on AMI mortality

- Study Goals:

  - to examine how AMI mortality changed over time in New Jersey relative to control states

  - to determine whether there were differential effects based on patient insurance type

# Study Population

- **Primary diagnosis: acute myocardial infarction (AMI)**

  - common
  - treatable
  - high mortality rate
  - inpatient-only condition (admission criteria do not change over time)

# Longitudinal comparison of geographic area outcomes

- In choosing a condition in which there is little discretion as to hospital admission, severity of patients is constant over time except for demographic changes
- Relative to cross-hospital or cross-sectional analyses selection bias is avoided
- Control is needed for intertemporal change

# Empirical model: Is there a significant effect post rate-setting?

Linear probability model adjusting for:

- patient characteristics
- baseline differences in mortality between the two states
- common intertemporal trends
- identified effect of interest as post-HCRA divergence

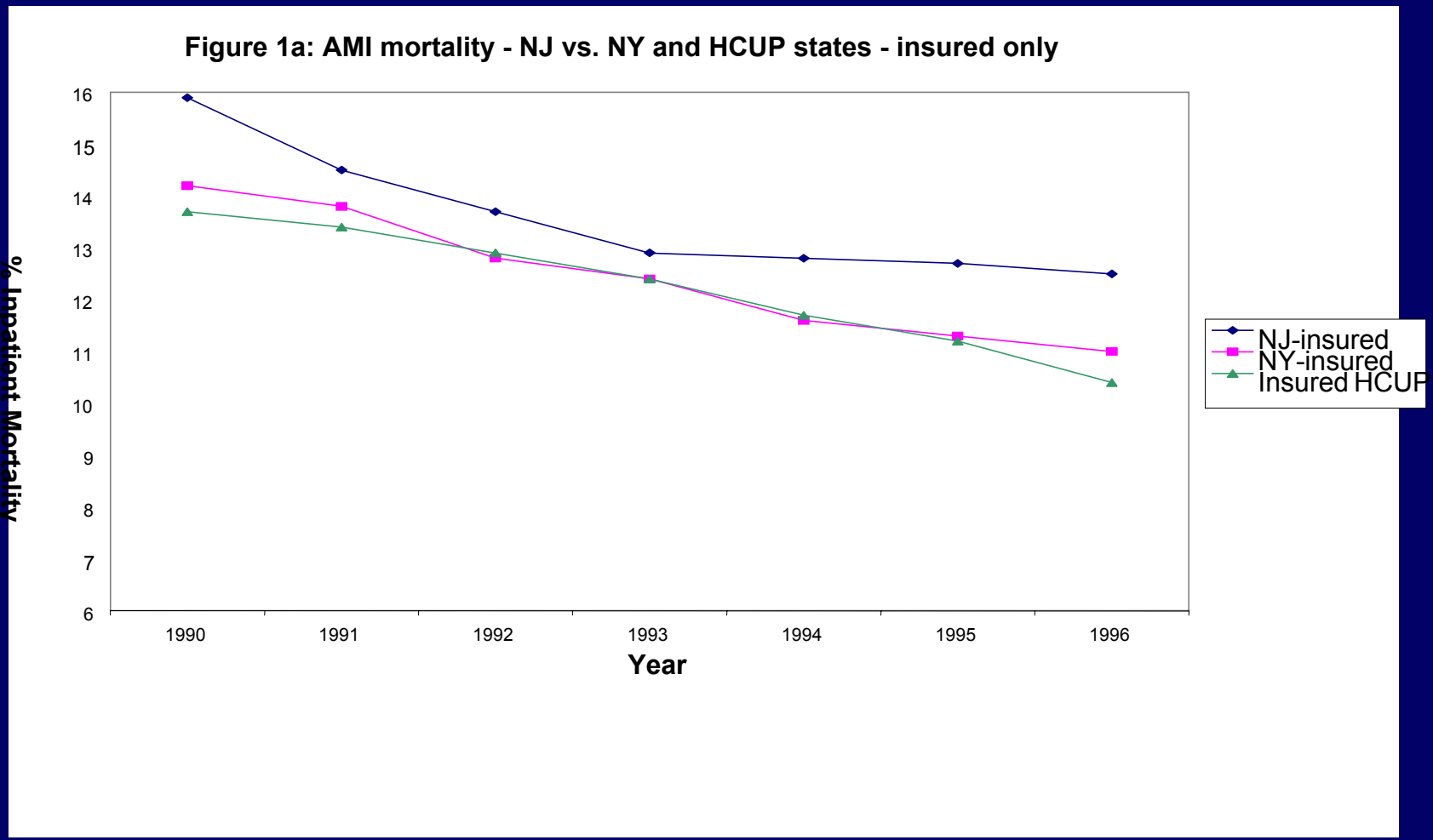
# New York as a control group

- New York had a hospital rate setting system throughout the time period of the study
- New York is a large, adjoining state
- New Jersey and New York had similar rates of change in mortality for study conditions during the three years pre-reform

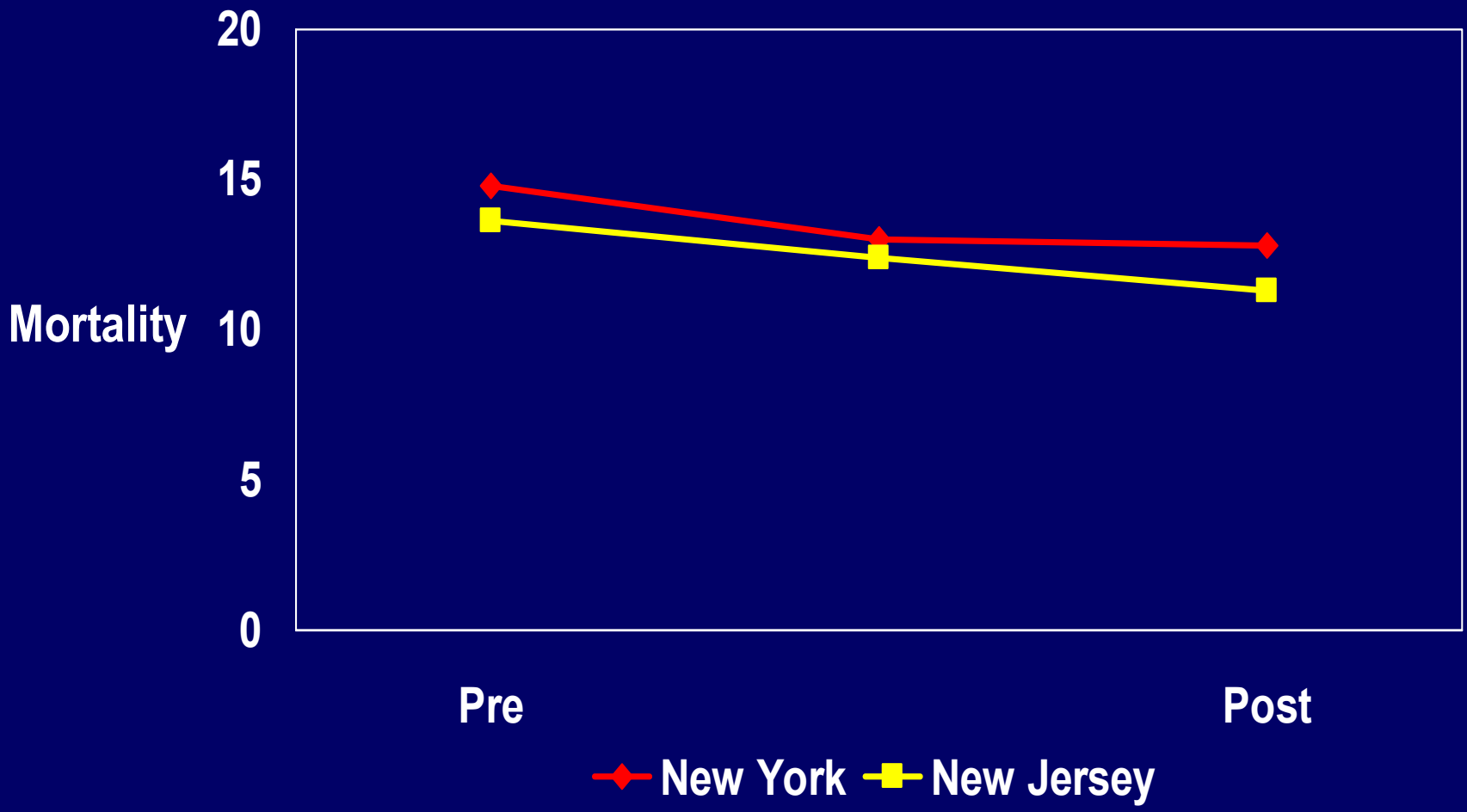
# Data sources and outcomes

- 1990-96 data
- Patient discharge data from New Jersey and New York (258,627 AMI patients)
- HCUP Nationwide Inpatient sample to corroborate time trends (364,273)
- Primary outcome measure: 30-day in-hospital mortality
- Secondary outcomes:  use of cardiac procedures (catheterization, angioplasty, CABG)

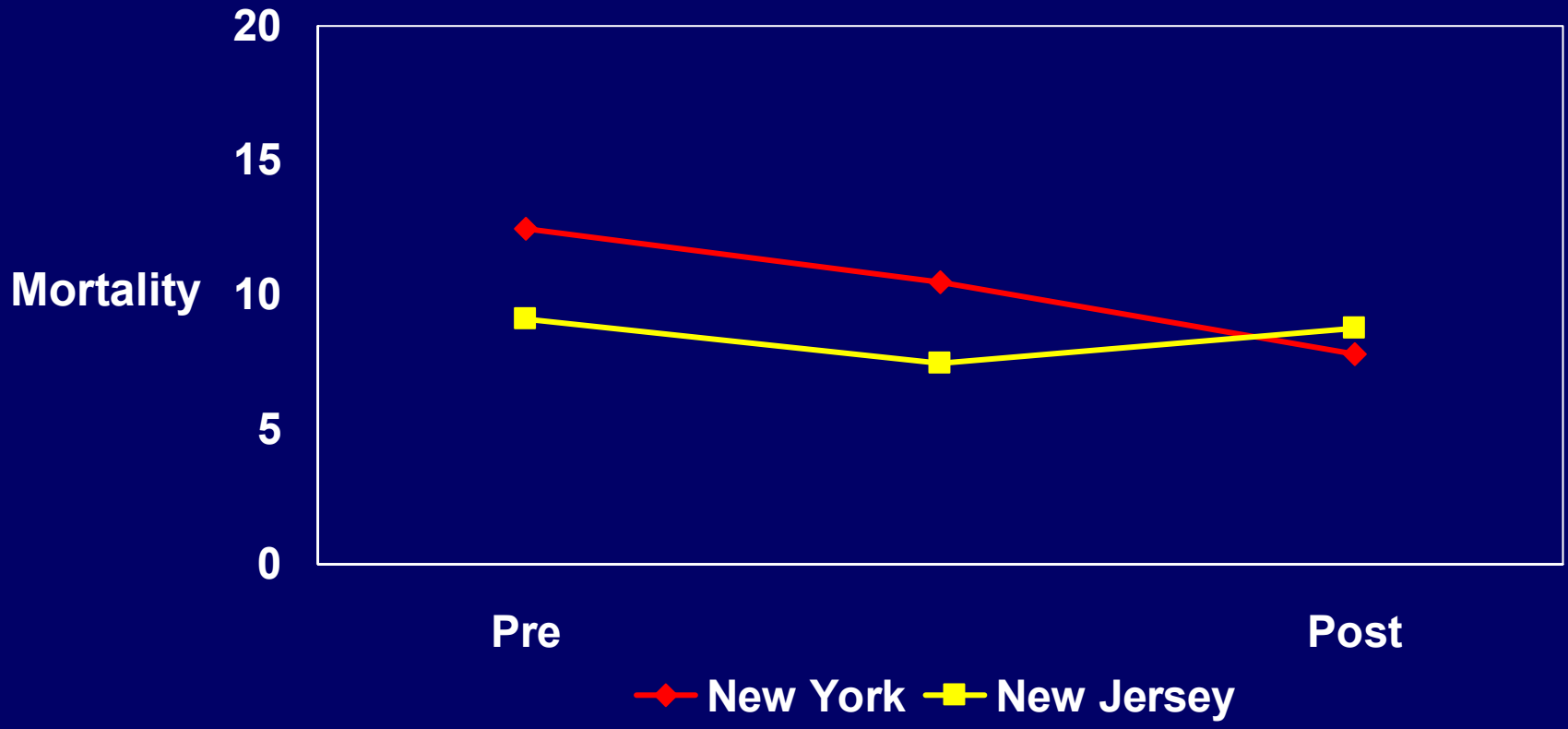
# NY and HCUP NIS had similar trend in mortality over time



# No significant effects were observed in mortality among the insured

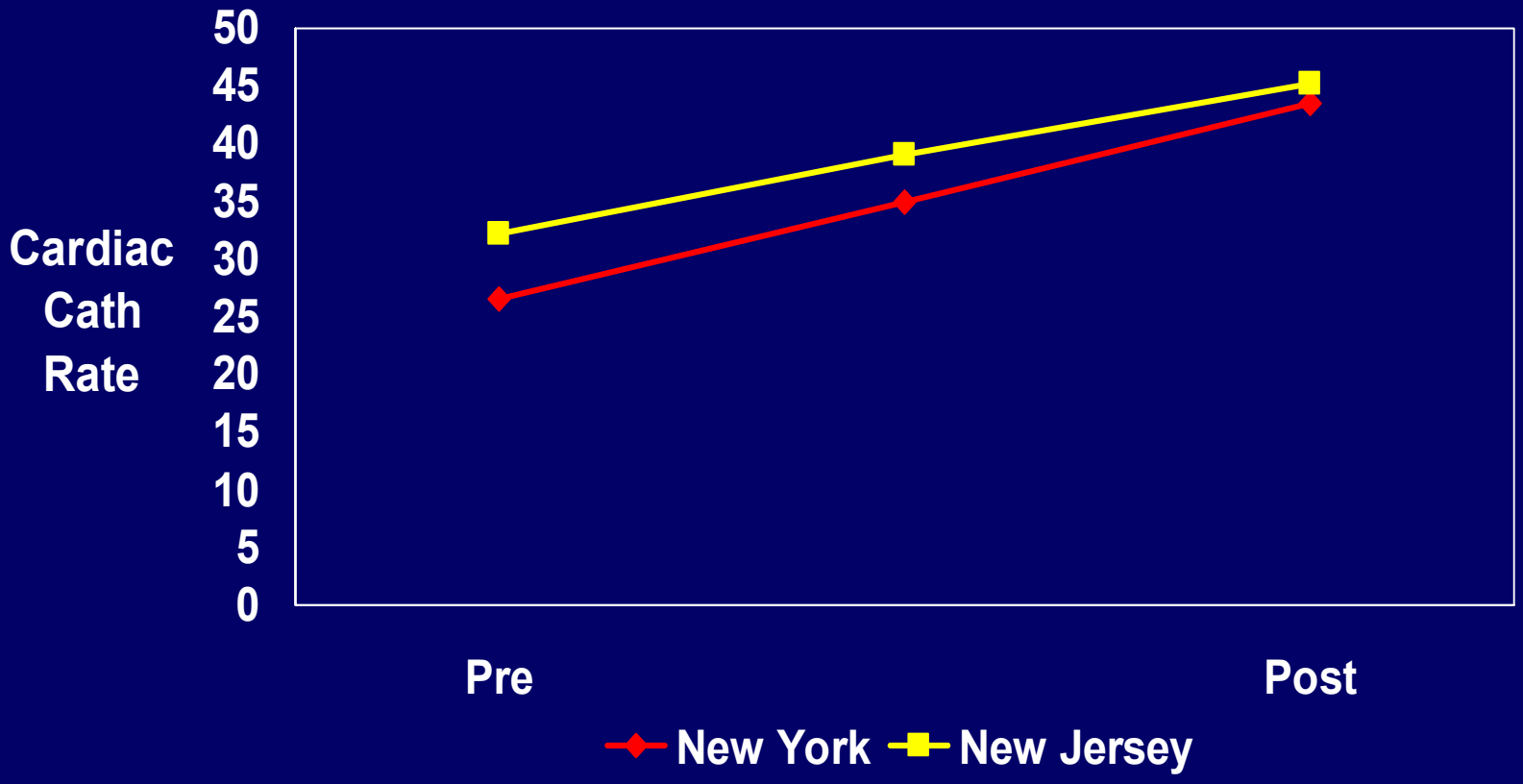


# There was a significant relative increase in mortality among uninsured NJ AMI patients

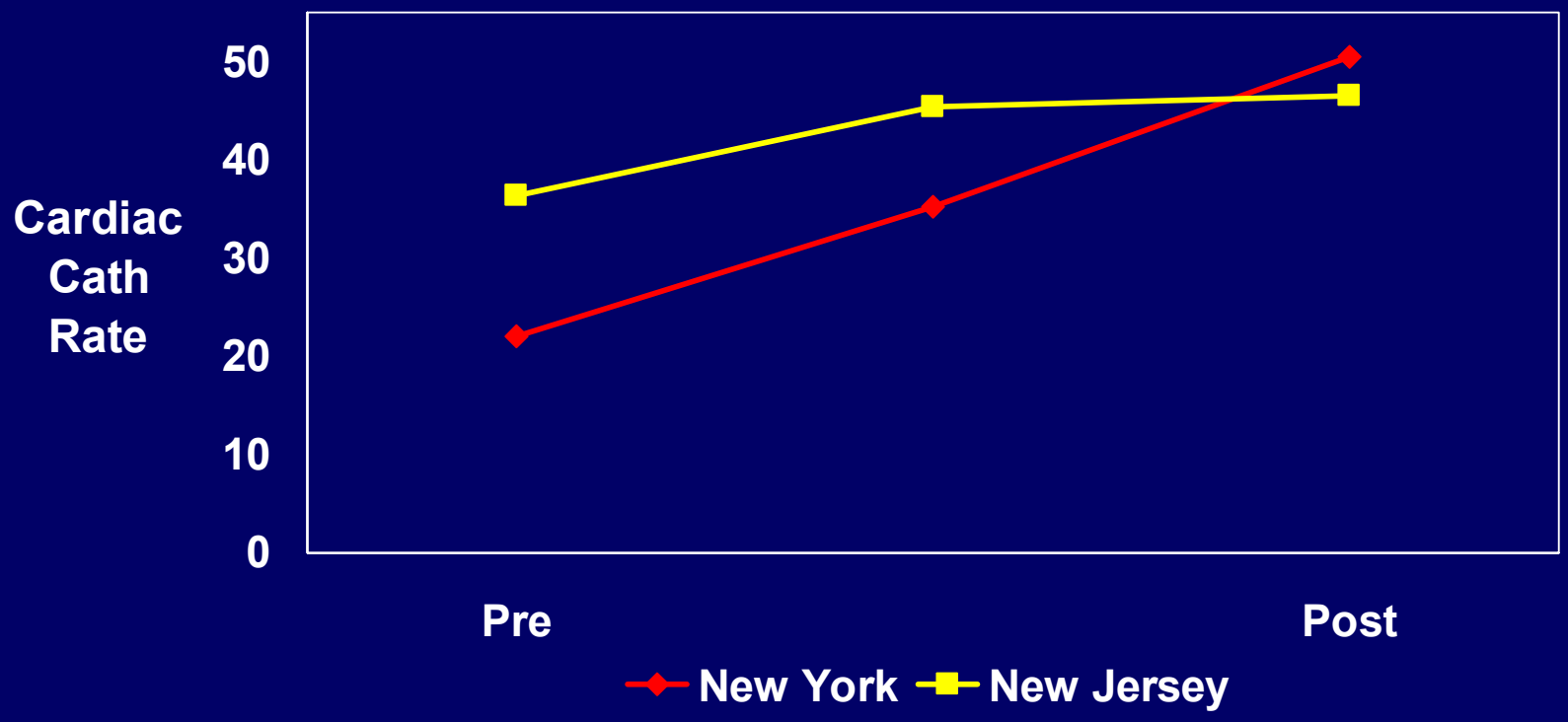



Relative to New York, mortality for the uninsured in New Jersey increased by 4.9 percentage points

# Relative change in cardiac catheterization rate post-MI was similar among insured patients in NJ and NY



# Among uninsured, there was a relative decrease in cardiac catheterizations in NJ




Relative to New York, cardiac catheterization rates for the uninsured in New Jersey decreased by 13.5 percentage points

# Larger reductions were also observed in mechanical revascularization rates among NJ uninsured

- Approximately 3.0 percentage point reduction among NJ insured relative to NY insured
- Approximately 9.7 percentage point reduction among NJ uninsured relative to NY uninsured

# Conclusions

- Mortality worsened for uninsured AMI patients in NJ following passage of HCRA
- Relative reductions in the rate at which cardiac procedures were done support the notion that the uninsured may have received worse care post-reform

# Limitations

- No data on transaction prices
  - Other investigators have shown that price competition decreases costs and price-cost margins

- In-hospital data only
  - LOS decreased more in NJ than NY biasing against finding relative increases in mortality in NJ

- Analyses limited to one diagnosis

# Study #2: Effects of HCRA on mortality for seven conditions and effects of competition

- Goals:

  - To examine whether market-based reform in NJ led to relative increases in mortality among patients with medical conditions other than AMI

  - To determine whether patients treated at hospitals with more difficult market conditions experienced larger increases in inpatient mortality

# Measuring effects

- Compared risk-adjusted mortality over time for patients in NJ vs control state NY

- Adjusting using Linear probability model:
  - patient characteristics
  - baseline differences in mortality
  - common intertemporal trends
  - adjusted SE's for hospital-level clustering

- In more competitive vs less competitive hospital markets

# Study Population

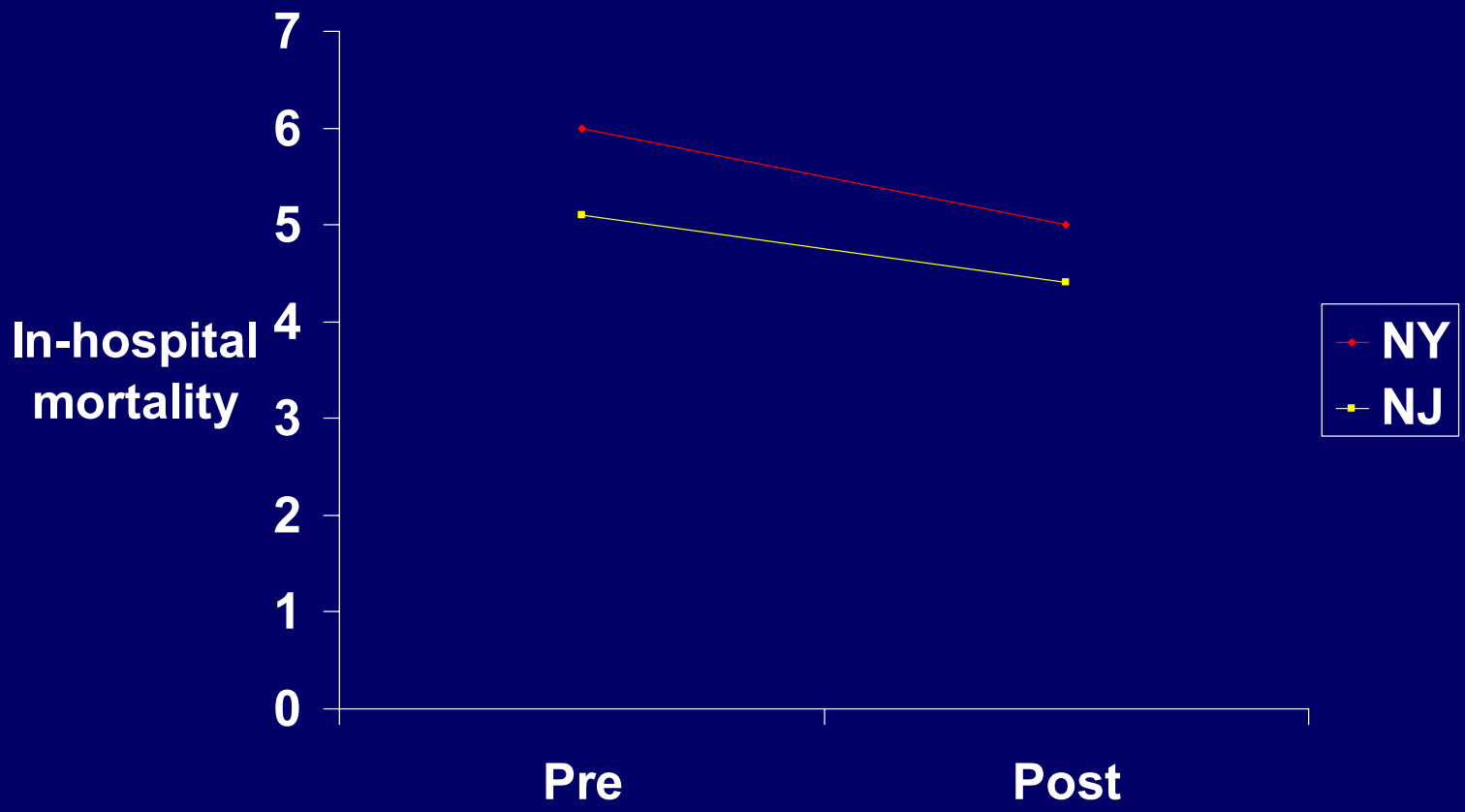
- All patients under age 65 admitted to hospitals in New Jersey or New York from 1990-96 (N=367,261)
  - AMI (in market analyses)
  - Stroke
  - Pulmonary embolism
  - Hip fracture
  - Gastrointestinal bleeding

  Non-discretionary Admissions

  - Congestive heart failure
  - Pneumonia

  Discretionary Admissions

# Mortality declined in both states for these six conditions over time

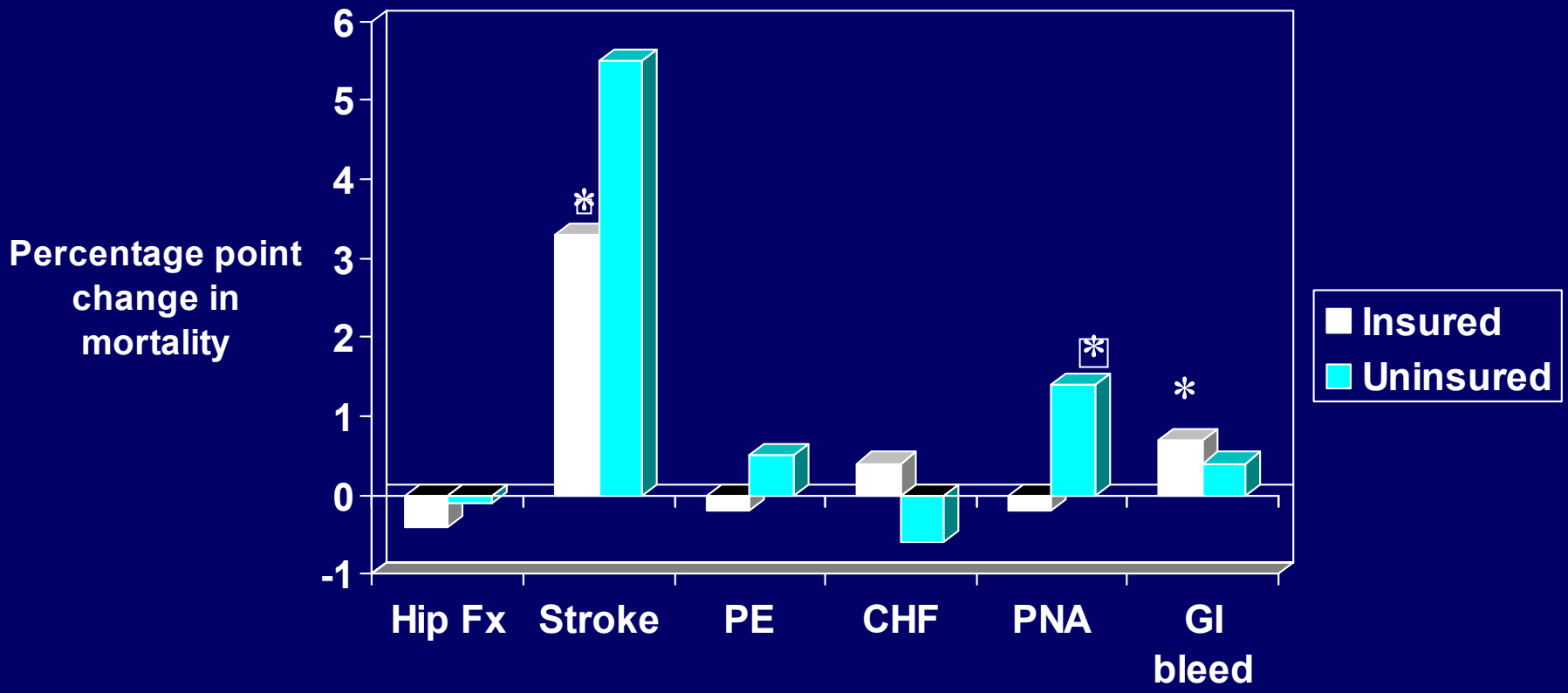


# Relative overall increase in mortality in NJ for six conditions

| | Percentage Point Increase | P value | N |
|---|---|---|---|
| Insured: | 0.4 | .059 | 318862 |
| Uninsured | 1.0 | .096 | 48339 |
| Overall | 0.5 | .044 | 367261 |

Difference between insured and uninsured is not significant (p=.373)

# Among six conditions, size of increase in mortality in NJ relative to NY varied

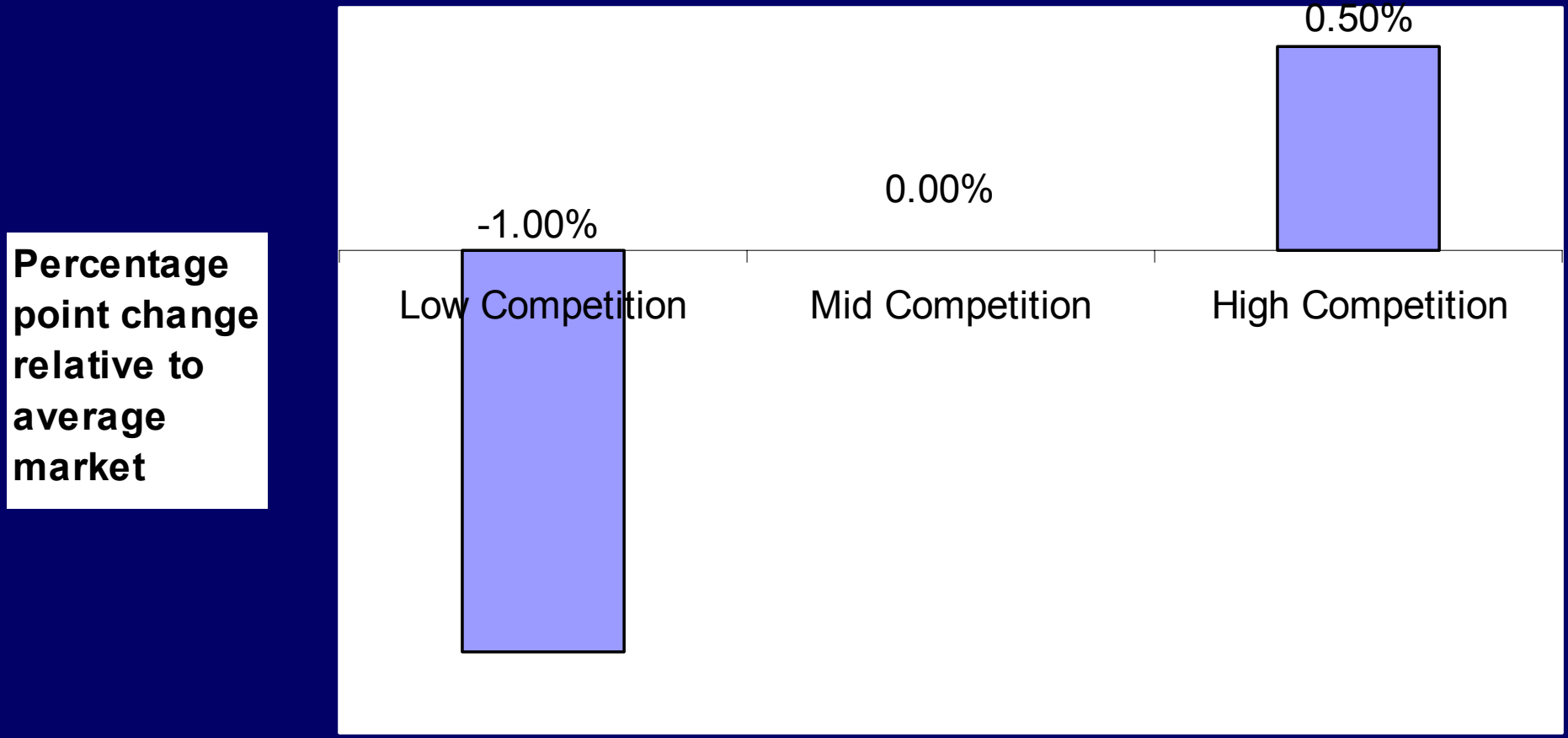



*Sig at .05 level

# Measuring competition

- Markets defined by Health Service Areas (HSAs)
- Hirschman-Hefindahl Index (HHI) – commonly used as a measure of hospital concentration
- Interaction between HHI and HMO penetration was used to group hospitals into “low,” “mid” and “high” competitive groups

# Mortality worsened more for patients in more competitive markets




Difference between low and high competition markets sig with p=.04

# Did reductions in subsidies for uncompensated care have an independent effect on mortality?

- Could not measure subsidies directly
- Used % of uninsured patients at each hospital as proxy for effects of reduced subsidies as hospitals with high % uninsured were affected more

# Hospital proportion of uninsured was a significant factor in overall effects

| | Percentage Point Increases | |
|---|---|---|
| | **Model A** | **Model B** |
| Main effect | 0.5* | 0.2 |
| Low Comp | -1.0 | -0.9 |
| High Comp | 0.5 | 0.7 |
| % Uninsured | | 0.8* |

*sig at .05 level

# Conclusions

- Mortality worsened for six conditions in NJ following passage of a market-based reform
- More competitive hospital markets within NJ had bigger adverse changes in hospital outcomes
- The proportion of uninsured patients in hospitals explained some of the overall effect and appears to have been complementary to price competition

# Limitations

- Only 9 different HSAs in New Jersey
- Not much variation in market concentration (effects might otherwise be stronger)

# Study #3: Do effects of NJ HCRA differ by race

Goal:

- To determine whether market reform in NJ affected blacks differently than whites adjusting for differences in insurance status

# Health Disparities are a widely recognized problem

- Cross-sectional studies show that blacks generally receive worse quality of care than whites
- Explanations include differences in access to care, insurance status, patient characteristics, patient preferences, racial bias

# Have Market Reforms contributed to disparities?

- Market reforms (price competition and selective contracting) have been widely embraced to reduce health costs

- Such reforms could reduce access to hospital care or the quality of care once patients are admitted to hospitals

# Study Population

- All patients admitted to hospitals in New Jersey or New York from 1990-96 (1,357,394) with:
  - Acute Myocardial Infarction
  - Stroke
  - Pulmonary embolism
  - Hip fracture
  - Gastrointestinal bleeding

  Non-discretionary Admissions

  - Congestive heart failure
  - Pneumonia

  Discretionary Admissions

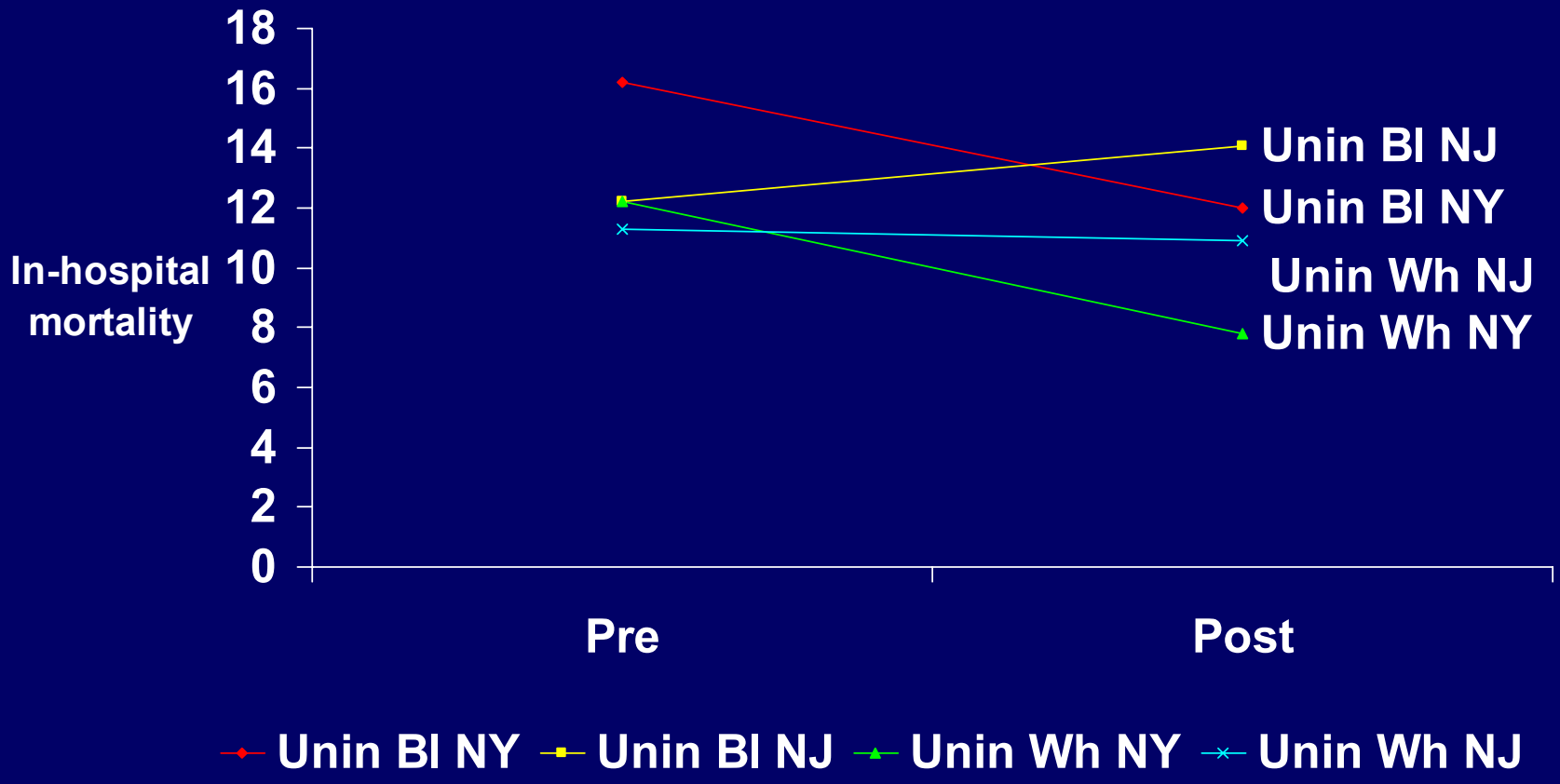
# Empirical Strategy

- Compare rate of change in risk-adjusted mortality for patients in NJ vs. patients in NY by race and insurance status
- Determine whether 5 conditions with non-discretionary admissions have different findings than 2 conditions with discretionary admissions
- Examine whether proportion of black patients is a significant predictor of magnitude of adverse effects

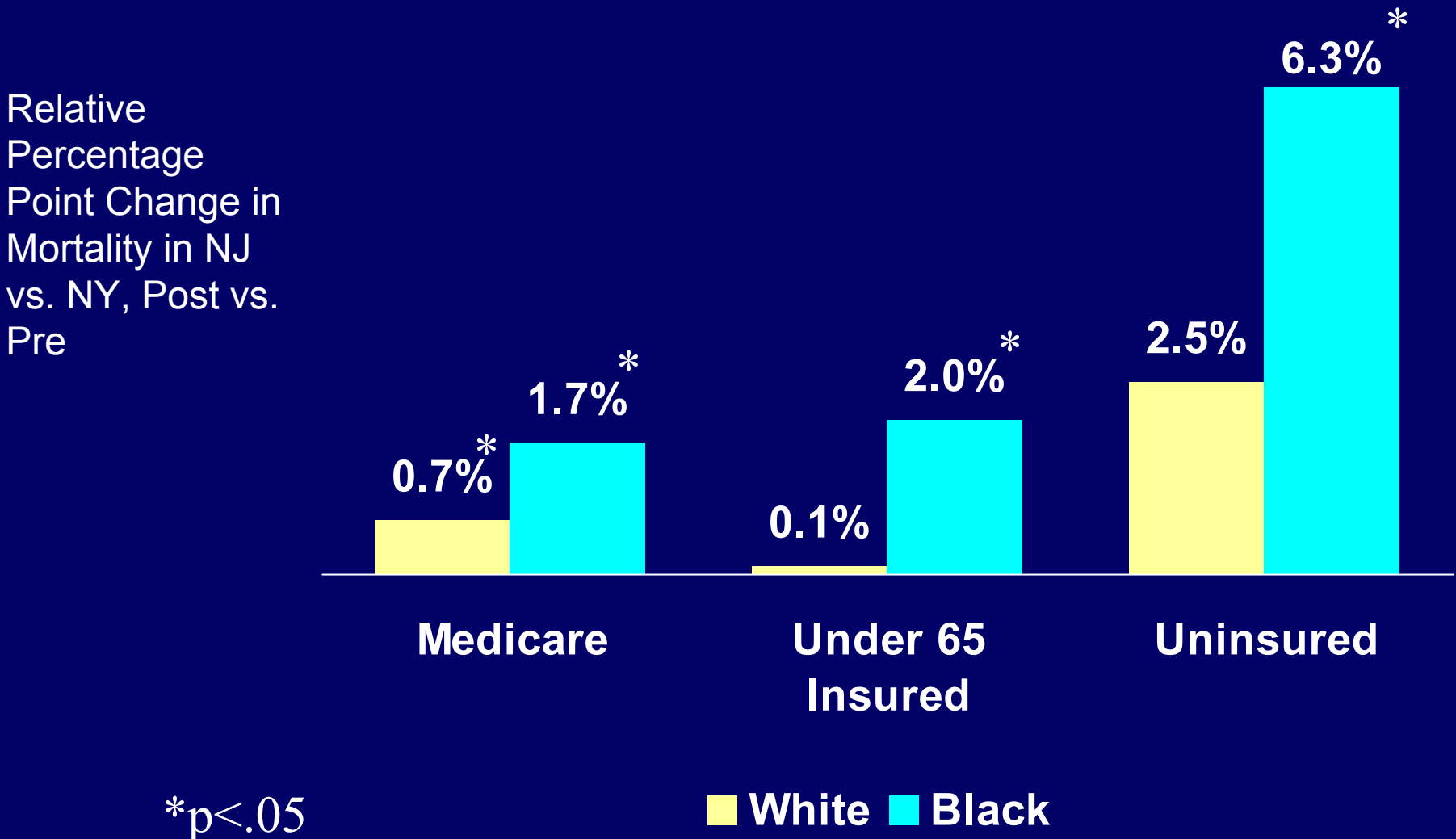
# Number of cases for nondiscretionary admissions under age 65 is nearly constant over time

| | Pre | Post |
|---|---|---|
| New Jersey | | |
| Whites | 19,847 | 19,293 |
| Blacks | 4,252 | 4,442 |
| New York | | |
| Whites | 39,956 | 39,448 |
| Blacks | 9,608 | 9,870 |

# Uninsured Blacks in NJ were the only subgroup among the uninsured to experience increased mortality

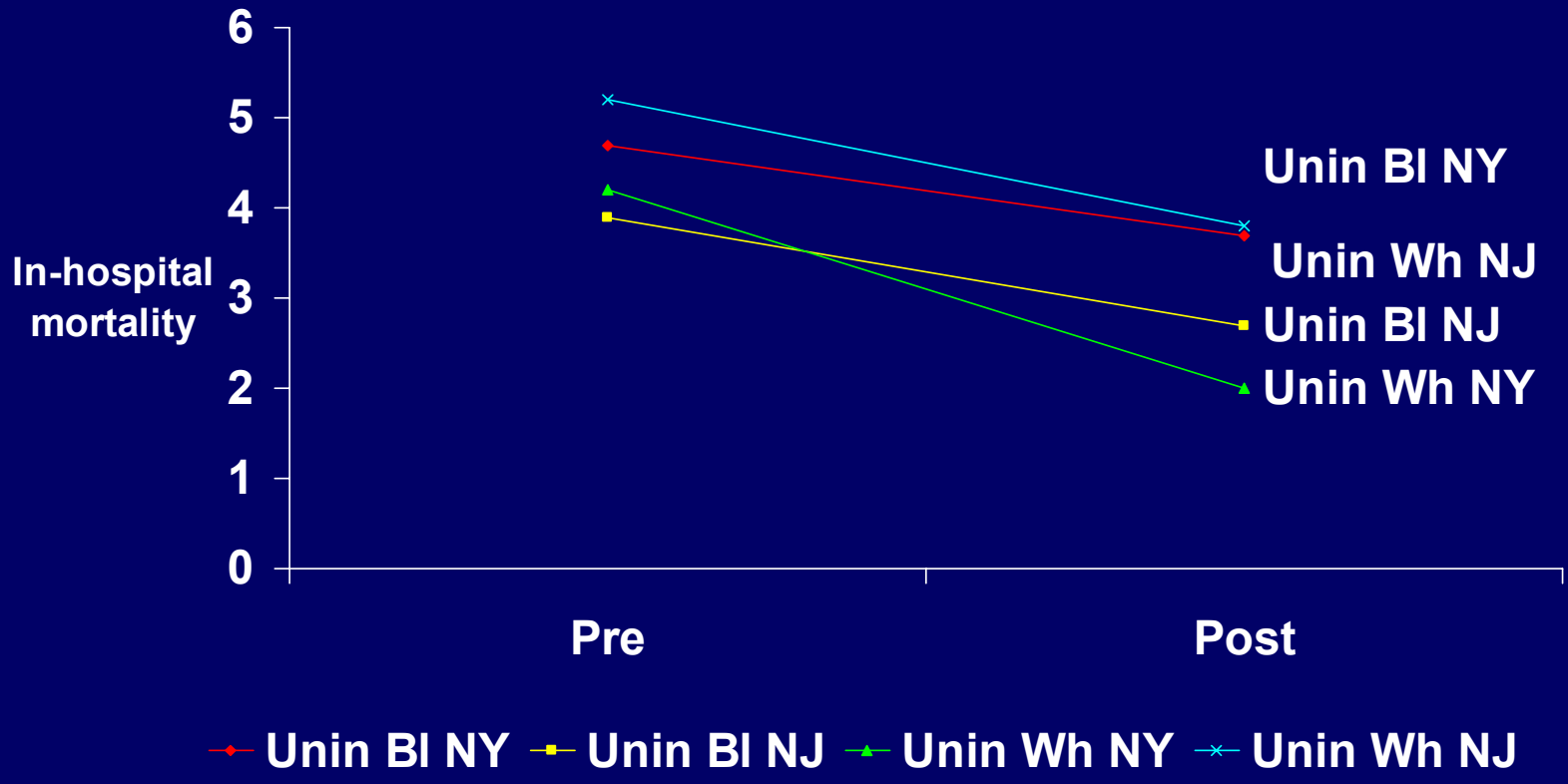


# Mortality increased more for blacks than whites for 5 Conditions with Non-discretionary Admission

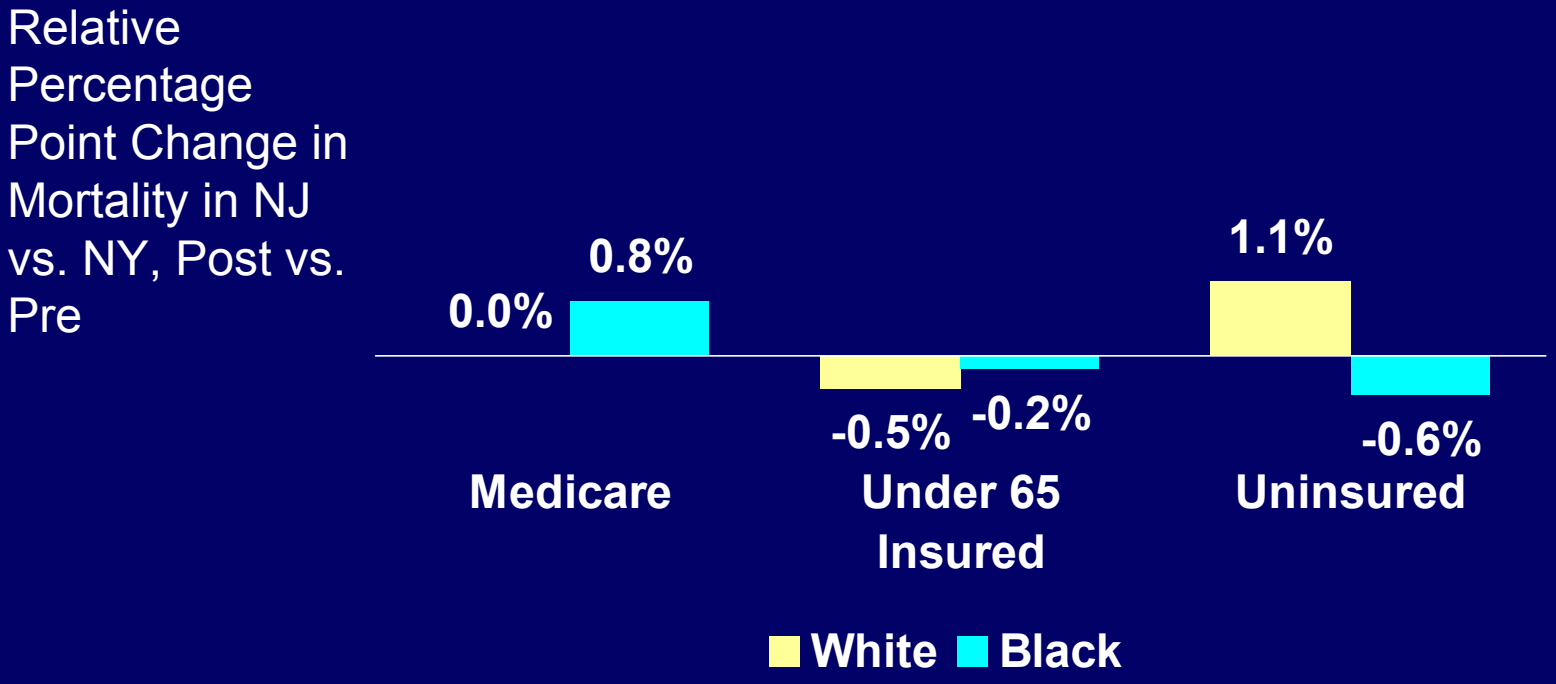



*p<.05

# Among patients with 2 conditions with discretionary admissions, mortality for uninsured in NJ and NY changes similarly



# Relative Changes in Mortality Are Much Smaller for CHF and Pneumonia and blacks do not fare worse



# Many blacks are treated in different hospitals than whites

- Hospitals where whites are treated – average % blacks about 12%
- Hospitals where blacks are treated – average % blacks about 32%

# Do blacks do worse within the same hospitals or is it a between hospital effect? (5 condition sample)

| | w/o hosp cntrl | w/cntrl |
|---|---|---|
| Effect - Whites | .007 | .004 |
| | (.021) | (.357) |
| Effect - Blacks | .022 | .015 |
| | (.000) | (.09) |
| % Black*NJ effect | | .011 |
| | | (.113) |
| Test of difference | .015 | .008 |
| Blacks vs. Whites | (.015) | (.455) |
| | | |
| N | 569,467 | 569,467 |

# Conclusions

- Among patients with non-discretionary admission, NJ blacks had relative increases in mortality of 2.2 percentage points overall, 6.3 percentage points among uninsured
- Hospitals with more blacks had bigger increases
- Lack of increased mortality among blacks with CHF, pneumonia may represent unmeasured severity or true differences
- HCRA contributed to racial disparities

# Limitations

- Lack of data on hispanics and other races
- Mechanism that provides corroborating evidence

# Study #4: Financial Impact of HCRA and relationship of financial stress and quality of care

Goals:

- determine the financial impact on NJ hospitals of HCRA

- examine whether hospitals which were more affected financially had bigger adverse changes in outcomes

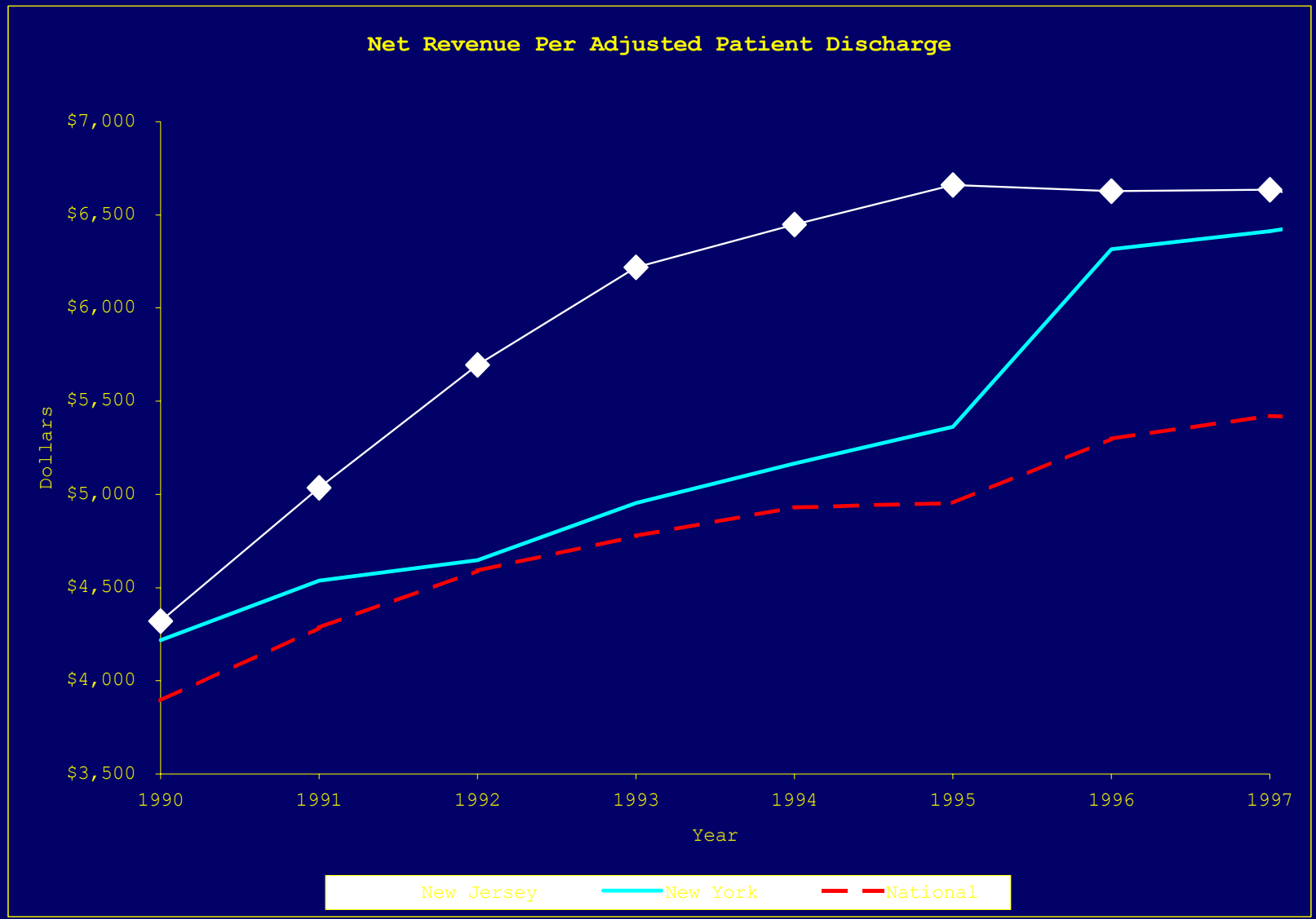
# There is some evidence that financial stress in hospitals affects quality

- Hospitals with the lowest inpatient operating costs had the highest likelihood of negligent medical injury (Burstin, 1993)
- Reductions in Medicaid reimbursements have been associated with reduced rates of revascularization (Langa and Sussman 1993) and reductions in the number of services per admission (Dranove and White, 1998)
- Decrease in PPS reimbursement from 1985 to 1994 increased 30-day mortality of AMI patients (Shen, 2003)

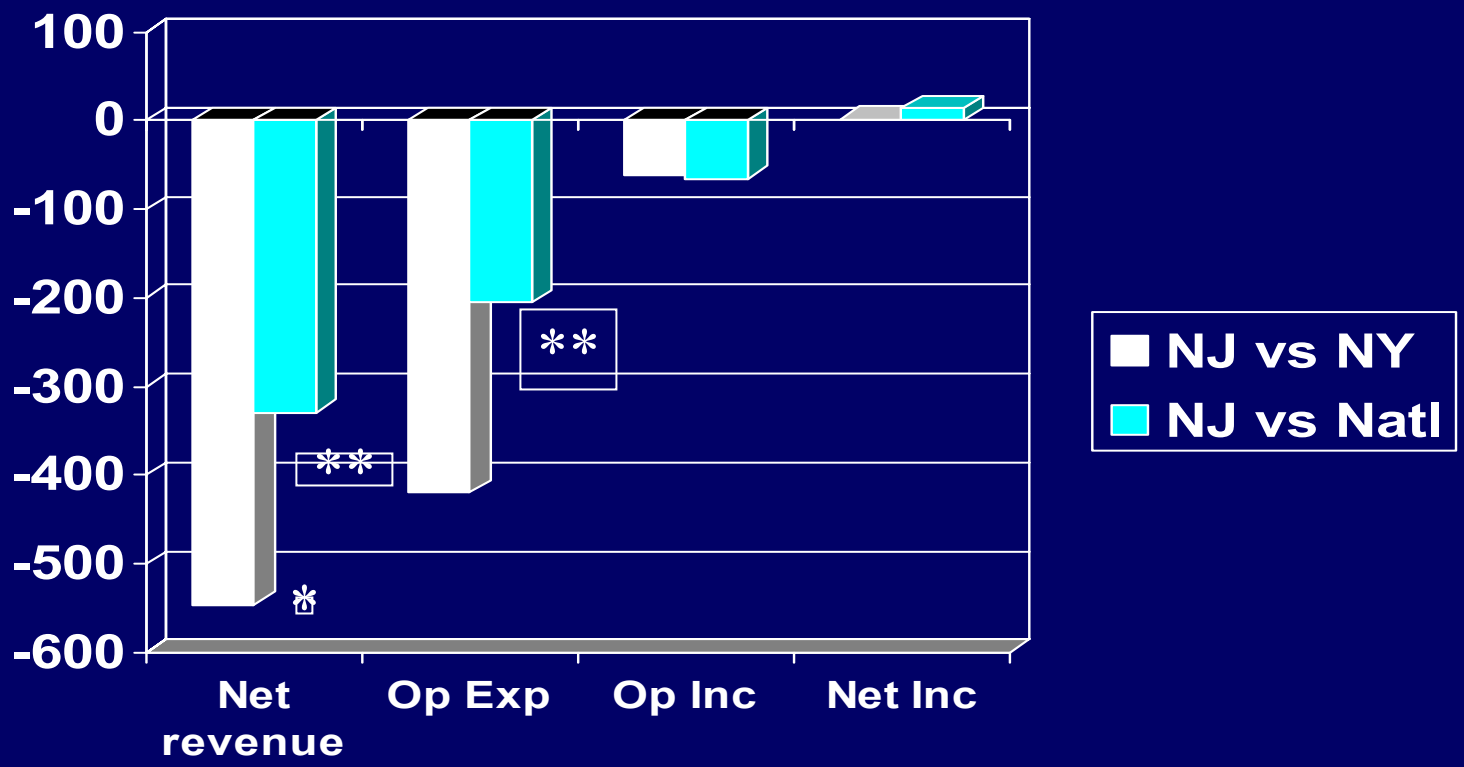
# Why might price competition induce financial stress and affect quality of care?

- Increase in size and frequency of price discounting puts pressure on hospital profit margins leading to attempts to cut costs
- In contrast to price, outcome-enhancing technical quality is not easily observed or measured by payers
- If net revenues decrease, hospitals must decide whether to reduce operating margins or expenditures on health services

# Net revenues per adjusted patient discharge flattened out in NJ post-HCRA



# Financial health of NJ hospitals worsened relative to comparison states




* Sig at .10 level

** Sig at .05 level

# Changes in net revenues were not associated with market measures

- No significant associations between changes in net revenues and HHI, HMO penetration

# Were patients within NJ differentially affected by changes in hospital financial health?

- Compare patient mortality risk over time for patients in different hospitals within NJ

$$y_i = X_i\beta + \sum_{t=1991}^{1996} \alpha^t \delta^t + \sum_{h=2}^{H} \alpha_h HOSP_i^h + \sigma FIN_{it}^h + \varepsilon_{it}$$

where,

$y_i$ = mortality within 30 days of hospital admission for individual I,

$X_i$ = vector of individual characteristics

($\delta$) = dummy variables for intertemporal trends

$HOSP_i^h$ = hospital dummy variables

$FIN_{it}^h$ = hospital-level financial measures

# Study population – 2 separate samples

- Patients with 7 conditions used in previous studies

- General surgery, orthopedic surgery and vascular surgery patients that had complications (DVT, hospital-acquired pneumonia, shock or cardiac arrest, upper gastrointestinal bleeding, hospital acquired sepsis) – 230,837 cases

# Relationships between our measures of hospital financial health and quality were not significant

- Neither changes in net revenue, net income or operating expenses were associated with mortality changes post-HCRA
- Effects were non-significant for both insured and uninsured patients

# Conclusions

- Preliminary evidence suggests no differential effect of hospital market structure on changes in net revenues
- Changes in quality do not appear to be mediated by financial stressors alone
- Further work is needed to better understand role of financial stress