

AN ABSTRACT OF THE THESIS OF

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Title: Public vs. Private Prison Violence: An Empirical Study of Inmate-on-staff Assaults.

Abstract Approved

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Studies on prison violence have typically focused attention at individual level inmate-on-inmate assaults, however, there has been limited research into the rates of inmate-on-staff violence at the facility level. There also appears to be a need for further scholarship relating to the differences in various prison level predictors of inmate violence when comparing public versus privately operated facilities. Since the early 1980's the U.S. has witnessed increasing prison privatization as a response to the explosion of inmate populations in public facilities. Previous multivariate comparisons between private and public prisons suggest that state and federal facilities experience significantly fewer inmate assaults on staff members proportionally. This essay will contribute to the literature by examining the effects of several independent variables on inmate inflicted assaults in public and private prisons, and by looking at the disputed impact of privatization on prison safety. This study uses negative binomial regression analysis to examine the most currently available comprehensive facility level data from all adult inmates housed in state, federal, or private prisons in the United States provided by the Bureau of Justice Statistics from 2000 and 2005. Despite using more sophisticated methods, and improved models, than previous studies have employed the results produced in this study remain ambiguous.

Public vs. Private Prison Violence: An Empirical Study of Inmate-on-staff Assaults
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Respectfully,

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Introduction

The Bureau of Labor Statistics (BLS) reported that in 2009, among all occupations, correctional officers had one of the highest rates of days away from work due to nonfatal work injuries (Konda, Reichard, and Tiesman, 2012). Regardless of this evidence many studies on prison safety and violence have focused attention on inmate-on-inmate assaults. Research into the rates and predictors of inmate-on-staff violence is sparse, and even more so is any research at the prison or facility level (Sorensen, Cunningham, Vigen, and Woods, 2011; Lahm, 2009). Despite the several acknowledgements of the gap in research into this little understood phenomenon there still appears to be a need for scholarship pertaining to the differences in inmate violence when comparing public versus privately operated facilities. Among the extant research “there is no clear consensus” about the significance of prison-level variables (Worrall and Morris, 2011, p. 132).

This research seeks to explain whether privately operated prisons are safer than their public counterparts (i.e. State and Federal) by comparing the frequency of inmate-on-staff assaults across facility types while controlling for confounding factors. This study adds to the existing research by bringing together the issues of prison privatization and violence on prison staff by analyzing the most currently reported facility level prison data.¹ This analysis reveals significant differences in reported assaults on staff in 2000 and 2005 between publicly and privately operated prison facilities. Specifically the results produced in this research generate inconsistent evidence to support a conclusion that privately operated facilities are less safe, in terms of staff assaults, than publicly operated prisons.

¹ Bureau of Justice Statistics self-reported prison data from all state Departments of Corrections, the Federal Bureau of Prisons, and privately operated adult confinement facilities in the United States from 2000 and 2005.

Correctional Culture and Administration

Prisons have a unique organizational culture that relies on domination and interpersonal violence, and has an inherent conservatism in the policies surrounding correctional leadership. During the 1970's many criticisms arose regarding the abuses of power relating to domination and control. This domination serves not only as an instigating factor in prison violence, but its legitimacy is claimed to be a critical element of the safe and secure daily operation of prison life, yet it has been under constant challenge since the beginning of the US prison culture transformation that some have called a "revolution in prisoner rights" (Logan, 1990, p. 218), that took place following several major riots in 1970's.

In 2010, the Criminal Justice Institute surveyed the directors of the 50 state correctional agencies and the Federal Bureau of Prisons (BOP) regarding two key themes; major accomplishments, and major challenges looking to the future. According to the responses provided by these directors, improved safety and security are not mentioned at all as a future challenge, and are only noted twice as a major accomplishment. In fact these responses indicate that prison safety no longer appears to be a fundamental concern within the area of correctional administration. Another key issue relating to this study that has appeared to have lost salience is prison privatization which was cited as a major concern by only one director. (Camp and Useem, 2015)

Privatization

Privatization warrants ample discussion in order to properly frame the arguments contained in this research. It has been said that in the process of privatizing prisons the state is divesting itself of its fiduciary role of managing the assets of a key function of government by "stimulating [private] capital accumulation," increasing labor efficiency, and allowing for the

private provision of social welfare and public safety (Taylor and Cooper, 2008, p. 3). Some scholars view the privatization of prisons as “the marketization of a core state activity that seemed fanciful only a short time ago” (Taylor and Cooper, 2008, p. 3-4).

Since the 1980’s the U.S. has witnessed increasing prison privatization in response to an explosion of inmate populations in publicly operated facilities. America’s first and the world’s largest private prison company, Corrections Corporation of America (CCA), came into being and quickly started securing government contracts (Ashton, 2013; Chang and Thompkins, 2002; Logan, 1990; Price and Morris, 2012). It is important to note the prominence of CCA when mentioning private prison corporations, and to recognize this firm’s market power as it commanded 50 percent of the U.S. private prison market as of 2002 (Chang and Thompkins, 2002; Harr, 1999). Wackenhut Corrections Corporation changed its name to The GEO Group, Inc. in 2003, and “as of 2010, GEO holds contracts with 13 states, the Federal Bureau of Prisons, the U.S. Marshals Service, and U.S. Immigration and Customs Enforcement” (Ashton, 2011, p. 8). In 2010 the GEO Group acquired Cornell Companies - a for-profit private prison company with revenues of over \$400 million in 2009, and with further concentration of market power we see “the majority of private prisons now under the management of either GEO or CCA. (Ashton, 2011, p. 8).

It is generally accepted that the birth of privately owned and operated prisons in the US began during the economic hardships of the early 1980’s (Ashton, 2013; Chang and Thompkins, 2002; Price and Morris, 2012). During this time the Reagan administration promoted policies that caused “criminal justice militarization” (Chang and Thompkins, 2002, p. 48) due to a declared war on both crime and drugs (Price and Morris, 2012). It wasn’t until the War on Drugs that Americans passed laws with severe penalties drug crimes that caused US prisons to soar in

population and led to overcrowding (Chang and Thompkins, 2002; Price and Morris, 2012).

Despite President Reagan's calls for a smaller government the above policies ensured the expansion of what scholars have termed "the prison industrial complex" (Chang and Thompkins, 2002, p. 45; Price and Morris, 2012, p. 31; Taylor and Cooper, 2008, p. 7). This overcrowding of existing public prison facilities fueled the movement toward private prison management (Makarios and Maahs, 2012; Price and Morris, 2012).

As is most likely true in nearly all privatization scenarios, the cost reduction factor is prominently at work in the case of private prisons. From this concept both proponents and critics seem to find standing. Some claim that profit maximization and competition will ensure efficiency while others say that it is this process of profit seeking that drives inefficiency in delivering a public good with lost social welfare for everyone (Gran and Henry, 2007-08). In this case competition is recognized as freeing the correctional services from government monopoly on a public good. Government monopoly is undesirable when subpar public sector services are supplied due to a lack of market competition by private entities willing and able to perform the same function more effectively and efficiently. It has been said that "the more essential a service, the greater the need for a diversity of contingent sources of supply" (Logan, 1992, p. 235). Other scholars recognize the opposition to for-profit prisons who cite prisoner abuse and gross inefficiency despite the counter claims that market forces such as private cost-cutting and competition will drive efficient performance (Avio, 1998; Chang and Thompkins, 2002; Gran and Henry, 2007-08; Logan, 1990).

In the matter of cost-cutting, which is the primary engine of private revenue, some studies suggest that "cost differences between state and private prisons are insignificant" (Taylor and Cooper, 2008). Private prisons, however, hinge their argument on the fact that they operate at

significant savings to the State on the premise that they do so by cutting the costs of substantial resources such as labor and programming. In addition to lower financial costs reported by private prisons other scholars propose that there are also reduced opportunity costs when considering that a private prison “can be up and running more quickly than a public prison in most instances” (Price and Morris, 2012, p. 202). Despite efforts to reduce costs scholars have noted that CCA staff in fact undergo training consistent with the hours of training required by Federal Bureau of Prisons staff, and in some instances exceeds the training received by certain county guards and state-employed correctional staff (Logan, 1990).

It has been argued that attempts to expand the private prison market would likely lead correctional firms to deny prisoners due process, extend sentences, and lobby for policies that generate more incarceration (Chang and Thompkins, 2002; Kyle, 2013; Taylor and Cooper, 2008). Others argue, however, that private incentives might increase prisoners’ due process rights by way of exposing the corporate prison to higher levels of civil liability, and thereby demand higher standards in order to avoid lawsuits (Logan, 1990). In economic terms private prisons “face an incentive structure that encourages efforts to maintain demand” (Kyle, 2013, p. 2103). This tendency can be accomplished at the lowest levels “through increased assignment of infractions that decrease an inmate’s likelihood of parole and by maintaining ineffective rehabilitation efforts” (Kyle, 2013, p. 2107). Both the GEO Group and CCA recognize that a shrinking prison population illustrates “the greatest threat to the viability of the private prison industry” (Kyle, 2013, p. 2094). In this tangled relationship between the state and private industry it becomes clear that corporate interests and government priorities may not be aligned (Logan, 1990; Taylor and Cooper, 2008).

Prison Violence and Assaults on Staff

Confinement facilities have been an essential public service in the US since the 1700's. Yet looking beyond a pure market analysis of the performance of institutional corrections “the ability to measure their effectiveness has been problematic since their inception” (Price and Morris, 2012, p. 188). The safety of both staff and inmates has been a measure of the quality of confinement in prisons for over three decades beginning with the instrument designed by Charles Logan in 1992, but which was included in the Prison Social Climate Survey (PSCS) that was implemented by the BOP in 1988 (Price and Morris, 2012). Looking at safety, some scholars assert that while a significant decrease in the rate of major prison disorder and general violence has been reported, the rate of inmate-on-staff assaults has remained virtually unchanged (Sorensen, *et al*, 2011).

Previous studies have examined the role of facility security level in determining the likelihood of increased inmate violence (Griffin and Hepburn, 2013; Konda *et al*, 2012; Lahm, 2009; Steiner and Wooldredge, 2008a; Steiner and Wooldredge, 2008b; Worrall and Morris, 2011). Griffin and Hepburn (2013) found that although prison authorities have attempted to control the incidence of increased individual criminality through assignment to facilities with higher security levels greater misconduct persists in higher security facilities. Again Steiner and Wooldredge (2009) found that across studies few prison-level correlates, including facility security level, maintained consistent statistical significance in their relationship to inmate misconduct.

The existing research into the effects of prison crowding on general prison violence has produced mixed results. In 2006 the Commission on Safety and Abuse in America's Prisons asserted that facilities with populations in excess of their rated capacity are more prone to

violence (Griffin and Hepburn, 2013). Researchers have found correlations between increased crowding and increased rates of inmate misconduct (Gaes and McGuire, 1985; Griffin and Hepburn, 2013; Lahm, 2008; Wooldredge, Griffin, and Pratt, 2001; Worrall and Morris, 2011). Gaes and McGuire (1985) conclude that of all the structural variables observed, crowding was the most significant predictor of staff assault rates. Other studies have found that prison misconduct rates are not affected by crowding (Camp, Gaes, Klein-Saffran, Daggett, and Saylor, 2002; Steiner, 2009). Some researchers have tested prison crowding against multiple penological theories such as the Deprivation model and the Administrative-control model, and find that crowding is either a weak or nonexistent predictor of inmate violence and misconduct (Franklin, Franklin, and Pratt, 2006). McCorkle, Miethel, and Drass (1995) found no specific relationship between crowding and staff assaults. Steiner and Wooldredge (2009) attribute the above inconsistencies to varying methodologies across studies.

Prior research that looks at individual level correlates of serious assaults on prison staff proposes that this type of violence would be disproportionately perpetrated by young black males that are assigned to higher custody level housing facilities (Sorensen, et al, 2011). The body of scholarship on this subject, however, while acknowledging that individual dynamics are important, asserts that institutional-level factors such as the racial composition of the inmate population, facility security level, and crowding produce greater correlations than any other predictors related to the incidence of staff assaults (Griffin and Hepburn, 2012; Lahm, 2009; Sorensen, et al, 2011). Austin and Coventry (2001), using a 1997 national survey, examined the differences between private and public prisons and found that while privately operated facilities employed higher proportions of non-white staff they also reported remarkably higher rates of inmate-on-staff assaults.

Assaults on Staff in Private and Public Prisons

Research into the effects of privatization on measures of prison quality, including inmate and staff safety, seems to have produced mixed results. Some researchers clearly demonstrate that private prisons perform better than state and federal facilities in the ability to avoid inmate attacks on staff, and that “private prisons remained significantly less likely than federal prisons to experience violence” (Lukemeyer and McCorkle, 2006, p.189). Other studies tended to favor private facilities in measuring quality of confinement due to private wardens and managers respectively increased level of flexibility and higher morale (Logan, 1991). Gaes, Camp, and Saylor (1998), favor private prisons in their meta-analysis of eight studies that measured several factors including inmate assaults. However, Austin and Coventry (2001) used a 1997 national survey, and limited their investigation to medium and minimum security facilities to highlight that private prisons report substantially higher rates of inmate inflicted staff assaults compared with public prisons.

As the basis of this new research it is important to look more closely at the findings of Makarios and Maahs (2012). They find that comparisons between private, and both state and federal prisons result in statistically significant correlation. In other words when compared to privately operated facilities state prisons report fewer staff assaults, and federal prisons report slightly more staff assaults.

Using BJS Censuses of State and Federal Adult Correctional Facilities (CSFACF) data from 2000 Makarios and Maahs (2012) examined several dependent variables consistent with the seven “domains of quality” framework that has been established in prior research (Logan, 1992; Perrone and Pratt, 2003). The domain of interest examined in this study is safety, and is generally defined as the presence or lack of interpersonal violence that includes for example

threats of assault, injury, or death to inmates and/or prison staff (Makarios and Maahs, 2012).² Prior to their 2012 research “no single study has examined all seven domains” (Makarios and Maahs, 2012, p.340). These authors controlled for the following independent variables across all domains: facility security level (e.g. maximum and medium), housing assignment by gender identification (e.g. male and mixed), the average daily population of facilities (ADP), and the age of the facility. The facility age was calculated by subtracting the original year of construction from the year 2000.

Data and Methods

The purpose of this study is to determine the differences in staff safety between publicly and privately operated adult confinement facilities in the United States. This will be accomplished in several steps. First, by partially replicating a previous study by Makarios and Maahs (2012), which examined rates of staff assaults in 2000. Second, by improving upon the Makarios and Maahs (2012) model relating to prison safety, measured by the number of inmate-on-staff assaults for 2000. Lastly, by extending the improved model to the data contained in the 2005 CSFACF.

Census of State and Federal Adult Correctional Facilities

This study uses BJS CSFACF data that is composed of facility level data from all US correctional facilities. The facilities in this census were staffed with Federal, State, local, or private employees, held inmates primarily for State or Federal authorities, and were physically, functionally, and administratively separate from other facilities.³ The 2000 Census includes data

² Sexual assaults have more recently been added to the reporting criteria since the 2000 Census and appear aggregated among the reports of assaults in the 2005 data.

³ Excluded from the Census for both 2000 and 2005 are: private facilities not primarily for State or Federal inmates, military facilities, Immigration and Customs Enforcement facilities, Bureau of Indian Affairs facilities, facilities operated by or for local government, including those housing State prisoners, facilities operated by the US Marshals Service, hospital wings and wards reserved for State prisoners, facilities that hold only juveniles.

from 1,668 State, federal, and private facilities. The 2005 Census includes data from 1,821 facilities in total.

The dependent variable in this study is a discrete count of the number of inmate inflicted assaults on staff reported by each facility (“Staff Assaults”). This outcome variable appears in the 2000 data as the number of inmate inflicted physical or sexual assaults on staff that were reported between July 1, 1999 and June 30, 2000. For the 2005 data this measure has been slightly modified to include the number of inmate-inflicted physical or sexual assaults on facility staff that involved a weapon, or a serious injury that were reported between January 1, 2005, and December 30, 2005. In the original Makarios and Maahs (2012) study the authors transform this variable into the natural logarithm to account for the highly skewed data. In the improved models a negative binomial regression analysis of the original count variable is used to achieve similar results.⁴

Methods

As mentioned above the analysis of the relationships among the independent variables previously described and their impact on the reported number of inmate-on-staff assaults will take place in three phases. The first phase involves replicating a portion of a study by Makarios and Maahs (2012), which examined staff assaults in 2000 using OLS regression and a logged dependent variable. This will be done by approximating the original study as closely as possible using the same CSFACF data, and by using the same model functional form. The second phase involves creating an improved model by adding more controls to the Makarios and Maahs (2012)

⁴ We should note that it is possible a significant reporting change may have occurred relating to inmate-inflicted assaults on facility staff due to the addition of an operational definition added to the 2005 Census survey which refined the term assault to mean “an attack that results in physical injury ranging from minor bruises or cuts needing no first-aid to death or serious harm requiring immediate hospitalization,” and that “severely restricts the prisoner’s or staff member’s usual activity” (Census of State and Federal Adult Correctional Facilities, 2005 Codebook).

model that specifically measured the number of inmate-on-staff assaults for 2000, and by using negative binomial regression analysis of the standard count of staff assaults. The third phase of this study extends the improved model to the data contained in the 2005 CSFACF.

In model 1 the Makarios and Maahs (2012) model was approximated to a sample within 46 observations of their original sample for the safety outcome variable. The approximate replication sample for the year 2000 consists of 1,155 adult confinement facilities out of the total of 1,668 facilities that responded to the survey. For models 2 and 3, in addition to the original predictor variables several additional independent variables are included that appear in the literature and are believed to provide more explanatory power in the question about public versus private prison safety. The sample for the year 2005 consists of 1,228 adult confinement facilities out of the 1,821 facilities surveyed. In an effort to conform to measurements in the original research the size of the sample was arrived at by excluding “community correctional facilities” or facilities that allowed more than half of their population to leave (e.g. work release centers). Local and jointly operated prisons only account for approximately one percent of the facilities surveyed, and are excluded from the analysis.

Other sample restrictions include supermax security level facilities, 26 of which were identified for the year 2000, and 24 for the year 2005. These supermax security facilities are excluded from the analysis for the simple reason that, as of the date of this writing, there are no privately operated prisons at this particular security level. For the 2005 sample, observations from the State of Illinois were omitted due to reporting inconsistencies.⁵ Another factor relating to Illinois that is addressed as a modelling restriction is the observation representing the number

⁵ Data for Illinois in 2005 was imputed or estimated as follows: facility level data was carried forward from 2000, while state level numbers of facilities and inmates were based on the Illinois Department of Corrections web site as of June 30, 2005.

of inmate-on-staff assaults reported at the Pontiac Correctional Center, which was dropped from the 2000 sample as severe outlier.

In the improved models for both 2000 and 2005 the primary independent variable of interest remains the facility operator which has been constructed as a set of three dummy variables; State, Federal, and Private. The category of privately operated facilities has been omitted from the models and serves as the reference variable for this group. Other control variables include: facility security level coded as Maximum, Medium, and Minimum security prisons with the latter being omitted as a reference category; housing assignment by gender identification for both Male and Mixed facilities, with Female omitted as a reference category; the ADP of facilities, and the age of the facility which was generated by subtracting the year of original construction from the year 2000 and 2005 for each respective year.

Beyond the variables in the replication of the Makarios and Maahs (2012) study a series of controls for crowding, race, and citizenship have been constructed. Although the above authors recognized crowding as an important variable of concern they employed it as a dependent outcome variable rather than an independent predictor variable for measuring other outcomes such as safety. For this study a crowding variable was constructed that is consistent with Makarios and Maahs (2012), and was created by dividing the ADP by the rated capacity of the facility. Various functions that facilities identify were also included as control variables such as whether a prison functions as a general adult population facility, reception, medical, mental, or geriatric facility. Race variables are also employed as controls that corresponding to the proportion of black, Hispanic, and white inmates in each facility. Race variables were constructed by dividing the total number of black, Hispanic, and white inmates by the ADP.

Lastly a variable reflecting the proportion of non-US citizens housed in US prisons has been included which was constructed by dividing the total number of non-US inmates by the ADP.

In order to evaluate the presence of severe correlation issues among variables a pair-wise correlation table for both 2000 and 2005 was consulted which indicated no severe correlations between independent variables.⁶ A Variance Inflation Factor (VIF) test was also performed on the 2000 and 2005 data, and no severe multicollinearity of predictor variables was indicated in the output.⁷ This test is designed to show how much the variance of the coefficient estimates are potentially inflated by multicollinearity which tends to reduce the precision of our estimates. Since the improved models consist of far more variables than the Makarios and Maahs model, and it is harder to reject the null hypothesis when multicollinearity is present it is important to ensure that the standard errors are not over exaggerated.

Clustered errors are used in the improved models for 2000 and 2005 which produce more conservative standard errors to account for the lack of independence of facilities within states. This option eases the usual requirement that the observations be independent. In other words the observations are independent across states, but not necessarily within each state which accounts for varied state incarceration policies.

These improved models for both 2000 and 2005 use negative binomial regression to analyze the count dependent variable (number of inmate-on-staff assaults) rather than log transform this outcome variable in order to use ordinary least squares (OLS) regression as the original Makarios and Maahs (2012) study used. Because the dependent variable in this study is a count variable without negative values with a non-normal distribution of standard errors, and in order to avoid other violations of OLS assumptions such as heteroskedasticity a poisson

⁶ See Appendix A.

⁷ See Appendix B.

regression analysis was found to be favorable to OLS. However, after conducting a poisson regression on the sample data the log-transformed over-dispersion parameter (lnalpha) was significantly greater than zero and therefore negative binomial analysis is preferred and will control for over dispersion where the variance of errors is greater than the mean.

Results

Table 1.
2000 Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min.	Max.
Staff Assaults	1155	13.953	27.623	0	253
State	1155	0.849	0.358	0	1
Federal	1155	0.069	0.254	0	1
Private	1155	0.081	0.274	0	1
Maximum	1155	0.259	0.438	0	1
Medium	1155	0.435	0.496	0	1
Minimum	1155	0.306	0.461	0	1
Male	1155	0.840	0.367	0	1
Mixed	1155	0.077	0.267	0	1
ADP	1155	1025.959	946.452	0	7200
Age	1155	30.402	31.781	0	189
Crowd	1155	1.014	0.251	0	2.156
Function GAP	1155	0.900	0.301	0	1
Function Reception	1155	0.144	0.351	0	1
Function Medical	1155	0.119	0.323	0	1
Function Mental	1155	0.128	0.334	0	1
Function Geriatric	1155	0.028	0.164	0	1
Proportion Black	1154	0.461	0.248	0	4.375
Proportion Hispanic	1154	0.102	0.153	0	1.850
Proportion white	1154	0.424	0.338	0	7.500
Proportion nonCitizen	1154	0.052	0.116	0	1.825
Note: ADP = Average Daily Population					
GAP = General Adult Population					

Looking at the summary statistics for the year 2000 data the dependent variable (Staff Assaults) is the number of inmate-on-staff assaults which is a discrete count variable ranging from 0 to 253 staff assaults with a mean of approximately 14 staff assaults per facility. Approximately 85 percent of this sample is composed of state operated facilities, nearly 7 percent are federally operated, and just over 8 percent (94 private facilities in total) are privately operated. Approximately 26 percent of facilities are rated at maximum security, 44 percent at

medium security, and 30 percent are rated as minimum security facilities. 84 percent of the adult confinement facilities in this sample are male housing units only with approximately 8 percent housing male and female prisoners (mixed housing). The average daily population (ADP) of this sample ranges from 0 to 7,200 inmates with a mean of 1,026 inmates per facility. The age of these prisons ranges from 0 to 189 years old with a mean age of 30 years old. In order to report the description of the statistic relating to the crowding variable it is necessary to also describe the construct of this particular variable. The crowding variable consists of the ADP divided by the rated capacity, and those facilities that have an ADP greater than the rated capacity are overcrowded. For this variable 1.0 equals a facility at 100 percent capacity, and with the mean of 1.014 for the 2000 data facilities are crowded at 1.4 percent over capacity. 90 percent of this sample functions as a General Adult Population (GAP) facility, 14 percent functions as a reception facility, 12 percent functions as a medical facility, 13 percent function as mental facilities, and 3 percent function as geriatric units. For the entire sample 46 percent of the inmate population of the 1154 facilities are black inmates, 10 percent are Hispanic, and 42 percent are white/Caucasian inmates. Approximately 5 percent of the inmate population for this sample are non-US citizens.

Table 2.
2005 Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min.	Max.
Staff Assaults	1228	2.952	11.632	0	180
State	1228	0.835	0.372	0	1
Federal	1228	0.078	0.269	0	1
Private	1228	0.087	0.282	0	1
Maximum	1228	0.281	0.450	0	1
Medium	1228	0.371	0.483	0	1
Minimum	1228	0.349	0.477	0	1
Male	1228	0.843	0.364	0	1
Mixed	1228	0.060	0.238	0	1
ADP	1227	1052.197	980.367	0	7195
Age	1184	31.736	30.515	0	194
Crowd	1196	1.044	0.272	0	2.757
Function GAP	1228	0.894	0.308	0	1
Function Reception	1228	0.124	0.329	0	1
Function Medical	1228	0.129	0.335	0	1
Function Mental	1228	0.136	0.343	0	1
Function Geriatric	1228	0.042	0.200	0	1
Proportion Black	1196	0.424	0.213	0	1.716
Proportion Hispanic	1065	0.135	0.161	0	1.401
Proportion white	1198	0.440	0.201	0	1.667
Proportion nonCitizen	1226	0.054	0.115	0	1.021
Note: ADP = Average Daily Population					
GAP = General Adult Population					

Table 2 contains the summary statistics for the 2005 sample. The overall number of observations for this year is larger than the 2000 sample by just over 6 percent, and ranges from 1,065 to 1,228 depending on the variable. We see a dramatic difference in the dependent variable with a maximum of 180 inmate-on-staff assaults, and a mean of approximately 3 staff assaults per facility. Compared to the 2000 sample there is a similar proportion of state operated facilities (84 percent), federally operated (approximately 7 percent), and privately operated facilities slightly increasing to nearly 9 percent (107 private facilities in total). 28 percent are rated at the maximum security level, 37 percent at medium security, and 35 percent are rated minimum security facilities. 84 percent of facilities house only male inmates, and 6 percent are mixed (male/female) housing facilities. The ADP ranges from 0 to 7,195 with an average of 1,052

inmates per facility. The age of the facilities in this sample range from 0 to 194 years old with the mean age of approximately 32 years old. The crowding variable for the 2005 data has a mean of 1.044 which translates to facilities being 4.4 percent over capacity on average. 89 percent of facilities in the 2005 sample function as GAP facilities, 12 percent as reception facilities, 13 as medical facilities, just over 13 percent function as mental facilities, and 4 percent as geriatric units. Compared to the 2000 sample the proportion of black inmates reported in this sample declined to just over 42 percent, the proportion of Hispanics increased to over 13 percent, and the proportion of white prisoners increased to 44 percent. The number of non-US citizen inmates increased from 5.2 percent in the 2000 sample to 5.4 percent in the 2005 sample.

The statistical regression output for the three models is presented side-by-side in in Table 3. The following interpretation will focus on the direction and significance of the relationship between the independent variables and inmate-on-staff assaults.⁸ The first step is identifying which variables have a positive effect recognized by beta coefficients greater than zero, and which variables have a negative effect documented as having betas less than zero. The second step will acknowledge the statistical significance for each variable at different confidence intervals.⁹ The next step is discussing whether the effects, and their respective significance levels are consistent across all three models.

With respect to model 1 (i.e. the replication model), the state prison variable, indicates a significantly ($p < 0.01$) lower expected count of inmate-on-staff assaults relative to privately operated prisons. Relative to private prisons, federally operated facilities are associated with a

⁸ The original Makarios and Maahs (2012) study uses OLS with standardized beta coefficients and normal standard errors, while the improved models use negative binomial regression with clustered standard errors, so magnitude differences may be difficult to make side-by-side comparisons.

⁹ 95% confidence – ($p < 0.05$); 99% confidence – ($p < 0.01$); 99.9% confidence – ($p < 0.001$).

significantly ($p < 0.01$) higher expected number of staff assaults.¹⁰ Among control variables maximum and medium security prisons, relative to minimum security prisons, have significantly more staff assaults ($p < 0.001$). The variables representing housing assignments are not statistically significant. ADP is associated with higher expected assault counts, and is highly significant ($p < 0.001$). As the age of the facility increase there is an associated significant ($p < 0.01$) increase in the number of staff assaults.

Looking at the improved 2000 model (Model 2 in Table 3) the key independent variables representing public prisons have mixed results. State prisons have significantly fewer ($p < 0.01$) inmate-on-staff assaults relative to private prisons, while the federal prison variable coefficient is not statistically significant. Among control variables, the coefficients for both maximum and medium security level prisons are positive, and highly significant ($p < 0.001$), meaning they both have more staff assaults than minimum security facilities. Crowding yielded non-significant results. The remaining control variables with significant results for this model are the facility function variables. Facilities that function both as medical and mental units are associated with significantly increased levels of inmate-on-staff assaults. Geriatric units are associated with significantly fewer staff assaults.

Model 3 applies the improved model to the 2005 data. We see from the beta coefficients in Model 3 several differences in the direction and significance of the relationship between independent variables and the dependent variable. In this model the key independent variables representing facility operator show that neither state, nor federal prisons report statistically significant differences in the number of staff assaults relative to privately operated prisons in 2005. Among control variables, maximum and medium security facilities both experience greater

¹⁰ See the discussion on federal reporting differences between “serious,” and “non-serious” assaults.

numbers of staff assaults relative to minimum security prisons ($p < 0.001$). All-male housing units report significantly ($p < 0.001$) more staff assaults. An increase in ADP is positively correlated with increased numbers of staff assaults, and is highly significant ($p < 0.001$). The variable representing prisons that report a mental health function is associated with highly significant ($p < 0.001$) increased numbers of staff assaults. Looking at racial composition, as the proportion of Hispanic inmates in a facility increases there is a statistically significant increase in the number of inmate-on-staff assaults reported by prisons. As the share of non-US citizen inmates increases there is a highly significant ($p < 0.001$) increase in the number of inmate on staff assaults for the 2005 sample.

Table 3.
Regression Output

Number of Staff Assualts	Model 1	Model 2	Model 3
	Original 2000	Improved 2000	Improved 2005
	β /se	β /se	β /se
State	-0.0745** {0.121}	-0.5380** {0.201}	-0.235 {0.438}
Federal	0.0958** {0.168}	0.4437 {0.277}	-0.5167 {0.976}
Maximum	0.4669*** {0.092}	2.1840*** {0.189}	2.6214*** {0.322}
Medium	0.2682*** {0.080}	1.4428*** {0.185}	1.9143*** {0.394}
Male	0.0003 {0.117}	0.0191 {0.208}	1.0691*** {0.318}
Mixed	-0.0336 {0.159}	-0.2094 {0.263}	0.2684 {0.488}
ADP	0.4107*** {0.000}	0.0008*** {0.000}	0.0006*** {0.000}
Age	0.0556** {0.001}	0.0039** {0.001}	0.0027 {0.003}
Crowd		-0.5472 {0.358}	0.6891 {0.566}
Function GAP		0.0137 {0.280}	-0.429 {0.366}
Function Reception		0.0601 {0.225}	0.1253 {0.328}
Function Medical		0.5373* {0.239}	0.3388 {0.261}
Function Mental		0.5121* {0.205}	0.9867*** {0.272}
Function Geriatric		-0.5578* {0.252}	-0.0004 {0.462}
Proportion black		0.3409 {0.445}	0.8272 {0.610}
Proportion Hispanic		-0.4397 {0.550}	-3.4331* {1.361}
Proportion white		-0.307 {0.257}	-0.1872 {0.765}
Proportion nonUScitizen		0.6387 {0.523}	3.3086* {1.341}
_cons	0.3765* {0.161}	0.6488 {0.550}	-3.3857*** {0.938}
lnalpha			
_cons		0.6346*** {0.115}	1.5116*** {0.206}

Note: * p< .05, ** p< .01, *** p< .001

Discussion

In comparing levels of inmate-on-staff assaults reported in public versus private prisons, the results depend on model specification and year analyzed. The Makarios and Maahs (2012) model suggested that relative to private prisons, state prisons experienced significantly fewer staff assaults, and federal prisons reported significantly more inmate inflicted staff assaults. Among the controls in the original model maximum and medium security facilities experienced significantly more staff assaults. Also the ADP, and increased facility age were indicators of significantly more inmate-on-staff assaults.

While it is true that many of the additional controls in both of the improved models do not yield significant results on their own, they do have significant impacts on the beta coefficients that are carried forward from the original model. These results indicate the possible effects of omitted variable bias, improper functional form, or incorrect model specification. When the model is better specified to include a more complete list of control variables suggested in the literature some interesting findings come to light. For example in a direct comparison of the regression output between both models 1 and 2 using the 2000 sample data, all but one independent variable, the primary variable of concern, retains its direction of correlation and statistical significance level. The singular variable in the original replication model that is impacted by the addition of more controls and more conservative standard errors (e.g. clustered) in the improved model 2 is the dummy variable for federally operated facilities, which no longer keeps its significance. In other words, when using the improved model federal prisons no longer show any significant difference in the number of staff assaults when compared to privately operated prisons. This loss of significance suggests a potential omitted variable bias contained in the original Makarios and Maahs (2012) model.

Looking at the improved model using 2005 data (Model 3 in Table 3) the key independent variable, facility operator, loses statistical significance for both state, and federally operated prisons when compared to private prisons. In other words the data supports rejecting any hypothesis that suggest there is a difference in staff assaults between public and private prisons. This essentially negates the findings of Makarios and Maahs (2012) using the most currently reported BJS data.

Of the additional 10 control variables contained in the improved models only three have statistical significance when looking at the 2000 data; the facility function variables of medical units, mental units, and geriatric units. The variables that represent the facility security level remain consistent for both the 2000 and 2005 samples, both maximum and medium security facilities are positively correlated with increased inmate-on-staff assaults compared with minimum security facilities, and both are highly significant ($p < 0.001$). When compared to both the original and the improved 2000 models, the all-male housing variable for model 3 moves from non-significant to highly significant ($p < 0.001$) using the 2005 sample. ADP remains highly significant ($p < 0.001$) across all three models. Facility age loses statistical significance in model 3, whereas the same measure was highly significant ($p < 0.01$) for the original and improved 2000 models.

Other added control variables not in the original study include the crowding variable, while not included as a control variable in the original study, but is discussed thoroughly in the literature, is not significant in either the 2000 or 2005 improved models. Out of the three facility function variables that had significant explanatory influence on the dependent variable in model 2 (e.g. medical, mental, and geriatric), only the mental function variable remained, and in fact increased in significance ($p < 0.001$). Looking at the effect of an increase in the proportion of

Hispanic inmates on staff assaults, there was a non-significant relationship in model 2, but is associated with a significant decrease in staff assaults for 2005. The last additional control variable shows that for an increase in the proportion of non-US citizen inmates in 2000 there was a non-significant relationship with the dependent variable, but in the 2005 sample this was associated with a highly significant ($p < 0.001$) increase in staff assaults.

One key explanatory variables that could have been included in the improved models, but was unavailable in these data is the average age of the inmate population. Another variable that was not explored in this research is the racial composition of the facility staff, such as the proportion of black or white guards for any given facility. Sexual assaults have also more recently been added to the reporting criteria since the 2000 Census and appear aggregated among the reports of assaults in the 2005 data.

It should also be noted here regarding self-reporting issues that while federal facilities reported more assaults on both inmates and prison staff, according the CSFACF codebook, the large majority were classified as “nonserious” (Makarios and Maahs, 2012). Other shortcomings encountered in the use of these data included the inability to fully describe the differences in the composition of the inmate population. While partial control was achieved in the area of facility security level, and by the use of facility function variables, this study was not able to control for factors such as gang membership and other population characteristics like types of offenses resulting in incarceration.

Conclusion

The results of this data analysis cannot provide a persuasive argument in favor or against the privatization of a core function of government; the private provision of an historically public good. This research only considered one particular measure of prison safety, which as alluded to

in the introduction is in fact a measure of occupational or workplace safety. In the case of adult correctional facilities there are other measures of safety that were not studied as part of this examination, chief among them is inmate-on-inmate assaults. The outcomes produced in the models in this study continue to add questions to the debate about whether public entities provide the safest environment to confine adult criminal offenders, but should in no way be used as the basis for making a policy decision regarding privatization. More importantly the results contained in this study create questions and concerns regarding the risks associated with self-reported data, as in the case of the CSFACF. In other words the effects seen in this research cannot unambiguously suggest any course of action.

Regarding arguments over privatization, as with the original 2012 study, and although this research focused only on prison safety, the data resulting from this investigation affirms that “private prisons are comparable, though not superior, to publicly operated facilities” (Makarios and Maahs, 2012, p. 353). Setting aside normative debates over this subject there appears to be room to continue to explore the differences in costs and benefits between public and private methods of incarceration.

It is demonstrated in the literature that there is no clear evidence that the profit motive causes increased criminality in terms of increased rates of inmate-on-staff assaults or resulting decreased prison safety. There are valid points to be made, both for and against prison privatization, however, economic theories suggesting that the profit motive alone is reason enough to condemn this growing phenomenon seem not to be a credible basis for arguing on the grounds of prison safety. One preeminent criminal justice scholar even contends that it is in fact the profit motive that assures safer and more efficient methods of adult confinement will be

adhered to (Logan, 1990). However, it should be stressed that there are numerous measures of safety and efficiency that were not explored in this study.

One problem that may have massive impacts on concluding about the effectiveness of private prisons, and most probably contributes to spurious relationships seen in studies on this subject is the fact that private prisons have the ability to pick and choose the inmates they house, whereas state and federal prisons are not granted that luxury. Other problems with making conclusive policy recommendations based on this study in particular, and others that use the CSFACF, is that there are several significant variables that are not included in the data such as special housing units (e.g. administrative segregation), rates of known gang affiliation, and the average age of the inmate population, all of which would have effects on prison violence. A last note to consider relating to the reported numbers of assaults is that private prisons quite possibly employ fewer correctional staff per facility, so they will likely have fewer reported assaults simply because they have fewer staff to be assaulted.

The contribution of this research is a limited one, but it has improved on previous work. It has contributed to the development of a better specified model that includes a more comprehensive list of estimators for examining one of the key domains of the quality of confinement (i.e. prison safety). With the above considerations in mind the only accurate conclusion to be made is that further research is necessary to fully understand this issue, or to make fully informed policy determinations about privatizing prisons.

**Appendix A.
2000**

	inAssS~N	State	Federal	Private	Maximum	Medium	Minimum	
inAssStaffN	1.0000							
State	0.0173	1.0000						
Federal	0.0163	-0.6477	1.0000					
Private	-0.0377	-0.7068	-0.0812	1.0000				
Maximum	0.3335	0.1771	-0.0912	-0.1470	1.0000			
Medium	-0.0440	-0.0646	-0.0402	0.1217	-0.5191	1.0000		
Minimum	-0.2697	-0.0989	0.1299	0.0087	-0.3921	-0.5827	1.0000	
Male	0.0836	0.0273	0.0169	-0.0513	-0.0168	0.0122	0.0028	
Mixed	-0.0558	-0.0598	0.0107	0.0684	-0.0151	0.0343	-0.0226	
ADP	0.4573	0.0109	0.0865	-0.0946	0.2057	0.1360	-0.3420	
Age	0.0820	0.1766	-0.0097	-0.2221	0.0974	-0.1383	0.0562	
Crowd	0.0198	-0.1175	0.3600	-0.1806	0.0125	0.0214	-0.0350	
funcGAP	0.1128	0.0284	0.0685	-0.1007	0.0528	0.1250	-0.1848	
funcRecept~n	0.0305	0.1173	-0.0826	-0.0768	0.1354	0.0483	-0.1807	
funcMedical	0.1909	0.0796	-0.0263	-0.0798	0.1622	-0.0252	-0.1271	
funcMental	0.1708	0.0963	-0.0434	-0.0857	0.1992	-0.0337	-0.1531	
funcGeriat~c	0.0007	0.0711	-0.0460	-0.0502	0.0207	0.0220	-0.0433	
Prop_black	0.0307	0.0736	-0.0306	-0.0679	0.1151	-0.0547	-0.0505	
Prop_Hisp	0.0585	-0.0278	-0.1788	0.2033	-0.0458	0.1092	-0.0740	
Prop_white	-0.0769	-0.0413	0.1305	-0.0676	-0.0162	-0.0244	0.0417	
Prop_nonUS~n	0.0324	-0.3780	0.4553	0.0708	-0.0352	0.0322	-0.0012	
		Male	Mixed	ADP	Age	Crowd	funcGAP	funcRe~n
Male		1.0000						
Mixed		-0.6616	1.0000					
ADP		0.1345	-0.0569	1.0000				
Age		0.0000	0.0029	0.0681	1.0000			
Crowd		0.0790	-0.0350	0.2391	0.0796	1.0000		
funcGAP		0.0975	-0.1195	0.2202	0.0871	0.1316	1.0000	
funcRecept~n		-0.2181	0.1130	0.0718	0.0894	-0.0026	-0.0027	1.0000
funcMedical		-0.1245	0.1049	0.2031	0.1068	0.0202	0.0424	0.2008
funcMental		-0.1575	0.1029	0.1705	0.0969	-0.0174	0.0678	0.1826
funcGeriat~c		-0.0701	0.0699	0.0268	0.0718	-0.0071	0.0564	0.0963
Prop_black		0.1715	-0.1980	-0.0021	-0.0530	-0.1010	0.0661	-0.1347
Prop_Hisp		0.0142	0.0311	0.1836	-0.0919	-0.1016	-0.0126	-0.0208
Prop_white		-0.0813	0.0562	-0.1524	0.0041	-0.1626	0.0080	0.0325
Prop_nonUS~n		0.0301	0.0437	0.1926	-0.0722	0.1643	0.0718	-0.0406
		func~cal	func~tal	funcGe~c	Prop_b~k	Prop_H~p	Prop_w~e	Prop_n~n
funcMedical		1.0000						
funcMental		0.4762	1.0000					
funcGeriat~c		0.2807	0.1720	1.0000				
Prop_black		-0.0153	-0.0229	-0.0324	1.0000			
Prop_Hisp		-0.0216	-0.0455	-0.0345	-0.2085	1.0000		
Prop_white		0.0118	0.0271	0.0522	0.1088	-0.0572	1.0000	
Prop_nonUS~n		0.0042	-0.0223	-0.0496	-0.1091	0.3939	0.2228	1.0000

Appendix A.
2005

	inAssS~N	State	Federal	Private	Maximum	Medium	Minimum
inAssStaffN	1.0000						
State	0.0664	1.0000					
Federal	-0.0523	-0.6544	1.0000				
Private	-0.0377	-0.6942	-0.0900	1.0000			
Maximum	0.1908	0.1757	-0.0943	-0.1417	1.0000		
Medium	-0.0080	-0.0217	0.0278	0.0021	-0.4796	1.0000	
Minimum	-0.1719	-0.1438	0.0607	0.1315	-0.4572	-0.5612	1.0000
Male	0.0461	0.0367	0.0007	-0.0491	-0.0636	0.0811	-0.0222
Mixed	-0.0260	-0.0531	0.0537	0.0188	0.0321	0.0183	-0.0488
ADP	0.2663	-0.0147	0.1143	-0.0889	0.2119	0.1552	-0.3573
Age	-0.0276	0.1596	-0.0549	-0.1606	0.0532	-0.0178	-0.0327
Crowd	0.1727	-0.1487	0.3600	-0.1454	0.0783	0.0561	-0.1306
funcGAP	0.0482	0.0891	0.1002	-0.2128	0.1091	0.1489	-0.2538
funcRecept~n	0.0077	0.1340	-0.1095	-0.0723	0.1942	-0.0170	-0.1659
funcMedical	0.1141	0.0859	-0.0485	-0.0670	0.1278	0.0023	-0.1228
funcMental	0.1945	0.0870	-0.0624	-0.0552	0.2383	-0.0584	-0.1655
funcGeriat~c	0.0612	0.0047	-0.0606	0.0515	-0.0121	0.0516	-0.0409
Prop_black	0.0691	0.0421	0.0751	-0.1331	0.1026	0.0364	-0.1345
Prop_Hisp	0.0098	-0.2598	0.0251	0.2588	-0.0481	-0.0143	0.0616
Prop_white	-0.0872	-0.0917	0.1962	-0.0723	-0.0765	-0.0126	0.0854
Prop_nonUS~n	-0.0157	-0.4308	0.4031	0.1844	-0.0581	0.0108	0.0439
	Male	Mixed	ADP	Age	Crowd	funcGAP	funcRe~n
Male	1.0000						
Mixed	-0.5864	1.0000					
ADP	0.1375	-0.0253	1.0000				
Age	-0.0198	0.0193	0.0325	1.0000			
Crowd	0.0711	0.0031	0.4261	0.0579	1.0000		
funcGAP	0.0260	-0.0352	0.2471	0.0279	0.1280	1.0000	
funcRecept~n	-0.2453	0.1023	0.0886	0.0029	-0.0010	0.0650	1.0000
funcMedical	-0.1281	0.0867	0.1262	0.1101	0.0078	0.0769	0.3282
funcMental	-0.1159	0.0393	0.0698	0.0097	0.0106	0.0670	0.2404
funcGeriat~c	-0.0671	0.0330	-0.0164	-0.0027	-0.0333	-0.0478	0.1077
Prop_black	0.2153	-0.1733	0.0066	-0.0108	-0.1136	0.1392	-0.1406
Prop_Hisp	0.0700	-0.0239	0.2559	-0.0707	0.0231	-0.1205	-0.0895
Prop_white	-0.2495	0.1170	-0.1901	-0.0079	-0.0402	-0.0126	0.1309
Prop_nonUS~n	0.0385	0.0547	0.1938	-0.0688	0.1545	0.0725	-0.0954
	func~cal	func~tal	funcGe~c	Prop_b~k	Prop_H~p	Prop_w~e	Prop_n~n
funcMedical	1.0000						
funcMental	0.5145	1.0000					
funcGeriat~c	0.2370	0.1317	1.0000				
Prop_black	-0.0800	-0.0306	-0.0761	1.0000			
Prop_Hisp	-0.0919	-0.1269	0.0051	-0.3270	1.0000		
Prop_white	0.0876	0.0722	0.0439	-0.3950	-0.3501	1.0000	
Prop_nonUS~n	-0.0513	-0.0600	-0.0361	-0.1040	0.6634	-0.0155	1.0000

Appendix B.
2000

Variable	VIF	1/VIF
Federal	2.71	0.368987
State	2.00	0.498877
Prop_nonUS~n	1.96	0.509684
Male	1.94	0.516765
Mixed	1.84	0.542250
Maximum	1.70	0.587354
Prop_Hisp	1.65	0.605476
Medium	1.63	0.613410
ADP	1.43	0.697347
funcMedical	1.43	0.700759
funcMental	1.37	0.730374
Crowd	1.33	0.751007
Prop_white	1.22	0.821477
Prop_black	1.18	0.847893
funcRecept~n	1.16	0.858727
funcGAP	1.12	0.893375
Age	1.11	0.902793
funcGeriat~c	1.11	0.903817
Mean VIF	1.55	

2005

Variable	VIF	1/VIF
Prop_Hisp	2.79	0.358414
Prop_black	2.29	0.435942
Prop_white	2.23	0.447713
Prop_nonUS~n	1.90	0.527252
Maximum	1.80	0.556094
ADP	1.75	0.572558
Male	1.67	0.598683
Medium	1.62	0.616606
funcMedical	1.54	0.650466
Mixed	1.47	0.678525
funcMental	1.43	0.697637
Crowd	1.39	0.720763
funcRecept~n	1.28	0.782326
State	1.24	0.808691
funcGAP	1.18	0.850790
funcGeriat~c	1.09	0.921505
Federal	1.08	0.929126
Age	1.05	0.948279
Mean VIF	1.60	

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