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# Prison Health Care: Is Contracting Out Healthy?

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## Abstract

U.S. Prison health care has recently been in the news and in the courts. A particular issue is whether prisons should contract out for health care. Contracting out has been growing over the past few decades. The stated motivation for this change ranges from a desire to improve the prison health care system, sometimes in response to a court mandate, to a desire to reduce costs. This study is a first attempt to quantify the impact of this change on inmate health. As morbidity measures are not readily obtainable, we focus on mortality. More specifically, we use a panel of state prisons from 1979-1990 and a fixed effects Poisson model to estimate the change in mortality associated with increases in the percentage of medical personnel employed under contract. In contrast to the first stated aim of contracting, we find that a 20 percent increase in percentage of medical personnel employed under contract increases mortality by 2 percent.

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Keywords: prison health care, contracts, managed care, outcomes, mortality

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## 1. Introduction

There has been a large increase in contracting out for health care in U.S. prisons. As of 2004, 32 states contract for some or all prison health services (LaFaive 2006). Despite the massive shift towards contracting out for prison health care, the popular press has voiced concerns about the resulting quality of service for inmates. For example, a recent series of *New York Times* articles by Paul von Zielbauer (2005A, B, C) blames contracting out for poor health care in New York and Alabama, including inmate suicides and prisoners dying after being denied treatment. He blames these poor outcomes on Prison Health Services (PHS), a large health care company which has recently received large contracts in the states he studies. In fact, PHS is the largest private healthcare provider for penal institutions (both prisons and jails), providing care in 28 states for 237,000 inmates, about 10 percent of the penal population, grossing \$690 million in 2004 (Zeilbauer 2005A).<sup>1</sup> While this is a big company, the market for outsourced medical care is much larger still. The president of PHS estimates that \$3 billion of the \$7 billion spent on penal medical care is contracted out (*Business Week* 2005).

While there are concerns that prison health care contracting out leads to understaffing and under-treatment (Robbins 1999), it is also possible that outsourcing produces efficiency gains by applying the principles of managed health care and thereby reduces costs without reducing quality. In fact, contracting out has sometimes been instituted in response to court orders as a means of improving prison health care quality (McDonald 1999). The argument for outsourcing as a means to improve quality rests on

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<sup>1</sup> State and federal prisons house individuals who have been sentenced as punishment for crimes. Jails, typically operated by local governments, largely house individuals who have been accused of crimes. Jail stays, on average, are for shorter periods. While many economic and legal issues are the same for jails and prisons, our data is limited to prisons.

the notion that independent organizations (often, but not necessarily profit-seeking firms) are more flexible and efficient than governmentally operated prison health care staffs. For one thing, contract health care providers are allowed to pay professionals wages that exceed state-mandated pay schedules that are often too low for difficult work in prisons in isolated areas (Gater 2005).<sup>2</sup> Profit-seeking firms also have better incentives to produce care more efficiently because managers are allowed to keep the residual earned by reducing costs (Alchian and Demsetz 1972, Boardman and Vining 1989, Frech 1976, Fazel and Nunnikhoven 1992).

While there is a substantial literature examining the relative efficiency of government versus private firms in the context of goods produced directly for markets, such as insurance or privatization of state-owned enterprises (Ehrlich, Gallais-Hamonno, Lieu, 1994, Boardman and Vining 1989, Frech 1976, Shleifer 1998.), to the best of our knowledge only Hart, Shleifer and Vishny (1997) formally models contracting for services that are not bought on the open market. They set up a simple model where the provider, either a government employee or a private contracting firm can invest in either improving quality (which also tends to raise price) or reducing cost (which also tends to reduce quality). They show that private contractors have stronger incentives to both improve quality and reduce costs than government employees. The problem is that private contractors may have incentives that are too strong to reduce costs, since they ignore the adverse impact on quality. They apply the model to the question of privatizing entire prisons. Like contracting out for prison health care, privatizing entire prisons is growing in popularity in the U.S., though it is much less common than contracting out

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<sup>2</sup> All these issues were raised by Judge Thelton Henderson in appointing a receiver to take over the California system (*Plata v. Schwartznegger* 2005).

health care alone.<sup>3</sup> Their model suggests that prisons are not good candidates for privatization because of the possibility for significant reductions in quality as a byproduct of reducing costs. And, of course, inmates are not effective monitors of quality. Consistent with this prediction, they present limited evidence that private prisons have both lower costs and lower quality.

Given the theoretically ambiguous impact of prison health care contracting out on the quality of inmate health care, the objective of this study is to quantify the impact. Ideally, we would include measures of morbidity and mortality. Unfortunately, morbidity data is not readily available. As such, we focus on mortality. In particular, we use Census of Prison data from 1979-1990 and a fixed effects Poisson model to estimate the impact of increases in health care outsourcing on inmate mortality. We find a negative effect of contracting out on health (a positive effect on death). More specifically, we find that a 20 percent increase in percentage of medical personnel employed under contract increases mortality by 2 percent.

## **2. Prison Health Care Contracting**

### ***2.1. The History of Court Involvement***

Before the federal courts began intervening, health care in American prisons was poor and limited. Prison officials often considered medical care as a privilege, rather than a right. It was sometimes withheld to discipline inmates. Care was often dispensed by retired military corpsmen and untrained inmate nurses. The few physicians that existed often had restricted institutional licenses (McDonald 1999, Anno 2004). The early descriptive literature is harrowing. For example, Pennsylvania inmates who tried to hang

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<sup>3</sup> In 1995, private prisons had only about 3 percent of the market (Hart, Shleifer and Vishny 1998).

themselves were simply cut down, medicated and returned to their cells without psychological evaluation (McDonald 1999, Anno 2004).

One of the complaints of the rioters in the infamous 1971 Attica New York prison riot was inadequate health care. Although prisoners and prisoner advocates sued prisons on the grounds that health care was inadequate, during this early period the courts generally took a hands-off approach. The legal environment changed abruptly when the federal courts began to view health care through the lens of the U.S. Constitution's Eighth Amendment prohibition of cruel and unusual punishment. An early landmark case in this regard was the federal district court decision, affirmed by the Fifth Circuit of Appeals, *Newman v. State of Alabama* (1974). Among the factual findings of the decision was the story of a quadriplegic who was not given intravenous feeding in the three days before his death. The court found the conditions barbarous and in violation of the Eighth Amendment. In 1976, the Supreme Court addressed these issues in *Estelle v. Gamble*. They declared that "deliberate indifference" to a prisoner's serious medical problem is a Constitutional violation. Subsequent rulings further established the right to "reasonably adequate medical care" (McDonald 1999).

Partly due to the vagueness of these standards,<sup>4</sup> these legal changes initiated an endless stream of court cases and led to heavy involvement of the courts in forcing improvements in prison health care. Medical care is the most litigated issue involving prisons (Schlanger 2003). By 1996, 36 states were under federal court order to improve prisons. The majority of these cases included health care (McDonald 1999). A survey of

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<sup>4</sup> Most observers cite under-treatment, especially of relatively sick prisoners. But, the concept of "reasonably adequate medical care" is so vague that surprising outcomes of any kind can occur. For example, in a controversial instance, the California prison system provided a heart transplant to twice convicted of armed robber, at a cost of \$1,000,000 (McKneally and Sade 2003).

prisons in 2003 showed that 56 percent were operating under court orders regarding medical care and 65 percent had been under court orders that had been lifted by 2003.

In the new legal situation created by the federal decisions, various professional organizations stepped in to set standards. Meeting these standards supports a legal defense of following the usual practice. Free entry into standard setting led to as many as four separate sets of standards. Today, there are still two, those of the American Correctional Association and the National Commission on Correctional Health Care. There are also generally higher standards that are not specific to prisons that some prisons do meet.

## ***2.2. Prison Health Care Costs and Health Status***

Naturally, in this setting, costs for prison health care have risen substantially. Although data are surprisingly difficult to come by, surveys indicate that spending in 1995 was about \$2,308 per prisoner per year. That was up from \$880 in 1982, an increase of 160 percent (McDonald 1999). The variation in spending across state prison populations is also striking. In 1998, costs ranged from a low of \$1,001 in Alabama to a high of \$4,365 in Massachusetts (Lamb-Mechanick and Nelson, undated). Note that per capita health care spending in the U.S. as a whole in 1995 was \$3,509 (U.S. Census 1997).

The seemingly high level of prison health care spending described above underlies public policy towards cost control, including contracting out. But, one should be careful making comparisons between inmate and non-inmate medical expenditures. While prisoners are quite young, they are generally thought to be less healthy than the population at large and therefore to need more medical services. However, the evidence

for this is mixed. For example, death rates in prisons are lower than for the general population, after controlling for race, sex and age, though they are higher for infectious disease and suicide (McDonald 1999). In a study of the Cook County (Chicago) Jail, Kim *et al* (2006) found a 68 percent lower adjusted mortality rate for inmates than for the general population. On the other hand, when prisoners are released, their death rates jump and become much higher than those of the general population. In a study of former Washington State inmates, the adjusted death rate for the former inmates was 3.5 times the state's overall death rate (Binswanger *et al* 2007).

We know of only one nationwide analysis of prison health care costs, done by Lamb-Mechanic and Nelson (undated). They use state level data obtained from a dedicated survey of state departments of corrections, plus the Federal Bureau of Prisons (BOP) in 1998. Lamb-Mechanic and Nelson report per day health care costs per inmate ranging from \$2.74 in Alabama to \$11.96 in Massachusetts, with a mean of \$7.15. They also study the determinants of costs using a simple OLS model and data from 38 states. The regressors include several measures of medical professional inputs, and whether juveniles are included in the budget. No state socio-economic variables are used. For our purposes, the most interesting finding involves the dummy variable for whether the state used capitated contracts (like many private sector HMOs) for ambulatory care. 18 states report using such contracts. Lamb-Mechanic and Nelson find that states with capitated contracts have 31 percent lower costs per inmate. While this result is interesting, it is reasonable to be quite concerned about omitted variables bias in this context and one should therefore interpret these estimates with care.



One rationale for both contracting out and using private-sector managed care techniques is to reduce costs. Another technique borrowed from the private sector (and from Medicare) is prisoner copayments. This has been shown by Hyde and Brumfield (2003) to be effective. They examine the initiation of small copayments (\$3.00 for a sick care visit and \$2.00 for a prescription) in Idaho prisons in 1998.<sup>5</sup> As one might expect, the number of sick care requests declined by about 40 percent. This result is roughly consistent with, though slightly larger than, the classic RAND study comparing free care to small copayments (Newhouse *et al* 1981 and 1993). However, the comparison is not perfect as there is likely to be significant non-price rationing in prisons, especially in the absence of copayments.

### ***2.3. Prison Health Care Quality and Outcomes***

Our knowledge about the impact of contracting out on the quality of prison health care is limited to case studies from Texas, Baltimore and Salt Lake City. As a result of successful inmate lawsuits in the early 1990s, the U.S. District Court ordered Texas to improve prison health care. In 1994, Texas responded by contracting out to a managed care network established by and integrated with Texas state medical schools and their affiliated teaching hospitals. The system uses a global capitation system, an HMO-like system with strong incentives for cost control. Raimer and Stobo (2004) state that the result has been improved health care by many process measures. For example, staff vacancies declined greatly and compliance with practice guidelines improved. More interestingly, several outcome measures also improved, including blood sugar levels in diabetics, the proportion of inmates with high blood pressure, and death rates from AIDS

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<sup>5</sup> Indigent inmates (about 20 percent of inmates) do not have to pay these fees.

and asthma. At the same time, this contracting out strategy saved the state \$215 million over six years.

In a similar vein, as a result of prisoner protests in the Baltimore City Jail, health care was contracted out to a newly created nonprofit organization in 1977. A comparison of outcome measures pre and post contracting shows substantial effects. While the number of sick visits fell from 62.9 to 27.4 patients per day per 1,000 inmates, the length of time nurses spent with patients per visit rose from 2.8 to 10.9 minutes. At the same time, clinical staffing at the jail increased by 60 percent while costs rose by only 13 percent, largely because hospital use declined. Overall, Freeman (1981) considers this to be a substantial improvement in care.

Lastly, Szykula and Jackson (2005) detail a case study for managed mental health techniques in a large Salt Lake City jail. They report lower costs and much lower levels of psychotropic medication of the inmates after the initiation of managed care.

### **3. Inmate Mortality Data**

We construct a balanced three year panel from the 1979 and 1984 Census of State Adult Correction Facilities and the 1990 Census of State and Federal Adult Correction Facilities. The sample is restricted to these three years because they are the only surveys that include the necessary data. Because federal data are only reported in 1990, the panel is also restricted to state prisons. All data are self reported at the institution level. As the objective is to estimate the impact of medical contracting on inmate mortality, we restrict the sample to facilities that are likely to offer at least some amount of medical care. Operationally this means that the sample is restricted to state prisons housing adults with

a minimum capacity of 100 inmates and a positive number of professional staff in each of the three years. This restriction reduces the sample from 1560 to 1095 prisons. Most of the excluded prisons are very small and have no medical staff.

We use two dependent variables: deaths due to illness (including AIDS) and deaths due to illness or suicide. Deaths due to violence are excluded. Our primary independent variable is the percentage of professional staff under contract (not on regular payroll). The number of professional staff is the number of medical doctors, dentists, nurse, paramedics, psychiatrists, psychologists, educational and vocational counselors, teachers, social workers, and so on. We are forced to amalgamate medical and other professionals because the 1990 data does not separately identify them. Section 4.1 examines the possible biases introduced by this amalgamation. In particular, we use the more detailed data available in the 1979 and 1984 data to approximately bound the estimates. Table 1 reports the average percentage of professional staff employed under contract at the prison level. Columns 1 and 2 show that the fraction of professional staff employed under contract was essentially stable between 1979 and 1984, and then increased substantially between 1984 and 1990.

The remaining control variables, other than the prison fixed effects, are listed in Table 2. All models include the number of professional staff, the number of other staff, prison population, prison capacity, prison security level, and the number of inmates killed in the past year. The number of inmates killed is a proxy for social conditions in the prison. The columns in Table 2 report these summary statistics for a variety of sub-samples. Our primary sample includes all prisons with a minimum capacity of 100 inmates and a positive number of professional staff in each of the three years. Column 2

restricts the sample to prisons with a hospital, a shared hospital, or an infirmary and column 3 restricts the sample to just prisons with a hospital. Columns 4 and 5 restrict the sample to prisons with an average capacity of 500+ and 1000+, respectively. We use these samples in Section 4 to check the sensitivity of the results to various sample specifications.

#### 4. Fixed Effects Poisson Model

The objective is to estimate the impact of medical contracting in prisons on inmate mortality:

$$M_{it} = \alpha_i + \phi_t + \beta C_{it} + \gamma P_{it} + X_{it}\theta + \varepsilon_{it} \quad (1)$$

where  $i$  denotes prisons,  $t=1979, 1984, \text{ or } 1990$ ,  $M$  is the annual prison-level mortality count,  $\alpha$  is a vector of prison fixed effects,  $\phi$  is a vector of year indicators,  $C$  is the proportion of professional staff employed on contract (ranges from 0 to 1),  $P$  is the number of professional staff,  $X$  is a vector of time-varying prison characteristics, and  $\varepsilon$  is the usual error term. The central feature of our prison mortality data is that it is a non-negative count with a large number of zeros (see Table 3 and Figure 1). As such, we estimate equation (1) using a fixed effects Poisson model. We also report OLS estimates for comparison.

The estimates for equation (1) are reported in Table 4. Columns 1 and 2 report the fixed effects Poisson estimates when mortality includes both illnesses and suicides and excludes suicides, respectively. For comparative purposes, columns 3 and 4 report the same estimates for a linear fixed effects model. All models are weighted by average capacity. The sample sizes are smaller for the Poisson models compared to the OLS

models because prisons with constant mortality counts are dropped in the fixed effects Poisson estimation. The first row reports the primary coefficient of interest,  $\beta$ , which is the impact of contracting out on inmate mortality. Our preferred estimate includes deaths due to suicide and uses a Poisson model (column 1). Under this specification, the contracting coefficient is 0.352 with a standard error of 0.036.<sup>6</sup> This impact is both statistically significant and economically important. The coefficient estimate for contracting out implies that a 20 percent increase in contracting (this is the mean for the biggest change observed by prison) increases mortality by 0.07 deaths or 2 percent relative to a mean death count of 3.49. Alternatively, one can think about a complete change from no contracting out to complete contracting out. In this case, the estimated coefficient estimate implies that mortality will rise by 0.352, or 10 percent. However, one should be careful with this interpretation since there are very few changes of such magnitude in the data. The point estimates for the other three specifications are similar in magnitude.

The other coefficients are reported in the remaining rows of Table 4. Focusing on column 1, as one might expect, mortality falls as professional staff increases. On the other hand, increases in non-professional staff and prison population are associated with increases in inmate mortality. Also as expected, the trend in prison mortality is upward.

Table 5 replicates columns 1 through 4 in Table 4 under a variety of sample specifications. For comparative purposes the first row reports the baseline estimates.

The second row restricts the sample to prisons with a hospital, shared hospital, or an infirmary. Row 3 restricts the sample to prisons with a hospital. Rows 4 and 5 use prison

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<sup>6</sup> Two related notes. One, the standard errors are quite a bit smaller in the Poisson regressions than the OLS regression. This makes sense, since this is count data. Two, the fixed effects are jointly significant in all models, as one would expect with such heterogeneous institutions as prisons.

capacity, 500+ inmates and 1000+ inmates, as an alternative to direct measurement of medical facilities, to focus on prisons that are more likely to provide a high proportion of medical services in the prison itself. While the point estimates for large prisons and prisons with a hospital are substantially larger than the baseline and the other two less restrictive sub-samples, they are similar in percentage terms. A 20 percent increase in contracting increases mortality by 0.13 deaths or 2 percent relative to a mean death count of 5.75 for prisons with a hospital and by 0.13 deaths or 2 percent relative to a mean death count of 5.23 for prisons with 1000+ inmates.

#### ***4.1. Medical Staff Measurement Problems***

For our purposes, the primary flaw of available data is the fact that medical staff is not separately identified from other professional staff in the 1990 survey. As a result, we are forced to use all professional staff and the percentage of them employed under contract instead of isolating medical contracting out. This lack of disaggregated data is unfortunate since most of the substantial changes in contracting occur between 1984 and 1990. The 1979 and 1984 surveys do separate medical personnel from other professional staff. Table 6 therefore replicates Table 4 with three differences. First, the sample only includes the first two years, 1979 and 1984. Second, medical staff and other professional staff enter all models separately (rows 1 and 3) as do the percentage of medical and other professionals who are under contract (rows 2 and 4). Third, the sample is restricted to prisons with at least some professional and medical staff in both 1979 and 1984.

Several features of Table 6 warrant comment. First, the point estimates are less consistent across specifications. This is likely due to the limited number of prison

contracting changes between 1979 and 1984. Second, in this sample period, the prisons not dropped from the Poisson model are generally large prisons; since these are the only institutions with contracting and/or death count changes. As such, it may not be surprising that the OLS and Poisson estimates are quite different, with the Poisson estimates being similar to the large institution estimates reported in Table 5 and the OLS estimates being more similar to the baseline estimates reported in Table 4. Third, while the point estimates for the percentage of medical staff contracted out are estimated reasonably precisely, the estimates for the other medical and professional measures are very noisy. Again this likely reflects the fact there are very few changes between 1979 and 1984. Finally, although not reported in the table, the average percentage of contracting is similar across medical and other professional categories, and changes very little between years. In 1979 9.5 percent of medical staff are employed under contract compared to 8.3 percent for other professionals. By 1988 these percentages had changed slightly to 8.8 percent for medical staff and 8.0 for other professionals. Taken as a whole these findings suggest that proxying medical contracting with professional contracting is likely to be fairly reliable.

#### ***4.2. Endogenous Medical Contracting***

The analysis of the impact of medical contracting on prisoner mortality raises the question of endogeneity. More concretely, one may be concerned that the results partly reflect the decision of prisons with high and rising death rates to switch towards medical

contracting to slow the rise in the death rate.<sup>7</sup> As we have three years of data, we can investigate this possibility by relating changes in mortality in the earlier period to contracting out choices in the later period. We estimate the following simple model:

$$\Delta C_i^{90-84} = \alpha + \phi_{84} + \pi \Delta M_i^{84-79} + \gamma P_{i84} + X_{i84} \theta + \varepsilon_{i84} \quad (2)$$

where  $i$  denotes prisons,  $\Delta C_i^{90-84}$  is the change in the percentage of professional workers employed under contract from 1984 to 1990,  $\Delta M_i^{84-79}$  is change in prison-level mortality from 1979 to 1984,  $\phi$  is a 1984 year indicator,  $P$  is the number of professional staff,  $X$  is a vector of prison characteristics as measured in 1984. Using equation (2), we ask whether prisons that experienced increases in inmate mortality responded by changing their professional staff contracting rate.

The results are reported in columns 1 and 2 in Table 7. Whether mortality includes or excludes suicides, there is no relationship between the change in mortality between 1979 and 1984 and the change in medical contracting between 1984 and 1990. The point estimates are zero to three decimal places and the standard errors are small. In order to check the sensitivity of this finding to alternative specifications, columns 3 through 8 replace the change in mortality with the level of mortality in 1984, 1979, both and 1979 and 1984. The results for all specifications are similar: the data indicate that prisons did not respond to mortality changes by changing the percentage of their medical staff employed under contract, at least during the period of for which we have data.

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<sup>7</sup> To the extent that higher mortality rates deter crime, as shown Katz, Levitt and Shustorovich (2003), it is also possible that the composition of prisoners is changing over time. While it is not obvious how this would bias the reported estimates, we have no way to deal with possibility of such selection.



## 5. Conclusion

We find no evidence to support the positive rhetoric regarding the impact of prison health care contracting out on inmate health, at least as measured by mortality. Our findings of higher inmate mortality rates under contracting out are more consistent with recent editorials raising concerns about this method of delivering health care to inmates. In fact, the reported results lead one to wonder if Paul von Zielbauer (2005A, B, C) is indeed correct asserting that contracting out may be as good as “death sentence,” for at least some inmates?

It is, of course possible that the estimated declines in health care quality are offset by gains in lower costs. The literature (Lamb-Mechanick and Nelson, undated) shows that contracting out does reduce costs. These results, together with ours, suggest that the theoretical analysis of Hart, Shleifer and Vishny (1997) may be right. Contracting out may reduce both cost and quality.

Future work on the important issues of prison health care contracting would benefit from better data on costs and on the details of the incentives created by different types of contracts. Further, one might distinguish between contracting out to profit-seeking versus nonprofit firms. And, it would be useful to repeat this study for more recent data. All of these approaches require new datasets, going beyond the Census.

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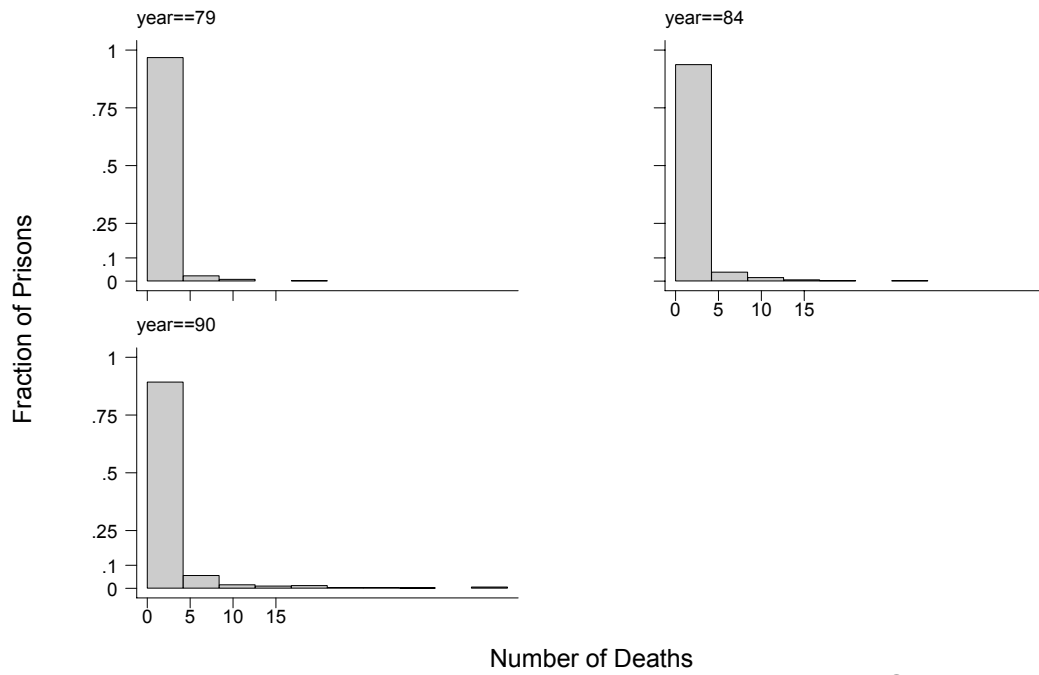


Figure 1. Annual Prison-Level Inmate Death Count

Table 1. Contracting Percentage (Measured at the Prison Level)

	1979	1984	1990
None	53	59	31
1-24 percent	27	24	41
25-49 percent	15	11	15
50-74 percent	4	5	7
75+ percent	1	2	7

Unweighted.

Table 2. Prison-Level Summary Statistics

	(1)	(2)	(3)	(4)	(5)
Deaths due to illness or suicide	3.49 (6.06)	3.63 (6.16)	5.75 (8.88)	4.00 (6.39)	5.23 (7.23)
Deaths due to illness	3.01 (5.63)	3.13 (5.73)	5.02 (8.35)	3.45 (5.96)	4.51 (6.79)
Percent contract professional	0.10 (0.19)	0.10 (0.18)	0.12 (0.21)	0.09 (0.17)	0.08 (0.16)
Professional staff	80.23 (69.36)	82.74 (69.83)	96.11 (89.64)	89.80 (70.15)	109.67 (74.45)
Other staff (in 100s)	5.45 (4.64)	5.61 (4.66)	5.95 (4.65)	6.07 (4.66)	7.36 (4.89)
Prison population (in 100s)	15.85 (13.04)	16.38 (13.09)	16.91 (13.37)	17.95 (12.91)	22.76 (12.89)
Prison capacity (in 100s)	15.97 (13.20)	16.51 (13.26)	16.90 (13.30)	18.09 (13.08)	22.98 (13.05)
Maximum security facility	0.51 (0.50)	0.53 (0.50)	0.60 (0.49)	0.56 (0.50)	0.61 (0.49)
Medium security facility	0.41 (0.49)	0.41 (0.49)	0.38 (0.49)	0.41 (0.49)	0.37 (0.48)
Minimum security facility	0.08 (0.28)	0.07 (0.25)	0.03 (0.16)	0.04 (0.19)	0.02 (0.13)
Inmates killed per 100 inmates	0.02 (0.06)	0.02 (0.06)	0.03 (0.07)	0.03 (0.06)	0.03 (0.05)
<u>Average Prison-Level Death Rate</u>					
Due to illness or suicide (per 1000 Inmates)	2.2	2.2	3.4	2.2	2.3
Due to illness (per 1000 Inmates)	1.9	1.9	3.0	1.9	2.0
Sample size	1095	966	255	615	276
<u>Sample restricted to prisons with:</u>					
A hospital, shared hospital, or infirmary	No	Yes	No	No	No
A hospital	No	No	Yes	No	No
Average Capacity 500+	No	No	No	Yes	No
Average Capacity 1000+	No	No	No	No	Yes

Weighted by average prison capacity.

Table 3. Prison-Level Death Counts by Year

Death Count	1979	1984	1990
0	251	202	163
1	52	69	67
2	20	37	36
3	8	13	24
4	17	11	20
5	8	7	9
6	2	5	10
7	1	4	7
8	1	4	3
9	1	5	5
10	2	1	0
11	1	2	2
13	0	1	0
14	0	1	3
15	0	0	2
16	0	1	0
18	0	0	3
19	1	1	1
20	0	0	2
22	0	0	2
26	0	0	1
29	0	1	1
32	0	0	1
38	0	0	2
42	0	0	1

Unweighted.



Table 4. The Impact of Contracting Out on Inmate Mortality

	Poisson		OLS: log(1+deaths)	
	(1)	(2)	(3)	(4)
Percent contract professional	<b>0.352</b> (0.036)	<b>0.284</b> (0.039)	<b>0.307</b> (0.125)	<b>0.243</b> (0.127)
Professional staff	<b>-0.002</b> (0.000)	<b>-0.001</b> (0.000)	<b>-0.001</b> (0.001)	0.000 (0.001)
Other staff (/100)	<b>0.017</b> (0.002)	<b>0.021</b> (0.003)	0.009 (0.010)	0.016 (0.011)
Prison population (/100)	<b>0.018</b> (0.002)	<b>0.009</b> (0.002)	0.010 (0.008)	0.001 (0.008)
Prison capacity (/100)	<b>0.005</b> (0.002)	<b>0.007</b> (0.002)	<b>0.019</b> (0.009)	<b>0.020</b> (0.009)
Inmates killed (per inmate)	<b>0.484</b> (0.094)	0.117 (0.108)	0.070 (0.355)	-0.108 (0.359)
Medium security facility	<b>-0.098</b> (0.017)	<b>-0.117</b> (0.018)	-0.094 (0.066)	-0.102 (0.067)
Minimum security facility	<b>-1.080</b> (0.053)	<b>-0.993</b> (0.054)	<b>-0.299</b> (0.131)	<b>-0.292</b> (0.133)
1984	<b>0.484</b> (0.012)	<b>0.488</b> (0.013)	<b>0.198</b> (0.040)	<b>0.194</b> (0.040)
1990	<b>0.969</b> (0.016)	<b>1.041</b> (0.017)	<b>0.436</b> (0.056)	<b>0.428</b> (0.056)
Sample size	750	711	1095	1095
Deaths include suicides	Yes	No	Yes	No

All models also include prison indicators. Weighted by average prison capacity. Standard errors are in parentheses.

OLS standard errors are heteroskedastic consistent. Bold coefficients are statistically significant at the 5% level and bold italics are statistically significant at the 10% level.

Table 4. Robustness

	Poisson		OLS: log(1+deaths)	
	(1)	(2)	(3)	(4)
<u>Sample restricted to prisons with:</u>				
All prisons	<b>0.352</b> (0.036) [750]	<b>0.284</b> (0.039) [711]	<b>0.307</b> (0.125) [1095]	<b>0.243</b> (0.127) [1095]
Hospital, shared hospital, or infirmary	<b>0.373</b> (0.037) [684]	<b>0.298</b> (0.040) [654]	<b>0.345</b> (0.138) [966]	<b>0.269</b> (0.140) [966]
Hospital	<b>0.659</b> (0.051) [213]	<b>0.521</b> (0.055) [201]	<b>0.677</b> (0.250) [255]	<b>0.472</b> (0.251) [255]
Prison capacity 500+	<b>0.369</b> (0.038) [540]	<b>0.294</b> (0.041) [519]	<b>0.414</b> (0.191) [615]	<b>0.331</b> (0.194) [615]
Prison capacity 1000+	<b>0.652</b> (0.044) [270]	<b>0.522</b> (0.047) [261]	<b>0.728</b> (0.324) [276]	<b>0.558</b> (0.340) [276]
Deaths include suicides	Yes	No	Yes	No

All models include the variables listed in Table 3. Weighted by average prison capacity. Standard errors are in parentheses.

OLS standard errors are heteroskedastic consistent. Sample sizes are in square brackets. Bold coefficients are statistically level significant at the 5% and bold italics are statistically significant at the 10% level.

Table 6. Separating Medical and Other Professionals

	Poisson		OLS: log(1+deaths)	
	(1)	(2)	(3)	(4)
Percent contract medical professionals	<b>0.6754</b> (0.0668)	<b>1.0502</b> (0.0838)	<b>0.3303</b> (0.1620)	<b>0.3731</b> (0.1567)
Medical staff	<b>0.0022</b> (0.0005)	0.0000 (0.0005)	0.0024 (0.0021)	0.0006 (0.0021)
Percent contract non-medical professionals	<b>-0.1924</b> (0.0613)	<b>-0.1579</b> (0.0713)	-0.0028 (0.1843)	-0.0200 (0.1782)
Other professional staff	<b>-0.0012</b> (0.0004)	<b>0.0008</b> (0.0005)	-0.0014 (0.0015)	0.0006 (0.0014)
Other staff (/100)	<b>0.0477</b> (0.0095)	<b>0.0781</b> (0.0106)	<b>0.0923</b> (0.0381)	<b>0.1352</b> (0.0368)
Prison population (/100)	<b>0.0352</b> (0.0031)	<b>0.0249</b> (0.0034)	0.0134 (0.0122)	-0.0025 (0.0118)
Prison capacity (/100)	<b>0.0241</b> (0.0038)	<b>0.0173</b> (0.0042)	0.0173 (0.0126)	0.0142 (0.0121)
Inmates killed (per inmate)	<b>-0.5864</b> (0.1427)	<b>-0.8387</b> (0.1710)	-0.2255 (0.4392)	-0.1596 (0.4247)
Medium security facility	<b>-0.3891</b> (0.0377)	<b>-0.4749</b> (0.0432)	-0.1437 (0.0956)	-0.1512 (0.0925)
Minimum security facility	<b>-0.9005</b> (0.0919)	<b>-1.0281</b> (0.0945)	-0.2261 (0.1842)	<b>-0.2995</b> (0.1781)
1984	<b>0.2228</b> (0.0179)	<b>0.2627</b> (0.0204)	<b>0.0827</b> (0.0495)	<b>0.0922</b> (0.0479)
Sample size	370	322	638	638
Deaths include suicides	Yes	No	Yes	No

All models also include prison indicators. Weighted by average prison capacity. Standard errors are in parentheses.

OLS standard errors are heteroskedastic consistent. Bold coefficients are statistically significant at the 5% level and bold italics are statistically significant at the 10% level.

Table 7. Change in Professional Contracting between 1984 and 1990

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Death Change (1984-1979)	0.000 (0.008)	0.000 (0.008)						
Deaths in 1984			0.007 (0.007)	0.007 (0.007)	0.009 (0.010)	0.015 (0.011)	0.005 (0.008)	0.002 (0.008)
Deaths in 1979							0.006 (0.011)	0.014 (0.012)
<u>Other controls measured in 1984:</u>								
Professional staff	<b>-0.001</b> (0.001)	<b>-0.001</b> (0.001)	<b>-0.001</b> (0.001)	<b>-0.001</b> (0.001)	<b>-0.001</b> (0.001)	<b>-0.001</b> (0.001)	<b>-0.001</b> (0.001)	<b>-0.001</b> (0.001)
Other staff (/100)	0.004 (0.016)	0.004 (0.016)	0.002 (0.016)	0.002 (0.016)	0.004 (0.016)	0.004 (0.016)	0.003 (0.016)	0.003 (0.016)
Prison population (/100)	0.012 (0.010)	0.012 (0.010)	0.012 (0.010)	0.012 (0.010)	0.012 (0.010)	0.012 (0.010)	0.012 (0.010)	0.012 (0.010)
Prison capacity (/100)	-0.011 (0.009)	-0.011 (0.009)	-0.012 (0.009)	-0.012 (0.009)	-0.011 (0.009)	-0.011 (0.009)	-0.011 (0.009)	-0.011 (0.009)
Inmates killed (per inmate)	-0.336 (0.284)	-0.336 (0.284)	-0.346 (0.282)	-0.341 (0.282)	-0.381 (0.287)	-0.410 (0.286)	-0.372 (0.287)	-0.405 (0.287)
Medium security facility	-0.002 (0.036)	-0.002 (0.036)	0.003 (0.036)	0.002 (0.036)	0.005 (0.037)	0.006 (0.037)	0.006 (0.037)	0.007 (0.037)
Minimum security facility	0.030 (0.047)	0.030 (0.047)	0.032 (0.047)	0.031 (0.047)	0.034 (0.047)	0.034 (0.047)	0.034 (0.047)	0.034 (0.047)
Constant	<b>0.117</b> (0.037)	<b>0.117</b> (0.037)	<b>0.118</b> (0.036)	<b>0.118</b> (0.037)	<b>0.115</b> (0.037)	<b>0.116</b> (0.036)	<b>0.116</b> (0.037)	<b>0.117</b> (0.037)
Sample size	365	365	365	365	365	365	365	365
Deaths include suicides	Yes	No	Yes	No				

Bold coefficients are statistically significant at the 5% level and bold italics are statistically significant at the 10% level. Unweighted.