A Power-Law of Death

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A Pareto-Distribution

• Across geographic units, executions are distributed as Pareto noted that wealth is distributed: A small number of the units have a large percentage of the executions.

• Pareto suggested a model by which the “rich get richer” – a proportionate growth model.

• Why do some jurisdictions never or rarely impose the death penalty while others do so more by several orders of magnitude?
Plan of Talk

• An informal discussion of proportionate-growth models
• Background on the death penalty
• Core of the presentation: geographic distribution of executions
• My goal: to get your help in explaining an interesting empirical puzzle, one with substantive importance for equal justice
Proportionate Growth with a Random Start

• Assume a random start, and different units begin with different sizes (or histories)
• Subsequent growth is proportionate to size.
  – Think: web sites with more prominence continue to get more links to them, increasing their prominence
  – Big companies may grow faster than smaller ones, leveraging their advantages in scale
  – The rich get richer

How might this apply to the development of a “local legal culture”?
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
Empirical Expectations

- Time elapsed between executions then decline with each successful case
- Executions per year should be predicted by number of previous executions, more than by number of murders or the crime rate
- Patterns should not be predictable based on simple geography or slave-state status
- Should hold at all levels of scale
- Pattern should move from relatively random (murders) to relatively extreme as we move through the stages of the process: capital charges brought, sentences, executions
- Outliers should always be present but may not always be the same in different historical periods
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: ~1.7 in 1,000
• 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).
Executions in the US, 1800-2002
Death Sentences, Executions, and the Size of Death Row, 1930-2006
Net Public Opinion, 1953-2004
Homicides: decline from 24,500 in 1993 to 15,500 in 2000

NB: France, UK, approx 400 per year
OK, finally to the point

• Some maps

• Some data

• Some ideas about what might explain the patterns observed
Counties with 36 or more executions since 1976
Counties with 35 or more executions since 1976
Counties with 17 or more executions since 1976
Counties with 6 or more executions since 1976
Counties with 4 or more executions since 1976
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 at least one and Harris County 116.
Executions by county 1977 to 2011

454 counties 1242 executions as of April 11
If all cases were random

Frequency Distribution

Log-Log Presentation

Pure randomness

Log-log presentation of a random distribution

Cases have average 50 with a st. dev. of 15.
If all cases were equal

Frequency Distribution

Log-Log Presentation

All values have an equal number of observations

Log-log presentation of a perfectly equal distribution
US counties with 10 or more executions since 1977

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

- No Executions (2,706 counties): 11.7%
- One or More Executions (437 counties): 19.8%
- Eight or More Executions (22 counties): 23.9%
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.
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. \( R^2 = 0.97 \)
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.

\[ \ln(\text{Frequency}) = 1.8 - 0.34(\ln (\text{Executions}+1)) \]

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.
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


- 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

- Belarus
- Equitorial Guinea
- Indonesia
- Egypt
- Somalia
- Sudan
- Bangladesh
- Afghanistan
- Japan
- Syria
- Libya
- Viet Nam
- North Korea
- Yemen
- Pakistan
- USA
- Iraq
- Saudi Arabia
- Iran
- China

Includes only countries with six or more executions.
Executions by Country, 2007-2010

- Viet Nam: 54
- North Korea: 77
- Yemen: 111
- Pakistan: 171
- USA: 177
- Iraq: 188
- Saudi Arabia: 341
- Iran: 1303
- China: 4198

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.
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.

\[ \ln(\text{Frequency}) = 8.62 - 2.17(\ln(\text{Executions}+1)) \text{ Adj. } R^2 = 0.98 \]
Excludes the first 7 executions, which had long delays.
Time between executions, Texas

Days from previous execution

Cumulative execution number
Time between executions, Virginia
Time elapsed between executions, Harris County TX
Executions vs. Previous Executions by Region (N, S, TX)

Execs ~ Prev. Execs: R-sq = 0.71
Are the stages progressively more skewed?

- For North Carolina, I have data from the state indigent defense services database of all murder cases from approx 1977 to 2011.

- Following slides show progressively more skew in the distributions as we move from:
  - Murders
  - Death sentences
  - Executions
Cumulative Number of Murders in North Carolina

Number of Counties vs. Number of Murders
Cumulative Number of Death Sentences in North Carolina

Number of Counties

Number of Death Sentences
78 counties have executed no one but Mecklenberg has executed 5.
Murders are not close to a log-log distribution but executions are.
Murders, Sentences, and Executions are imperfectly correlated

\[ R^2 = .70. \]
Death Sentences and Executions

Number of Executions

Number of Death Sentences

R-2 = .41.
Death Sentences and Executions

Number of Executions

Number of Murders

R-2 = .31.
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

Number of Executions

Source: Espy file.
Top Executing Counties, 1900 to 1972

- Erie NY
- San Francisco CA
- Shelby TN
- Essex NJ
- Duval FL
- Orleans LA
- Jefferson KY
- Cuyahoga OH
- Sacramento CA
- Bronx NY
- Dallas TX
- Allegheny PA
- Harris TX
- District of Columbia DC
- Jefferson AL
- Fulton GA
- Philadelphia PA
- Los Angeles CA
- Kings NY
- Cook IL
- New York NY

Source: Espy file.
Little correlation from early 20th c. to modern period

$r = 0.28$
This is slide # 83

Thank you for your patience

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