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Shifting Patterns in Wisconsin Crime Rates

By

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Shifting Patterns in Wisconsin Crime Rates

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Shifting Patterns in Wisconsin Crime Rates

Abstract

In this study we explore shifting patterns in crime across Wisconsin counties between 1990 and 2000. Building on the three core ecological theories of criminology including strain/anomie, social disorganization and economic rational choice theories we hypothesize that socioeconomic well-being can be used to identify predictable patterns of change in crime. The data generally support the notion that higher levels of socioeconomic well-being at the beginning of the period are associated with lower levels of both violent and property crime at the end of the study period.

Introduction

The 1990s witnessed a remarkable decline in crime rates across the US and Canada. While this trend is positive from a sense of social well-being, it has presented social scientists, and in particular criminologists, with a range of new questions. The dominant theories of crime, including economic rational choice theory (Beccaria 1764; Bentham 1789; Fleisher 1966; Becker 1968, 1993; Ehrlich 1973), anomie and strain theory (Durkheim 1893; Merton 1938) and social disorganization theory (Park and Burgess 1925; Shaw and McCay 1931, 1942, 1969), were unable to predict the stagnation in the growth of crime during the 1980s and the ensuing decline during the 1990s (Ouimet 2002).

A second, perhaps less fundamental problem with the dominant theories of crime is that the macro-empirical evidence is often inconclusive at best and contradictory at worse (Chirico 1987; Patterson 1991; Bausman and Goe 2004).¹ This latter problem is compounded in the handful of studies that focus on rural crime patterns (Rephann 1999; Jobes 1999; Osgood and Chambers 2000; Wells and Weisheit 2004). The statistical patterns that tend to appear in urban focused studies tend to not hold when using rural data. This latter result is troublesome because a comprehensive theory of crime should not have caveats. While the criminology literature is vast and richly interdisciplinary there is still a vast amount of work to be undertaken, both theoretically and empirical.

Beyond our academic interest in better understanding why crime occurs, the policy implications of this line of work are profound. In Wisconsin, for example, public expenditures per \$100 of personal income on corrections (prisons and jails) increased slightly less than six percent annual over the 1990s, while the average for the US was less than two percent. Do expensive “get tough on crime” policies that have been popular in the US, and particularly Wisconsin, deter

¹ Within the criminology literature macro-empirical analysis refers to studies that use regional data such as cities, counties or states as the unit of analysis while micro-empirical analyses use individual level data in the form of survey or interview data.

crime? When these increases in corrections expenditures have been paid for with corresponding decreases in state spending for higher education, are limited public dollars being wisely invested? Do investments in education reduce crime rates? Should these investments be in preschool programs such as Head Start or post-secondary education? Are targeted preventive programs more cost effective? What should these programs look like and who should be targeted? Is crime purely a function of poverty and would more comprehensive efforts to tackle poverty have greater social and economic payoff of which reduced crime is but a small outcome? Is crime more a function of social and economic disruptions which requires a different set of policy choices?

The intent of this applied study is to focus attention on crime patterns across Wisconsin. Wisconsin is a diverse and dynamic region with large urban centers such as Milwaukee and a clustering of second tiered urban areas such as the Fox Valley (Appleton to Fond du Lac) and Madison to a wealth of rural hamlets. The economic base is equally diversified ranging from tourism, agriculture and forestry products and paper production, to small manufacturing and large business service industries. Using county level data we look at changes in violent and property crime rates between 1990 and 2000. Using simple scatter plots and correlation analysis we focus our attention on unemployment, education, levels of income, wealth and equality in 1990 on changes over the 1990s. We focus on this small set of explanatory variables based on our review of the current literature and current policy debates within Wisconsin. In addition, the overlap between economics and sociology appears to most fruitful when thinking in terms of inequality within a region. Clearly, this modest applied study can not answer the broad questions outlined above, but the analysis opens the door to more focused discussion in Wisconsin.

Beyond these introductory comments our study is composed of four additional sections. Next we review the current thinking within the criminology literature with a focus on the macro-level studies as these are most applicable to our analysis. We then outline current trends in crime across Wisconsin. Our empirical approach is outlined and then we discuss our results. We close the study with a review of our findings and discuss possible policy implications. We also outline a broader research agenda by raising a series of questions about the changing dynamics of Wisconsin and how those dynamics may affect future crime patterns.

Theoretical and Empirical Perspectives of Crime

The range of theoretical approaches to crime is as vast and complex as are the parent disciplines of criminology. Theories range from Cesare Lombroso's trait theory and the idea of the "born criminal" to Marx and Engel's notion of class conflict and the modern interpretation embodied in critical criminology and the National Deviancy Conference. While there are many "fringe" theories of crime mainstream criminology is built on three broad ecological theories of

crime: social disorganization theory, anomie or strain theory, and rational economic choice theory.

Social disorganization theory, or social cohesion theory, widely known as the Chicago School of Criminology due to the pioneering work of Park and Burgess (1925) and Shaw and McCay (1931, 1942, 1969) and their studies of crime in Chicago, emphasizes social, economic and political forces at the macro or community level. Attention is focused on social capital broadly defined across the community and is concerned with the deterioration of neighborhoods and the social ties that link neighbors. As social capital or social cohesion of the community deteriorates, or is initially weak, social controls that put limits on criminal activity deteriorates (Thorbecke and Charumilind 2002; and Lederman, Loayza and Menendez 2002). Conflicting social or cultural values leads to breakdowns or shifts in social controls, again allowing for criminal activity. In essence the social norms of the community go through radical change or deteriorate and through the resulting conflict crime is a by-product.

Studies of rural "boom-towns", such as those by Dixon (1978), Freudenburg (1978), Krannich, Greider and Little (1985), Freudenberg and Jones (1991), Smith, Krannich and Hunter (2001) and Hunter, Krannich and Smith (2002), find that rapid economic and social change results in increased incidents of crime, both real and perceived. The central hypothesis is that the social norms, or the social cohesion, of the community are disrupted and crime is a byproduct. Within the macro empirical literature social disorganization theory tends to be proxied by general poverty levels, youth poverty levels in particular, ethnic heterogeneity, residential turnover and/or mobility, unemployment, economic instability, and income and/or wealth inequality among others.

Examples of change in Wisconsin that can lead to conflict are many and varied. The immigration of Hispanic populations to work in agricultural processing has altered the dynamics of some Wisconsin communities. The rise of the Hmong community has created significant conflict in other parts of Wisconsin. The recent case of Chai Vang and the shooting of eight hunters in which six were killed drew international attention to rural Wisconsin. The question of racial bigotry was at the forefront of the criminal trial as well as public discussions.

The shift in the nature of the recreational housing markets in Wisconsin has also introduced social conflict within wide swaths of rural Wisconsin. As the first wave of baby-boomers reach retirement age many recreational homes are being converted into four season homes with retirement destination as the objective. One would not think of northern Wisconsin as retirement destination regions, but the supply of recreational homes is conducive to attracting retirees. More broadly, the shift from high paying manufacturing jobs to lower paying service jobs, particularly in the recreational industry, is altering the income distribution throughout the state.

Anomie or strain theory focuses on conflicts between goals and means to achieve those goals (Fay 1993). Unlike social disorganization theory that looks at macro issues within the

community, strain theory tends to focus on individuals and behavior of those individuals within the community. Unequal distribution of wealth and/or income creates an “envy affect” (Kelly 2000) where those at the lower socioeconomic spectrum are jealous of those that have higher socioeconomic status. There is a level of frustration where the poor either do not have the skills or the means to achieve higher levels of income and/or wealth. Unsuccessful individuals become alienated from the community, social norms from the individual’s perspective come into question, and the strain results in criminal activity. Rural residents are more likely to keep community problems to themselves by viewing crime as a personal matter and not seek the help of law enforcement agencies (Laub 1981). As noted by Weisheit and Donnermeyer (2000), rural law enforcement personal often voice frustration because of the conservative nature of many rural residents. Many people in rural areas simply prefer to handle their own problems without seeking help from “outside”.

An additional element of the theory is the explicit allowance of acceptable alternative means to achieve an end. In the intercity where economic opportunities are few the draw of illegal drug activity is powerful. Low income persons, generally youth and young adults, face the choice of achieving economic success through low paying service jobs or the potentially highly profitable illegal drug trade. Any means possible to achieve one’s goals become acceptable within the community.

The rise of the economic and political “clout” of the Native American population that has resulted from the success of tribal gaming enterprises has altered the social structure of many parts of rural Wisconsin. Although the perception of income received by Native American families from gaming does not always match the reality, there are incidences of strain theory at work. Many of the Native American communities are experiencing “boom-town” effects and concerns over the introduction of illegal gang activity have been a cause of concern for many Tribal Elders. The immigration of Hmong, Hispanics and retirees from urban settings coupled with the changes within the Wisconsin Native American community are but a few of the examples of socioeconomic changes occurring across Wisconsin.

Rational economic choice theory, which has been within the sociology literature in some form or another for many years, was introduced into the economic literature by Becker (1968, 1993) and Ehrlich (1973).² Becker argued that crime was the product of rational decision making by individuals who are attempting to maximize economic well-being by comparing the benefits of crime versus the costs of apprehension and fines and/or imprisonment. If the potential gain was sufficiently large, then the choice to commit a crime is rational. Economists maintain

² Becker was not the first economist to consider economic motivations for committing crime, for example see Fleisher (1963, 1966a, 1966b). The prominence of Gary Becker, who won the Nobel Prize in Economics in 1992 "for having extended the domain of microeconomic analysis to a wide range of human behavior and interaction, including nonmarket behavior" such as criminal activity, within economics drew considerable attention by other economists.

that the power of the rational choice theory is that it is rooted on deductive theory of individual behavior that allows for direct and more exact empirical testing. This is in contrast to the more inductive research approaches of sociology and political science. Formal derivations of the economic rational choice theory are available in Chiu and Madden (1998), Fajnzylber, Lederman and Loayza (2002), Lederman, Loayza and Menendez (2002) and Chisholm and Choe (2004).

There are three ways in which the empirical literature has approached the rational choice way of thinking about crime. The first emphasizes law enforcement policies such as police expenditures, arrest rates and criminal punishment policies (Lochner 1999). The logic is that the potential criminal is calculating the risk of being caught and punished and clearly public investments in law enforcement will increase the cost side of the criminal equation. Unemployment, economic marginalization, or economic instability may place people in difficult positions where criminal activity is necessary in the short-term to provide basic economic necessities. The third line centers on economic inequality. In communities that have higher levels of inequality the combined effects of having the presence of lower income persons in close proximity to high income individuals provides rational incentives and opportunities to commit crime.

In Wisconsin the success of many Native American tribes and the shifting recreational housing market has introduced perceived and to some extent real increases in inequality. In a study of how crime is capitalized into local land prices and wages Deller and Ottem (2001) found that burglary rates are the highest in Wisconsin counties that have a high proportion of the housing stock classified as recreational. In that study they found that it is fairly common for recreational houses to be vandalized during the winter months.

While each of the three main ecological theoretical approaches offers unique perspectives on explaining crime, there are several common elements that are present in each. First, economic marginalization, often measured through poverty data, plays a role in each theoretical approach. In social disorganization theory poverty is associated with populations where social cohesion is weak and social norms required to deter crime are weak or not present. In strain theory people in poverty are subject to envy effects and may pursue criminal activities as a mean to achieve desired outcomes. In rational economic choice theory people in poverty may see a greater benefit from crime than forgone opportunities if captured. Second, unemployment, or more precise sustained periods of unemployment, follows the same logic across all three theoretical approaches.

The third is economic inequality. From social disorganization theory high or increasing levels of inequality results in crime indirectly through increases in poverty. More directly, there is a perception of those in the lower economic tiers that those in the higher tiers have a disproportionate share of economic, social and political power. In a Marxist sense, class conflict results in lower levels of social cohesion and crime is a direct product. From strain theory people

in the lower economic structure are frustrated by the economic success of those around them. In short, people who view themselves as unsuccessful become alienated from society and commit crime. In rational economic choice theory the higher the inequality within a community positions low income persons in close proximity to higher income people who make ready target for criminal activity.

Given the triangulation of the three dominant ecological theories of crime onto a handful of socioeconomic variables, it would seem reasonable to expect the empirical literature to be consistent and robust in its findings. This unfortunately is not the case. A detailed review of the empirical literature is far beyond the scope of this particular study. But there have been a number of reasons offered for why this literature has tended to find inconsistent and contradictory results.

In separate reviews of the literature Patterson (1991) and Chiricos (1987) conclude that much of the earlier empirical literature is inconsistent with measurements of crime where total crime is often used where violent and property crime are mixed. They find that studies that tend to focus on property crimes tend to find more consistent results that are in line with the predictions by theory. Violent crime tends to be more difficult to empirically model. For example, violent crime that is associated with domestic violence cuts across all socioeconomic spectrums thus defying the macro empirical approaches that are of interest to this study. The conclusion they offer is that greater care must be taken when defining the dependent variable in empirical studies.

In their theoretical discussion of rational economic choice theory Christolm and Choe (2004) observe that income and income inequality are defined and measured inconsistently from one study to the next. Income has been measured using individual wages (hourly, monthly and annually), per capita total personal income, per capita wage and salary income, both median and average household income as well as both median and average family income. They also note that income inequality measures have also been erratically defined across studies. While one would expect many of these to be correlated, subtle differences can result in inconsistent and contradictory results.

In an extensive review of the empirical literature Land, McCall and Cohen (1990) suggest that many macro empirical studies of crime fall prey to multicollinearity. Many studies using regression analysis, for example, include measures of income, poverty, ethnicity, unemployment and other measures of socioeconomic deprivation making it difficult to separate out the effects of individual variables. Fundamentally the inversion of the design matrix (i.e., control variables) in the computation of the regression parameter estimates is unstable and minor changes in the design matrix can dramatically alter the parameter estimates and error covariance matrix. To address this issue some researchers, such as Wells and Weisheit (2004), suggest using variable reduction techniques, such as principal components, to create indices of relevant variables.

A third problem area within the empirical literature is the nature of causation between crime and the wide range of socioeconomic variables hypothesized to be associated with crime.

Many studies of regional economic growth and development, such as Carlino and Mills (1987) and Deller, et.al., (2001) find that crime is a “disamenity” and a deterrent to growth. In Robert Putnam’s influential book *Bowling Alone* (2000: 137) he discusses the notion of social capital, which captures many of the core elements of social disorganization and cohesion theories as well as anomie and strain theory, he suggests that the arrows of causation is “as tangled as a well-tossed spaghetti.” Some researchers, such as Messner, Baumer and Rosenfeld (2004), suggest using simpler bivariate analysis or simultaneous equation estimators of structural equations masks the detailed relationships within the “bowl of spaghetti”.

A fourth problem, particularly for studies that are interested in rural, is that the Federal Bureau of Investigation’s (FBI) Uniform Crime Reports (UCR), the primary source of data for domestic macro level studies, tends to underreport actual crime (Weisheit and Donnermeyer 2000). For example, in many rural areas the presence of law enforcement is limited to the county sheriff who has large geographic areas to cover with limited resources. In this case rural residents may view the reporting of a crime to have minimal use. There is also evidence that rural areas are more governed by informal social control. In a study of rural crime Smith (1980) found that shoplifting and rural theft was rarely reported to the police and in most cases handled informally. Smith reported on the frustration of rural law enforcement officers in the lack of turning to their offices for help when a crime has been committed. Because everyone “knows everyone else” in rural areas people are more inclined to deal with crime through informal mechanisms. As argued by Weisheit and Donnermeyer (2000) density of acquaintanceship can influence the reporting of crime by increasing the watchfulness of neighbors making them more likely to act when a crime is committed. In addition, density of acquaintanceship acts as a deterrent to criminal behavior because the offenders can be more easily identified.³

A fifth problem area for macro empirical studies centers on the unit of analysis. For micro level studies the unit of analysis is the individual with data often drawn from surveys or data from the criminal justice system. For macro studies researchers are limited by which the data of interest are reported by government agencies. For our study the county is an arbitrary spatial unit of analysis and criminal activity in one county may spill over into neighboring counties. In essence, the spatial error terms are not independent and this introduces spatial dependency problems within any statistical analysis and biased and inconsistent results (LeSage 1997). While there are spatial correction methods, they have not found their way into the empirical criminology literature. A more likely problem with county level is the rich variation within the county is lost; heterogeneous communities that make up the county are treated as one homogenous unit. Despite these limitations, the county is a relevant unit of analysis because for

³ This observation is more commonly advanced as an explanation for why crime rates tend to be lower in rural settings. Teenagers and young adults are deterred from committing petty crime because they are known within the community. Because of strong community networks the parents often know what the child has done before the child even returns home.

most states the county is the unit of government responsible for law enforcement, the court system and jail services.

Patterns Across Wisconsin

From a long-term (1960-2003) perspective there is a clear inverted-U shaped pattern of crime rates for total crime (Figure 1a), violent crime (Figure 1b) as well as property crime (Figure 1c) for both the nation and Wisconsin. Consider the pattern of total crime first (Figure 1a). For the US the total crime rate was the lowest at the beginning of the period with 1,887 total crimes per 100,000 persons, then peaks in 1980 at 5,950 total crimes per 100,000 persons and again in 1991 at 5,898. From the low in 1962 to the peak in 1980, the total crime rate increased by 215.3 percent. After 1991, there is a clear and consistent downward pattern with total crime for the US declining by 31.1 percent. Wisconsin's total crime rate is consistently below the national level by about 26 percent over the 44 year period with the largest difference on a percent bases is in 1962 at 42 percent and on an absolute difference of 1,692 in 1988. More important is the consistency in the inverted-U shaped pattern over the period for both Wisconsin and the nation.

The pattern for violent crime over the same period follows many of the same patterns as total crime but with some important differences (Figure 1b). The first important difference is that violent crime increased by 379.5 percent from its low in 1962 to its peak in 1991. Clearly violent crime at the national level grew at a much faster rate over the period than total crime. The accelerated growth in violent crime has been used for "get tough on crime" policies that have been widely popular at the national and state level. Like total crime there is a clear inverted U-shaped pattern with the violent crime rate declining by 37.3 percent from its peak in 1991 to 2003.

The more important difference given our focus on Wisconsin is the consistently large gap between Wisconsin and the nation. While it is true that violent crime increased by 879.4 percent from its low in 1962 to its peak in 1995, the gap between the US and Wisconsin violent crime rate averaged about 64 percent during the peak levels of crime in late 1980s and early 1990s.⁴ The third important difference is that the decline in violent crime after 1991 is much more noticeable for the US than it is for Wisconsin. While the violent crime rate has declined by 21.4 percent since 1995 for Wisconsin this decline is not as noteworthy as the decline at the national level. As we will discuss below, violent crime actually increased for most Wisconsin counties during the 1990s.

When we look at property crime patterns (Figure 1c) we see that it closely parallels the total crime rate (Figure 1a). This is explained simply by the observation that the total crime rate is

⁴ Care must be taken when comparing absolute and percentage changes. In the case of violent crime, the absolute increase in the crime rate for the nation is much larger than Wisconsin, but because Wisconsin starts the beginning of the period with a much smaller absolute level, the percent changes are much larger for Wisconsin.

dominated by property crime; property crime has consistently accounted for 88.3 percent of total crime at the national level for the 44 year period examined. Because total and property crime track each other so closely we will not belabor the discussion but to only point out again the inverted-U pattern of rising then falling crime across the nation and Wisconsin.

When we look at patterns in crime across Wisconsin counties we want to focus our attention on the more recent data, specifically over the 1990s when crime rates were declining. As described above and in more detail in the next section of the study many of our theoretical approaches to thinking about crime and resulting empirical studies were unable to predict the inverted-U shaped pattern. Nor is it clear that theoretical approaches and empirical insights that “worked” during periods of increasing crime rates continue to “work” during periods of decreasing crime rates. There we will focus on the time period 1990-2000.⁵

Consider first patterns in 1990. There is a strong relationship between population and total crime rates with the counties with the lowest overall crime rate including the rural counties of Florence, Pepin, Buffalo and Lafayette and those with the highest being urban counties including Milwaukee, Dane, Racine and Waukesha. The same general pattern appears for violent and property crime. A simple model regressing population in 1990 on total, violent and property crime in 1990 yields R^2 s of .3927, .3025 and .3584, respectively. This suggests that population alone explains about one-third of crime rates. The same general relationship between crime rates and population holds for the 2000 data, but the R^2 s are slightly lower, suggesting that there is more to crime rates than simply the population size of the county.

As we showed above total, violent and property crime decreased across Wisconsin, but there is significant variation across the state. Of the 71 counties contained in the analysis, 49 experienced a decline in total crime, but 22 counties experienced an increase in total crime.⁶ Counties that experienced the largest absolute level declines in crime rates also tended to be those that had the highest levels in 1990 including Milwaukee, Dane, Winnebago and Waukesha counties. Those counties experiencing increases in the total crime rate tended to be more rural in nature including Sawyer, Monroe, Rusk and Forest counties. The fact that there are a handful of counties that moved in the opposite direction from the nation and Wisconsin overall raises the question as to why. Is it simply a matter of reporting or is criminal activity actually increasing in rural Wisconsin?

As we demonstrated above the declines in violent crime rates for Wisconsin are not as robust as for the nation and this plays out when looking at the individual county data. Of the 71 counties only 27 experienced a decline in the violent crime rate, but the majority, 44 counties, actually experienced increases in violent crimes. Although more counties experienced increases

⁵ A more practical reason for picking 1990 and 2000 as the beginning and end points of our analysis is that we can match the crime data with census data.

⁶ Because of the unique status of Menominee County it is removed from the analysis.

in violent crime, the relative size of the declines in large counties such as Milwaukee, Dane and Waukesha dominated the increases in smaller counties such as Door, Florence and Iowa counties, thus explaining how the violent crime rate for the state can decline while so many counties experienced increases. But not all the counties that experienced increases in violent crime were smaller more rural counties; the largest increase occurred in Kenosha County which saw its violent crime rate increase from 268 in 1990 to 621 in 2000, an increase of 131.7 percent. The county with the second next to the highest, Rock County, experienced an increase of only 33.7 percent.

When we look at property crime rate we see a similar pattern we saw with the total crime rate. Again, because the total crime rate tends to be dominated by property crime, this is not surprising. Of the 71 counties, 52 experienced declines in property crime with the largest declines again occurred in the largest counties including Milwaukee, Dane, Winnebago and Waukesha. Interestingly, Kenosha County, which experienced a surprising large increase in violent crime over the 1990 to 2000 period experienced one of the largest declines in property value. Of the 19 counties experiencing an increase in property crime Columbia County had the largest increase followed by Sawyer, Monroe and Oconto counties.

If we look at changes in violent and property crime rates at the same time we might expect that the majority of counties would have experienced a decline in both. We do not find this to be the case; 33.8 percent of Wisconsin counties did indeed experience a decline in both violent and property crime, 22.5 percent experienced an increase in both, and the majority, 43.7 percent, saw an increase in one category and a decline in the other (Figure 2).⁷ Counties that went counter to the national and state trends in terms of general declines in crime rates and experienced in both violent and property crime rates include Columbia, Sawyer, Monroe and Oconto. Counties that experienced declines in both categories tended to be larger metropolitan such as Milwaukee, Dane, Brown and St. Croix, but a few rural counties in this classification include Iron, Pepin, Taylor and Barron to name a few.

Perhaps the more interesting collection of counties is those that experience an increase and decrease in one or the other categories. From our analysis above it should not be surprising that the vast majority of these counties experienced an increase in the violent crime rate and a decrease in property crime. Only three counties (Marquette, Shawano and Vernon) experienced a decrease in violent and an increase in property crime rates.

The results of this simple descriptive analysis raise several interesting questions. For example, are these patterns in change in crime rates simply a function of the size of the county? Why do Wisconsin counties seem to run counter to national trends in changes in violent crimes? Yet, at the same time we see noticeable declines in property crime rates. Our intent with this

⁷ It is important to note that in all graphics where we plot data for Wisconsin counties we remove some of the outliers such as Milwaukee County for more visually clear figures. None of the data has been removed from the supporting statistical analysis.

work is to not only describe some of the patterns of crime across Wisconsin, but to lend insights into what factors influence. To gain some of these insights we now turn to the statistical component of this study.

Empirical Modeling

There have been numerous empirical approaches used within the criminology literature to understanding and predicting crime patterns. The most common approach is to use some form of multivariate analysis such as regression. The approach that we adopt for this study follows a simple scatter-plot type of analysis in order to visualize the data as used by Lederman, Loayza and Menedez (2002), Glaeser and Sacerdote (1999) and others in addition to applying regression analysis. The framework is to look at changes over the 1990-2000 period with a focus on the role of initial conditions (1990) on that change. This lagged approach is widely used in economic growth studies where conditions today explain growth or change tomorrow. More relevant to the study reported here Bausman and Geo (2004) argue that one of the reasons for the inconsistent empirical findings in the macro criminology literature is the predominance on statistic cross-sectional models. They argue that a more dynamic dimension needs to be introduced into the literature such as that adopted by Gould, Weinberg and Mustard (2002). Indeed, when one thinks about social disorganization theory it is the changing dynamics of the community that drives crime (Wilson 1987). Based on the three ecological approaches to studying crime we focus our attention on three broad areas of socioeconomic factors: size, income, and social capital. We will discuss the logic behind each in turn.

Wisconsin is composed of a range of counties of different sizes including major metropolitan areas such as Milwaukee to minor metropolitan areas such as Brown and Dane Counties to a vast array of nonmetropolitan counties such as Florence County with a 2000 population of only 5,088. The small handful of studies that have focused on rural crime have observed that the remarkable decline in crime at the national level over the 1990s is driven almost exclusively by metropolitan areas (Rephann 1999; Jobes 1999; Wells and Weisheit 2004). Given our simple descriptive analysis of Wisconsin counties presented in the previous section of this study we could conclude that the same urban-rural pattern applies to Wisconsin. Finally, based on simple regressions of population on crime levels introduced above population is a strong predictor on crime levels.

Income, or more specifically certain characteristics of income and wealth, is perhaps one of the most commonly used explanatory variables in thinking about and modeling crime. As noted by Chisholm and Choe (2004) income measures have ranged from median and average family income to median and average household income to per capita income to wages. Our first characterization of income is simply median household income. Recent studies have found that higher levels of average income tend to be associated with lower levels of crime (Reilly and Witt

1996; Gould, et al. 2002). Yet, there are other recent studies that find higher income is associated with higher crime (Rephann 1999). Unfortunately, theory does not provide us with any insight into which income measure is best. While one would expect these different measures to be highly correlated and in essence substitutes, when interchanged within model with numerous explanatory variables slight variations can cause wide swings in empirical results.⁸ Chisholm and Choe (2004) argue that the vagueness of results on higher income levels may be due that higher income might be measuring both the benefits of legal activity but also greater opportunities for illegal ones.

A more consistent interpretation of income within the three ecological approaches to criminology would not focus necessarily on average income levels but rather on the poverty rate. For this study we use three measures of poverty: the general poverty rate in 1990, the child poverty rate, and the percent of households with income below \$15,000. Based on the theory we expect to find a positive relationship between measures of poverty at the beginning of the period and changes in crime over the study period. Although Patterson (1991) notes that the empirical literature has been somewhat inconsistent, the data tends to support the ideas advanced by the theory. Patterson (1991) further notes that source of inconsistency hinges on aggregation bias where violent and property crimes are grouped. It is generally accepted now in the empirical criminology literature that the factors that affect violent crimes such as rape are different than those that affect property crimes such as burglaries. Indeed, much of the inconsistency in the empirical literature flows from studies that try to explain total crime as opposed to specific types of crime.

Income distribution has been a major focus of studies on crime (Carcach 2001; Thorbecke and Charumilind 2002). As early as Ehrlich's (1973) work the role of inequality in the empirical studies of crime has been acknowledge. In the line of Becker's (1968) rational economic decision framework of crime Ehrlich uses income inequality as a proxy for opportunity costs. Individuals at the low end of the income distribution may be more prone to commit crime because the potential pay-off is greater in terms of forgone wages. Ehrlich, along with Fleisher (1966a), Fajnzylber, Lederman and Loayza (2002) and Kelly (2000) find that higher levels of income inequality are statistically tied to higher levels of crime. Strain theory as well as social disorganization theory both maintain that higher levels of inequality will lower overall social capital and provides an additional theoretical link between higher levels of inequality and crime (Kawachi and Kennedy 1997). Land, McCall and Cohen's (1990) review of much of the earlier empirical work, unfortunately again, find mixed results.

For this study we use the Gini Coefficient of income distribution along with the percent of households with income below \$15,000 and percent of households with income above \$75,000. The Gini Coefficient is one of the most widely used measures of income distribution and ranges

⁸ This speaks to the problem of multicollienarity as advanced by Land, McCall and Cohen (1990).

between zero and one and has been commonly used in the study of crime (Daly, et al. 2001). A value of zero is associated with perfectly equal distribution of income; an economy with a population of 100 persons and \$100 of total income, every person has \$1 of income. A value of one is associated with severe inequality; that same economy with 100 persons and \$100 of total income, one person has \$100 of income and 99 persons have zero income. This latter case is sometimes called a “king’s economy”.

We have two additional variables that could be described as additional dimensions of the county’s economy; the median housing value and the unemployment rate. It is generally believed that higher unemployment rates are conducive to higher levels of crime. In a review of sixty empirical studies of crime Chiricos (1987) found that unemployment rates are a strong predictor of property crimes but had a poor relationship to violent crimes. This follows from both Becker’s rational economic agent theory as well as strain theory. Some of the more current empirical work, such as Carcach (2000), Gould, Weinberg and Mustard (2002) and Reilly and Witt (1992) confirm these general results. Others such as Timbrell (1990), Field (1990), Pyle and Deadman (1994) and Bausman and Goe (2004) have not been able to confirm this relationship.

Median housing value is a measure of wealth and the logic of its role in helping us understand criminal activity follows closely that of income; higher housing values are associated with higher levels of wealth and lower levels of crime. In other words, people with higher levels of wealth have less of an incentive to engage in criminal activity. At the same time, however, if a county has high levels of poverty and higher median housing values, then strain theory as well as rational economic choice theory suggests that crime could be higher.⁹ Higher housing values may make an area more attractive to targeted criminal activity. The handful of studies that have looked at the relationship between housing value and crime have tended to find a negative relationship; higher values lead to lower crime, particularly property crime (Reilly and Witt 1996; Malczewski and Poetz 2005; Kennedy and Forde 1990; Bursik and Grasmick 1993; Sampson and Wooldredge 1987).

Our final set of variables is intended to proxy social capital within the county and includes the infant death rate and the percent of the population over age 25 with at least a bachelor’s degree. Infant death rate has been widely recognized as measure of social, human and economic capital (Kawachi, et al 1997; Wise 2003). Higher infant mortality rates are not only associated with limited access to health care but also less than desirable home conditions such as alcohol and drug abuse as well as domestic violence. We hypothesize that higher infant death rates at the beginning of the period will be associated with either increasing or at least stagnant crime rates over the period studied. Education level within the criminology literature is often studied from the micro-perspective where the research focuses on the educational attainment of

⁹ While such a situation might be counter intuitive, in the light of widening income distributions and higher levels of heterogeneity across a county this situation is very possible.

those arrested or convicted of a crime. These studies generally find that higher education levels are associated with lower levels of criminal activity (Ehrlich 1975; Grogger 1998; Donohue and Siegelman 1998; and Lochner 1999). From a macro perspective we believe that higher levels of education are associated with higher levels of social capital and hence lower levels of crime, or in our case, declining crime rates.

Scatter Plot Results

To help facilitate our discussion and reduce the volume of results we will focus our attention only on violent and property crime. We do this for two reasons. First, it has become widely accepted in the criminology literature that limiting attention to only the total crime rate will be subject the analysis to aggregation bias. As we have seen above, the factors that drive rape and murder are fundamentally different from the factors that drive larceny and burglary. Second, upon comparison of national and Wisconsin trends (Figures 1a and 1c) it becomes apparent that property crime dominates the total crime index. If this is the case, tracking both total and property crime at the same time becomes somewhat redundant. The scatter plots along with the results of simple regression analysis are presented in Figures 3a through 13b.¹⁰ In addition, we offer a complementary set of correlation coefficients in Table 1. The consistency of the simple correlation results across total and property crime provides further justification for discussing just violent and property crime in subsequent analysis.

Let us begin our discussion with population levels in 1990 and its affect on changes in violent and property crime rates over the 1990s (Figure 3a and 3b). Given the national and state historical analysis presented in Figures 1a, 1b and 1c along with the descriptive analysis of Wisconsin counties we expect that larger counties should experience larger declines in crime. For both violent and property crime we find this to be the case with the results strongest for property crime. What is of interest is that there are a number of Wisconsin counties that have experienced an increase in the violent crime rate over the 1990s. This is evident in the statistical evidence with the intercept term of the simple regression equation being positive. This again begs the question; what is it about Wisconsin that we are experiencing increases in violent crime while the predominance of the nation is experiencing declines? For property crime the predominance of Wisconsin counties are experiencing a decline with the simple linear model reporting a negative intercept term. If we look at the percent of variance in the change in the crime rates initial population levels explains only 4.5 percent of violent crime and 14.1 percent of property crime. Clearly there is significant variation in changing crime rates that is not explained by population levels.

¹⁰ Recall that for most of these scatter plots we have removed a small handful of the largest counties to aid with the presentation. All of the data are included in the statistical analysis. In some cases, the trend line that is imposed on the scatter plots may not perfectly reflect the regression equation. In each case, the reported regression equation reflects the correct result.

Income levels, measured by median household income, have a negative association with changes in crime rates, but only at the 90 percent level of confidence (Figure 4a and 4b). These results complement the micro-level studies discussed above where people with higher income levels are less likely to engage in criminal activity. For both violent and property crime median household income explains slightly more than four percent of the change between 1990 and 2000. Based on the estimated regression coefficients and the simple correlation coefficients median household income has approximately the same impact on both types of crime. The policy implication of this result is straightforward; policies aimed at increasing income will have the positive impact of reducing both violent and property crimes.

A common theme throughout the empirical criminology literature is the role of poverty in predicting crime. For Wisconsin counties the empirical evidence provides at best weak support for the hypothesis relative to violent crime and no support relative to property crime (Figure 5a and 5b). Based on the statistical analysis, poverty is not a predictor of changes in crime. One argument that is advanced is that the appropriate measure of poverty is not overall poverty which includes poor elderly but child poverty rates. The argument is that youth are more prone to commit crime than the overall population. The data for Wisconsin seems to support this logic with respect to violent crime (Figure 6a) but not for property crime (Figure 6b). This latter result is somewhat counterintuitive because the logic behind using youth poverty rate is that youth are more likely to commit property crime such as vandalism, burglary and drug and alcohol related crimes. A case could be made that the data used here are too aggregate to capture the subtle differences that are advanced in the theoretical literature. For example our data does not reflect youth crimes but rather overall crime. The higher association with violent crime may be a function of domestic violence which has little if anything to do with children. Taken on face value, the data for Wisconsin suggests that changes in crime rates are not a function of poverty.

Rather than focusing on poverty attention in the criminology literature has turned to examining the role of income distribution, and the Wisconsin data supports the notion that there is a statistical relationship between initial levels of income distribution and changes in crime rates over the 1990s (Figure 7a and 7b). The general line of reasoning as discussed above is that higher levels of inequality should be associated with higher levels of crime. The Wisconsin data, however, seems to suggest that higher levels of income inequality at the beginning of the period results in lower levels of crime at the end of the study period. In other words, higher levels of income inequality seem to be associated declining violent and property crime rates. This result is counterintuitive given all three ecological theories of criminology. Indeed, the policy implication is that to decrease crime rates the state should work to increase income inequality; clearly a perverse policy recommendation. Obviously additional work with the Wisconsin data is required before further conclusions can be reached on role of income distributions on crime.

We have two additional ways in which to think about income distribution; percent of households with income below \$15,000 and the percent above \$75,000. For low income, this could be interpreted as an alternative way of measuring poverty. A higher share of low income is weakly associated with increases in violent crime rates (Figure 8a) as well as property crime. Here the simple regression models explain 3.5 and 4.3 percent of the increases in violent and property crimes, respectively. At the same time the higher the percentage of households with income greater than \$75,000 tends to be associated with decreasing levels of both violent and property crime, although the result on property crime is statistically weak. Taking these results independently they are consistent with the expectations flowing from the three ecological theories of criminology. When taken in tandem we get results that are more consistent with our expectations on income distribution. Care must be taken with this latter interpretation because the statistical models are not formally linked and income distribution influences are indirect.

Median housing value is an indicator of wealth within the county and is expected to have a negative relationship with changes in crime rates over the 1990s; counties with higher property values should see lower levels of crime at the end of the study period. For both violent (Figure 10a) and property (Figure 10b) crime higher levels of median housing value result in statistically significant declines in crime rates. This is consistent with the results on median household income and percent of households with high income levels. As with most of the models, the percent of the variation in the change in crime rates is relatively low; for violent crime median house value explains 4.8 percent of the variation and about 7.6 percent of the variation in the change in property crime.

Our final economic based model is the unemployment rate where we expect higher levels of unemployment at the beginning of the period to be associated with higher levels of crime at the end of the period. For the period examined the Wisconsin data supports this idea with robust statistical validity (Figure 10a and 10b). Based on the equation R^2 , the unemployment rate explains about 5.8 percent of the variation in the change in violent crime rates and 10.4 percent of changes in property crime. While the results are as expected the strength of the results are somewhat surprising. Within the literature periods of unemployment are argued to have more of a short-term impact on crime; people experience short-term periods of unemployment and may find that the benefits of crime outweigh the potential costs. The ten year period examined in this study can not reasonably be described as short-term. But the strength of the statistical results clearly indicates that the relationship between unemployment and changing crime rates may have more long-term dimensions.

Our two measures of social capital, the infant death rate and the education level as measured but the percent of the population over age 25 with at least a bachelor's degree, perform as expected. Higher infant death rates at the beginning of the 1990s are associated with higher levels of violent crime at the end of the 1990s (Figure 11a). Based on the equation R^2

statistic infant death rate explains about 4.4 percent of the variation in the change in violent crime. At the same time there is no apparent relationship between infant death rate and changes in property crime (Figure 11b). The statistical results for education levels are stronger than the infant death rate and are associated with lower levels of both violent and property crime at the end of the study period (Figures 12a and 12b). For violent crime a higher share of the population with a college education explains about six percent of the change over the 1990s but over ten percent for property crime. Our simple measures of social capital tend to perform statistically as we expected; higher levels of social capital at the beginning of the study period tends to associated with lower levels of crime at the end of the study period.

Discussion and Conclusions

The applied research presented in this study aims to come to a better understanding of changing crime patterns across Wisconsin. From at least 1960 till about 1990 total, violent and property crimes rates across the nation and Wisconsin had been increasing. Throughout the 1990s, however, crimes rates have been steadily decreasing. The three dominate ecological studies of criminology including rational economic choice theory, anomie or strain theory and social disorganization theory, where unable to predict the reversal in crime rate trends.

Using the Federal Bureau of Investigation's (FBI) Uniform Crime Reports (UCR) matched with census data we estimate a collection of simple change models where we regression initial (1990) levels of a range of socioeconomic variables on changes in violent and property crime over the 1990s (1990-2000). Using simple scatter plots, regression and correlation analysis we uncover a number of interesting patterns in the data that help us better under trends across Wisconsin.

From a longer-term perspective Wisconsin tends to have lower violent and property crime rates than the national average and property crimes tend to track closely the national levels including the dramatic reversal that occurred at the beginning of the 1990s. Patterns in violent crime for Wisconsin, particular the decline throughout the 1990s, is not as apparent when compared to the national data. We find that violent crime declined in the largest counties in Wisconsin but actually increased in the majority of counties. While violent crime in most Wisconsin counties is relatively small the upward trend in most counties is troublesome and warrants additional analysis. Why would most Wisconsin counties be experiencing increases, although modest, when the bulk of the nation is experiencing declines in violent crime?

Given the differences in the descriptive analysis of violent and property crimes, it is not surprising that the statistical analysis concludes that many of the factors that help us understand property crime tend not to help us understand violent crime. Of the eleven separate socioeconomic variables that we examine seven appear to have the same influence on both types of crime and the remaining four have different influences. Variables that have a dampening

affect on crime rates over the 1990s include population, income levels, housing values and education levels. Two variables that are consistently associated with increasing crime rates are unemployment and income distribution levels. The former result is as expected, but the income distribution result is counterintuitive. Specifically, higher levels of income distribution are associated with lower levels of crime at the end of the period. This is the only empirical result that is opposite of our expectations and the general findings of the broad empirical criminology literature.

Poverty rates, both overall and youth, tend not to be associated with changes in crime rates based on the variances of the estimated parameters. Youth poverty rates tends to be somewhat weakly associated with higher levels of violent crime, which is what we would expect given our three ecological theories of crime. Interestingly the percent of households with income below \$15,000 which is used as an alternative to official poverty rates appears to have a positive impact on the level of property crime end the end of the period. Thus the results on levels and patterns of income, wealth and unemployment rates are as expected but the strength of the results depend on how specific variables are defined. This apparent inconsistency in our results related to poverty is common to the literature and strongly suggests that great care must be taken when thinking about how we measure our socioeconomic variables. The results also could be explained that the official poverty measure is simply not the correct measure of "poorness" when we are concerned with crime. Indeed, the arbitrariness of the official definition of poverty within the US is widely accepted (Weinberg 1995).

Our two simple measures of social capital perform mostly as expected. Higher infant death rates are associated with higher levels of violent crime at the end of the period but do not impact changes in property crime. Higher education levels is strongly associated with lower levels of both violent and property crime at the end of the period. Given the increased interest in the notions of social capital flowing from the work of Putnam (2000), a slightly different approach to thinking about crime comes to the forefront. Perhaps the approach of Messner, Baumer and Rosenfeld (2004) were we move to more specific ways of thinking about of formal and informal institutions and notions of social trust may prove fruitful. Some, such as Woolcock (1998), however, warn that broad notions of social capital "becom[es] all things to all people, hence nothing to anyone" (2000, 7).

For some of the rural counties experiencing increases in crime such Sawyer, Rusk and Forest, there is a transition occurring within the recreational housing market with a noticeable increase in retirement migration. Are the socioeconomic changes resulting in an increase in crime or simple increased reporting? Some studies (Marcouiller, et al. 1996) have found that in Wisconsin seasonal residents are more likely to report crime to local officials than year-round residents. This speaks directly to the differences in attitudes about crime between rural and urban residents. Yet, in another Wisconsin specific study Deller and Ottem (2001) find that the

presence of recreational housing tended to encourage certain types of property crime. These results suggest that the changing socioeconomic dynamics, beyond those examined in this study, in many rural parts of Wisconsin are shifting the social fabric of the community hence opening the door to additional crime. Is the increasing dependency on tourism broadly defined for many rural Wisconsin communities having the unintended affect of increased crime?

Our results generally are consistent with the expectations laid out by the three ecological theories of crime. Based on our results it appears that policies aimed simply at reducing poverty may not be sufficient to have the desired affects on crime. Rather, more comprehensive polices aimed at increasing overall socioeconomic well-being such as higher education and income levels may have the desired affects. Our results on violent crime for Wisconsin seems to suggest that the massive increase in spending on corrections may not have had as a desirable a result as first thought. Clearly, this study has only scratched the surface on helping us better understand the changing dynamics of crime across Wisconsin.

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Table 1. Simple Correlation Coefficients for Wisconsin

	Change in Total Crime	Change in Violent Crime	Change in Property Crime
Population	-0.3916 (0.0007)	-0.2108 (0.0776)	-0.3755 (0.0013)
Median Household Income	-0.2201 (0.0651)	-0.2013 (0.0923)	-0.2052 (0.0861)
Poverty Rate	0.0681 (0.5728)	0.1841 (0.1242)	0.0508 (0.6738)
Child Poverty Rate	0.0117 (0.9229)	0.2014 (0.0921)	-0.0098 (0.9351)
GINI Coefficient of Income Distribution	-0.2304 (0.0533)	-0.2048 (0.0867)	-0.2153 (0.0713)
Percent of Households with Income Below \$15,000	0.2193 (0.0661)	0.1881 (0.1161)	0.2063 (0.0843)
Percent of Households with Income Above \$75,000	-0.1937 (0.1056)	-0.2319 (0.0516)	-0.1726 (0.1501)
Median Housing Value	-0.2897 (0.0143)	-0.2196 (0.0657)	-0.2750 (0.0203)
Unemployment Rate	0.3403 (0.0037)	0.2399 (0.0439)	0.3225 (0.0061)
Infant Death Rate	0.1201 (0.3185)	0.2095 (0.0795)	0.0975 (0.4183)
Percent of Population over Age 25 with at Least a Bachelors Degree	-0.3377 (0.0040)	-0.2444 (0.0400)	-0.3187 (0.0067)

Marginal significance levels in parentheses.

Figure 1a: Historical Patterns in US and WI Crime Rates: Total Crime

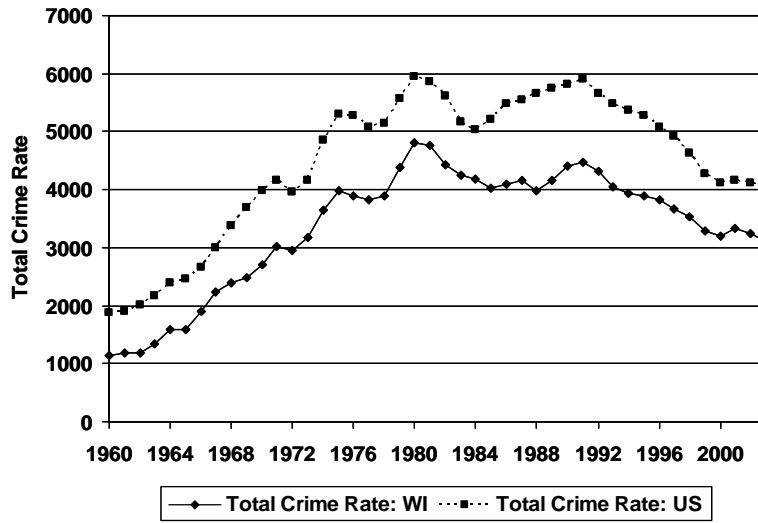


Figure 1b: Historical Patterns in US and WI Crime Rates: Violent Crime

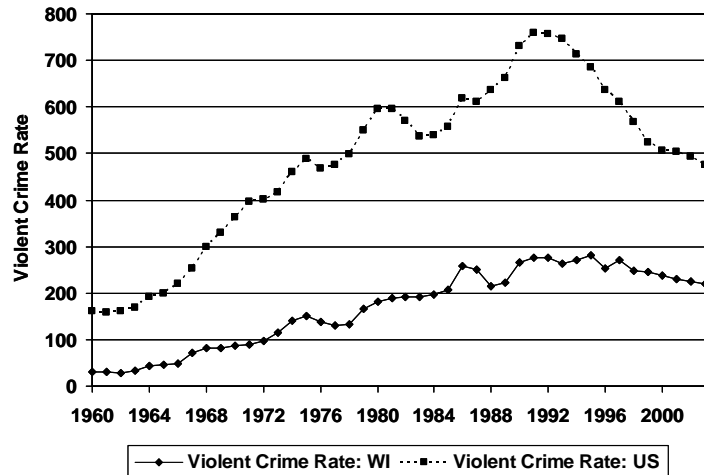


Figure 1c: Historical Patterns in US and WI Crime Rates: Property Crime

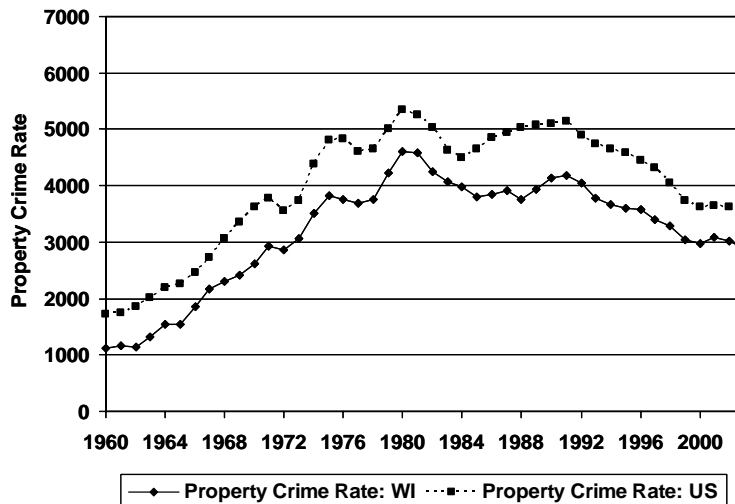


Figure 2. Change in Violent vs Property Crime for Wisconsin Counties (1990-200)

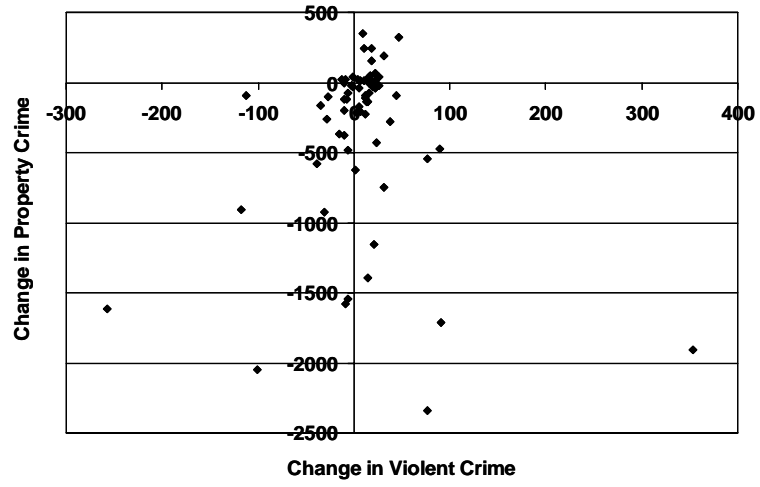


Figure 3a: Population on Change in Wisconsin County Violent Crime Rates

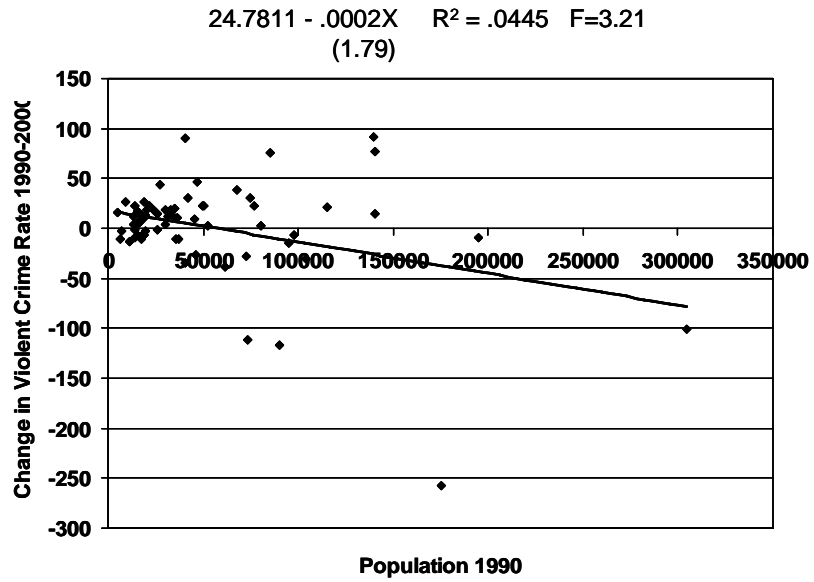


Figure 3b: Population on Change in Wisconsin County Property Crime Rates

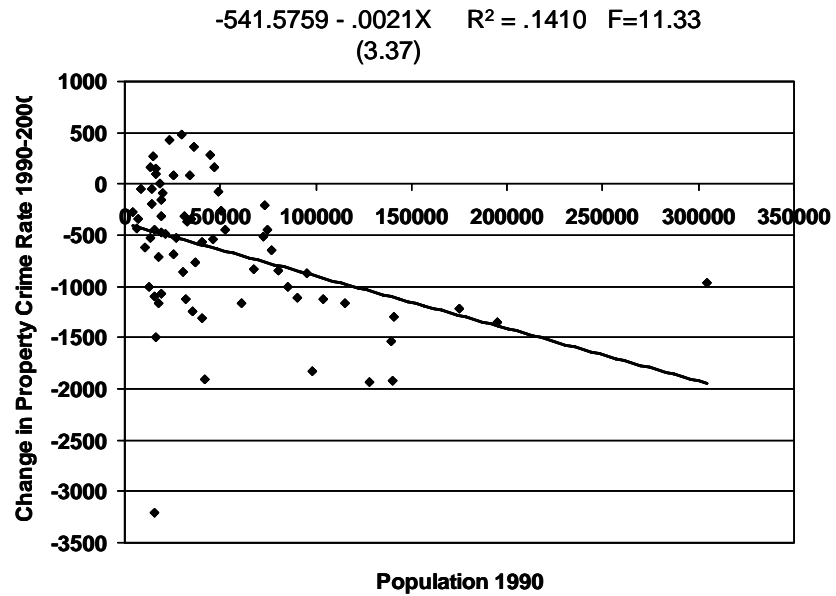


Figure 4a: Median Household Income on Change in Wisconsin County
Violent Crime Rates

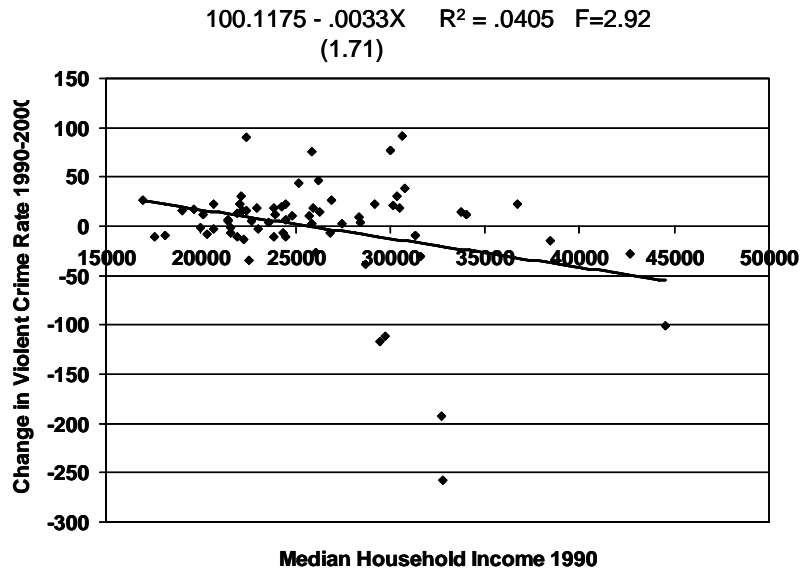


Figure 4b: Median Household Income on Change in Wisconsin County
Property Crime Rates

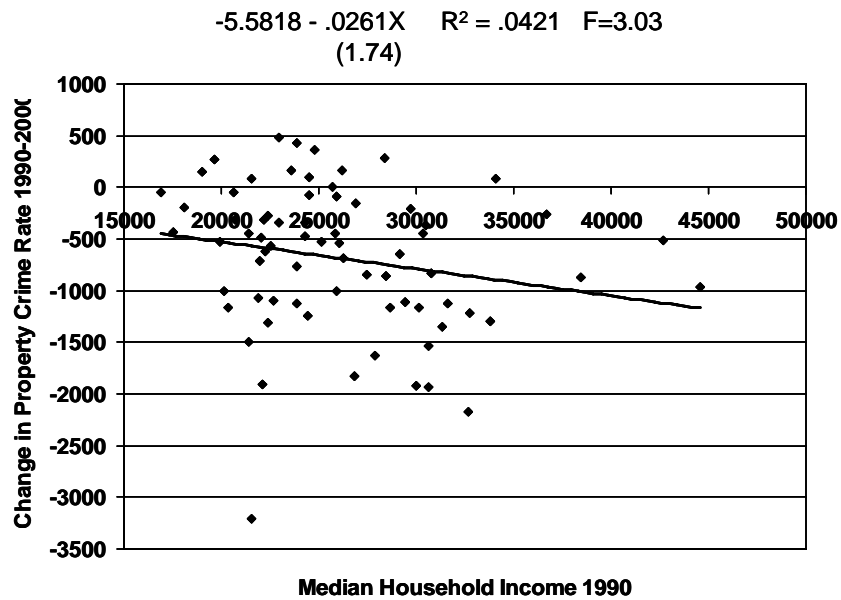


Figure 5a: Poverty Rate on Change in Wisconsin County Violent Crime Rates

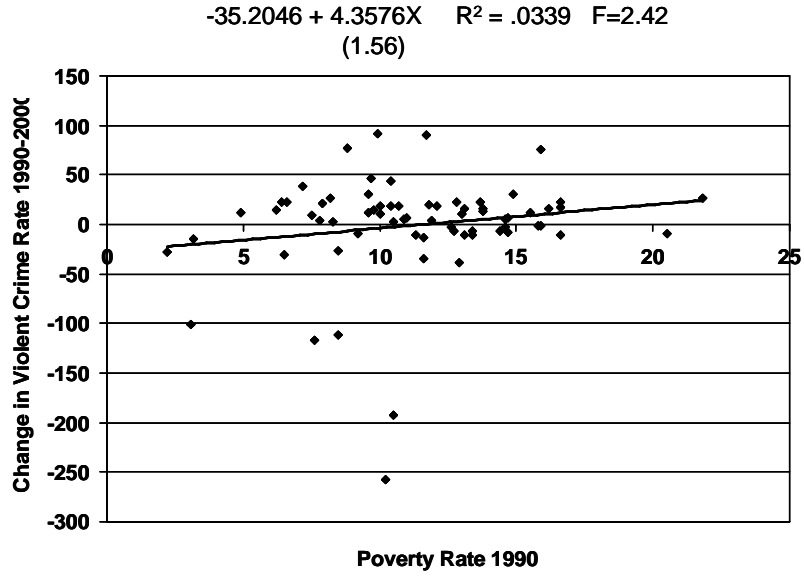


Figure 5b: Poverty Rate on Change in Wisconsin County Property Crime Rates

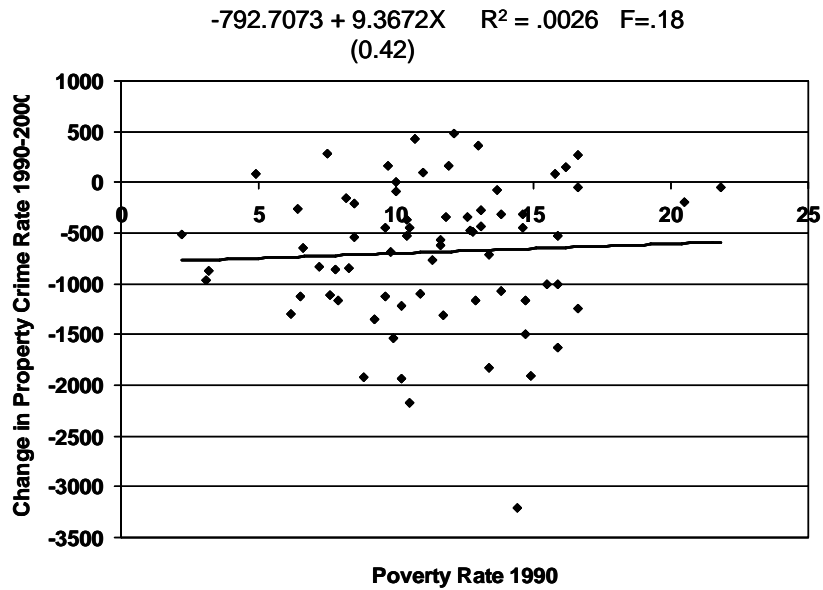


Figure 6a: Youth Poverty Rate on Change in Wisconsin County Violent Crime Rates

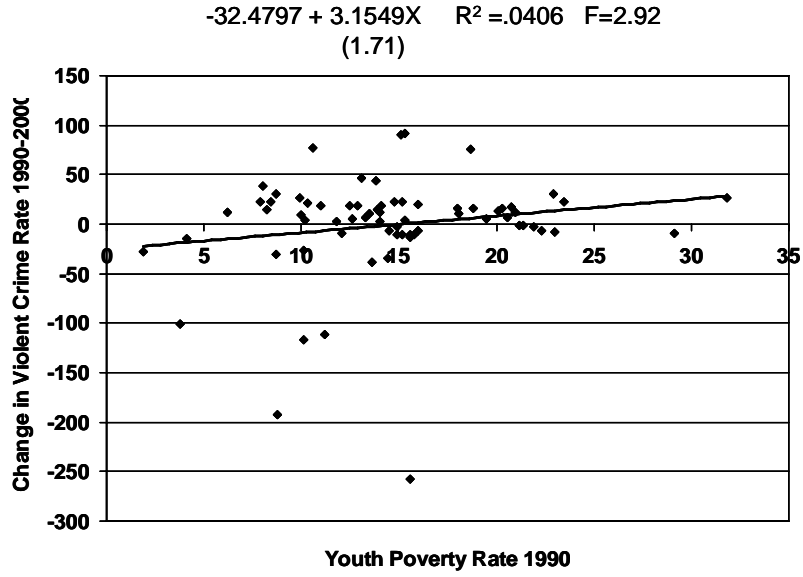


Figure 6b: Youth Poverty Rate on Change in Wisconsin County Property Crime Rates

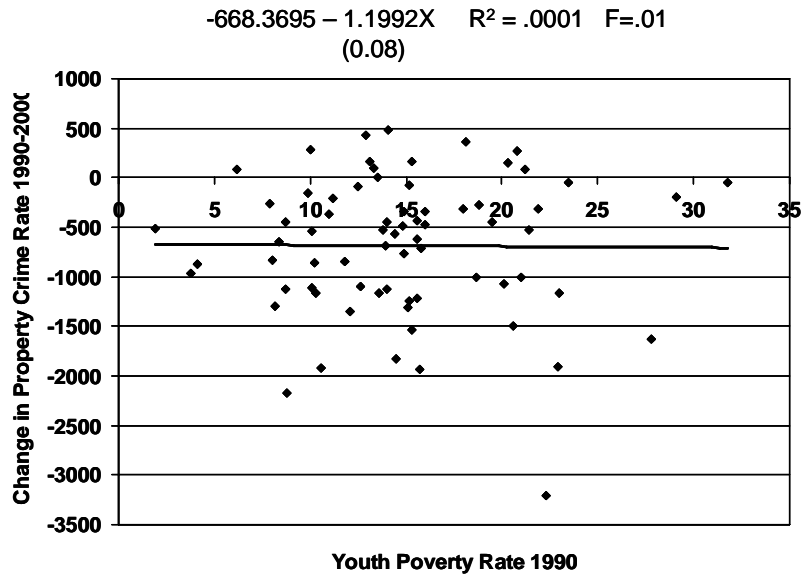


Figure 7a: Gini Coefficient on Change in Wisconsin County Violent Crime Rates

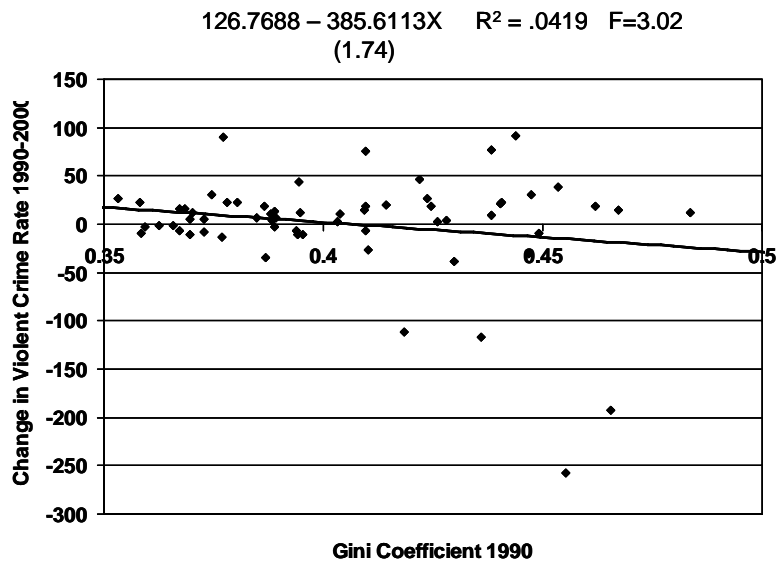


Figure 7b: Gini Coefficient on Change in Wisconsin County Property Crime Rates

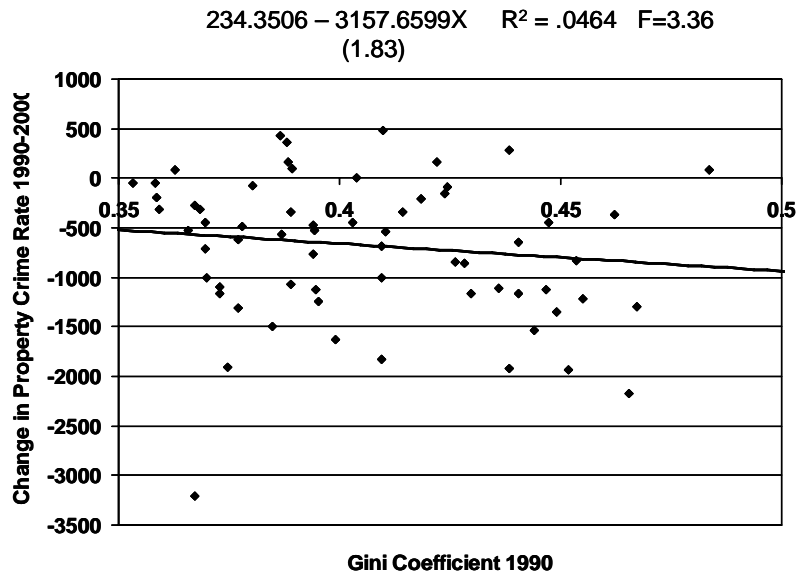


Figure 8a: Percent of Households with Income Below \$15,000 on Change in Wisconsin County Violent Crime Rates

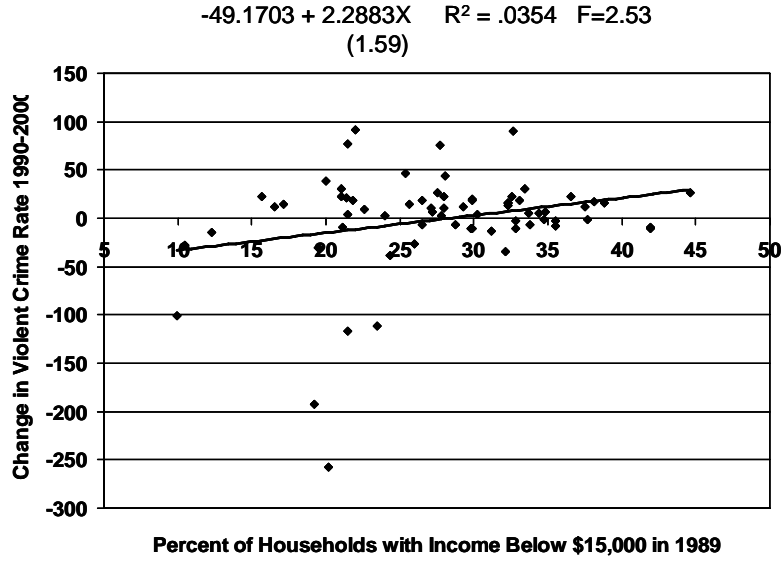


Figure 8b: Percent of Households with Income Below \$15,000 on Change in Wisconsin County Property Crime Rates

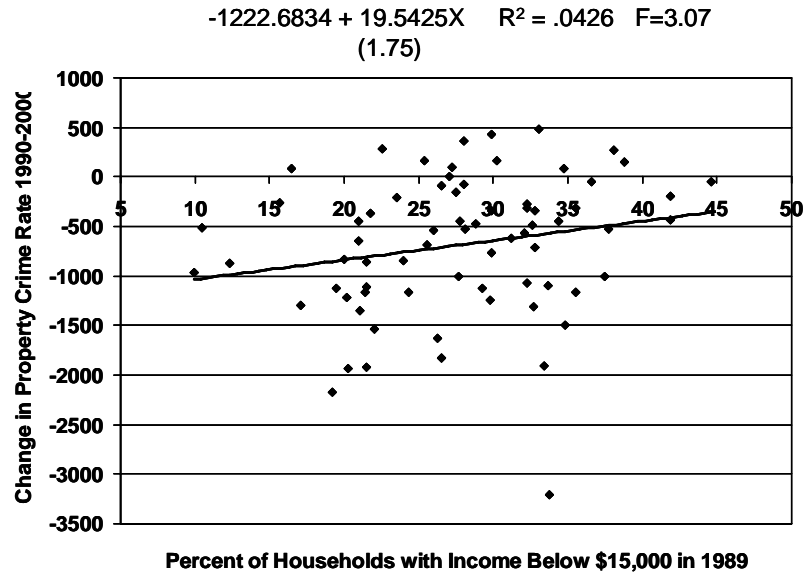


Figure 9a: Percent of Households with Income Above \$75,000 on Change in Wisconsin County Violent Crime Rates

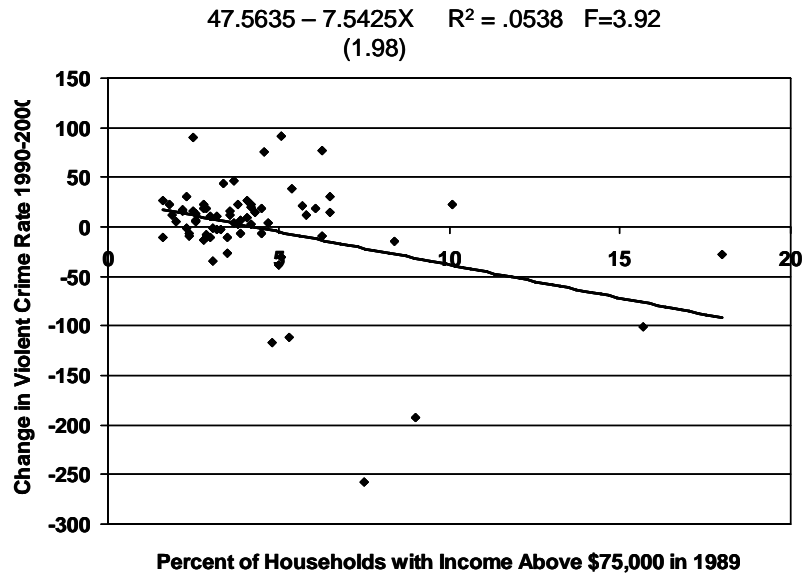


Figure 9b: Percent of Households with Income Above \$75,000 on Change in Wisconsin County Property Crime Rates

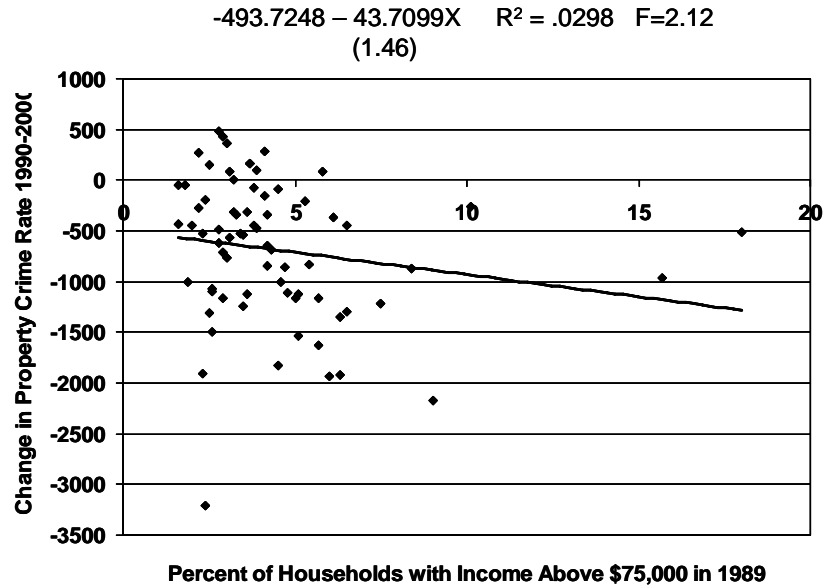


Figure 10a: Median House Value on Change in Wisconsin County Violent Crime Rates

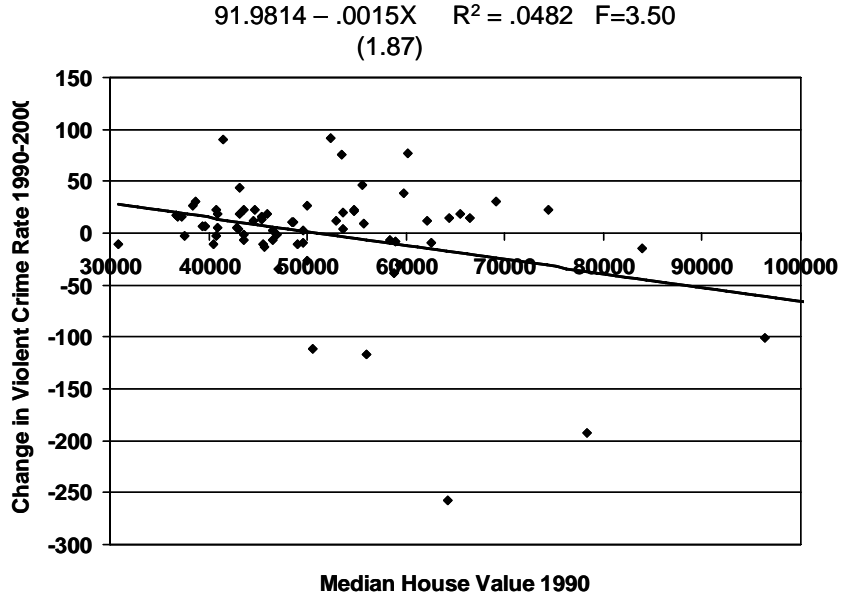


Figure 10b: Median House Value on Change in Wisconsin County Property Crime Rates

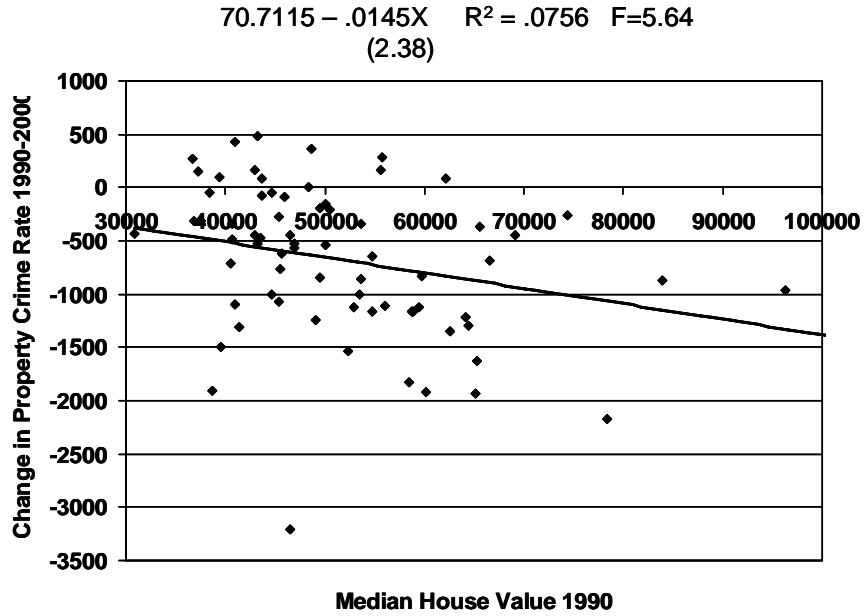


Figure 11a: Unemployment Rate on Change in Wisconsin County Violent Crime Rates

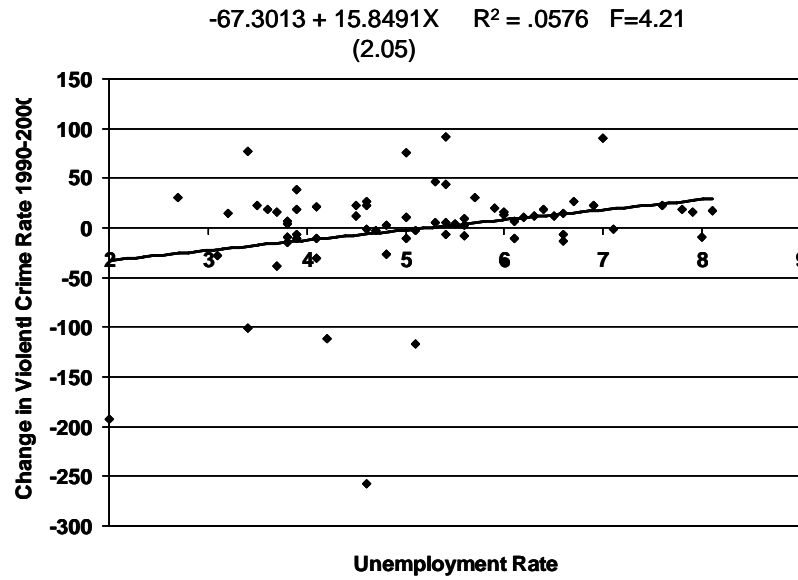


Figure 11b: Unemployment Rate on Change in Wisconsin County Property Crime Rates



Figure 12a: Infant Death Rate on Change in Wisconsin County Violent Crime Rates

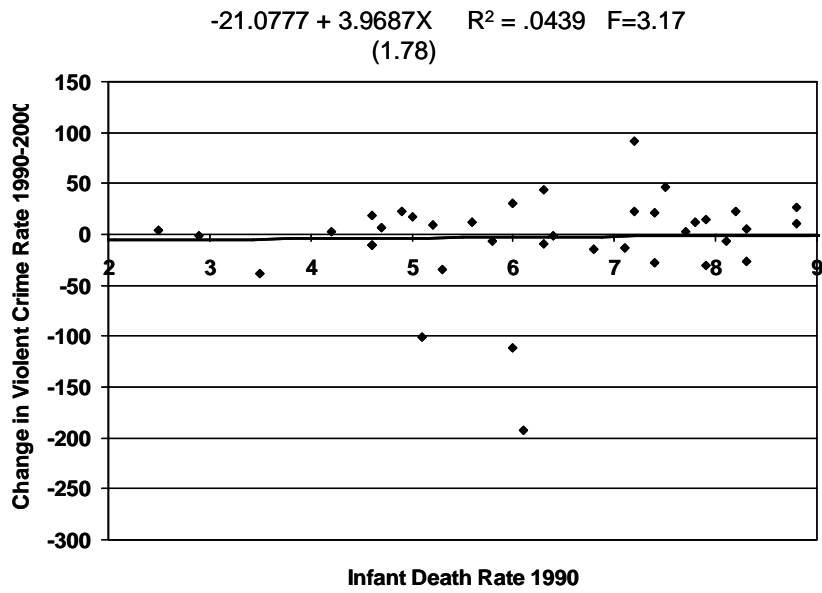


Figure 12b: Infant Death Rate on Change in Wisconsin County Property Crime Rates

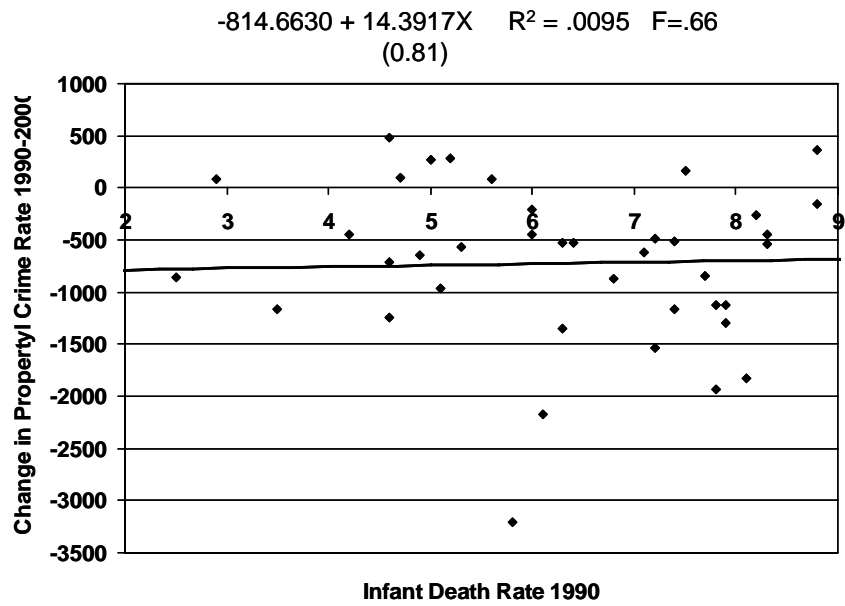


Figure 13a: Percent of the Population Age 25+ with at Least a Bachelor's Degree on Change in Wisconsin County Violent Crime Rates

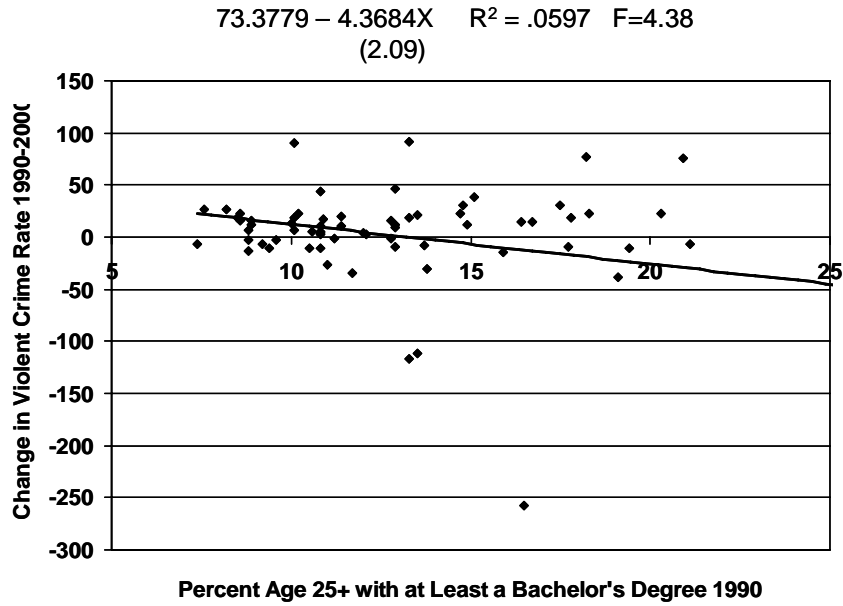


Figure 13b: Percent of the Population Age 25+ with at Least a Bachelor's Degree on Change in Wisconsin County Property Crime Rates

