

# A Power-Law of Death

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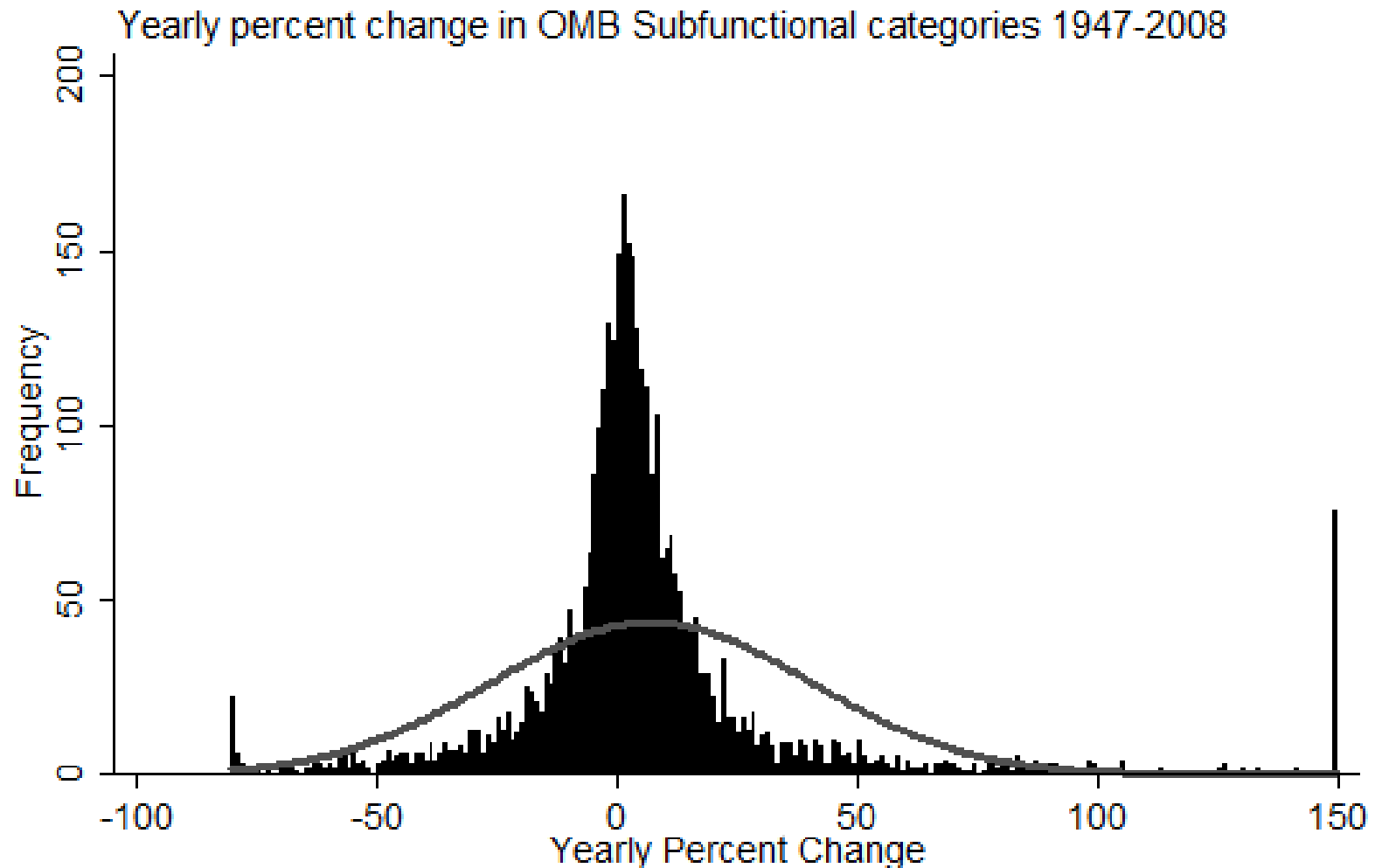
# Plan of Talk

- Some background on complexity-related ideas in my work
- Background on the death penalty
- Core of the presentation: geographic distribution of executions and the puzzle why it follows a power-law or something close to that
- My goal: to get your help in explaining an interesting empirical puzzle, one with substantive importance for equal justice

# Policy Agendas Project

- [www.policyagendas.org](http://www.policyagendas.org)
- Work with Bryan Jones, University of Texas
- Large databases on US government activity since 1947: all hearings, all bills introduced, all laws, etc. Millions of observations.
- Unpredictable nature of policy change, positive feedback / cascade effects

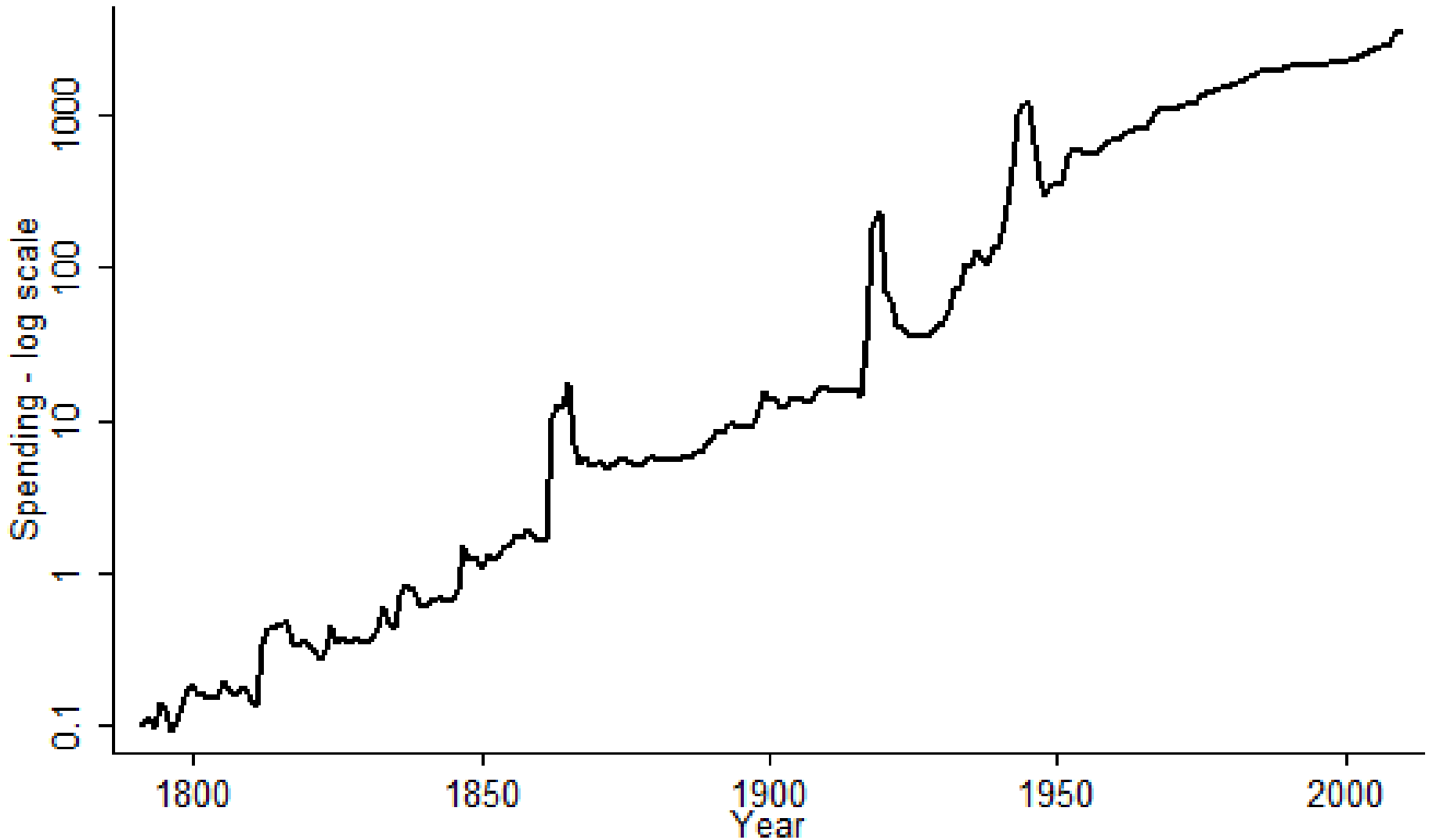
# An example: Government Spending



N= 3726 K= 606.01 LK=0.605

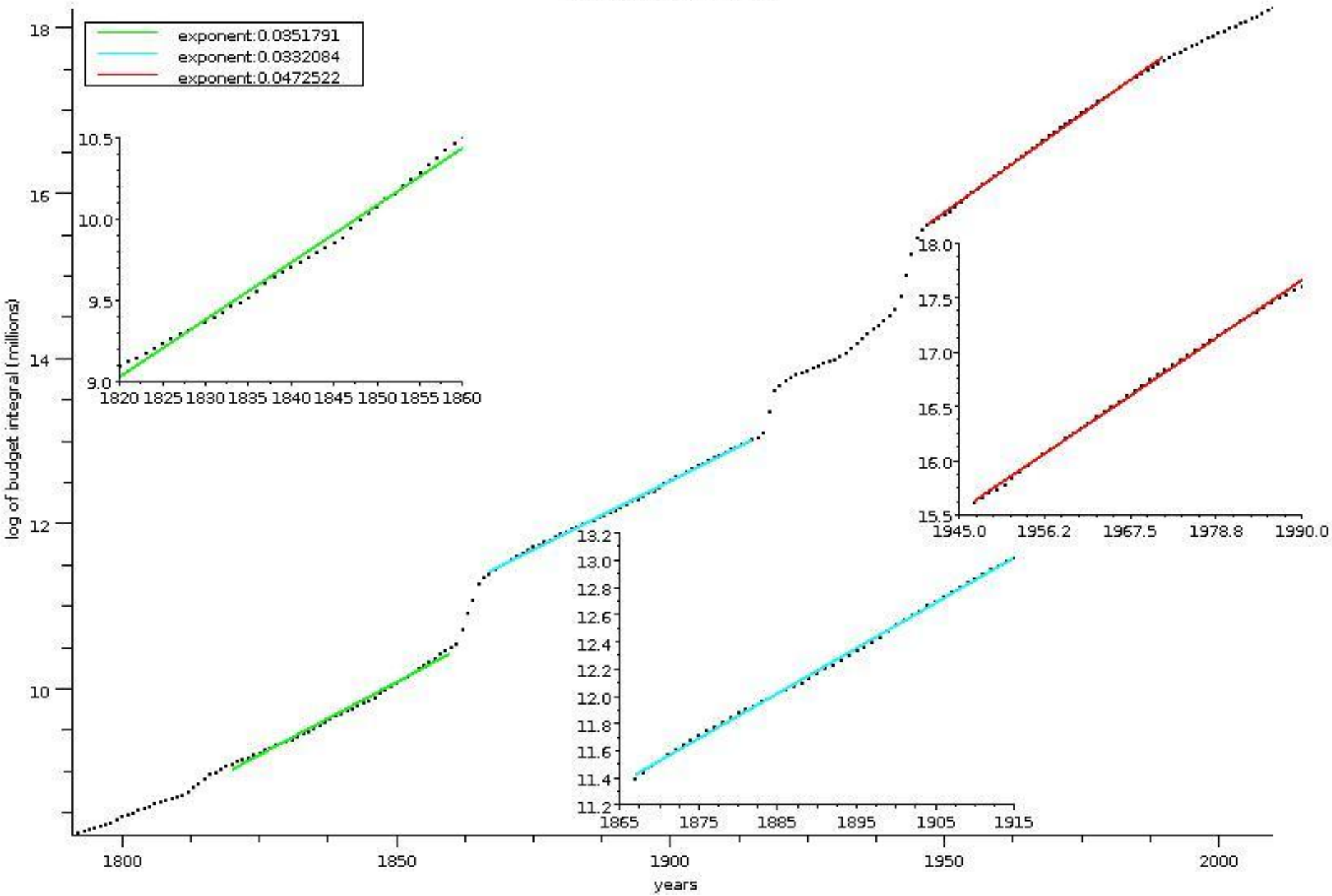
Note: Extremely high / low values clustered at -80 and +150

# US Federal Government Outlays



Spending in billions of 2010 dollars

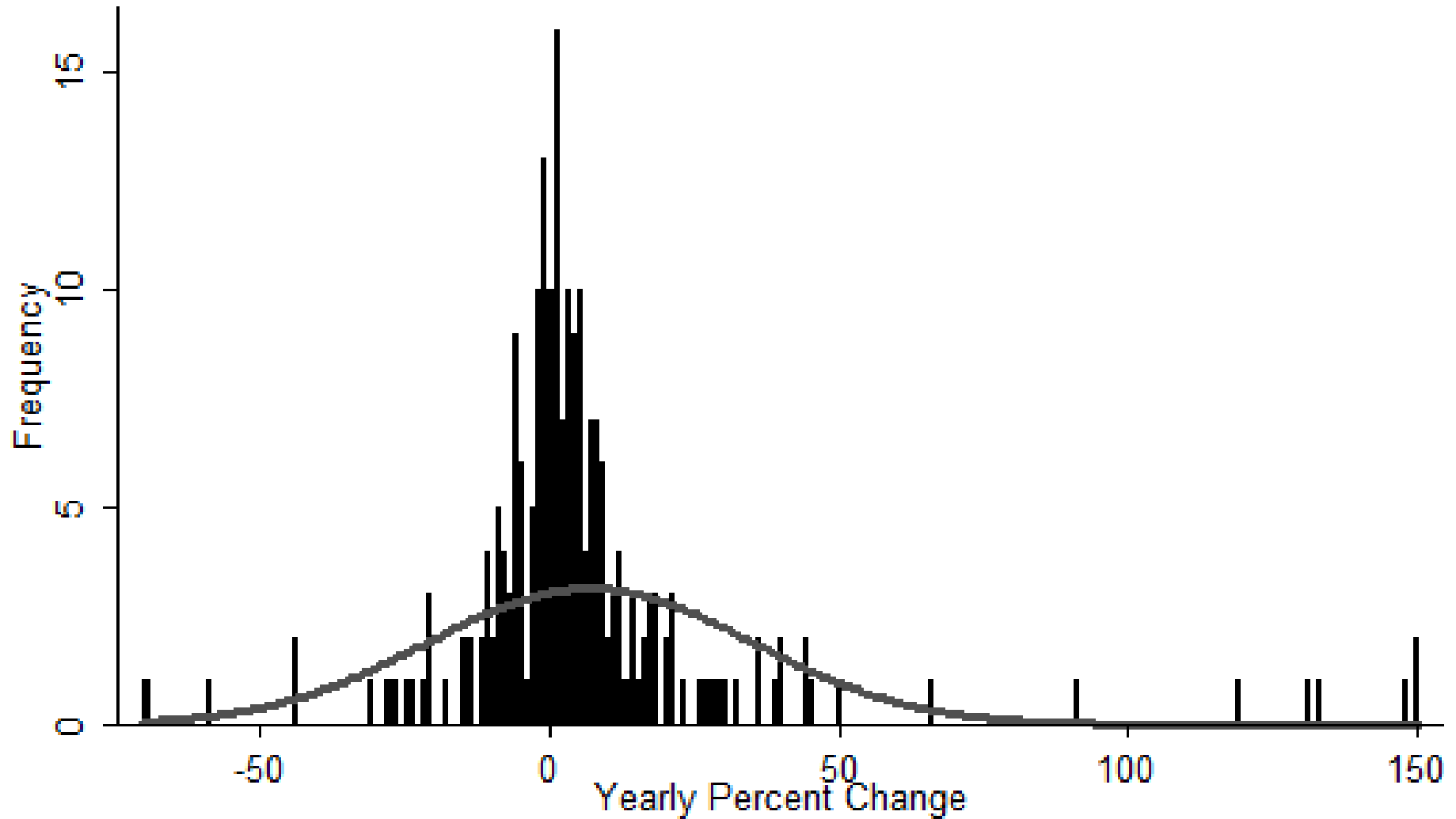
log of Total budget integral



# Same patterns at different scales

- Wars affect the entire budget
  - Shock to spending
  - New areas of government activity, which remain in place
  - They may also affect the subsequent pattern of growth, what we expect government to do
- But exogenous shocks are not the whole story
- We can look at more detailed budget categories, only from 1947, and we observe similar patterns

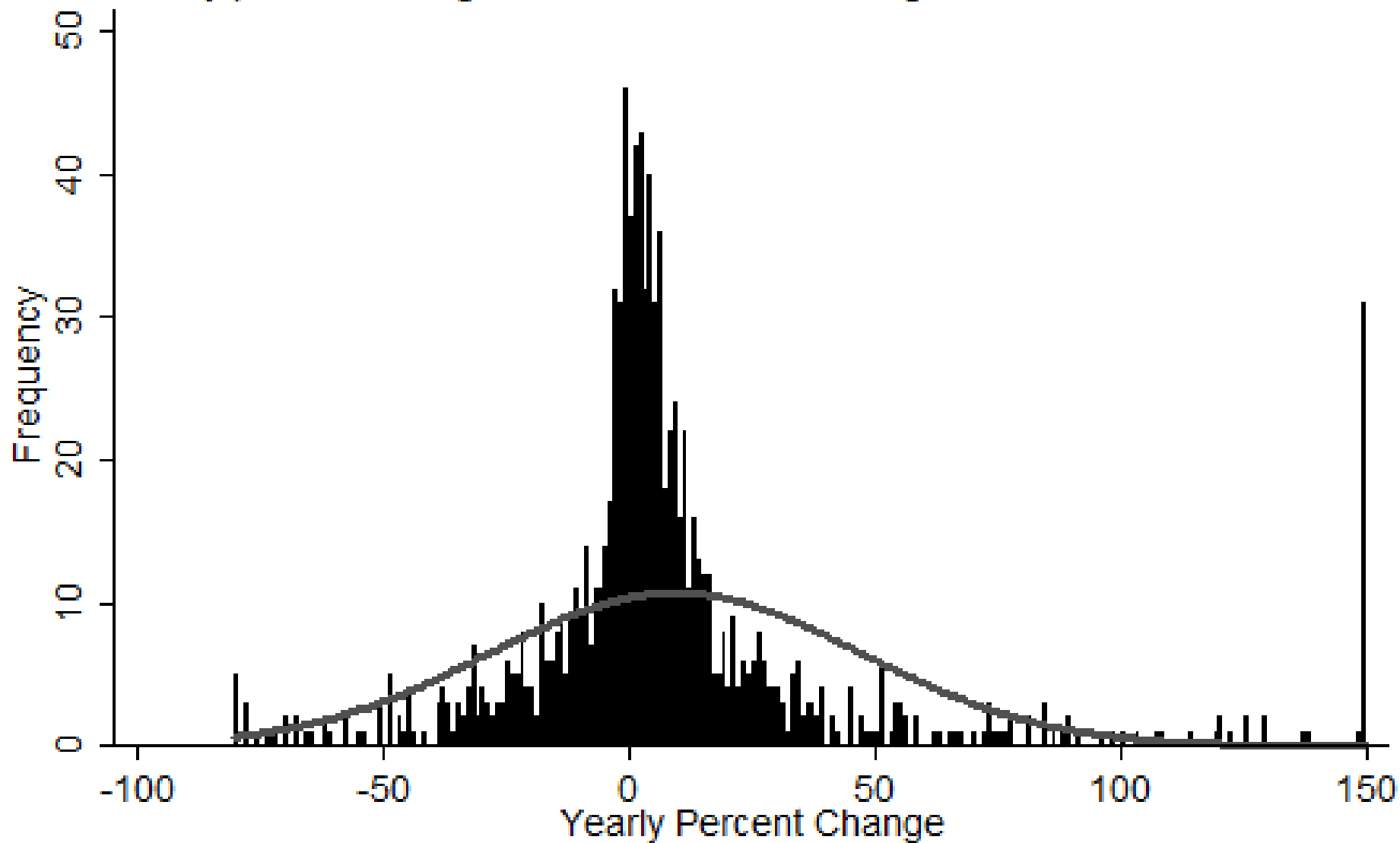
# Yearly percent change in Total Budget Outlays



N= 219 K= 68.13 LK=0.553

Note: Extremely high / low values clustered at -80 and +150

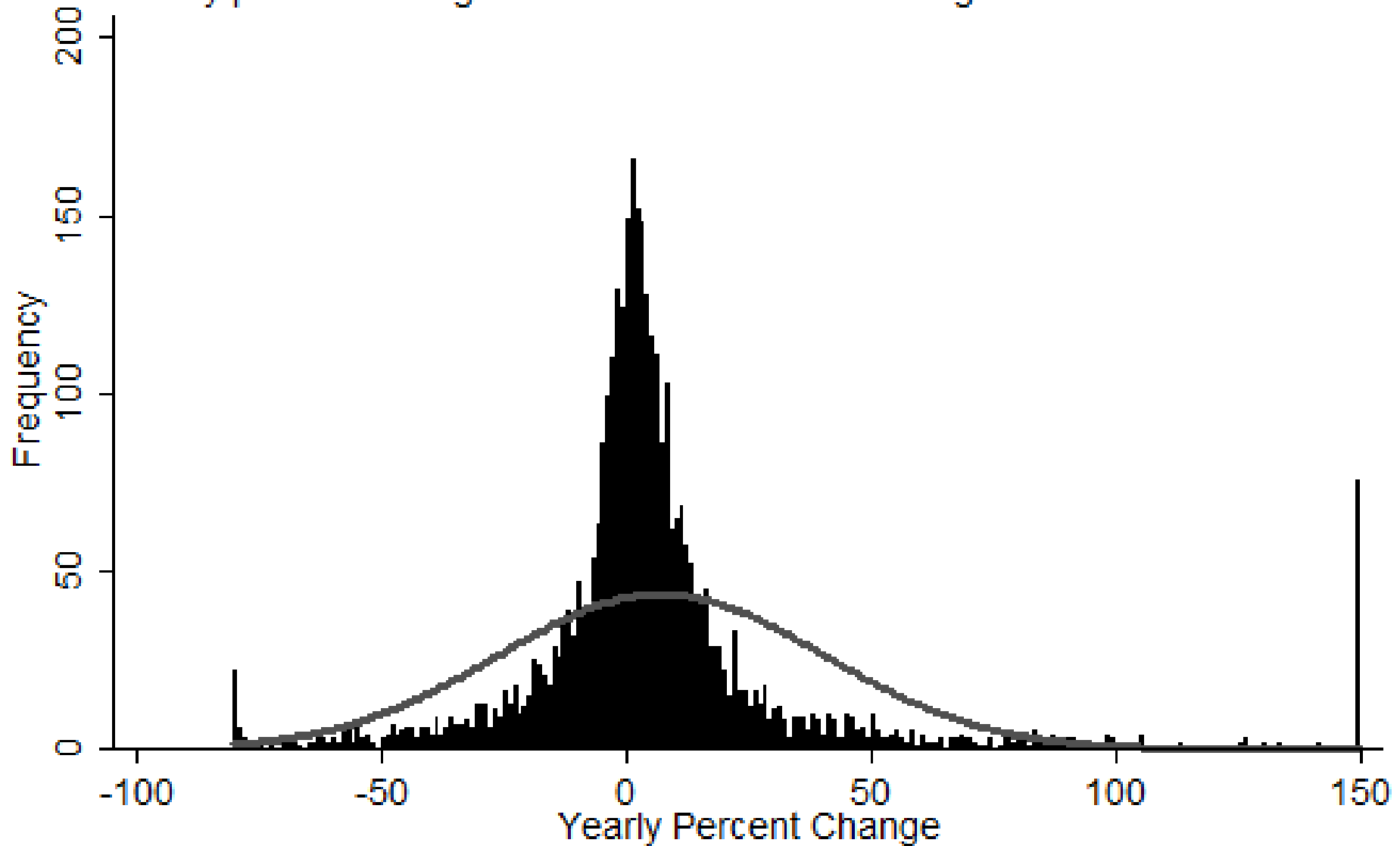
# Yearly percent change in OMB Functional categories 1947-2008



N= 1074 K= 190.96 LK=0.580

Note: Extremely high / low values clustered at -80 and +150

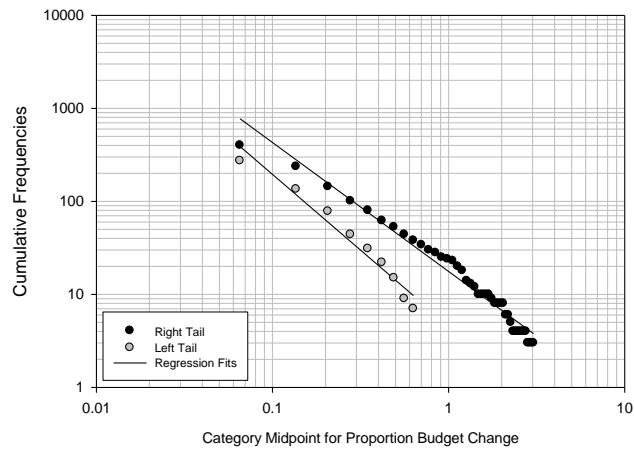
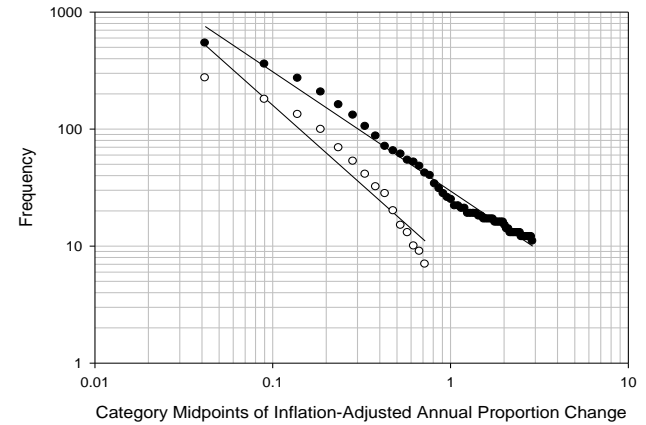
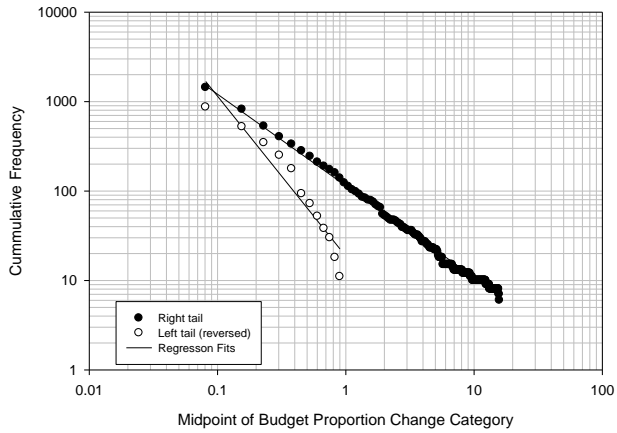
# Yearly percent change in OMB Subfunctional categories 1947-2008



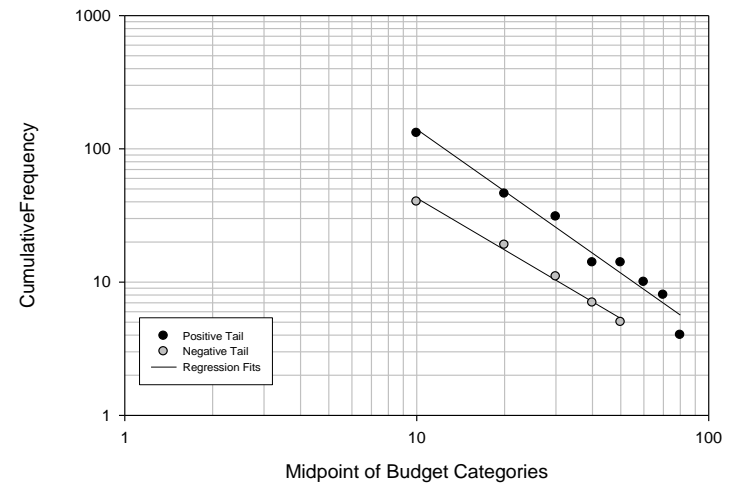
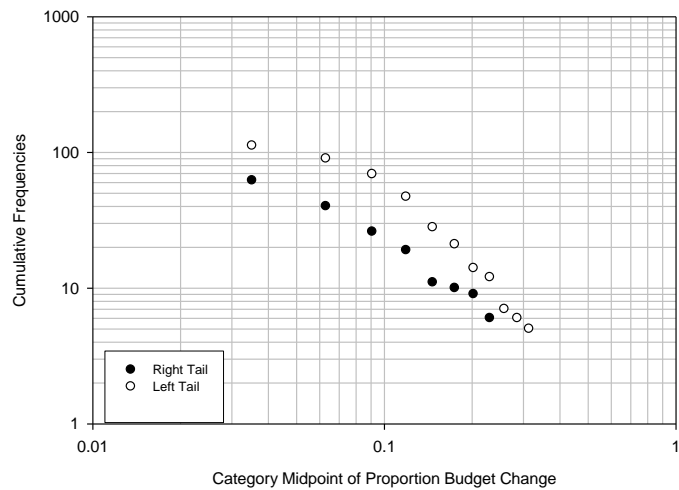
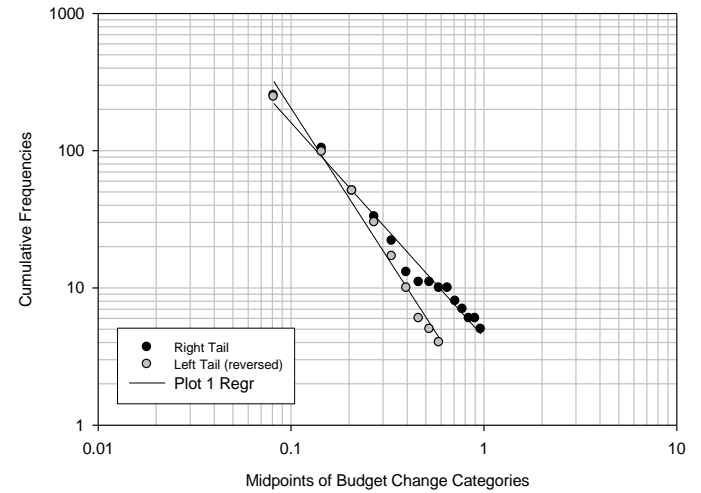
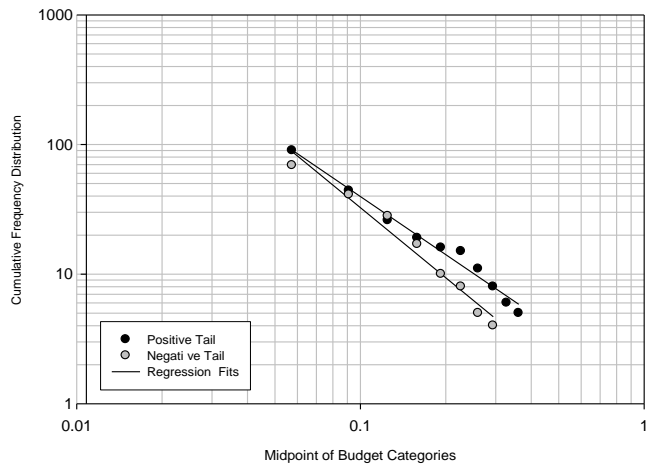
N= 3726 K= 606.01 LK=0.605

Note: Extremely high / low values clustered at -80 and +150

# US, France, Germany



# UK, Denmark, Canada, Belgium



# “Friction” as a model

- Stick-slip dynamics from earthquake studies
- Bounded rationality from psychology
- Limits on human attention cause us to ignore the vast majority of things most of the time as we focus our attention on “urgent” matters
- Organizations also impose higher or lower “decision costs” – super-majorities, etc.
- Two papers in AJPS 2009 on these topics, Politics of Attention (Chicago Press, 2005)

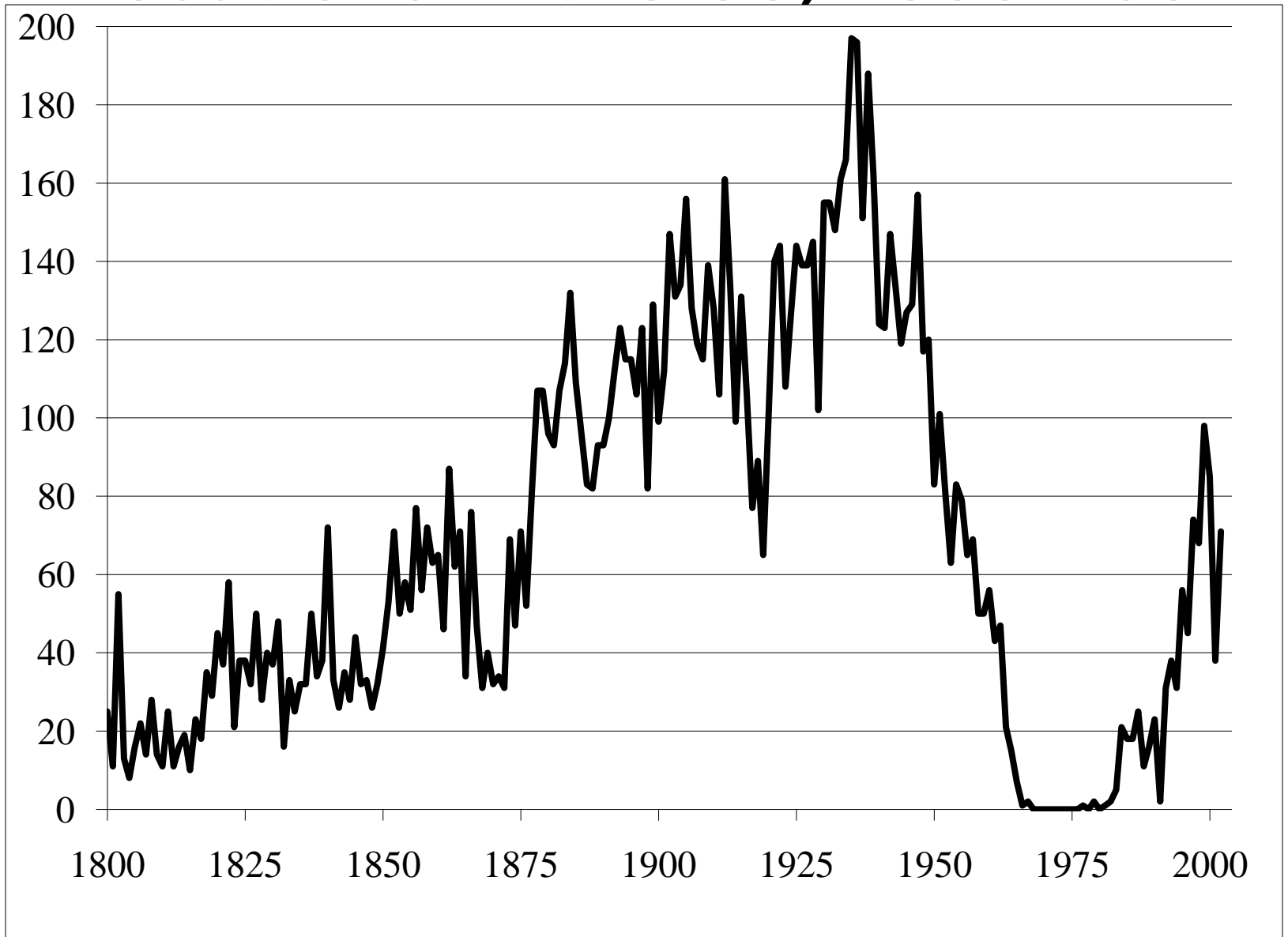
# The Death Penalty

- My initial interest: how it is being “reframed”
- Framing as a cause of many policy punctuations: Nuclear power, smoking, pesticides have all seen abrupt shifts when the popular and elite understanding shifted
- Cascades, mimicking models useful here
- Book in 2008 explored this issue and attempted to predict statistically the number of death sentences

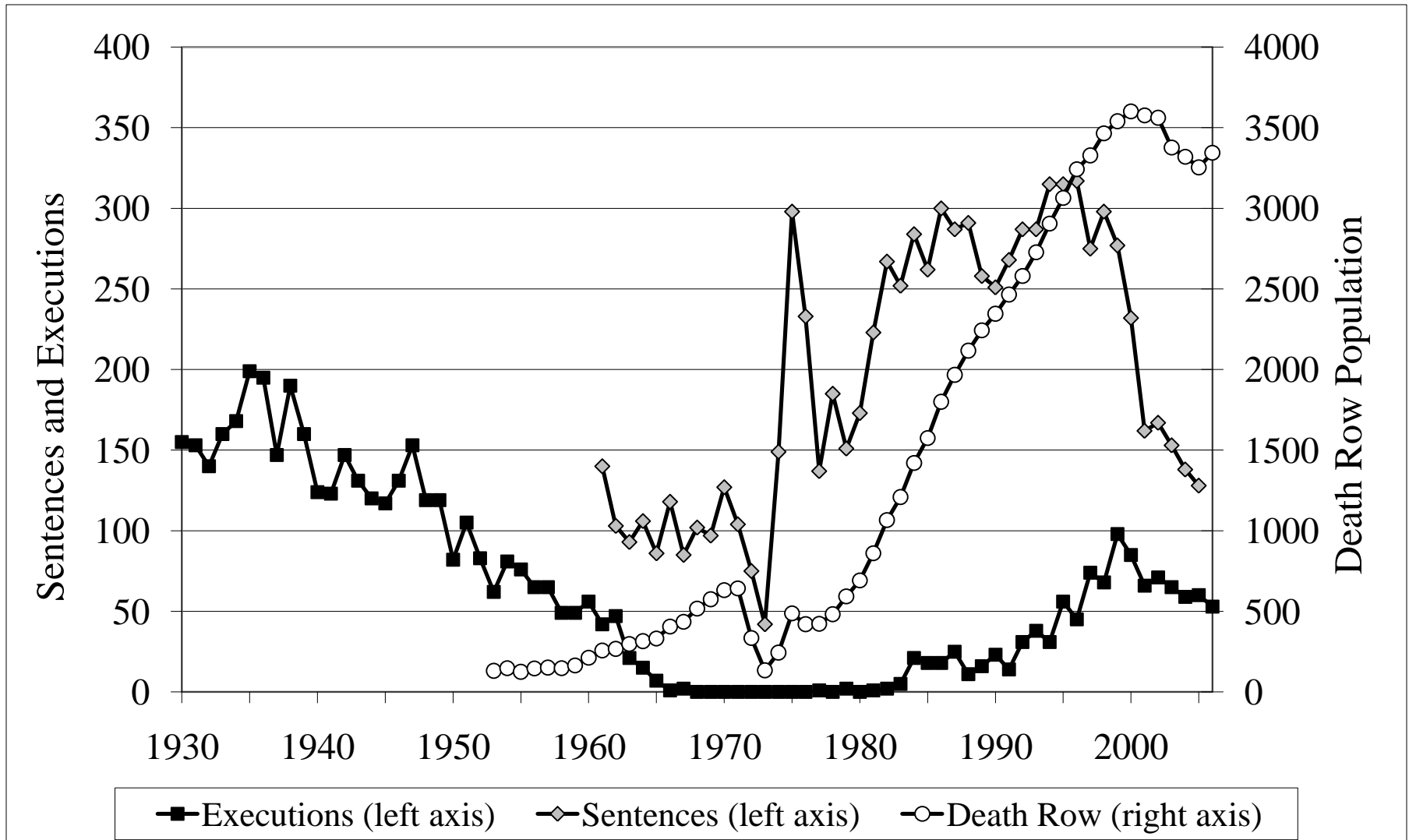
# A New View on an Old Debate

- The death penalty is a government program run by bureaucrats and it is prone to cost-overruns, inefficiencies, and mistakes...
  - Peter Loge, The Innocence Project, 2002
- Capital punishment is a government program, so skepticism is in order...
  - George F. Will in the *Washington Post*, 6 April 2000

# Executions in the US, 1800-2002



# Death Sentences, Executions, and the Size of Death Row, 1930-2006



# Some background facts

- 1972: State laws ruled unconstitutional
- 1976: 37 new state laws pass constitutional review by Supreme Court
- 1977: Gary Gilmore, a volunteer, shot by firing squad in Utah
- NJ, NM, IL recently have become first states in US history to VOTE to abolish.
- Current trends all toward reduction
- Inflection: late 1990s

# More facts

- Since 1976, about 20,000 homicides per year, or 720,000 homicides
- Same period: 1,239 executions
- Homicides > executions: 1 in 580
- Homicides > death sentences: ~ 1 in 100
- Death sentences > executions: 20 percent
- Other outcomes: 65 percent reversed on appeal, others die in prison, are commuted. About 5 percent are EXONERATED (freed).

# Estimating Error Rates

Many possible ways of doing this:

140 exonerations v. 1,200+ executions: ~ 13 %

Impossible to know exactly how many innocent have been killed. Rare that serious inquiries are made.

But: How reliable is the *system*? A reliable system should reach the same conclusion each time.

# James Leibman et al. 2002: Why is there so much error in capital cases...

Review of ALL murder cases from 1973 to 1995 in those states having capital punishment

118,992 murder convictions

5,826 death sentences

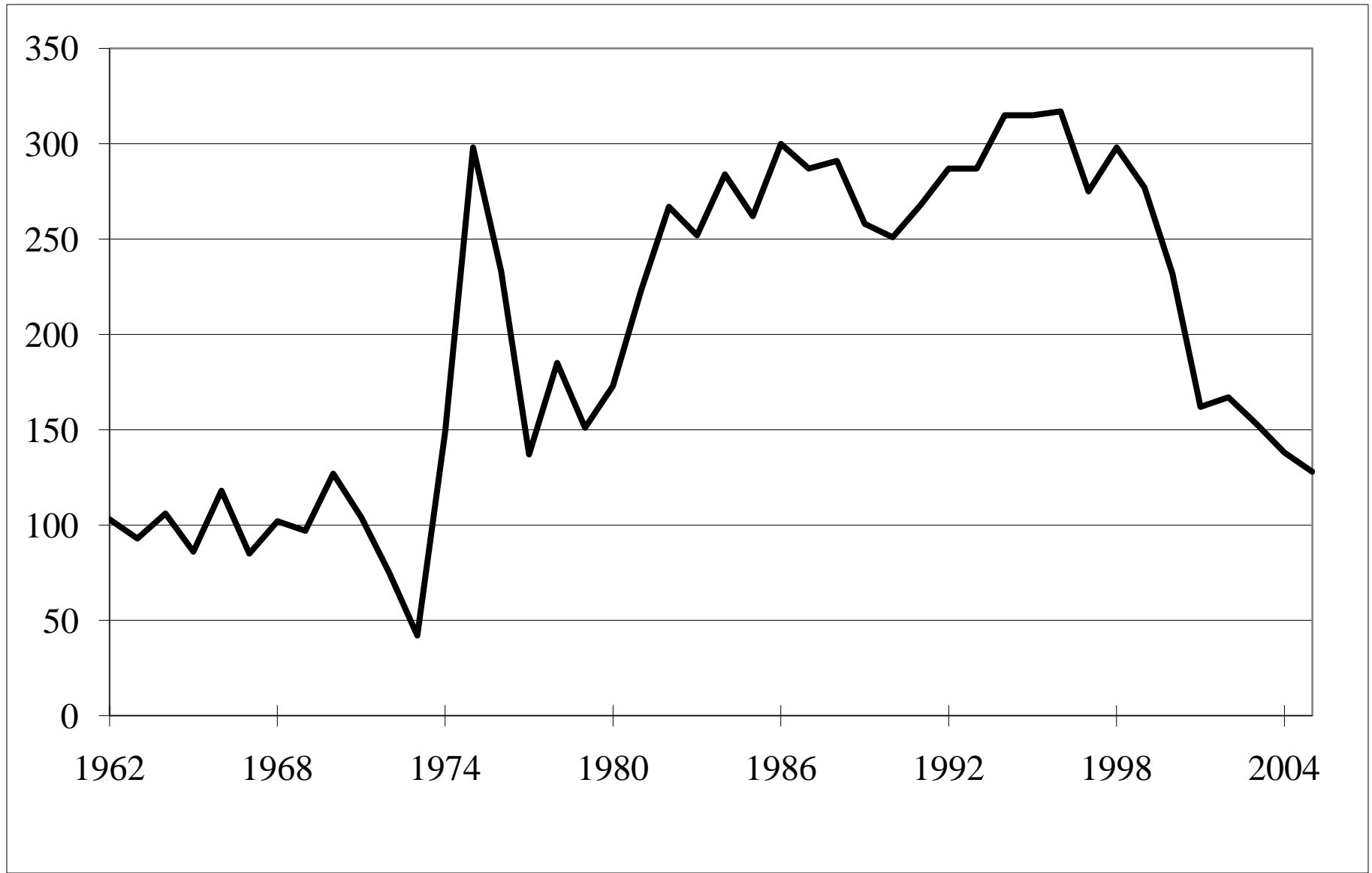
All reviewed by federal judges or state supreme court:

Automatically, no appeal required. This is unique in US criminal justice because of the history of state application of death sentences.

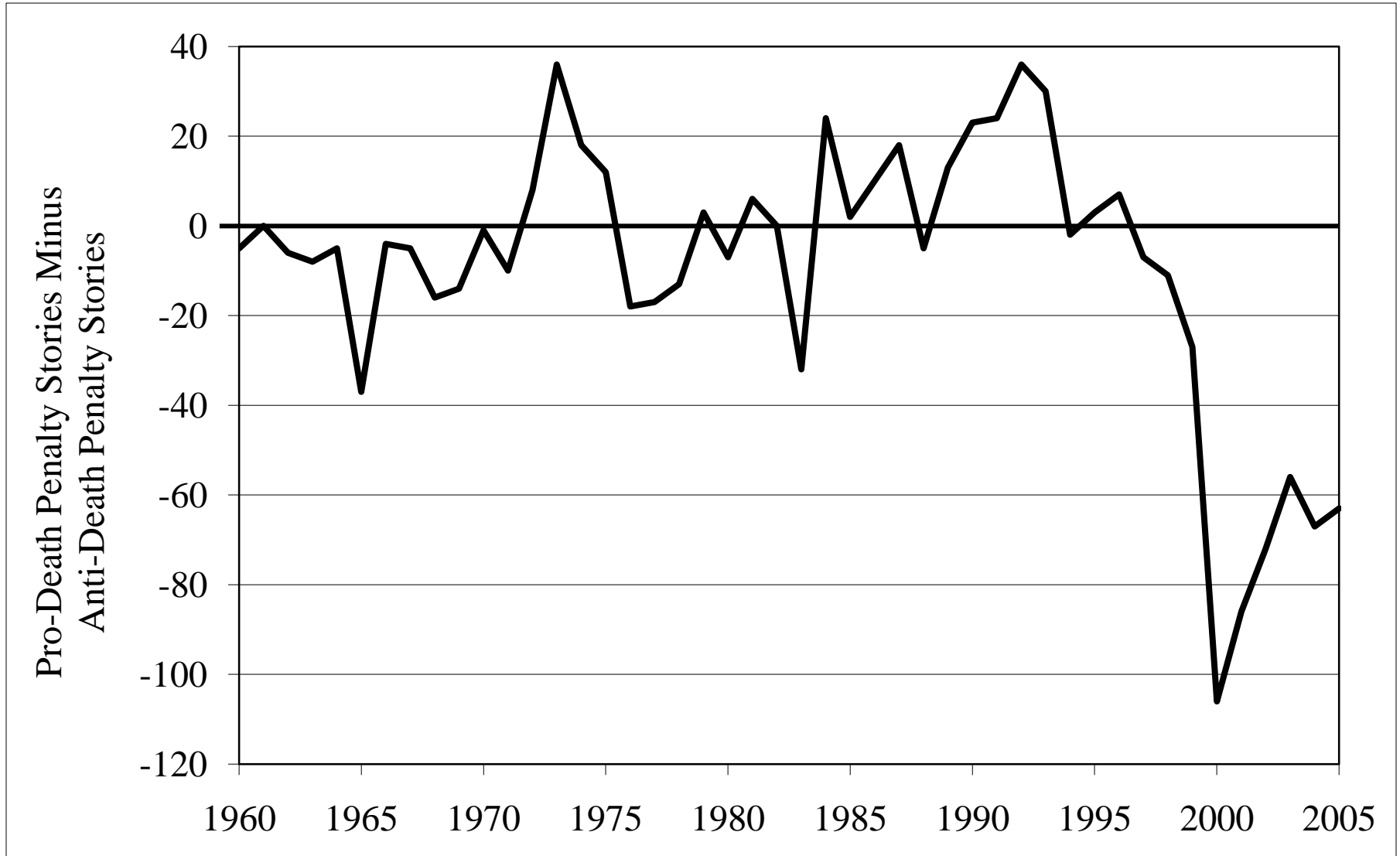
How many are overturned, with the federal judge requiring a new trial?

68 percent

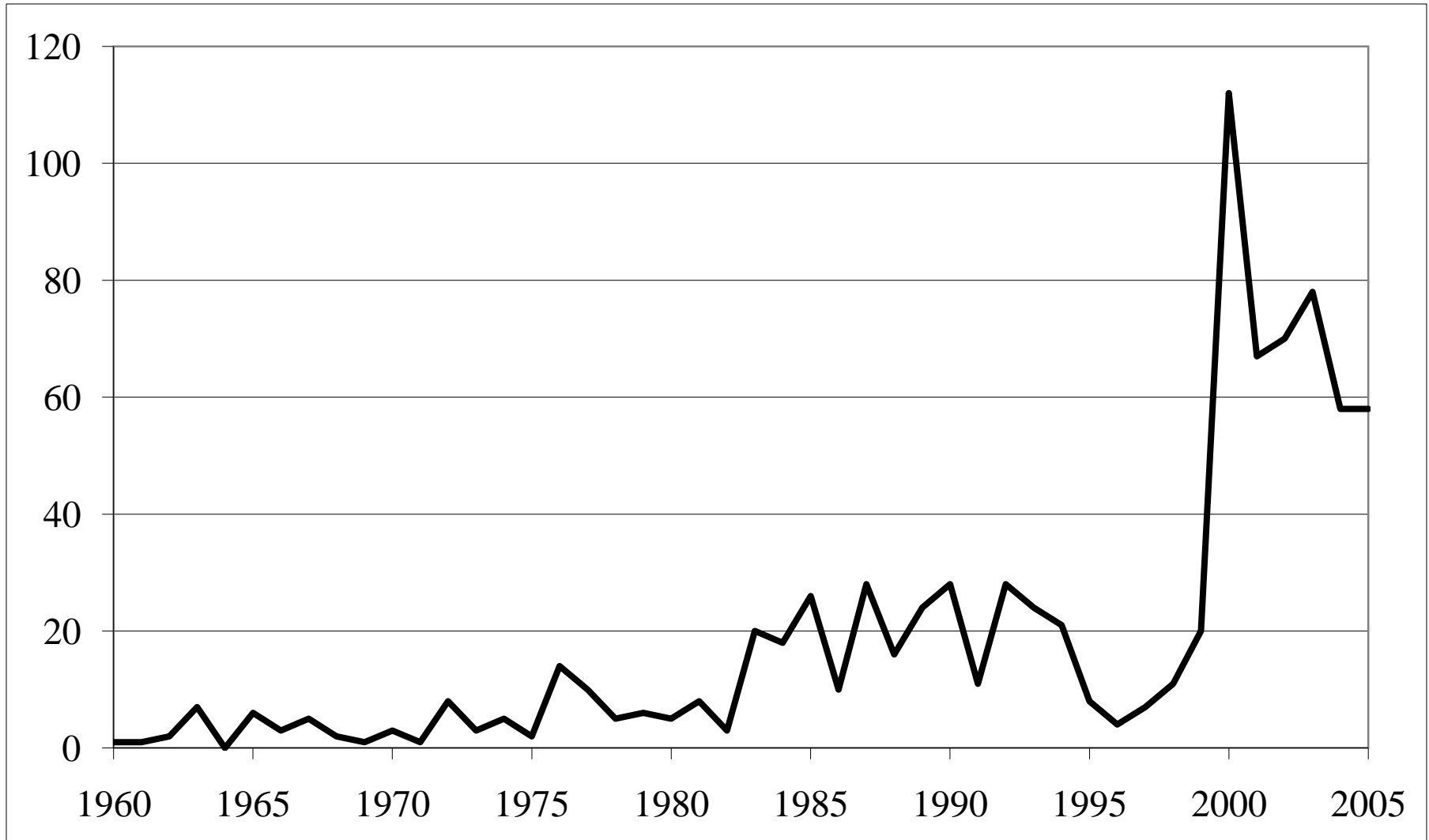
# Number of Death Sentences



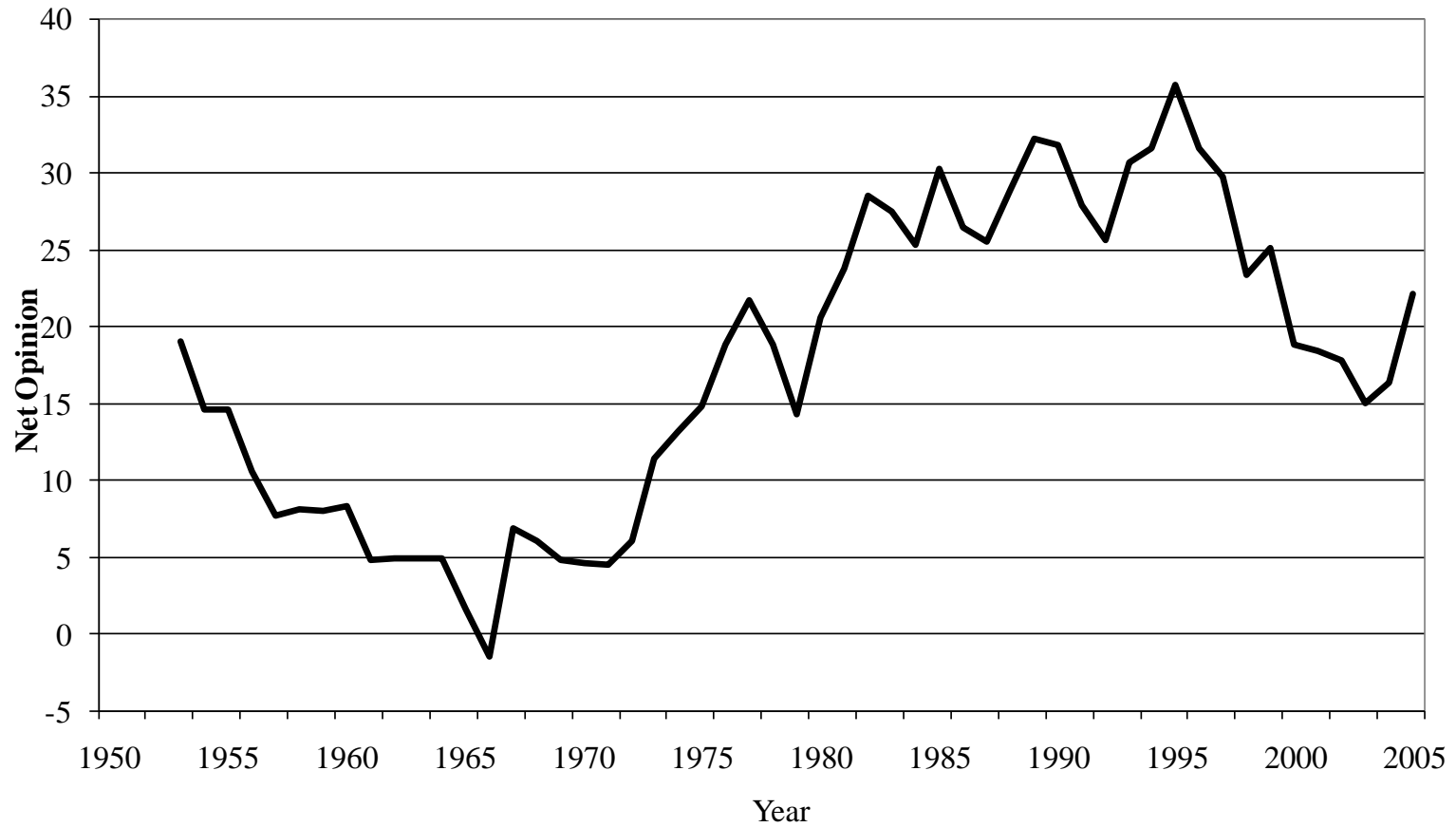
# “Net Tone” of NYT Coverage



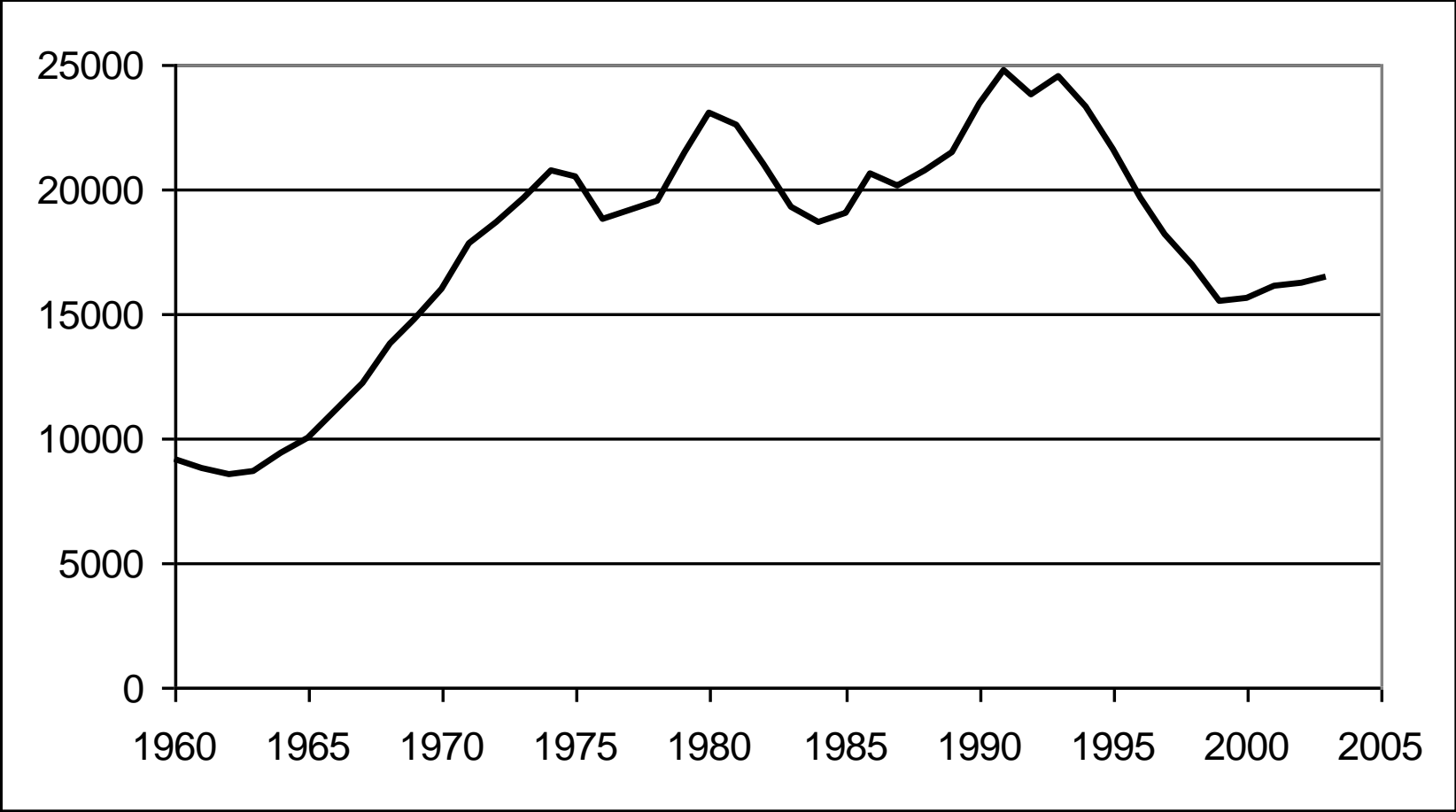
# The Rise of the “Innocence” Frame



# Net Public Opinion, 1953-2004

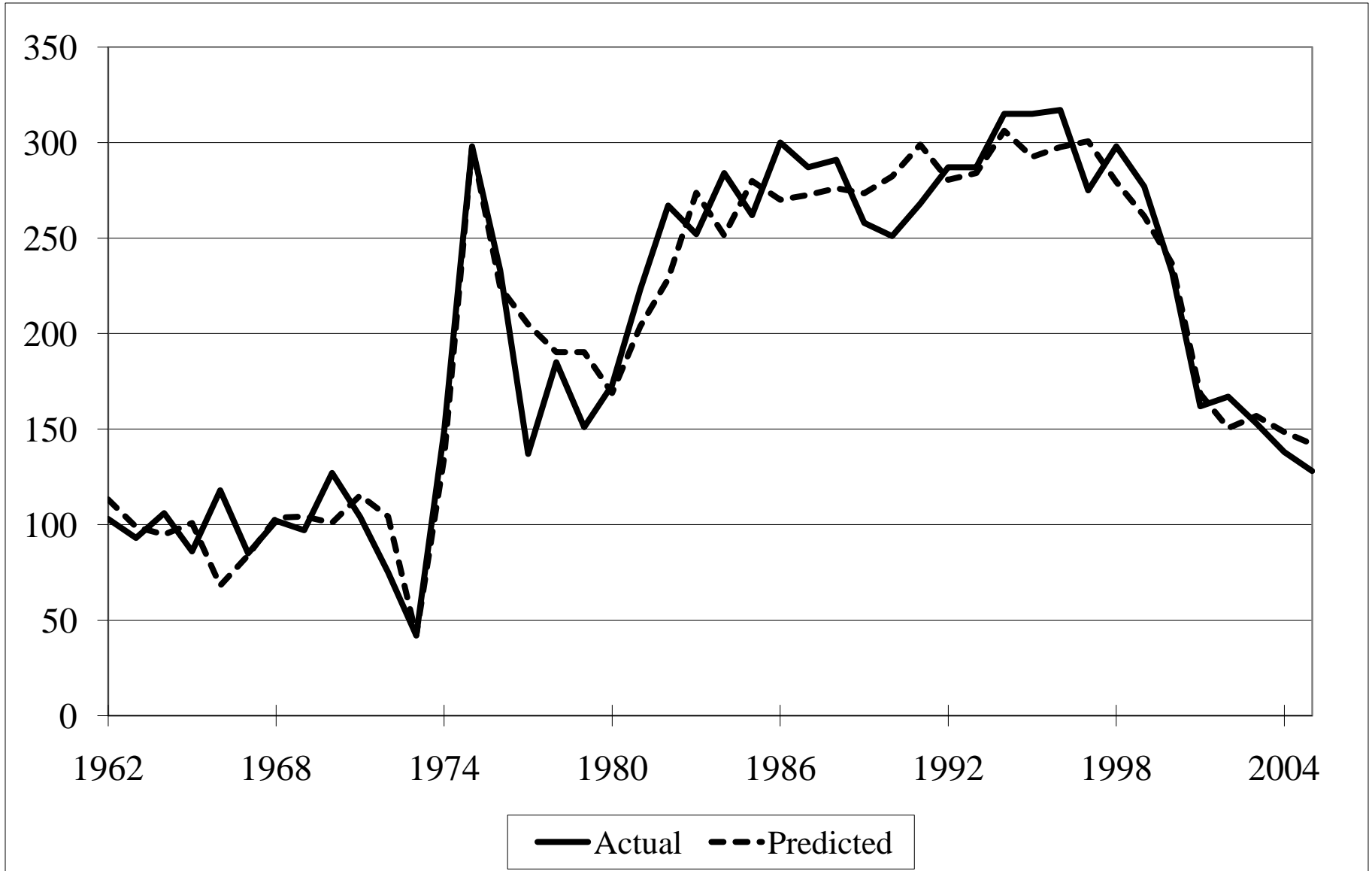


# Homicides: decline from 24,500 in 1993 to 15,500 in 2000



NB: France, UK, approx 400 per year

# Predicted and Actual Death Sentences



# Explaining a policy reversal

- Decline of the death penalty, like its rise, is related more to how we think about the issue than to what we think about it.
- Rise: Morality, abstract, “tough on crime.”  
Self-reinforcing nature of this way of thinking.
- Decline: sudden “discovery of innocence”  
though it is nothing new.
- That book shows power of framing, develops an informal model of a policy cascade.

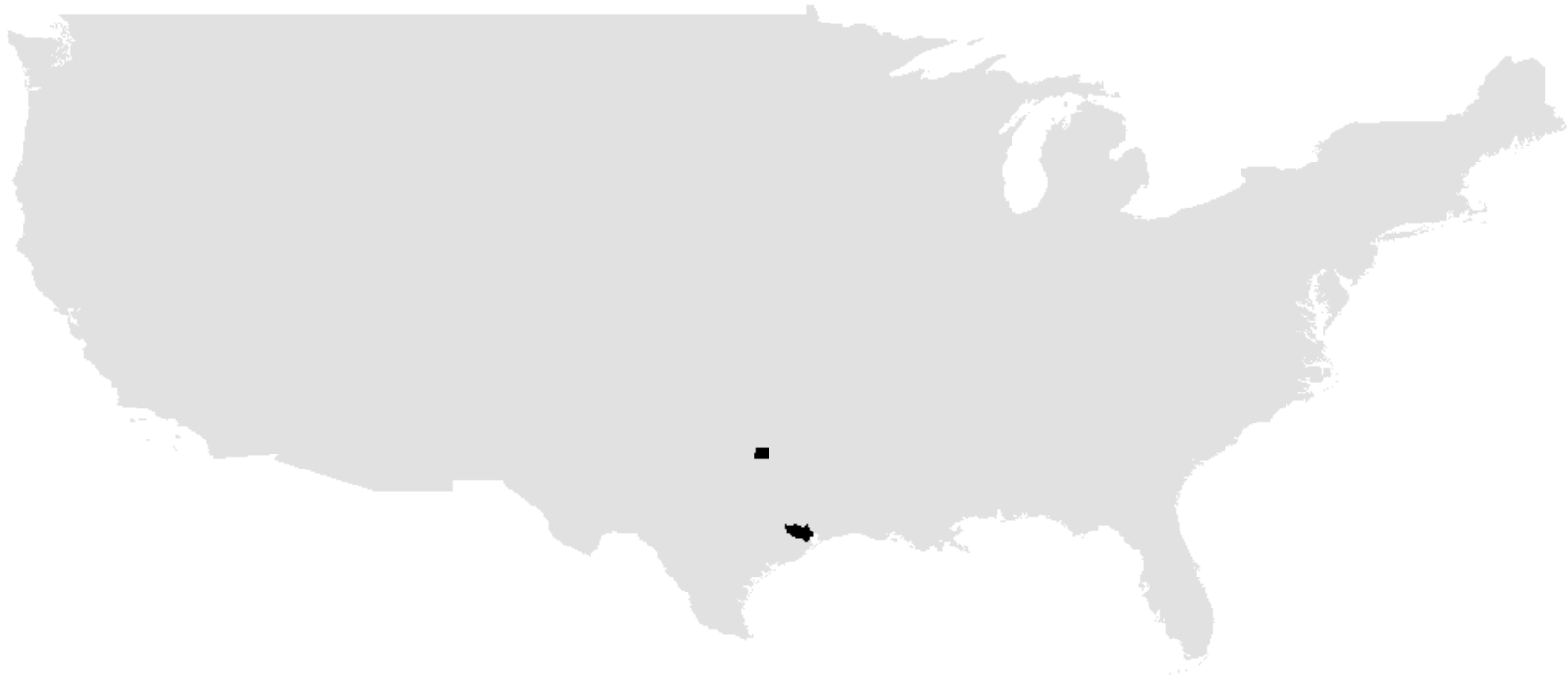
# OK, finally to the point

- Some maps
- Some data
- Some ideas about what might explain the patterns observed

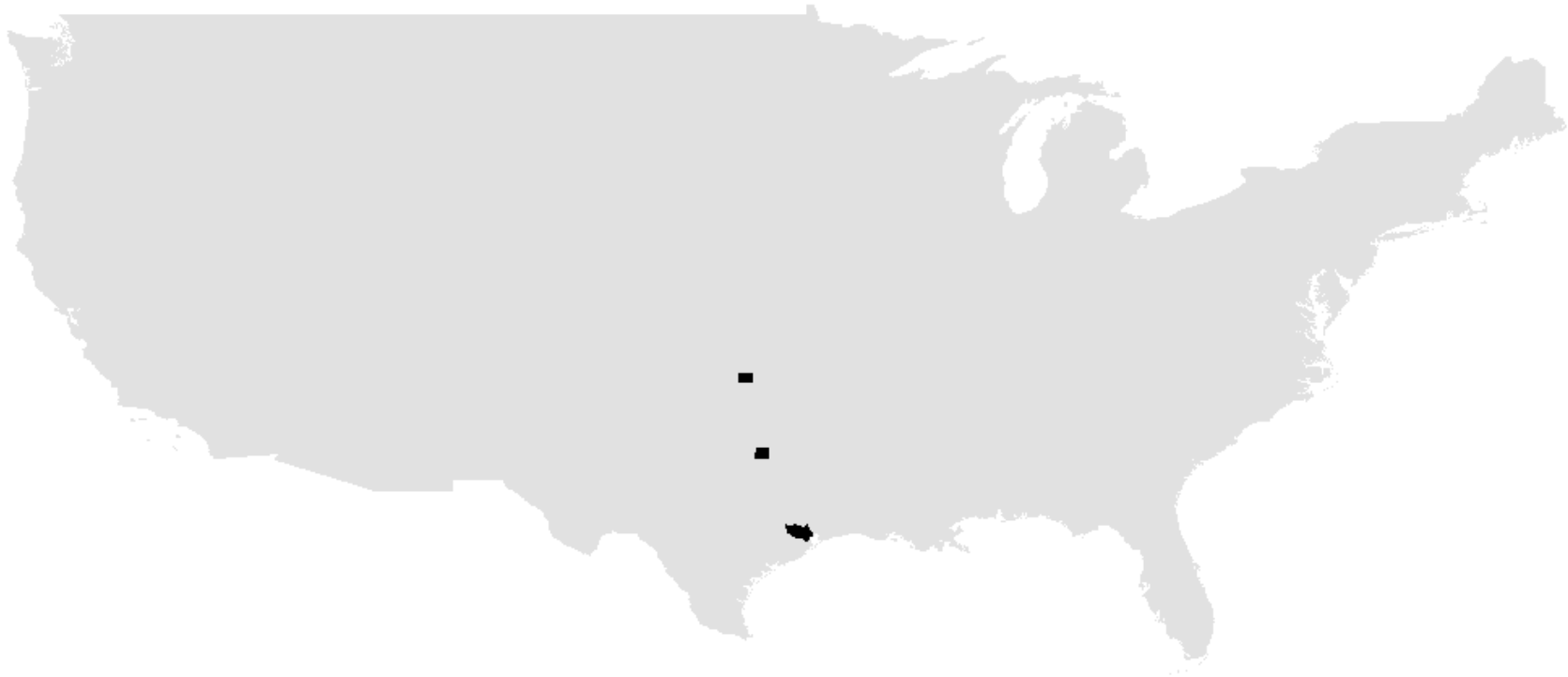
Counties with 116 or more executions since 1976



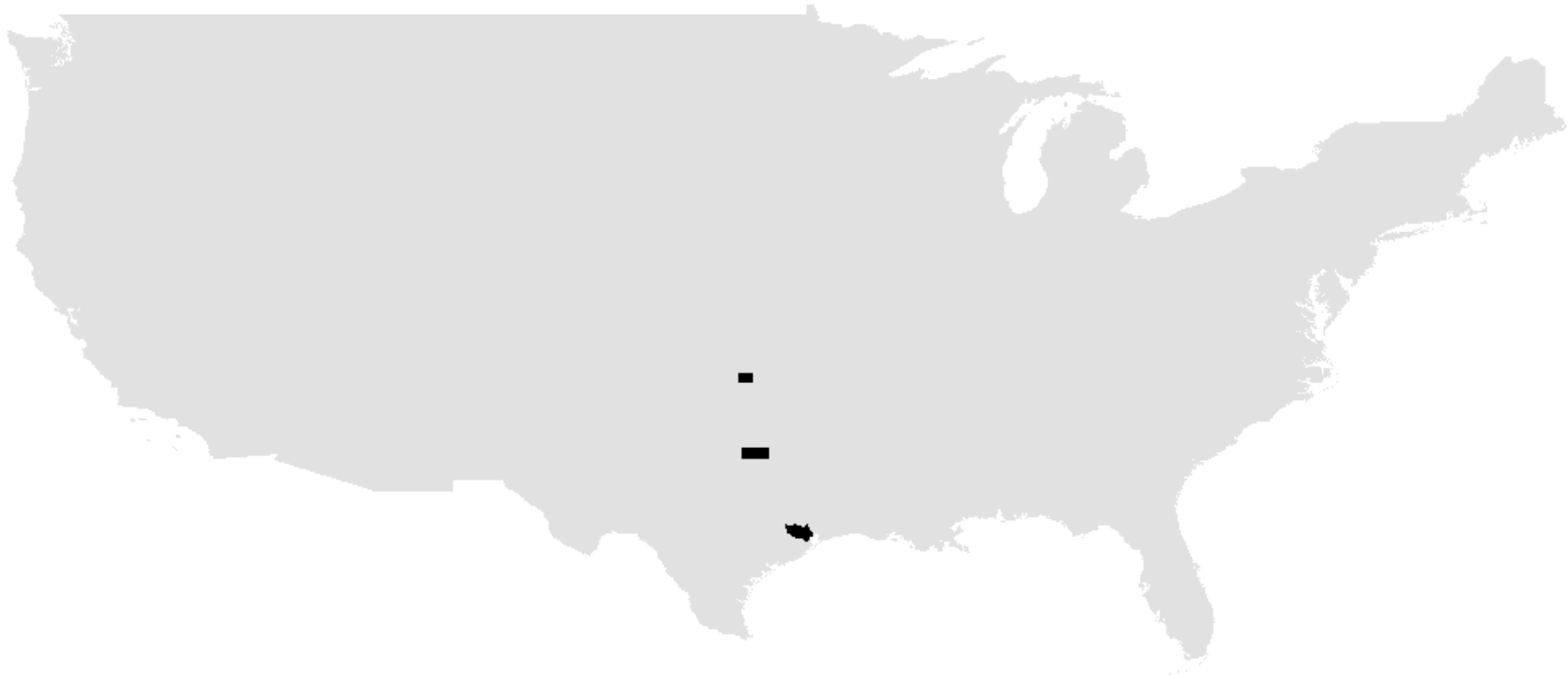
Counties with 44 or more executions since 1976



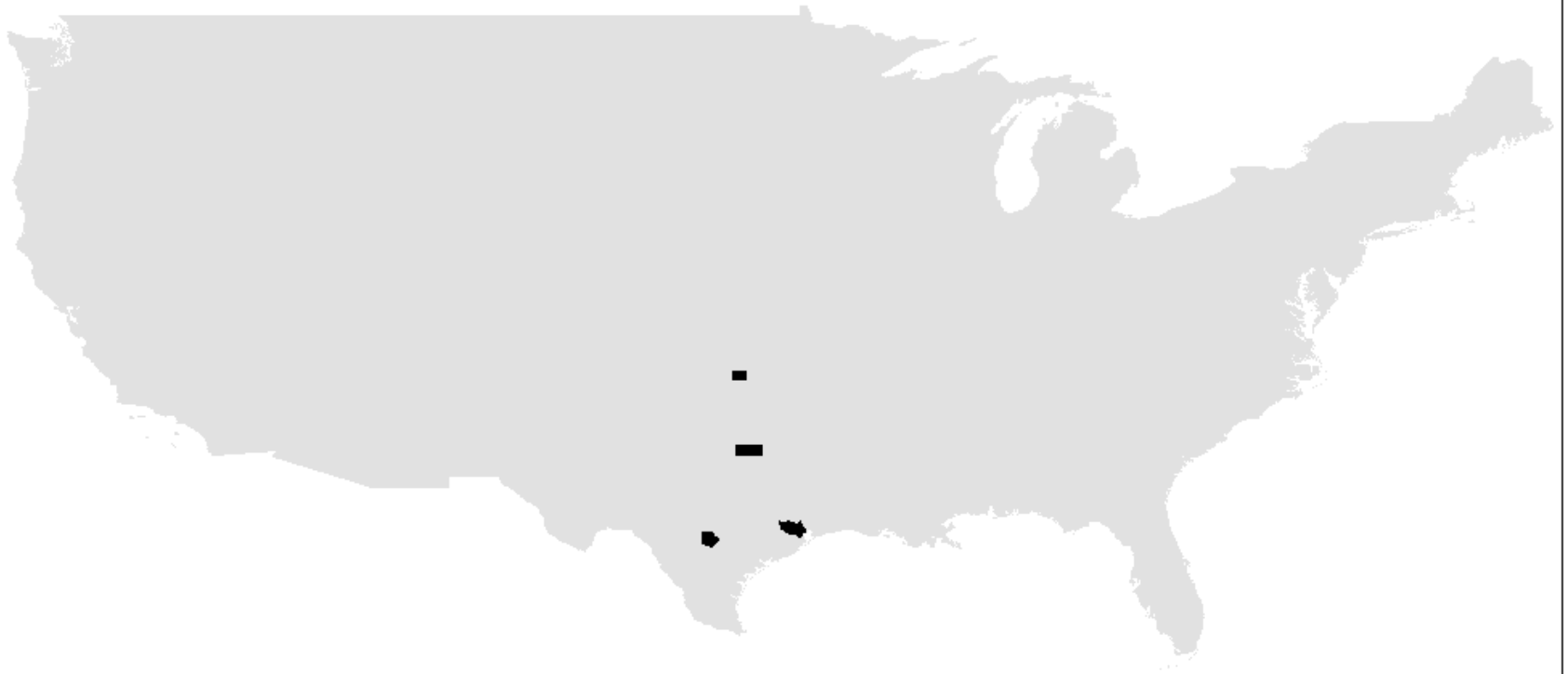
Counties with 36 or more executions since 1976



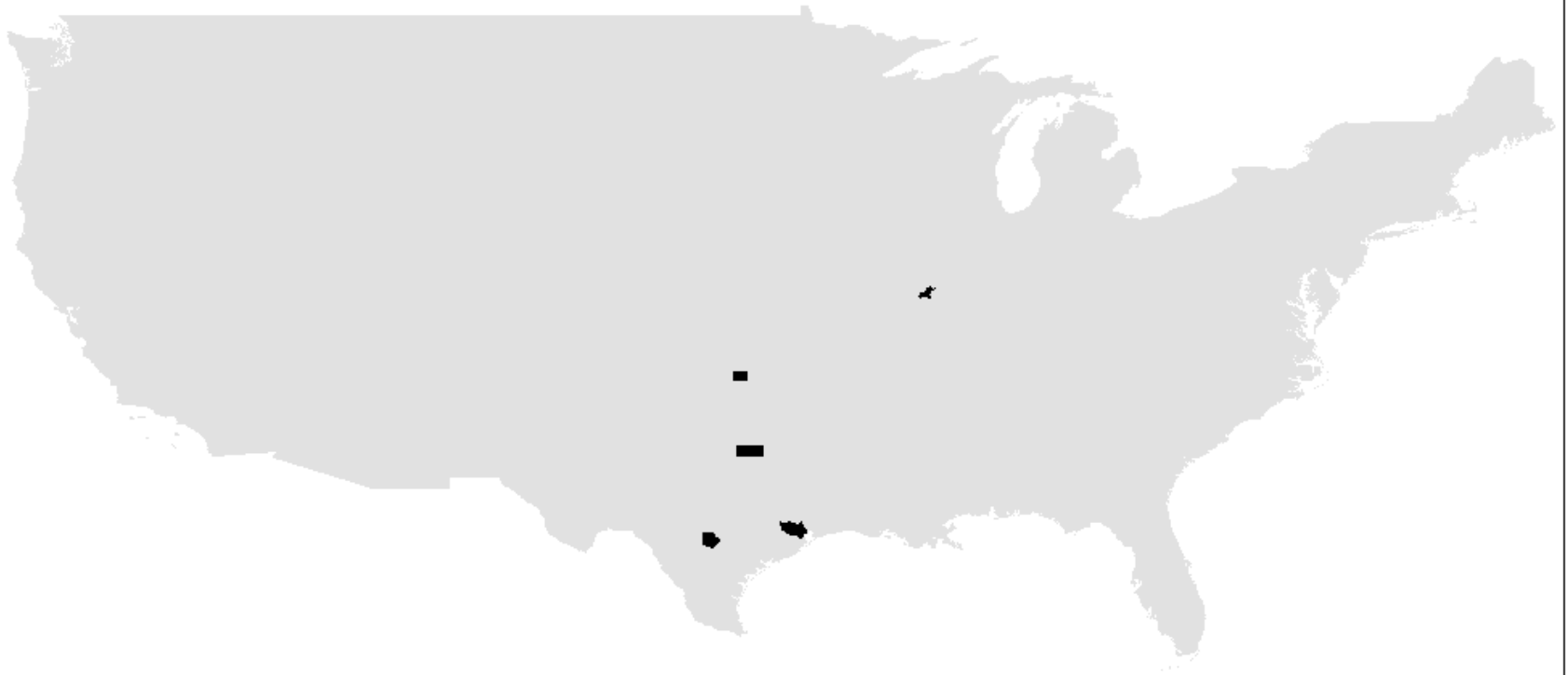
Counties with 35 or more executions since 1976



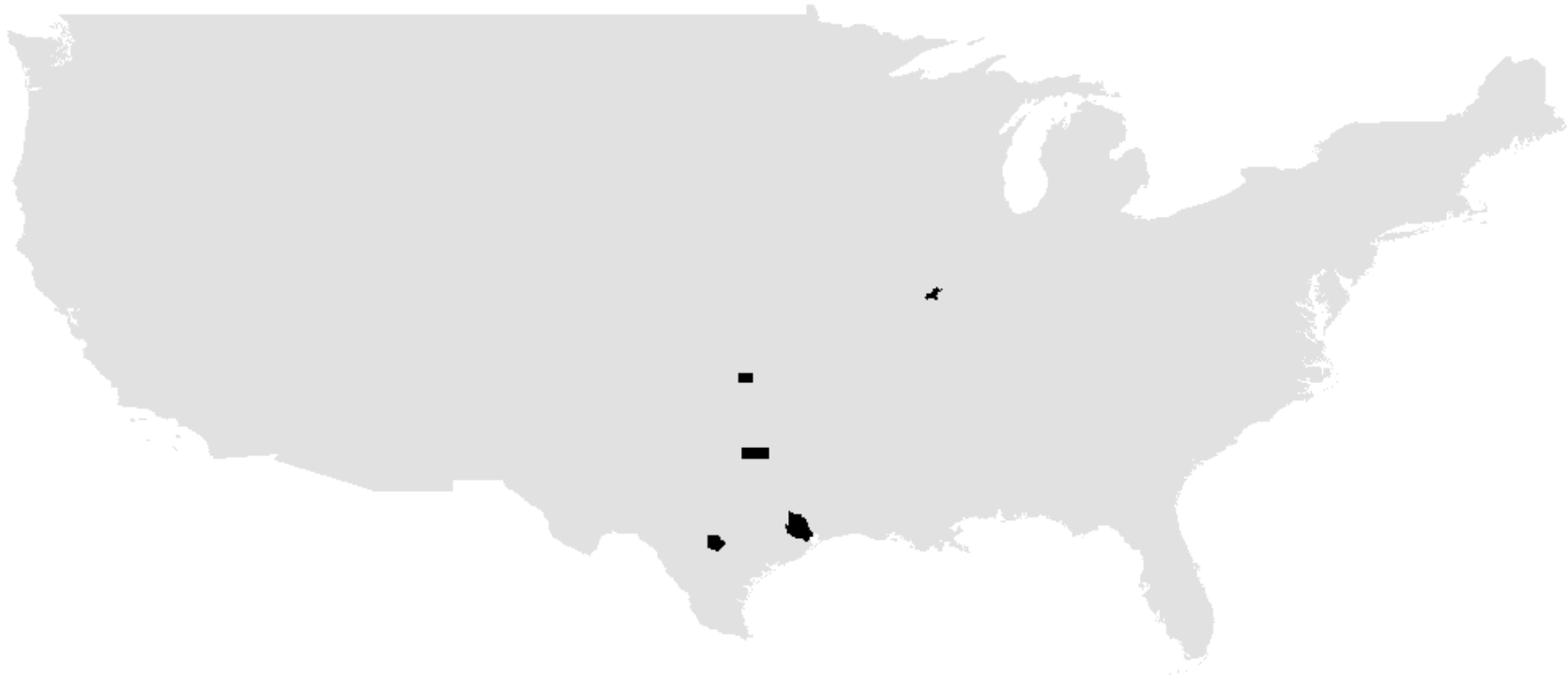
Counties with 31 or more executions since 1976



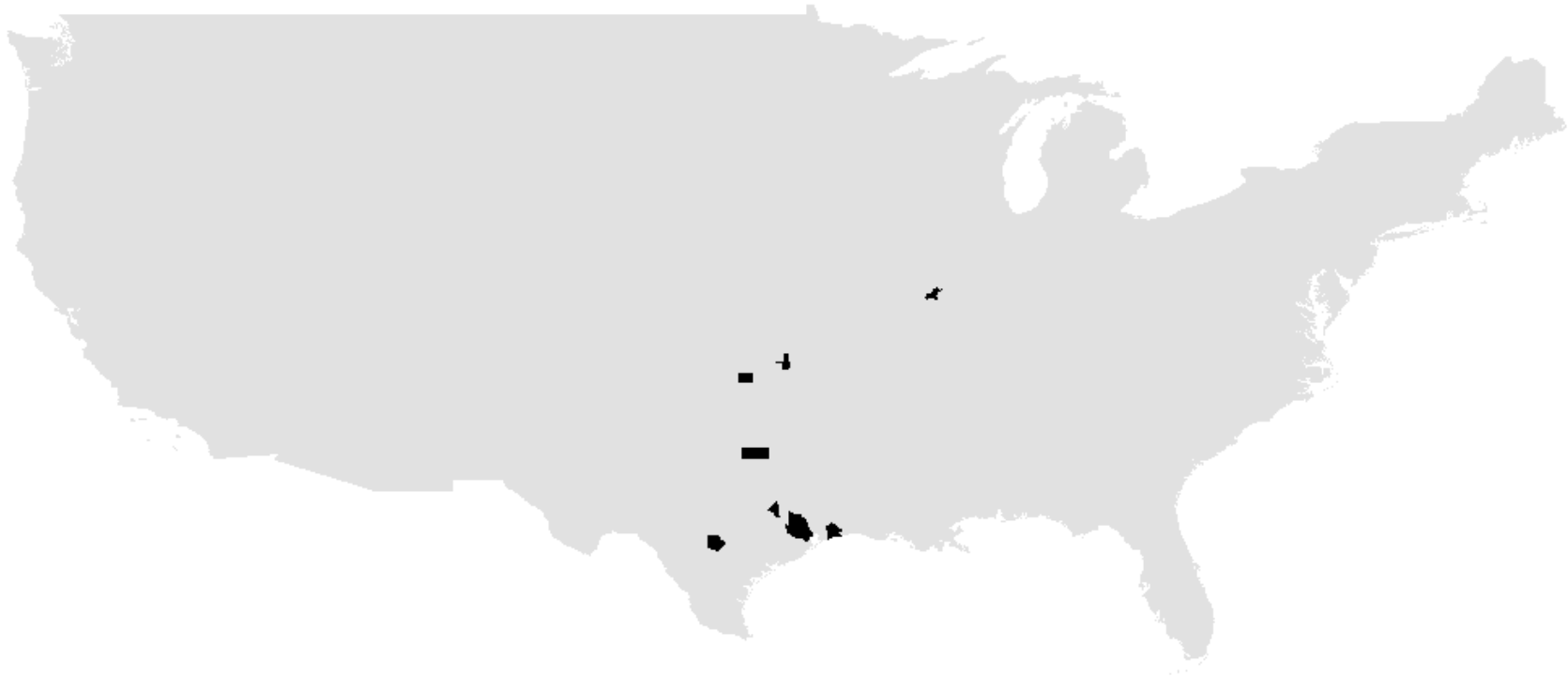
Counties with 17 or more executions since 1976



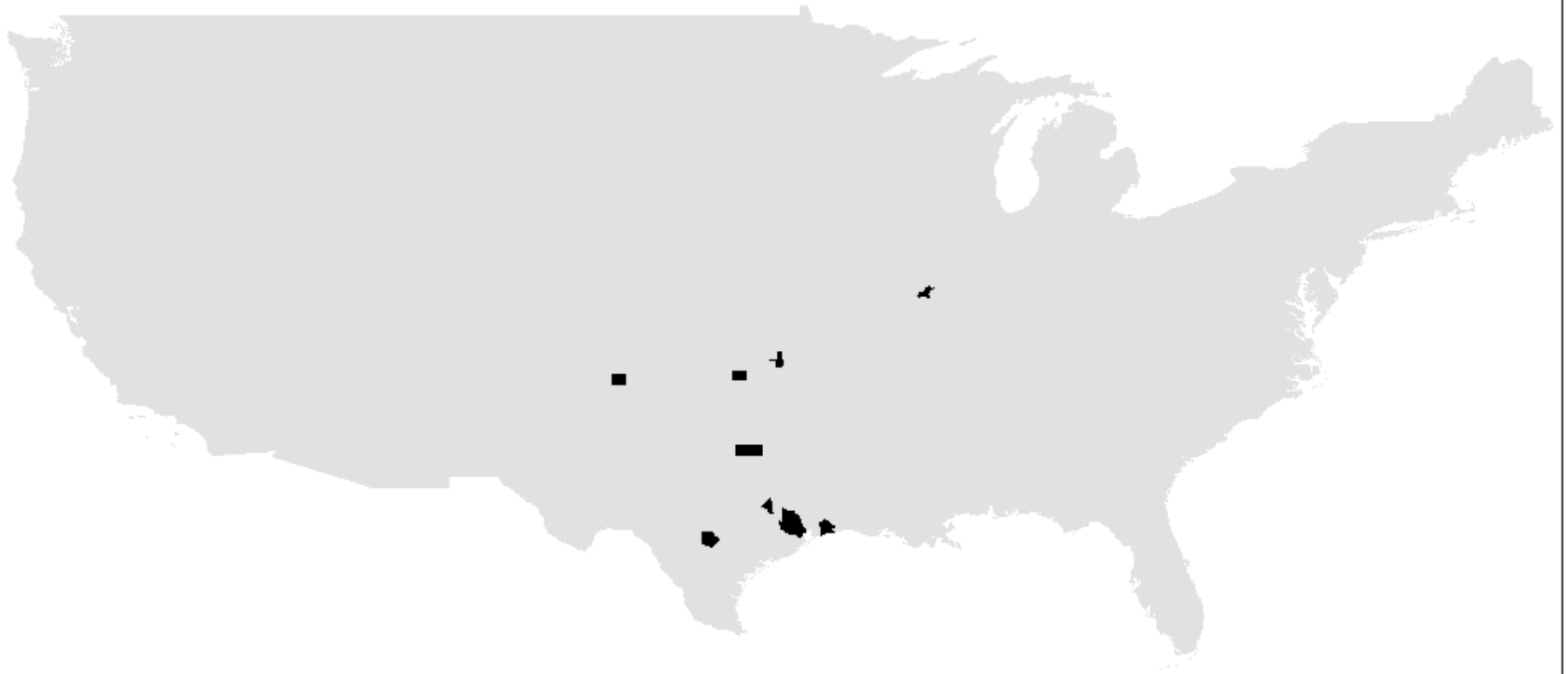
Counties with 14 or more executions since 1976



Counties with 12 or more executions since 1976

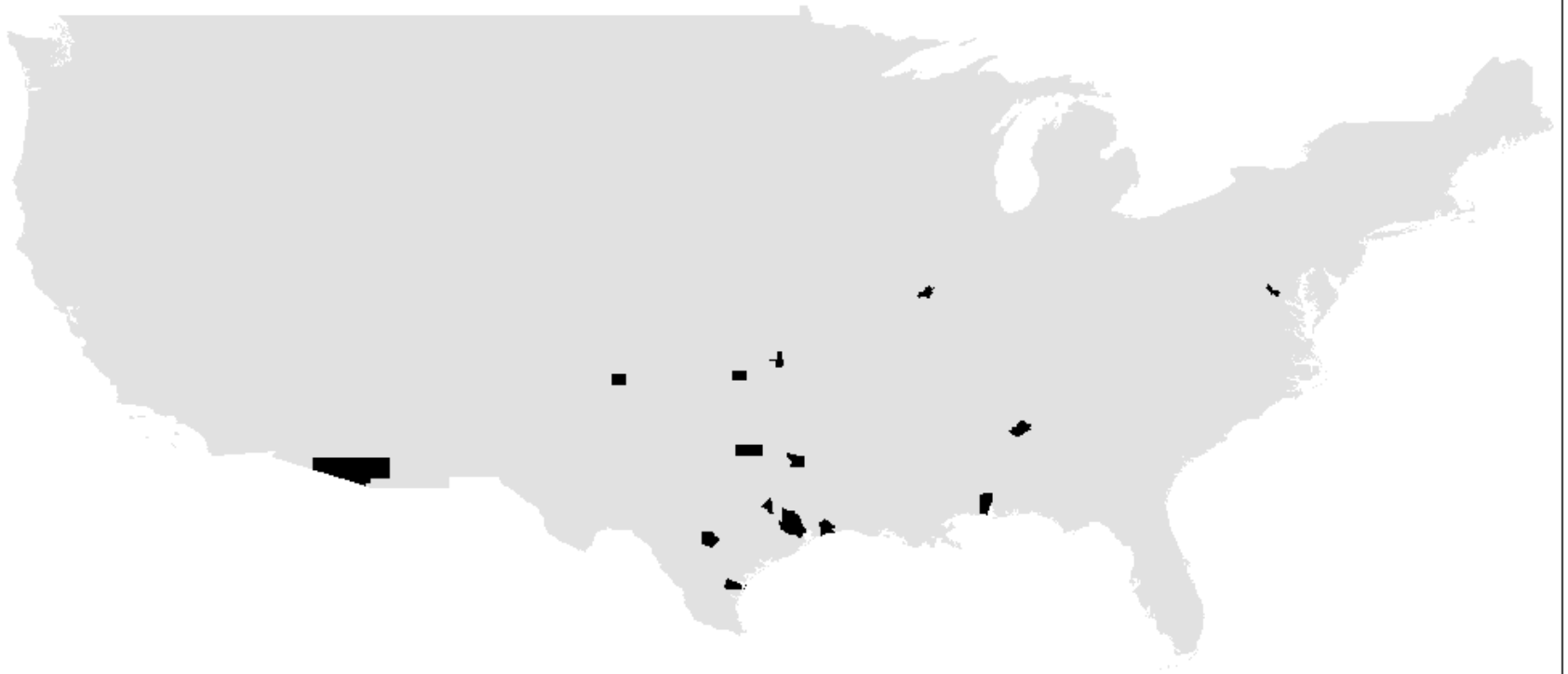


Counties with 11 or more executions since 1976





Counties with 9 or more executions since 1976

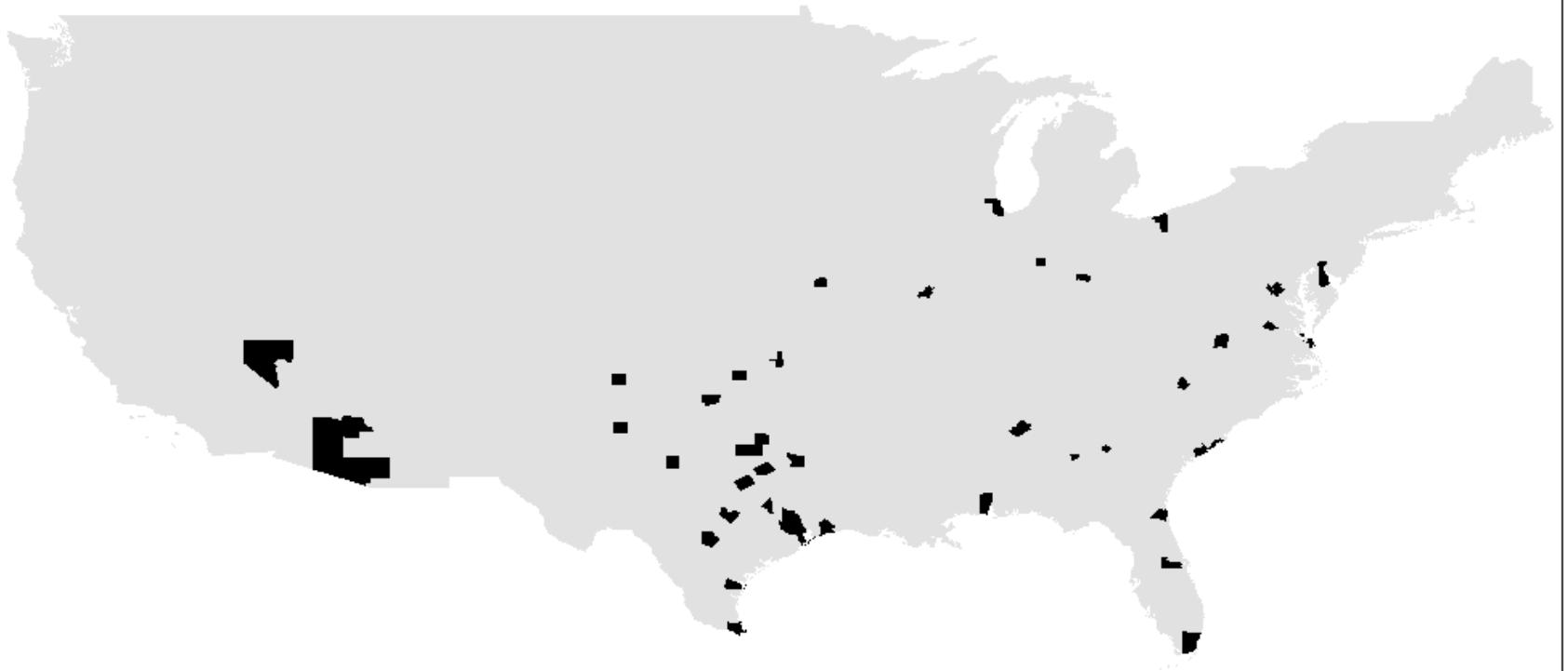




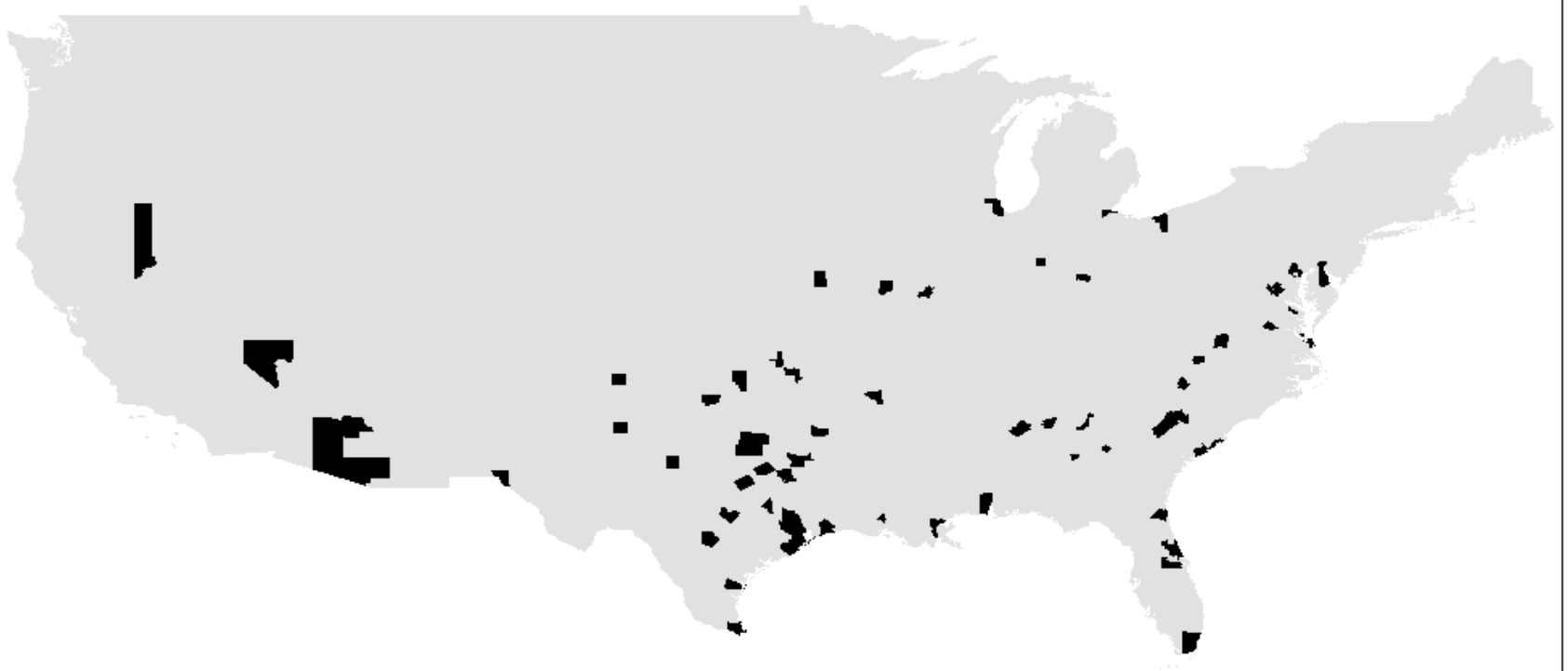




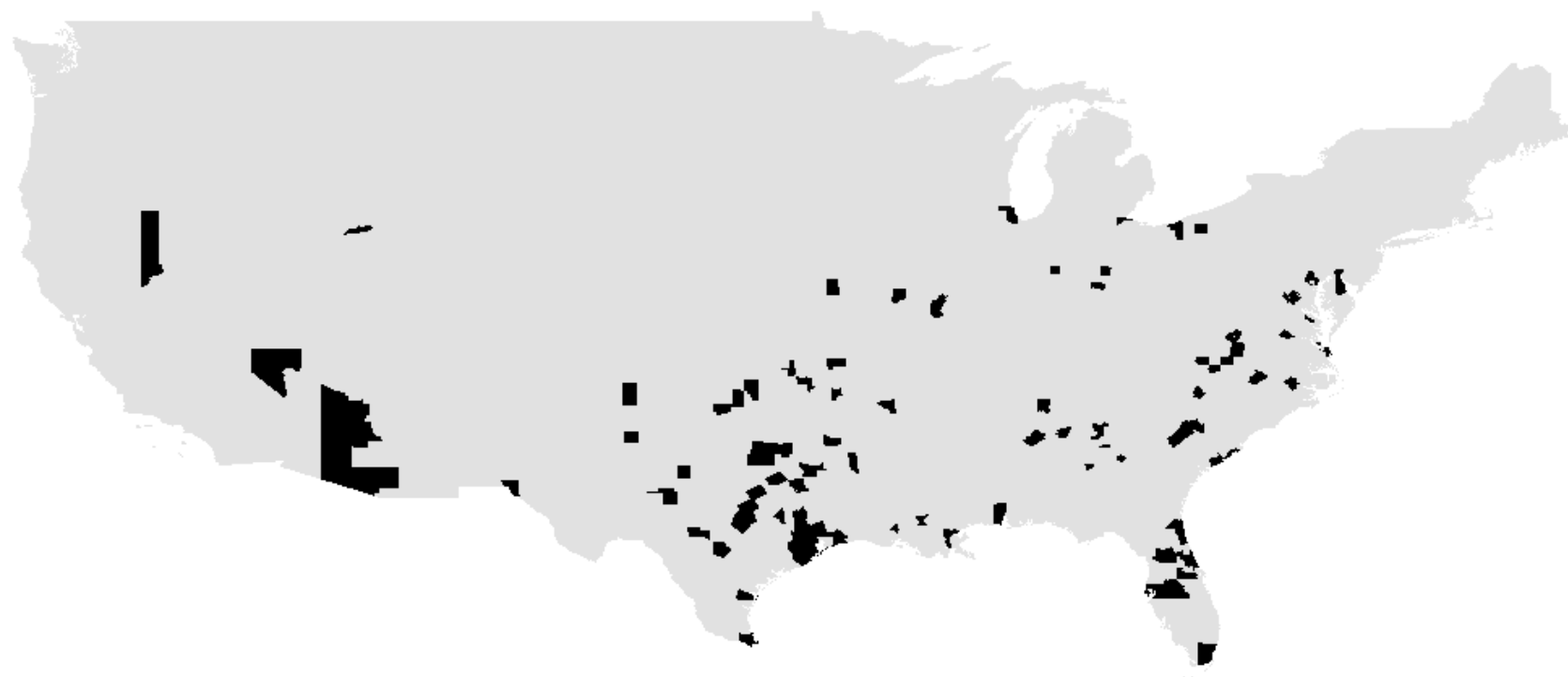
Counties with 5 or more executions since 1976



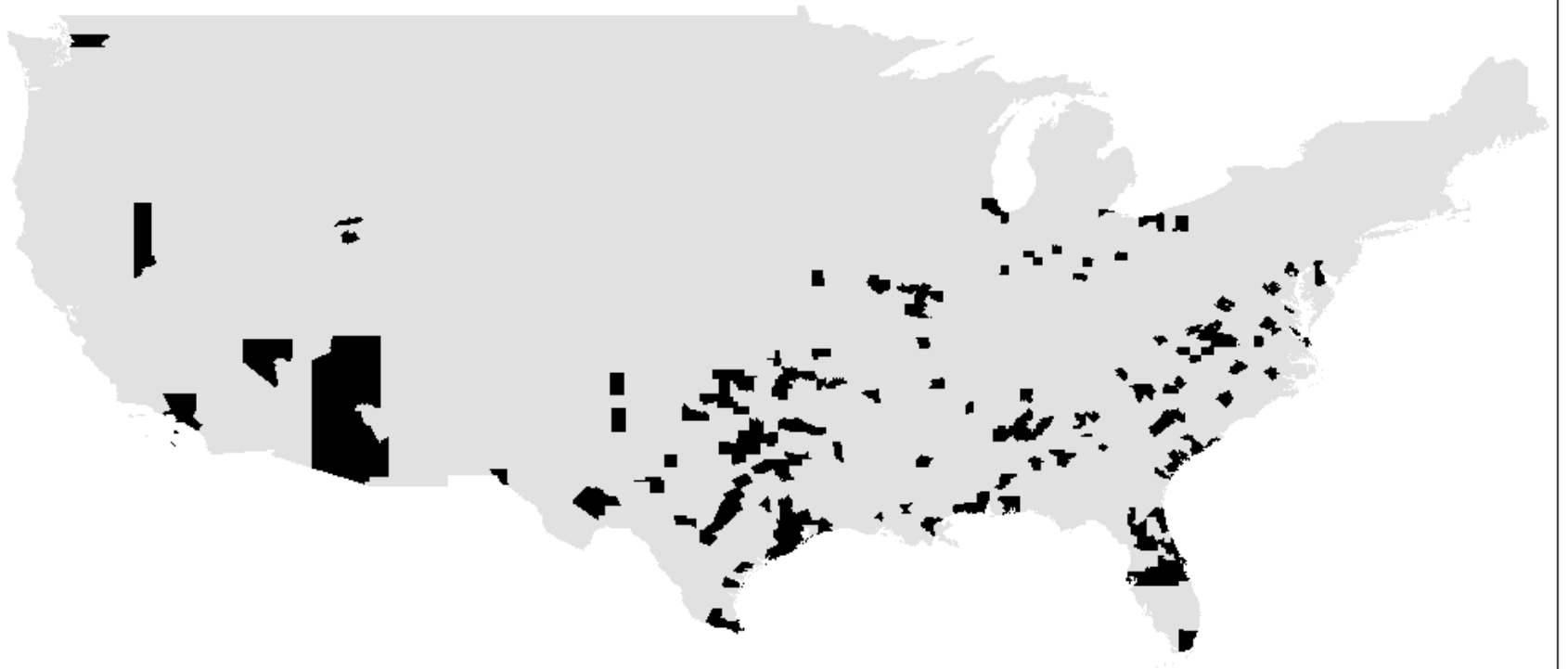
Counties with 4 or more executions since 1976



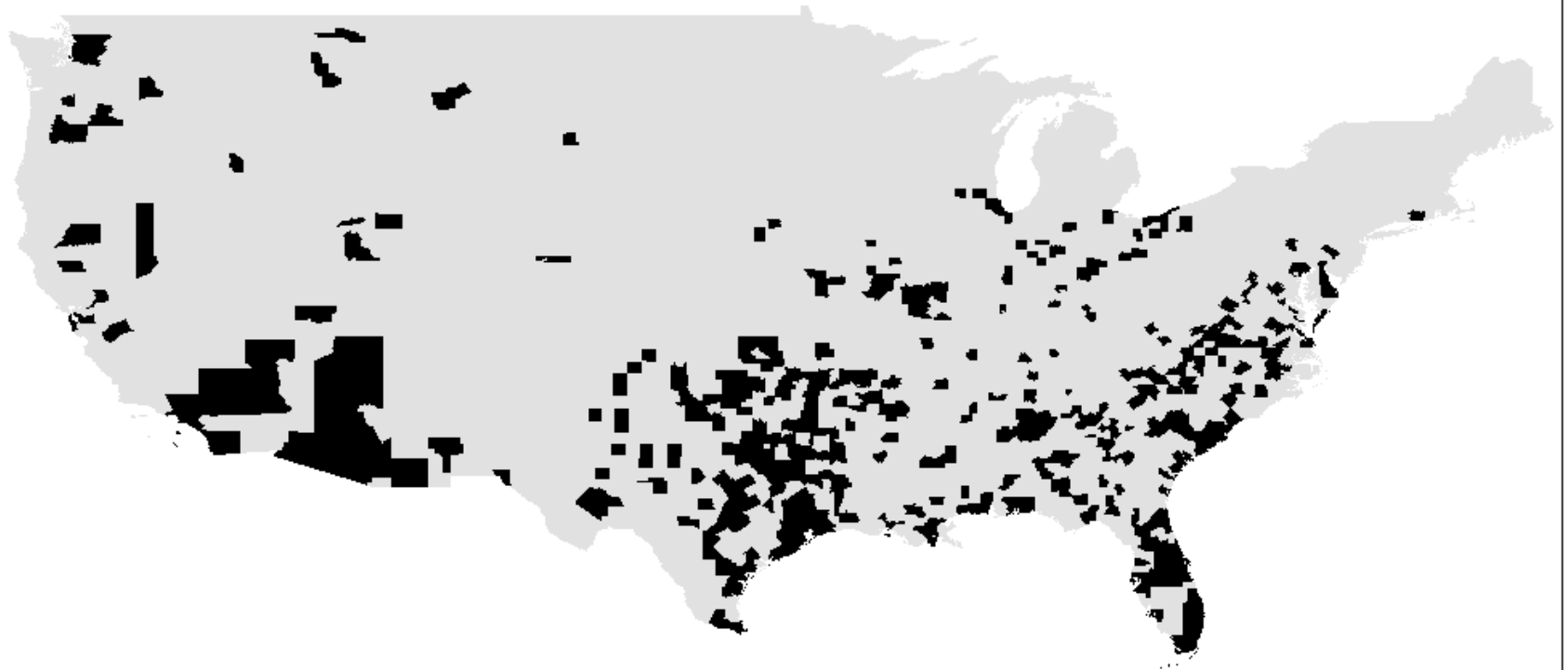
Counties with 3 or more executions since 1976



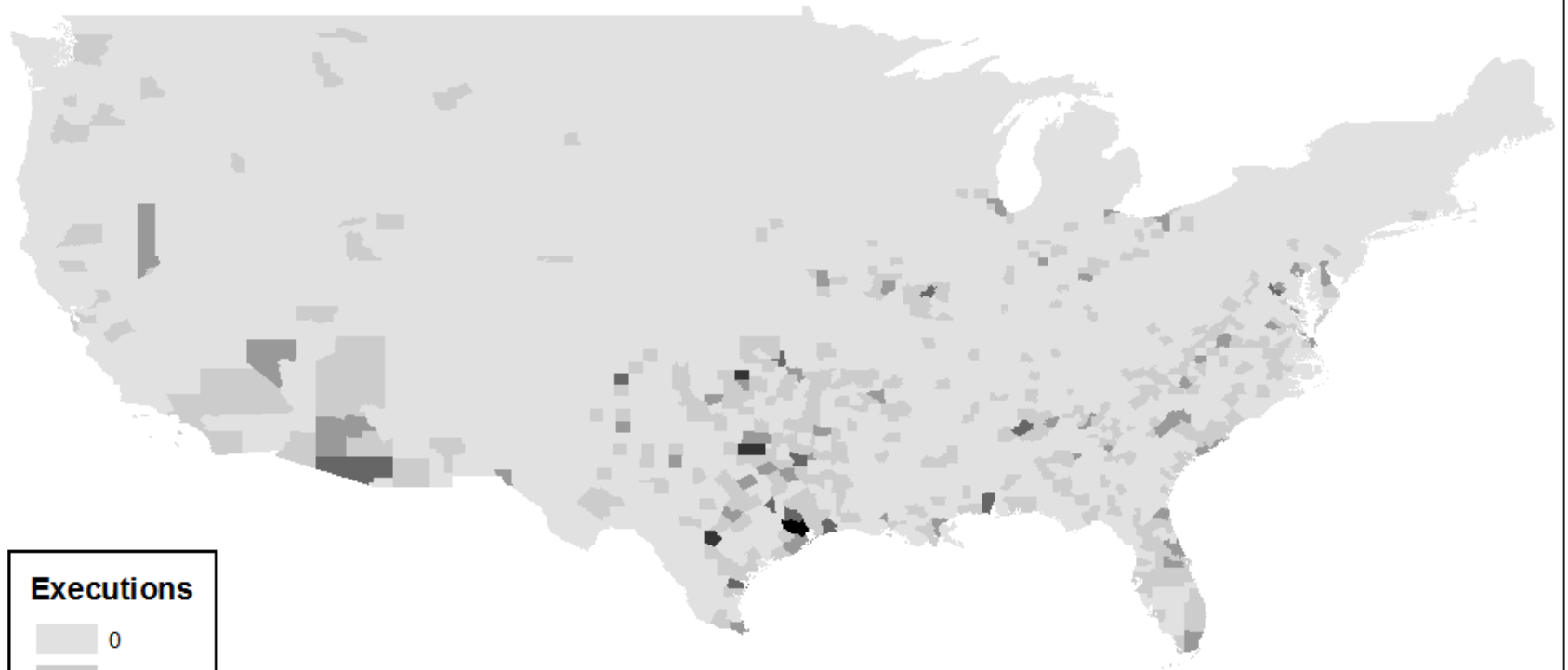
Counties with 2 or more executions since 1976



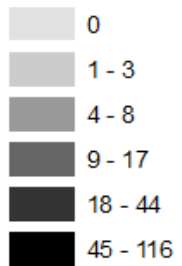
Counties with 1 or more executions since 1976



# Number of executions per county since 1976



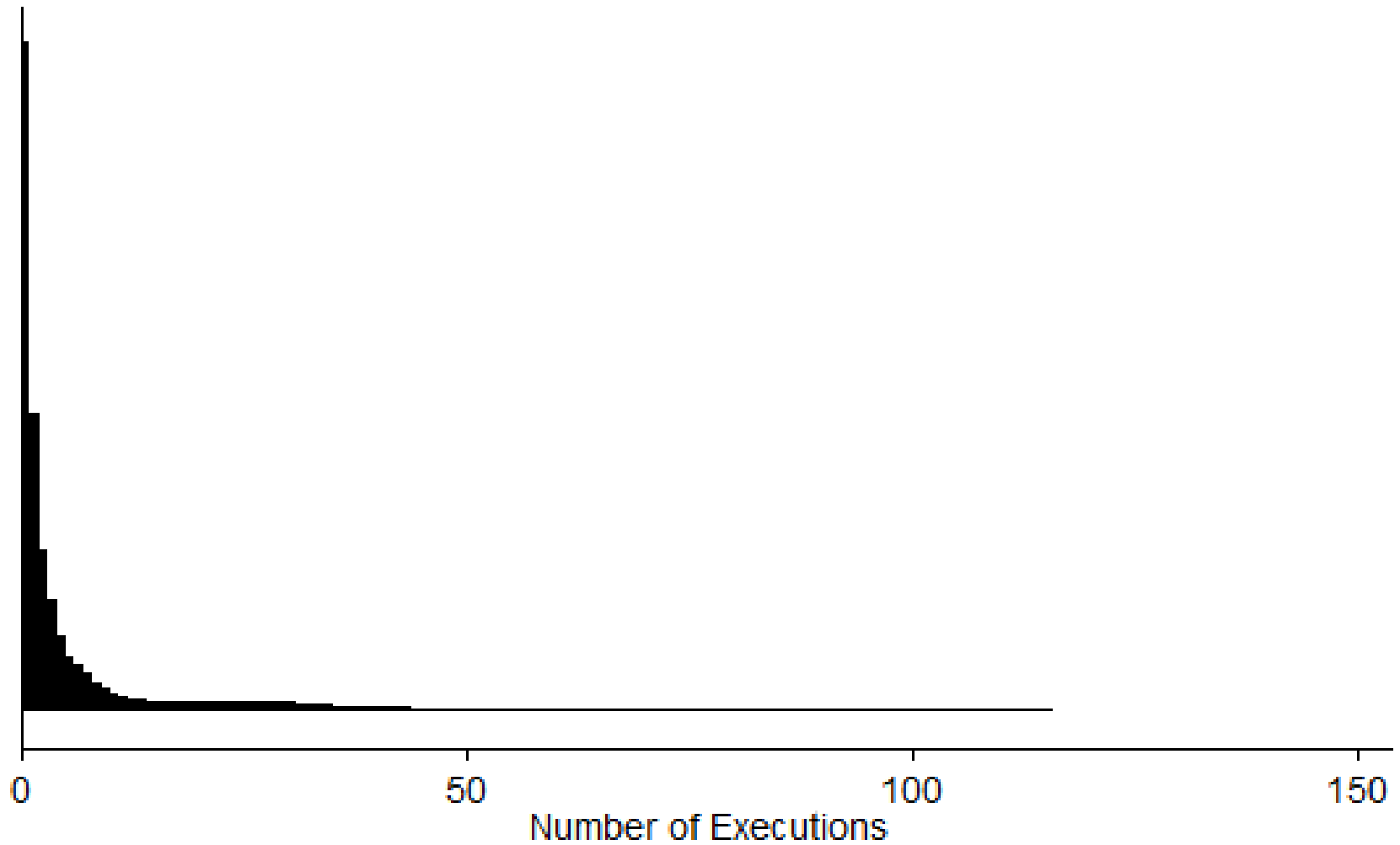
## Executions



# Five levels of scale, same pattern

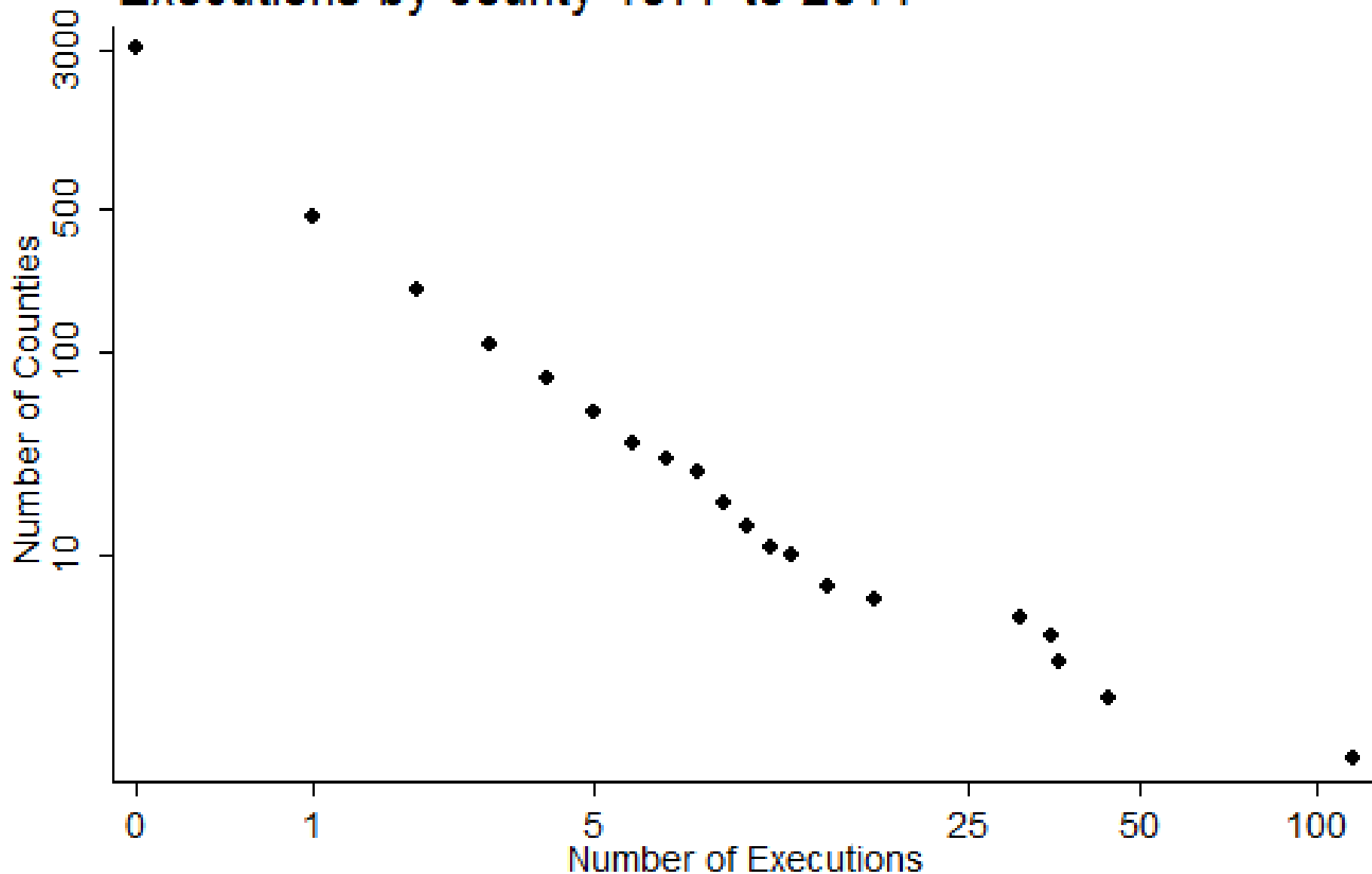
- ~3,000 counties in the US
  - Counties within individual states
  - The 50 states
  - The 12 federal judicial circuits
  - ~200 countries of the world
- 
- Patterns are not identical and some are more exponential than paretian, but all are extreme

## Executions by County



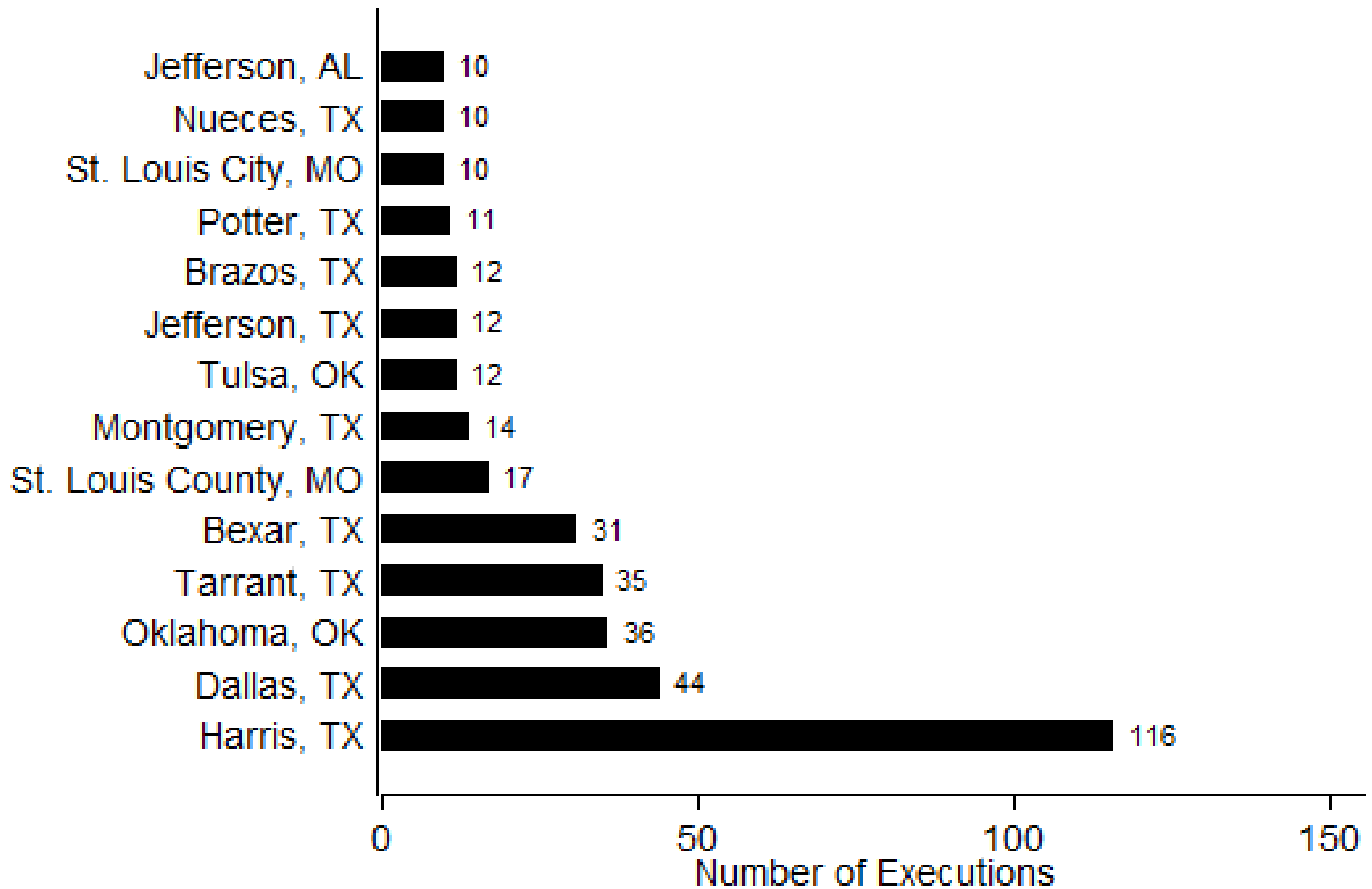
Includes 1245 executions from 1977 to April 10 2011.  
2692 counties have executed no inmates 455 at least one and Harris County 116.

# Executions by county 1977 to 2011



454 counties 1242 executions as of April 11

### US counties with 10 or more executions since 1977

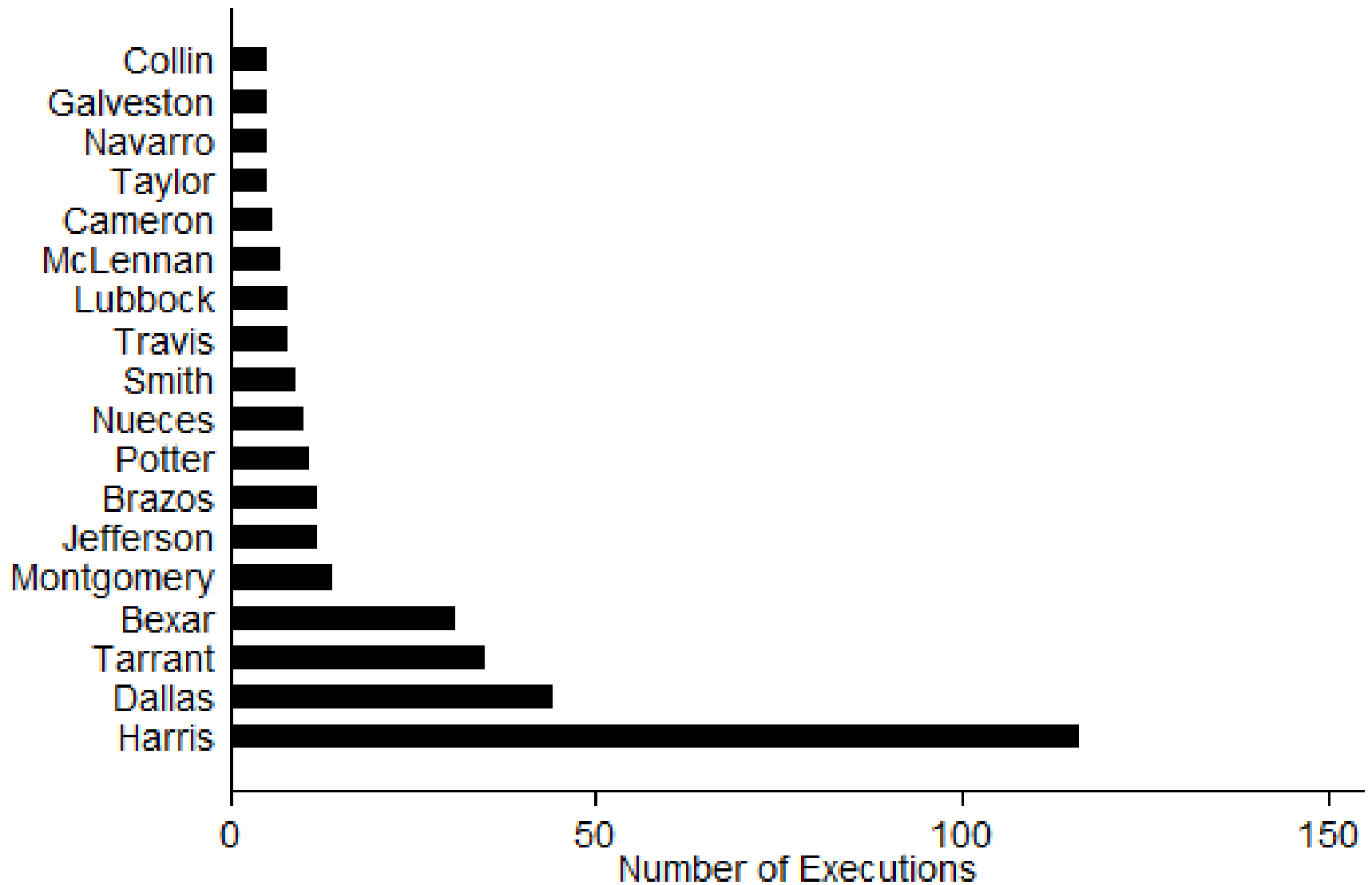


Includes counties with 10 or more executions from 1977 to April 10 2011.

# These trends also hold for individual states

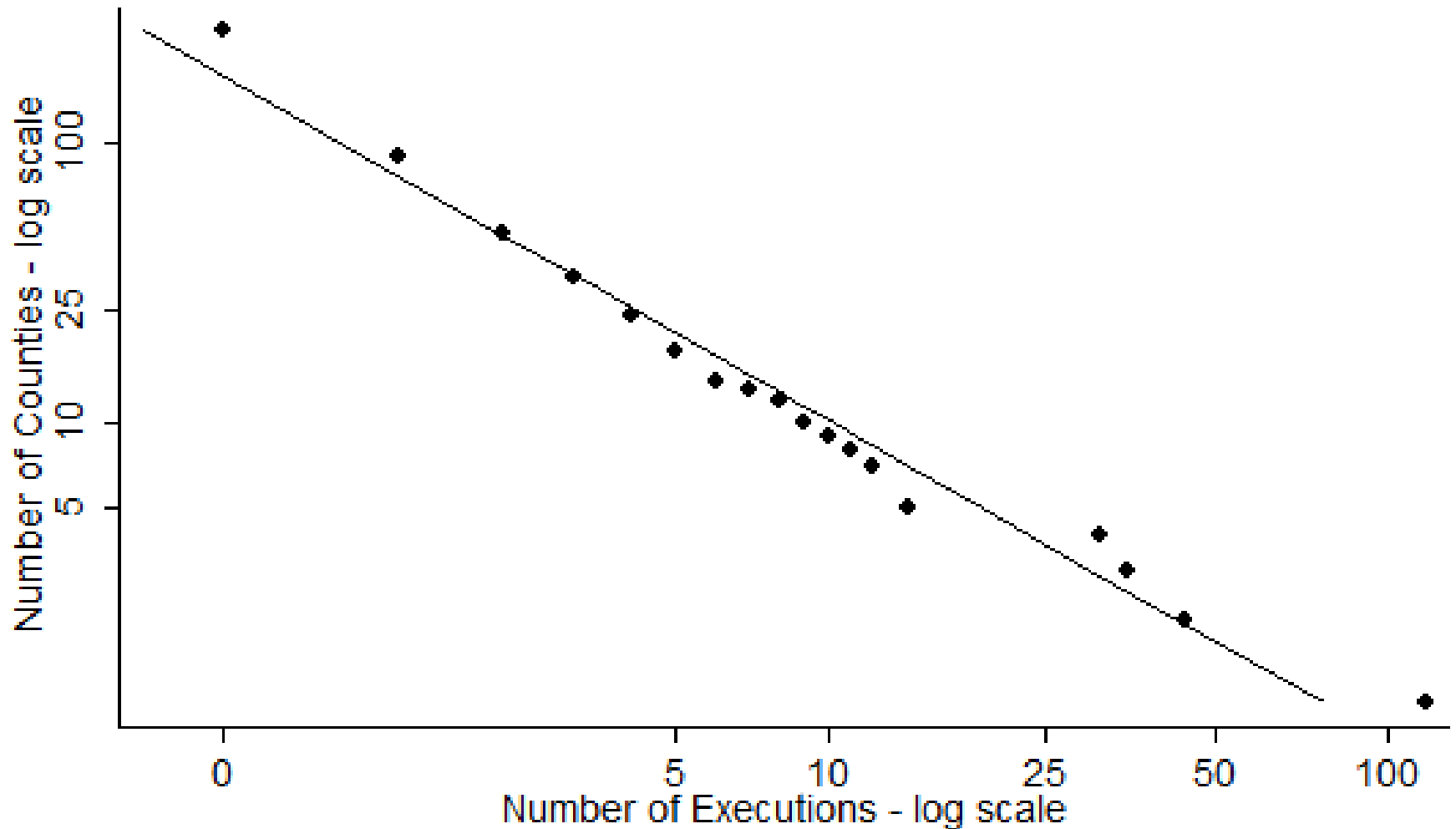
- The following slides show similar analyses for the state with by far the greatest number of executions, Texas, and for North Carolina.
- We can have greater confidence in the national analysis since it is based on a larger number of observations, but the pattern also holds within individual states.

## Texas counties with 5 or more executions 1977 to 2011



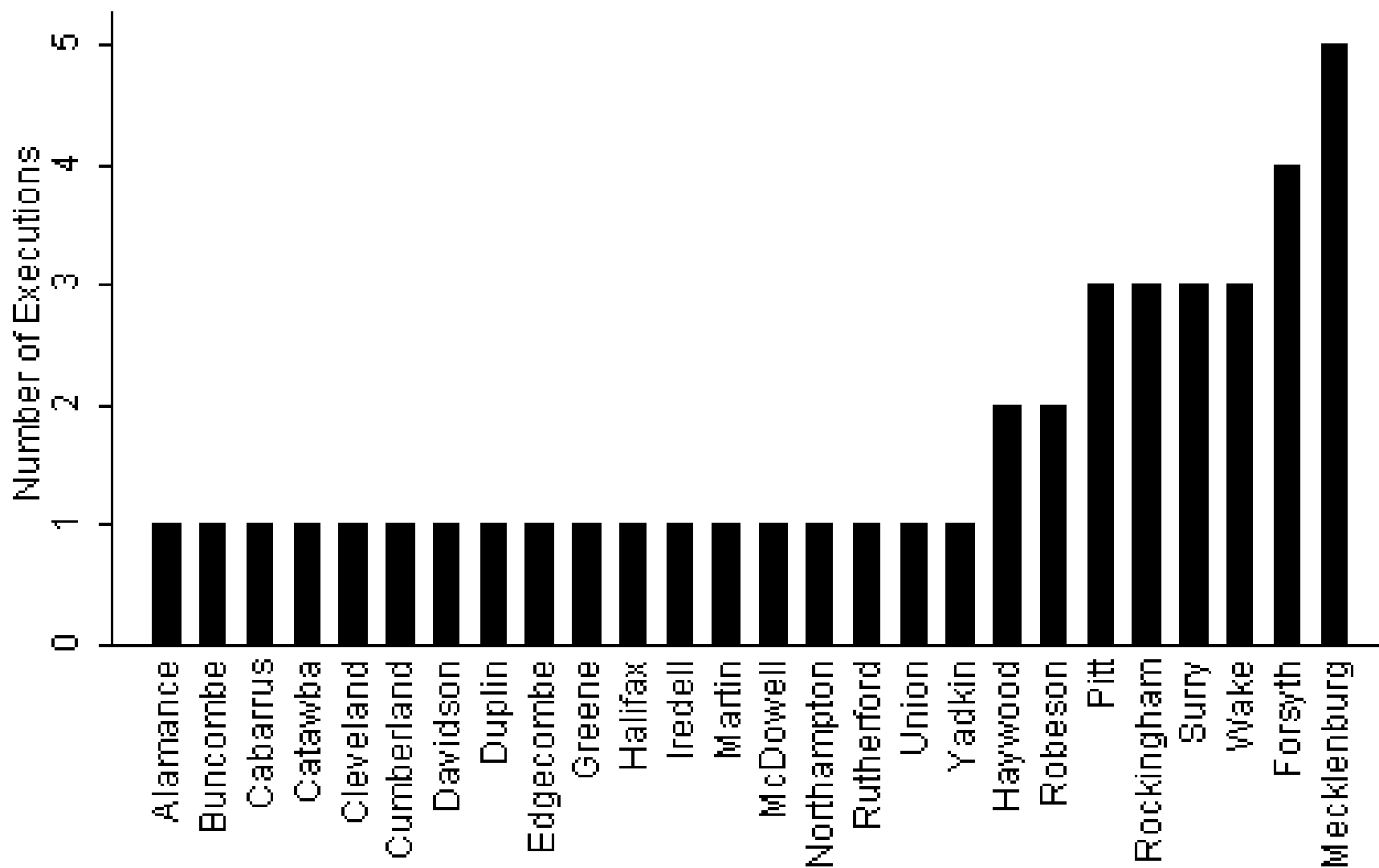
Note: 164 of the 254 counties in Texas have had no executions.

# Frequency of Executions by County, Texas



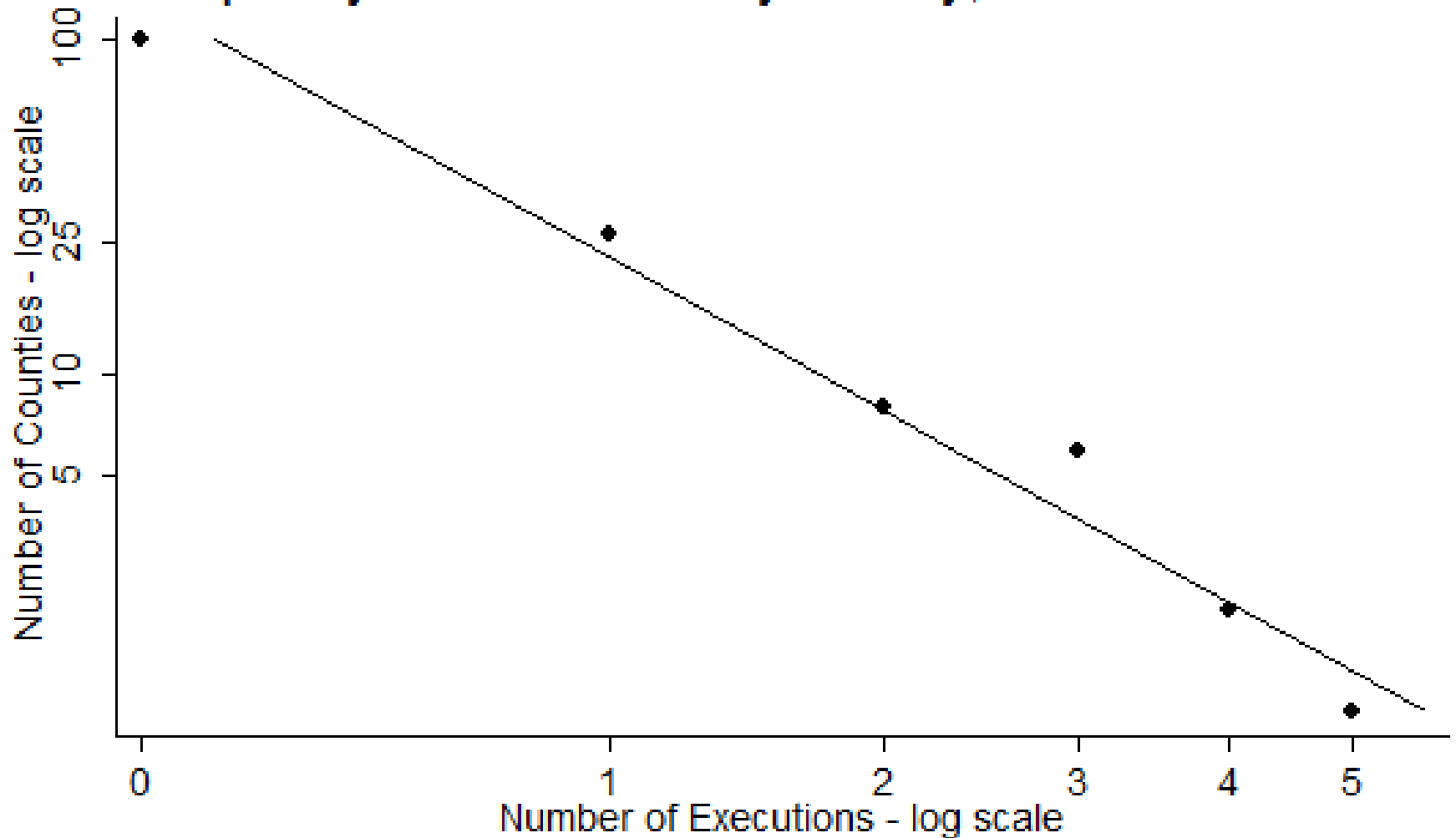
Among 254 counties in Texas, 90 have had one or more executions, 9 counties have executed 10 or more, and one (Harris) has executed 116.  
 $\ln(\text{Frequency}) = 4.36 - 0.85(\ln(\text{Executions} + 1))$  Adj. R2 = 0.97

## Executions by County in North Carolina 1977 to 2011



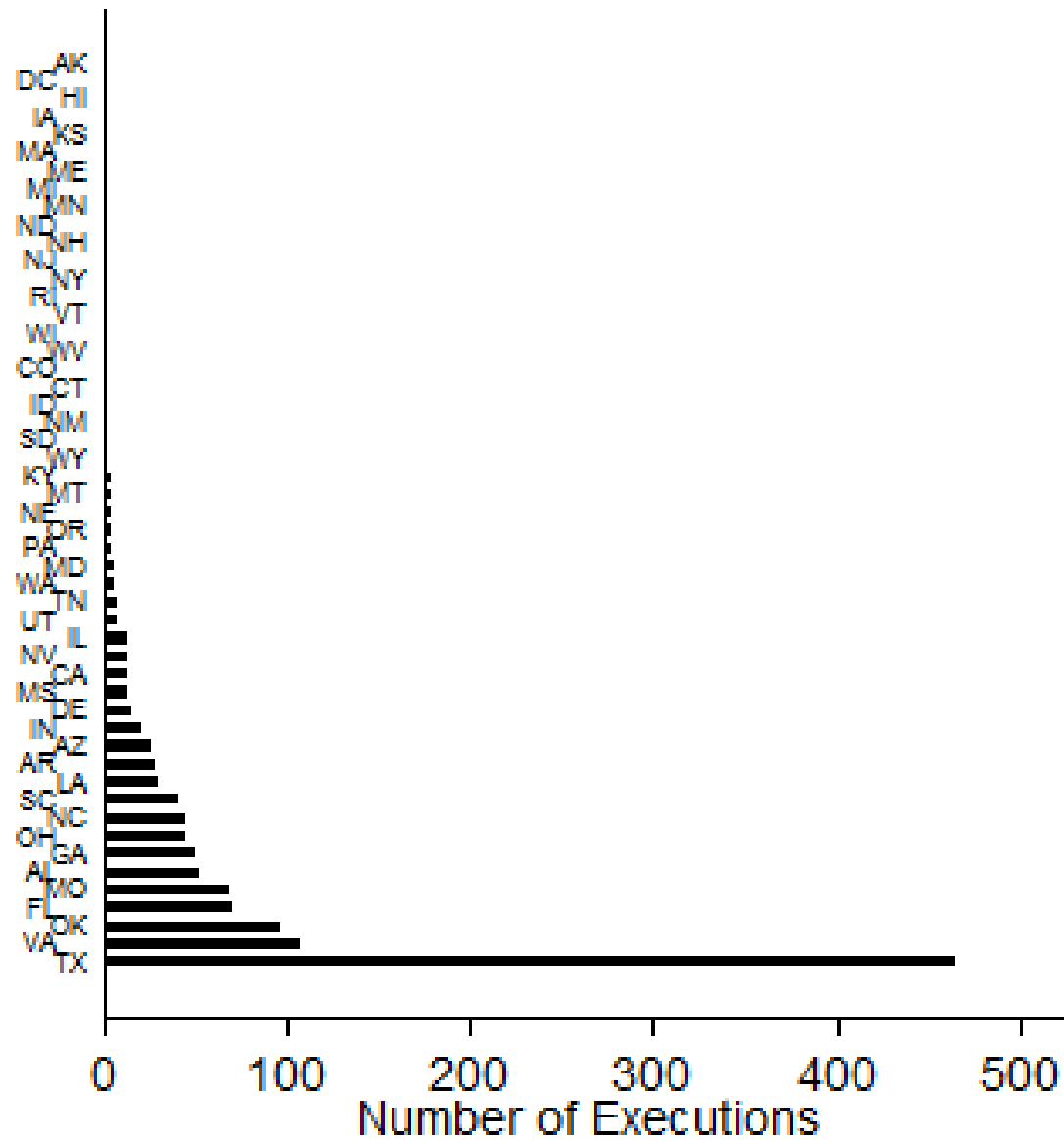
Note: 74 of the 100 counties in North Carolina have had no executions.

# Frequency of Executions by County, North Carolina



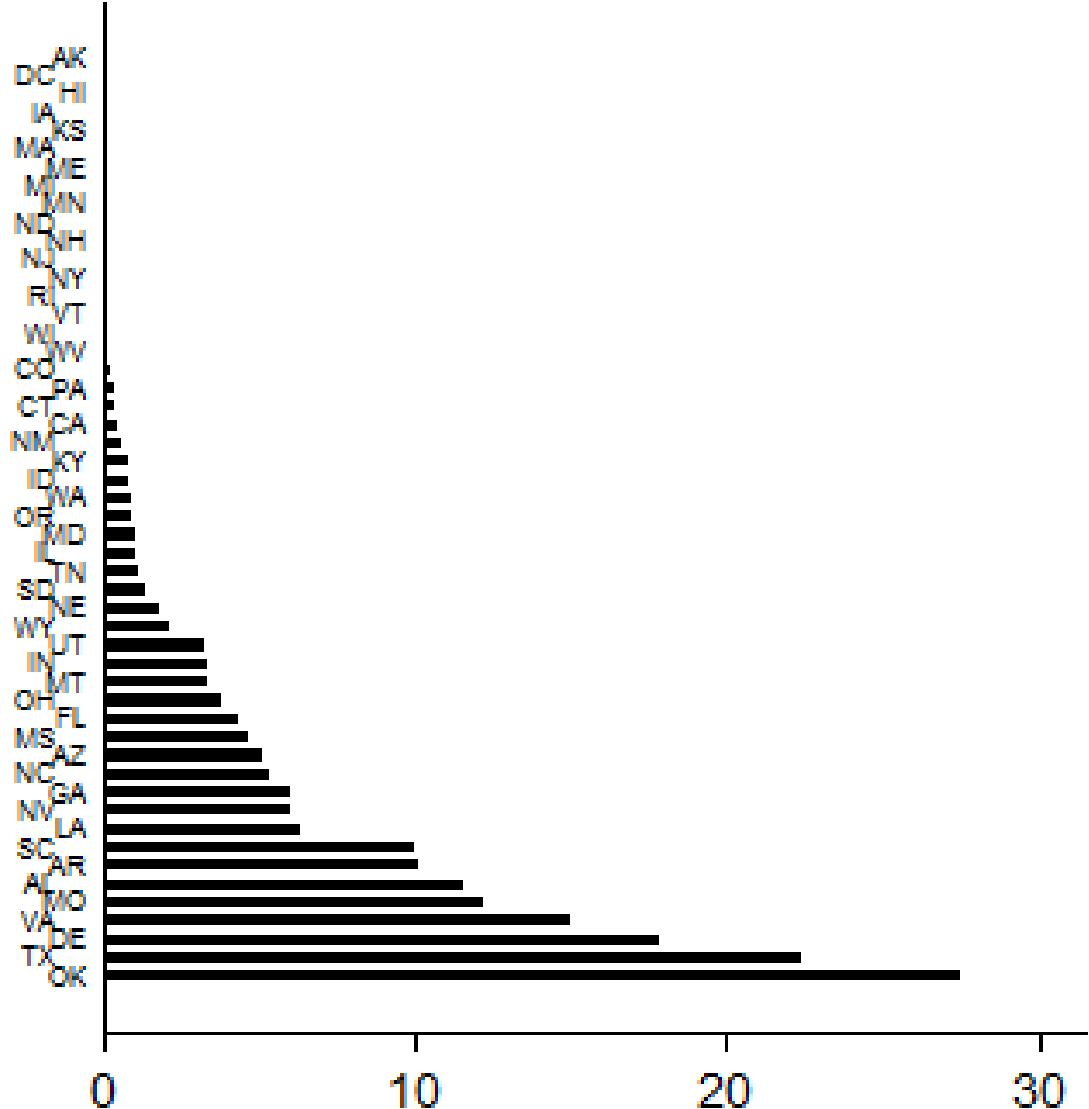
Among North Carolina's 100 counties, 26 have had one or more executions, 8 counties have executed 2 or more, and one (Mecklenberg) has executed 5.  
 $\text{Ln}(\text{Frequency}) = 1.8 - 0.34(\text{Ln}(\text{Executions}+1))$  Adj.  $R^2 = 0.95$

# Executions by State



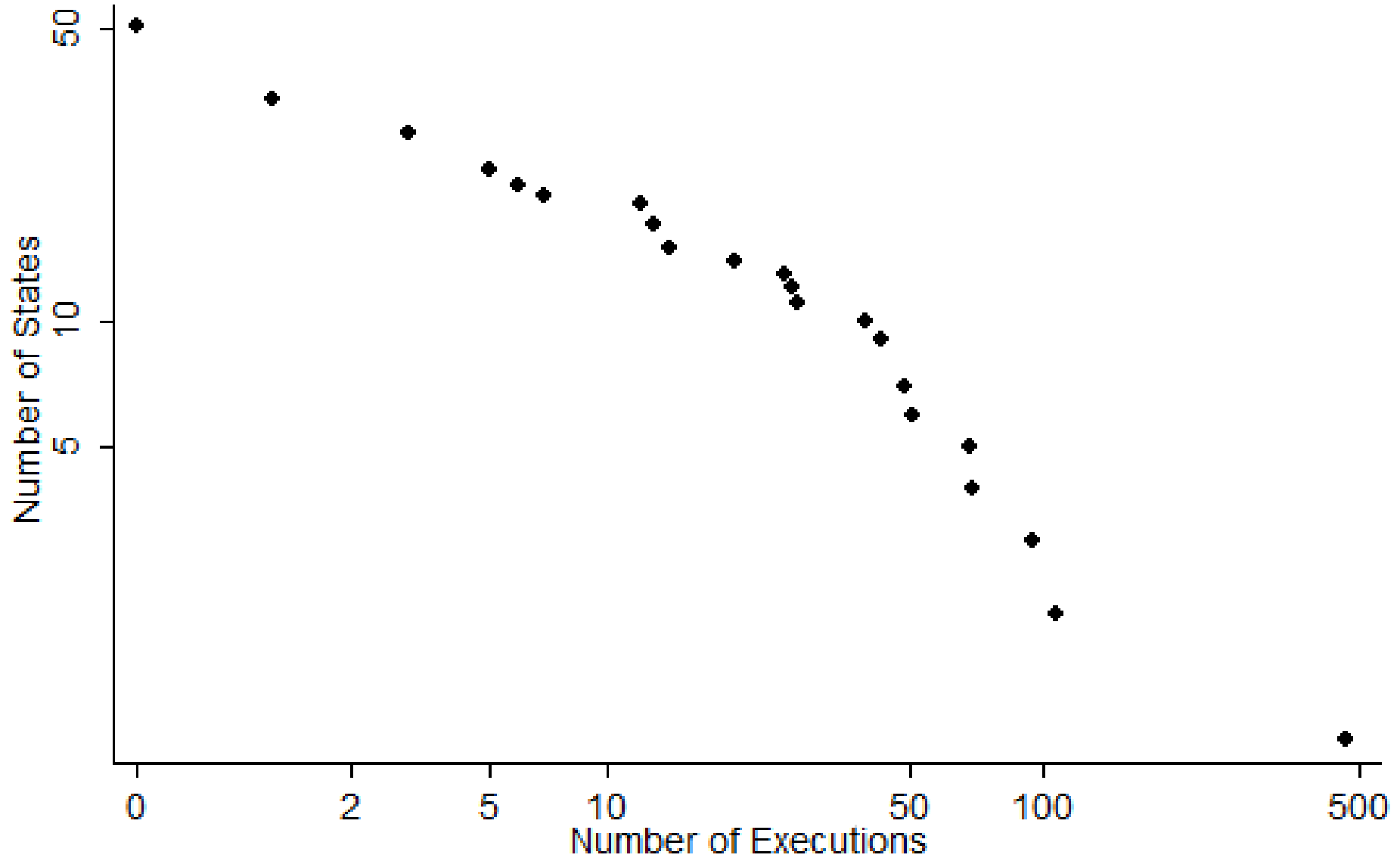
Based on 1,239 executions from 1976 to June 2011.

# Executions Rates by State



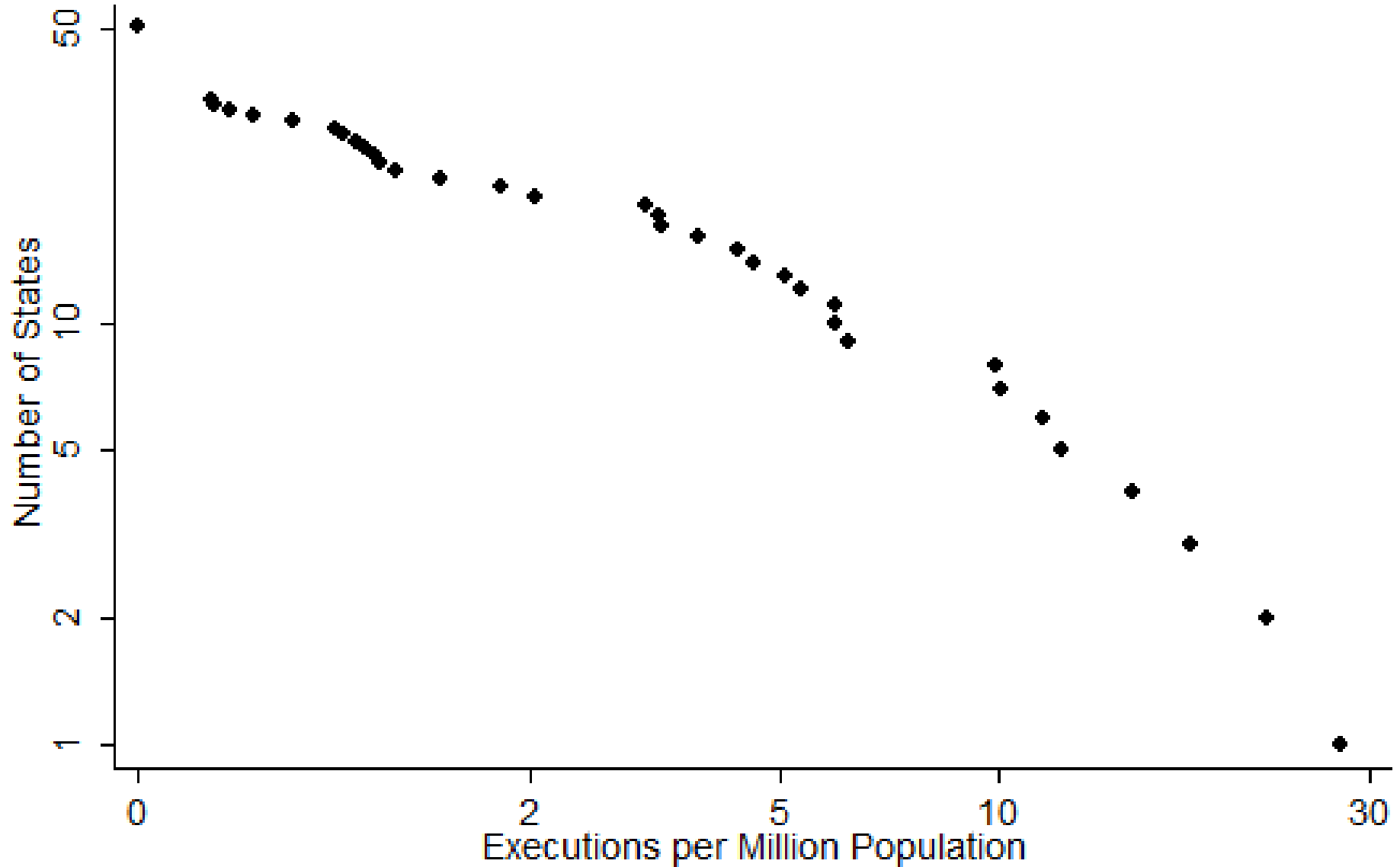
Number of Executions per Million Population  
Based on 1,239 executions from 1976 to June 2011.

# Cumulative Executions across US States



Based on 1,239 executions from 1976 to June 2011.

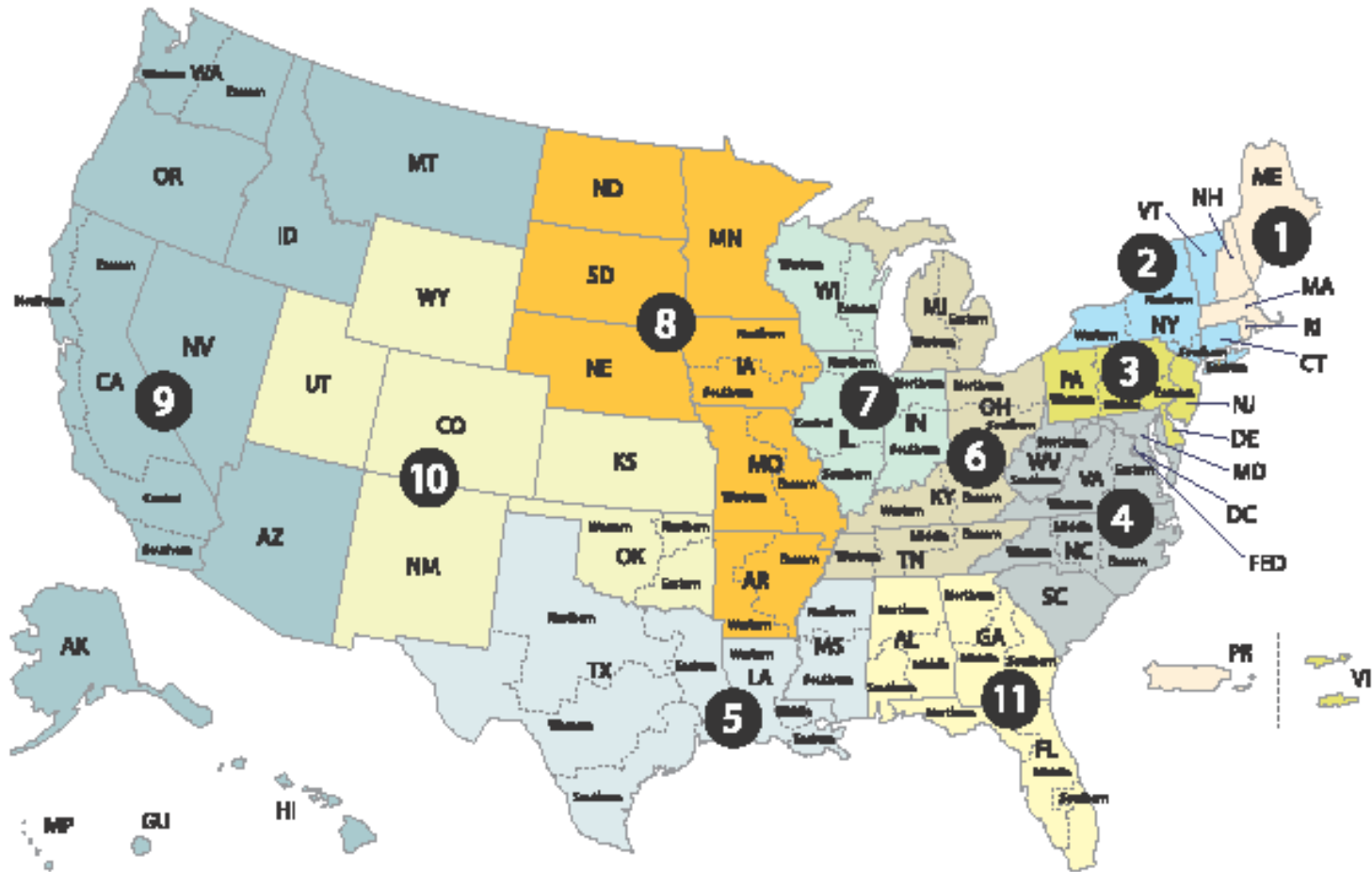
# Cumulative Execution Rates across the 50 States



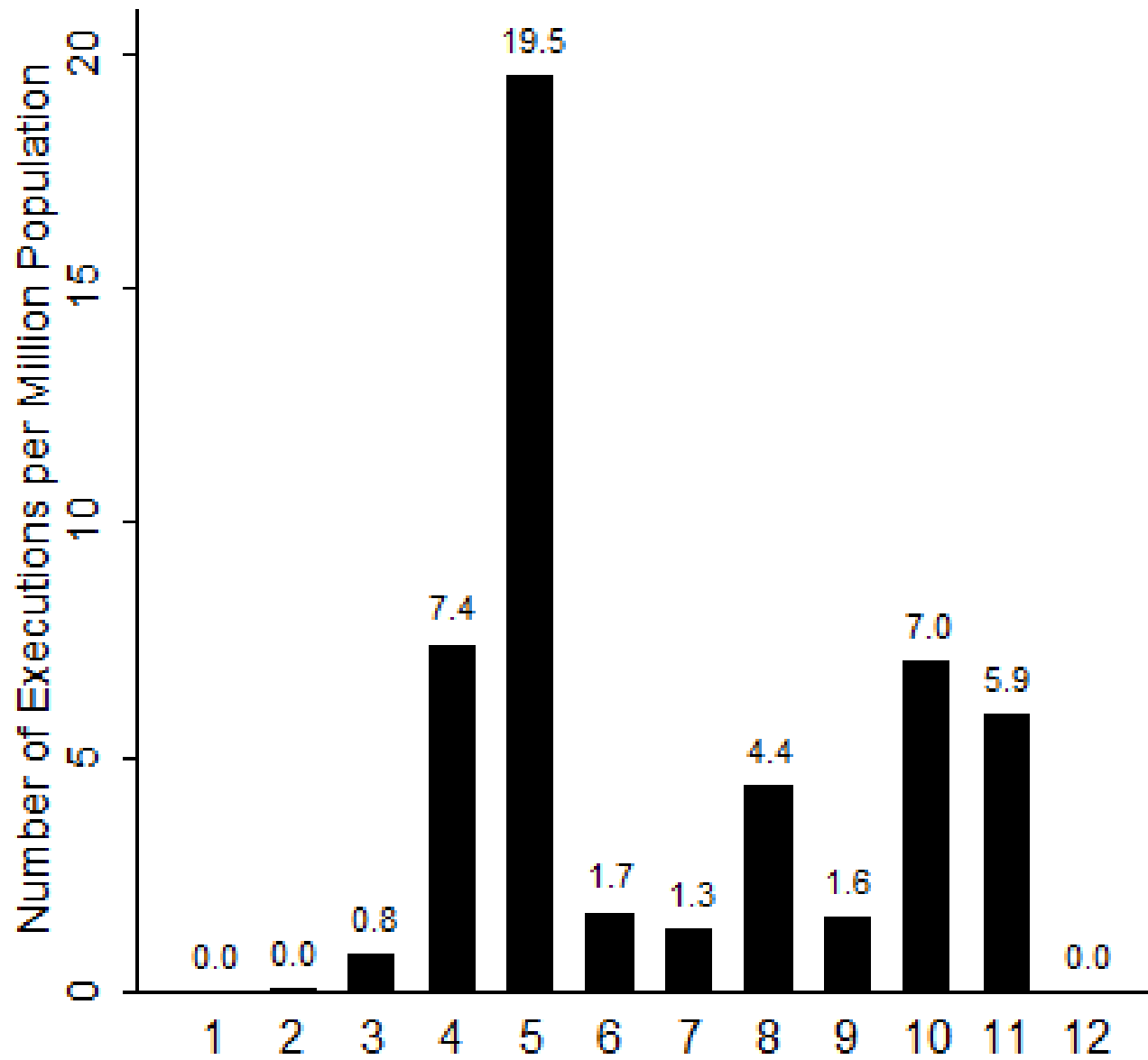
Based on 1,239 executions from 1976 to June 2011.

# Geographic Boundaries

of United States Courts of Appeals and United States District Courts

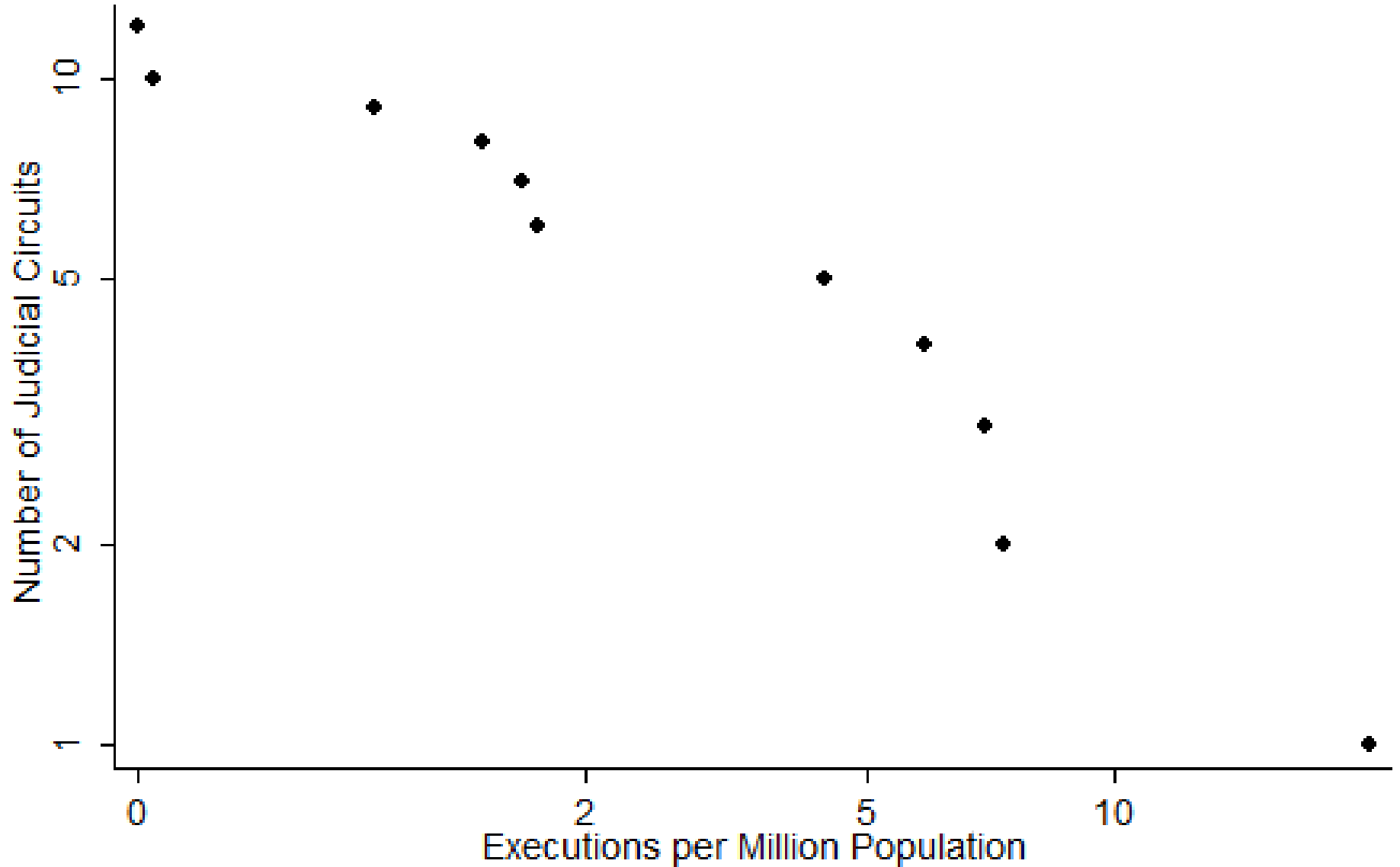


## Executions Rates by Federal Judicial Circuit



Based on 1,239 executions from 1976 to June 2011.

# Cumulative Executions across US Judicial Circuits

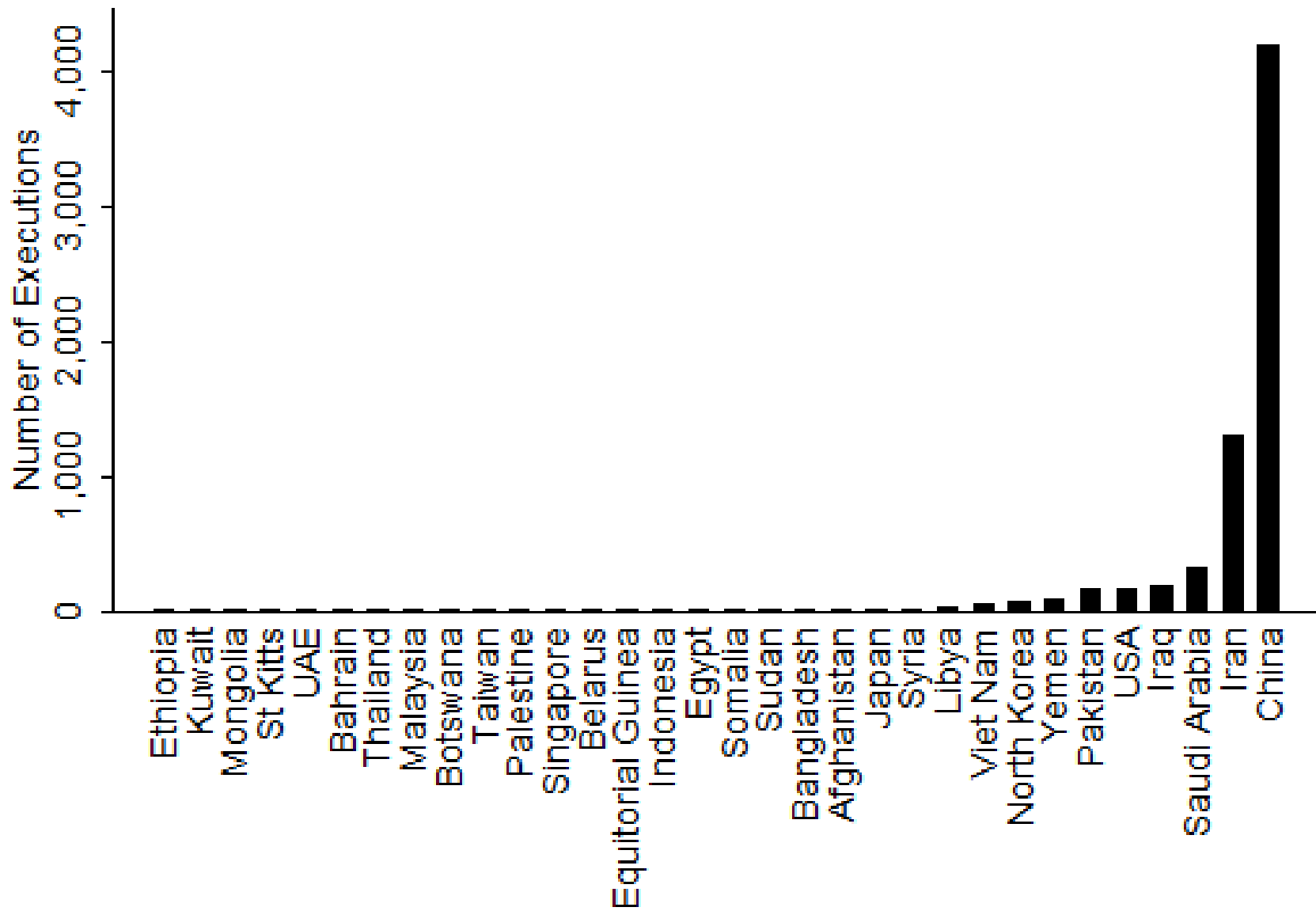


Based on 1,239 executions from 1976 to June 2011.

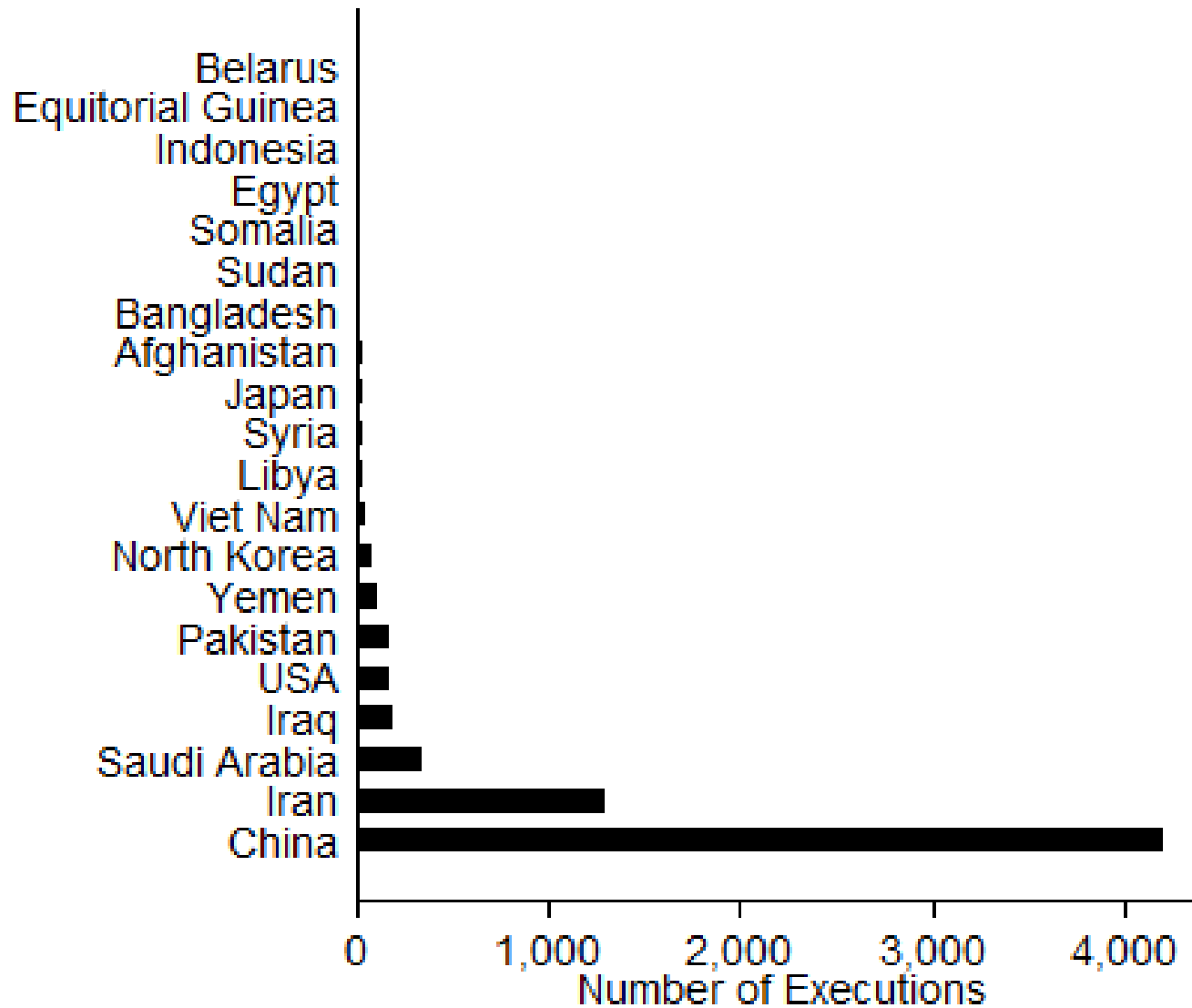
# These trends also hold for countries across the world

- Since 2007, Amnesty International has published an annual review of capital punishment around the world:  
<http://www.amnesty.org/en/death-penalty/numbers>
- Where they present a range, I use the lowest number in order to be conservative.
- Following charts combine 2007 through 2010.

Executions by Country, 2007-2010

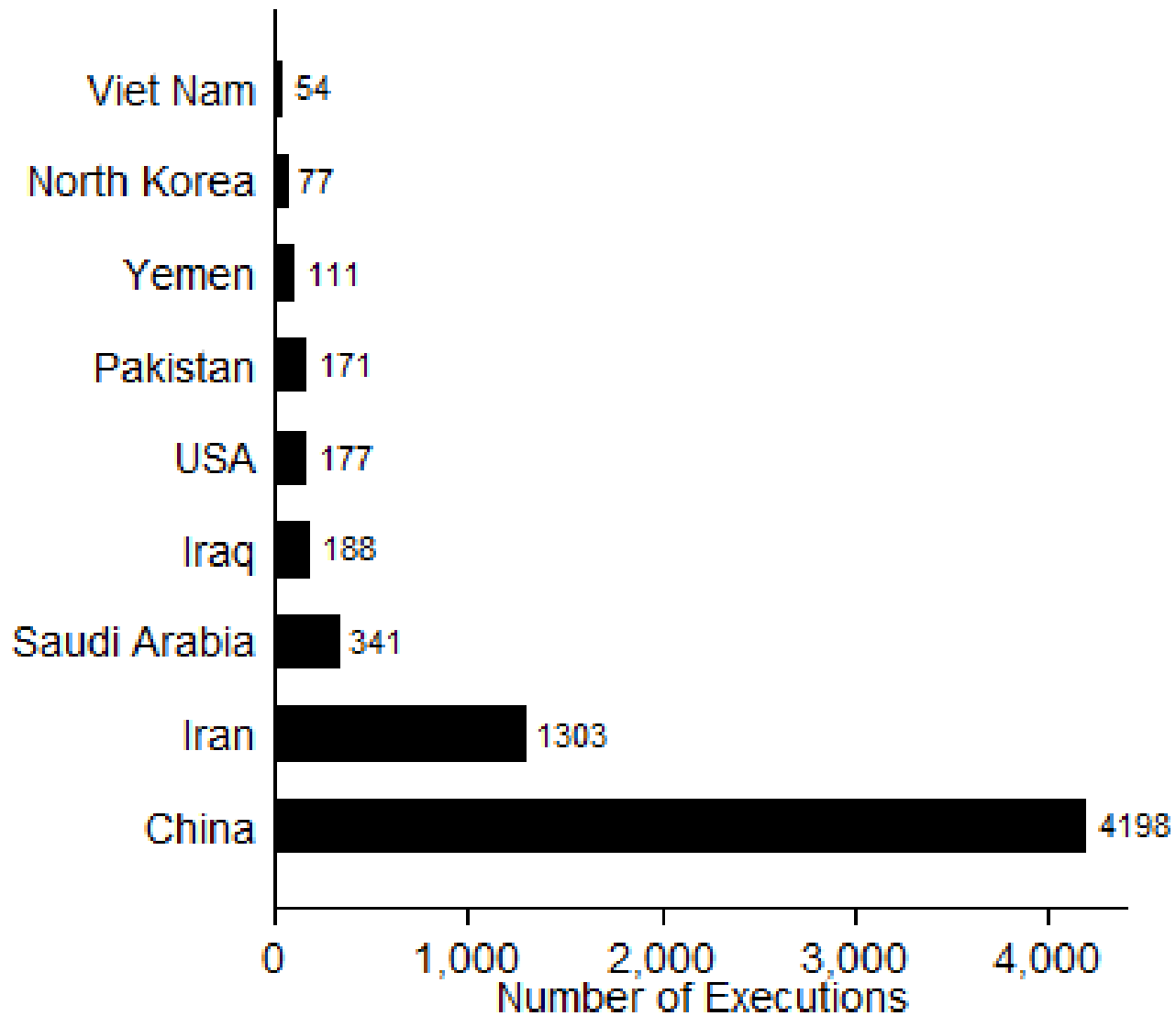


## Executions by Country, 2007-2010



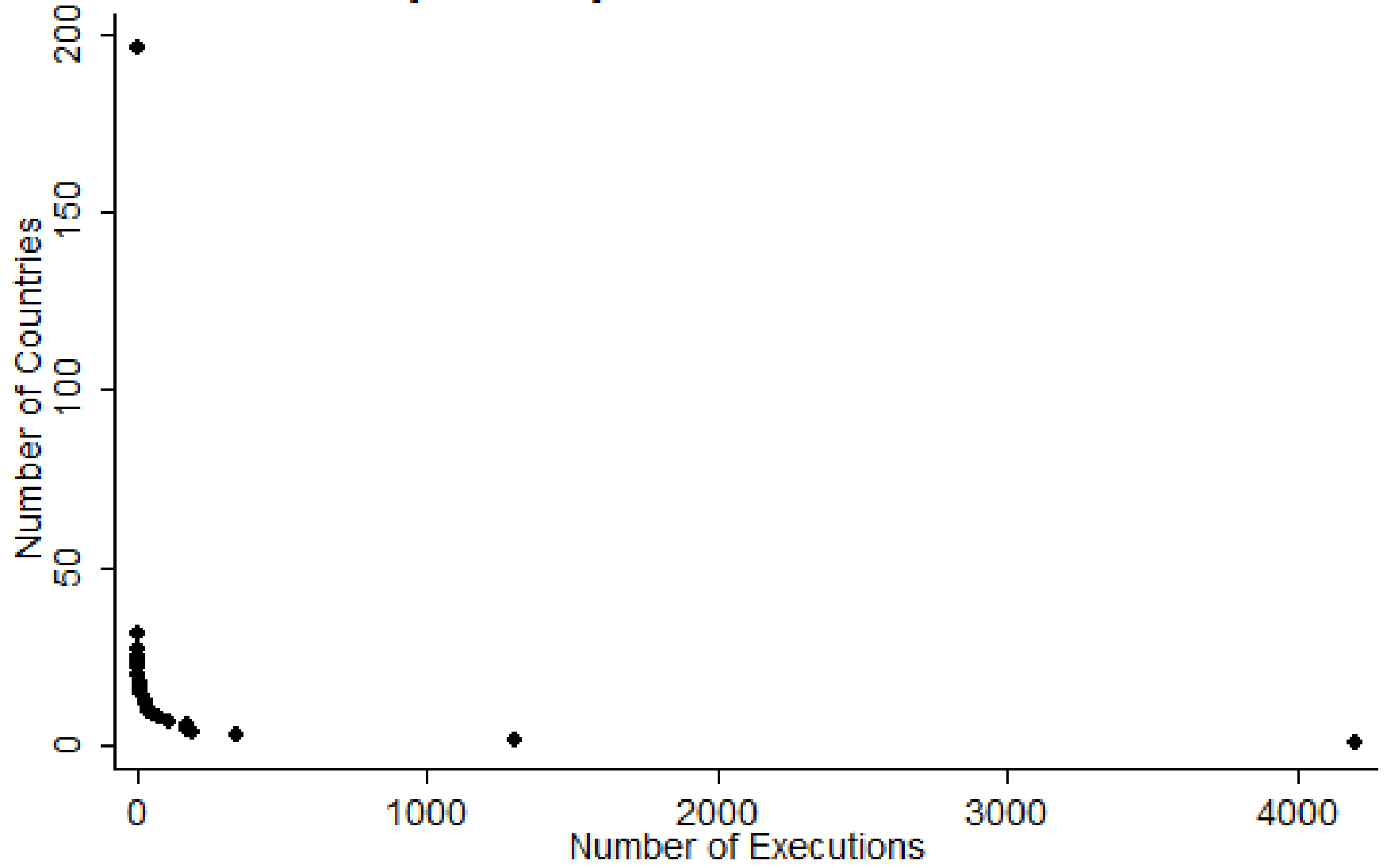
Includes only countries with six or more executions.

## Executions by Country, 2007-2010



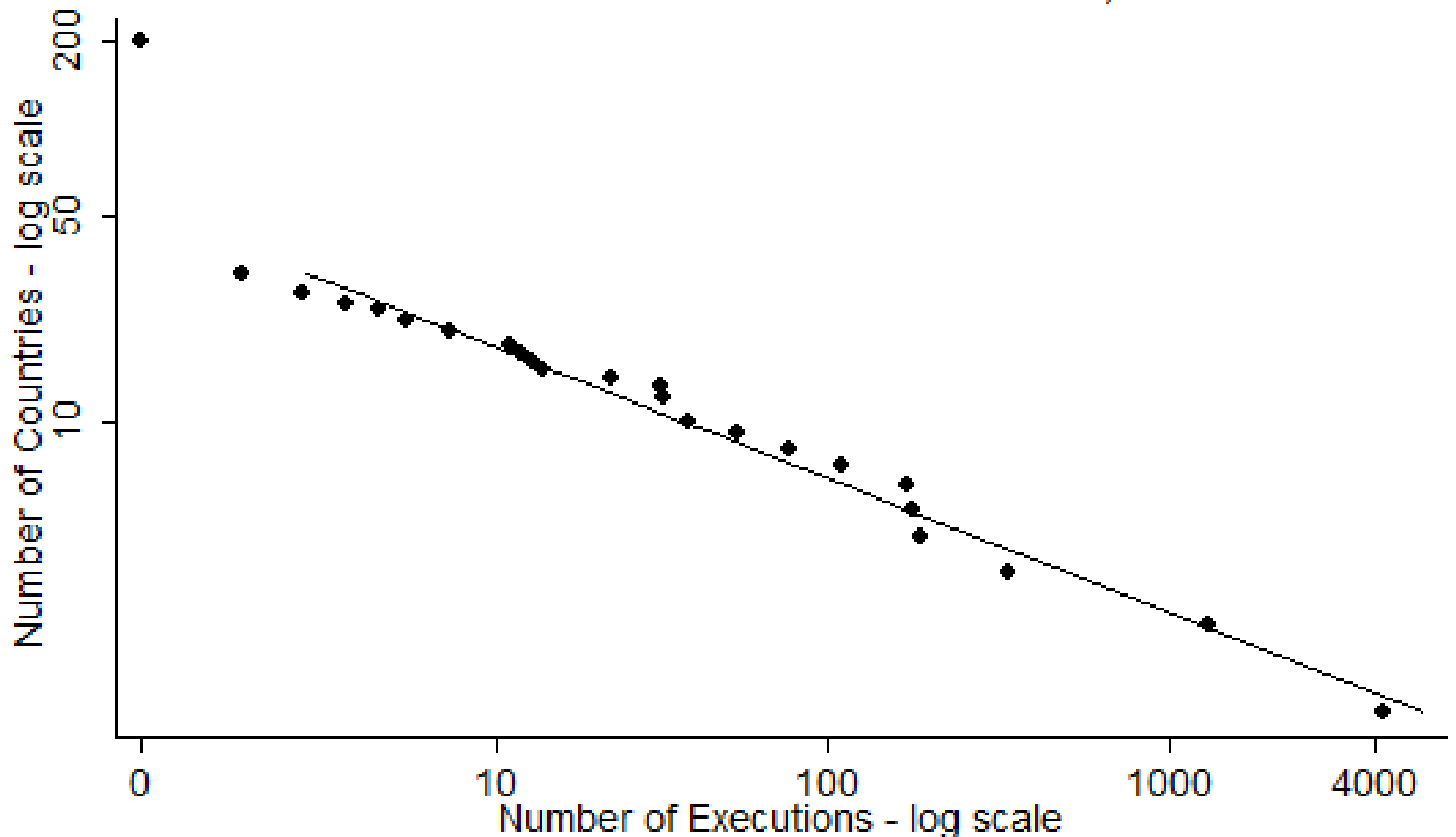
Includes only countries with 50 or more executions.

# Executions by country, 2007-2010



Of 196 countries, 164 executed no one but China executed over 4,000.

## A Power Law of Death Across the World, 2007 to 2010



Among 196 countries in the world, 164 have had no executions, 7 have executed 100 or more, and one (China) has executed over 4,000.

$\text{Ln}(\text{Frequency}) = 8.62 - 2.17(\text{Ln}(\text{Executions}+1))$  Adj.  $R^2 = 0.98$

# How to explain this?

- The development of a “local legal culture”
- Expectations of failure v. expectations of success
- Six actors in the US system:
  - Prosecutor
  - Defense (Public Defender’s Office, funded by state)
  - Juries
  - Judges
  - State appellate courts
  - US circuit courts
  - (US Supreme court as well, but affects all actors equally)

# Assume no executions so far in your jurisdiction

- Next heinous murder occurs
- Probably not the most heinous in local history
  - Therefore does not merit more severe punishment
- Prosecutor has no confidence that:
  - He has the staff experience to do it
  - Defense attorneys cannot fight successfully
  - Juries will go for it
  - Judges will allow it
  - Appellate courts will sanction it

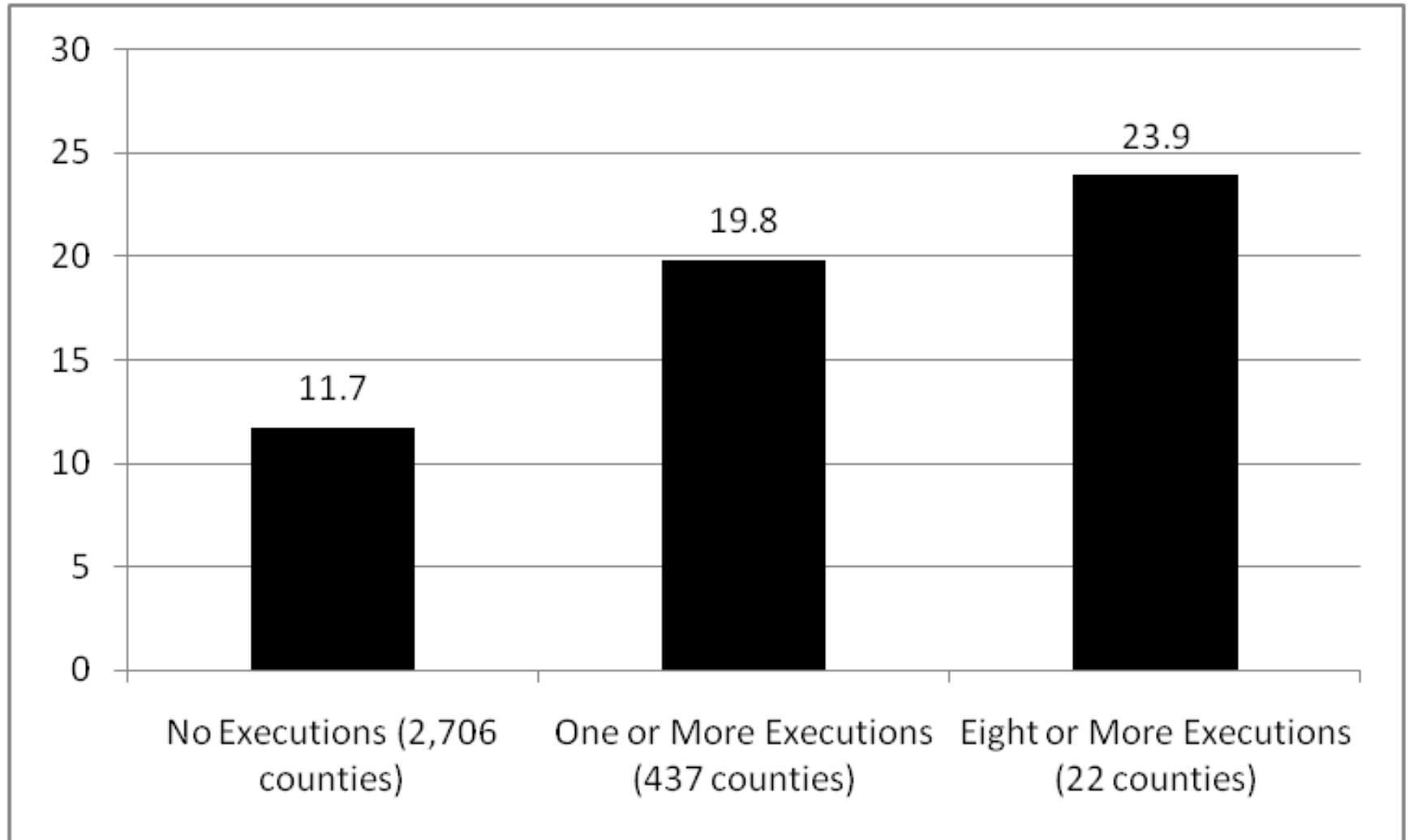
# Assume some previous executions

- Next heinous murder occurs
- It may well be more heinous than some previous case which led to execution
- Prosecutor has confidence that:
  - He has the staff experience to do it (and maybe a younger lawyer who needs a promotion)
  - Juries will go for it
  - Public Defender is under-funded and ill-equipped
  - Judges will allow it (and keep the Defender weak)
  - Appellate courts will sanction it

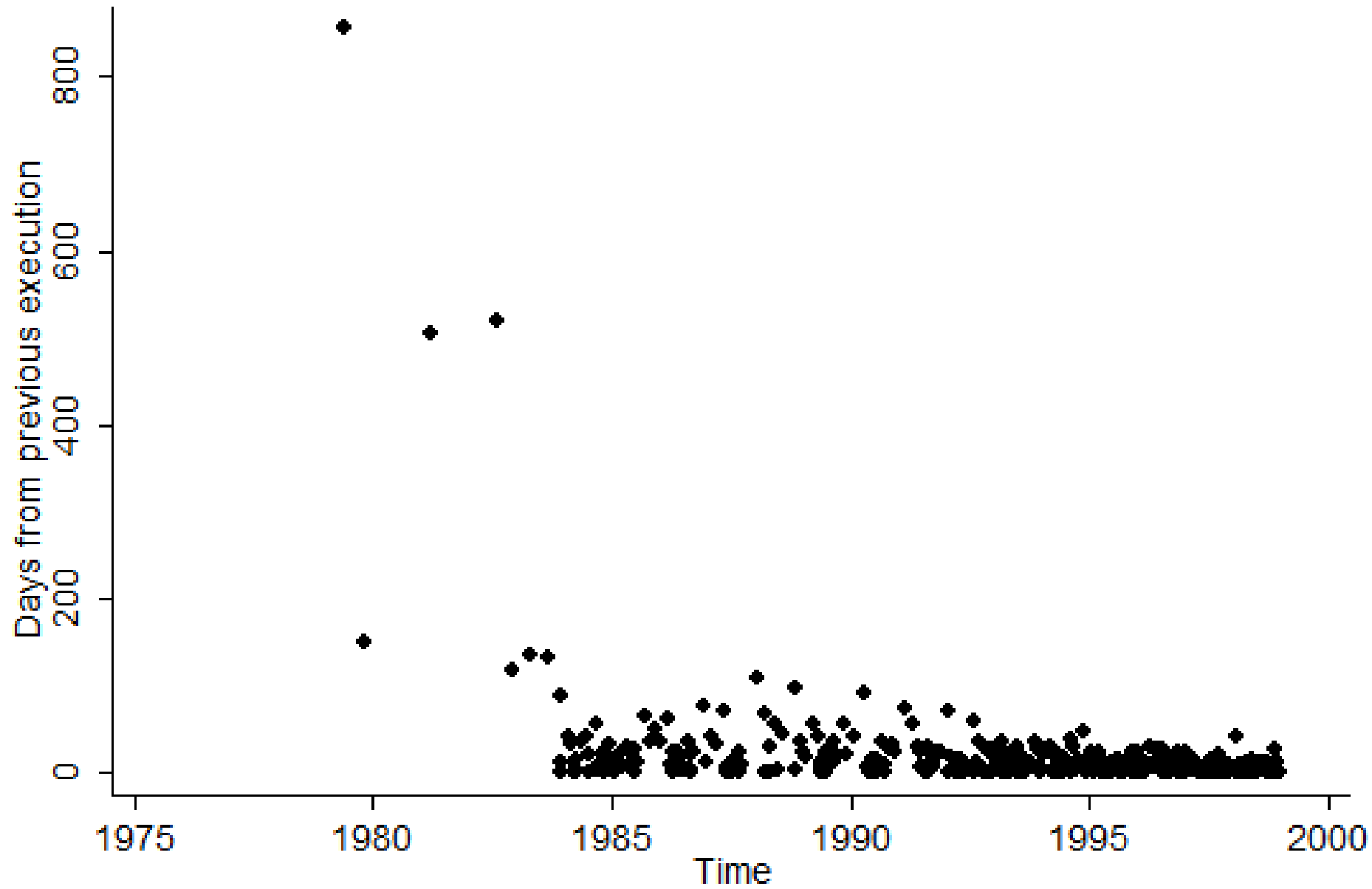
# Local norms developing independently

- Baseline factors:
  - Former slave states
  - High minority population
- But why Houston and not, say, New Orleans?
- Random start, then self-reinforcement
- If we can show this it excludes “equal justice” as a factor, which could be unconstitutional
- Time elapsed between executions then should decline with each successful case

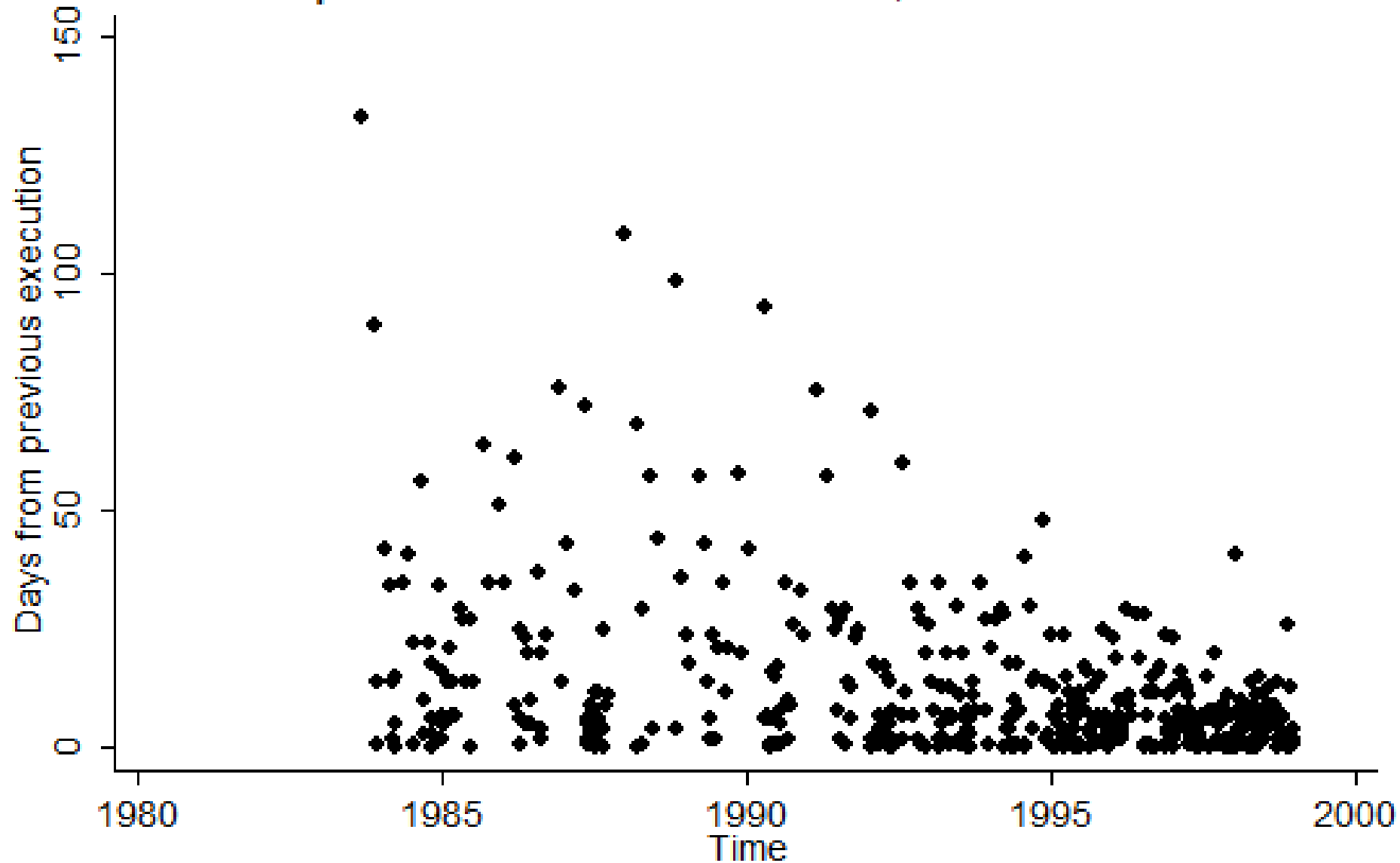
# Percent Minority Population



# Time elapsed between executions, US

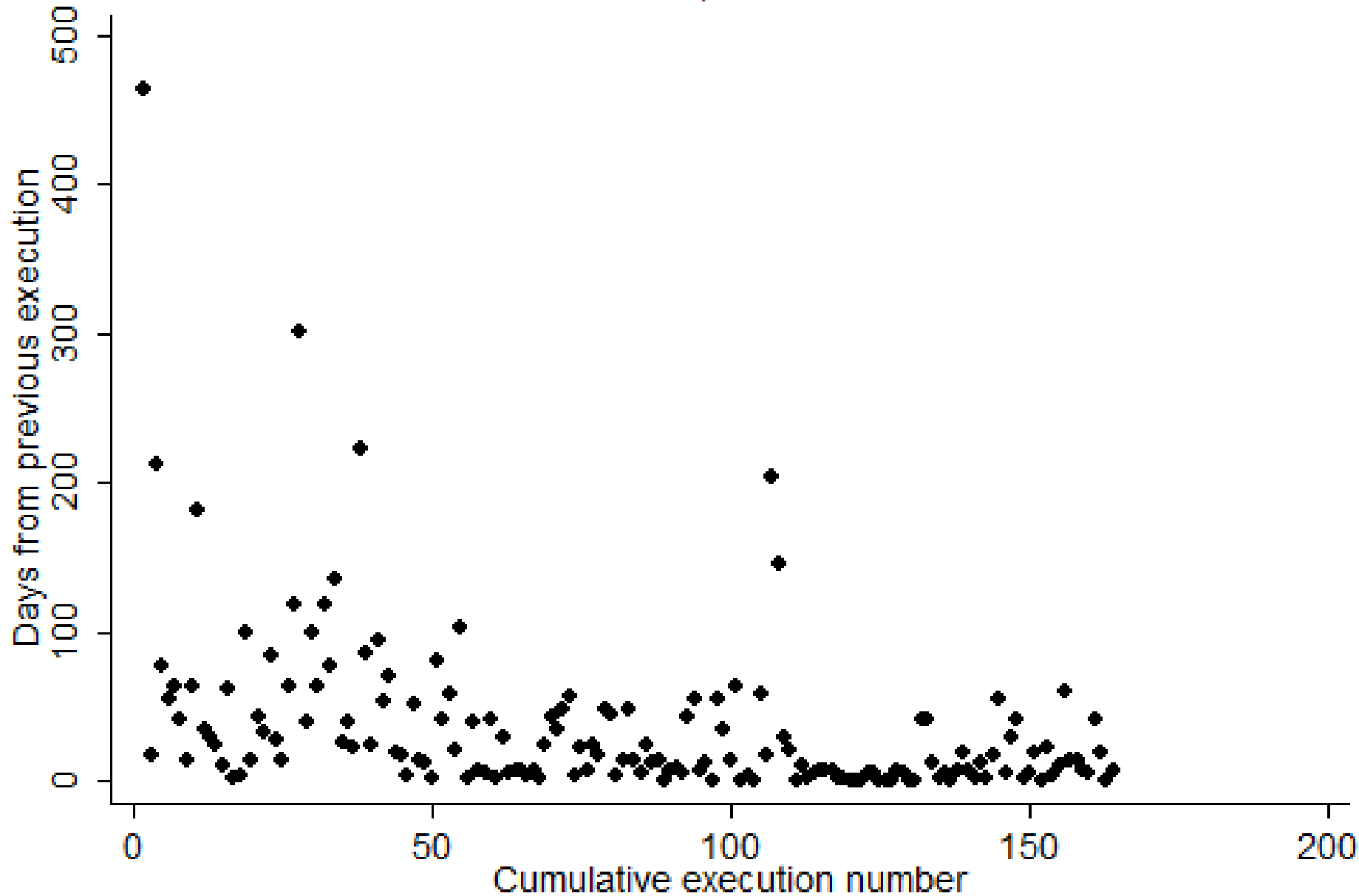


# Time elapsed between executions, US

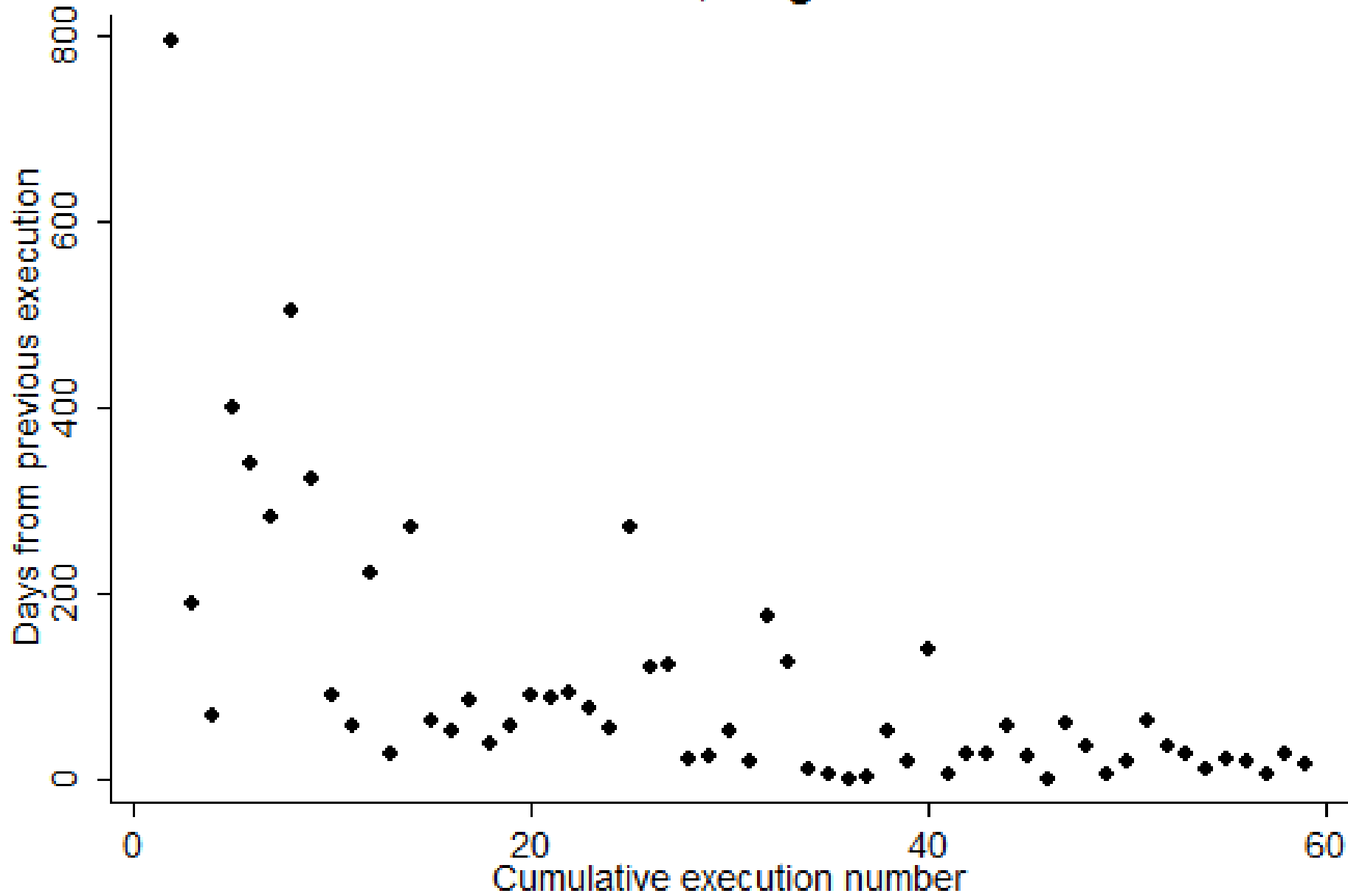


Excludes the first 7 executions, which had long delays.

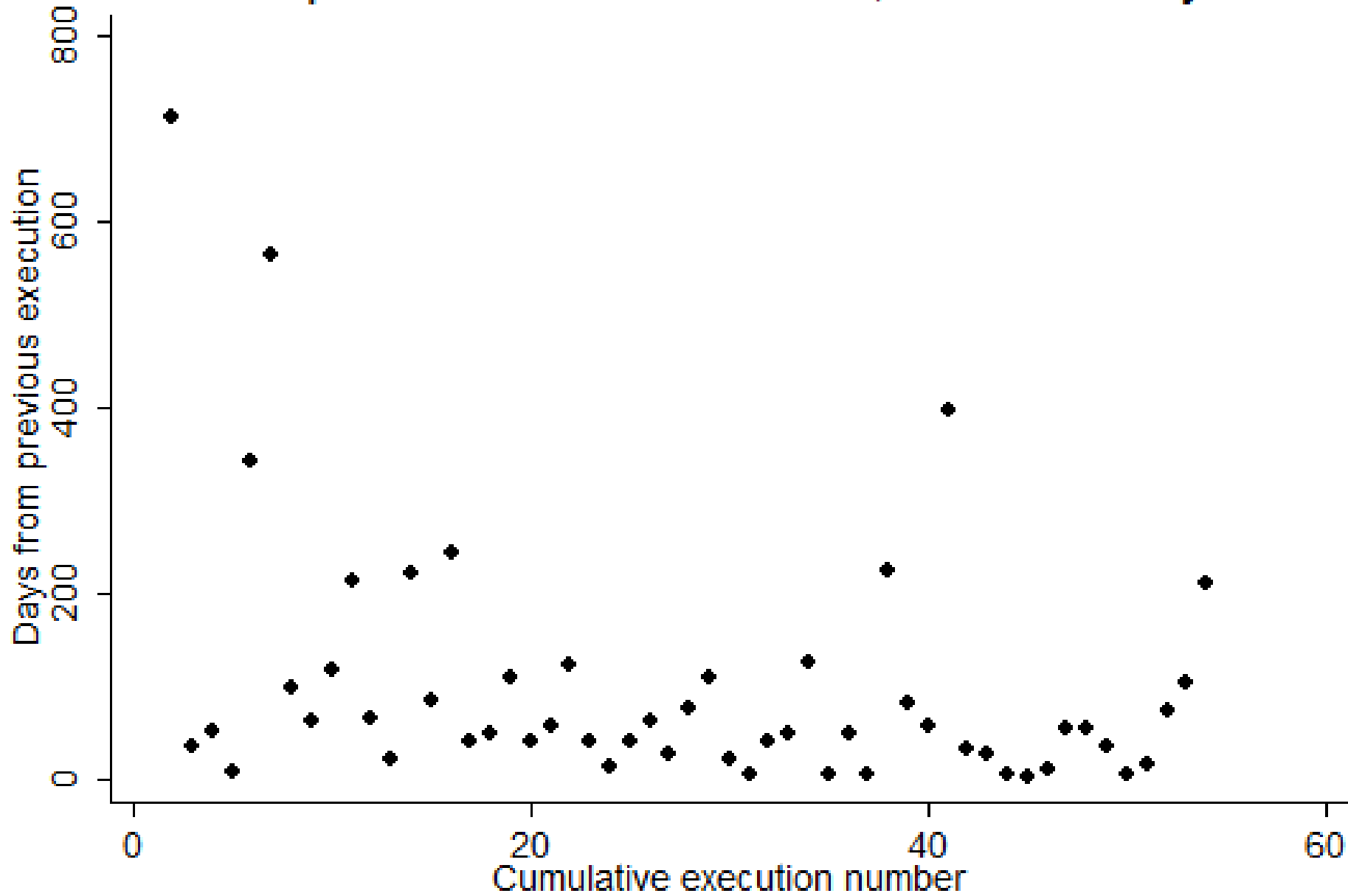
# Time between executions, Texas



# Time between executions, Virginia



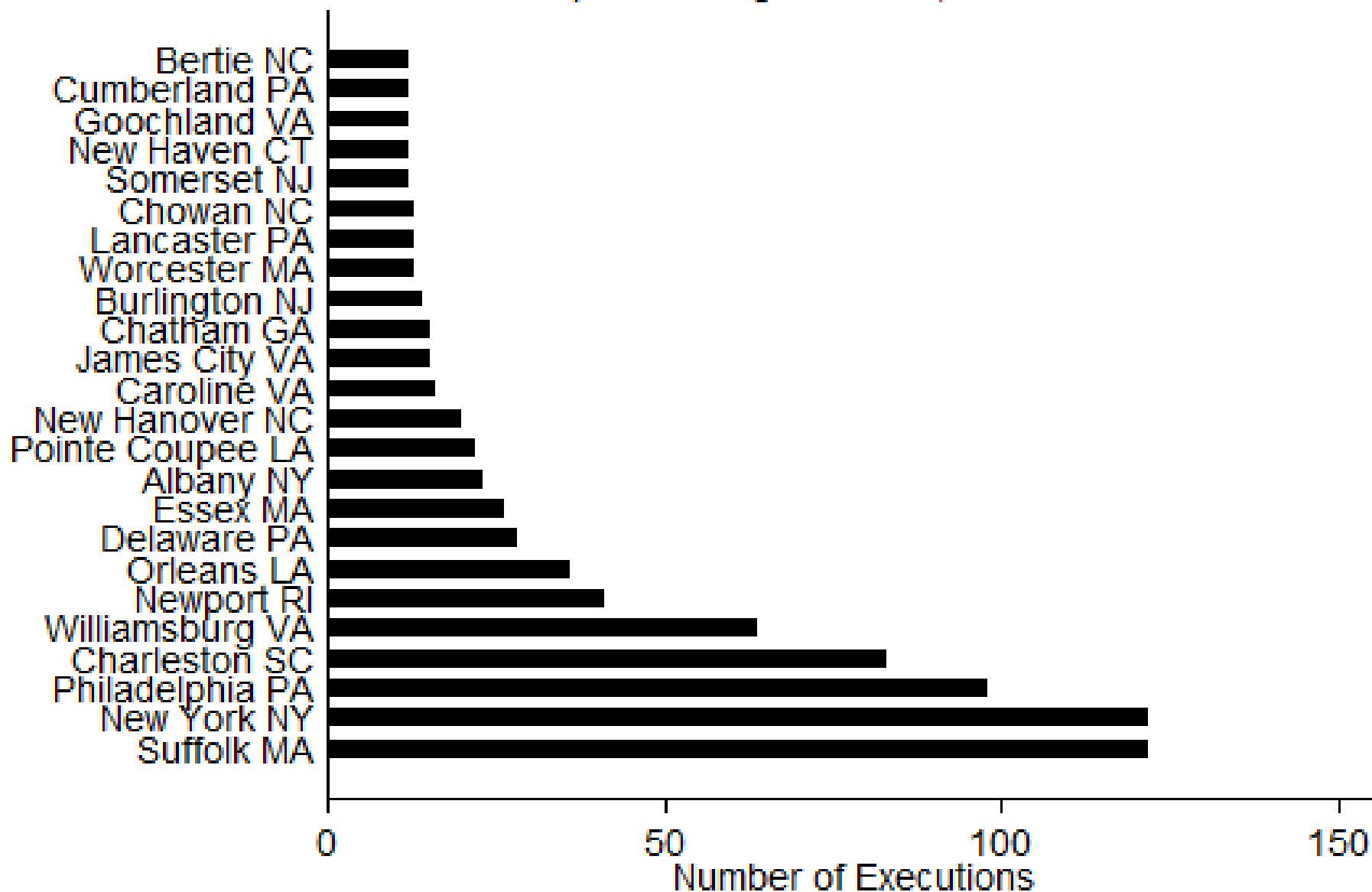
# Time elapsed between executions, Harris County TX



# Note: Modern era shows different geographic patterns than previous eras

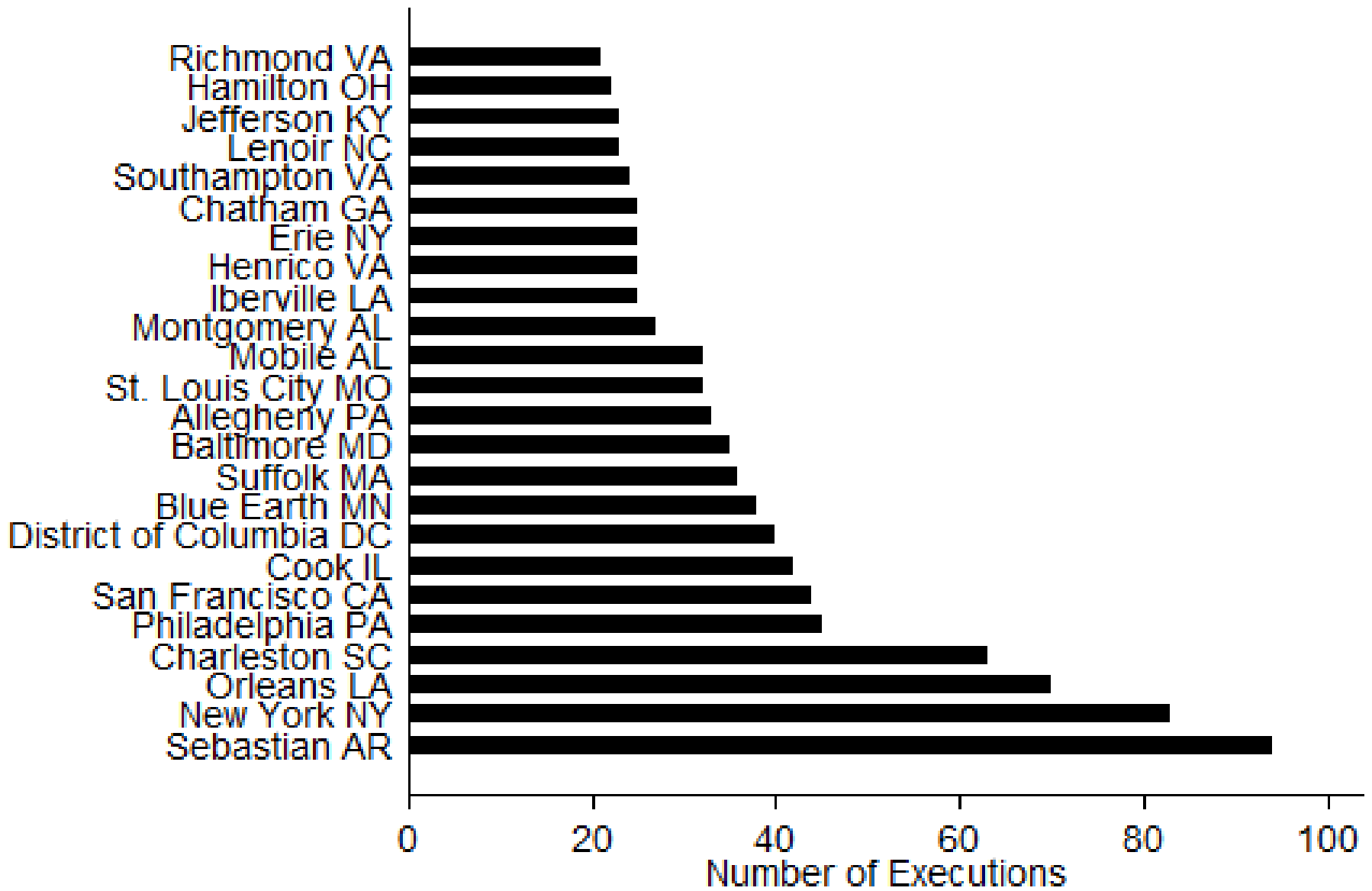
- Early period: very common in large northern cities as well as in the South
- Modern period: almost entirely limited to the slave states
- Strong “states’ rights” reaction to Supreme Court decisions from the 1960s and 1970s
- Very little historic continuity in these patterns
- So it is possible to “break the cycle”
- Nothing inevitable about certain counties rather than others having most of the executions

# Top Executing Counties, 1600 to 1799



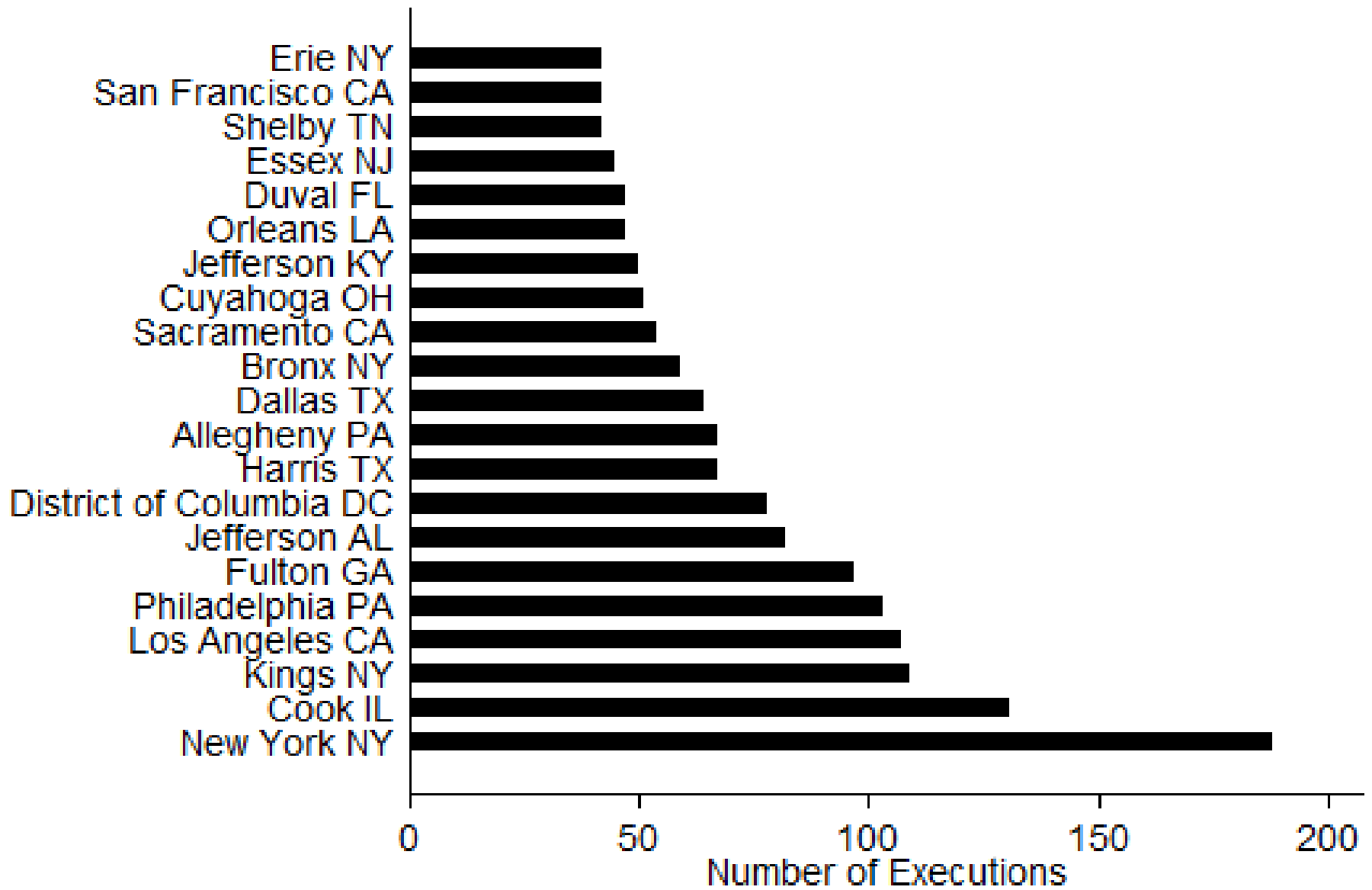
Source: Espy file.

# Top Executing Counties, 1800 to 1899



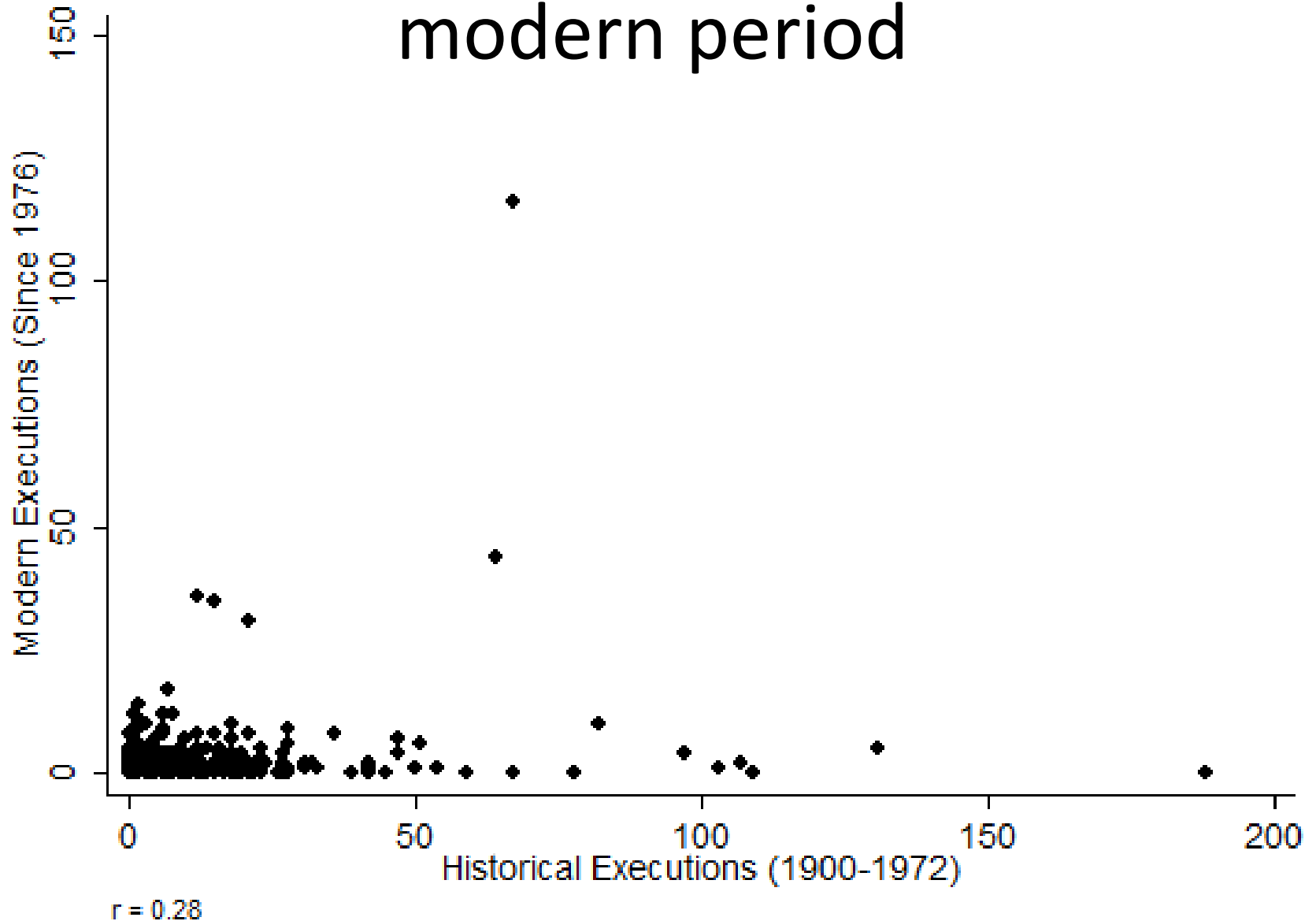
Source: Espy file.

# Top Executing Counties, 1900 to 1972



Source: Espy file.

# Little correlation from early 20<sup>th</sup> c. to modern period



This is slide # 88

Thank you for your patience

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