How U.S. GDP Affects Prison Population: Discrediting Conceptions of Recessions

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Submitted to the
Embry-Riddle Office of Undergraduate Research

Embry-Riddle Aeronautical University
2021

Abstract

This research was designed to discover correlative effects of US GDP with prison population. This arose out of the lack of studies conducted on economic effects of prison laborers within the U.S. economic framework. A rudimentary statistical regression was executed to determine the effects of real GDP based in the year 2012 with the U.S. prison population. Qualitative and theoretical sources supplemented the analysis to provide context to the trends that were discovered. Change in U.S. GDP was found to have ambiguous effects on the prison population which debunks the notion that recessions cause escalations in serious criminal activity.

Introduction

Prisons were introduced to the United States (U.S.) legal system in the19[th] century as a means to deviate from more severe forms of punishment commonly used by their former colonial counterparts. Broadly, there was not a ponderous use of a penal system within US society until the late 1970s (Alexander, 2020). The use of the penal system arose from political measures stemming from the Lyndon B. Johnson administration. It was in this era that the, "war on drugs," was initiated. Several directives arrived in this period of declining incarceration and crime rates that would have long lasting effects on the U.S. penal system. Some have theorized that the contradictory measures of criminal regulation were a means towards political expediency and gain, while others have hypothesized that the true reason for the stark uptick in carceral actions was one derived in economic gain for low lost labor through the penal welfare system. Flounders (2011) asserted that, "private prisons…are a greater source of profit [than military spending] and are reinforced by the climate of racism and reaction." This hypothesis has yet to be founded in terms of quantitative economic analysis. This paper aims to see the reverse causality. Does US economic activity have any role in prison population? This leads us to generate more substantiation towards answering the higher level societal question: Should the U.S. keep prisons?

From a sociological lens prison are unethical and detrimental to the well-being of incarcerated persons, particularly if levels of crime are not severe or if criminal activities are not repeated. When created, prisons were originally intended as a temporary means to reduce the severity in criminal punishment and were even projected to certainly cause severe mental health issues by the likes of Charles Dickens (Davis, 2011). They continue to subject those punished to forms of abuse and what some may consider mental torture. Some would argue that their effects of rehabilitation have decreased crime rates in high populated areas; however, the National Research Council concluded that while prison growth was a factor in reducing crime, "the magnitude of the crime reduction remains highly uncertain and the evidence suggests it was unlikely to have been large," (Criminal Justice Facts, 2021). This common misconception has led to the bi-lateral agreement of politicians and voters to cosign the legislation that increases the number of incarcerated citizens within the united states (Alexander, 2020). This action and consensus perpetuates sociological issues that damage the framework of interactions among U.S. citizens. Despite these prevailing issues the penal system seems to thrive in this country with the U.S. having 639 per 100,000 citizens incarcerated, the largest incarceration rate in the world (Statista). It is only logical to further examine the penal system's utility form an economic lens to discern if there is an overall benefit towards incarceration to the U.S. societal framework.

Prisons have been deemed lucrative by leading economists since the late 1990s. There have been so many benefits from convict labor that it has been recommended that

there be an increase in carceral means to rehabilitate prisoners and utilize this practice as means to bolster economic production (Flanagan, 1993). The overarching effect prisons have on the U.S. economy arrive from their ability to produce goods at extraordinarily low wages. It must be recognized that prisons currently generate millions in revenue via Prison Industry Enhancement (PIE) organizations every year (Bair 2007). This amount of revenue is correlated with the amount of prison commodities produced by federal, state, and private prisons. That amount of production is correlated to the amount of inmates held within all three entities at a given time. Thus, there may be correlative effects of U.S. prison population numbers to the changes in the US GDP. This paper is aimed towards analyzing data to determine if there are any such correlations.

Literature Review

By constructing data trends in changes in prison population statistics over time, there can be a determination of effective measures on economic activity as it relates to the amount of potential candidates for low cost prison labor. The following doctrine analyzes a high level correlation of gross domestic product (GDP) to the change in prison population over a span of forty years starting in the year 1980. This will give those who may be interested in justifying—or negating—the use of prison labor in the U.S. economy a clearer perspective of potential economic effects. The hypothesis based on previous research done by Bair (2007) and Douglas et al. (2018) is that the US GDP and the change in the U.S. prison population could have a direct correlation.

Douglas et al. (2018) posit that prison labor has contributed to the national economy since the New Deal era. While the privatized sector of the economy boomed due to the industrial age and the country's economic stability moved from less of a state-controlled economy, government labor expanded more in the direction of the Prison Industrial complex (PIC). The PIC expansion that has so occurred is so intertwined with the overall economy that Douglas et al. (2018) hypothesize that it is nearly impossible to determine the effects of prison industrial labor (within the U.S. economy). However, literature of prison labor income and prison commodity production has been produced, which may lead to more information on what effects inmate labor has on the overall economy.

Prisoners are considered to have an income through federal welfare (Bair, 2007). This income can be reduced below normal based on an inmate's condition (i.e. if they are segregated from the prison population due to solitary confinement). A prisoner's income can be re-defined as welfare plus master provision. The master provision is the value of the labor that the prison-warden allots each inmate. A subsumed class revenue can be received by prisoners who are subject to the, "SFCP (slave fundamental class process)," within a production process involving a state entity. There is an increase in demand for products and services that were once provided by prison welfare. The increase in demand has caused a higher amount of government spending on the PIC. This in turn forces more inmates to seeking labor while serving their sentences, boosting the prison economy. The warden can then distribute welfare funds based on the grant received from the state and can manipulate the value of the prison wages based on contribution to final value of products produced to maximize profit.

Bair also explains that if the price difference of a prison commodity and the commodity's market value is less than the difference of the welfare provided commission for prison labor and the labor value asserted by the warden of the prison, then the cost of production justifies the continuation for prison labor production of that commodity. If the

price of the prison produced commodity is raised, the warden of either a state or federal prions can make a profit without having to manipulate the value of the inmate labor. From these findings, it can be assumed that that the state and federal prison system benefits substantially from obtaining low cost prison labor.

Prior to The 1980s states used laws and other restrictive legislation to limit the market for prison goods, thereby limiting the appeal of the corrections arena for private investors. The Percy Amendment in 1979 is what allowed conditions for interstate commerce, recommended inmate wage deductions of 80%, and decreed that inmates could not be denied workers compensation. Percy Act later became the Prison Industry Enhancement (PIE) Act. Private sectors have historically taken two roles in the PIE process: employing inmates by hiring or firing prison workers as an operator near the prison or purchasing a sizable portion of the goods generated by the prison industry (Flanagan 1993). If a PIE agency of a particular state is selling a commodity, then (even in cases of being a non-profit entity) there can be a labor surplus produced from the exchange of the prison produced good. On average the federal and state deductions made by PIE entities are about 54%. In California the sole PIE authority is the Prison Industry Authority (PIA) which typically pays inmates whose production is not involved with private enterprise commodities $0.30-$0.95 per hour. Wages are then typically reduced by, "court ordered restitution and fines, payments to cover room and board, and other fees which jurisdictions may impose (Bair 2007)." The appropriation of welfare which causes low prison wages and profit for wardens then leads to the ability for PIE agencies to generate higher revenue. This amount of benefit from surplus labor and state welfare is based on the amount of prisoners within a given system and the value of the commodity.

It must be noted that incarcerated people commonly do not have the choice to work, and there are several prisons where the number of jobs is not proportional to population. Therefore, what we consider to be wages can be classified as nothing more than provisions provided to incarcerated persons. This distinction is made because based on the Marxian theory, wages are deemed to be chosen in a capitalistic framework by an individual. Individual laborers are also considered to have the choice to sell their labor power. Inmates in a US prison do not have this option. They can be assigned work based on behavior and do not always get to decide what work they are given (commodity production versus housekeeping roles).

Despite what may seem to be an overarching ethical dilemma that involvement of private sector entities provides, Kling et al. (2001) made a prescription to the U.S. government to increase close cooperation between the private sector and the prison industry. It may be noted that the inability of the laborers to choose their role, could have an adverse economic effect due to a lack of specialization. Prisoners not having an ability

to select the work they do can put many laborers in positions not fit for optimal production. This may cause an inefficiency in goods produced and actually run many prisons at a loss for commodities produced in relation to labor potential. Furthermore, providing prisoners with mere provisions could also have detrimental effects on production quantity and quality. In addition, reducing the amount of compensation below a wage that provides prison laborers with the ability to utilize their earnings for amenities possibly dissuades laborers from generating optimal production based on. The number of welfare-based amenities inmates receive might determine whether a prisoner has a labor surplus. This is dictated by whether they are segregated by the population due to infractions. Following the manipulation of funds, the welfare that prisoners are to receive typically go towards commodities for prisoners and prison expenditures (Bair, 2007). Flanagan et al. (1993) discusses how prisons can contribute to the improvement of economic productivity in a non-threatening way to. This study describes several models of full employment of the U.S. prison population as well as providing some projections of the economic impact of prisoner full employment. Flanagan et al. (1993) find that by increasing prison labor rates the PIC would be more lucrative over time and the money could be utilized for other industrial complexes. The effects of wage/amenity differences on commodity production is a topic that could be dissected in future research studies.

Another beneficial topic to inspect would be the PIE agencies for all 50 states within the U.S. Analyzing the benefit of revenue from the welfare and labor surplus produced by each state could lead to determining the significance of prison labor on the larger economic scale. Scott et al. (2006) examine whether the prison economy displaces state industries. As of 2004, the Ohio Prison industry (OPI) generated $31.6 million in sales revenue. Of this the multiplier effect caused $ 10 million to be distributed as employee wages and $ 1.5 million as prisoner wages. Such a phenomenon, does impact the local economy. The amount of revenue generated could be compared to the amount of investments and government spending that contribute to GDP to grasp a thorough perspective of the broader economic effects of prison labor. Finally, a similar analysis could be conducted for every state to denote the impact of prion labor on state economies. Our study contributes to this literature by finding if the level of economic activity contributes to prison population.

Model

The basic statistical regression model studied in this study understands a relationship between number of prisoners, time of study and level of economic activity as measured by gross domestic product.[1]

$$P_{i,t} = a_{i,t} + b_{i,t}Y_i + c_{i,t}t$$

$$P_{i,t}: number\ of\ prisoners\ at\ time\ 't' \ \forall\ i = 1\ldots 3$$

$$i = \begin{cases} 1 & all\ prisoners\ are\ considered \\ 2 & prisoners\ with\ govt\ considered \\ 3 & prisoners\ held\ by\ private\ prisons \end{cases}$$

$$Y_t: GDP\ for\ year\ 't'$$

Where *t* is the time period (or year minus the year before the first year in the dataset) *a,b,c* are the coefficients that determine the relationship of number of prisoners with other variables and a constant.

Methodology

Time series data were acquired from the U.S. Department of Justice and the Bureau of Justice statistics, Federal Reserve Bank of St. Louis and the Bureau of Labor Statistics. The number of prisoners are classified into three major subcategories: federal, state, and private. Federal and state prisoners are those housed in institutions owned by the federal and state government. They are operated and run by federal employees and are typically funded by tax dollars (welfare as aforementioned) allotted by the Federal government. Private prisons are owned, developed, and operated by for-profit corporations that have contracts with the government. The prison population is then correlated with GDP of each corresponding year using a statistical regression methodology.

We use regression analysis on the entire prison population as well as subcategories of federal, state and private populations.
At more detailed level further analysis in relation to specific welfare distributions, government spending, and PIE organization revenue over time must be acquired and analyzed.

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[1] We did not consider either US population or GDP per capita as they are assumed to be correlated with the time trend variable and GDP respectively. That is for future work.

Results

Results of the regression models are presented in tables 1 through 4. Prison population was positively correlated with the level of economic activity until the year 2009, when the new law was implemented (Model 1). Post that, even as the economy continued to expand prison population started shrinking (Model 2). These relationships were valid even accounting for time trend which seemed to have a positive effect on prison population (Models 3 and 4). When broken down by government prisoners in Models 5, 6, 7 and 8, these relations are maintained (the only exception being in Model 7, when introduction of time trend causes a negative correlation between GDP and number of government prisoners). However, this relation was not statistically significant. Because of this, further investigation was initiated and the dependent variable was drilled down to state prisons and federal prisons. The relationship was maintained in the case of federal prisons (Models 9, 10, 11 and 12) and most models of state prisons (Models 13, 14 and 16). However, it was the state prisons in Model 15 that the correlation between GDP and number of prisoners was negative and significant at 5% that caused the overall relationship to be not significant at 10% in Model 7.

Additionally, we studied the correlations between private prisoner numbers and GDP and time trend. This time we did not find any correlation of prisoner numbers with time. However, the positive pre-2009 correlation with GDP and negative post-2009 correlation was maintained. These correlations were robust across federal and state prisoner models as well as inclusion of time trend. (Models 17-28)

Subsequently we discussed the effect of prison population on change in GDP to evaluate whether it was recessions that were affecting prison population levels. We found that change in GDP had ambiguous effect on the prison population from year to year.

The following data trends were gathered from the collected data:
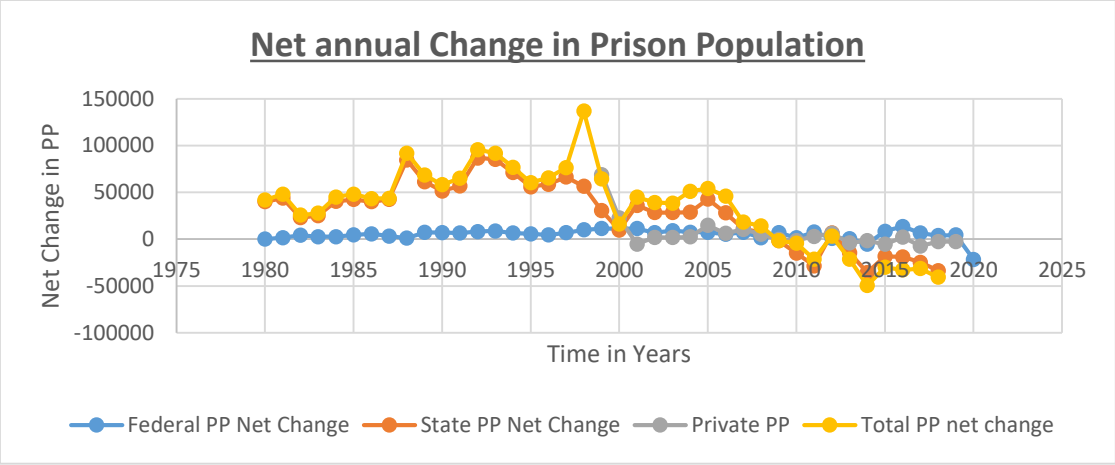
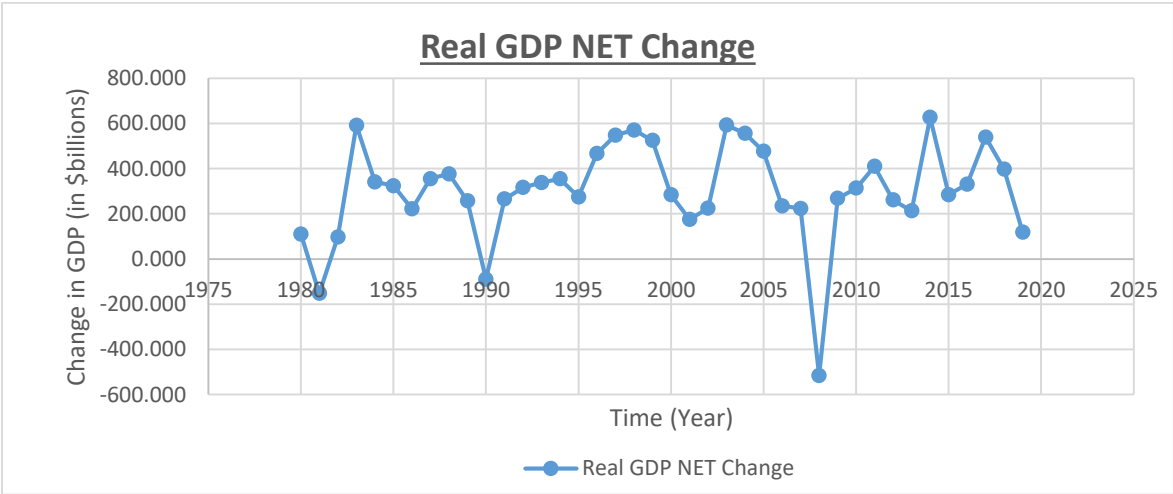Fig 1. Net annual change in prison population starting in 1980.

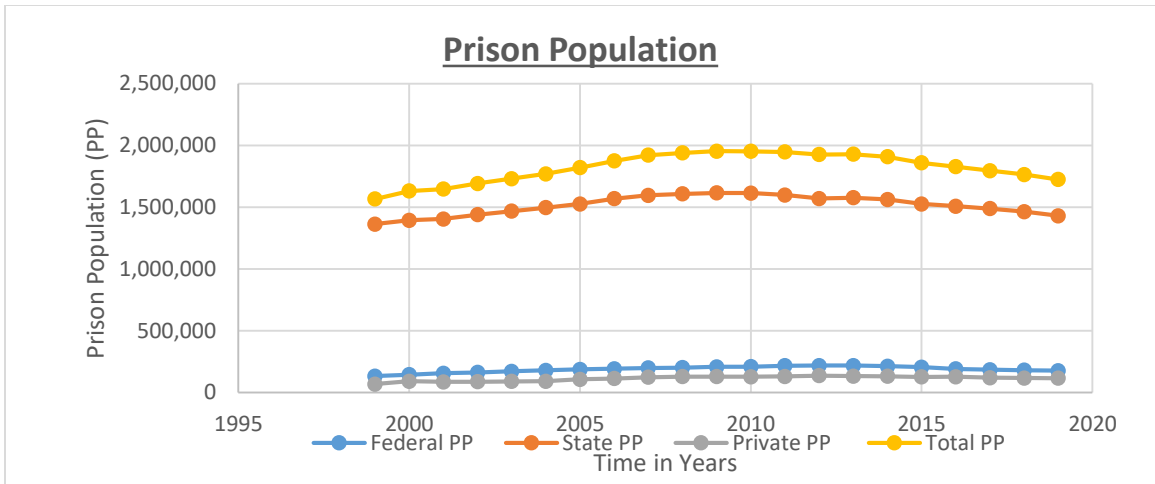Fig 2. Net annual change in U.S. Real GDP since 1980.
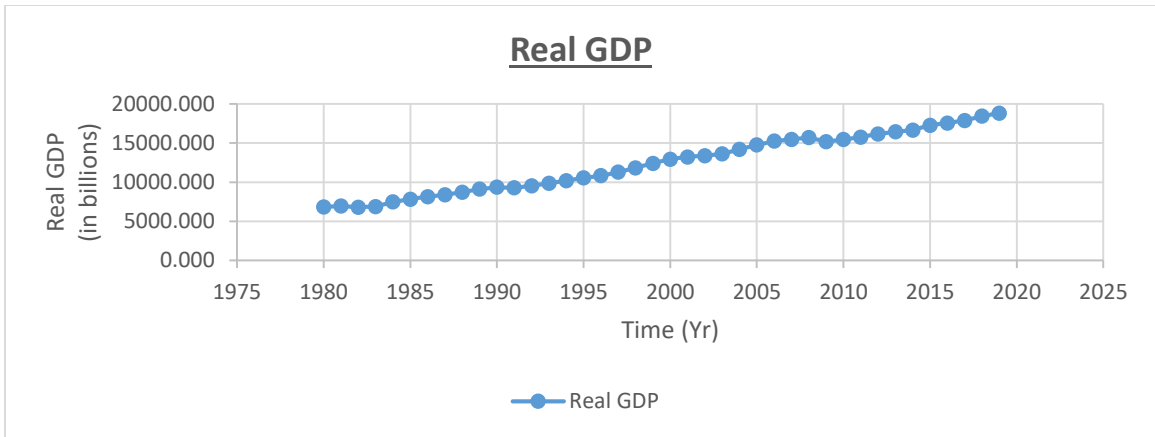
Fig 3. Prison population levels since 1998.

Fig 4. Real U.S. GDP (Yr. 2012) since 1980.

Discussion

From the tables above, it seems that the level of economic activity as seen from real GDP was an indicator of higher incarceration until 2009 and 2010. This is a result of the Fair Sentencing Act of 2010 which reduced the sentencing time of prisoners who were formerly convicted under statutes of the Controlled Substances Act (Library of Congress, 2010). The 2010 Act eliminated the mandatory minimum sentence of 5 years for first time-possession of crack cocaine offenders. It can also be seen that in the year 2019 there was a severe drop in the net amount of prisoners due to the novel COVID-19 virus outbreak. This pandemic reduced the amount of prisoners being sentenced as a means to mitigate the spread of viral infection among inmates. Many aspects of the economy were impacted by the virus, thus the drop in net prison sentencing cannot justify the decrease in economic performance for that year as it relates to GDP.

When accounting for the structural break in the net change of prison population post the year 2009 political and legislative causations were considered. This period marks the first time since 1970 that there had been 3 consecutive years of net prison population decline This was an outcome of political-economic happenings. There seemed to be a bigger political push to reduce the nation's reliance on prisons. The reduction could also be attributed towards the recession of that time period. State budgets for prisons were being reallocated and used towards alternative punishment methods that were more effective and to cost reductive (Goode, 2013).

From a legislative perspective there were motivators for the decreasing net change in prison population:

> "In August 2010, the Fair Sentencing Act was signed into law, which changed (reduced) the amount of prison time a person would receive for convictions involving crack cocaine. The sentencing guidelines developed for that legislation were made retroactive so that inmates who were already in the system could see a reduction in their prison terms." (Pavlo, 2014)

However, the decree only reduced sentences for a very few number of prisoners that applied (percentages in the range of 5%-15%). The steady decrease seen on the population seems to have been an offspring from the number of prisoners that qualified for early release. We found that change in GDP had ambiguous effect on the prison population indicating that there may be a falsehood in the common ideology of recessions increasing dire criminal offenses (i.e. murder, assault, and other crimes which warrant prison sentencing.

While we have correlative effects at play the dominating factor to cause the correlation still remains a mystery. It could be assumed in further research that it is the decrease in low cost labor through inmate population that drives the economy into recession. An analysis of PIE organization revenue by each state over the past 20 years may provide an indicator towards the effects of prison revenue. Currently the correlation asserts that—

like all other industries in the U.S. economic system—a downturn in GDP causes negative effects of employment within the prison system.

Conclusion

The reliance on prisons as a form of correctional action has been on a stark rise within the U.S. since the 1970s. The resulting increase in prison population has raised ethical concerns over whether the US GDP may have a correlation with low cost prison labor that generates revenue for PIE organizations. Many misconceptions and claims have been made in justifying and rejecting the continual use of prison labor within the U.S. economic framework. From the analysis conducted the change in GDP appears to have ambiguous effect on the prison population debunking the common conception that recessions tend to increase serious criminal activity. This is critical realization in molding future economic policy as it relates to the Bureau of Justice. Further research may be conducted on the revenue generated by prisoners over time to respective PIE organizations to determine the level of significance the prison industrial labor force has on the U.S. economy.

Acknowledgements

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Appendix

Table 1: Results from regression models of factors determining prison population including GDP and time trend

	M1	M2	M3	M4	M5	M6	M7	M8
Period (first year / last year)	(1/29)	(30/ 40)	(1/29)	(30/40)	(1/29)	(30/40)	(1/29)	(30/40)
Dependent variable	PP	PP	PP	PP	GovPP	GovPP	GovPP	GovPP
Constant	200441***	2988526***	496434***	3456791***	-713276***	2791365***	4356743**	3174492***
	53533	81664	99098	178521	68908	67258	174270.6	147968
	0.006	0	0.002	0	0	0	0.019	0
Y_t	110.57 ***	-66.15***	47.51**	-182.8***	170.05***	-62.017***	-34.271	-157.487***
	3.79	4.83	19.81	41.91	6.216	3.9747	30.31	34.737
	0.00	0	0.048	0.002	0	0	0.269	0.002
T			24209.15	42903**			69432***	35102**
			7538.92	15351			10219	12724
			0.15	0.023			0	0.025
ΔY_t								
R^2	0.99	0.9543	0.9962	0.9769	0.9652	0.9463	0.9875	0.9817
F-stat	853***	188	928	169	749	243	1023	215
n	10	11	10	11	29	11	29	11

Table 2: Results from regression models of factors determining prison population from state and federal prisons including GDP and time trend.

	M9	M10	M11	M12	M13	M14	M15	M16
Period (first year / last year)	(1/29)	(30/40)	(1/29)	(30/40)	(1/29)	(30/40)	(1/29)	(30/40)
Dependent variable	GovfedPP	Govfedpp	Govfedpp	GovfedPP	GovstPP	GovstPP	GovstPP	GovstPP
Constant	-1119335	391121***	-109096***	558768***	-5939541***	2400243***	544770	2615724***
	4053.3	37409	16952	96065	67807	3649	169274.7	77391.2
	0	0	0	0	0	0	0.003	0
Y_t	20.67***	-11.152***	18.857***	-52.927**	149.37***	-50.86***	-53.1295*	-104.56***
	0.36564	2.211	2.948	22.55	6.117	2.157	29.44	18.168
	0	0.001	0	0.047	0	0	0.083	0
T			618.734	15360			68813***	19742**
			994.03	8261			9925.6	6655
			0.539	0.1			0	0.018
ΔY_t								
R^2	0.9916	0.7387	0.9918	0.8176	0.9567	0.9841	0.9848	0.9924
F-stat	3198	25.4	1563	17.93	596	556	842	524
n	29	11	29	11	29	11	29	11

Table 3: Results from regression models of factors determining prison population of private prisons, federal private prisons including GDP and time trend.

	M17	M18	M19	M20	M21	M22	M23	M24
Period (first year / last year)	(1/29)	(30/40)	(1/29)	(30/40)	(1/29)	(30/40)	(1/29)	(30/40)
Dependent variable	Pvpp	Pvpp	pvpp	Pvpp	Pfedpp	Pfedpp	pfedpp	pfedpp
Constant	-121886***	197161***	-157609**	282298***	-91394***	83303***	-107400***	168722***
	23120	19065	65723	49032	9192	17873	25956	44516
	0	0	0.048	0	0	0.001	0.004	0.005
Y_t	15.687***	-4.137***	23.3	-25.352*	7.9089***	-2.889**	11.319*	-24.174**
	1.635	1.1267	13.136	11.511	0.65	1.056	5.187	10.45
	0.001	0.005	0.119	0.059	0	0.023	0.065	0.049
T			-2921.68	7800			-1309	7826*
			5000	4216			1975	3828
			0.577	0.101			0.529	0.075
ΔY_t								
R^2	0.92	0.5997	0.9238	0.7196	0.9487	0.4539	0.9518	0.6413
F-stat	92.06	13.48	42.41	10.27	148	7.48	69	7.15
n	10	11	10	11	10	11	10	11

Table 4:: Results from regression models of factors determining prison population from state private prisons including GDP and time trend.

	M25	M26	M27	M28	M29	M30	M31	M32
Period (first year / last year)	(1/29)	(30/40)	(1/29)	(30/40)	(1/29)	(30/40)	(1/29)	(30/40)
Dependent variable	Pvstpp	Pvstpp	Pvstpp	Pvstpp	PP	PP	PP	PP
Constant	-30493*	113859***	-50208*	113575***				
	16462	7933	47251	24378				
	0.101	0	0.323	0.002				
Y_t	7.778***	-1.248**	11.979*	-1.178*				
	1.164	0.4688	9.444	5.723				
	0	0.026	0.245	0.842				
T			-1613	-25.92				
			3595	2096.3				
			0.667	0.99				
ΔY_t					-205.26	-132.23	10.459	44.926
					254.7	82.52	24.135	30.744
					0.44	0.144	0.678	0.182
R^2	0.848	0.4406	0.8523	0.4406				
F-stat	44.64	7.09	20.19	3.15				
n	10	11	10	11	10	11	10	11