Economies of Scale within State Prisons

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Our paper analyzes the cost of state prisons as a function of state prison populations across U.S. states. Historically and intuitively, a given state's prison expenditures have risen as more inmates enter the prison system. Through panel regression analysis, a detailed understanding is obtained of how state prisons experience economies of scale as inmate populations rise over time. Our model consists of a single function. The equation is quadratic in nature and uses a cost function to see if there are economies of scale within the state prison systems. Our results indicate that as prison populations increase over time, the cost per-prisoner decreases at a decreasing rate. We find that state prison systems are experiencing economies of scale.
Equation Explained

\[
\frac{\text{COST}_{it}}{\text{P}_{it}} = \alpha_0 + \alpha_1 \text{P}_{it} + \alpha_2 \text{P}_{it}^2 + \alpha_3 \text{CPI}_{it} + \alpha_4 \text{GUARD}_{it} + \alpha_5 \text{THREE}_{it} + e_{it}
\]

\text{COST}_{it} = \text{Total State Prison Expenditures in Each State}

\text{P}_{it} = \text{State Prison Population}

\text{CPI}_{it} = \text{Consumer Price Index Across States}

\text{GUARD}_{it} = \text{Annual Prison Guard Wage}

\text{THREE}_{it} = \text{Tests the Presence of a Three Strikes Law in Each State}

\text{e}_{it} = \text{Error Term which Captures Unaccounted Variables}

\_it\text{ denotes a panel data set. Panel data sets consist of cross-sectional and time-series data}

Why This Project?

- The United States imprisons 753 inmates for every 100,000 people
  - 240% more than in 1980
  - Poland is the 2nd closest country with 224 inmates per 100,000 people

- State Prisons account for 60% of inmates and roughly 60% of total correction expenditures

- Recent news has highlighted record-high prison populations, creating a socially relevant topic to research
  - Media generally targets California overcrowding within state prisons

- Similar studies have been done on the postsecondary educational system
Historical Evidence

The model we adopted is based on a previous study that focuses on how the application of cost functions can be used in policy making, and how institutional factors influence costs.


We believe the relationship between prison population and the cost per-prisoner will show that short-run reductions in expenditures per-prisoner can be achieved through increasing the prison population.

Economies of Scale

Economies of scale will exist, but at a decreasing rate. A point will come where adding another prisoner in fact makes the cost per-prisoner rise. 

i.e. Overcrowding
Results Displayed Graphically

[Diagram showing the relationship between average cost per-prisoner and prison population, with points labeled as Economies of Scale and Diseconomies of Scale. The graph includes a vertical line at Q* representing the optimal prison population.]
Our theory aligned with our results, confirming that economies of scale exist within US state prison systems.

Data limitations existed:
- Data prior to 1994 must be requested in paper form
- In 1980 political initiatives that began the war on drugs caused a massive spike in prison inmates

Inclusion of data from 1980 onward would increase the overall accuracy of our equation.

Three Strikes Variable, although statistically insignificant, is still a viable variable if prisoners are to be housed indefinitely, surely this will have a positive effect on prison expenditures.
- Extending our data to 1980 will possibly make three strikes a viable variable and increase our equations accuracy
- Prior to 1993 no states had a three strikes law