The Impact of Incarceration Rates on Crime in Canada: An Econometric Analysis of Panel Data for Six Provinces, 2002-2012

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***Abstract*—This paper conducts an econometric analysis of the impact of incarceration rates on crime rates using panel data from six Canadian provinces: Nova Scotia, Quebec, Ontario, Manitoba, Alberta and British Columbia during the years 2002-2012. This paper employs an empirical model based on the effect of incarceration rates per 100,000 population on crime rates (the number of incidents per 100,000 population) as well as the effects of three right-hand side variables, the unemployment rate, the rate of police officers per 100,000 population, and the postsecondary graduation rate. This model is used in both levels model regression and log-log model regression through which the right-hand side variables, province dummy variables and robust standard errors are added in a total of eight individual models. The results demonstrate that incarceration rates per 100,000 adults do have an impact on crime rates and that in all models except the levels model 1 and log-log model 1, the effect was negatively related. This finding has policy implications for Canada's current policy climate surrounding the federal Conservative's tough-on-crime agenda and the effective reduction of crime rates in a time of fiscal restraint.**

***Index Terms*—Conservatives, crime, incarceration, police officers, policy, postsecondary graduation, unemployment.**

I. Introduction

It is a challenge of governments everywhere to manage and mitigate the occurrence of crime within their jurisdictions. There is an expectation that as the locus of legitimate power and authority, national governments will do what is necessary to keep crime rates low and deploy policies that will do so effectively. What constitutes effective policy for reducing a country's crime is less certain. There are countless factors that can presumably impact the rate of crimes committed, some of which are unique to the particular country or time period. Further, crime is influenced by sociological factors that are rooted in social behaviours and societal problems, such as unemployment. Most often, the factors that are of particular interest to policymakers are those that can be modified directly by policy and can be observed to result in a reduction in crime rates. These policies can be more easily marketed to the public and will be well received. Typically, governments will fall back on methods of deterrence to manage the crime rate, for example through incarceration and police presence. The effectiveness of this 'tough-on-crime' approach is ambiguous given the high cost of resources for these methods and their uncertain efficiency in reducing crime rates [1].

The federal Conservative government of Canada under the administration of Stephen Harper has undertaken a crime reduction agenda that is unequivocally 'tough-on-crime.' Since 2006, the Conservative government has tabled various legislation, crafting a more deterrence-based justice system. This has included introducing minimum mandatory sentences into Canada's penal system and the proposal to eliminate parole for those sentenced to life in prison. Recent research, however, has suggested that this upward trend of stricter crime reduction strategies will not result in the desired reduction in crime rates [2]. As described in [3], these studies cite the state of Texas, known for its tough-on-crime agenda, where incarceration rates were once the highest in the world. Recently, the state has reversed its tough-on-crime policies in favour of more preventative measures and has notably seen a decrease in its overall crime rates [3]. The policy implications of this research for the future of Canada's crime reduction response serves as the motivation for this research paper.

Given the Conservative government's policy focus on making prison sentences harsher, an econometric examination of whether incarceration rates have an impact on crime rates (and whether this focus makes for effective policymaking) will be helpful in the current policy environment. Panel data from six Canadian provinces, Nova Scotia, Quebec, Ontario, Manitoba, Alberta and British Columbia, for the years 2002 to 2012 will be the focus of this paper; a multivariate regression model will be specified to assess the magnitude of the impact of incarceration rates on crime rates in these provinces and how much of the decline in crime rates is explained by the various incarceration rates. As independent variables, this paper will assess unemployment rates (the percentage of the total labour force over age 15 that is unemployed), the rate of police officer personnel per 100,000 population, and the post-secondary graduation rate (based on the percentage of Canadians aged 20-24) to control for the effect on the crime rate caused by the incarceration rate. The results of this research can help inform the future policy direction of the Canadian government and whether a 'tough-on-crime' agenda is efficient and effective policy.

Within a policy context, the analysis that follows is important and timely. The challenge facing the Canadian government (and most other governments) is the current fiscal environment and the desire to make government expenditure and resource allocation highly efficient. In

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addition, the author is unaware of any Canadian studies on incarceration rates using time-province data.

Data

The data referenced in this paper and used in the empirical model was entirely collected from Statistics Canada's database, the Canadian Socio-economic Information Management System (CANISM). The data collected represents panel data consisting of both time and jurisdictional parameters; it was gathered from six Canadian provinces including Nova Scotia, Quebec, Ontario, Manitoba, Alberta and British Columbia ranging from 2002 to 2012. The data originated from various CANSIM tables and the classification of each table is presented in the source column of Table IX. It is important to note that the parameters of this data were chosen based on relevance and availability. The six provinces chosen represent each region of Canada (excluding only Northern Canada): the Pacific region, the Prairie region, the Central region, and the Atlantic region. This ensures a more representative analysis. These provinces are the largest and most populous of the provinces thereby making their analysis more relevant to the broader discussion of crime in Canada. The provinces with a larger population also have a larger crime rate which makes this analysis more useful. The years 2002-2012 were selected based on the raw data recorded by CANSIM. For some variables looked at, the data was not available or was missing for some years, however, all the variables examined had data recorded for 2002-2012, making this the ideal time frame examined.

The variables this paper examines consist of the crime rate as the dependent variable and incarceration rate as the main independent variable of interest. The unemployment rate, the rate of police officer personnel, and postsecondary graduation rates are examined as additional right hand side variables of the multivariate regression model. These variables are commonly examined in the econometric literature when assessing the explanatory factors of the crime rate. This influenced the decision to include these variables here.

The crime rate data in CANSIM is provided in terms of actual incidents, crimes cleared, and the rate per 100,000 population among other output options. It is also available by type of criminal violation, including all criminal code violations, or specific violations ranging from violent offences to traffic offences. The data examined in this paper is limited to the total Criminal Code violations, excluding traffic violations with no specific distinction between violations and is presented in terms of the crime rate per 100,000 population.

The incarceration rate is the independent variable of interest. Through CANSIM, data on incarceration is provided by province as well as a measure of persons incarcerated, persons on probation or under community supervision and as a rate per 100,000 adults. To maintain consistency with the crime rate, and to allow the two datasets to be compared, this paper looks at the incarceration data as a rate per 100,000 adults.

Three other independent variables are examined in the multivariate regression model including the unemployment rate, the police officer rate and the postsecondary graduation rate. Unemployment data in CANSIM is recorded in the labour force survey data that includes output options such as population, total labour force, participation rate, and employment and unemployment in numbers and rate. This paper utilized the unemployment rate, which for this paper is calculated as the percentage of the labour force age 15 and over that is unemployed. The data is seasonally adjusted to account for variation caused by seasonal differences and the data output for this rate was changed from monthly values to yearly averages. The data regarding police officer personnel in CANSIM is provided by police officer strength and the rate per 100,000 population among other output options. In order to compare the data with the crime and incarceration rates, this paper uses the rate of police officers per 100,000 population.

Finally, data tracking postsecondary graduation is provided in CANSIM and is classified by the Pan-Canadian Standard Classification of Education (PCSCE). The data is presented in terms of institution type, education programs, sex of the students, and immigration status of the students. This paper examines only Canadian students, both male and female, because international students convicted of a crime would likely be deported back to their own countries to serve their sentence. Included in the data examined are all institution types as well as all program types classified by PCSCE. The data provided by CANSIM, however, is only accessible as real numbers of graduated students. In order to make the data more comparable to the crime rate, the incarceration rate, and the police officer rate, the CANSIM Table 051-0001 containing data of the population of each province was used to calculate the rate of 20-24 year olds that have graduated from postsecondary education.

II. Empirical Model

The model used to assess the impact of incarceration rates on crime rates is an OLS multivariate regression model. This model that depicts the relationship between crime rates and incarceration rates includes the right-hand side variables discussed above. The model is as shown:

$$crimerate_{it} = \beta_0 + incarcerationrate_{it} + \beta_2\, unemploymentrate_{it} + \beta_3 policeofficerrate_{it} + \beta_4 postsecondaryrate_{it} + \varepsilon_{it}$$

where $crimerate_{it}$ is the number of incidents per 100,000 population each year examined in province i and in year t; $incarcerationrate_{it}$ is the percentage of 100,000 adults incarcerated in province i and in year t; $unemploymentrate_{it}$ is the percentage of the labour force age 15 and over who are unemployed in province i and in year t; $policeofficerrate_{it}$ is the number of police officers per 100,000 population in province i and in year t; $postsecondaryrate_{it}$ is the population of 20-24 years olds divided by the number of postsecondary education graduates in province i and in year t and ε_{it} is the error term.

Variations of this model were used to assess the impact of incarceration rates on crime, including a levels model as

displayed above, and a log-log model shown below:

$$lncrimerate_{it} = \beta_0 + \beta_1\, lnincarcerationrate_{it} + \beta_2\, lnunemploymentrate_{it} + \beta_3\, lnpoliceofficerrate_{it} + \beta_4\, lnpostsecondaryrate_{it} + \varepsilon_{it}$$

The log-log model used the same variables as the levels model; however, the natural logarithms of the data were used instead of the real numbers. More specifically, there were eight variations of these models employed; the first four were based on the levels model and the second four were based on the log-log model. The first model was a regression of the crime rate as the dependent variable, and the incarceration rate as the independent variable of interest. The second model was a regression of the crime rate and the incarceration rate in addition to the other independent control variables, the unemployment rate, the police officer rate and the postsecondary graduation rate. The third model was the same as the second model; however, it introduced province dummy variables into the regression. Finally, the fourth model was the same as the third model; however, it introduced the use of the "robust" command in addition to the province dummy variables. The four log-log models involved the same regression variables as the four levels models above, with the only difference being the use of the data logarithms.

The introduction of the multivariate model 2, using several independent variables, is expected to increase the strength of model 1 in assessing the impact of the incarceration rate on the crime rate. Moreover, the introduction of province dummies in model 3, in order to control for the factors unique to each province that might be captured in the regression, as well as the "robust" command in model 4 is also expected to increase the strength or Adjusted R-Squared of the model.

III. Econometric Analysis

A. Levels Model

The results of the four levels model regressions are presented in Tables I, II, III and IV. The tables include the results of the coefficient estimates of both the incarceration rate as well as the other independent variables. It also includes the values of the standard errors and the t-statistic. The Adjusted R-Squared value is included for each individual model.

B. Model 1

The results of the regression of model 1 by which the impact of the incarceration rate on the crime rate was assessed suggest that incarceration rates have a significant positive effect on crime rates. The coefficient estimate is not only positive; it is also of a significantly high magnitude. The model suggests that with a one person per 100,000 adults increase in the incarceration rate, there is a 23.8067 increase in the number of criminal incidents per 100,000 population. The sign of the estimate is counterintuitive given the assumption that greater incarceration will lead to a decrease in crime, either because of a lack of opportunity while incarcerated or because of the deterrence associated with stricter incarceration measures [4]. The magnitude of the estimate also appears to be artificially high given that the value indicates a highly significant result despite the contradiction with sociological and econometric assumptions.

The nature of this model, as a univariate model is such that various other factors that can potentially impact crime rates are likely being captured by this coefficient. These factors are not included as variables and therefore are not controlled for in the model. This effect of unobserved heterogeneity is captured in the standard error value produced by the model. With a high standard error, this model does not actually demonstrate a good fit of the data despite the misleading coefficient estimate. The findings of this model suggest that the incarceration rate per 100,000 adults is significant at the 1% level. This would imply that the results of this model are accurate with only a 1% likelihood of being replicated. Given that the coefficient estimate for the incarceration rate is very high, the value of the t-statistic is likely artificially high as well. The inconsistencies of the model is most evident in the Adjusted R-Squared value, which, at 0.1350, is extremely low and implies that barely any of the variation in the crime rate is explained by the incarceration rate as captured by this model. Model 1 does not include sufficient right-hand side variables to justify the accuracy of the results.

TABLE I: Levels Model Regression 2002-2012 (Model 1)

	Coefficient Estimate	Standard Error	t-statistic
Incarceration Rate Per 100,000 Adults	23.8067	7.130348	3.34
Adjusted R-Squared	0.1350		

C. Model 2

Through the results of the regression of model 2, the impact of the incarceration rate on the crime rate was assessed with the addition of three other right-hand side variables. The results suggest that, unlike model 1, incarceration rates have a significant negative effect on crime rates. With the addition of other independent variables, the sign of the coefficient estimate of incarceration rates changed from positive to negative, presenting a more intuitive result. The model implies that with a one person per 100,000 adults increase in the incarceration rate, there is an 11.29718 decrease in the number of criminal incidents per 100,000 population. While this result is expected in terms of the negative effect, the magnitude of the coefficient estimate suggests a considerably large effect that is not necessarily demonstrated in the literature. The potential impact of other variables on the crime rate including unemployment rate, the police offer rate and the postsecondary rate are accounted for in this model and help control for the unobserved heterogeneity in model 1. However, there may be other factors still that impact crime rates and are captured in the coefficient estimate.

The standard error of this model is higher than the error presented in model 1 suggesting that despite the addition of other independent variables, the fit of the model in

explaining the data is not improved. This could reflect the omission of other important variables that have a significant impact on the crime rate, or factors that are unobserved, which are unique to the various provinces examined. The incarceration rate is found to be significant at the 10% level, which implies a significant change between models 1 and 2. For this model, the results can be replicated 10% of the time; however the Adjusted R-Squared presented is considerably larger than that of the previous model, and therefore much more of the variation in crime rates can be explained by the variation in the incarceration rate. The results of this model are not much more reliable than the results of model 1, save for the value of the Adjusted R-Squared.

In terms of the other independent variables, unemployment rates are found to also have a negative effect on crime rates. The results suggest that with an increase in one person age 15 and over who is unemployed, there is a 37.01629 decrease in the number of criminal incidents per 100,000 population. This coefficient estimate is counterintuitive as there is an assumption that higher unemployment makes criminal activity more attractive, especially if it entails monetary gains. According to this model, the rate of police officers per 100,000 population also has a negative effect on crime rates. With an increase in one police officer per 100,000 population, there is an 11.35705 decrease in the number of criminal incidents per 100,000 population. The sign and magnitude of this coefficient is intuitive because it is assumed that with an increase in police presence, there is less of a likelihood of criminal activity because of the threat of being caught. Finally, this model suggests that the rate of post-secondary graduates has a positive effect on crime. With an increase of one person age 20-24 that has graduated from postsecondary education, there is an 1109.367 increase in the number of criminal incidents per 100,000 population. This result is also counterintuitive as it is assumed that the more highly educated a person is, the less likely they are to commit crimes, either because they have more to lose, or they have a reasonable wage and are not incented by criminal monetary gain.

TABLE II: LEVELS MODEL REGRESSION 2002-2012 (MODEL 2)

	Coefficient Estimate	Standard Error	t-statistic
Incarceration Rate Per 100,000 Adults	-11.29718	10.36661	-1.09
Unemployment Rate	-37.01629	196.4922	-0.19
Police Officers per 100,000 Population	-11.35705	21.53626	-0.53
Post-secondary Graduation Rate	1109.367	193.6085	5.73
Adjusted R-Squared	0.5826		

D. Model 3

The results of the regression of model 3 present the impact of the incarceration rate on the crime rate with the addition of the other right-hand side variables as well as province dummy variables to control for effects that may be unique to a particular province. This model suggests that the incarceration rate has a negative impact on crime rates and that with an increase in one person incarcerated per 100,000 adults, there is a 5.713762 decrease in the number of criminal incidents per 100,000 population. The sign and the magnitude of the coefficient confirm that the null hypothesis, that incarceration rates do not impact the crime rate, can be rejected.

Not unlike the results of model 2, however, this finding must be considered carefully. Relative to model 2, the Adjusted R-Squared implies this is a stronger model that suggests more of the variation in the crime rate per 100,000 population is explained by the incarceration rate per 100,000 population when province dummies are included. This means that according to this model, in which province dummies were used for five of the six provinces examined, there is indeed some effect that can be attributed to the factors that are unique to each province relative to the province omitted as a dummy variable, British Columbia. For this reason, any policy implication that may be derived from these results must take into consideration the different features of the crime rate among provinces relative to that of British Columbia. The standard error and t-statistic for the incarceration rate also confirm the seemingly strong fit of the model. The model produces a standard error that is smaller with the province dummies than without and the results are found to have a significance level higher than 10%. Consequently, these findings can be replicated more than 10% of the time and are thus, considerably reliable.

The independent variables in this model are found to have the same effects on the crime rate as found in model 2, however, the magnitude of each of the independent variables increased significantly between models 2 and 3, suggesting that these variables were less affected by province specific factors than was the incarceration rate in terms of their impact on crime rates.

TABLE III: LEVELS MODEL REGRESSION 2002-2012 (MODEL 3)

	Coefficient Estimate	Standard Error	t-statistic
Incarceration Rate Per 100,000 Adults	-5.713762	5.873532	-0.97
Unemployment Rate	-66.82483	70.26869	-0.95
Police Officers per 100,000 Population	-67.3383	10.11282	-6.66
Post-secondary Graduation Rate	368.5125	118.8593	3.10
Nova Scotia Dummy Variable	-1847.054	400.8426	-4.61
Quebec Dummy Variable	-3496.594	353.4214	-9.89
Ontario Dummy Variable	-4377.672	230.5871	-18.98
Manitoba Dummy Variable	1126.557	813.3035	1.39
Alberta Dummy Variable	-3107.683	392.1958	-7.92

The unemployment rate has a negative impact on crime in that with an increase in one person age 15 and over who is unemployed, there is a 66.82483 decrease in the number of criminal incidents per 100,000 population. The sign of the coefficient estimate remains counterintuitive even with the introduction of province dummy variables and therefore these results can be said to have little weight in contributing to the econometric analysis of crime. Similarly, the rate of police officers per 100,000 population also returned a negative effect on crime which, unlike the unemployment rate, represents a significant finding. The result that with an

increase of one police officer per 100,000 population, there is a 67.3383 decrease in the number of criminal incidents per 100,000 population suggests that this finding holds true to the sociological and econometric literature and basic assumptions about this deterrence mechanism. Finally, the postsecondary graduation rate continues to imply a positive impact on crime rates such that with an increase of one person age 20-24 who has graduated from postsecondary education, there is a 368.5125 increase in the number of criminal incidents per 100,000 population. This finding remains counterintuitive, and like the findings of the unemployment rate, can be said to have little weight in the broader discussion of crime rates.

E. Model 4

The results of the regression of model 4 provide further assurance of the results of model 3, where the introduction of the "robust" command to generate robust standard errors is the only addition. The inclusion of robust standard errors is expected to make this model more reliable in terms of ensuring the t- statistics are not artificially high. The strength of the model in terms of the variation in crime rates that can be explained by the variation in incarceration rates is captured in the R-Square value of 0.9643. This is the highest R-value found of all four models. According to this model, the incarceration rate has a negative impact on the crime rate and the coefficient estimate is the same as that of the incarceration rate in model 3. The t-statistic is also the same and thus the findings regarding the impact of the incarceration rate is also significant at a level more than 10%. That the t-statistic did not change between model 3 and model 4 would appear to suggest that model 3 did not produce an artificially high t-statistic. This confirms the validity and importance of the findings in model 3 given that the findings for the incarceration rate are statistically significant.

TABLE IV: LEVELS MODEL REGRESSION 2002-2012 (MODEL 4)

	Coefficient Estimate	Standard Error	t-statistic
Incarceration Rate Per 100,000 Adults	-5.713762	5.900188	-0.97
Unemployment Rate	-66.82483	71.17099	-0.94
Police Officers per 100,000 Population	-67.3383	12.4179	-5.42
Post-secondary Graduation Rate	368.5125	147.0466	2.51
Nova Scotia Dummy Variable	-1847.054	497.7056	-3.71
Quebec Dummy Variable	-3496.5594	441.5108	-7.92
Ontario Dummy Variable	-4377.672	245.0041	-17.87
Manitoba Dummy Variable	1126.557	846.6226	1.33
Alberta Dummy Variable	-3107.683	444.6862	-6.99
R-Squared	0.9643		

F. Log-Log Models

The results of the four log-log model regressions are presented in Tables V, VI, VII and VIII. These tables include the same statistics as the levels model results, including coefficient estimates, standard of error values, t-statistic values and the Adjusted R-Squared for each model. The detailed presentation of the results of the levels models above will provide the basis for the following analysis of the log-log models. While the data for these models were converted from the raw data into natural logarithms, this did not change the overall findings of the levels models regarding crime and incarceration.

Like the levels models, model 1 suggested incarceration rates have a positive impact on crime rates and presented a very low Adjusted R-Squared. This suggests the model is not strong without other independent variable controls. Model 2 presented a negative relationship between incarceration rates and crime rates, as did models 3 and 4. The results of the log-log models were, however, more telling about the impact of incarceration measures. This is because the results, in natural logarithms, provide indication of the percentage of criminal incidents per 100,000 population that would decrease given a one percentage point increase in the incarceration rate. These findings provide a more compelling conclusion for assessing the overall implications for crime reduction policy.[1]

TABLE V: LOG-LOG MODEL REGRESSION 2002-2012 (MODEL 1)

	Coefficient Estimate	Standard Error	t-statistic
Incarceration Rate Per 100,000 Adults	.2788854	.1001019	2.79
Adjusted R-Squared	0.0942		

TABLE VI: LOG-LOG MODEL REGRESSION 2002-2012 (MODEL 2)

	Coefficient Estimate	Standard Error	t-statistic
Incarceration Rate Per 100,000 Adults	-.5995978	.154557	-3.88
Unemployment Rate	-.3430653	.1625644	-2.11
Police Officers per 100,000 Population	.9121737	.5289742	1.72
Post-secondary Graduation Rate	1.287435	.1832812	7.02
Adjusted R-Squared	0.6236		

TABLE VII: LOG-LOG MODEL REGRESSION 2002-2012 (MODEL 3)

	Coefficient Estimate	Standard Error	t-statistic
Incarceration Rate Per 100,000 Adults	-.0319407	.1086986	-0.29
Unemployment Rate	-.0771786	.05059	-1.53
Police Officers per 100,000 Population	-1.315106	.302371	-4.35
Post-secondary Graduation Rate	.4245363	.1009377	4.21
Nova Scotia Dummy Variable	-.1417173	.0593877	-2.39
Quebec Dummy Variable	-.429722	.0465479	-9.23
Ontario Dummy Variable	-.6013756	.0290754	-20.68
Manitoba Dummy Variable	.0371595	.0916807	0.41
Alberta Dummy Variable	-.3699076	.0650115	-5.69
Adjusted R-Squared	0.9664		

[1] The findings of this paper are consistent with the results reported in similar studies. The coefficient estimates arrived at through the log-log models replicate, while not in magnitude, the results of Levitt (1996).

TABLE VIII: LOG-LOG MODEL REGRESSION 2002-2012 (MODEL 4)

	Coefficient Estimate	Standard Error	t-statistic
Incarceration Rate Per 100,000 Adults	-.0319407	.1017375	-0.31
Unemployment Rate	-.0771786	.046624	-1.66
Police Officers per 100,000 Population	-1.315106	.3199669	-4.11
Post-secondary Graduation Rate	.4245363	.11878	3.57
Nova Scotia Dummy Variable	-.1417173	.0619451	-2.29
Quebec Dummy Variable	-.429722	.0513514	-8.37
Ontario Dummy Variable	-.6013756	.0273552	-21.98
Manitoba Dummy Variable	.0371595	.0997947	0.37
Alberta Dummy Variable	-.3699076	.067956	-5.44
R-Squared	0.9710		

TABLE IX: DATA SUMMARY AND SOURCES

Variable	Source	Mean	Standard Deviation	Minimum	Maximum
Total Crimes per 100,000 Population	CANSIM Table 252-0051	7937.35045	2519.3296	4051.51	12729.24
Incarceration Rate per 100,000 Adults	CANSIM Table 251-0005	89.9804545	40.7583938	40.07	233.61
Unemployment Rate	CANSIM Table 282-0087	81.0772727	21.1294166	41.3	115.2
Police Officers per 100,000 Population	CANSIM Table 254-0002	187.824242	14.6376234	156.1	216.4
Post-Secondary Graduation Rate	CANSIM Table 477-0020 CANSIM Table 051-0001	6.75181818	1.92628691	4.23	11.67

IV. CONCLUSION

This paper's analysis of the effect of incarceration rates on crime serves as a contribution to the existing literature that investigates the numerous factors that can impact crime rates. Using panel data from six Canadian provinces, including Nova Scotia, Quebec, Ontario, Manitoba, Alberta and British Columbia for the years 2002-2012, this research provides an additional perspective of how to best manage the crime rate. The models employed, both a levels model and a log-log model that utilized the independent variables, unemployment rate, police officer rate and postsecondary graduation rate, as well as province dummy variables and robust standard errors, demonstrated that the incarceration rate had a significantly negative effect in six of the eight models. It was found that an increase by one person incarcerated per 100,000 adults results in a decrease ranging from five to eleven criminal incidents per 100,000 population. Similarly, this paper finds that a one percentage point increase in the incarceration rate results in a decrease in the number of criminal incidents per 100,000 population of anywhere from 0.03% to 0.5%. These results are consistent with the findings of much of the econometric literature including [4] and [7].

In terms of the policy implications of these findings, the general nature of the crimes examined make it so that the results presented are not conclusive in assessing the effectiveness of incarceration polices to reduce crime rates. As mentioned, previous studies have distinguished violent crime from non-violent crime and have received differing results. Therefore a definitive consensus about all crime is not attainable from this study. However, the consistencies of this paper's findings with the findings of other literature suggest that there may be some validity to governments' reliance on deterrence measures, including incarceration for crime reduction. This would appear to suggest that the federal Conservative government policy is reflective of econometric findings and that 'tough-on-crime' policies, as part of the broader agenda since 2006, are effective policies. Nonetheless, the recent research that suggests that a stricter sentencing regime will increase crime rate in the long-run may present a challenge to this paper's and previous studies' findings and ultimately instigate changes to the future policy directive.

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