

"All crime in the end is the crime of the community"



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This study performs a multivariate regression analysis into the factors determining violent and property crime in urban areas, with the fundamental findings concluding that the incentive structures differ enough between aggravated assault and burglary such that the determinants of each crime rate are significantly different.

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I. Introduction

a. A Criminological Background

Conventional wisdom holds that crime prevention needs to be based on a thorough understanding of crime itself¹. This is where the problem of crime manifests itself, as despite the range of crime prevention policies attempted, each of which with varying success, the difficulties involved with grasping the fundamental causes of crime mean criminal activity remains largely prevalent in society. Considering that the United States as an economically powerful, technologically advanced, and academically strong nation still suffers from high relative crime rates adds emphasis to the complications of crime prevention. The overall crime rate in the U.S has risen by as much as 350% since the mid-1960s though has steadily declined since the early 1990s.

Violent and Property Crime Rates per 100,000 inhabitants

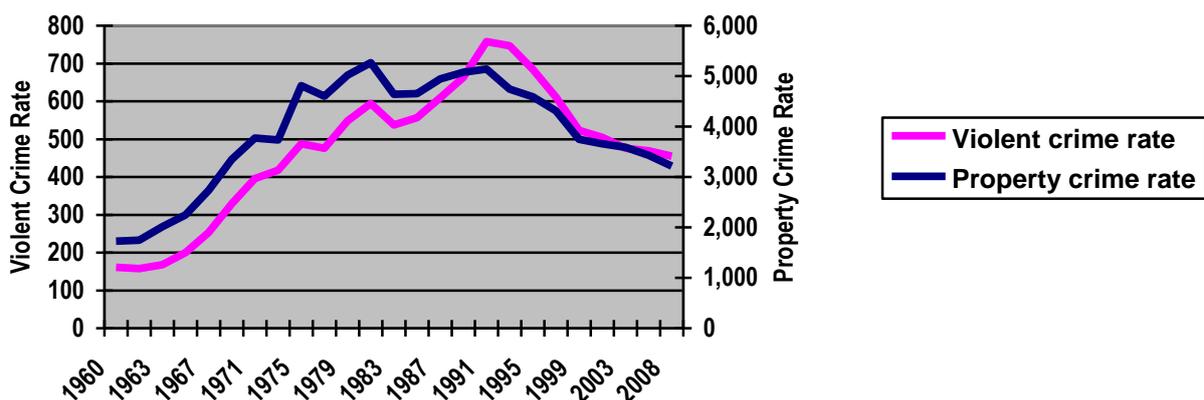


Figure 1 – Analysing Violent and Property Crime Rates

Source – FBI's Uniform Crime Reports

Such trends have subsequently led to mass investigation into factors such as income inequality, policing quality, education and legalized abortion, though conflicting results mean that the changes in crime rates still remain largely unexplained; consequently the underlying cause of crime still continues to be a phenomenon.

¹ Clarke R.V.G. (1980) – "Situational" Crime Prevention: Theory and Practice

Literature regarding the underlying influential factors of criminal activity commonly focuses on the balance between the deterrents and incentives that an individual faces prior to illegitimate action. Early theories of criminal activity are orientated towards the behavioural choices of an individual, taking into consideration the consequences of their actions and the alternative opportunities available to them. Beccaria (1764) and Bentham (1789) shared the view that criminal activity can be most effectively portrayed as a pleasure-pain balance and that a rigid penal code was the most effective way of controlling crime. With "much of the American criminal justice system based directly or indirectly on the ideas of Beccaria and Bentham", the implications of such ideas on American policy are widespread². Developing the ideas of Beccaria and Bentham, a large proportion of literature and criminal policy concentrates on policing and the penal code. Ultimately however, the general difficulties involved with identifying the determinants of crime have resulted in a multitude of literature and crime prevention policies – none of which can ever be considered completely successful or correct.

b. Motivation

H. G. Wells once said "Crime and bad lives are the measure of a State's failure, all crime in the end is the crime of the community". Rather than analysing the effect of policing and punishments on the level of crime this study investigates the incentives and conditions that may lead an individual to commit crime. With a large focus on demographic and socio-economic elements, this study will endeavour to explain the main determinants of crime and subsequently discuss the policy implications of findings. In an attempt to prove the significance of criminal incentive structures, this study will go as far to comparing the determinants of two separate crimes such that conclusions can be made whether socio-economic factors act as a good predictor crime rather than the more widely accepted views on policing and incarceration. If the incentive structures differ significantly we can infer that community structure and characteristics may play a major role in determining crime rates.

More specifically, the foundations of this specific subject form on the phenomenon that burglary rates and violent crime rates are distributed geographically differently, such that an area with a high burglary rate may have a low aggravated assault rate. This paper also discusses the

² Piliavin et al. (1986) – Crime, Deterrence and Rational Choice

existence of racial and youth subcultures of violence and crime. Section II examines the relevant literature regarding the subject. Section III explores the logic behind the hypothesis, whereas Section IV outlines the methodology, model and data. Empirical results will be discussed in Section V, with the conclusion in Section VI.

II. Literature Review

a. Police and the penal code

There is a vast amount of literature concerning deterrent theorem and the cost-benefit analysis of police expenditure on criminal activity. However, as stated before, this study places more focus on the incentive structures of burglary and assault. It should be noted that this essay is not dismissive of the various deterrence theories and the importance of such, but in the context of this investigation, most aspects of deterrence have little implication on conclusions.

One problem with analysing policing and crime levels is highlighted by the suggested inaccuracies in crime statistics. Basic theory stipulates that increased police levels would induce reduced crime rates on the basis that increasing the amount of police increases the probability of getting caught, thus acting as a deterrent on illegitimate behaviour. However, some argue that a reporting problem arises due to the fact that increased police levels result in an increase in the numbers of crimes observed and arrests made, thus more police may actually increase crime rates.

b. Property Crime

A considerable amount of literature has been dedicated to investigating the crime-unemployment relationship, though researchers generally fail to reach a consensus over the importance and effect of unemployment on property crime levels. Phillips, Votey and Maxwell (1972), amongst other researchers, adopted the approach that an individual can opt either for a life of crime or a legitimate job, concluding that unemployment is an effective predictor of property crime. However, an underlying problem with this method is that statistics show that a large proportion of offenders are in employment. Cloward and Ohlin (1961) emphasised that criminal organisation creates criminal opportunity structures which act as an alternative to lawful activity,

with research from Phillips and Votey (1972) observing a strong relationship between the rising arrest rates of young males and the falling rates of labour market participation. However, with criminal organisation extremely challenging to observe, it is difficult to provide any conclusive evidence in the support of such theories. Nevertheless, labour force participation will be taken in to consideration in the regression model. Alternatively, Machin and Meghir (2004) argued that the low-wage labour market matters more for crime than unemployment. In line with the aforementioned observation that many crimes are actually committed by those with jobs, they believe that the wage acts as a more efficient measure of legal alternatives than unemployment. Consequently, the regression model will include each of unemployment, income and labour force participation, despite possible multicollinearity.

c. Violent Crime

Literature regarding the causes of violent crime differs from that of property crime, with a greater focus placed on the elements of social distress. Other than the previously mentioned factors, criminological literature has included theories on violent sub-cultures, conflict, socio-economic strain and family disorganisation. Wolfgang and Ferracuti (1967) and Hackney (1969) all expressed the view that high violent crime rates in the southern states could be attributed to a violent nature embedded in southern sub-culture. Whereas Wirth (1931), Sellin (1938) and Sutherland (1947) suggest that culture clashes between racial groups is a significant cause of violent crime, especially with the largest concentrations of ethnic minorities in the south. There are several problems with ideas of such; one of which being that the relative economic inferiority of southern states may be a explanation of higher crime rates. In studying the existence of racial subcultures, Kposowa, Breault and Harrison (1995) included 3 different racial groups (Black, Hispanic and Native American) in their regressions. Despite each variable being a statistically significant determinant of crime rates they concluded that racial subcultures of crime/violence could not be supported due to the vastly different cultures of each racial group.

A study by Danziger and Wheeler (1975) concluded that income inequality has a more profound effect on crime than average income levels. This effect has been observed in the United Kingdom with the deterioration of the low-skilled labour market coinciding with increasing crime rates despite an overall increase in average income. Other studies have focused on family

background on the basis that quality of upbringing reduces an individual's propensity to commit crime. A paper by Glueck and Glueck (1950) revealed that 60% of delinquents came from broken homes. Despite several studies supporting similar ideas, a flaw specific to this particular study is that they studied boys in correctional facilities – a situation which could have been a result of the absence of a parent.

d. Comparing violent and property crime

Ultimately, the mass of literature regarding the crime fails to reach agreement, yet, it is possible that due to the multitude of factors involved it has been difficult for economists and criminologists to highlight one factor as a major cause. Although there is a distinct lack of literature comparing the relative determinants of different crime rates, a study by Kposowa, Breault and Harrison (1995) attempted to investigate the elements of criminal activity and the existence of subcultures using three different regression models; one each for homicide, property crime and violent crime. They realised that the strongest determinants of property crime were race, education, age, unemployment and population change whereas for violent crime they were race, unemployment, population change and population density. Income inequality was significant at the 10% level for property crimes but not significant at all in the determining the violent crime rate. The following study will expand on the work of Kposowa, Breault and Harrison (1995) by taking into consideration many aforementioned and alternative factors such as low-wage, housing stress and family disorganisation but solely focusing on highly populated urban areas.

What distinguishes this study from other literature is that it is the first to use multivariate regression techniques to compare the determinants of two separate crime rates. Criminological literature predominately concentrates on crime as a whole or individual crime rates – this study seeks to provide analysis of the strongest determinants of multiple crime rates in addition to the cross-comparison of coefficients across separate equations. Another distinguishable factor in this study is the use of solely highly populated counties, rather than national, state, or all counties. Description and analysis of the main methods used in literature can be found in the appendices.

III. Logic

The fundamental reason why this study seeks to discover if incentive structures may differ between burglary and assault is instigated by the idea that burglary is a crime against a property that provides some pecuniary gain whereas assault is the crime against a victim, with no financial gain³. One example of the differences between burglary and assault can be seen in a study by Shannon (1954). He observed that the areas that are most notorious for violent crime were concentrated in the south-east (of United States) whereas burglary rates were highest in the western and eastern seaboard states.

The graph below shows the relationship between a city's burglary rate ranking and its aggravated assault ranking for 2007 (where 1 is the highest offence rate and 50 is the lowest).

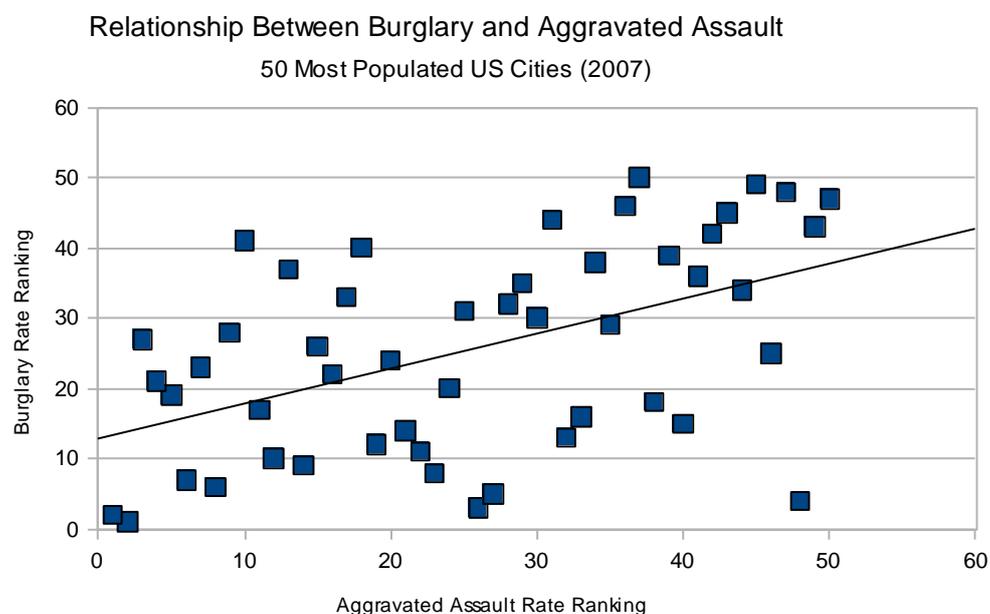


Figure 2 – Graph showing the relationship between burglary rate and aggravated assault rate rankings

Source – FBI's Uniform Crime Reports

The weak correlation in this *Figure 2* reveals that a city's notoriety for burglary may not necessarily be matched by similar notoriety for aggravated assault. Consequently, one could infer that factors other than policing levels may hold significant influence over criminal activity. Thus, the crux of the essay is to determine whether different incentive structures can explain the disparities between assault and burglary rates in metropolitan areas. Many of the elements which

³ This study will refer to the term "Incentive Structures" on several occasions. The meaning of this term is the conditions and opportunities that would lead a person to choose to commit a crime

may be considered major determinants of criminal activity will be influential factors of both burglary and aggravated assault, but the significance of this paper is to distinguish how influential certain factors are on each offence, and whether any results can be used to explain geographical differences.

Aggravated assault is a crime against a person whereas burglary is a crime against a person's ownership; so therefore, this study proposes that those with a larger propensity to commit aggravated assault are likely to be influenced by factors causing some form of distress, illustrated by:

$$\text{MPA} = [D - C(P+E)] | X^4 \quad (1)$$

From (1), in theory, a person will commit the assault if $D > C(P+E)$. As a result, it can be predicted that significant factors affecting aggravated assault rates will be linked to social distress. Therefore, it can be expected that family disruption (measured as % female headed households), poor housing conditions and income inequality may be influential on assault rates in addition to certain demographic factors and factors that affect judgement such as drug and alcohol abuse.

On the other hand, those with a larger propensity to commit burglary are more concerned with the pecuniary gain and thus are more likely to be influenced by substandard economic standing, so:

$$\text{MPB} = [M - C(P+E)] | X^5 \quad (2)$$

Accordingly, in theory, a person will commit burglary if $M > C(P+E)$. Consequently, we can predict that income, poverty, income inequality⁶, unemployment amongst the factors that affect judgment may be good predictors of burglary rates.

⁴ where MPA = Marginal Propensity to Commit Assault, D = Discontent/Anger, C = Probability of Getting Caught, P = Punishment, E = Employment and X = Factors Affecting Judgment

⁵ where MPB = Marginal Propensity to Commit Burglary and M = Monetary Gain

⁶ Income inequality affects the magnitude of the monetary gain, and possibly makes opportunities more "worthwhile" if the individual predisposed to commit the crime is of low income

IV. Data, Model and Method

Cross-sectional data has been collected from the ICPSR's (Inter-University Consortium for Political and Social Research) County Characteristics 2000-7 database, in order to facilitate multi-level data analyses⁷. In order to concentrate my focus on urban areas I have restricted my data to the use of counties with a population exceeding 250,000.

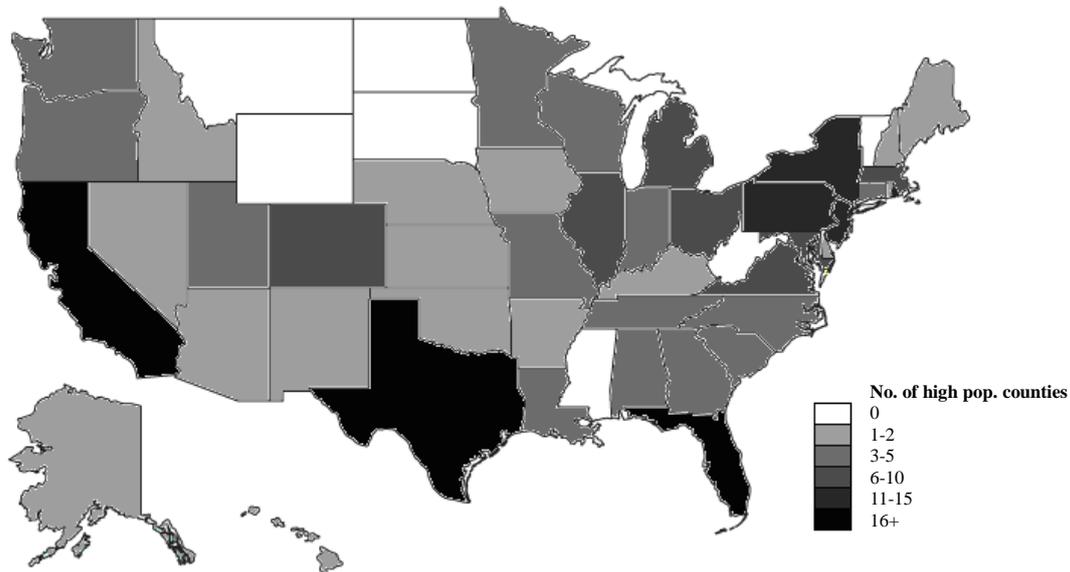


Figure 3 – Geographical distribution of counties with population above 250,000 inhabitants

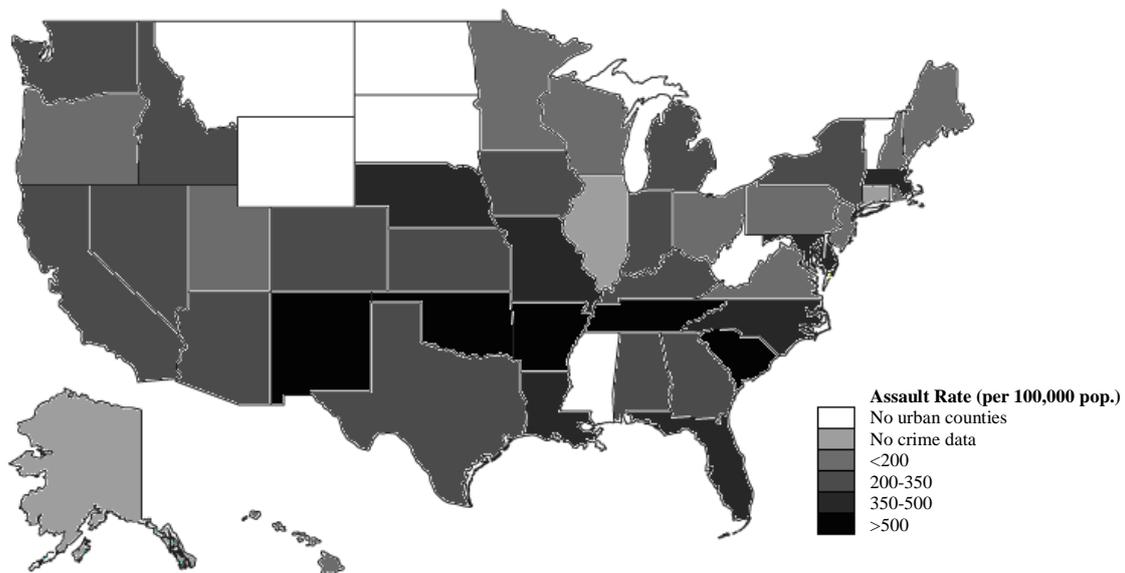


Figure 4 – Average urban county assault rate by state⁸

⁷ See Appendix 1

⁸ In this study "urban county" refers to those with population exceeding 250,000 people, thus figures 4-6 show data that reflects only the "urban counties" within the state and not the state as a whole

Figure 3 shows the geographical distribution of the counties that are used in this study. It reveals that counties are well-distributed with the exception of the northern mountainous states. Figure 4 shows little geographical patterns with relation to assault, whereas in Figure 5 below stronger geographical patterns are evident, with higher burglary rates in the southern confederate states.

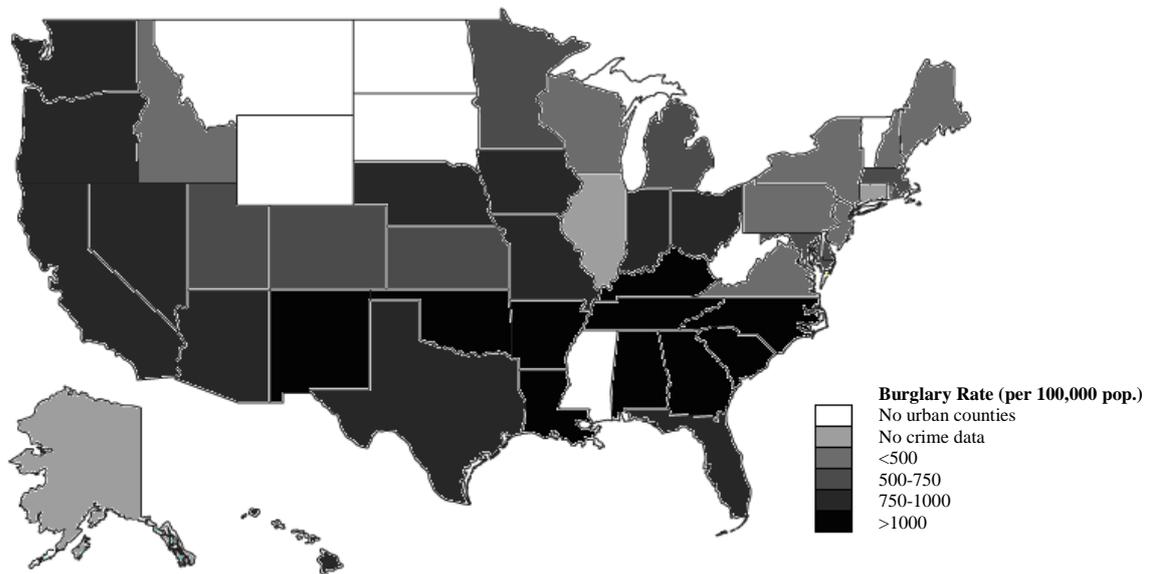


Figure 5 – Average urban county burglary rate by state

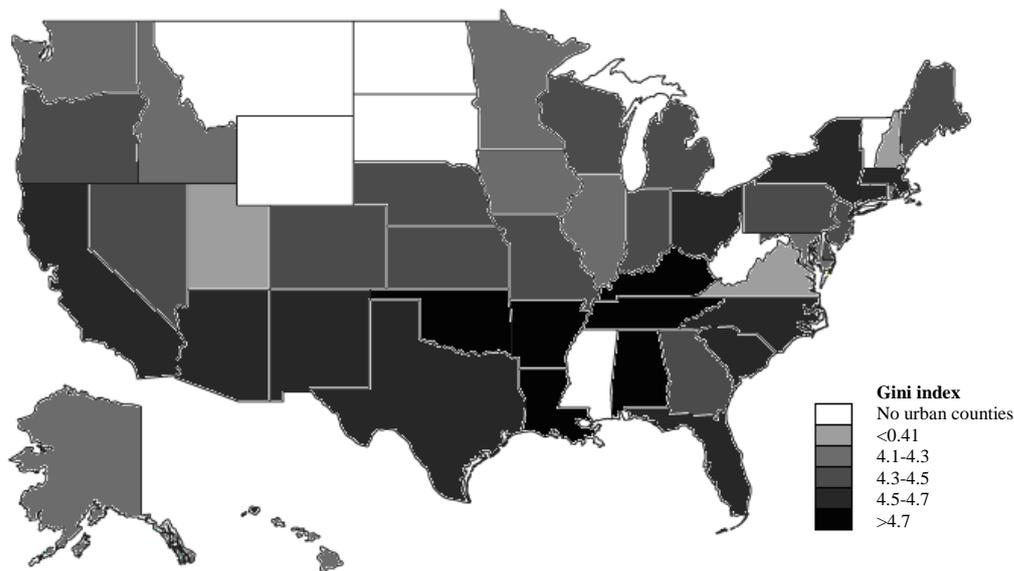


Figure 6 – Average urban county gini index by state

This study performs a multivariate regression using burglary and aggravated assault as the two dependent variables to understand whether the underlying incentives differ to a significant

extent. The equation is as shown below:

$$\begin{aligned} \text{Assault Rate/Burglary Rate} = & \alpha + \beta_1 \text{PopGrw00-05} + \beta_2 \text{SexRatio} + \beta_3 \text{MaleMedianAge} + \\ & \beta_4 \text{PctWhite} + \beta_5 \text{UnempRate} + \beta_6 \text{HouseStress} + \beta_7 \text{LowEduc} + \beta_8 \text{PerstPov} + \beta_9 \text{Income} + \beta_{10} \text{Popdens} \\ & + \beta_{11} \text{LFP'n} + \beta_{12} \text{Gini} + \beta_{13} \text{StateDrugPrev} + \beta_{14} \text{StateAlcAbuse} + \beta_{15} \text{PctFemHeadHouse} \end{aligned} \quad (3)$$

The main hypothesis of this study is whether the factors determining the assault rate are significantly different to the factors determining the burglary rate. In order to evaluate this, we will perform tests analysing the differences between the coefficients on the variables. A detailed list of variables and summary statistics for each are included in the appendices.

a. Justifications

Multivariate regression analysis ("MRA") is an increasingly popular technique in empirical studies. It enables the simultaneous estimation of equations with different dependent variable, albeit producing the same coefficients and standard errors as two separate ordinary least squares regressions ("OLS"). The principal advantage of using MRA is that it allows hypothesis testing of coefficients between multiple equations. Thus, MRA allows more facilitated analysis of the relationships between variables. Unlike standard OLS regressions, MRA controls type-I errors through the consideration of the set of dependent variables in a multidimensional space. Due to the reasonably correlated nature of the two dependent variables in this study, MRA is the most efficient method to use. This study also uses a multivariate analysis of variance ("MANOVA") regression. This allows the comparison of mean differences on several dependent variables simultaneously. Like with MRA, a MANOVA regression reduces the probability of type-I errors. One problem with MRA and MANOVA is a high sensitivity to outliers; however, due to the nature of the data in this study, outliers are extremely rare. An issue with MANOVA is that it requires more assumptions than multiple ANOVAs, for example it requires multivariate normality, linearity between the dependent variables, multicollinearity and singularity, and the homogeneity of the variance-covariance relationship⁹.

⁹ Central limit theorem proves that the distributions of means in this sample are normally distributed. Assumption tests are in the appendices

b. Limitations

A significant area of consideration when studying the determinants of crime is the perceived accuracy of criminal statistics. There are a series of problems with the reporting of crime that can create a substantial level of scrutiny over any conclusions made. A significant problem arises over the perceptions of crime (Walker 1983). From a witness point of view, inconsistencies occur over who is around to witness a crime, what a witness perceives as a crime, tolerance towards and approval of laws and whether a witness believes the police will take the crime seriously enough for them to take the hassle in reporting it. As a victim, a person may opt not to report a crime for numerous reasons. A victim may fear the repercussions of reporting a crime, feel sceptical of the police's ability to solve the crime, and in the case of violence, a victim may feel too embarrassed to deem reporting necessary. Also, with assault, in some areas the offence may be so common that they are rarely regarded as offences with victims occasionally previously being offenders. In addition, the fact that the police must consider whether an offence warrants an arrest also limits the quality of crime statistics. Carr-Hill and Stern (1979) suggest that one factor of the recording phenomenon is the tendency for authorities to develop stereotypes, "partly due to organisation and training but also to facilitate their own job performance". In the sixties these stereotypes were mostly observed as that of a youthful working-class subculture whereas more recently racial stereotypes have developed. On the contrary, we must consider that there are factors that encourage reporting. In relation to burglary, insurance claims often require crimes to be reported, whereas regarding assault, publicity about and appeals to bring forward victims of crimes like "wife-battering" may have encouraged crime reporting¹⁰.

The two main sources of criminal statistics in the U.S are the FBI's annual Uniform Crime Reports ("UCR") and the Bureau of Justice Statistics' annual National Crime Victimization Survey ("NCVS"). The validity of UCR data has been hotly debated by both opponents and proponents (Gove, et al. 1985; Hindelang 1974; Kituse and Cicourel 1963; McCleary, et al. 1982; Seidman and Couzens 1974; Skogan 1975; Wolfgang 1968)¹¹. Many regard the NCVS as a more reliable source of information about the incidence of property and violence crimes than the UCR, however, there is no evidence precluding the use of one or another. This study uses UCR because it is the only data

¹⁰ Walker M.A. (1983) – Some Problems in Interpreting Statistics Relating to Crime

¹¹ Kposowa A.J, Breault K.D & Harrison B.M (1995) – Reassessing the Structural Covariates of Violent and Property Crimes in the USA: A County Level Analysis

source available that containing county-level information for the whole of the United States. Other than the previously mentioned reporting problems, an issue with the UCR database is that when two or more crime types are simultaneously committed, only the more serious crime is entered into the system. For example, if we imagine a situation where a robbery has taken place alongside a serious assault, only the assault will be present in the UCR.

V. Empirical Results

Source	Statistic	df	F(df1 , df2)	= F	Prob>F		
Model	W	0.2760	15	30.0	412.0	12.84	0.0000
	P	0.8770		30.0	414.0	10.78	0.0000
	L	2.2048		30.0	410.0	15.07	0.0000
	R	1.9246		15.0	207.0	26.56	0.0000

Table 1 – Results from MANOVA regression

Where W = Wilks' lambda, L = Lawley-Hotelling trace, P = Pillai's trace and R = Roy's largest root

This study performed a MANOVA regression to identify both the effect of changes in the independent variables on the dependent variables, and also the interactions between independent and dependent variables. *Table 1* reveals that the model is significant with all the p-values for each of the four diagnostic tests <0.0000 . *Section a.* analyses the most significant determinants of each crime rate, makes comparisons with predictions and literature and gives explanations for surprising results. *Section b.* performs hypothesis testing on the differences between coefficients and an overall comparison of the incentive structures, whereas *Section c.* argues the existence of subcultures.

a. The Main Determinants

	AssaultRate		BurglaryRate	
	t	P>t	T	P>t
PopGr00_05	1.28	0.202	1.11	0.270
SexRatio05	0.67	0.502	2.85	0.005***
Male_MdAge05	1.98	0.049**	0.95	0.342
PctWhite05	-2.05	0.042**	-1.69	0.092*
UnempRate05	-0.23	0.820	2.12	0.036**
HouseStrs04	-0.38	0.707	-1.62	0.106
LowEduc04	1.29	0.198	-2.57	0.011***
PerstPov04	-0.32	0.752	-1.17	0.242
Income	-1.55	0.124	-4.04	0.000***
popdens05	-1.43	0.154	-3.97	0.000***
LFP05	0.21	0.837	2.11	0.036**
giniindex	4.28	0.000***	6.80	0.000***
DrugPrev	0.65	0.514	-1.57	0.118
AlcAbuse	-1.35	0.177	-4.61	0.000***
PCTfemhead~e	4.30	0.000***	5.27	0.000***
_cons	-1.91	0.057	-3.34	0.001

Table 2 – T and p-values for each variable from a multivariate regression

Superscript *, ** and *** refers to significance at the 10, 5 and 1% levels respectively

In accordance with earlier predictions, the results from the initial multivariate regression (Table 2) reveal that race, income inequality and the percentage of female headed households are statistically significant in both equations. The fact that the percentage of female headed households is significant at the 1% significance level would appear to provide overwhelming support for the conclusions of Glueck and Glueck (1950), who found evidence in support of the idea that “family cohesiveness” had a significant impact on juvenile delinquency. In addition, results for race and income inequality appear consistent with a wealth of literature.

Regarding assault, the most significant determinants of the aggravated assault rate consist of male median age, race, income inequality and family disruption (% female headed households). In comparison to Kposowa, Breault and Harrison (1995), this study concurs with the importance of race, but fails to find any substantial evidence to support the significance of population density, population change and unemployment in determining the assault rate. Despite Kposowa, Breault and Harrison (1995) finding that income inequality has little effect on the violent crime rate, the

results in *Table 2* agree with the findings of Danziger and Wheeler (1975) that income inequality acts as a better predictor of the violent crime rate than average income levels. Contrary to predictions, this study fails to accept the significance of housing stress; possibly due to how the dummy variable is computed. Generally, results for the burglary rate equation correspond with both predictions and the results of Kposowa, Breault and Harrison (1995), with the exception of population density and age. The significance of labour market participation, in addition to that of income and unemployment, indicates the possibility that the proposed emergence of criminal organisation has created an alternative to lawful employment as suggested by Phillips, Votey and Maxwell (1972).

b. Differing Incentive Structures?

The principal test run to examine whether incentive structures differ significantly tests the hypothesis that all the coefficients on assault rate are not equivalent to their burglary rate counterparts. This test can be described as follows:

$$H_0: \beta_{1a} = \beta_{1b}, \beta_{2a} = \beta_{2b}, \dots, \beta_{ja} = \beta_{jb} \quad (4)$$

The subsequent results of this test show that overall the incentive structures and the determinants of each crime rate are significantly different with an F-value of 11.06 and a p-value less than 0.0000 (Appendix 4). Earlier predictions infer that specific variables will be different between the two equations whereas others may have very similar effects on both. To investigate this proposition, individual testing of each variable is performed, such that (for i separate equations):

$$H_0: \beta_{ia} = \beta_{ib} \quad (5)$$

Table 3 shows the resulting F-test and p-values for each variable under the hypothesis shown in (5).

H0: [AssaultRate]indepvar = [BurglaryRate]indepvar		
Variable	F(1, 207)	Prob > F
PopGr00_05	0.07	0.7980
SexRatio05	6.31	0.0128**
Male_MdAge05	0.16	0.6938
PctWhite05	0.11	0.7401
UnempRate05	5.64	0.0184**
HouseStrs04	2.06	0.1527
LowEduc04	12.99	0.0004***
PerstPov04	1.01	0.3154
Income	9.85	0.0019***
Popdens05	9.93	0.0019***
LFP05	4.26	0.0402**
Giniindex	16.86	0.0001***
DrugPrev	4.42	0.0367**
AlcAbuse	15.03	0.0001***
PCTfemheadhouse	6.22	0.0134**

Table 3 – F-test and p-values for comparisons of the two separate coefficients for each variable

Superscript *,** and *** refers to significance at the 10, 5 and 1% levels respectively

Table 3 shows three instances where the difference between the two coefficients is largely insignificant: Population growth, male median age and % white inhabitants. As predominately demographic variables, it is understandable that their effects are similar on both crimes despite age and race being significant at the 5% level with assault but not with burglary. Although gender would usually be included in the demographics bracket, this variable appears to have largely different effects on the separate crimes. The differences between the coefficients for the dummy variables for housing stress and persistent poverty also prove insignificant, a result that somewhat contradicts earlier predictions. One possible explanation for the persistent poverty result may be that there are only 5 observations that qualify for this dummy variable. Though initially described as a factor causing social discontent, it is possible that housing stress is additionally an indication of monetary discontent and thus similarly influences a person's propensity to commit burglary. Analogous to Section a., the results in Table 3 verify earlier predictions that the effects of income, unemployment and labour force participation would be different for each crime. Table 3 also indicates that the coefficients on variables population density, education and both drug and alcohol abuse are different – a result that can largely be explained in the theory, previous literature and results from Section a..

Possibly the most interesting result from Table 3, is the extremely low p-value for the gini index variable. Recalling the *Logic* section, it was proposed that income inequality contributes to the social distress factor that would stimulate a person towards committing assault. However, it was also noted that income inequality affects a person's propensity to commit burglary as it increases the magnitude of any monetary gain available through illegitimate action. The fact that there is a distinguishable difference in the explanations why income inequality affects each crime may be the reason for the above result. The proportion of female headed households is another variable that is significant in both regressions but has significantly different effects on both. This phenomenon remains largely unexplained, though a mass of literature supports the idea that female headed households are an indicator of poverty.

c. Testing the Existence of Subcultures

Empirical studies on criminology tend to reach a consensus that race or percentage black is a significant variable in determining the crime rate, whereas a large proportion of literature associates youth with crime. This section performs income, income inequality and unemployment adjusted regressions.

	(1)				(2)				(3)			
	AssaultRate		BurglaryRate		AssaultRate		BurglaryRate		AssaultRate		BurglaryRate	
	t	P>t	t	P>t	t	P>t	t	P>t	t	P>t	t	P>t
Male_MdAge	1.66	0.172	0.17	0.871	0.32	0.754	-1.08	0.300	-0.23	0.823	0.71	0.487
PctWhite05	-1.60	0.186	-0.30	0.782	-0.26	0.797	-0.63	0.540	-1.59	0.133	-1.09	0.294

Table 4 – F-test and p-values for % white and male median age under three different regressions – Note: Other variables were included in regression, only omitted from table for presentation purposes.

Using *Table 4*, regression (1), restricted to counties whose average income is less than one standard deviation below the mean, reveals that in reduced income areas, race and age are no longer statistically significant with either crime¹². Regressions (2) and (3), restricted by income inequality and unemployment respectively, both reach the same conclusion as regression (1)¹³. Consequently, the results of these regressions fail to provide sufficient evidence in support of racial or youth subcultures.

¹² (1) results in 20 poorest counties

¹³ (2) is restricted to counties whose income inequality is more than one standard deviation higher than the mean – resulting in 30 observations. (3) is restricted to counties whose unemployment rate is more than one standard deviation higher than the mean – resulting in 31 observations

VI. Conclusion

The fundamental aim of this study was to investigate whether the incentives structures that influence an individual's propensity to commit crime differ between aggravated assault, a violent crime, and burglary, a property crime, to such an extent that the determinants of each separate crime rate are significantly different. Historically, the typical response to a rise in crime rate was an increase in police numbers; though, more recently authorities have sought to resolve the underlying problems that stimulate criminal behaviour (Tonry and Farrington 1995). This study performed a multivariate analysis on crime rates for 223 urban counties in the U.S., revealing the significant determinants of each crime rate in addition to the differences between each regression. Results from the regressions evidently conclude that the incentive structures are different between each crime with variables predominately showing dissimilar effects on the individual crime rates. Although several independent variables do have similar effects on both rates, these are primarily demographic factors whereas socio-economic variables such as income inequality, unemployment and education appear to produce the most diverse effects on the two crimes. One auxiliary question of this study was to investigate the existence of racial and youth subcultures. In accordance with a wealth of literature, race and youth show significance in initial regressions, despite this, further analysis has failed to support subculture theories.

a. Policy Implications

One consequence of these results is that it allows one to infer that social organisation provides effective explanation of crime rates. A trend realised in literature and highlighted in this study is the prominence of income inequality as a major component of crime rates. As previously noted, rising income inequality in the United States has coincided with increases in crime rates. The implications of such are wide reaching and regression results in this study would appear to provide substantial justification for progressive taxation. Inequality itself, as a more broadened term, appears to be the main instigator of criminal activity whether it is educational, social or housing (amongst other factors). Results on unemployment and labour force participation underline growing concerns that criminal organisations have created an alternative to legitimate employment. One possible implication of such is whether the improving availability of job opportunities in urban areas can deter individuals from a career in crime.

b. Limitations & Extensions

The limitations of this study include the missing crime rate data for urban counties in Alaska, Illinois and Connecticut, and missing labour force data for urban counties in Louisiana, ultimately resulting in 16 counties that will be omitted from regressions. Another limitation is the use of state-level data for drug and alcohol abuse. Although this was the only available data, state-level analysis ignores possible variations within the state. In addition, the general difficulty of measuring the prevalence of alcohol and drug usage whether it be through health surveys, substance related deaths, substance related crimes or hospital admissions, makes the use of these variables in regressions a systemic problem – a possible reason why these variables have little or no significance in earlier regressions. The fact that the R-squared value of the burglary regression is considerably higher than that of assault suggests that important variables that may reflect an individual's predisposition to commit assault may have been omitted from this regression. One possible solution would be to add a measure of social class, for example, the proportion of people in that county in working class occupations. Additionally, the dummy variables for housing stress and persistent poverty have proved relatively ineffective; it may be useful for future studies to find alternative variables.

As this study uses cross-sectional data, causality cannot be inferred in any conclusions. A possible extension to this study would be to apply a profile analysis of repeated measures regression technique in attempt to discover how changes in the independent variables over time affect the interactions within the regression. Further investigation into the existence of different incentive structures may benefit from increasing the amount of dependent variables to account for more crimes (especially homicide). Furthermore, in order to reinforce the conclusions of this study, an investigation using victimisation data from the NCVS is necessary.

Appendices

Appendix 1 – Dataset Description

The ICPSR *County Characteristics, 2000-2007* dataset contains 470 variables covering an array of county characteristics by which by researchers can investigate contextual influences at the county level. Included are population size and the components of population change during 2000-2005 and a wide range of characteristics on or about 2005: population by age, sex, race, and Hispanic origin; labour force size and unemployment; personal income; earnings and employment by industry; land surface form typography; climate; government revenue and expenditures; crimes reported to police; 2004 presidential election results; housing authorized by building permits; Medicare enrolment; and health profession shortage areas. With some exceptions, the variables were derived from data files that were prepared by various federal agencies: the Bureau of the Census, the Bureau of Economic Analysis, the Bureau of Labour Statistics, Centres for Medicare and Medicaid Services, the Department of Energy, the Economic Research Service of the Department of Agriculture, and the Health Resources and Services Administration. Crime statistics (twelve variables) were taken from a data file prepared by ICPSR's National Archive of Criminal Justice Data.

About one half of the variables in *County Characteristics* were copied verbatim from the data sources, while the rest were computed. Most of the computed variables were generated by combining information across records or variables in the original data files. In addition, some rates, percentages, and sums were computed. *County Characteristics* has a separate record for each of the 3,141 counties and county equivalents in the United States, as defined by the National Institute of Standards and Technology (NIST) as of 2005. Puerto Rico and the other United States possessions are not included. The county equivalents comprise Washington, D.C., parishes in Louisiana, boroughs and census areas in Alaska, and independent cities, mostly in Virginia. For the sake of conciseness all of these entities are referred to as counties in this study.

Appendix 2 – Variables Summary

Variable	Description
AssaultRate	Index aggravated assault rate per 100,000 inhabitants
BurglaryRate	Index burglary rate per 100,000 inhabitants
PopGr00_05	Percent population growth, 7/1/00 to 7/1/05
SexRatio05	SexRatio05 = Male05 / Fmale05
Male_MdAge05	Median age of male resident population, 7/1/05
PctWhite05	PctWhite05 = 100(White05 / Pop05)
UnempRate05	Unemployment rate, annual average estimate, 2005
HouseStrs04	2004 ERS Policy Type: Housing stress (Dummy Variable) – 30 percent or more of households had at least one these housing conditions in 2000: lacked complete plumbing, lacked complete kitchen, paid 30 percent or more of income for owner costs/rent, or had more than 1 person per room ¹⁴
LowEduc04	2004 ERS Policy Type: Low-education (Dummy Variable) – 25 percent or more of residents 25-64 years old had neither a high school diploma nor GED in 2000
PerstPov04	2004 ERS Policy Type: Persistent poverty (Dummy Variable) – 20 percent or more of residents were poor as measured by each of the last 4 censuses
Income	Per capita personal income (dollars), 2005
Popdens05	Population density (per square mile), 2005
LFP05	Labour force participation rate, annual average estimate, 2005
Giniindex	Gini index income inequality measure, 2005
DrugPrev	State-level Illicit drug use prevalence (last month), Nov 2005
AlcAbuse	State-level Binge Alcohol use prevalence (last month), Nov 2005
PCTfemheadhouse	Percent of Under-18 population living in female headed family households

¹⁴ The Department of Agriculture's Economic Research Service. ERS developed the county typology codes (ERS Economic Type and ERS Policy Type) and the Urban Influence and Rural-Urban Continuum Codes.

Appendix 3 – Summary Statistics

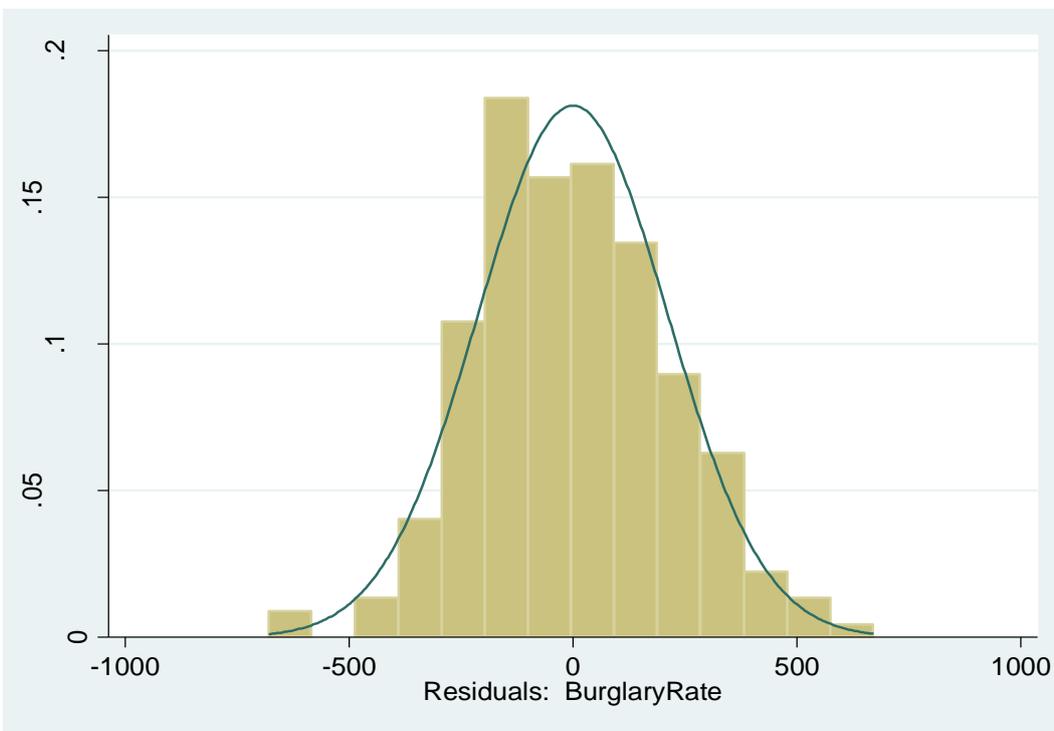
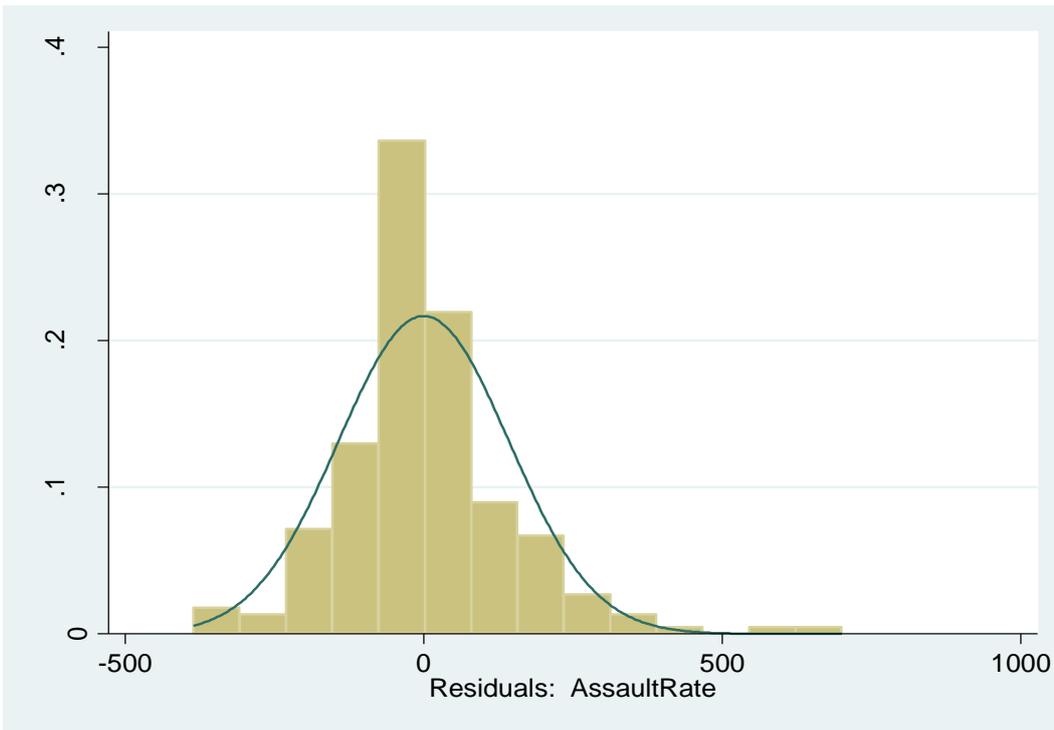
Variable	Obs	Mean	Std. Dev.	Min	Max
AssaultRate	227	306.7873	198.8447	27.12292	1173.474
BurglaryRate	227	753.5406	358.1616	17.98259	1829.47
PopGr00_05	241	6.274066	7.62705	-5.93	46.88
SexRatio05	241	.9649378	.0373399	.87	1.08
Male_MdAge05	241	34.9444	3.066523	24.7	47.2
PctWhite05	241	78.71535	14.12501	22.87	97.54
UnempRate05	239	4.950209	1.208891	2.4	9.5
HouseStrs04	241	.439834	.4973999	0	1
LowEduc04	241	.0580913	.2344028	0	1
PerstPov04	241	.0207469	.1428324	0	1
Income	239	37129.86	9254.664	12837	93377
popdens05	241	2007.188	5747.326	61.472	69390.24
LFP05	239	.5146093	.0413121	.3695706	.6257285
Giniindex	241	.4462697	.0353397	.356	.601
DrugPrev	241	7.825477	.9794088	5.5	12.04
AlcAbuse	241	24.16942	2.704704	17.38	33.3
PCTfemhead~e	241	.0611945	.0221743	.0254386	.1824708

Appendix 4 – Overall test of coefficients between the two equations

H0: [AssaultRate]indepvar = [BurglaryRate]indepvar	
(1)	[AssaultRate]Male_MdAge05 - [BurglaryRate]Male_MdAge05 = 0
(2)	[AssaultRate]UnempRate05 - [BurglaryRate]UnempRate05 = 0
(3)	[AssaultRate]giniindex - [BurglaryRate]giniindex = 0
(4)	[AssaultRate]PCTfemheadhouse - [BurglaryRate]PCTfemheadhouse = 0
(5)	[AssaultRate]PopGr00_05 - [BurglaryRate]PopGr00_05 = 0
(6)	[AssaultRate]Income - [BurglaryRate]Income = 0
(7)	[AssaultRate]PctWhite05 - [BurglaryRate]PctWhite05 = 0
(8)	[AssaultRate]SexRatio05 - [BurglaryRate]SexRatio05 = 0
(9)	[AssaultRate]HouseStrs04 - [BurglaryRate]HouseStrs04 = 0
(10)	[AssaultRate]PerstPov04 - [BurglaryRate]PerstPov04 = 0
(11)	[AssaultRate]popdens05 - [BurglaryRate]popdens05 = 0
(12)	[AssaultRate]LFP05 - [BurglaryRate]LFP05 = 0
(13)	[AssaultRate]DrugPrev - [BurglaryRate]DrugPrev = 0
(14)	[AssaultRate]AlcAbuse - [BurglaryRate]AlcAbuse = 0
(15)	[AssaultRate]LowEduc04 - [BurglaryRate]LowEduc04 = 0
F(15, 207) = 11.06 Prob > F = 0.0000	

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Appendix 5 – Normal distributions for residuals of both equations



¹⁵ PLEASE NOTE: Certain restrictions with version of Stata software and inability to download new features prohibited further multivariate assumption analysis

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Appendix 6 – Correlation between variables (Testing for Multicollinearity and Singularity)

	Assault Rate	Burglary Rate	Pop Gr 00_05	Sex Ratio	Male MdAge	Pct White	Unemp Rate	House Strs	Low Educ	Perst Pov	Income	Pop dens	LFP	Gini index	Drug Prev	Alc Abuse	PCT Femhead
Assault Rate	1.000																
Burglary Rate	0.650	1.000															
Pop Gr 00_05	-0.144	-0.082	1.000														
Sex Ratio	-0.282	-0.116	0.402	1.000													
Male MdAge	-0.135	-0.270	-0.149	-0.287	1.000												
Pct White	-0.425	-0.366	0.256	0.340	0.177	1.000											
Unemp Rate	0.323	0.345	-0.190	-0.103	-0.413	-0.174	1.000										
House Strs	0.142	0.058	-0.018	0.202	-0.312	-0.198	0.245	1.000									
Low Educ	0.213	0.058	0.060	0.002	-0.382	-0.038	0.522	0.290	1.000								
Perst Pov	0.175	0.111	0.047	-0.136	-0.260	0.045	0.297	0.151	0.383	1.000							
Income	-0.197	-0.361	-0.181	0.001	0.408	-0.093	-0.421	0.003	-0.308	-0.241	1.000						
Pop dens	0.112	-0.139	-0.179	-0.268	-0.014	-0.312	0.121	0.211	0.165	-0.006	0.341	1.000					
LFP	-0.368	-0.282	-0.037	0.262	0.159	0.188	-0.492	-0.280	-0.475	-0.339	0.500	-0.101	1.000				
Gini index	0.441	0.337	-0.353	-0.334	0.046	-0.277	0.203	0.239	0.151	0.145	0.321	0.399	-0.202	1.000			
Drug Prev	-0.037	-0.167	-0.192	0.132	0.147	0.139	0.156	0.260	0.054	-0.160	0.094	0.153	0.002	0.089	1.000		
Alc Abuse	-0.159	-0.260	-0.123	-0.109	0.075	0.243	0.018	-0.249	-0.112	0.093	0.066	0.033	0.245	-0.047	0.013	1.000	
PCT femhd	0.619	0.626	-0.257	-0.432	-0.377	-0.580	0.530	0.153	0.242	0.336	-0.377	0.204	-0.470	0.408	-0.142	-0.012	1.000

Appendix 7 – Main Literature

Study	Focus	Sample	Method	Findings
Becker, G. (1968) – <i>Crime and Punishment: an Economic Approach</i>	Punishment	N/A	Theoretical	N/A
Blau, J.R. and Blau, P.M. (1982) – <i>The Cost of Inequality: Metropolitan Structure and Violent Crime</i>	Racial inequality in socioeconomic	1970 data for the 125 largest metropolitan areas (SMSA) in the USA from Uniform Crime Reports	Ordinary Least Squares	Criminal violence is positively related race, poverty and location in the south
Cloward, R. A. and Ohlin, L. E. (1961) – <i>Delinquency and Opportunity</i>	Social Structure	N/A	Theoretical	Social strain can instigate criminal activity
Danziger, S. and Wheeler, D. (1975) – <i>The Economics of Crime: Punishment or Income Redistribution</i>	Punishment and Income Distribution	1960 data for metropolitan areas (SMSA), Census data	Time series regression, Ordinary Least Squares	Punishment, demographics and income all important in crime generation. Income inequality has a more profound effect on crime than average income levels
Glueck, E. T. and Glueck, S. (1950) – <i>Unravelling Juvenile Delinquency</i>	Youth	500 boys in a correctional facility	Various regression techniques	60% of delinquents came from broken homes

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Study	Focus	Sample	Method	Findings
Hackney, S. (1969) – <i>Southern Violence</i>	Southern Violence	1954 using data on crime for the years 1946-1952	Ordinary Least Squares	A Southern sub-culture of violence exists.
Kelly, M. (2000) – <i>Inequality and Crime</i>	Income inequality	1991 Uniform Crime Reports	Poisson Regression, Logistic Regression	Inequality has no effect on property crime but a robust effect on violent crime. Property crime is well explained by the economic theory of crime, violent crime is better explained by strain and social disorganisation
Kposowa A. J., Breault, K. D. & Harrison, B. M. (1995) – <i>Reassessing the Structural Covariates of Violent and Property Crimes in the USA: A County Level Analysis</i>	Assessing the determinants of different crime rates	Uniform Crime Reports	Ordinary Least Squares, Weighted Least regression	The strongest determinants of property crime were race, education, age, unemployment and population change whereas for violent crime they were race, unemployment, population change and population density.
Machin, S. and Meghir, C. (2004) – <i>Crime and economic incentives</i>	Wage levels and distribution	Police force data of England and Wales between 1975 and 1996, New Earning Survey (NES)	Ordinary Least Squares, Instrumental Variables regression	Low wage has more of an effect on crime than unemployment
Merlo, A. M. (2003) – <i>Income Distribution, Police Expenditures, and Crime: A Political Economy Perspective</i>	Wage levels and distribution, police expenditures	Uniform Crime Reports, National Crime Victimization Survey, Public Use Microdata Samples, National Longitudinal Survey of Youth, 1990	Maximum Likelihood estimates	Criminal activity can be modelled through analysis of expenditure and income

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Study	Focus	Sample	Method	Findings
Phillips and Votey (1972) – <i>An Economic Analysis of the Deterrent Effect of Law Enforcement on Criminal Activity</i>	Deterrence	Uniform Crime Reports	Basic figure analysis	Law enforcement should be bolstered substantially to control crime
Piliavin, I., Gartner, R., Thornton, C. and Matsuoda, R. L. (1986) – <i>Crime, Deterrence and Rational Choice</i>	Deterrence	National Supported Work Demonstration surveys (USA)	Various regression techniques	Evidence supports the opportunity and reward component of the rational-choice model of crime, but not the risk element
Shannon, L. W. (1954) – <i>The Spatial Distribution of Criminal Offences by State</i>	Spatial distribution of crime rates	Uniform Crime Reports, 1946-52	Basic figure analysis	Crime rates are distributed geographically differently
Viscusi, W. K. (1986) – <i>The Risks and Rewards of Criminal Activity: A Comprehensive Test of Criminal Deterrence</i>	Risk-rewards trade-off	NBER survey of inner-city black youths 1979-80	Various regression techniques	Support of the criminal deterrence hypothesis

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