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PUNISHMENT: ITS SEVERITY AND CERTAINTY

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The role of punishment in preventing crime has again become a topic of discussion.[1] For some time, however, "sociologists and enlightened jurists showed a tendency to reject Bentham's[2] 'classical' hypothesis that man avoids criminal behavior if that behavior elicits swift, severe and certain punishment."[3] History has shown, critics contend, that punishment has never reduced crime to any marked degree.[4] In Eighteenth Century England, for example, there were over 350 capital offenses, including the theft of a handkerchief, cutting down a cherry tree, letter stealing, forgery, sheep stealing, associating with gypsies and pickpocketing.[5] Despite these severe penalties, crime rates continued to rise. A similar situation is also said to have existed in Colonial America where over a dozen offenses were punishable by death.

Historical examinations of homicide rates before and after the abolition of the death penalty have also questioned the efficacy of capital punishment. International investigations have generally concluded that homicide rates and the death penalty are independent factors.[6] Similarly, longitudinal investigations of states in this country have led to similar conclusions: "There is no clear evidence in any of the figures we have examined that the abolition of capital punishment has led to an increase in the homicide rate, or that its reintroduction has led to its fall."[7]

In sum, it has generally been concluded by most sociologists that the death penalty's inefficiency has been proven conclusively; and further, that punishment in general is ineffective in deterring crime.[8] Witness the following statement by Barnes and Teeters which reflects the views of many sociologists on this matter:

> Not a single assumption underlying the theory of capital punishment can be squared with the facts about human nature and social conduct that have been established through the progress of science and sociological thought in the last century and a half. In fact, the whole concept of capital punishment is scientifically and historically on a par with astrological medicine, the belief in witchcraft or the rejection of biological evolution.[9]

Some recent deterrence investigators have taken strong exception to conclusions such as the above. Gibbs, for example, points out that capital punishment has not been shown not to deter other offenses. Unfortunately, most discussions of punishment and deterrence have been of a moralistic and speculative nature. Many have had much to say on the issue of punishment, but few provide any sound evidence to support their positions.[10]

Typically, deterrence investigations have been quite limited in scope. For the most part only one offense has been examined—homicide—and only one form of punishment—capital punishment. These studies tell us little if anything about the

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[1] *See, e.g.*, Chiricos & Waldo, *Punishment and Crime: An Examination of Some Empirical Evidence*, 18 SOC. PROB. 200 (1970); Gibbs, *Crime, Punishment and Deterrence*, 48 SOC. SCI. Q. 515 (1968); Gray & Martin, *Punishment and Deterrence: Another Analysis of Gibbs' Data*, 49 SOC. SCI. Q. 289 (1969); Tittle, *Crime Rates and Legal Sanctions*, 16 SOC. PROB. 409 (1969); F.E. ZIMRING, PERSPECTIVES ON DETERRENCE (1971).

[2] J. BENTHAM, *Principles of Penal Law*, in THE WORKS OF JEREMY BENTHAM (J. Browning ed. 1843).

[3] Chiricos & Waldo, *supra* note 1, at 200.

[4] H. BARNES & N. TEETERS, NEW HORIZONS IN CRIMINOLOGY (1951).

[5] E. JOHNSON, CRIME, CORRECTION AND SOCIETY (1964).

[6] *See* ROYAL COMMISSION ON CAPITAL PUNISHMENT (1949–1953), REPORT. GREAT BRITAIN PARLIAMENT, in G. MCCLELLON, CAPITAL PUNISHMENT at 66–71 (1961); Schuessler, *The Deterrent Influence of the Death Penalty*, 284 ANNALS 54 (1952).

[7] T. Sellin, *quoted in* ROYAL COMMISSION ON CAPITAL PUNISHMENT (1949–1953), REPORT. GREAT BRITAIN PARLIAMENT, at 23 (Papers by command, MD. 8932, 1955).

[8] Gibbs, *supra* note 1.

[9] H. BARNES & N. TEETERS, *supra* note 4, at 355.

[10] And furthermore, the evidence usually cited in defense or refutation of capital punishment is often inappropriate to the question at hand. Gibbs, *supra* note 1; Andenas, *General Prevention—Illusion or Reality?*, 43 J. CRIM. L.C. & P.S. 176 (1952).

use of other forms of punishment in deterring non-capital offenses. Most past studies of deterrence have been quite limited theoretically as well.[11] Deterrence theory suggests the importance of the severity, certainty and celerity aspects of punishment. Typically, however, only the severity factor has been examined, and usually only quite narrowly.[12] Other equally important, if not more important, aspects of punishment have been ignored. In short, deterrence theory has never "been really tried." It has never been given a "fair chance".[13] In reference to the death penalty, Jeffery states, for example, that "the lesson to be learned from capital punishment is not that punishment does not deter, but that the improper and sloppy use of punishment does not deter or rehabilitate."[14]

An examination of recent deterrence research reveals an attempt to build upon the shortcomings and limitations of past investigations. Gibbs introduced imprisonment as a form of punishment in an investigation of homicide. He further examined the probability of imprisonment as a measure of the certainty of punishment for that offense.[15] In line with deterrence theory, he hypothesized that the severity and certainty of punishment are inversely related to a state's homicide rates. In a similar type of investigation, Tittle extended Gibbs' design to include each of the major index offenses. He too hypothesized an inverse relationship between his estimates of the severity and certainty of punishment and offense rates.[16] Likewise, Chiricos and Waldo examined the relationship between estimates of the severity and certainty of punishment and offense rates for the index crimes. Their investigation differed from Gibbs' and Tittle's, however, in their choosing to examine these relationships over three points in time, where previously only one time period had been dealt with.[17] They further extended Gibbs' and Tittle's design by examining changes in the levels of the severity and certainty of punishment and their effect on corresponding offense rates.

In each of the above investigations, an attempt has been made to provide a more complete and refined examination of deterrence theory. The research reported here is an attempt to continue in this direction. Specifically, our focus is upon the relationship between two major aspects of punishment, its severity and certainty.

The Severity and Certainty of Punishment

Deterrence theory suggests that the severity and certainty of punishment are additive factors. That is, when punishments are severe and administered with certainty, maximum deterrence results. Inversely, when punishments are slight and uncertain, deterrence will be minimal. Common sense, as well as some evidence, would seem to support these assertions.

Gibbs' investigation of homicide revealed that his estimates of the severity and certainty of punishment were additive in their effect on a state's offense rates. The average homicide rate of states with low levels of certainty and severity was found to be three times the average for states with high levels of certainty and severity. Eighty-one percent of the states with both low values of severity and certainty had homicide rates above the nation's average, while only nine percent of the states high on both severity and certainty had rates above the average.[18] In a re-analysis of Gibbs' data, Gray and Martin also came to a similar conclusion. They found the relationship between the severity and certainty of punishment, and a state's homicide rates to be $r^2 = .136$ and $r^2 = .079$, respectively. The multiple coefficient of determination, combining the effects of the two punishment variables was $R^2 = .219$, thus suggesting an additive relationship.[19]

[11] For example, most deterrence investigators have ignored deterrence theory's concern with: 1) the celerity of punishment; 2) the making of punishment public; and 3) the judicial attitude behind punishment. Each of these elements is central to the classical criminology position.

[12] As Andenas, *supra* note 10, points out, we have mistakenly equated punishment with the severity of punishment.

[13] E. Puttkammer, Administration of Criminal Law 17 (1953).

[14] Jeffery, *Criminal Behavior and Learning Theory*, 56 J. Crim. L.C. & P.S. 294, 299 (1965).

[15] Gibbs' measures of the severity and certainty of punishment are described later in the paper.

[16] Tittle's measures of the severity and certainty of punishment are described later in the paper.

[17] Actually, Chiricos and Waldo examine the certainty variable over three points in time (1950, 1960, and 1963) and severity two points (1960 and 1964).

[18] Furthermore, the homicide rates of states that are below the median on certainty, but above the median on severity are not appreciably different from the states above the median on certainty, but below the median on severity.

[19] The corresponding log coefficients between the severity and certainty of punishment and homicide rates are $r = -.506$, and $r = -.279$, respectively. The log multiple correlation is $R = .614$, again suggesting additivity. A discussion of both the index and log statistical models will follow later in the paper.

Tittle's examination of a state's homicide rates, by degrees of severity and certainty, also suggested the additivity of these two aspects of punishment. For this offense, the lowest overall rates were observed at fairly high levels of severity and certainty, while the highest rates generally held where levels of severity and certainty were low.[20] For the remaining index offenses, additivity was not so evident. For robbery, burglary, larceny and assault, the lowest offense rates occur under high certainty conditions, with degrees of severity showing little variation except for lower levels of certainty. For auto theft and sex offenses a "most unusual" pattern occurs. The lowest rates for auto theft apparently occur under conditions of low certainty and severity.[21] For sex offenses, optimal deterrence conditions occur when certainty is high and severity is low, "although the total effect of severity at different levels of certainty is complicated." [22] Tittle concludes:

> [T]he relationship between the severity and offense rate at constant levels of certainty reveals that severity of punishment has little constant independent or additive effect, and holding severity constant does not seem to affect the negative association between certainty and incidence to any appreciable degree except for homicide.[23]

The evidence cited above suggests that the severity and certainty of punishment are additive factors, but only for the offense of homicide. For the other index offenses, additivity does not appear evident. The evidence for these offenses is quite limited, however. Further, some additional evidence would suggest that the severity and certainty of punishment are not additive for homicide when the death penalty is considered. In fact, some writers suggest that these two aspects of punishment are inversely related when capital punishment is examined.

The death penalty in Eighteenth Century England provides a case in point:

> Perhaps during no other period in the history of Western civilization were more frantic legislative efforts made to stem crime by the infliction of capital punishment.... The intentions of Parliament, however, were blocked in part by the widespread tolerance by judges and prosecutors of innumerable dodges designed to help culprits escape the noose: conviction for an offense less than that stated in the indictment; failure to press grand juries to indict; 'pious perjury,' wherein jurymen appraised stolen property at amounts just under the felony limits....[24]

In short, the death penalty failed to deter because of its lack of use.[25] And, its uncertainty would appear equally true today.[26]

Although systematic research is lacking in this area, numerous observations would suggest that when the offense is capital, many factors may work against the death penalty.[27] Witnesses and the injured, it is said, are less willing to testify against the accused when the death penalty is mandatory.[28] Juries are more likely to acquit or find the defendant guilty of a lesser charge when the death penalty is demanded.[29] Similarly, judges have been said to refuse to pass down the death penalty even when it is dictated by law, as have prosecutors refused to demand the death penalty when it is warranted.[30] Moreover, wardens have been reported to refuse to carry out executions after having been ordered to do so.[31] In short, the death penalty would appear to be quite uncertain.[32] The statistical evidence indicates that only about one percent of those eligible to be executed are ever so punished.[33]

In conclusion, evidence would suggest that the

[20] Combinations of different levels of severity and certainty showed little appreciable difference in rates.

[21] Tittle, *supra* note 1, points out, however, that the pattern for auto theft may reflect the fact that a large portion of auto thieves are juveniles, and are not subject to punishments as conceptualized here.

[22] *Id.* at 417.

Id. at 419.

[24] D. TAFT & R. ENGLAND, CRIMINOLOGY (4th ed. 1968), as well as other "careful" penal historians object to the common argument that the ineffectiveness of the death penalty in Eighteenth Century England, is conclusive proof of its general ineffectiveness.

[25] D. GIBBONS, SOCIETY, CRIME AND CRIMINAL CAREERS (1968), however, argues that the actions of Parliament were not an empty ritual, for a large number of executions were carried out.

[26] E. SUTHERLAND & D. CRESSEY, CRIMINOLOGY 297 (8th ed. 1970).

[27] H. BLOCH & G. GEIS, MAN, CRIME AND SOCIETY (1962), for example, point out that there is very little experimental evidence available on how juries operate. Part of this information gap results from the element of secrecy and sacredness traditionally surrounding jury deliberations.

[28] Ehrman, *The Death Penalty and the Administration of Justice*, 284 ANNALS 73 (1952).

[29] *Id.*; T. Sellin, Minutes of Proceedings on Evidence, 17 Jt. Comm. of Senate and House of Commons on Capital Punishment and Lotteries 669 (1954).

[30] D. TAFT & R. ENGLAND, *supra* note 24.

[31] Our system of pardoning also works against the death penalty.

[32] E. SUTHERLAND & D. CRESSEY, *supra* note 26.

[33] Jeffery, *supra* note 14. H. BARNES & N. TEETERS, *supra* note 4, put the chances of being executed at about 1 in 10.

severity and certainty of punishment are inversely related when the death penalty is considered. Jeffery further extends this inverse relationship to other forms of punishment as well. He states, the "severity of punishment can be gained only by sacrificing certainty" and that "increasing the penalties for crimes has had the negative effect of making the punishment less certain."[34] The present research consists of an examination of the hypotheses that: 1) the severity and certainty of punishment are inversely related for each of the major index crimes; and 2) changes in the levels of the severity and certainty of punishment are inversely related for each of the major index crimes. The available evidence in these areas is minimal and inconsistent.[35]

Research Method

We are concerned with the relationship between the severity and certainty of punishment for the major index crimes. In order to examine these relationships, indices were constructed for each variable for three time periods, utilizing official police and prisoner statistics. A discussion of each index, the population under investigation, and the data gathering and processing techniques follow below.

The Population

The population for this investigation consisted of the states of this country. It was not possible, however, to secure complete population data for the three time periods chosen. For 1950, the states of Michigan and Georgia failed to report the prisoner data needed for the severity[36] and certainty[37] indices. For 1960, New Jersey failed to report the needed data, as did New Jersey and Alaska for 1964. This left a total of 46 states for 1950, 47 states for 1960, and 48 states for 1964. It is not possible at this time to say why these prisoner data were not available for the states and years mentioned. These states are simply excluded from tables reporting such data with a note stating, for example, "Excludes statistics for Georgia and Michigan." Inquiries to the Federal Bureau of Prisons about this matter have received no reply.

Measures

The Certainty of Punishment

The certainty of punishment measure used in this investigation consisted of the number of admissions to state prisons for each of the index offenses divided by the number of such crimes reported to the police. This measure produced a certainty of punishment value for each offense for the states and years designated above. The measure would appear as follows for the three time periods:[38]

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[34] Jeffery, *supra* note 14, at 299.

[35] It is of interest to note that in Zimring's, *supra* note 1, recent discussion of marginal deterrence—"the effectiveness of deterrence through variations in the conditions of legal threats"—he examines numerous conditions that may influence how changes in the levels of the severity and certainty of punishment might affect deterrence. He ignores, however, the relationship between these two aspects of punishment, and how changes in the level of one of these variables might influence the effectiveness of the other as a deterrent.

[36] Severity data were gathered from the following sources:

1951: National Prisoner Statistics: Prisoners Released from State and Federal Institutions, 1951 24–27 (1955).
1960: National Prisoner Statistics: Characteristics of State Prisoners, 1960 69.
1964: National Prisoner Statistics: State Prisoners: Admissions and Releases, 1964 52.

[37] Police and prisoner statistics were used to construct the certainty of punishment measure. The sources of these data are as follows:

Federal Bureau of Investigation,
1950: Uniform Crime Reports—1950 78–82 (1951).
1960: Crime in the United States: Uniform Crime Reports—1960 34–37 (1961).
1964: Crime in the United States: Uniform Crime Reports—1964 50–53 (1965).

[38] Our measure of the certainty of punishment is quite similar to that used by Gibbs, Tittle and Chiricos & Waldo.

Gibbs: $\dfrac{\text{Number of State Prison Admissions for Homicide in 1960}}{\text{Mean Number of Homicides known to Police 1959–1960}}$

Tittle: $\dfrac{\text{Number of State Prison Admissions for "X" Offense in 1960 and 1963}}{\text{Number of "X" Crimes known to the Police in 1959 and 1962}}$

Chiricos & Waldo:

$$\frac{\text{1950 Admissions to Prison for "X" Offense}}{\text{Mean of "X" Crimes known to Police in 1949 and 1950}}$$

$$\frac{\text{1960 Admissions to Prison for "X" Offense}}{\text{Mean of "X" Crimes known to Police in 1959 and 1960}}$$

$$\frac{\text{1963 Admissions to Prison for "X" Offense}}{\text{Mean of "X" Crimes known to Police in 1962 and 1963}}$$

$$\text{Certainty} = \frac{\text{Number of admissions to prison for offense "X"}}{\text{Number of "X" crimes reported to the police}}$$

The above equation yields a certainty of punishment value which can range theoretically from zero to one. A value of zero would indicate that no one was convicted and imprisoned for the offense in question, while a value of one would suggest that an equal number of convictions and offenses were reported.[39] It should be kept clearly in mind that such certainty estimates *can not* be interpreted as the proportion of offenders who are convicted and imprisoned; such data on individual offenders, while preferable, are simply not available.

As indicated earlier, data are not available for all states for some years. In addition, complete prisoner data are not available for all offenses for states included in the analysis. In the tables where these missing prisoner data would normally be reported, one finds a dash (—).[40] It is not clear what this dash means, for there are no footnotes describing this symbol. The same symbol appears elsewhere in Bureau of Prisons publications where frequencies are too small ($n < 10$ or 12) to compute meaningful averages. In the tables being considered here we are dealing with frequencies, however, and small n's are not a consideration. It would thus appear that the dash (—) is used to symbolize either: (1) that no persons were sent to prison in these states for these offenses (a zero frequency), or (2) that no data are reported by these states on prison admissions for these offenses for these years. The first explanation would seem more plausible, for no zero frequencies are reported in these data. Inquiries to the Federal Bureau of Prisons as to the meaning of this symbol (—) have received no response to date. Consequently, 25 state-by-offense categories (13 for 1950, 8 for 1960, and 4 for 1964) were omitted from the analysis.[41]

The certainty of punishment *measure* used in this investigation suffers from a few drawbacks that should be noted. First, as mentioned earlier, this measure does not refer to the probability of individual offenders being imprisoned for various offenses. Secondly, the measure used here is narrow in scope. It refers solely to the certainty of *imprisonment*, ignoring other penalties such as fines, deferred sentences, probation, jail, parole, and combinations of these. Thirdly, our measure of certainty does not take into account the commission of multiple offenses by a person[42] nor problems associated with "plea-copping".

While it does suffer from the difficulties indicated, the certainty index does reflect, although with error, the relative certainty of punishment in different states. Assuming the error to be random, it will serve to attenuate any "genuine" correlations between certainty and severity.

The Severity of Punishment

The severity of punishment was operationally defined as the median number of months served

[39] In some instances, it was found that there were more admissions to prison for an offense than reports of such offenses to the police. In other words, the numerator of our certainty index was found to be larger than the denominator, thus yielding a certainty value greater than unity. In the 28 cases where this occurred, a certainty value of .999 was assigned. This value was assigned in 27 cases for 1950 and distributed by offense as follows: murder and nonnegligent manslaughter (5), robbery (1), assault (3), auto theft (12) and forcible rape (6). For 1960 only one deviant case was discovered (assault) and none were found for 1964. In total, these constitute 7.3% of the certainty values for 1950 and 0.3% of the cases for 1960.

This situation could have occurred as a result of a number of factors: 1) police departments in the states in question underreported the number of such offenses; 2) prison authorities were inaccurate in reporting the number of prison admissions for these offenses; 3) as a result of negotiated pleas, more persons were imprisoned for an offense than the number of such offenses reported to the police; 4) the excess in prison convictions resulted from the imprisonment of persons whose offenses were committed and reported during a previous year; or 5) any combination of the above.

[40] This symbol appears for the following offenses by year:
1950: Manslaughter (3), auto theft (8), rape (2);
1960: Auto theft (8);
1964: Auto theft (8), larceny (1).

[41] A further difficulty with these data centers around the problem of comparability of offense categories. The index offenses used for 1950 include the following: murder, manslaughter, robbery, rape, larceny, auto theft, burglary, and aggravated assault. Prisoner data for 1950 are comparable. For 1960 and 1964, however, no prisoner data are reported for manslaughter or rape. Consequently, these offenses were dropped from the 1960 and 1964 analyses.

In addition, data from the UNIFORM CRIME REPORTS, *supra* note 37, for 1960 and 1964 exclude criminally negligent manslaughter. This offense, however, is evidently included in prisoner homicide data for these two years. Further, the assault categories for the prisoner and offense rate data are not completely comparable. For 1960 and 1964, this offense was categorized for the prisoner data as "assault." Offense rate data are only available for "aggravated assault" for these years. Despite this discrepancy, this offense was left in the analysis. "Assault" data were used in the numerator of our certainty equation, while "aggravated assault" data were used in the denominator. This would have the effect of escalating the certainty values for this offense. It would be a constant factor, however, for all states.

[42] Tittle, *supra* note 1.

in prison by released felons. These data were obtained from statistics published by the Federal Bureau of Prisons for 1951, 1960, and 1964.[43]

Like the certainty of punishment data discussed above, the prisoner statistics published on the severity of punishment for the index offenses were also found to be incomplete.[44] These data were found to be inadequate in two basic ways. First, severity statistics (median length of sentence) were not available for 1950. Apparently, the Federal Bureau of Prisons did not request these data from the states that year. Severity data were compiled for 1951, however. These data were used as an estimate of 1950 severity. It was felt that these statistics would provide an adequate estimate for the former year. Further, it was felt to be important to examine the severity-certainty relationship over three points in time, rather than just two (1960 and 1964).

Second, like the certainty data, the published severity statistics are incomplete. For 1951, 17 severity figures are not reported. This resulted from the fact that no prisoners were released from prison in some states for some offenses in 1951. Data were also missing for 1960 and 1964 when the median length of sentence was not reported for offense categories where fewer than ten persons were released. For 1960 and 1964 this amounted to 31 and 36 missing cases, respectively.[45] It was not possible to secure comparable severity data for 1951 or 1961, nor for 1963 or 1965, to calculate estimates for these missing cases. Consequently, these cases were dropped from the analysis.[46]

Changes in Severity and Certainty

Changes in the levels of the severity of punishment were computed by comparing state's severity values, for each offense, for the following years: 1951–1960, 1951–1964, 1960–1964. For each set of years compared, smaller severity values were subtracted from the larger. Where the larger of the two values occurred for the later year the difference score was considered positive, thus indicating an increase in the level of severity between years. Where the larger severity values occurred for the earlier year, the difference score was considered negative, indicating a decrease in the level of punishment between years. To illustrate, consider the following hypothetical severity values: 1951 = 100, 1960 = 200, 1964 = 75. Using the above procedure, the following change scores result: 1951–1960 = 100, 1951–1964 = −25 and 1960–1964 = −125. Changes in the levels of the certainty of punishment were computed by the same procedure for each offense for the following years, 1950–1960, 1951–1964, 1960–1964.

Data Processing and Analysis

Data processing in this investigation consisted of two phases. First, correlation coefficients were computed between estimates of the severity and certainty of punishment, for all offenses, for each of the three time periods. Second, correlations were computed between changes in the levels of the severity and certainty of punishment, for each offense, for corresponding time periods.[47]

The measure of association used in this analysis is the Pearson product moment correlation (r).[48] The only assumption that must be met to use this measure is that one's data reach at least an interval level of measurement. This assumption would appear warranted for our data.[49]

In their deterrence investigations, neither Gibbs nor Chiricos and Waldo were apparently willing to assume that their data were of an interval level of measurement. Gibbs, and Chiricos and Waldo utilized a conventional ϕ analysis, dichotomizing their data at the median. In defending his choice of ϕ, Gibbs argues that his data do not meet the assumption of normality. Gray and Martin, how-

[43] This measure of severity differs from that used by Tittle, *supra* note 1, who used the mean length of sentence served (in months) rather than the median. It also differs from that used by Gibbs, *supra* note 1, who used the median number of months served by felony prisoners as of December 31, 1960. Our severity measure is the same, however, as that used by Chiricos & Waldo, *supra* note 1.

[44] *See* note 36 *supra* for the source of these data.

[45] Data were missing for the following offenses by year:
1960: Homicide (9), robbery (4), assault (7), larceny (4), auto theft (7);
1964: Homicide (11), robbery (4), assault (7), auto theft (14).

[46] In addition, exact severity figures were not provided for offenses where median severity was over 180 months. These included:
1960: Homicide (2);
1964: Homicide (8), robbery (3).
These offenses were assigned a value of 180.

[47] A correlation routine was used in the change analysis that takes into account the sign of the change scores.

[48] For a discussion of the Pearson product moment correlation (*r*), *see, e.g.*, H. Blalock, Social Statistics Ch. 17 (1960); L. Freeman, Elementary Applied Statistics Ch. 9 (1968).

[49] This assumption is violated, however, in the few cases where our severity values were arbitrarily scored 180 months. *See* note 46 *supra*. These cases are too few (11), however, to seriously distort the assumed interval level of measurement.

TABLE 1

INDEX CORRELATIONS BETWEEN THE SEVERITY AND CERTAINTY OF PUNISHMENT BY OFFENSE AND YEAR[a]

Offense	1950	1960	1964
Homicide	−.130	.172	−.279
Robbery	−.157	.033	−.245
Assault	−.264	−.400	−.454
Burglary	−.344	−.408	−.439
Theft	−.178	−.433	−.414
Auto Theft	.043	−.283	−.251
Manslaughter	−.020	—	—
Forcible Rape	.031	—	—

[a] Coefficients are Pearson Product Moment Correlations.

ever, point out that this assumption is not required to use r as a measure of association, but only if one is interested in using tests of significance for population inference.

Tittle also appeared unwilling to assume that his data were of an interval level. Some might argue that the possible unreliability of police statistics, for example, do not allow an interval level of measurement to be assumed. The possible unreliability of police data, however, is not negated by reducing one's level of measurement.

Tests of significance were not utilized in the analysis because they require a number of rather stringent assumptions, including random sampling, that could not be met here.[50] Consequently, we have arbitrarily chosen to regard as "low" coefficients whose absolute value is less than .400. Correlations between .400 and .500 will be considered as "moderate" and those over .500 as "high." Whenever one-fourth or more of the variation ($r \geq .50$) in one punishment variable is covariant with another, the correlation should be considered substantial. Conversely, correlations which are possibly statistically significant, but only permit 15% or less ($r < .40$) explained variation should be considered as low. We believe this to be a conservative practice and one that avoids the common error of equating statistical significance with possible theoretical significance.

[50] It is of interest to note that in Gibbs, Tittle, and Chiricos and Waldo's investigations, each cited *supra* note 1, the assumption of random sampling also could not be met. They saw fit to use tests of significance, however.

An Alternative Model

Gray and Martin found that a power function relating the severity and certainty of punishment and offense rates better explained Gibbs' homicide data than the usual model used in a correlation analysis ($Y = A + B_x$). The power function also produced a higher correlation in relating the severity and certainty of punishment than the alternative model, although the relationship between these two variables was not their concern. Both statistical models will be tried here.

The power function is expressed by taking the logarithms of both variables, and computing the conventional Pearsonian product-moment correlation coefficient. The index model is expressed by computing the same correlation coefficient with the raw data. The model with the higher r value has the better fit for a particular set of data. That is, the index model is the model of better fit if the raw data produce higher correlation coefficients than the logarithmic data, while the power function is the model of better fit if the reverse occurs.

FINDINGS

Hypothesis number one suggests a substantial inverse relationship between the severity and certainty of punishment. Inspection of Table 1, relating these two punishment variables, reveals that 16 of 20 (80%) of the index correlations are in the hypothesized inverse direction. Of these 16 coefficients, however, only 6 are of a moderate size by our standards; and none are large. In addition, for no single offense are the correlations consistently of a moderate size for all three years. For the offenses of assault, burglary and larceny, the correlations are moderate for 1960 and 1964. For auto theft and forcible rape for 1950, and homicide and robbery for 1960, the coefficients are of a positive sign. Each of these correlations is quite low, however.

The log correlations in Table 2 reveal a picture quite similar to the above. Of 20 log coefficients, 18, or 90%, are of a negative sign, as hypothesized. As with the index statistical model, the correlations between the severity and certainty indexes are of a positive sign for homicide for 1960 and auto theft for 1950. Of the 18 negative coefficients, four are of a moderate size and four are large by our standards (a total of 45%). For assault the severity and certainty estimates are inversely related at at least a moderate level for all three years. For burglary and larceny the log coefficients, like the index cor-

TABLE 2

LOG CORRELATIONS BETWEEN THE SEVERITY AND CERTAINTY OF PUNISHMENT BY OFFENSE AND YEAR[a]

Offense	1950	1960	1964
Homicide	−.096	.050	−.262
Robbery	−.252	−.020	−.529
Assault	−.422	−.625	−.585
Burglary	−.382	−.462	−.509
Theft	−.183	−.489	−.420
Auto Theft	.377	−.392	−.230
Manslaughter	−.088	—	—
Forcible Rape	−.002	—	—

[a] Coefficients are Pearson Product Moment Correlations.

TABLE 3

INDEX CORRELATIONS BETWEEN CHANGES IN THE LEVELS OF THE SEVERITY AND CERTAINTY OF PUNISHMENT FOR SELECTED OFFENSES[a]

Offense	Changes in Severity 1951–1960 with Changes in Certainty 1950–1960	Changes in Severity 1951–1964 with Changes in Certainty 1950–1964	Changes in Severity 1960–1964 with Changes in Certainty 1960–1964
Homicide	−.152	−.436	.305
Robbery	.113	−.195	.034
Assault	−.153	−.045	−.406
Burglary	−.237	−.133	−.380
Larceny	−.300	−.290	−.428
Auto Theft	−.431	−.233	−.283

[a] Coefficients are Pearson Product Moment Correlations.

relations, are moderately inversely related for 1960 and 1964.[51]

In sum, the data in Tables 1 and 2 suggest that the severity and certainty of punishment are inversely related, but not substantially for each of the index offenses. Out of a total of 40 correlations for the index and log statistical models combined, 88% are of a negative sign. Only 40% of these coefficients, however, are of a substantial size as hypothesized.

In addition, a comparison of Tables 1 and 2 further reveals that the log statistical model better describes the relationship between the severity and certainty of punishment than the index model. Comparisons by offense and year reveal the log correlations to be larger in 14 of 20 (70%) cases. The log model proves consistently superior for the offenses of assault, burglary and larceny for all three years. Only for homicide is the index model consistently superior for three years. For the remaining offenses, neither statistical model would appear preferable.

Our second hypothesis suggests a substantial inverse relationship between changes in the levels of the severity and certainty of punishment. Examination of Table 3 reveals that 17 of the 20 (85%) index correlations between changes in the two punishment variables are in the hypothesized direction. The exceptions are for the offenses of robbery for 1950 and 1964, and homicide for 1964. Each of these positive correlations is low by our standards.

[51] Further, the log correlation for burglary for 1950 ($r = -.382$) is only .018 away from being of a moderate size.

Of the remaining negative correlations in Table 3, only 4 (24%) are of a moderate size. None are large. Further, for no single offense are the change correlations consistently of a moderate size for as many as two time periods.

Sixteen of the 20 (80%) log coefficients relating changes in the levels of the severity and certainty of punishment are in the hypothesized inverse direction. Again, the exceptions are for the offenses of robbery (1950 and 1960) and homicide (1964), as well as burglary (1960). As with the index statistical model, these positive correlations are all low.

Of the 16 negative log correlations, only one (homicide, 1960) is of a moderate size. None of the remaining correlations are large.

In sum, the coefficients in Tables 3 and 4 suggest that with few exceptions, changes in the levels of the severity and certainty of punishment are not substantially inversely related. For no single offense, for either statistical model, were the two punishment variables found to be substantially related for as many as two time periods.

Examination of the type of changes in the levels of the severity and certainty of punishment for individual states reveals that a combination of increases in the severity of punishment accompanied by decreases in certainty is generally responsible for our negative change correlations. For all three time intervals this pattern consistently holds for robbery, assault, burglary, theft and auto theft. Only for homicide are the negative change correlations (1950–1960 and 1950–1964) primarily

TABLE 4

LOG CORRELATIONS BETWEEN CHANGES IN THE LEVELS OF THE SEVERITY AND CERTAINTY OF PUNISHMENT FOR SELECTED OFFENSES[a]

Offense	Changes in Severity 1951–1960 with Changes in Certainty 1950–1960	Changes in Severity 1951–1964 with Changes in Certainty 1950–1964	Changes in Severity 1960–1964 with Changes in Certainty 1960–1964
Homicide	−.342	−.498	.045
Robbery	.061	.011	−.024
Assault	−.200	−.166	−.177
Burglary	−.047	.088	−.296
Larceny	−.211	−.275	−.191
Auto Theft	−.191	−.119	−.315

[a] Coefficients are Pearson Product Moment Correlations.

a result of decreased levels of severity accompanied by increased levels of certainty between years.[52]

Further examination of Tables 3 and 4 reveal the index statistical model to better describe the relationship between changes in levels of the severity and certainty of punishment. In 13 of 18 (72%) comparisons, the index correlations are larger. In addition, four out of five of the moderate size change coefficients are index correlations. For the offenses of robbery, burglary and larceny the index model proves superior for all three years, while the log model fails to prove consistently superior for a single offense.

SUMMARY

Deterrence theory suggests the severity and certainty of punishment to be additive factors in their affect on offense rates. Investigations by Gibbs, Gray and Martin, and Tittle seem to support this proposition for the offense of homicide, but not for the other major index crimes. Additional evidence would suggest these two aspects of punishment to be inversely related when the death penalty is considered. The evidence is far from conclusive, however.

The present research has consisted of an examination of the hypotheses that the severity and certainty of punishment are inversely related for each of the major index crimes, and that changes in the levels of these two variables are also inversely related.

The evidence reported above suggests a fairly consistent inverse trend in the relationship between our estimates of the severity and certainty of punishment, as well as between changes in the levels of these two variables. For the static part of our analysis, 89% of the index correlations and 90% of the log correlations are in the hypothesized negative direction. Similarly, 85% of the index coefficients and 80% of the log coefficients are negative in the change analysis. With the exception of homicide, increased severity accompanied by decreased levels of certainty is primarily responsible for these negative change correlations, as Jeffery predicts. The remaining coefficients are of a positive sign but none are of a substantial size.

Clearly, a negative trend is evident in our data, as hypothesized. Despite this trend, few of the negative correlations (35% for the static analysis and 13% for the change analysis) are of a substantial size ($r > -.40$). In addition, our findings are not consistent over time. Only for the offense of assault (log model) in the static part of the analysis are the correlations of at least a moderate size for all three years. None of the change correlations are of a moderate size for the three time periods.

A major concern in this investigation has been to test whether the simple index or a log statistical model better describes the relationship between the severity and certainty of punishment. Comparison of the index and log correlations, by year and offense, reveals the log model to be superior in 80% of the cases in the static part of the analysis. The log correlations are consistently larger for all three years for assault, burglary and larceny, while the index correlations are only consistently larger for homicide.[53] Quite a different picture is revealed from a comparison of the index and log coefficients in the change analysis. For these data, the index correlations are larger in 72% of the comparisons.

[52] For all three time intervals combined, the percent of states experiencing (a) a decrease in the severity of punishment and an increase in the certainty of punishment, or (b) an increase in the severity of punishment and a decrease in the certainty of punishment are as follows:

	(a)	(b)
homicide	34.1%	14.2%
robbery	5.7%	58.6%
assault	6.0%	50.4%
burglary	4.7%	44.8%
theft	23.2%	36.0%
auto theft	11.6%	38.3%

[53] Gray & Martin, *supra* note 1, found the log correlation to be larger in their investigation of homicide: log $r = -.129$, index $r = -.023$.

Further, the index correlations are consistently larger for all three time periods for robbery, burglary and larceny.[54] The log model is not consistently superior for a single offense.

In short, the log statistical model appears clearly superior in describing the relationship between the severity and certainty of punishment for the three individual years (1950, 1960, 1964), thus suggesting consistent curvilinearity in the data. The opposite holds for the change data where a straight regression line consistently provides a better fit. These findings provide a particularly interesting situation when considering that neither statistical model proves consistently superior for a single offense in both phases of the analysis. For example, the log correlations are consistently larger for burglary and larceny in the static analysis, while the index coefficients are larger for these two offenses in the change analysis.

In conclusion, our findings are in the hypothesized direction, but few of the correlations are of a substantial size and consistent over time. The most obvious conclusion that might be drawn from these data is that, contrary to Jeffery's and others' assertions, the severity and certainty of punishment are not substantially inversely related for the index crimes, nor are changes in their levels. This conclusion may not be appropriate, however. It might well be that the whole question of the relationship between these variables is inadequately addressed through the use of police and prisoner statistics. In their investigation, Chiricos and Waldo questioned the use of available aggregate data in conducting deterrence research. "[C]rimes known to the police [the denominator of our certainty index] are probably sensitive to so many extra-punitive factors, that their use... is ill-advised."[55] This "sensitivity" may in large part account for our weak and inconsistent findings. It is difficult to say, however, how the possible bias in official statistics might have affected our data.[56] Gibbs argues that had his data (official police and prisoner statistics) been better, his correlations would have been larger. He fails to mention, however, the extent to which the size of his coefficients were affected. No attempt will be made at such a "guess" here either. Gibbs' argument does seem plausible for our data, however. It might be argued that had our data been more free of bias (more reliable) our findings would have been more in line with our hypotheses. In fact, the possible effect of bias in our police and prisoner data, and its diminishing effect from 1950 to 1964, may be reflected in our findings. An examination of Tables 1 and 2 reveals that the highest correlations are observed for 1964, a presumably low noise year compared to 1950 and 1960. Next comes 1960 and lastly 1950 with the lowest correlations.[57] In short, a perfect gradient is formed. The more reliable the data, presumably, the more in line our findings would appear with our hypotheses.

In order to account for the problems of bias in police and prisoner statistics, it is suggested that future research in this area take a direct, rather than indirect approach to the collection of data. Specifically, we recommend that individual offenders be followed through the workings of the justice system in order to more closely examine the factors that affect the relationship between the severity and certainty of punishment, i.e., the role played by the police, prosecutors, juries, witnesses and judges.

[54] In addition, 4 out of 5 of the moderate size change correlations are of the index model.

[55] Chiricos & Waldo, *supra* note 1, at 215. Gibbs and Tittle, each cited *supra* note 1, also discuss the possible unreliability of police and prisoner statistics.

[56] The problem of bias in official police and prisoner statistics has been widely discussed and debated. *See* Beattie, *Criminal Statistics in the United States*, 51 J. CRIM L.C. & P.S. 49 (1960); Cressey, *The State of Criminal Statistics*, 3 NAT. PROBATION & PAROLE ASSN. J. 230 (1957); Wolfgang, *Uniform Crime Reports: A Critical Appraisal*, 111 U. PA. L. REV. 708 (1963).

[57] The average index correlations, by year, for Table 1 are: 1950 = .146, 1960 = .288, 1964 = .347. The corresponding log correlations in Table 2 are: .225, .340 and .423, respectively.