

APRIL 2003

# THE INTERRELATIONSHIP BETWEEN PUBLIC AND PRIVATE PRISONS:

DOES THE EXISTENCE OF PRISONERS UNDER  
PRIVATE MANAGEMENT AFFECT THE RATE OF GROWTH  
IN EXPENDITURES ON PRISONERS UNDER  
PUBLIC MANAGEMENT?\*

James F. Blumstein\*\*  
Mark A. Cohen\*\*\*

\* Work on this project was funded by the Corrections Corporation of America (CCA) and by the Association for Private Correctional and Treatment Organizations (APCTO).

\*\* Centennial Professor of Law, Vanderbilt Law School; Director, Health Policy Center, Vanderbilt Institute for Public Policy Studies. B.A. (Economics), Yale College; M.A. (Economics), Yale University; LLB, Yale Law School. Institutional affiliations for identification only.

\*\*\* Professor of Management (Economics), Owen Graduate School of Management, Vanderbilt University; Director, Vanderbilt Center for Environmental Management Studies; Leverhulme Visiting Professor and Visiting Professor of Criminal Justice Economics, University of York (U.K.). B.S.F.S., Georgetown University; M.A. & Ph.D., Carnegie-Mellon University. Institutional affiliations for identification only.

## EXECUTIVE SUMMARY

This study investigates the relationship between (i) the fact that a particular state houses some of its prison population in prisons that are privately owned or operated and (ii) the growth in costs per prisoner in publicly operated prisons. The core objective has been to determine whether the existence of prisoners under a state's jurisdiction that are held in **private** facilities can have a beneficial effect on the rate of growth in expenditures on **publicly held** prisoners.

The hypothesis is that states that allow prisoners under their jurisdiction to be held in private facilities will experience significant cost savings in the per diem cost of public prisons. Anecdotal evidence supports this hypothesis.<sup>1</sup> Recent studies on private prisons have directed their focus away from actual dollar cost differences between the public and private sectors. Instead, researchers have noted that one effect of the introduction of private prisons might be that their existence helps control the cost of public prisons. The insight of these studies has been that “[p]rivatization can offer increased innovation, access to expertise, improved quality, and enhanced accountability.” That is, much of the cost savings from the introduction of private prisons stems from competition, and “that competition has beneficial effects on the entire system,” as “workers and management throughout the system respond to privatization.”<sup>2</sup> As one commentator has recently noted, “private

prisons are a promising avenue for the future development of the prison system.”<sup>3</sup>

Thus, this project is not premised on a hypothesis of private-public prison displacement. Rather, the focus has been on an assumption of public-private prison symbiosis, which can stem from a number of factors – *e.g.*, a learning effect on public prisons, an incentive effect for public prisons to operate efficiently, and a “yardstick” or “benchmark” effect that allows public prisons to compare themselves to a standard.

The fundamental conclusion of the study is that, for the three-year period 1999-2001 (the period for which appropriate data exist), states that have some of their prisoners in privately owned or operated prisons experience lower growth in the cost of housing their public prisoners. As presented in Model 2 in Table 3A, that finding is statistically significant at the conventionally accepted 5% level ( $p = .04$ ). Although the data on private prisoners available prior to 1999 are less detailed and reliable, the same relationship also would appear to exist for the twelve-year period 1990-2001.

The following are some highlights of the findings:

- During the period 1999-2001, the existence of prisoners under private management in a jurisdiction seems to have had a restraining effect on the growth of expenditures on public prisons. That finding is statistically

significant at the 4% level ( $p = .04$ ). See Table 3A, Model 2.

- During the period 1999-2001, the existence of prisoners under private management in a jurisdiction seems to have resulted in reduced growth in per diem expenditures on publicly held prisoners by 8.9%, about 4.45% per year (1999-2000 and 2000-2001 budget cycles). That finding is statistically significant at the 4% level ( $p = .04$ ). See Table 3A, Model 2.
- During the period 1999-2001, the average growth in cost per public prisoner in states without any prisoners under private management was 18.9%. During that same period, the average growth in cost per public prisoner in states that had at least some prisoners under private management was 10.8%. The differential in the average growth in cost per public prisoner in states with and without prisoners under private management was 8.1% (18.8% - 10.8%). That finding is statistically significant at the 9% level ( $p = .09$ ). See Table 2, Part I.
- During the period 1999-2001, there is also evidence consistent with the hypothesis that the growth in cost per public prisoner was less in states with higher percentages of private prisoners. For example, states with under 5% of their prison population under private management experienced a 12.5% growth in their per capita public prison costs, compared to only a 5.9% increase in per capita public prison costs in states with 20% or more of their prison population

under private management. While these findings are suggestive, they are not statistically significant by conventional standards. See Table 2, Part II. and Report, pages 10-11 & n.19.

In 2001, the average Department of Corrections expenditures in states without private prisoners was approximately \$455 million. Our findings suggest that if the “average” state in that group were to introduce the use of private prisons to some extent, the potential savings for one year in Department of Corrections expenditures for public prisons could be approximately \$20 million (4.45% x \$455 million). These putative savings on public prisons would be in addition to any direct savings from the use of private prisons by itself.<sup>4</sup>

We have been asked to investigate the relationship, if any, between (i) the fact that a particular state houses some of its prison population in prisons that are privately owned or operated and (ii) the growth in costs per prisoner in publicly operated prisons. The assumption underlying this project is that the prison system of the future is likely to be more pluralistic than in the past and that it will include both public and private prisons.<sup>5</sup>

The hypothesis is that states that allow prisoners under their jurisdiction to be held in private facilities will experience significant cost savings in the per diem cost of public prisons. Anecdotal evidence supports this hypothesis. For example, when private prison operators in Virginia decided not to use expensive

<sup>1</sup> Russell L. Boraas, “Structuring Successful Privatization Projects,” Virginia Department of Corrections, 1997 (as reported in Geoffrey F. Segal and Adrian T. Moore, “Weighing the Watchmen: Evaluating the Costs and Benefits of Outsourcing Correctional Services, Part II: Reviewing the Literature on Cost and Quality Comparisons.” Reason Foundation Report No. 290, January 2002.)

<sup>2</sup> Geoffrey F. Segal and Adrian T. Moore, “Weighing the Watchmen: Evaluating the Costs and Benefits of Outsourcing Correctional Services, Part II: Reviewing the Literature on Cost and Quality Comparisons.” Reason Foundation Report No. 290, at p. 2, January 2002.

<sup>3</sup> Note, *A Tale of Two Systems: Cost, Quality, and Accountability in Private Prisons*, 115 HARVARD L. REV. 1868, 1891 (2002).

<sup>4</sup> There are numerous empirical studies comparing public to private prison costs. One review of the evidence indicates that “virtually all of the studies find private prison costs to be lower – on average between 5 and 15 percent.” (See Geoffrey F. Segal and Adrian T. Moore, “Weighing the Watchmen: Evaluating the Costs and Benefits of Outsourcing Correctional Services, Part I: Employing a Best-Value Approach to Procurement.” Reason Foundation Report No. 289, at p. 2, January 2002.)

<sup>5</sup> In 1999, the number of states with no prisoners housed in privately operated prisons was 20, and the number of states whose prison population included some prisoners housed in privately run prisons was 30. See Table 2.

warehouse and staff to store 30 days of food – a habitual practice that apparently had harkened back to the days of mule trains - state prison officials quickly adopted these innovations and reduced overall public prison costs as well.<sup>6</sup>

Recent studies on private prisons have focused much less on actual dollar cost differences between the public and private sectors. Instead, the trend has been to identify other equally important motivations. For example, one study noted, “The full measure of worth of privatization has to be assessed in a policy context with full due diligence given to the broader goals that can be achieved. Privatization can offer increased innovation, access to expertise, improved quality, and enhanced accountability. Most important is recognizing that cost savings from privatization is itself a product of competition, and that competition has beneficial effects on the entire system.”<sup>7</sup> “Whether from fear of being privatized themselves, or pride in showing they can compete, or from being compared by higher authorities, workers and management throughout the system respond to privatization.”<sup>8</sup>

Thus, our project has not been premised on a hypothesis of private-public prison displacement. Rather, our focus has been on an assumption of public-private prison symbiosis. That symbiosis can stem from a number of factors, including a learning effect on the part of public prisons, an incentive effect for public prisons to operate efficiently, and a

“yardstick” or “benchmark” effect that creates an empirically-based standard by which public prisons can compare themselves (*i.e.*, a means of comparison akin to a market in the private sector, something that public agencies lack in the absence of a mode of comparison afforded by a “yardstick” or a “benchmark” institution).

Our objective has been to determine (a) whether the existence of prisoners under a state’s jurisdiction that are held in **private** facilities can have a beneficial effect on the rate of growth in expenditures on **publicly held** prisoners. If the answer to that question is yes, as we have found it to be, then the questions we sought to investigate are (b) whether there is a threshold or other relationship between the percentage of privately-managed prisoners in a state and the rate of growth of costs per prisoner in the public prison sector and (c) whether there is a typical period of time in which the positive effect of private prisons on public prison costs emerges and is most significant.

#### **MODELING THE GROWTH IN CORRECTIONS SPENDING: THE MAIN HYPOTHESIS**

Our main hypothesis is that the existence of private prisons to manage a portion of a state’s prison population has the effect of moderating the growth in costs per prisoner in the public sector. That is, states that have some of their prisoners in privately owned or operated prisons are expected to have lower growth in

the cost of housing their public prisoners.

Our investigation has determined that, for the three-year period 1999-2001 (the period for which appropriate data exist), that relationship seems to exist. Data on private prisoners are available prior to 1999, but they are less detailed and reliable. Nevertheless, that relationship also would appear to exist for the twelve-year period 1990-2001. While not as statistically valid these data tend to reinforce the conclusion that a relationship exists between including some prisoners in privately owned or operated prisons and lowering the rate of growth in per-prisoner costs in publicly operated prisons.

#### **DATA AVAILABILITY**

In order to perform our assignment, we had to identify the kinds of data that were necessary and to match those needs with the sources of data that were available.

At the outset, we needed to determine for each state whether any prisoners were housed in privately owned or operated prisons and, if so, the percentage of that state’s prison population housed in privately owned or operated prisons. The reason that those data are important is that, in order to determine whether a relationship exists between privately housed prisoners and the rate of growth in the per-prisoner cost of operating public prisons, we needed to have a source of information about privately housed prisoners and about per-prisoner state expenditures for its public prison system.

As it turns out, systematic data on the number of private prisoners have only been available annually from the federal Bureau of Justice Statistics since 1999.<sup>9</sup> These data are available for the three-year period 1999-2001. Those data allow us to have most confidence in our findings for the 1999-2001 time frame.

Prior to the availability of Bureau of Justice Statistics data for 1999, a survey conducted by Abt Associates in 1997 also provided data on privately managed prisoners.<sup>10</sup> However, the definitions of private prisoners are not identical in the two surveys (e.g. the Abt survey may have included half-way houses in some states), and thus the two sources of data cannot be directly compared. Another source of data on the existence of private prisons is the Corrections Yearbook, an annual compilation of survey data that includes information on whether a state allows private prisoners and/or has a private prison facility located within its borders. From that source, we can also construct an annual time series of “0-1” variables indicating whether or not private prisoners were allowed by law and whether or not they were actually housed in the State. However, that source does not have private prison population data.

#### **METHODOLOGY: IN GENERAL**

Methodologically, our dependent variable is the cost per prisoner in public facilities. While one can easily estimate the overall cost per prisoner in a State by dividing total corrections expenditures by the number of prisoners,<sup>11</sup> that

<sup>6</sup> Russell L. Boraas, “Structuring Successful Privatization Projects,” Virginia Department of Corrections, 1997 (as reported in Geoffrey F. Segal and Adrian T. Moore, “Weighing the Watchmen: Evaluating the Costs and Benefits of Outsourcing Correctional Services, Part II: Reviewing the Literature on Cost and Quality Comparisons.” Reason Foundation Report No. 290, January 2002.)

<sup>7</sup> Geoffrey F. Segal and Adrian T. Moore, “Weighing the Watchmen: Evaluating the Costs and Benefits of Outsourcing Correctional Services, Part II: Reviewing the Literature on Cost and Quality Comparisons.” Reason Foundation Report No. 290, at p. 2, January 2002.

<sup>8</sup> *Id.*

<sup>9</sup> Source: U.S. Department of Justice, “Prison and Jail Inmates at Midyear” (various years).

<sup>10</sup> Douglas McDonald, Elizabeth Fournier, Malcolm Russell-Einhorn, and Stephen Crawford. Private Prisons in the United States: An Assessment of Current Practice. Abt Associates, 1998.

<sup>11</sup> This calculation assumes that the prison count data at mid-year reflect the average daily prisoner count. For comparison purposes, however, what matters most is that there are no systematic differences in the mid-year versus average daily prisoner count by state or with respect to public versus private prisons.

figure would not reflect the cost per prisoner in **public prisons**. If we include private prisons in the “cost per prisoner” calculation, we would not be able to determine whether or to what extent lower overall costs might be attributable to lower per-prisoner costs of privately-run prisons because lower private prison costs would be part of and contribute to the lower overall state costs per prisoner. That is, if private prisons are less costly than public prisons, then overall prison cost data would not, by itself, be a reliable way of determining whether the existence of privately run prisons within the state’s system contributed to a reduced rate of growth in prison spending in publicly run prisons. To be able to examine that question, we constructed a measure of the cost per prisoner held in public facilities from available data. We did that by isolating private prison costs and subtracting them from overall per-prisoner expenditures. That allowed us to examine per-prisoner costs in public prison facilities and thereby determine what relationship, if any, those public prison costs had with the existence of privately run prisons managing prisoners within a state’s prison system.

Tables 1A and 1B list the variables and provide descriptive statistics for data used in this report. Those variables are as follows: (a) the number of private prisoners ( as a percentage);

(b) whether or not prisoners are housed in privately run prisons; (c) overall government expenditures per capita; (d) Department of Corrections per diem budget (net of private prisons); and (e) percent of prisons under court order.<sup>12</sup> Total expenditures on **private** prisons are derived from multiplying the average cost per prisoner per day for private prisons by the number of prisoners in privately run facilities. Our measure of the cost per prisoner in **public** facilities is obtained by subtracting out the total expenditures on private prisoners from the Department of Corrections spending, and dividing this result by the number of public prisoners.<sup>13</sup> Note that because we only have the **number** of private prisoners from 1999-2001, this key variable is unavailable in prior years. Later, we will discuss the robustness of our results in earlier years. While Table 1A contains data on all 50 states (if available), Table 1B limits the data to those 46 states that are ultimately used in much of the empirical analysis that follows.

#### METHODOLOGY: STATISTICAL SIGNIFICANCE

An important methodological issue relates to the concept of “statistical significance.” The conventional representation of “statistical

significance” is described as a “p-value.” A “p-value” is the “probability of getting data as extreme as or more extreme than the actual data, given that the null hypothesis is true.”<sup>14</sup> In this case, the “null hypothesis” is that there is no difference between the rate of growth in public prisoner per diem costs in states that have private prisoners versus states that do not. Thus, for example, if  $p < .05$ , the likelihood of getting particular results in error is less than five in one hundred or 5%; that is, with a “p-value” of  $p < .05$ , one can confidently reject the “null hypothesis.”

Statistical significance is not a yes/no inquiry; degrees of statistical significance fall on a continuum. As a general matter, a “p-value” of  $p < .05$  has become the conventional standard for determining statistical significance. Failure to achieve a “p-value” of  $p < .05$  does not negate the findings but means that the certainty of the association is less assured. Thus, a “p-value” of  $p < .06$  suggests that there is a less than six in one hundred chance (or 6% chance) of (erroneously) finding that a relationship exists even though it does not in fact exist. Higher p-values indicate that the relationships under investigation are less assured. Oftentimes, statisticians will label findings with a “p-value”  $< .10$  as “weakly significant.”

As shown in Table 1A, 62% (31 out of 50) states had privately held prisoners under their jurisdiction in both 1999 and 2001.<sup>15</sup> The percentage of prisoners in the U.S. that

were held in privately run facilities increased from 6.9% in 1999 to 7.3% in 2001. Average government expenditures per capita (unadjusted for inflation) rose by 9.6% over this time period, compared to an average 13.7% increase in the cost per publicly held prisoner. In 1999, 11.5% of prison facilities in the U.S. were under court order, compared to only 9.1% in 2001. Similar figures are shown in Table 1B.

#### THE COST PER PRISONER IN PUBLIC FACILITIES: THE DATA

Table 2 reports on the growth in costs of housing prisoners in public prisons. It compares states in two ways -- by the percentage of **private** prisoners under their jurisdiction (Part II) and by distinguishing among states that do have and do not have prisoners under private management (Part I).

Part 1 of Table 2 compares states that have prisoners held in private facilities versus those that do not. From 1999 through 2001, states that had no private prisoners had an average increase in the per diem cost of housing their (all publicly managed) prisoners of 18.9%. During that same three-year period, states that had some prisoners in privately run institutions faced a 10.8% increase in the per diem cost of housing a prisoner in a **public** facility. This difference represents an 8.1% higher expenditure growth rate in states that do not have private prisoners,<sup>16</sup> a difference that is

<sup>12</sup> Both public and private prison populations are taken from U.S. Department of Justice, *supra* note 5. Department of Corrections and state general fund expenditures were provided by the National Association of State Budget Offices. Data on the number of facilities under court order were taken from the *Corrections Yearbook*. All but the latter were provided us by Lattimore Black Morgan & Cain, P.C. To obtain the per diem cost of public prisons (net of private prisoners), we estimated the cost of private prisoners in a state based on the weighted average contract price for private prisons in that state as reported in the *Corrections Yearbook*. In states where those data were not available, we used the weighted average private prison contract price in the U.S. This figure is multiplied by the number of private prisoners to arrive at the total cost of private prisons.

<sup>13</sup> Note that throughout this report we refer to the term “per diem” costs of public or private prisoners. As explained in the text of the report, our measure of per diem costs is based on total Department of Corrections expenditures divided by the number of prisoners. Thus, we would necessarily include non-prison related costs in the numerator – including the cost of departmental overhead, parole, etc. Actual variable costs associated with adding a prison day would likely be less than the “average per diem” amount we calculate. While we cannot directly compare the cost of running a public versus private prison - that is not our purpose. Instead, we interested in the effect on the entire system.

<sup>14</sup> David H. Kaye & David A. Freedman, “Reference Guide on Statistics,” in *Reference Manual on Scientific Evidence*. Federal Judicial Center, 2000, p.122.

<sup>15</sup> This figure diverges slightly from the number presented in Table 2, which reports on growth in per diem expenditures. Since corrections expenditure data from Alaska are unavailable during the 1999-2001 time period, Table 2 compares 30 states with prisoners in privately run prisons to 19 states that do not.

<sup>16</sup> The 8.1% differential is derived as follows:  $18.9\% - 10.8\% = 8.1\%$ . A more dramatic way of stating this finding is that the rate of per diem expenditure increase in states without private prisons in the system’s mix was 75% higher than in jurisdictions in which some prisoners were held in privately run institutions. That calculation is as follows:  $8.1\% / 10.8\% = 75.0\%$

significant at  $p < .09$ .

Part II of Table 2 compares growth in public prison costs depending upon the percentage of a state's prisoners that are held by privately operated facilities. This inquiry is designed to investigate whether the relationship between privately run prisons and the rate of growth in per diem costs of public prisons depends on the percentage of a jurisdiction's prison population maintained in privately run facilities.

As shown at the bottom of the first column, between 1999 and 2001, the overall average cost of housing a prisoner in a public facility grew by 14.0%. This figure represents an average of the 19 states that (in 1999) had no private prison population (18.9% increase), and the remaining 30 states that (in 1999) had some prisoners held in privately run prisons (10.8% increase). This 14.0% rate of average growth varied considerably depending upon how many prisoners the state had under private management. Three comparisons seem worthy of highlighting because they seem to suggest the possibility of threshold or breakpoint characteristics. The levels of statistical significance of these comparisons, however, only allow us to advance these specific comparisons on a tentative basis.

- The first comparison of potential special note is between the two extremes. States with no private prisoners had an average growth of 18.9% over this time period, compared to an average growth rate of only 5.9% for those that had 20% or more of

their prisoners under private management between 1999 and 2001. That is, when one compares jurisdictions in which a relatively high percentage of the prison population is under private management with jurisdictions in which no private prisons play a role, the difference in the rate of growth in public per diem prison expenditures is quite substantial (13%).<sup>17</sup>

- The second comparison of potential special note is between states with no private prison presence and those with a small percentage (under 5%) of its prison population under private management. There appears to be a substantial difference in the cost per prisoner simply by comparing those states that have private prisoners versus those that do not. States with fewer than 5% of their prisoners under private management had a 12.5% growth in costs of publicly run prisons compared to 18.9% growth in costs of publicly run prisons for those states that do not have any private prisoners, a differential of 6.4%.<sup>18</sup>
- The third comparison of potential special note is between states that had some but fewer than 5% of their prison populations under private management and states that had 20% or more of their prison populations in privately run prisons. States with fewer than 5% of their prison populations under private management experienced a growth rate of 12.5% in the cost per public prisoner. In comparison to states in which no prisoners were under private

management, that 12.5% rate of growth in the cost of public prisons is favorable (12.5% is considerably lower than 18.9%, as discussed above). However, the rate of growth of expenditures for public prisons stabilized for states that had between 5%-20% of their prison population in private prisons. Once the level of the prison population held in privately run prisons reached beyond 20%, another substantial breakpoint emerged. States that housed 20% or more of their prison population in **privately run** prisons experienced a rate of growth in the cost per prisoner in **publicly run** prisons of only 5.9%. Therefore, the difference in the rate of growth in cost per public prisoner between states at the 5% threshold and states at or beyond the 20% threshold (in terms of the percentage of prisoners under private management) was 6.6% -- reflecting a decrease from 12.5% to 5.9%.<sup>19</sup>

## ALTERNATIVE EXPLANATIONS

The fact that states with **private** prisoners have lower growth in **public** prison costs does not necessarily imply causation. For example, it is possible that there is a third variable that causes both a slow growth in public prison costs and the existence of private prisons. It might be, for example, that Southern states happen to be both fiscally conservative and have a proclivity to use private prisons. In this section, we attempt to control for these potential factors in order to isolate the effect that the introduction of private prisons has on public prison costs. The key factors we have looked at are: (1) growth in non-corrections-related expenditures; (2) growth in court-ordered mandates that affect the cost

of prisons; and (3) the number of years since private prisons were first introduced in a state. Additional factors we considered but which had no measurable impact include differences in the cost of living across states, percentage of prisoners held in maximum security, and prison capacity utilization.

### (1) Growth in government

In theory, one would expect that state governments that spend more per capita on government services in general would also spend more on prison services. There are several reasons we would expect this to be the case. First, states with a taste for government spending on social services (*e.g.*, high welfare or education spending) would likely also spend a lot on prison services (*e.g.*, more spending on rehabilitation services). Second, states that generate high levels of revenue, that do not have very significant fiscal restraints, and/or that have a lot of wasteful spending are likely to spend more on prison services because of fund availability, ineffective management controls, or waste.

### (2) Court imposed or other legal requirements

If a court imposes legal restrictions that have significant cost implications, that could mask any findings about the effect of the introduction of some private prison management on overall costs. For example, if a court orders prisons in a state to increase education programs in prison, one would expect costs to rise in that state. However, if this is a state that also has a large private prison population, the fact that costs are rising due to the court-ordered education program could hide the fact that private prisons are holding costs down.

### (3) Years since Privatization began in State

<sup>17</sup> This is derived from the following calculation:  $18.9\% - 5.9\% = 13\%$ . Stated otherwise, the rate of growth in per diem expenditures in public prisons in states without any private prison presence is 220% of the growth in comparable expenditures in states in which 20% or more of the prison population is managed in privately run facilities ( $13\%/5.9\% = 220\%$ ). Note that this difference is only significant at  $p = .18$ .

<sup>18</sup> Stated otherwise, the rate of growth in per diem expenditures in public prisons in states without any private prison presence is 51% greater than the growth in comparable expenditures in states in which some but less than 5% of the prison population is managed in privately run facilities ( $6.4\%/12.5\% = 51\%$ ). However, this difference is only significant at  $p < .30$ .

<sup>19</sup> Stated otherwise, this reflects a drop in the rate of increase in costs in public prisons of 52.8%. That calculation is as follows:  $6.6/12.5 = 52.8\%$ . Note, however, that this difference is not statistically significant ( $p = .48$ ).

There is some evidence that the effect of privatization is not constant from year to year. For example, evidence from Arizona, Tennessee and Texas suggests that the gap between public and private costs narrows over time.<sup>20</sup> This would be consistent with a “yardstick” or “benchmark” hypothesis whereby state corrections officials learn from and/or compete with their private prison colleagues. One would expect that learning and innovations in the public sector would take some time to implement so that any observed effect on costs would occur after a lag. Thus, the important figure is not just the number (or percent) of prisoners that are under private supervision, but also how long the state has had to adjust to the pluralistic environment.

## REGRESSION RESULTS

Multiple regression analysis is a technique often used by statisticians to control for confounding factors.<sup>21</sup> It models a dependent variable (in this case the growth in per diem public prisoner costs) as being explained by a series of explanatory factors. For example, in this report, we have controlled for potential confounding factors such as court-ordered provisions that raise the cost of running prisons, and the overall growth in government spending. After controlling for these factors, we found that states with private prisoners have significantly lower growth in the per diem expenditures on their public prisoners.

### A. Main Findings, 1999-2001 (Tables 3A and 3B)

Table 3A reports on several regression analyses that attempt to control for these factors. In all cases, the dependent variable is the percentage growth in per diem costs for prisoners held in public facilities. As before, this is measured after expenditures on private prisons are subtracted from total prison expenses for the years 1999 through 2001. Table 3B provides an interpretation of the regression coefficients in Table 3A, illustrating the marginal effect of a change in the explanatory variable on the growth in public per diem prison costs.

The key explanatory variable of interest is the existence of some prisoners in privately run prisons. We have measured this variable in several ways.

- Model 1 measures the percentage of prisoners in the state that are under private prison management. The analysis indicates that states with a larger percentage of prisoners under private management have lower growth in the cost of housing prisoners in public facilities. The coefficient is -0.29, As shown in Table 3B, this suggests that a one percentage point increase in the number of state prisoners that are held in private facilities is associated with a -0.29 percentage point decrease in public per diem prison costs. Note that this variable is not statistically significant ( $p = .24$ ).

Model 1 contains two other explanatory variables: (a) growth in government expenditures (other than corrections), and (b) the growth in prisons that are under court order. Both of these coefficients are positive. The “growth in government

expenditures” variable is statistically significant at  $p < .05$ ; the “growth in prisons under court order” variable, while positive, is not statistically significant for Model 1. The statistically significant finding confirms our hypothesis that states that have higher growth in overall per capita government spending are also likely to have higher growth in spending on publicly managed corrections (on a per diem basis). Overall, Model 1 explains 17% of the variance in the growth in per diem costs for public prisoners.<sup>22</sup>

- Model 2 is identical to Model 1 except that the private prison variable is now measured as a 0-1 dummy instead of a continuous percentage. That is, it examines the yes/no question whether the existence of some prisoners under private management has an effect on the growth of expenditures for public prisons. This variable is still negative, suggesting that the existence of private prisoners in a jurisdiction has a restraining effect on the growth of expenditures on public prisons. Note that the finding is now statistically significant at  $p < .05$ . As shown in Table 3B, the coefficient of -0.089 indicates

that the existence of prisoners in privately run facilities in a state’s system reduced its growth in per diem expenditures on publicly held prisoners by 8.9 percentage points over the 1999-2001 time period. The other explanatory variables maintain their signs and are slightly more significant than before. Overall, this change increases the explanatory power of the equation, with 22.4% of the variance being accounted for.

- Model 3 is identical to Model 2 except that an additional variable has been added to account for the first few years of in which private prisons were introduced into a state. The objective here is to determine whether the presence of privately run prisons in a system after two or three years has an effect on the expenditures in the public prison system that is in addition to the initial effect of instituting private prisons in the first place<sup>23</sup> This variable is negative as expected, but not statistically significant by conventional standards ( $p=.19$ ). Thus, we find some evidence consistent with the notion that gains from privatization are higher during the first few years of introducing private prisons into a state. However, that evidence is not conclusive.

<sup>22</sup> The “adjusted-R<sup>2</sup>” of 0.17 indicates that the model was able to explain 17% of the variation in the growth rate of per diem public prisoner costs. This is often called the “goodness of fit.” The remaining variation is said to be random or unexplained. There is no yardstick to measure whether or not 0.17 is “good enough,” since that depends on the purpose of the model. Mark Cohen has published numerous peer-reviewed academic articles with regression equations yielding an adjusted-R<sup>2</sup> of this magnitude or less. If one were interested in forecasting the ultimate growth rate for any individual state, this model would not likely provide a very accurate prediction for that one state. However, we are not interested in predicting the actual growth rate, but instead, want to know how the growth rate will vary by the existence of private prisons. The purpose of the multiple regression analysis is to capture the non-random component of growth in public prison costs so that we can be certain that the private prison variable is not otherwise serving as a proxy for another variable that we have omitted. Once we have controlled for the main independent factors that determine the growth rate, it does not matter that there is still considerable randomness. We are not interested in estimating the growth rate that any one state would receive. Instead, our purpose is to determine whether states with private prisons have a lower markup, on average, than those that do not have private prisons – after controlling for the other non-random factors that make up prison costs. The adjusted-R<sup>2</sup> ranged from approximately 0.17 to 0.239. For the purposes discussed in this report, Dr. Cohen believes that these models are a sufficiently “good fit.”

<sup>23</sup> This additional 0-1 dummy variable has been coded 0 in all years except during the 2<sup>nd</sup> and 3<sup>rd</sup> year in which a state has private prisoners. In other words, it is coded 1 if private prisoners were first allowed in the state in either 1999 or 2000.

<sup>20</sup> Segal and Moore, *supra* note 3 at 6-10 (recounting Arizona report that examined costs in the state-run prisons compared to Arizona’s one private prison and found the cost difference converged over 1998 and 1999, mostly due to falling costs in state-run prisons).

<sup>21</sup> Kaye and Freedman, *supra* note 10, also discuss multiple regression analysis as a technique often used to control for confounding factors.

Model 3 increases the explanatory power of the model, accounting for 27.6% of the variance.

Although not reported here, additional models were estimated for robustness of our results. For example, several potential explanatory variables were included, such as the prison capacity utilization (under the theory that prisons that are over capacity might have lower costs per prisoner) and the average security level of prisons in a state (under the theory that a higher proportion of maximum security facilities would raise the per diem cost of prisoners). We also tried various specifications of the private prison variable, including a nonlinear specification (*e.g.*, percentage of prisoners squared), various threshold levels (*e.g.*, 10% or 20% of private prisoners), and piece-wise linear formulations. None of these alternative models provided any significant explanatory power that proved to be better than the models presented here. However, they were generally consistent with the findings reported here.

#### B. Confirmatory Evidence (Tables 4 & 5)

This section reports on several robustness tests of our key variables, using more limited data from a longer time period, 1990-2001. In order to estimate the per diem cost of public prisons for the period 1999-2001, we have relied on the availability of data on the private prison population and average costs for maintaining prisoners in privately run facilities. The total cost of operating privately run prisons is established by multiplying the average cost per prisoner by the number of privately held prisoners. The amount spent on public prisons is then derived by subtracting that amount from the amount spent overall by a jurisdiction on its prisons.

Because we do not have private prison

population data prior to 1999, we cannot estimate the per diem cost of public prisons prior to that date. Prior to 1999, we do have data on gross Department of Corrections expenditures. Those figures include total expenditures on prisons, lumping together expenditures on public and private prisons. While we do not know the size of the private prison population prior to 1999, we do know whether or not a state had any private prisoners under its jurisdiction. From those data, we can construct annual data on gross Department of Corrections expenditures and relate that to the existence or non-existence of private prisons as far back as 1990.

Since we have not been able to subtract out from the gross cost the cost of private prisons, we may be underestimating the per diem cost of public prisons in states that have private prisoners. If a state increases the percentage of its prisoners that are held in private prisons, this will have the effect of muting any increase (or magnifying any decrease) in the growth in public per diem costs. Thus, we cannot necessarily rely exclusively upon these gross expenditure data. Nevertheless, it is instructive to examine these gross data to see if we obtain similar findings to what we find in the more refined (but more time-circumscribed) 1999-2001 data. The advantage of performing this analysis is that it allows examination of a longer time period.

Table 4 reports on a panel regression model using all 50 states for the 12-year time period 1990 through 2001. Because of the long time span, we have controlled both for inflation (by placing all dollar figures in 2001 dollars) and a time trend. As shown in Table 4, the existence of private prisoners in a state has a significant negative effect on the per diem cost of prisoners in that state.<sup>24</sup> The coefficient of

-0.046 indicates that the existence of private prisoners under a state's jurisdiction reduces overall corrections expenditures in that state by 4.6%. This is consistent with our earlier findings for 1999-2001, when we were able to measure per diem costs for **publicly** held prisoners net of private prison costs. Of course, we do not know what portion of that 4.6% is due to reduced public as opposed to private prison costs. Note that the time trend is also significant and negative, indicating that over time, independent of the existence of private prisons and controlling for inflation, there has been a downward trend in the per diem cost of prisoners. It is possible that this downward time trend partly masks the effect that private prisons have had on holding down the cost of public prisons. That is, both the threat of introducing private prisons into a system and the "learning effect" of watching states that have embraced private prisons may have some effect on restraining the cost of public prisons even in states that have not accepted private prisons.

In Table 5, we compare the gross measure of public per diem costs of Table 4 with the more refined measure of Table 3. Instead of examining the gross data for twelve years (as is done in Table 4), we examine the three-year period 1999-2001 – the time period for which we have the more refined data. This is a rough attempt to see whether the gross data, which extend for twelve years, are likely to be reliable. Our thought was that a comparison of the gross and the refined data for the same period (1999-2001) would allow us to determine whether the analysis of the gross data fairly tracked the analysis of the more refined data.

The first model in Table 5 repeats Model 2 of Table 3, which measures public per diem costs net of private prison costs. These reflect analysis of the more refined data. The second model measures the dependent variable as "gross" per diem costs as we have done in Table

4. That is, the second model does not subtract out the cost of private prisons in calculating the per diem cost and, therefore, makes use of gross per diem prison cost data.

As expected, use of and analysis of the gross data tend to slightly overstate the effect that private prisons have on the cost of public prisoners. The effect on costs in public prisons from the introduction of private prisons is a cost reduction over two budget cycles of 8.9%. This is shown by reference to the coefficient (-.089) on the private prison dummy in the first column of Table 5. Analysis of the gross data suggests that the introduction of private prisons is linked to a greater (9.4%) cost reduction in the growth in overall per diem costs for prisons (including both public and private prisons lumped together) over the same two budget cycles. This is reflected by reference to the comparable coefficient (-.094) in the third column of Table 5. Moreover, this model has higher explanatory power, explaining 23% of the variance in per diem costs.

While analysis of the gross data may slightly overstate the effect that the introduction of private prisons can have on public prison expenditures, that analysis is sufficiently close to the more refined analysis for 1999-2001 to lend comfort to the reliability of the analysis of the gross data over the twelve-year period 1990-2001. That reinforces the overall finding that the introduction of private prisons into a jurisdiction's system is linked to reduced growth in the cost of operating public prisons within that jurisdiction.

#### CONCLUSION

This study was designed to investigate the relationship between (1) the fact that a particular state houses some of its prison population in prisons that are privately owned or operated and (2) the growth in costs per prisoner in

<sup>24</sup> This result is statistically significant, with a "p-value" for the private prison variable of  $p < .01$ .

publicly operated prisons. The core objective has been to determine whether the existence of prisoners under a state’s jurisdiction that are held in **private** facilities can have a beneficial effect on the rate of growth in expenditures on **publicly held** prisoners.

The fundamental conclusion of the study is that, for the three-year period 1999-2001 (the period for which appropriate data exist) – and a period that covers two budget cycles --, states that have some of their prisoners in privately owned or operated prisons experience lower growth in the cost of housing their public prisoners. That finding is statistically significant at the conventionally accepted 5% level (p = .04). Although the data on private prisoners available prior to 1999 are less detailed and reliable, the same relationship also would appear to exist for the twelve-year period 1990-2001.

The study indicates that the existence of prisoners in privately run facilities in a state’s system reduced growth in the state’s per diem expenditures on publicly held prisoners by 8.9% over the 1999-2001 time period, covering two budget cycles. That reduction in the rate of growth amounts to about 4.45% per year.

In 2001, the average Department of Corrections expenditures in states without private prisoners was approximately \$455 million. Our findings suggest that if the “average” state in that group were to introduce the use of private prisons to some extent, the potential savings for one year in Department of Corrections expenditures for public prisons could be approximately \$20 million (4.45% x \$455 million). These putative savings on public prisons would be in addition to any direct savings from the use of private prisons by itself.<sup>25</sup>

<sup>25</sup> There are numerous empirical studies comparing public to private prison costs. One review of the evidence indicates that “virtually all of the studies find private prison costs to be lower – on average between 5 and 15 percent.” (See Geoffrey F. Segal and Adrian T. Moore, “Weighing the Watchdog: Evaluating the Costs and Benefits of Outsourcing Correctional Services, Part I: Employing a Best-Value Approach to Procurement.” Reason Report No. 289, at p. 2, January 2002.)

Table 1A  
List of Variables and Average Values  
(50 states)

Variable	1999	2001	Ave. Change
Private Prisoners in (percentage)	6.9%	7.3%	0.4%
Private Prisoners (0-1 dummy)	62.0%	62.0%	--
Government Expenditures (per capita)* Per Diem Department of Corrections	\$1,497	\$1,641	9.6%
Expenditures (net of Private prisons)*	\$74.09	\$84.22	13.7%
Percent of Prisons under Court Order	11.5%	9.1%	-2.5%

\* General fund expenditures and Department of Corrections expenditures in 2001 were not available for Alaska. For comparison purposes, both Department of Corrections per diem expenditures and government expenditures are shown for the remaining 49 states in both 1999 and 2001.

Table 1B  
List of Variables and Average Values  
(46 states\*)

Variable	1999	2001	Ave. Change
Private Prisoners in (percentage)	6.2%	6.6%	0.4%
Private Prisoners (0-1 dummy)	57.8%	57.8%	--
Government Expenditures (per capita) Per Diem Department of Corrections	\$1,518	\$1,679	10.6%
Expenditures (net of Private prisons)	\$74.66	\$84.88	13.7%
Percent of Prisons under Court Order	10.9%	8.2%	-2.7%

\* These 46 states are included in the regression analysis in Table 3. States eliminated due to lack of available data are: Alaska, Nevada, North Carolina and Wyoming. Alaska is missing Department of Corrections data. Nevada, North Carolina and Wyoming were eliminated from the regression analysis because the calculated growth in general government expenditures per capita was negative over this time period.

Table 2  
Growth in Per Diem Cost for Public Prisoners by Percent of Prisoners in Private Facilities

Percent Private Prisoners	1999 to 2001	
	Average Growth in Cost per Public Prisoner	Number of States
<b>I. Yes/No Private Prisoners*</b>		
No	18.9%	19
Yes	10.8%	30
<b>p-value</b>	<b>0.09</b>	
<b>II. By Percentage</b>		
None	18.9%	19
< 5%	12.5%	9
5% to < 10%	12.1%	10
10% to < 20%	9.7%	7
20% or higher	5.9%	4
<b>Total</b>	<b>14.0%</b>	<b>49</b>

Note: Due to lack of data on Department of Corrections expenditures, Alaska was eliminated in the 1999-2001 comparison. Since Alaska authorized privately held prisoners in 1999, a total of 30 states had privately held prisoners in 1999, while 20 did not.

Table 3A  
Regression Models:  
Growth in Per Diem Cost for Public Prisoners, 1999-2001

	Model 1: Percent Private Coeff.	Model 2: Private vs. Public Only p-value	Model 3: Learning Hypothesis Coeff.	p-value	Coeff.	p-value
Constant	0.31	0.001	0.35	0.001	0.38	0.001
Private Prison (percentage)	-0.29	0.24				
Private Prison (0-1 dummy)			-0.089	0.04	-0.083	0.06
Private Prison in state 2-3 years					-0.064	0.19
Growth in Government Expenditures (per capita)*	0.06	0.01	0.06	0.004	0.06	0.001
Growth in Prisons under Court Order (percent)	0.16	0.17	0.19	0.09	0.21	0.06
Sample size	46		46		46	
Adjusted R-squared	0.17		0.224		0.239	

\* This variable has been transformed into natural logs as it better fits the model. See Table 3B for further details.

Table 3B  
 Predicted Effect of Variables on Growth in Public Per Diem Prison Costs  
 (Based on estimates in Table 3A)

	Model 1: Percent Private	Model 2: Private vs. Public Only	Model 3: Learning Hypothesis
<u>Private Prison:</u> - Increase Percentage in State by 1%	-0.29%		
<u>Private Prison:</u> - Introduce private prisoners in State		-8.9%	-8.3%
<u>Private Prison in State 2 or 3 years</u>			-6.4%
<u>Government Expenditures</u> - Additional 1% increase in spending during 1999-2001*	+0.48%	+0.50%	+0.54%
<u>Prisons under Court Order</u> - Additional 1% of prisons under court order between 1999 and 2001	+0.16%	+0.19%	+0.21%

\* Government expenditures have been transformed into natural logs. A natural log transformation is commonly used in regression analysis of economic data. In this case, it means that while there is a positive relationship between the growth in per capita government expenditures and the growth in per diem department of corrections expenditures, that relationship is not linear. Instead, increases at a decreasing rate – in other words, it tapers off at extreme levels of growth in government. For example, in Model 1, a 1% increase in government spending results in a 0.48% increase in per diem corrections expenditures. However, if we were to double the growth in government spending we would incur less than a doubling of the rate of growth in corrections expenditures. In this case, a 2% increase in government spending would result in a 1.14% increase in corrections, while a 5% increase in government spending would result in a 2.76% increase in corrections.

Table 4  
 Per Diem Prison Expenditures  
 Panel Data: 50 States, 1990-2001

	Coeff.	p-value
Constant	2.94	0.001
Private Prison (0-1 dummy)	-0.046	0.01
Government Expenditures (per capita)	0.28	0.001
Trend variable (1999=1)	-0.057	0.001
Sample size	588	
Adjusted R-squared	0.358	

Note: Both the dependent variable (per capita prison expenditures) and general government expenditures have been adjusted to constant 2001 dollars in order to take out any overall inflationary trends. They have also been transformed into natural logs as they better fit the model. See Table 3B.

Missing Data: Alaska (2001), Mississippi (1991), Nevada (1990-1993 and 1996-1998), New Mexico (1992-1993), Wyoming (2000).

Table 5  
 Growth in Per Diem Prison Costs, 1999-2001  
 (Public and Private Corrections Expenditures Combined)

	Growth in Public Per Diem Costs Net of Private Costs (from Table 3)	Growth in Per Diem Costs including Private Costs		
	Coeff.	p-value	Coeff.	p-value
Constant	0.35	0.001	1.34	0.001
Private Prison (0-1 dummy)	-0.089	0.04	-0.094	0.02
Growth in Government Expenditures (per capita)*	0.06	0.004	0.06	0.004
Growth in Prisons under Court Order (percent)	0.19	0.09	0.18	0.10
Sample size	46		46	
Adjusted R-squared	0.224		0.239	

\* This variable has been transformed into natural logs as it better fits the model. See Table 3B for further details.

