The Geographic Distribution of US Executions

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Abstract

We review statistical patterns of the geographic distribution of US executions, compare these to homicides, and demonstrate extremely high degrees of concentration in the modern period compared to previous historical periods. We further show that this unprecedented level of concentration is further increasing over the past 20 years. We demonstrate that it is virtually uncorrelated with factors related to homicides. Finally, we show that it corresponds to a statistical distribution associated with "self-reinforcing" processes: a power-law or exponential distribution. These findings obtain whether we look at individual counties within death penalty states, across the 50 states of the US, or look at the international distribution of executions across countries in recent years. The substantive conclusion from the statistical patterns observed is that these cannot be explained merely by random variation around some general average. Rather, localities start down a path, then are reinforced in their pathways. There appears to be little to no logic about why certain counties are the high-use counties whereas the vast majority have never executed a single individual in 40 years' experience with the modern death penalty, often in spite of thousands of homicides. A self-reinforcing system suggests that a main determinant of whether an individual will be executed is not the crime, but the jurisdiction's previous experience with executing others. This cannot be acceptable legally, morally, or constitutionally.

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Introduction

A small number of jurisdictions in the US generate most of the executions. This high level of geographic concentration cannot be explained by the number or the rate of homicides, as many of the jurisdictions with the greatest number, or the greatest rates of homicide per population, are not among the highest executing ones. The extreme concentration in use of the death penalty can be seen whether we compare the 50 states, over 3,000 counties across the country, counties within states, or even the countries of the world. The high level of concentration we observe in the modern death penalty (e.g., post-*Gregg*) has been growing in the past 15 years, as the death penalty has been in decline. Further, it is higher in the post-*Gregg* period than it was in any earlier period in US history to colonial times. Not only has the geography of execution become more focused, but it has taken on a "southern" character which it did not previously exhibit in other historical periods. Finally, the level of geographic concentration is so great that it satisfies the statistical requirements to be classified as a "power-law" distribution, suggesting a self-reinforcing (and therefore constitutionally arbitrary) process in which the best predictor of the next execution in a jurisdiction is not the number of homicides, but the number of previous executions already carried out. The nation has "self-organized" into a large majority of jurisdictions that are effectively abolitionist in spite of high numbers of homicides, and a small number which execute at rates many times greater than others but which are not particularly affected by high homicide rates.

The outline of our paper, as our analysis, is very simple. We begin by explaining the sources of our data; proceed to document the distribution across states and counties where executions have occurred in the post-*Gregg* period; compare these data with homicides; show that these trends are true across counties within states just as they are across states; compare the post-*Gregg* period with previous historical periods; and finally explain the "power-law" aspects

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of the data. We conclude with a discussion of the implications of these findings, which are all presented in simple graphical, mapping, and tabular forms, except for the power-law demonstration, which by its nature requires some algebra but which we explain in simple terms as well.

We focus here on executions, not death sentences, for several reasons. First, we have a comprehensive database on executions for the entire post-*Gregg* period, and this can be compared to an existing database for the earlier historical period. No such database exists with geographic codes for the question of death sentences. Further, a recent report (Dieter 2013) has shown that death sentences and executions show similar levels of concentration (in both cases, just 2 percent of the counties produce a majority of the cases), but different jurisdictions produce the death sentences as compared to the executions. Pennsylvania and California counties in particular produce very high numbers of death sentences but relatively few executions. Over 60 percent of all death sentences are overturned on appeal (see Liebman et al. 2000), and these rates of reversal differ dramatically from state to state (see Baumgartner and Dietrich 2015), a distinction between death sentencing and executing is inevitable, though perhaps surprising at first glance. In any case, we have no comprehensive information regarding county-level death sentencing data for the entire country for the post-*Gregg* period, but we do for executions. Our focus on executions allows us to assess those cases where the death penalty has been fully carried out, and also allows a comprehensive assessment of the entire record of the death penalty since its modern re-establishment.

Data Sources

We use the following sources of data throughout this analysis.

Executions

Modern Period

We use a comprehensive database of US executions coded by the county of conviction generated by Baumgartner and consistent with the widely used DPIC database.[2] For this analysis we use the date of execution and the county of conviction, covering the period from the beginning of the modern death penalty in 1977 through December 31, 2015.[3] This database consists of 1,422 executions from 474 counties across 34 states and the federal government. For the purpose of most of our analyses here we exclude the three federal executions, as those are not associated with a particular county.

Historical Period

We use the widely available "Espy file" listing all known judicial executions in the US from colonial times through the modern period (Espy and Smykla 2005). These data are also coded by the county of conviction, making it fully compatible with our post-1976 database.

Homicides

The US Department of Justice provides county-level counts of homicides in its annual Uniform Crime Reports (UCR) (US DOJ, annual). We compiled these annual reports from 1984 through 2012, all the datasets currently available, merging the annual counts for each county using the Census FIPS codes. In cases where homicides numbers were missing for an individual county for a particular year, we used the average number of homicides in the two previous and two subsequent years, or the average of the closest five years if that was not possible. Six counties in

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[2] This searchable database is available at: http://www.deathpenaltyinfo.org/views-executions.
[3] Some inmates have been sentenced to death for multiple crimes, sometimes in more than one county. We use only the county of conviction for the first death sentence imposed on each inmate. Very small variations therefore may distinguish our results here from some local studies which sometimes count the total number of death sentences, including multiple sentences for the same inmate. None of these small differences would affect the general pattern of our results.

Arkansas were missing throughout the study period, and were excluded from the analysis. We adjusted for a small number of counties (such as Miami-Dade) which changed FIPS codes during the study period, producing a dataset consistent with the 2010 codes. These steps generated a database with actual homicide counts or estimates (in a very small number of cases) for each of 3,137 US counties. For the most part, counties with high homicide numbers in one year also have high numbers in other years, given the vastly different population sizes across US counties. The small number of missing cases for homicides, as well as most of the estimates, were in small counties. None of the counties with missing homicide data had any executions. The homicide database was originally collected by Gram (2015).

The Degree of Geographic Concentration in the Modern US Death Penalty
Concentration by Country, by State, and by County

Table 1 shows the US states sorted by their cumulative numbers of executions in the modern period, the number of homicides in the 1984-2012 period, their 2010 population, and the rates of homicide per population and execution per homicide. For states with no executions, cumulative homicide totals and rates per population are listed in the last row. Non-executing and executing states differ only slightly by homicide rates, but individual states show great variation in homicide rates per population. Similarly, executions per 100 homicides range widely around the national average of 0.27. Delaware, Texas, and Oklahoma are the only states that surpass a rate of 1 execution per 100 homicides, and just four more states have rates above 0.50 executions per 100. Clearly, executions are not a widely used punishment for homicide, as the overall rate of application is on the order of ¼ of one percent, overall. Note that the table lists over 500,000 homicides in the US over the period of study.

Table 1. States with Executions by Population and Homicides

State	Population (2010)	Homicides (1984-2012)	Executions (1976-2015)	Homicides Per 1,000 Population	Executions Per 100 Homicides
Texas	25,145,561	47,918	531	1.91	1.11
Oklahoma	3,751,351	6,532	112	1.74	1.71
Virginia	8,053,257	12,773	111	1.59	0.87
Florida	18,801,310	29,877	91	1.59	0.30
Missouri	5,988,927	11,489	86	1.92	0.75
Alabama	4,779,736	10,489	56	2.19	0.53
Georgia	9,687,653	18,465	60	1.91	0.32
Ohio	11,536,504	14,924	53	1.29	0.36
North Carolina	9,535,483	16,488	43	1.73	0.26
South Carolina	4,625,364	9,320	43	2.01	0.46
Arizona	6,392,017	10,283	37	1.61	0.36
Louisiana	4,533,372	16,538	28	3.65	0.17
Arkansas	2,915,918	5,708	27	1.96	0.47
Mississippi	2,967,297	5,512	21	1.86	0.38
Indiana	6,483,802	9,391	20	1.45	0.21
Delaware	897,934	950	16	1.06	1.68
California	37,253,956	77,292	13	2.07	0.02
Illinois	12,830,632	23,561	12	1.84	0.05
Nevada	2,700,551	4,327	12	1.60	0.28
Utah	2,763,885	1,557	7	0.56	0.45
Tennessee	6,346,105	12,119	6	1.91	0.05
Maryland	5,773,552	14,132	5	2.45	0.04
Washington	6,724,540	6,123	5	0.91	0.08
Idaho	1,567,582	868	3	0.55	0.35
Kentucky	4,339,367	5,127	3	1.18	0.06
Montana	989,415	538	3	0.54	0.56
Nebraska	1,826,341	1,488	3	0.81	0.20
Pennsylvania	12,702,379	19,503	3	1.54	0.02
South Dakota	814,180	333	3	0.41	0.90
Oregon	3,831,074	3,117	2	0.81	0.06
Colorado	5,029,196	4,984	1	0.99	0.02
Connecticut	3,574,097	3,837	1	1.07	0.03
New Mexico	2,059,179	3,547	1	1.72	0.03
Wyoming	563,626	415	1	0.74	0.24
States with no Executions	71,012,628	108,904	-	1.53	-
Total	308,797,771	518,429	1,419	1.68	0.27

*Note: Seventeen states and the District of Colombia had no executions. Their combined population and homicide numbers are shown here. Three executions were carried out by the federal government and are not included here.

Figure 1 shows the distribution of executions by state. As can be seen in Table 1 as well, the distribution is extremely skewed, with Texas hosting over one third of the national total, and the top three states (Texas, Oklahoma, and Virginia) producing over half of the national total over the entire post-*Gregg* period. As we will see below, this level of geographic concentration is unprecedented in US history.

Figure 1. Executions across States, 1977-2015.
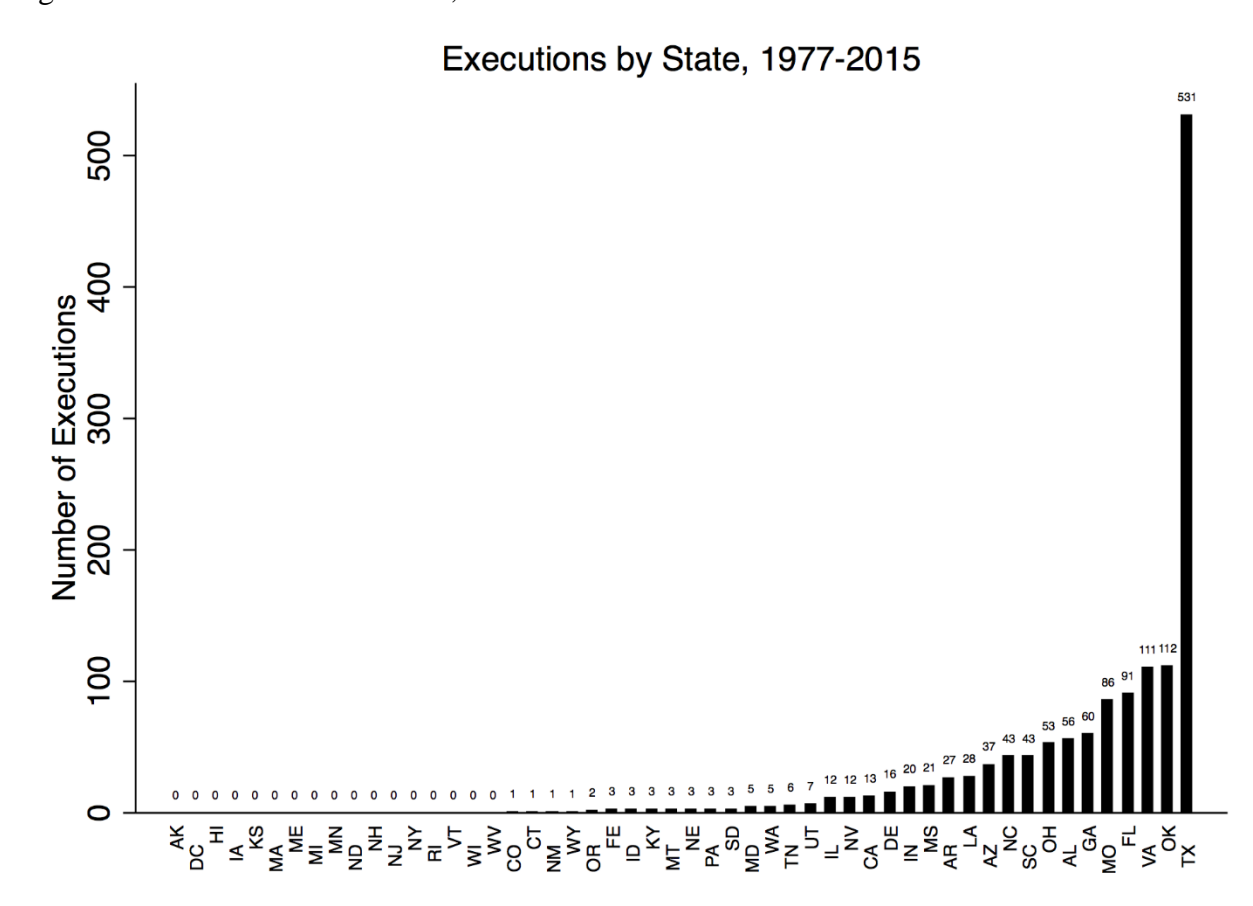
The skewed distribution apparent in Figure 1 comes into even sharper relief when we look across counties rather than states. There are 3,139 counties in the US, but only 474 have had even a single execution in the modern era; Figure 2 shows these data, restricted only to those counties with an execution. The figure shows the number of counties that have a given number,

or more, executions. Four hundred seventy-four counties have one execution or more; 223 have

two or more; six have 25 or more, and one has 125.

Figure 2. Executions across Counties, 1977-2015.

Number of Executions across US Counties

Excludes counties with no executions.
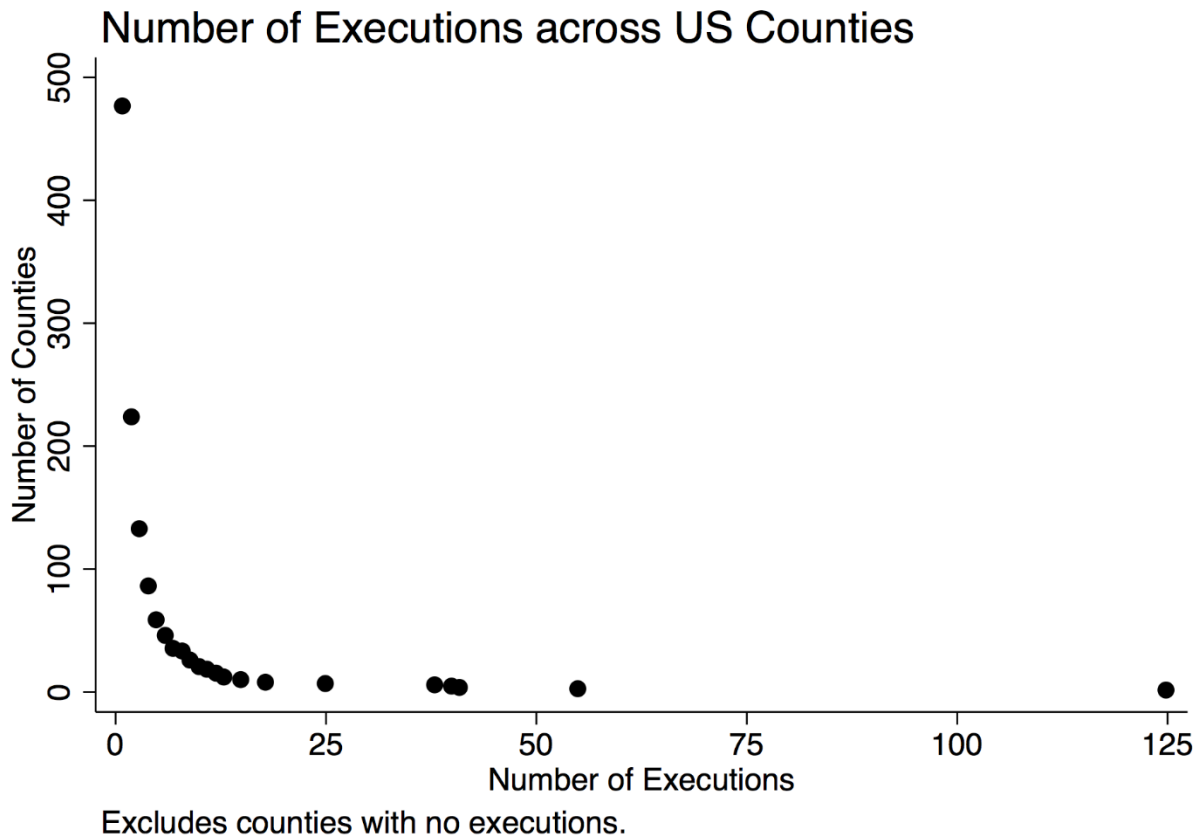
The top executing counties are listed in Figure 3. Just twenty counties have executed 10

or more inmates in the 40 years of the modern death penalty.

Figure 3. Top 20 Executing Counties in the United States
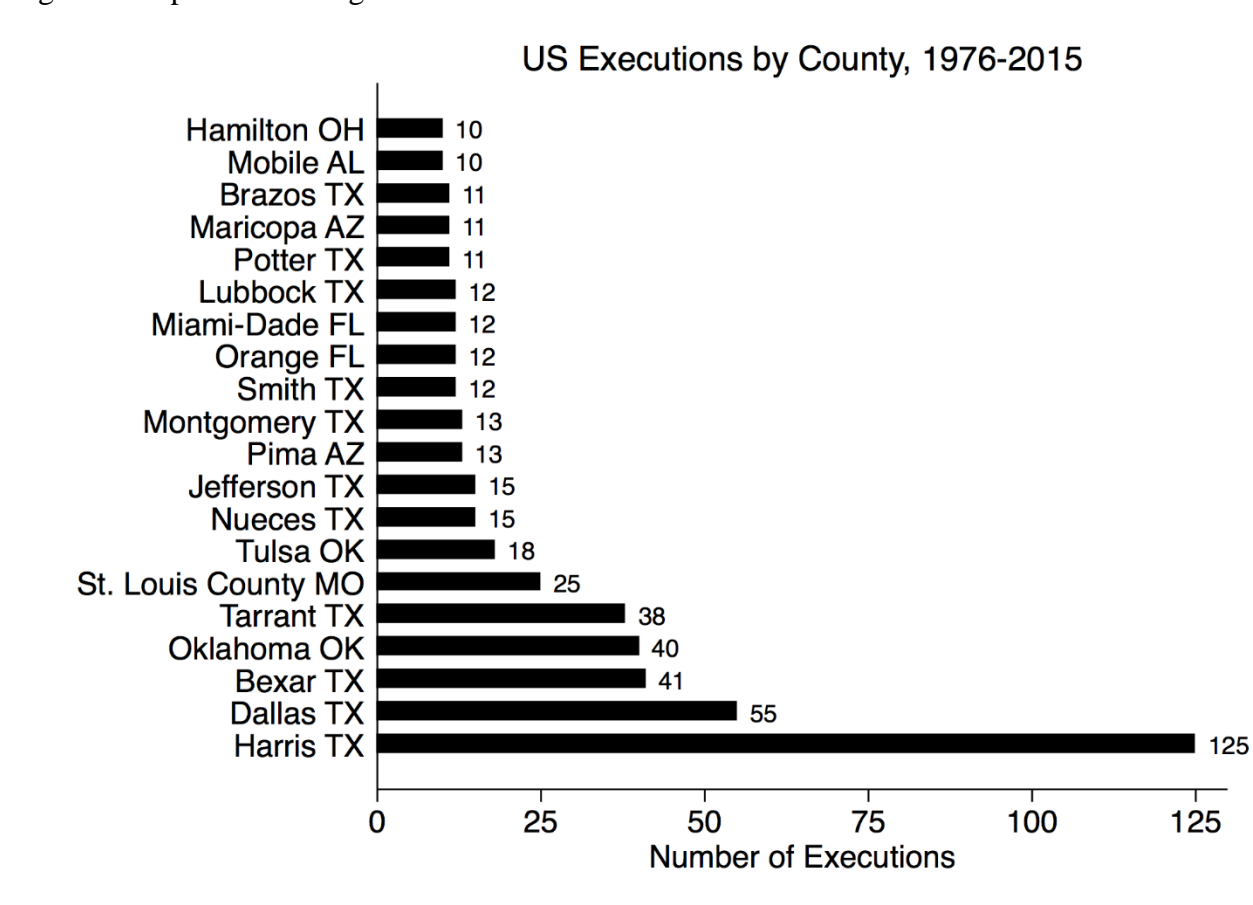
Several points stand out starkly here. First, of course is the high concentration. Harris County TX, if it were a state, would be second only to the rest of Texas in terms of executions; Oklahoma and Virginia have 112 and 111 executions, respectively. Second, over 40 years of modern experience with the death penalty, just 20 jurisdictions have executed as many as 10 individuals. Even in the top-use jurisdictions, spread over 40 years (and sometimes more than 10,000 accumulated homicides), executions are rare, unusual, extraordinary events. Third, of course, it is a southern phenomenon; Cincinnati OH (Hamilton County) is the only place on the list outside of the south. In the next section we consider whether these high-use execution jurisdictions are also distinctive by high rates or numbers of homicides.

A Few Counties, Many Executions

Table 2 shows the number of executions and homicides for counties with high and low numbers

of executions. The table is limited only to counties in death-penalty states.[4] Almost 40 percent

of the homicides, and 50 percent of the US population, are in counties that have not executed a

single individual in the past 40 years. The 20 counties that have executed 10 or more

individuals, by contrast, have generated 35 percent of the executions, but account for just 12

percent of the homicides and nine percent of the population

Table 2. Homicides, Executions, and Population, by Number of Executions

Counties with at least x executions (1977-2015)	Cumulative Number of Counties	Cumulative % of Total Executions (1977-2015)	Cumulative % of Homicides in states with DP (1984-2012)	Cumulative % of Population in states with DP (2010)
125 Executions	1	8.81	2.65	1.52
38 Executions	5	21.07	6.56	3.96
10 Executions	20	35.17	12.04	8.82
5 Executions	57	52.00	24.04	17.36
3 Executions	130	69.34	34.45	25.33
2 Executions	221	82.17	48.43	36.00
1 Execution	474	100.00	62.61	50.17
0 Executions	2,271	100.00	100.00	100.00

*Note: Percent of total executions is calculated using the total number of executions between 1977 and 2015 excluding three federal executions.

Comparing executions with homicides

Here we present four identically formatted maps of the US. In each case, red circles identify the

counties with the highest counts, and the circles are proportionate in size to the underlying

variable. Black dots show lower levels of each variable. States that had the death penalty

available throughout most of the period are shaded with light gray; states that were abolitionist
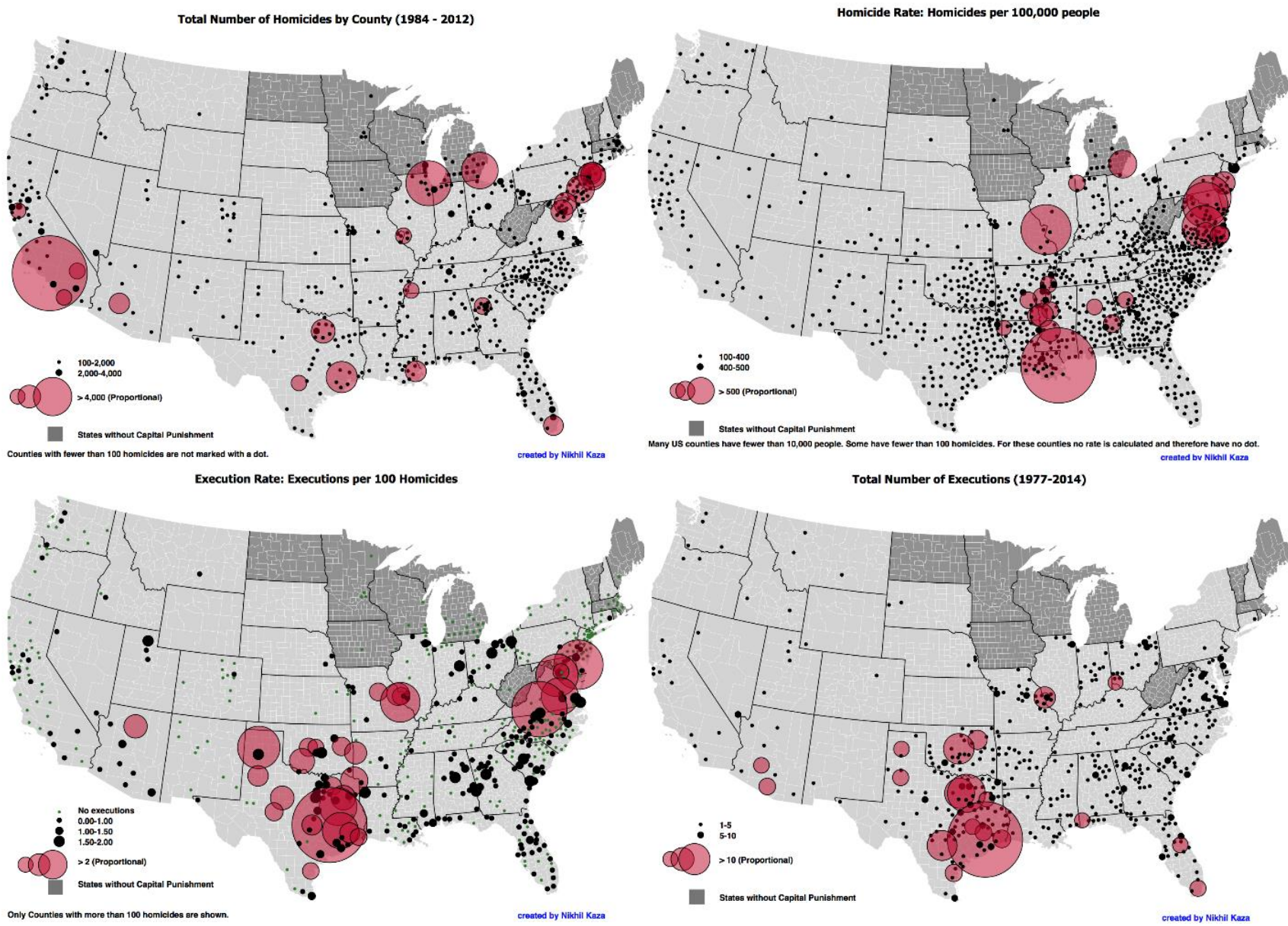
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[4] There were no changes in the number of death penalty states between 1984 and 2005, and the three states (RI, DC, MA) that abolished relatively quickly after *Gregg* had no executions. Therefore, for the purpose of Table 2 (and Figure 4 below), we count as abolitionist those states that did not have the death penalty over the bulk of the post-*Gregg* period. Six states abolished between 2005 and 2015, and they are included among the retentionist states here.

throughout the bulk of the period are shaded darker.[5] In the upper-left we show cumulative

homicides from 1984 through 2012. Counties with fewer than 100 homicides are left blank;

small dots represent those with 100 to 2,000 homicides; larger black dots identify counties with 2

to 4,000 homicides, and above that the red circles are proportionate to the number of homicides.

Homicides are clearly centered in Los Angeles, Chicago, Detroit, and the Philadelphia-New

York corridor. The next pane shows homicide rates per population. Here, we see New Orleans,

St. Louis (city, not county), a corridor from Richmond, VA through Washington, DC, Baltimore,

Philadelphia, Newark, with Detroit and Chicago also identified. In the lower panes we see

execution data. At the left, the number of executions per 1,000 homicides; here we exclude

counties with fewer than 100 homicides throughout the study period.[6] Execution rates are

concentrated in two general areas: Texas / Oklahoma / St Louis, and the mid-Atlantic states.

Finally, in the lower-right pane we see the total number of executions, similar to what we

presented in Figure 3 above. Texas, Oklahoma, Arizona, Florida lead with St. Louis, Mobile

Alabama, and Cincinnati, also identified.

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[5] This simply means that Illinois, New Jersey, New York, Connecticut, New Mexico, and Nebraska which abolished after 2005, are listed as retentionist here.

[6] This omits a small number of executions that occurred in small jurisdictions. Calculating rates of execution per homicide in those units with fewer than, say, five homicides, generates extremely high values that make it difficult to compare with other cases, which are based on a larger baseline.

Figure 4. Homicides, Homicide Rates, Execution Rates, and Executions.


Total Number of Homicides by County (1984 - 2012)

- 100-2,000
- 2,000-4,000
- > 4,000 (Proportional)
- States without Capital Punishment

Counties with fewer than 100 homicides are not marked with a dot.

created by Nikhil Kaza

Homicide Rate: Homicides per 100,000 people

- 100-400
- 400-500
- > 500 (Proportional)
- States without Capital Punishment

Many US counties have fewer than 10,000 people. Some have fewer than 100 homicides. For these counties no rate is calculated and therefore have no dot.

created by Nikhil Kaza

Execution Rate: Executions per 100 Homicides

- No executions
- 0.00-1.00
- 1.00-1.50
- 1.50-2.00
- > 2 (Proportional)
- States without Capital Punishment

Only Counties with more than 100 homicides are shown.

created by Nikhil Kaza

Total Number of Executions (1977-2014)

- 1-5
- 5-10
- > 10 (Proportional)
- States without Capital Punishment

created by Nikhil Kaza

The maps presented in Figure 4 present a series of puzzles. No county in Texas appears in the map showing areas with high rates of homicide. New Orleans, the county with by far the nation's greatest homicide rate, is not in the list of high execution counties at all; in fact, no Louisiana parish is, though the state is part of the same Federal Circuit which has overseen the high number of Texas executions. The correlations among the four variables mapped are low: homicides to executions, 0.31; homicide rates to executions, 0.06; homicide rates to execution rates, -0.26. Clearly, there are no strong causal or statistical links tying homicides to executions, even in death states.

Concentration is great even within death penalty states

The degree of concentration across counties that we observed in Figure 2 is apparent within individual death-penalty states. Space prohibits a full listing for each state, but Figure 5 shows the distribution of executions across the 246 counties of Texas and the 77 of Oklahoma. Other states show remarkably similar distributions.[7]

Figure 5. Executions by County in Texas and Oklahoma
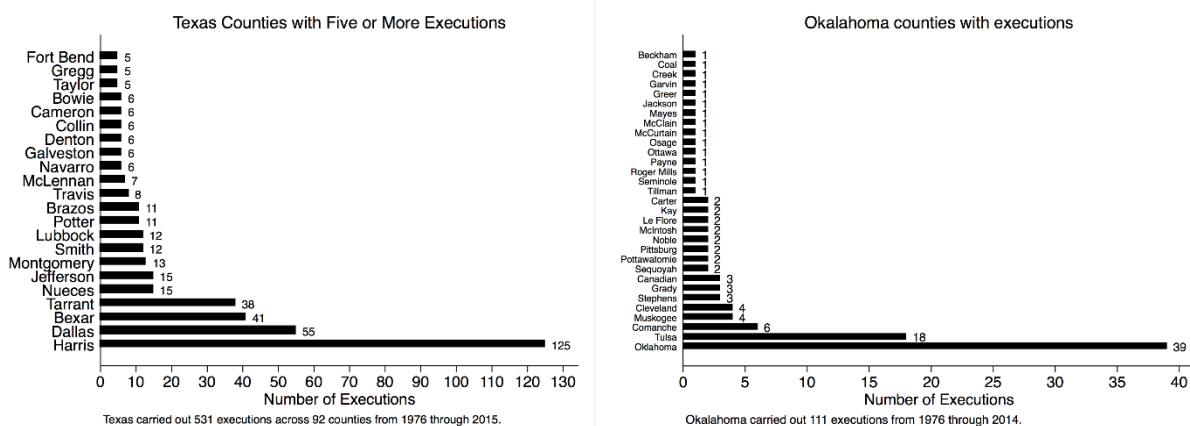
Note: 162 counties in Texas had no executions, 63 counties had fewer than five, and 21 had five or more. In Oklahoma, 46 counties had no executions, with 31 counties having one or more.

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[7] A full set of distributions by county for each major executing state is available from the authors.

In no state with large numbers of executions is the distribution of executions closely connected to homicide numbers or homicide rates. Rather, a small set of jurisdictions within the state "go for death" while many others do not. We can illustrate this with a few particular comparisons. Table 3 shows the same data as in Table 1 above for selected comparisons: St. Louis City and County, Orleans and Jefferson Parish (Louisiana), and Baltimore City and County.

Table 3. Paired Comparisons of Homicides and Executions in Six Jurisdictions

County	Population (2010)	Homicides (1984-2012)	Executions (1976-2015)	Homicides per 1,000 population	Executions Per 100 Homicides
St. Louis County	998,954	1,008	25	1.01	2.480
St. Louis City	319,294	4,462	8	13.97	0.179
Orleans Parish	343,829	7,040	4	20.48	0.057
Jefferson Parish	432,552	1,340	4	3.10	0.299
Baltimore County	805,029	864	4	1.07	0.463
Baltimore City	620,961	7,846	0	12.64	0.000

St. Louis city, like Baltimore, has a high homicide rate, particularly compared to its surrounding outlying county. In fact, there were more than four times as many homicides in the city of St. Louis than in the county, but the county had 23 executions whereas the county had eight. Similarly in Baltimore, the city has had almost ten times the number of homicides as the county, but has had no executions compared to four for the county. In Louisiana, both Orleans and Jefferson Parish have had the same number of executions, but Orleans Parish has almost seven times the homicide rate, and indeed has the highest homicide rate in the nation. If the executions do not follow the homicides, even within states that use the death penalty, it raises the question of what is driving them.

Donohue (2014) has shown geographic disparities in his comprehensive study of Connecticut, and similar findings have come from other scholars and are cited throughout the legal literature. Scheidegger (2011) and others (including Justice Thomas; see his dissent in *Glossip*), have suggested that "local control" is exactly what the framers desired, and that much of the difference between St. Louis or Baltimore and their surrounding counties might be related to public opinion or race. If black juries in central cities do not favor the death penalty (in spite of having been death-qualified), this should not suggest that white juries in surrounding areas may not impose it. Why Houston TX is the nation's leader in executions is clearly not explained by this logic. In fact, public opinion polls in Houston suggest that support there is lower than the state-wide average for Texas. According to a *Houston Chronicle* poll from 2002, in response to the question "Do you support or oppose the death penalty?" Harris county residents responded "oppose" at a rate of 30.8, compared to 21.9 of Texas residents, and 28.2 percent of US respondents.[8] In other words, Harris county public opinion was statistically indistinguishable from the national average, and significantly below the rest of the state. And yet use of the punishment was much higher there.

### *Concentration in the post-Furman period is higher than in previous periods of history*

In previous historical periods, the death penalty was not as concentrated in any particular state, nor was it particularly a southern phenomenon. The geography of the death penalty has become highly focalized in particular places, and increasingly southern, in the modern era. This was not the case historically. We can see this with some simple graphics showing the distribution of executions by state for different historical periods. The Espy file provides comprehensive data

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[8] Poll results available at: http://www.deathpenaltyinfo.org/harrissupportdp.pdf.

on all judicial executions since 1608. Figure 6 shows the distribution by state of all 14,489

executions carried out by judicial authorities. Part B. of the figure shows the total numbers for

the ten states with the highest totals.[9]

Figure 6. All US executions, 1608 through 1976.
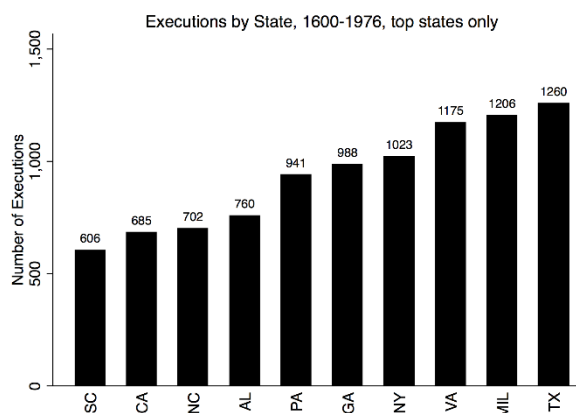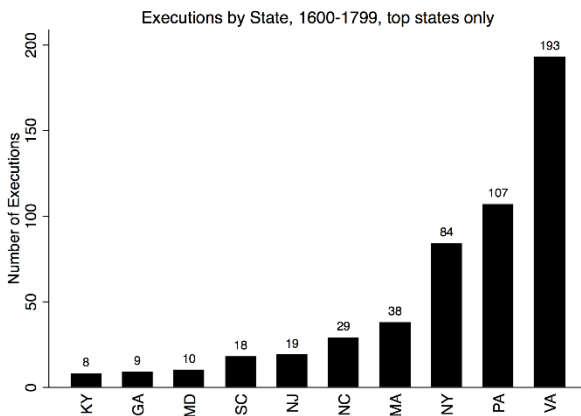
A. All states
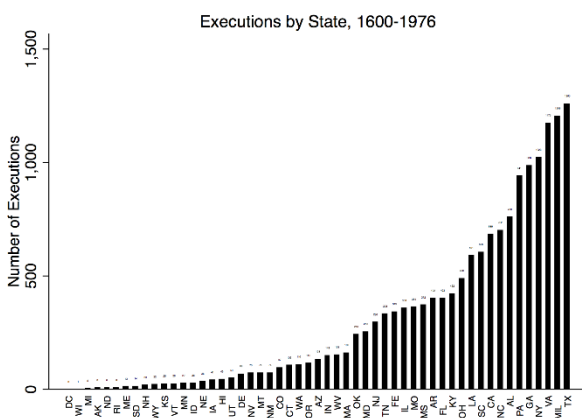
B. Top executing states only

Figure 7 shows identically formatted figures to Part B. of Figure 6, above, for each of

four different historical periods: the earliest period available, before 1800, the 1800s, the 1900s

through Furman, and the modern (post-*Gregg*) period.

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[9] The data for previous historical periods identify the executions by the legal jurisdiction that carried them out, using the Espy file variables for state as well as for the jurisdiction. All territorial, state, and Indian jurisdictions are listed by the state in which the execution took place. "Federal" (343 executions) and "Other-Military" (1,206 executions) are listed in Figure 6 with the acronyms "FE" and "MIL". In Figure 7, these non-state jurisdictions are excluded.

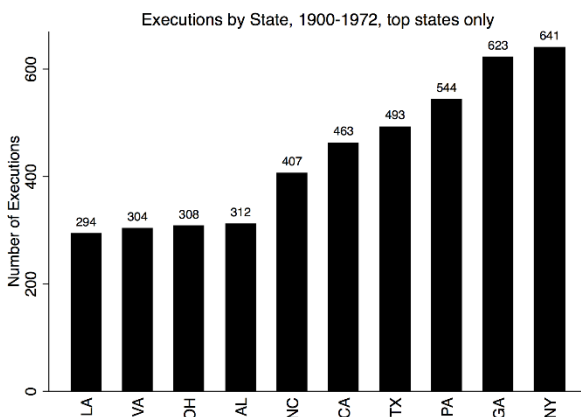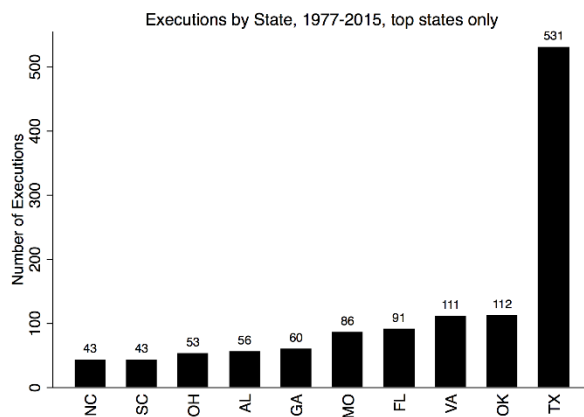Figure 7. Top executing states in different historical periods.

A. 1608-1799

Executions by State, 1600-1799, top states only

B. 1800s

Executions by State, 1800s, top states only

C. 1900 through 1976.

Executions by State, 1900-1972, top states only
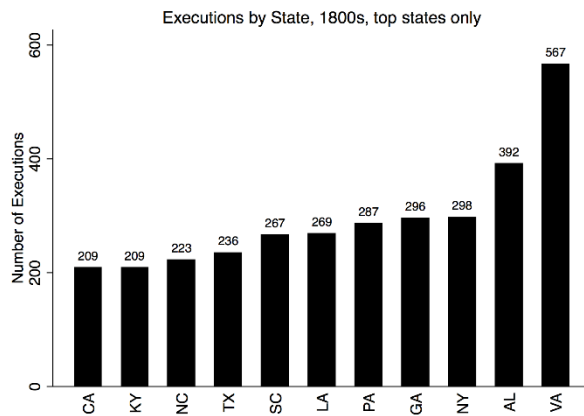
D. Modern period (1977-2015)

Executions by State, 1977-2015, top states only

In no period in American history has the death penalty been so highly concentrated as it has been in the modern period. Table 4 compares the early twentieth century (through the *Furman* decision) with the modern death penalty. It also calculates a commonly used indicator of "market concentration": The Herfindahl-Hirschman Index, reflecting the degree of concentration of the observations in a single or a few categories as opposed to a more equal spread across many. The index moves from a value of 0.046 to 0.168, a dramatic increase in the "market concentration" of executions in just a single state: Texas. Figure 7-C and Table 4 make clear that the death penalty was once spread across many jurisdictions, but this is no longer the case.

Table 4. Executions by State, 1900 through 1972 compared to the modern period

State	1900-1972	1977-2015	State	1900-1972	1977-2015
AL	312	56	NE	20	3
AK	8	0	NV	41	12
AZ	74	37	NH	3	0
AR	247	27	NJ	187	0
CA	463	13	NM	34	1
CO	65	1	NY	641	0
CT	65	1	NC	407	43
DE	25	16	ND	5	0
DC	0	0	OH	308	53
FL	266	91	OK	92	112
GA	623	60	OR	68	2
HI	42	0	PA	544	3
ID	9	3	RI	0	0
IL	203	12	SC	278	43
IN	70	20	SD	4	3
IA	28	0	TN	178	6
KS	15	0	TX	493	531
KY	202	3	UT	31	7
LA	294	28	VT	8	0
ME	0	0	VA	304	111
MD	111	5	WA	82	5
MA	65	0	WV	91	0
MI	0	0	WI	0	0
MN	7	0	WY	15	1
MS	244	21	FE	111	3
MO	107	86	MIL	26	0
MT	39	3			
Total	7,555	1,422			
HHI	0.046	0.168			

Note: FE = Federal. MIL = "Other or Military" as listed in Espy and Smylka (2005). HHI is the Herfindahl-Hirschman Index, a common measure of "market concentration" based on the simple formula of the sum of squared proportions of observations across categories. All observations from the same category would have a value of 1.00; observations spread throughout 53 categories would have a value of 0.0189. In the early part of the twentieth century, the data show that executions were much more spread out across many jurisdictions as compared to the modern period, as reflected in the index values of 0.046 compared to 0.168.

Concentration in a few jurisdictions has grown even more sharply since 1995

In the period of the decline of the modern death penalty (roughly since the mid- to late-1990s), its geographical concentration has only increased. In 1999, 98 executions were carried out by 72 counties across 20 states. By 2015, these numbers had declined to 28, 22, and six. Figure 8 shows the increased concentration of the death penalty in the past 20 years. The capital punishment usage series are all scaled to be compared to their maximum historical value during the 1977-2015 period, which is assigned a value of 100. The public opinion index is in relation to its value (scored as zero) in 1976. All the usage series decline to 20-40 percent of their maximum values.
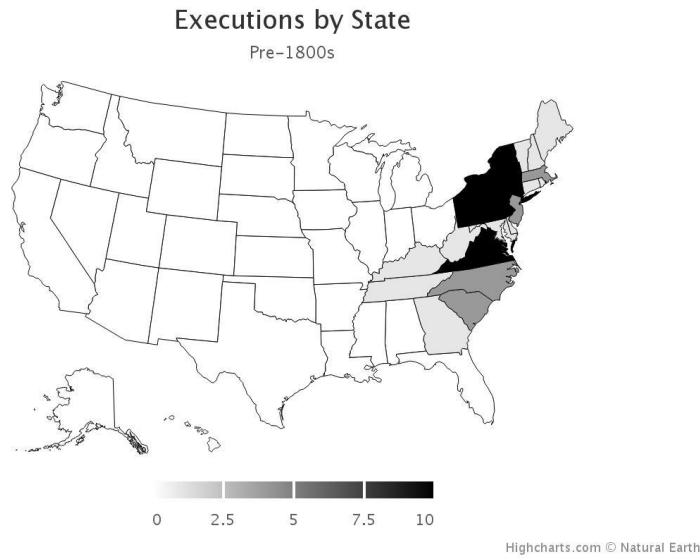
Figure 8. The Decline of the Death Penalty

The End of the Death Penalty
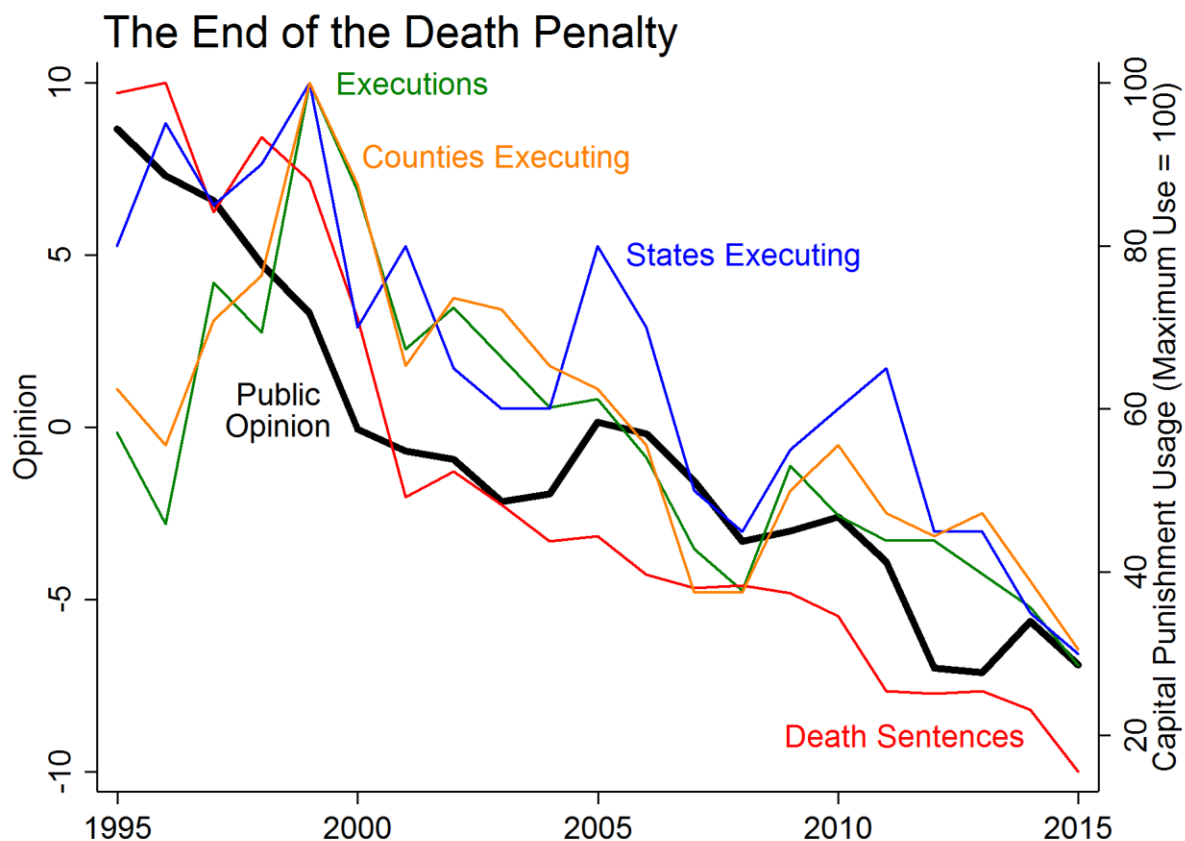
The focus on the South is unlike what has been seen in earlier periods

A simple perusal of the states listed in the previous section makes clear another clean break from past experience with the modern death penalty: it is almost purely a southern phenomenon today, whereas states such as Pennsylvania, Massachusetts, New York, California, Florida, and Illinois were among the top users in some previous historical periods. Stuart Banner (2002) and David Garland (2014) make clear many of the reasons for this, including (for Banner) the different types of crimes punishable by death in the north and south and (for Garland) the visceral reaction in southern state legislators to the 1972 Furman decision, coming as it did on the heels of other landmark Supreme Court decisions threatening "traditional values." Figure 9 shows with a map what we already saw in Figures 6 and 7: The modern death penalty is a much more "southern" affair than were its predecessor systems, making clear that the death penalty has ceased to be an "American" punishment and is now almost purely a southern one.[10] Prominent northern states such as New York, Massachusetts, and Pennsylvania no longer have their dark shadings, leaving only Ohio among northern states with high use of the death penalty.
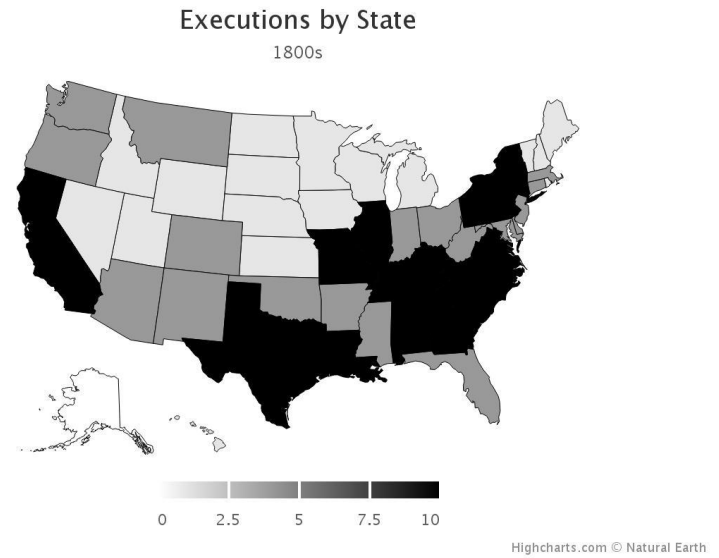
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[10] Each of the maps is color coded to be clear if there are no executions (or the state was not yet in existence at the time), and with cut-offs chosen to divide the death-use states into relatively equal numbers of low, medium, and high use categories. These are shaded progressively darker on the maps. Cut-offs are as follows: Pre-1800: 0, 1-9, 10-40, 41-193; 1800s: 0, 1-20, 21-130, 130-567; 1900-1972: 0, 1-40, 41-200, 201-641; 1977-2015: 0, 1-10, 11-50, 51-531. (The scale at the bottom of the map ranging from 0 to 10 should be ignored.)

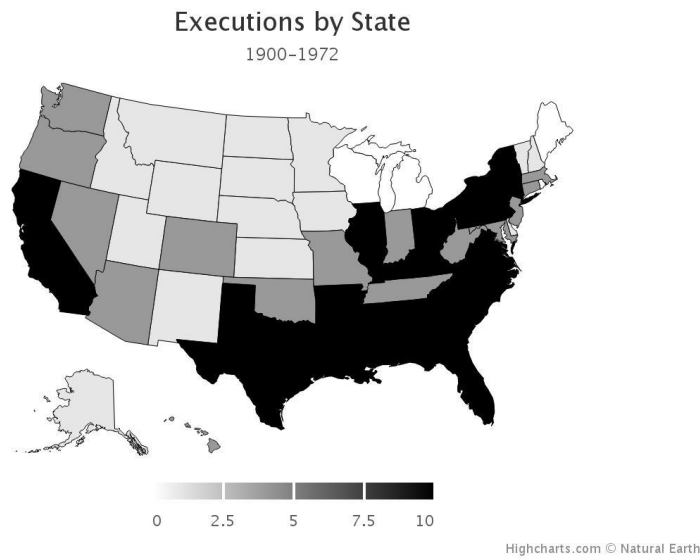Figure 9. The Geographic Distribution of US Executions across Time
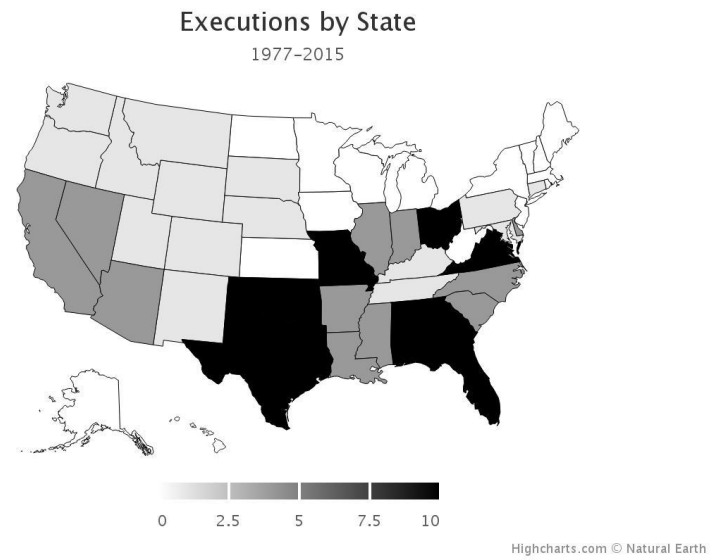A. Before 1800

Executions by State
Pre-1800s

B. 1800-1899

Executions by State
1800s

C. 1900-1972

Executions by State
1900-1972

D. 1977-2015

Executions by State
1977-2015

The Power-Law of Death

Compare the distribution of height in society with the distribution of wealth. Some people are taller than others, and some are wealthier. But we know intuitively that the process that generates height keeps us all within some range from relatively short to relatively tall, and that this range is much narrower than what we observe with something like income. Height is distributed as a bell curve (e.g., a Normal distribution); income is distributed as a "power-law" (or exponential distribution). If height were a power-law, we would not be surprised to see individuals who were 15 feet tall, and it would not be completely unheard of to see individuals who were 150 feet tall. Of course this is absurd, but we know that income is indeed like that. While most people fall within some range close to the overall average, we know that there are particular individuals who make thousands of times more money than average. Such is the difference between a process described by a bell-curve and a power-law.

Power-law distributions are not uncommon, but they must stem from a process that creates a "rich-get-richer" effect. Sometimes this is referred to as "preferential attachment." For example, the distribution of links across the World Wide Web has been shown to be a power-law: very few sites link to the vast majority of sites, but some sites have thousands or millions of incoming links. If one is thinking of designing a web site and wants to link to other useful sites, one is likely to link to sites that are already popular. Thus, one will preferentially choose to link (attach) to those sites that are already bigger. A preferential attachment process, working successively over time, generates a power-law distribution. If individuals randomly selected where to link (that is, with no regard to how helpful, well-known, or useful the links might be), then the resulting distribution would be the familiar bell-curve: some would have randomly more and some randomly fewer, but no large differences would result. A good and accessible review

of the literature on power-law distributions and what creates them can be found in Watts (1993, 2003), Barabasi (2005), and in many other writings (see also Jones and Baumgartner 2005 and Jones et al. 2009 for applications to government budgets).
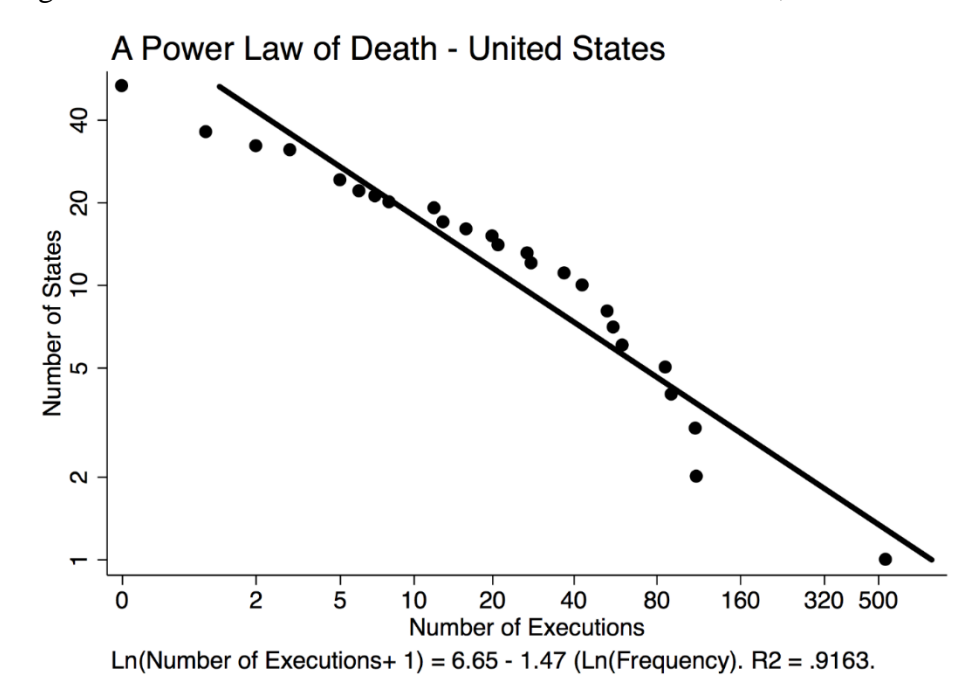
One could understand that across counties, executions, or executions per homicide, would not follow a clear mathematical formula linking them to homicides. Some homicides are more heinous than others, some jurisdictions might have randomly had a few more egregious ones, some juries may inexplicably have reached a verdict of death in a case that might surprise, or some may have done the opposite. All these are reasons to expect that any relation between homicides and executions should not be a perfect one. They are also reasons to expect that the distribution would be a bell-curve, or Normal one.

If the distribution of executions across jurisdictions follows a power-law, it suggests that there must be some kind of self-reinforcing, rich-get-richer process generating the distribution. This could easily be the case if local legal cultures develop separately, each focusing on their own history rather than how they relate to surrounding or other jurisdictions, even within the same state. Imagine the prosecutor's decision-making process when faced with a horrific murder in a jurisdiction where 25 executions have already been carried out. A number of factors suggest seeking death again: previous homicides where executions occurred may not have been as horrendous as this one; he knows juries will support it; he knows he has the staff to follow through; he knows judges and appellate courts will condone it; etc. Compare this to the same homicide in a jurisdiction that has yet to carry out a single execution: Was this the single most horrendous murder ever in the history of that jurisdiction? Will a jury return a verdict of death? Will a judge and appellate courts, for the first time in history, allow the verdict to stand? The two jurisdictions self-separate into high and low users of the death penalty. In any case, what we

observe in the distribution of executions across jurisdictions is consistent with this "rich-get-richer" phenomenon of self-reinforcement.[11]

Figure 1 already showed the extremely sharp gap between Texas and every other death penalty state, and the high concentration of executions in just a few states. Figure 10 presents a log-log presentation of this same distribution; the fact that the states array on a straight line where both the frequency and the value of the execution variable are logged demonstrates that the relationship is an exponential one, consistent with a rich-get-richer logic, but not with a random variability around some central tendency one. Figure 11 shows the same across the counties of the US. Figure 12 shows similar data within the top two death states, Texas and Oklahoma. And finally Figure 13 shows that this phenomenon also occurs when looking at the international distribution of executions across the countries of the world. In every case, the vast majority of jurisdictions abstain completely, but a few generate very high values indeed.

Figure 10. The Distribution of Executions across US States, 1976-2015

A Power Law of Death - United States

Ln(Number of Executions+ 1) = 6.65 - 1.47 (Ln(Frequency). R2 = .9163.

Figure 11. US Counties

A Power Law of Death

Ln(Number of Executions+ 1) = 4.32 - .596 (Ln(Frequency). R2 = .965.
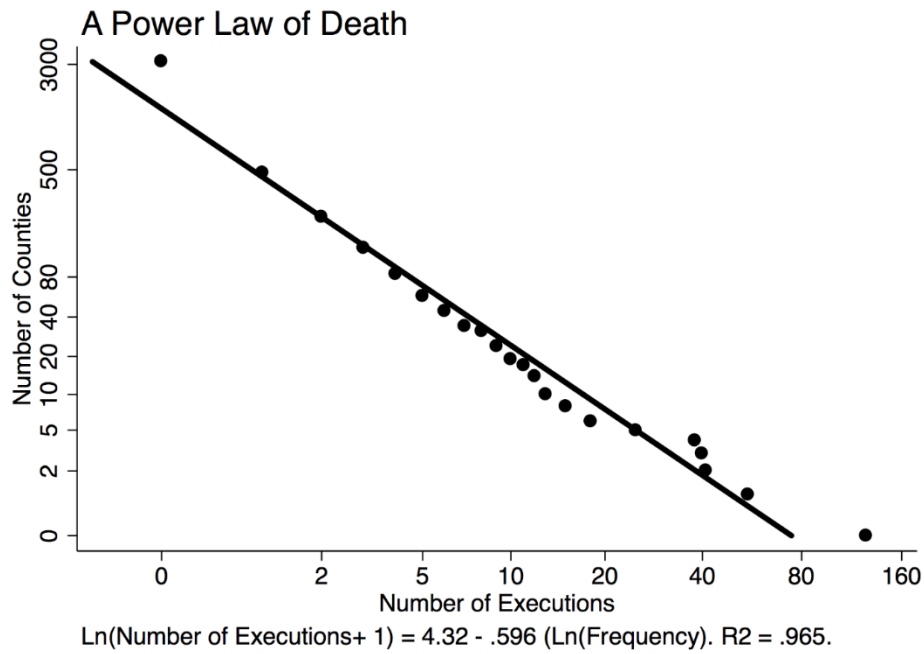
Figure 12. A power-law of death within Texas and Oklahoma.

A Power Law of Death
Texas

Ln(Number of Executions+ 1) = 4.450 - .771 (Ln(Frequency). R2 = .954.

A Power Law of Death
Oklahoma

Ln(Number of Executions+ 1) = 3.225 - .649 (Ln(Frequency). R2 = .885.

Figure 13. The Countries of the World[12]

A Power Law of Death - The World

Ln(Number of Executions+ 1) = 8.929 - .1.99 (Ln(Frequency). R2 = .957.
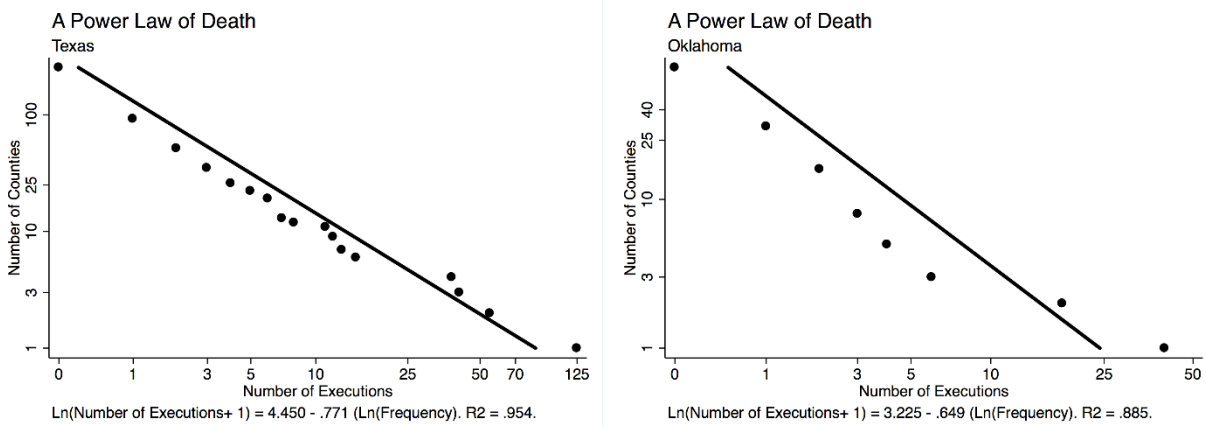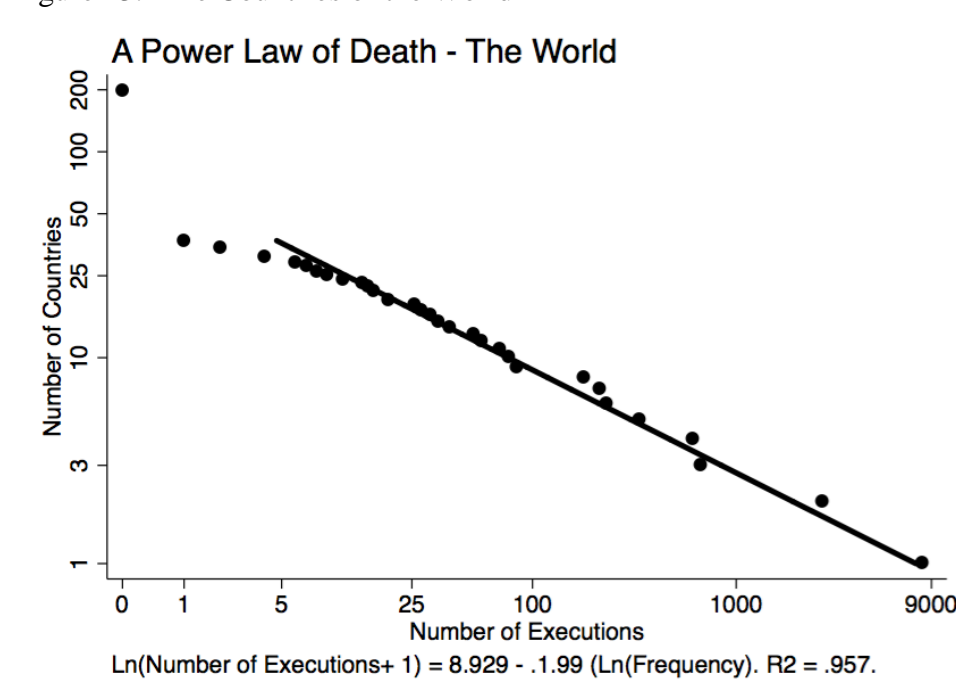
The fact that executions are skewed so sharply to a very small set of jurisdictions, and

that we can see a similar distribution consistently no matter if we look at counties within a state,

counties across states, states in the US, or even countries of the world strongly suggests that the

process is not driven by factors that might cancel each other out. Rather, they are driven by

factors that reinforce each other. If the likelihood that a particular murder will lead to execution

is more strongly associated with the number of previous executions that that jurisdiction has

previously carried out, rather than by the characteristics of the crime itself, this suggests that the

process truly is arbitrary and capricious.

Conclusion

Previous research has already documented that the geography of the death penalty is peculiar.

Our analysis of the broader statistical patterns suggests not only is the concentration very high,

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[12] Country-level data come from annual Amnesty International reports and cover the period of 2007 to 2014, with 197 countries included, and 38 having one or more executions across the time period.

but that it is an illustration of unconstitutional levels of arbitrariness. It corresponds to a pattern of purely random start and then self-reinforcement. The correlation between homicides and executions, even within states, is so low as to call into question any linkage between crime and punishment. Rather, we have a self-reinforcing and arbitrary development of legal norms developing independently of those in other jurisdictions. If the location where the crime occurs is a better predictor of one's chances of execution than the heinousness of the underlying crime, this cannot be acceptable on constitutional or abstract moral grounds.

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