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FEDERAL AND STATE PRISONS

Inmate Populations, Costs, and Projection Models

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The Honorable Bill McCollum
Chairman
The Honorable Charles E. Schumer
Ranking Minority Member
Subcommittee on Crime
Committee on the Judiciary
House of Representatives

This report focuses on trends in U.S. prison inmate populations and costs, and it is intended to assist Congress and the administration in considering the implications of sentencing policies and law enforcement initiatives. Our specific objectives in initiating this review were to identify (1) the trends in federal and state prison inmate populations and operating and capital costs since 1980, including projections for 2000 and beyond and the reasons for the trends and (2) the models and methodologies used by federal and state corrections agencies and nongovernmental forecasting organizations to make these projections, including whether any validity or reliability assessments have been conducted. Although you did not request this review, we addressed this report to you, as agreed, because of your interest in prison issues, as exemplified by the hearings you held on June 8, 1995.

To accomplish our objectives, we obtained and reviewed relevant population, cost, and modeling information from the Federal Bureau of Prisons (BOP), the National Council on Crime and Delinquency (NCCD), and corrections agencies in the two states with the largest numbers of inmates (California and Texas). Also, we relied extensively on data compiled by the federal Bureau of Justice Statistics (BJS) and the U.S. Bureau of the Census, and data in private publications, such as the Corrections Compendium, which is a journal published by CEGA Publishing in Lincoln, NE. We did not independently verify the accuracy of the prison inmate population and cost data. Our objectives, scope, and methodology are discussed in more detail in appendix I.

We performed our work from May 1996 to September 1996 in accordance with generally accepted government auditing standards.

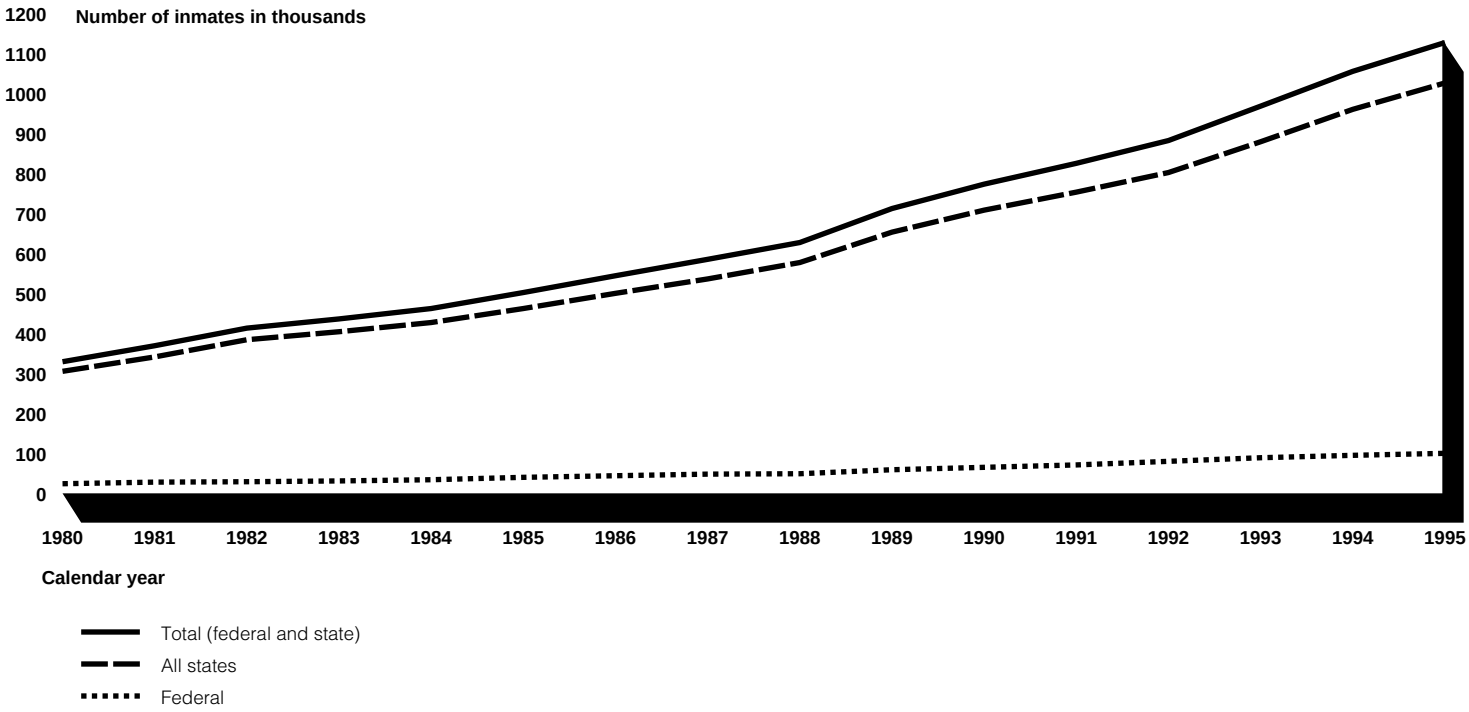
Results in Brief

From 1980 to 1995, the latest year for which complete data were available, the total federal and state[1] prison population grew at an average annual

[1]State data include all 50 states and the District of Columbia.

rate of 8.5 percent. As figure 1 shows, the total prison population grew from about 329,800 inmates in 1980 to about 1.1 million inmates in 1995, which is an increase of about 242 percent. During this period, the federal inmate population grew about 311 percent, and the inmate populations under the jurisdiction of state prisons grew about 237 percent. The corresponding average annual growth rates were 9.9 percent for federal populations and 8.4 percent for state populations.

Figure 1: Trends in Prison Inmate Populations, 1980 Through 1995



Source: BJS.

Federal and state corrections agencies—as well as nongovernmental forecasting organizations, such as NCCD—have projected that the prison population will continue to grow in future years. For example, in June 1996, BOP projected that the federal prison population could reach about 125,000 inmates by 2000, an increase of 25 percent over the 1995

level. In July 1995, NCCD projected that the total federal and state prison population under sentencing policies in effect in 1994 could reach 1.4 million inmates by 2000, representing an increase of about 24 percent over the 1995 level.

The size of the prison population is a function of many factors, including the nation's crime levels, sentencing laws, and law enforcement policies. In recent years, inmate population growth can be traced in large part to major legislative initiatives that are intended to get tough on crime, particularly on drug offenders. Examples of this new get-tough policy include mandatory minimum sentences and repeat offender provisions.

Reflecting the growth in inmate populations, U.S. prison (federal and state) annual operating costs grew from about $3.1 billion in fiscal year 1980 to about $17.7 billion in current dollars in fiscal year 1994. All prison costs (operating and capital costs) cumulatively totaled about $163 billion[2] during the fiscal years 1980 to 1994 period. The corresponding average annual growth rate for this period was 9.1 percent in inflation-adjusted terms. In June 1996, BOP projected that its prison operating costs could total about $3.6 billion in fiscal year 2000, which is an increase of about 88 percent over the fiscal year 1994 level. BOP also projected that its capital costs for new federal prisons scheduled to begin operations during fiscal years 1996 to 2006 could total about $4 billion. Regarding the states' needs, NCCD has estimated that $10.6 billion to $15.1 billion could be needed to construct additional prisons to accommodate anticipated inmate population increases from 1995 to 2000 and that $21.9 billion could be needed by the end of the decade to operate these prisons.

To forecast prison inmate populations, BOP, NCCD, California, and Texas each use a form of microsimulation modeling. Microsimulation provides the flexibility to adjust assumptions and data in response to new sentencing laws or policies and other criminal justice or law enforcement initiatives that could affect the size of prison populations.[3] Except for BOP's projection model, on the basis of a literature search and discussions with federal and state agency officials, we did not identify any independent assessments of the various projection models' validity or reliability. Generally, officials commented that projections beyond 5 years, and perhaps even beyond 2 years, are usually considered rough estimates.

[2]See tables III.1, III.2, and III.3 in appendix III.

[3]The various agencies or organizations do not use modeling to project operating and capital costs. Rather, costs generally are projected linearly using historical cost data (e.g., per-inmate operating costs and per-bed construction costs) adjusted for inflation and projected population data.

However, BOP and NCCD have tracked the accuracy of their respective projections. According to BOP, its projections of federal prison inmate populations for 1991 to 1995 were within 1.4 percent (on average) of the actual populations. Also, according to NCCD, its projections for 1991 through 1994 were within 2 percent (on average) of the actual populations.

Background

In recent years, Gallup opinion polls have indicated that the American public is concerned about crime and related violence. For example, in a 1995 poll, 27 percent of the respondents listed crime and violence as the most important problems facing the country. Polls also have suggested that tougher anticrime legislation is a top priority for the public. For instance, 80 percent of the respondents to a 1996 Gallup Poll supported life sentences for drug dealers. Congress has authorized grants to the states that support tougher sentencing policies for criminals and expanded prison construction to house the growing number of inmates. For example, in the Department of Justice's 1996 appropriations,[4] Congress authorized about $10.3 billion in grants to states for fiscal years 1996 through 2000 for, among other things, building or expanding correctional facilities to house persons convicted of violent crimes.

According to BJS' National Crime Victimization Survey (April 1996),[5] there were 51 violent victimizations[6] per 1,000 U.S. residents in 1994, which was the latest year that complete data were available. Since its inception in 1973, the survey has determined that crime rates and levels have fluctuated over extended periods. Specifically, violent crime rates leveled off between 1992 and 1994, compared with a 20-percent decline between 1981 and 1986 and a 15-percent rise between 1986 and 1991. Property crime[7] continued a general 15-year decline. The survey did not provide any reasons for the fluctuations in crime rates and levels. Even though crime rates have fluctuated, overall crime rates in the 1990s remain substantially higher than those in the 1960s. For example, according to Uniform Crime Reports data compiled by the Federal Bureau of Investigation, the nation's

[4]Public Law 104-134, April 26, 1996.

[5]Conducted in 1994, the survey measured personal and household offenses, including crimes not reported to police, by interviewing all occupants age 12 or older in a nationally representative sample of U.S. households, including persons living in group quarters, such as dormitories. In total, approximately 120,000 residents in 56,000 housing units were interviewed about the crimes they had experienced in the previous 6 months.

[6]Violent crimes included rape/sexual assault, robbery, aggravated and simple assault as measured by the survey, and murder as reported to the Federal Bureau of Investigation.

[7]The survey defined property crimes as household burglary, motor vehicle theft, and thefts of other property.

overall crime rate was about 2,000 crimes per 100,000 residents in the early 1960s compared with 5,374 crimes per 100,000 residents in 1994.

Against the backdrop of these higher crime rates, there is a continuing debate over the use of incarceration as a means of addressing increasing crime. Both proponents and opponents of increasing the use of incarceration as a solution to the crime problem can cite research to support their positions. For example, proponents of increased incarceration assert that investing in new prisons will have long-term benefits of crime reduction.[8] On the other hand, critics of increased incarceration argue that continued prison-building is wasteful and unaffordable and is unlikely to affect crime rates.[9]

In 1994, RAND issued a study of California's "three strikes" law, which mandates sentences ranging from 25 years to life for certain three-time felony offenders.[10] The study, which weighed crime reduction and cost, concluded that the California law, if fully implemented, will reduce serious felonies committed by adults in the state by between 22 and 34 percent below what may have occurred. The study also concluded that the reduction in crime would be achieved at an additional cost of between $4.5 billion and $6.5 billion in current dollars annually. According to the study, most of the cost increase would result from the need to build and operate additional prisons to house the inmate population, which could be expected to double as a result of sentencing under the law. A more recent RAND study[11] indicates that some preventative measures, such as parent training and graduation incentives, could potentially reduce crime rates more cost effectively than incarceration.

[8]John J. DiIulio, Jr., "Prisons Are A Bargain, by Any Measure," The Wall Street Journal, January 16, 1996. Mr. DiIulio, a professor of politics and public affairs at Princeton University, also is one of the authors of The State of Violent Crime in America (Council on Crime in America: Washington, D.C.), January 1996.

[9]For example, see the testimony of Todd R. Clear presented in hearings on the "Federal Prison Population: Present and Future Trends" before the House Subcommittee on Intellectual Property and Judicial Administration, Committee on the Judiciary, 103d Cong., 1st Sess. 80-98 (1993).

[10]Peter W. Greenwood, et al, RAND, Three Strikes and You're Out: Estimated Benefits and Costs of California's New Mandatory Sentencing Law (RAND/MR-509-RC), 1994.

[11]Peter W. Greenwood, et al, RAND, Diverting Children from a Life of Crime: What Are the Costs and Benefits? (RAND/MR-699-UCB/RC/IF), 1996.

Trends in Federal and State Prison Inmate Populations and Costs

Federal and state prison inmate populations have been growing since 1980, reaching about 1.1 million inmates in 1995. Federal and state corrections agencies and nongovernmental forecasting organizations project that these populations will continue to grow, potentially reaching 1.4 million inmates in 2000. Prison operating and capital costs[12] have also been growing and are projected to continue doing so in the future. For federal and state prisons, operating and capital costs cumulatively totaled about $163 billion[13] for fiscal years 1980 through 1994.

Prison Inmate Populations (1980 Through 1995)

From 1980 to 1995, which was the latest year that complete data were available, the total U.S. prison inmate population under federal and state jurisdiction[14] grew by about 242 percent, from 329,821 to 1,127,132,[15] respectively. The corresponding average annual prison population growth rate during this period was 8.5 percent (9.9 percent for the federal population and 8.4 percent for the state populations). The prison population increased at a slower rate—6.8 percent—between 1994 and 1995 than the average growth rate. Although an August 1996 BJS report[16] on prison and jail inmates—the source for our prison inmate population data—did not provide specific reasons for the decrease in the rate of growth, a BJS official commented that the smaller growth rate may be the result of the growing population base, currently over 1 million inmates. Nevertheless, we do not know whether this marks the start of a trend toward smaller rates of growth.

As previously shown in figure 1, the federal prison inmate population grew from 24,363 in 1980 to 100,250 in 1995, which is an increase of about 312 percent. The state prison population grew from 305,458 inmates in 1980 to 1,026,882 inmates in 1995, which is an increase of about

[12]As defined by the Census Bureau—our source for cost data—"costs," or "direct expenditures," are payments to employees, suppliers, contractors, beneficiaries, and other final recipients of government payments. Expenditures are net of recoveries and other correcting transactions and exclude retirement of debt, investment in securities, extensions of credit, and agency transactions.

[13]See table III.3 in appendix III.

[14]According to BJS, this population includes inmates serving sentences of more than 1 year ("sentenced prisoners"); those with sentences of a year or less; and those with no sentences (e.g., those awaiting trial in states with combined jail/prison systems). These inmates are under the jurisdiction of correctional authorities in the 50 states, the District of Columbia, and the federal government. Inmates under jurisdiction include persons under the legal authority of a prison system held elsewhere or outside its facilities.

[15]According to BJS, this is an advance count of prisoners under federal and state jurisdiction for 1995, and it may be revised.

[16]BJS, Prison and Jail Inmates, 1995 (NCJ-161132), August 1996.

236 percent. In California, the state prison inmate population grew from 24,569 in 1980 to 135,646 in 1995, which is an increase of about 452 percent. In Texas, the inmate population grew from 29,892 in 1980 to 127,766 in 1995, which is an increase of about 327 percent. Not all states exhibited inmate population increases to such an extent. For example, in Maine, the inmate population grew from 814 in 1980 to 1,447 in 1995, which is an increase of about 78 percent. In North Carolina, the inmate population grew from 15,513 in 1980 to 29,374 in 1995, which is an increase of about 89 percent.

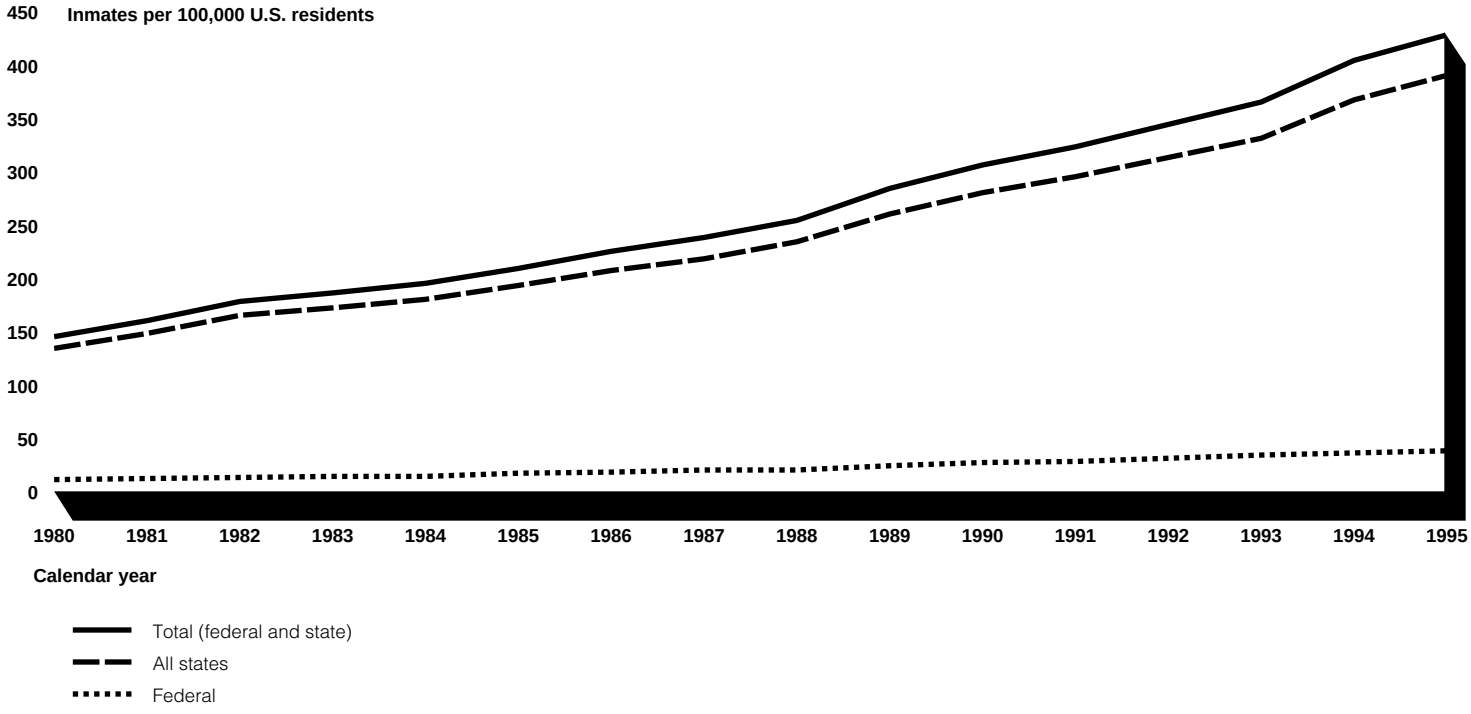
Inmate Incarceration Rates (1980 Through 1995)

Corresponding to the growth in prison populations, the incarceration rates[17] for federal and state prison inmates have also shown steady growth during the 16-year period of 1980 through 1995. As figure 2 shows, the total incarceration rate grew from 145 inmates in 1980 to 428 inmates in 1995 for every 100,000 U.S. residents, which is an increase of about 195 percent. Reflecting an even larger percentage increase (about 245 percent), the incarceration rate for federal inmates grew from 11 inmates for every 100,000 residents in 1980 to 38 inmates for every 100,000 residents in 1995.

Because most prisoners are under state jurisdiction, the incarceration rate for state inmates closely follows (and, indeed, is largely determinative of) the nation's total incarceration rate. Specifically, the incarceration rate for states grew from 134 inmates for every 100,000 residents in 1980 to 390 inmates for every 100,000 residents in 1995, which is an increase of about 191 percent. During this period, the incarceration rate in California increased 312 percent, growing from 104 inmates for every 100,000 residents in 1980 to 428 inmates for every 100,000 residents in 1995. The incarceration rate in Texas increased 222 percent, growing from 210 inmates to 677 inmates for every 100,000 residents in 1980 and 1995, respectively.

[17]The rate of incarceration is the total number of prisoners in correctional facilities per 100,000 U.S. resident population.

Figure 2: Trends in Incarceration Rates, 1980 Through 1995



Source: BJS.

Reasons for Prison Population Growth

According to various sources, including BJS and the U.S. Sentencing Commission, the significant growth in federal and state inmate populations since the 1980s is largely the result of changes in criminal behavior, law enforcement practices, sentencing law and policy, and release practices. For example, according to BJS, during the 1980s, an increasing number of probation and parole violators returned to prison, while in the 1990s, declining rates of release have sustained the growth in inmate populations.

More specifically, regarding federal offenders, under the Sentencing Reform Act of 1984,[18] parole was abolished, and good-time credits (time off sentence for good behavior) were limited to 54 days per year. In 1986,

[18]Public Law 98-473, October 12, 1993.

the Anti-Drug Abuse Act[19] established mandatory minimum sentences for certain drug offenses. In 1988 and 1990, Congress passed additional sentencing legislation, which increased mandatory minimum sentences for drug and weapons offenses. As a result of these statutory changes, the use of probation has been reduced and the length of prison stays has increased. According to BJS data, after 1986, the average time served in federal prisons increased from 15 months to 24 months. For violent offenses, the time served increased from 50 months to 56 months, and the time served for drug offenses increased from 22 months to 33 months.[20]

Particularly noteworthy has been the trend regarding drug offenders as a percentage of the total inmate population. According to a 1991 study by the U.S. Sentencing Commission, drug offenders constituted about 91 percent of all federal defendants sentenced under mandatory minimum provisions.[21] According to BJS, in 1993, which was the latest year that complete data were available, drug offenders constituted 26 percent of all federal and state inmates,[22] whereas these offenders constituted 8 percent of all inmates in 1980. Also, BJS has reported that the increase in drug offenders accounts for nearly three-fourths of the total growth in federal prison inmates since 1980.

The state prison inmate populations have grown as a result of, among other things, the increased number of arrests, higher probabilities of incarceration, and more severe sanctions. Specifically, according to BJS, the number of arrests increased by 41 percent between 1980 and 1993, the latest year that complete data were available. The rate of sending offenders to prison also increased. For example, the likelihood of incarceration increased 5-fold for drug violations and 4-fold for weapons offenses. According to the California Department of Corrections,[23] the prison population in that state has grown because of court decisions, voter initiatives, and legislation, all of which have resulted in stronger law enforcement and more severe criminal sanctions. For example, a California law prohibits the use of good-time allowances to reduce the sentences of repeat offenders convicted of certain violent felonies. State

[19]Public Law 99-570, October 27, 1986.

[20]BJS, Prisoners in 1994 (NCJ-151654), August 1995.

[21]U.S. Sentencing Commission, Special Report to Congress: Mandatory Minimum Penalties in the Federal Criminal Justice System, August 1991.

[22]In 1993, drug offenders constituted 60 percent of all federal inmates and 22 percent of all state inmates.

[23]The California Department of Corrections is responsible for, among other things, the incarceration of adult felons and nonfelon narcotics addicts. The Department also supervises and treats parolees released to the community.

corrections officials expected that the law may result in inmates' serving additional time, which could lead to an increase in the state's prison population in future years.

Prison Population Projections for 2000

While sources differed somewhat in their projected growth for federal and state prison inmate populations, they all showed substantial anticipated increases for these populations in 2000 and beyond. In June 1996, BOP projected that the federal prison population could reach about 125,000 inmates by 2000, which is a 25-percent increase over the 1995 level (see table 1). In July 1995, NCCD projected that, under sentencing policies in effect in 1994, the total inmate population for federal and state prisons could reach 1.4 million by 2000, which is an increase of 24 percent over the 1995 level. NCCD also projected that, if all states were to adopt truth-in-sentencing statutes, which would require inmates to serve at least 85 percent of their sentences, the states' prison population could grow by an additional 190,000 inmates and total about 1.6 million inmates by 2000, which would be an increase of about 42 percent over the 1995 level.

Table 1: Projected Prison Populations in 2000

Prison system	Source of projection	Total projected population in 2000	Percentage increase from 1995 to 2000
Federal	BOP	125,144	25
Federal and states	NCCD	1,400,000	24
Federal and states	Corrections Compendium (April 1996)	1,341,832	19
California	California Department of Corrections	203,593	50
Texas	Texas Criminal Justice Policy Council	143,748	13

Sources: As indicated in table.

The April 1996 issue of the Corrections Compendium presented a compilation of inmate population projections that were based on a survey of federal and state corrections agencies. The combined self-reported projections showed that the federal and state prison population could reach over 1.3 million in 2000, representing an increase of 19 percent over the 1995 level. However, the survey summary in the Compendium indicated that this total may be understated. According to the summary, if the historical growth rate (8.7 percent per year from 1980 through 1994) continues in future years, the prison population could actually

increase by 95 percent over the 1994 level, essentially doubling to about 2 million inmates by 2002.

In July 1995, NCCD projected that the inmate population in California could reach about 210,000 by 2000, which would be an increase of 55 percent over the 1995 level. Separately, in spring 1996, the California Department of Corrections projected that the state's prison population could reach 203,593 inmates in 2000, which would be an increase of about 50 percent over the 1995 level. For Texas, in July 1995, NCCD projected that the inmate population could reach about 149,000 by 2000, which would be an increase of about 17 percent over the 1995 level. In September 1996, the Texas Criminal Justice Policy Council projected that the state's prison population could reach 143,748 in 2000, which would be an increase of about 13 percent over the 1995 level.[24]

Appendix II presents additional information about actual and projected federal and state prison inmate populations and incarceration rates.

Prison Operating Costs (Fiscal Years 1980 Through 1994)

Prison operating costs[25] grew steadily during fiscal years 1980 to 1994, reflecting in part the growth in prison populations. As figure 3 shows, total U.S. prison operating costs grew from about $3.1 billion in fiscal year 1980 to about $17.7 billion in current dollars in fiscal year 1994. This is an increase of 224 percent based on constant or inflation-adjusted dollars.[26] Of this total, federal prison operating costs grew from about $319 million in fiscal year 1980 to about $1.9 billion in fiscal year 1994, which is an increase of about 242 percent based on constant dollars. The corresponding average annual growth rate during this period was 9.9 percent. State prison operating costs grew from about $2.8 billion in fiscal year 1980 to $15.8 billion in fiscal year 1994, which is an increase of 222 percent based on constant dollars. The corresponding average annual

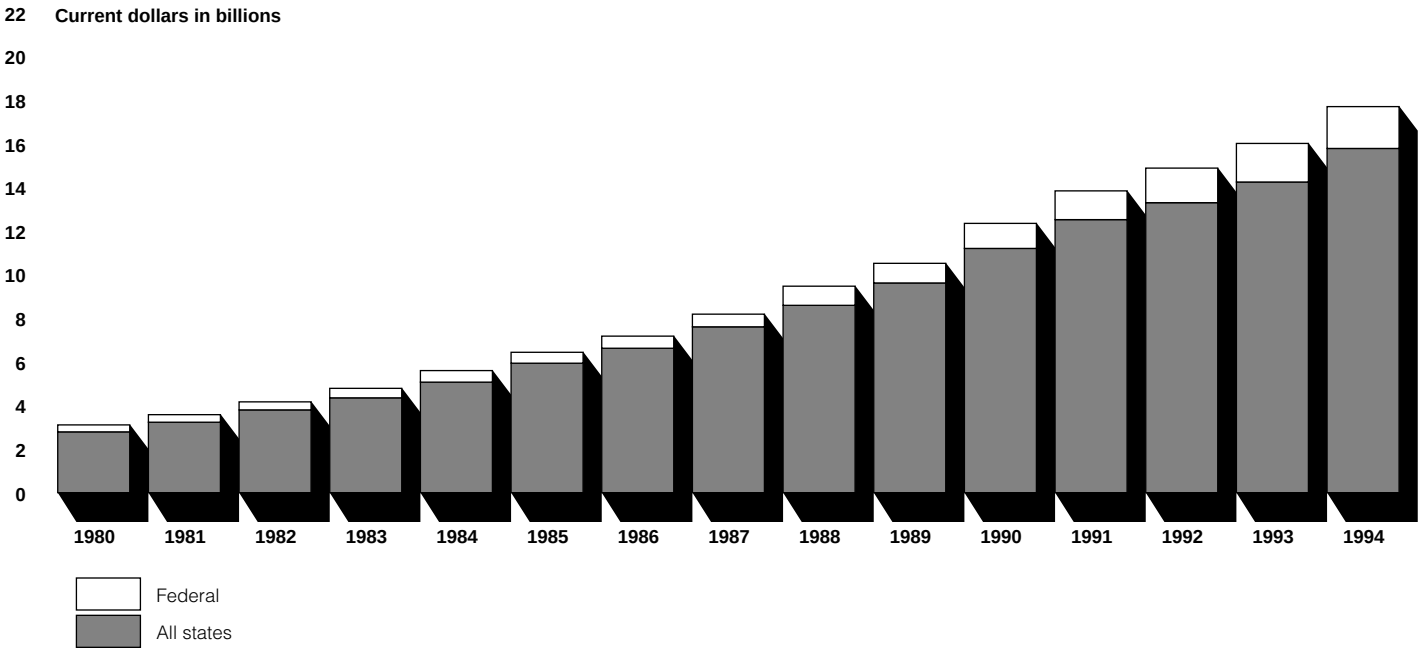
[24]According to the Council's September 1996 correctional population projection report, this projection was revised downward from earlier versions to account for the reduced growth in Texas' correctional population. According to the report, the reduced growth has resulted from a decline in reported crime, a stabilization in the number of new convictions, a decline in parole revocations, and a decline in the number of offenders sentenced to prison.

[25]As defined by the Census Bureau, prison operating costs include compensation of officers and employees, supplies, materials, operating leases, and contractual services. Operating costs also include repairs to existing works and structures.

[26]In this report, except for projections or future trends, percentage increases involving costs are based upon the conversion of current dollars to constant or inflation-adjusted dollars. Specifically, in calculating percentage increases for operating and capital costs during past years, we used annual implicit price deflators (as published in the U.S. Department of Commerce's Survey of Current Business) to adjust all dollars to 1994 purchasing power.

growth rate during this period was 8.7 percent. In California, operating costs grew from about $320 million in fiscal year 1980 to $2.6 billion in fiscal year 1994, which is an increase of 357 percent based on constant dollars. In Texas, operating costs grew from about $105 million in fiscal year 1980 to $1.2 billion in fiscal year 1994, which is an increase of 529 percent based on constant dollars.

Figure 3: Trends in Prison Operating Costs, Fiscal Years 1980 Through 1994



Note: Dollar figures represent actual dollars (no adjustment for inflation).

Source: Table III.1 in appendix III.

Prison Capital Costs (Fiscal Years 1980 Through 1994)

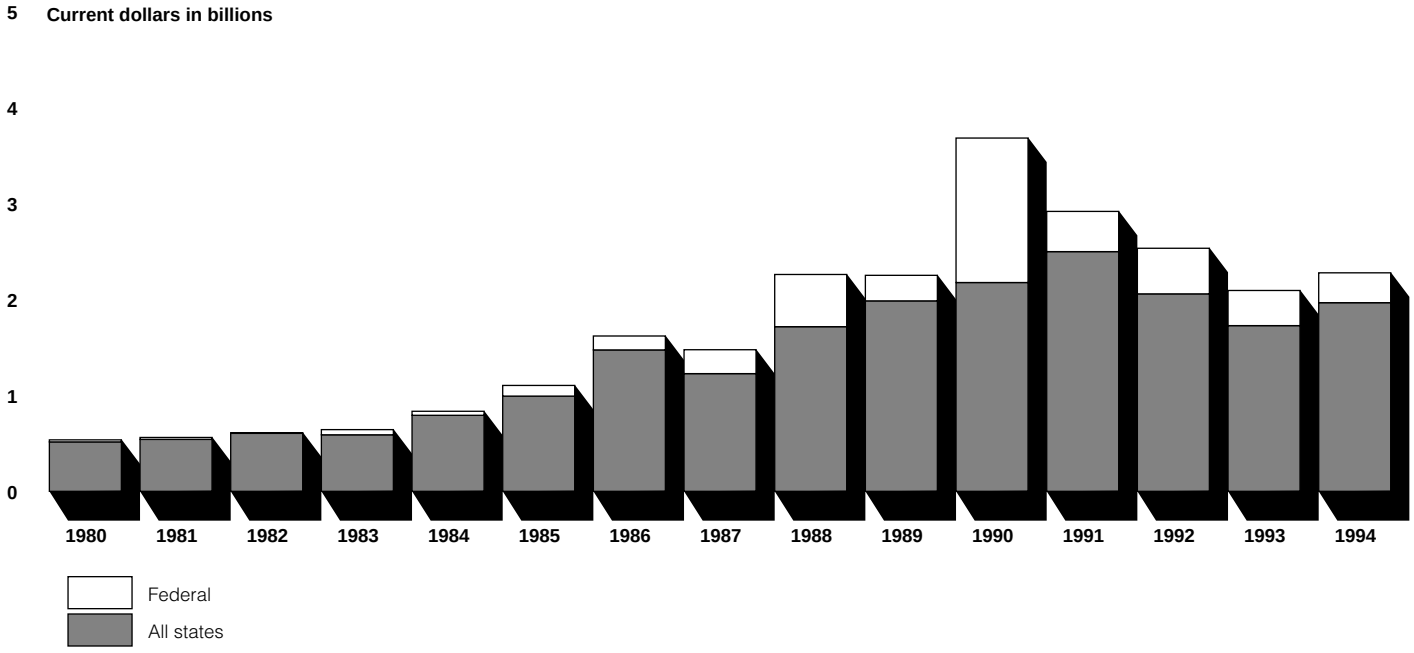
Prison capital costs,[27] while growing overall, have actually fluctuated on almost a year-to-year basis during fiscal years 1980 to 1994. As figure 4 shows, total U.S. prison capital costs grew from about $538 million in

[27]As defined by the Census Bureau, prison capital costs are the direct expenditures for contract or forced account construction of buildings, roads, and other improvements, purchase of equipment, land, and existing structures, and payment of capital leases. Capital costs also include expenditures for additions, replacements, and major alterations to fixed works and structures, but exclude repairs to such works and structures. Repairs are treated as operating expenditures.

fiscal year 1980 to about $2.3 billion in current dollars in fiscal year 1994. This is an increase of 141 percent based on constant or inflation-adjusted dollars. Federal prison capital costs grew from about $22 million in fiscal year 1980 to about $312 million in fiscal year 1994, representing an increase of about 715 percent (based on constant dollars). The corresponding average annual growth rate during this period was 87.9 percent.[28] State prison capital costs grew from about $516 million in fiscal year 1980 to about $2 billion in fiscal year 1994, representing an increase of about 116 percent based on constant dollars. The corresponding average annual growth rate during this period was 7.4 percent. In California, capital costs grew from $16 million in fiscal year 1980 to $413 million in fiscal year 1994, which is an increase of 1,327 percent based on constant dollars. In Texas, capital costs grew from $20 million in fiscal year 1980 to about $577 million in fiscal year 1994, which is an increase of 1,531 percent based on constant dollars.

[28]The average annual growth rate is distorted by large increases in certain fiscal years. For example, in fiscal year 1983, federal capital costs increased by almost 700 percent over the level in fiscal year 1982. Also, in fiscal year 1990, capital costs increased by about 440 percent over the level in fiscal year 1989.

Figure 4: Trends in Prison Capital Costs, Fiscal Years 1980 Through 1994



Note: Dollar figures represent actual dollars (no adjustment for inflation).

Source: Table III.2 in appendix III.

Projections of Prison Operating and Capital Costs

BOP estimates federal prison operating costs to grow through fiscal 2000, while capital costs are expected to fluctuate on a year-by-year basis. Specifically, in June 1996, BOP projected that its operating costs could grow to about $3.6 billion by fiscal year 2000, almost double the level in fiscal year 1994. BOP also projected that its capital costs for new federal prisons scheduled to begin operations during fiscal years 1996 to 2006 could total about $4 billion. According to Justice officials, these cost increases were projected on the basis of historically high rates of prison population increases. According to these officials, since recent BJS statistics show that the rate of increase in prison populations from 1994 to 1995 was below the average for the preceding 5 years, the BOP cost projections for 2000 and beyond may be overestimated.

NCCD has estimated that state prison population increases from 1995 to 2000 could result in total additional capital and operating costs of

$32.5 billion to $37 billion for this period. Specifically, NCCD estimated that $10.6 billion to $15.1 billion could be needed to construct additional state prisons, and that $21.9 billion could be needed by the end of the decade to operate these prisons.

Appendix III presents additional information about actual and projected federal and state operating and capital costs.

Models and Methodologies Used to Project Prison Populations

BOP, NCCD, California, and Texas each use microsimulation models to project prison inmate populations.[29] The models are similar in providing flexibility to adjust assumptions and data in response to new sentencing laws or policies and other criminal justice or law enforcement initiatives that could affect the size of prison populations in the respective jurisdiction. Appendix IV provides more detailed information about microsimulation and other models and methodologies used to project inmate populations.

On the basis of a literature search and discussions with federal and state agency officials, we did not identify any independent assessments of the various projection models' validity or reliability, except for BOP's model. This model, according to BOP officials, has been subjected to various reviews. For example, the officials made the following comments:

- In 1993, BOP staff published a paper (which was peer reviewed) on the projection methodology.[30]
- Justice's budget staff annually reviews BOP's inmate population projections and often reports to the Attorney General on the accuracy of the projections.

Some of the forecasting organizations and state corrections agencies have tracked and self-reported on the accuracy of their respective projections. For example, according to BOP, its projections of federal prison inmate populations for 1991 to 1995 were within 1.4 percent (on average) of the actual populations. Also, according to NCCD, its projections for 1991 through 1994 were within 2 percent (on average) of the actual populations.

[29]As previously noted, the various agencies or organizations do not use modeling to project operating and capital costs. Rather, costs generally are projected linearly using historical cost data adjusted for inflation and projected population data. For example, to project its operating costs, BOP adjusts actual per-inmate costs by an annual inflation factor of 3.1 percent.

[30]Gaes, G.G., Simon, E.S., and Rhodes, W.M., "20/20 Hindsight: Effectiveness of Simulating the Impact of Federal Sentencing Legislation on the Future Prison Population," The Prison Journal, 1993, pp. 5-29.

However, BOP officials and a modeling expert said that assessing a model's reliability by comparing projections with actual populations is not necessarily the only approach. For instance, the officials noted that after projections showing potential impacts are presented or published, legislators or administrators are more likely to modify or change certain policies or practices, taking the projections into consideration. Thus, according to these officials, another benefit of a population simulation is to inform the public policy debate.

The April 1996 issue of the Corrections Compendium presented the results of a survey that asked respondents to report on the accuracy of their models' population projections. The survey was originally sent to federal and state corrections agencies in October 1995, and the responses with the applicable data were collected through February 1996. Of the 39 respondents[31] to this question, 54 percent reported that their past projections were "accurate,"[32] 23 percent reported that their past projections were "too low," and 8 percent said their past projections were "too high."[33] The other respondents to the overall survey reported that they either did not project populations or did not assess the accuracy of their projections.

Agency Comments and Our Evaluation

We obtained comments on the draft of this report from Justice officials, including the Director of Justice's Audit Liaison Office, BOP's Chiefs of Research and Evaluation and Budget Development, and BJS' Chief of Corrections Statistics. These officials generally agreed with the contents of the draft report. However, BOP and BJS officials provided technical comments and clarifications related to certain numerical data in the report. Also, the BOP officials provided revised federal prison inmate data. We have incorporated these technical comments, clarifications, and revisions where appropriate in this report.

Regarding prison costs, BJS officials expressed the view that actual expenditure data compiled and published by the Census Bureau (e.g., Census of Government Finances) would be more accurate and complete than data from The Corrections Yearbook, the source we used for the draft of this report. Accordingly, from the Census Bureau, we obtained state prison expenditure data for fiscal years 1980 through 1994 (the latest year

[31]The respondents were BOP, 37 states, and the District of Columbia.

[32]For example, BOP, California, and Texas reported that their projections were accurate.

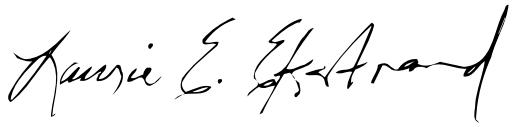
[33]The survey did not define or specify a given time period for "past" projections.

that complete data were available), and we incorporated this information and revised the related analyses in this report where appropriate.

In our draft report, we noted that we did not identify any independent assessments regarding the validity or reliability of the various models used to project federal and state prison inmate populations. However, in commenting on the draft report, BOP officials called to our attention examples of various reviews or evaluations that could be considered assessments of the Bureau's microsimulation model. We incorporated BOP's comments and examples in this report.

We also obtained comments on the draft of this report from NCCD's Executive Vice President and a NCCD Senior Researcher. These officials agreed with the contents of this report and stated that it factually represented information and statistical data developed by and previously published by NCCD. The officials also offered one technical clarification, which we have incorporated in this report.

We are providing copies of this report to the Attorney General; the Assistant Attorney General, the Office of Justice Programs; the Director, BOP; and other interested parties. Copies also will be made available to others upon request. The major contributors to this report are listed in appendix V. Please contact me on (202) 512-8777 if you or your staff have any questions.



Laurie E. Ekstrand
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Abbreviations

BJS	Bureau of Justice Statistics
BOP	Bureau of Prisons
FEDSIM	Federal Sentencing Simulation model
NCCD	National Council on Crime and Delinquency

Objectives, Scope, and Methodology

We initiated this review to identify (1) the trends in federal and state prison inmate populations and operating and capital costs since 1980, including projections for 2000 and beyond and the reasons for these trends[1] and (2) the models and methodologies used by federal and state[2] corrections agencies and nongovernmental forecasting organizations to make these projections, including whether any validity or reliability assessments had been done.

To address these objectives, we initially conducted a literature search to identify available data sources and to determine to what extent these issues had received congressional attention. In the latter regard, we noted that a Subcommittee of the House Committee on the Judiciary held hearings in 1993[3] that were useful in our analyses.

More specifically, to identify the trends in prison populations and costs, we contacted relevant federal agencies, such as the Bureau of Justice Statistics (BJS), the Federal Bureau of Prisons (BOP), and the U.S. Bureau of the Census, and corrections agencies in the two states with the largest prison populations (California and Texas). BJS compiles and publishes considerable statistical information covering both federal and state correctional systems. For example, two relevant series of BJS publications are the Sourcebook of Criminal Justice Statistics and Correctional Populations in the United States. The Census Bureau compiles and publishes, among other things, statistical information about federal and state government expenditures. For example, relevant series of Census Bureau publications are the Census of Government Finances and State Government Finances.

From BOP, we obtained historical as well as projected data covering both populations and costs for federal prisons. From the state agencies, we obtained and reviewed historical and projected prison inmate population data. State agency officials told us that prison operating and capital costs generally are not projected beyond the next fiscal year.

[1]We have previously reported on issues related to prison expansion and crowding. See Federal Prison Expansion: Overcrowding Reduced but Inmate Population Growth May Raise Issue Again (GAO/GGD-94-48, Dec. 14, 1993) and Prison Crowding: Issues Facing the Nation's Prison Systems (GAO/GGD-90-1BR, Nov. 2, 1989).

[2]State data include all 50 states and the District of Columbia.

[3]"Federal Prison Population: Present and Future Trends," hearings before the House Subcommittee on Intellectual Property and Judicial Administration, Committee on the Judiciary, 103d Cong., 1st Sess. 80-98 (1993).

Furthermore, in identifying prison population and cost trends, we also contacted nongovernmental sources, such as the National Council on Crime and Delinquency (NCCD). As a private organization engaged in research, training, and advocacy programs to reduce crime and delinquency, NCCD has published several studies of prison-related topics, including projections of inmate populations.[4] Also, another useful nongovernmental source was the Corrections Compendium, which is a journal from CEGA Publishing.

We discussed the population and cost data we obtained with cognizant officials at the federal and state agencies and the nongovernmental organizations. We did not independently verify the accuracy and quality of the data we obtained.

To identify the models and methodologies used by federal and state corrections agencies and nongovernmental organizations to make projections, we obtained and reviewed modeling and methodology information from BOP, NCCD, the Corrections Compendium, the California Department of Corrections, and the Texas Criminal Justice Policy Council.[5] We focused our review on BOP's Federal Sentencing Simulation model, NCCD's Prophet model (used by 23 states in addition to NCCD), and Texas' JUSTICE model (Texas has the second largest prison inmate population).

To identify the extent, if any, to which the forecasting models and methodologies had been assessed for validity and reliability, we conducted a literature search.[6] Also, we interviewed officials in BOP's Office of Research and Evaluation, which is responsible for, among other things, forecasting federal inmate populations. Similarly, we interviewed state corrections agency officials in California and Texas. We discussed issues related to the models and methodologies and their validity and reliability with cognizant officials from BOP and NCCD and the author of a 1990

[4]For example, see Michael A. Jones and James Austin, "The NCCD National Prison Population Forecast: The Cost of Truth-in-Sentencing Laws," NCCD Focus (San Francisco, CA: National Council on Crime and Delinquency), July 1995.

[5]The Council was created as an independent state agency in 1983 by the Texas legislature. As mandated by state law, the Council's basic operational activity includes making projections and impact simulations regarding criminal justice policy alternatives.

[6]For example, the April 1996 issue of Corrections Compendium presents the results of a survey on inmate population projections. The survey asked respondents whether past projections had been accurate.

BJS-sponsored study that reviewed (but did not evaluate) some of the projection models used by federal and state criminal justice systems.[7]

[7]BJS, Models of the Criminal Justice System: A Review of Existing Impact Models (NCJ-124011), prepared by William Rhodes, Abt Associates, Inc. (Cambridge, MA), June 1990.

Trends in Federal and State Prison Inmate Populations and Incarceration Rates

Federal and state prison inmate populations—and corresponding incarceration rates—have been growing since 1980. Federal and state corrections agencies and nongovernmental forecasting organizations project that these populations will continue to grow through 2000 and beyond. Populations in the other three correctional categories—probation, parole, and jail—have also grown since 1980.[1] However, in terms of the percentages of the overall adult correctional population, the relative distribution of adult offenders among the four categories were similar in 1994 and 1980.

Prison Inmate Populations and Incarceration Rates (1980 Through 1994)

Table II.1 shows that the federal prison inmate population and the corresponding incarceration rate have grown consistently from 1980 to 1995. By 1995, the prison population had grown 4-fold from the 1980 level, reaching over 100,000 inmates. The incarceration rate had grown more than 3-fold, reaching 38 inmates for every 100,000 U.S. residents in 1995.

Table II.1: Federal Prison Inmate Populations and Incarceration Rates at Year-End, 1980 Through 1995

Calendar year	Population	Inmates per 100,000 U.S. residents
1980	24,363	11
1981	28,133	12
1982	29,673	13
1983	31,926	14
1984	34,263	14
1985	40,223	17
1986	44,408	18
1987	48,300	20
1988	49,928	20
1989	59,171	24
1990	65,526	27
1991	71,608	28
1992	80,259	31
1993	89,587	34
1994	95,034	36
1995	100,250	38
Percentage change, 1980-1995	**311.5%**	**245.4%**

Source: BJS.

[1]The adult correctional population is the total number of adult offenders under some form of supervision—prison, probation, parole, or jail—by the criminal justice system.

Table II.2 shows the federal prison inmate population at fiscal year-end. According to BOP, the population data presented are different than BJS' data (presented in table II.1) in that, in addition to being compiled by fiscal year rather than calendar year, they represent inmates both in BOP facilities and alternative confinements, such as contract facilities.

Table II.2: Federal Prison Inmate Populations at Fiscal Year-End, 1980 Through 1995

Fiscal year	Population
1980	24,640
1981	26,313
1982	30,531
1983	33,216
1984	35,795
1985	40,330
1986	46,055
1987	49,378
1988	50,513
1989	57,762
1990	64,936
1991	71,508
1992	79,678
1993	88,565
1994	95,162
1995	100,958
Percentage change, 1980-1995	**309.7%**

Source: BOP.

As table II.3 shows, from 1980 to 1995, the state prison inmate population and the corresponding incarceration rate grew by about 236 and about 191 percent, respectively. In 1995, the state prison inmate population reached just over 1 million, compared with just over 300,000 in 1980. The incarceration rate reached 390 inmates for every 100,000 U.S. residents in 1995, compared with 134 in 1980. From 1980 to 1995, the prison populations in California and Texas grew by well over 400 percent and 300 percent, respectively.

Table II.3: State Prison Inmate Populations and Incarceration Rates at Year-End, 1980 Through 1995

Calendar year	All states	California	Texas	Inmates per 100,000 U.S. residents, all states
1980	305,458	24,569	29,892	134
1981	341,797	29,202	31,502	148
1982	384,133	34,640	36,149	165
1983	404,929	39,373	35,259	172
1984	427,739	43,197	36,682	180
1985	462,284	50,158	37,532	193
1986	500,584	59,484	38,534	207
1987	536,784	66,975	38,821	218
1988	577,672	76,171	40,437	234
1989	653,193	87,297	44,022	260
1990	708,393	97,309	50,042	280
1991	753,951	101,808	51,677	295
1992	802,241	109,496	60,487	313
1993	879,714	119,951	92,013	331
1994	960,039	125,605	118,195	367
1995	1,026,882	135,646	127,766	390
Percentage change, 1980-1995	**236.2%**	**452.1%**	**327.4%**	**191.0%**

Source: BJS.

Projected Prison Inmate Populations

Table II.4 shows that the federal prison inmate population is projected by BOP to continue growing, reaching over 125,000 inmates in 2000 and over 138,000 inmates in 2006. These projected populations represent increases of about 25 and about 38 percent, respectively, over the 1995 level.

Table II.4: Projected Federal Prison Inmate Populations, 1996 Through 2006

Year	Projected population[a]
1996	105,128
1997	111,347
1998	116,762
1999	120,974
2000	125,144
2001	128,451
2002	130,908
2003	133,140
2004	135,006
2005	136,678
2006	138,120

[a]These are point estimates generated by BOP's model. The model does not generate confidence intervals.

Source: BOP.

Table II.5 shows NCCD's prison population projections through 2000 for the 21 states that use its Prophet population projection model, California (which uses a similar model), and Texas, which provided its own projections to NCCD. Using data for these 23 states, and assuming that the sentencing policies in effect in 1994 would continue, NCCD estimated that the federal and state prison inmate population could reach 1.4 million in 2000.

Table II.5: Projected Prison Inmate Populations for 23 States, 1996 Through 2000

	Projected population, by year[a]				
State	**1996**	**1997**	**1998**	**1999**	**2000**
Arkansas	9,079	9,106	9,185	9,264	9,337
California	142,551	159,992	176,013	192,814	210,442
Colorado	12,261	13,308	14,326	15,455	15,455
Connecticut	12,989	13,301	13,458	13,684	13,999
Florida	72,357	73,999	75,493	76,512	77,896
Hawaii	2,102	2,290	2,415	2,540	2,261
Idaho	2,759	2,836	2,941	2,979	2,989
Illinois	41,726	43,586	46,105	48,561	51,216
Indiana	15,100	15,300	15,500	15,800	16,100
Kansas	7,045	6,997	6,839	6,637	6,637
Kentucky	12,320	13,072	14,518	15,227	15,987
Louisiana	28,000	29,500	31,000	32,500	34,000
Massachusetts	10,632	11,250	11,580	11,911	12,356
Michigan	44,073	45,796	47,580	49,440	51,365
Mississippi	12,194	12,684	13,184	13,664	14,170
Nevada	7,670	8,101	8,530	9,032	9,516
Ohio	43,059	43,915	44,850	46,080	47,215
Oklahoma	18,466	18,918	19,327	19,825	20,112
Oregon	7,472	8,600	9,764	11,440	13,116
Rhode Island	3,181	3,215	3,248	3,248	3,293
Tennessee	18,372	18,758	19,227	19,671	19,886
Texas	140,882	148,866	153,654	151,842	149,444
Virginia	31,700	34,659	38,050	39,005	40,984
Total	**695,990**	**738,049**	**776,787**	**807,176**	**837,800**

[a]These are point estimates generated by NCCD's model. The model does not generate confidence intervals.

Source: NCCD.

Growth in Other Adult Correctional Populations

As table II.6 shows, the populations in all four adult correctional categories—prison, probation, parole, and jail—have increased between 1980 and 1995. The total federal and state prison inmate population in custody[2] grew by about 237 percent from 1980 to 1995. In comparison, during the same period, the probation population grew by 176 percent, the

[2]Populations in custody are those actually held in a state's correctional facility. According to BJS, for comparison purposes across correctional populations, custody figures are used for prison and jail populations to avoid the double-counting of inmates.

parole population grew by 218 percent, and the jail population grew by 178 percent.[3] Overall, the total adult correctional population grew by 192 percent, from 1.8 million in 1980 to about 5.4 million in 1995.[4] During this time, the U.S. adult population grew by about 19 percent, from 163.5 million to about 194.0 million. Accordingly, the adult correctional population represented 2.8 percent of the total adult population in 1995, well over double the 1.1-percent level in 1980.

Table II.6: Adult Correctional Populations by Category, 1980 and 1995

Population category	1980	1995	Percentage population increase from 1980 to 1995
Prison	319,598	1,078,545	237
Probation	1,118,097	3,090,626	176
Parole	220,436	700,174	218
Jail	182,288	507,234	178
Total adult correctional population	1,840,419	5,376,579	192
U.S. adult population	163,541,000	194,015,000	19

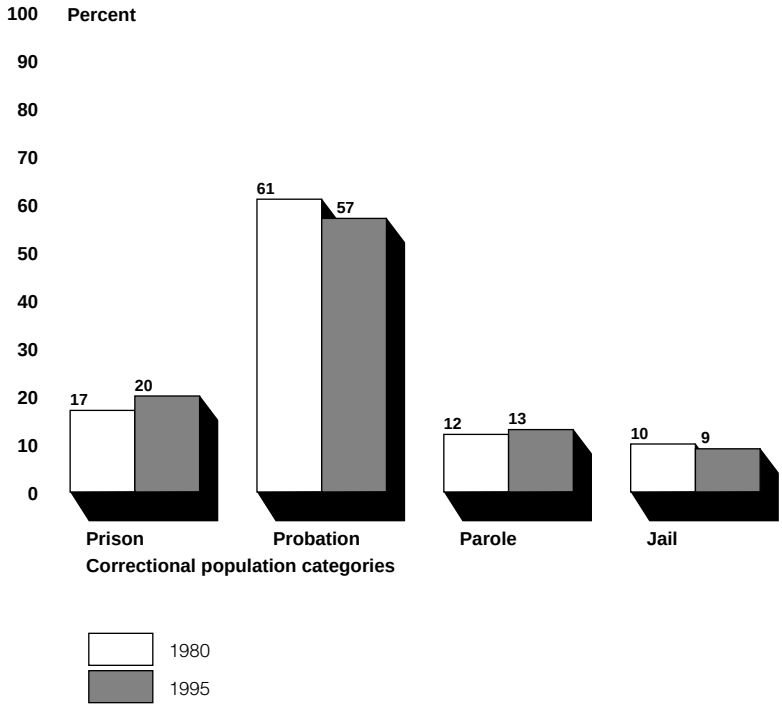
Source: GAO analysis of BJS data.

Figure II.1 shows that the populations in the four adult correctional categories as a percentage of the total adult correctional population were essentially unchanged between 1995 and 1980. Specifically, in 1995, the prison inmate population represented 20 percent of the total adult correctional population, compared with 17 percent in 1980. Also, in 1995, the probation population represented 57 percent (61 percent in 1980), the parole population 13 percent (12 percent in 1980), and the jail population 9 percent (10 percent in 1980) of the total adult correctional population.

[3]Jail population data are as of June 30, 1996.

[4]According to BJS, because some persons may have multiple statuses, the sum of persons incarcerated (prison or jail) and under community supervision (probation or parole) overestimates the total correctional population.

Figure II.1: Distribution of Adult Correctional Populations, 1980 and 1995



Source: GAO analysis of BJS data.

Trends in Federal and State Prison Operating and Capital Costs

Prison Operating Costs (Fiscal Years 1980 Through 1994)

Table III.1 shows that federal and state prison annual operating costs have grown significantly (a combined 224 percent increase in inflation-adjusted terms) since fiscal year 1980. These costs cumulatively totaled about $137.7 billion in current dollars for fiscal years 1980 through 1994.

Table III.1: Federal and State Prison Operating Costs in Current Dollars, Fiscal Years 1980 Through 1994

	Costs in thousands of current dollars		
Fiscal year	**Federal**	**State**	**Total[a]**
1980	$319,274	$2,787,369	$3,106,643
1981	346,517	3,229,234	3,575,751
1982	368,000	3,794,178	4,162,178
1983	435,000	4,346,273	4,781,273
1984	529,245	5,066,666	5,595,911
1985	500,941	5,934,160	6,435,101
1986	555,097	6,619,534	7,174,631
1987	580,120	7,601,594	8,181,714
1988	878,502	8,586,498	9,465,000
1989	900,334	9,611,020	10,511,354
1990	1,148,678	11,194,236	12,342,914
1991	1,318,741	12,514,171	13,832,912
1992	1,585,498	13,290,202	14,875,700
1993	1,767,019	14,239,710	16,006,729
1994	1,918,067	15,776,174	17,694,241
Total[a]	**$13,151,033**	**$124,591,019**	**$137,742,052**

Note 1: Dollar figures represent actual dollars (no adjustment for inflation).

Note 2: According to BOP, the federal cost data presented are actual obligations, adjusted for equipment and other capital item costs.

[a]Details may not add to total due to rounding.

Source: BOP and U.S. Bureau of the Census.

Prison Capital Costs (Fiscal Years 1980 Through 1994)

As table III.2 shows, federal and state prison capital costs have also grown significantly from fiscal year 1980 to 1994. Total capital costs reached about $2.3 billion in fiscal year 1994, an inflation-adjusted increase of about 141 percent over the level in fiscal year 1980. Federal and state capital costs cumulatively totaled about $25.4 billion for fiscal years 1980 through 1994.

Table III.2: Federal and State Prison Capital Costs in Current Dollars, Fiscal Years 1980 Through 1994

	Costs in thousands of current dollars		
Fiscal year	**Federal**	**State**	**Total[a]**
1980	$21,766	$515,854	$537,620
1981	20,807	541,939	562,746
1982	6,500	604,715	612,215
1983	54,000	589,325	643,325
1984	42,072	792,963	835,035
1985	111,787	992,071	1,103,858
1986	145,382	1,473,544	1,618,926
1987	249,279	1,226,049	1,475,328
1988	544,392	1,715,463	2,259,855
1989	266,994	1,984,518	2,251,512
1990	1,505,953	2,175,823	3,681,776
1991	419,262	2,497,997	2,917,259
1992	475,733	2,057,383	2,533,116
1993	366,144	1,726,171	2,092,315
1994	311,687	1,965,763	2,277,450
Total[a]	**$4,541,758**	**$20,859,578**	**$25,401,336**

Note 1: Dollar figures represent actual dollars (no adjustment for inflation).

Note 2: According to BOP, the federal cost data presented are actual obligations, adjusted for equipment and other capital item costs.

[a]Details may not add to total due to rounding.

Source: BOP and U.S. Bureau of the Census.

Table III.3 shows that federal and state prison operating and capital costs cumulatively totaled about $163.1 billion in current dollars for fiscal years 1980 through 1994. Federal costs totaled about $17.7 billion, while state costs totaled about $145.5 billion during this period. Operating costs totaled about $137.7 billion, while capital costs totaled about $25.4 billion.

Table III.3: Federal and State Prison Total Cumulative Costs in Current Dollars, Fiscal Years 1980 Through 1994

	Operating cost	**Capital cost**	**Total**
Federal	$13,151,033	$4,541,758	$17,692,791
State	124,591,019	20,859,578	145,450,597
Total	**$137,742,052**	**$25,401,336**	**$163,143,388**

Source: Summary of tables III.1 and III.2.

Projected Federal Prison Operating and Capital Costs

Table III.4 shows BOP's projections for federal prison operating and capital costs through fiscal year 2006. As shown, BOP projects that operating costs in fiscal year 2006 could be almost double the 1996 level. The projections also show that capital costs are expected to fluctuate on a year-by-year basis.

Table III.4: Projected Federal Prison Operating and Capital Costs, Fiscal Years 1996 Through 2006

	Costs in thousands of current dollars		
Fiscal year	Operating	Capital	Total
1996	$2,440,394	$445,903	$2,886,297
1997	2,843,292	506,552	3,349,844
1998	3,054,347	553,493	3,607,840
1999	3,365,142	424,136	3,789,278
2000	3,604,601	341,741	3,946,342
2001	3,805,956	303,576	4,110,532
2002	3,958,572	287,608	4,246,180
2003	4,163,304	282,823	4,446,127
2004	4,343,282	283,718	4,627,000
2005	4,528,328	287,555	4,815,883
2006	4,721,072	293,005	5,014,077

Note: According to BOP, projections of operating and capital budgets are based on estimated obligations—as presented in the Office of Management and Budget's fiscal year 1998 budget for the federal government—adjusted for equipment and other capital item costs.

Source: BOP.

Models and Methodologies Used for Projecting Prison Inmate Populations

Various types of models and methodologies are used to project prison inmate populations, but microsimulation is the model type most widely used by federal and state corrections agencies.[1] As used by BOP and 27 states, including California and Texas, microsimulation modeling can project prison populations by simulating a wide range of legislative, policy, or administrative changes that affect the criminal justice system. Other states use flow models or statistical methods to project populations. Except for BOP's projection model, we did not identify any independent assessments of the validity or reliability of the various projection models. However, self-reported data indicated that the models have been accurate.

Microsimulation Modeling Is Most Widely Used

Microsimulation models replicate the flow of persons through the criminal justice system, incorporating considerable detail from the actual records of convicted offenders. As table IV.1 shows, microsimulation modeling is used by BOP and 27 states. In 1987, BOP and the U.S. Sentencing Commission jointly developed the Federal Sentencing Simulation Model (FEDSIM) to comply with a series of congressional initiatives that required an impact analysis of federal sentencing guidelines. In January 1995, BOP began using a revised model (FEDSIM-2), which incorporates different data sets based upon experience under federal sentencing guidelines. The NCCD Prophet model is based on a model that the California Department of Corrections has used since 1976. The Texas Criminal Justice Policy Council developed the JUSTICE microsimulation model in 1987. Each of these three models is discussed separately in the following sections.

[1]NCCD, which is a nongovernmental forecasting organization, also uses a microsimulation model—NCCD Prophet.

Table IV.1: Types of Models Used by BOP and States to Project Prison Populations

Model type	User (BOP or state)[a]	Number of users
Microsimulation		
FEDSIM-2	Bureau of Prisons	1
NCCD Prophet	Arizona, California, Colorado, Connecticut, Florida, Hawaii, Idaho, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Mississippi, Nevada, New Jersey, Ohio, Oklahoma, Rhode Island, Tennessee, Virginia	23
Other[b]	Georgia, Minnesota, North Carolina, Texas	4
Flow[c]		
IMPACT	District of Columbia, Montana, Nebraska, New Mexico, Vermont, Wyoming	6
Other	Pennsylvania, Oregon, Utah	3
Statistical methods (various)[d]	Alabama, Alaska, Arkansas, Delaware, Iowa, Maryland, Missouri, New York, South Dakota, Wisconsin	10
Other (proprietary)[e]	New Hampshire, South Carolina, Washington	3
Total users	**N/A**	**50**

Legend: N/A equals not applicable.

[a]State data exclude North Dakota and West Virginia because these states do not project inmate populations.

[b]Includes the JUSTICE model used in Texas.

[c]Flow models track the movement or "flow" of persons throughout each stage of the criminal justice system, from arrest to parole. One flow model used by several states is the Interactive Model for Projecting Arrest and Corrections Trends (IMPACT).

[d]Various regression and time series analyses and techniques.

[e]Proprietary models not classifiable as microsimulation, flow models, or statistical methods.

Source: Developed by GAO from data presented in Corrections Compendium (April 1996) and NCCD FOCUS (July 1995), and discussions with BOP, NCCD, and state corrections agency officials.

BOP's Model (FEDSIM-2)

Using convicted offenders' cases, two data sets are used when FEDSIM-2 is updated annually: (1) the total prison population at the end of the prior fiscal year and (2) all inmates admitted into federal prisons during the prior fiscal year. In this model, prospective release dates for individuals in

both groups are recorded, and sentencing time is distributed into monthly groupings or "trace elements" to track the total time served for each prisoner. FEDSIM-2 tracks convicted drug offenders,[2] along with 20 other types of offenders, to determine the overall trend in the federal prison population.

NCCD's Model (Prophet)

The Prophet model, which NCCD has customized to accommodate states' correctional information systems, can predict future population levels, isolate the effects of specific practices, and predict the effects of proposed policy changes. This model is conceptually designed around the movement of offenders into, through, and out of the prison and parole systems. As shown in table IV.1, 23 states (including California) use a form of this model. The Prophet model simulates offender subgroup compositions and lengths of stays within each stage of the correctional system. Individual cases are then processed through a series of probability distribution arrays or matrices, which allows the model to compute prison populations.

Using the model, the total correctional population can be separated into subgroups, and forecasts for each subgroup can be made on the basis of the proposed policy changes, without altering the status of the other subgroups. Prophet requires five data sets to operate—prison admissions, prison exits, current prison population, current parole population, and parole exits.

Texas' Model (JUSTICE)

Texas' JUSTICE microsimulation model uses convicted felony offenders' records from the state's jail, prison, and parole populations. On a monthly basis, these data are loaded into or updated in the model, which has two parts. One part covers prisoners coming into the correctional system, and the second part covers the policies that determine movement within the system. Projections are made from the first part, and impact analyses of proposed policy changes are made from the second part.

JUSTICE creates future offenders' records by duplicating key characteristics (e.g., offense and sentence) of the current admissions and parolees and assessing the probability of these characteristics being present in future admissions. The model accounts for the specific months that offenders enter the different stages of the system and projects a total number of adult felony arrests on the basis of the at-risk population—i.e., that portion

[2]Since drug offenders constitute over one-half of the total federal prison population (60 percent in 1993), this category has been called the "tail that wags the dog."

of the Texas population (aged 18 to 44 years old) considered most likely to engage in criminal activity. Each offender's key characteristics determine the flow of the offender through the system by triggering certain criteria (e.g., parole eligibility) that affect the time and direction of the offender's movement through the system.

The first part of the JUSTICE model is used to make projections of those most likely to be sent to prison or placed on probation. The second part of the model permits simulating the impact of proposed changes affecting the size of the probation, prison, and parole populations. Texas' JUSTICE model has considerable flexibility in simulating changes in the major "rules of movement" through the state's correctional system. For example, 29 parameters can be interactively altered to assess the impact of proposed policy changes.

Reliability of Microsimulation Models

According to experts in the prison modeling field, there are no standard criteria for assessing or validating the reliability of microsimulation models used to project prison populations. The NCCD and state agency officials we contacted said that microsimulation models are generally considered reliable if the projections come within 2 percent of the actual populations. These officials also commented that projections beyond 5 years, and perhaps even beyond 2 years, are usually considered rough estimates.

Notwithstanding that comparing projections with actual prison populations may be an insufficient gauge of a model's reliability, on the basis of self-reported assessments, the three major models we identified (FEDSIM-2, NCCD Prophet, and JUSTICE) are reported to produce accurate projections. For instance, the April 1996 issue of the Corrections Compendium presented the results of a survey about prison population projections. In responding to a question in the survey related to projection accuracy, BOP, California, and Texas reported that their respective projections were accurate.

Other Models and Methods

As shown in table IV.1, in contrast to the microsimulation models used by BOP and most states, other states use flow models and statistical methods to project prison populations. Flow models separate the characteristics of the various groups or cohorts of prisoners moving through the system from the aggregate population for analysis. These models track the offenders through the criminal justice system by calculating percentages

(or branching ratios) of the offender population that continue through each stage of the system. For example, of every 100 arrests, perhaps only 30 percent of the individuals will be indicted; and, of the indictments, perhaps only 50 percent will be convicted; etc. In other words, flow models represent continuation into the next stage, with branching ratios used to "prune" out those offenders who will not become part of the prison inmate population.

Also shown in table IV.1, 10 states use statistical methods, such as regression analysis and time series analysis, to project prison populations. Statistical methods all use data from past patterns to project future inmate populations. Regression analysis, for example, is a statistical technique based on equations that functionally relate one or more independent variables, with coefficients determined from previous analysis, to a dependent variable. Statistical methods tend to be nonpolicy sensitive and, therefore, are not particularly useful for impact analyses. However, reasons for changes can be deduced retrospectively from these statistical methods.

Finally, as shown in table IV.1, three states use models or methodologies that are not classifiable either as microsimulation, flow models, or statistical methods. For example, one state projects its future population by extrapolating the previous 5-year growth trend in the existing population.

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