

## Rural Crime and Social Capital

STEVEN C. DELLER AND MELISSA A. DELLER

**ABSTRACT** This study explores rural U.S. crime patterns with a focus on social capital. We use a triangulation of three core theories of crime including social disorganization, anomie/strain, and rational choice theories to develop a formal theory and an empirical framework. The role of four unique measures of social capital is explored in understanding patterns of rural crime using nonmetropolitan U.S. county data. The empirical results generally support the theoretical predictions and conclude that rural communities that pursue economic growth and development must be prepared to address the resulting upward pressures on crime. The results on social capital and crime provide numerous policy insights for rural communities.

### Introduction

From Thomas Jefferson's vision of a republic built upon the yeoman farmer to Tönnies's concept of *gemeinschaft*, where strong personal, family, and communal ties define rural society, to Durkheim's mechanical theory, the notion of the "rural mystique" has influenced society's thinking of rural communities (Barnett and Mencken 2002; Bouffard and Muftic 2006; Jobes et al. 2004). Indeed, many rural communities build on this "rural mystique" in promoting economic growth and development by marketing the "rural lifestyle" or "rural quality of life" including perceptions of community environment such as a slower pace of living, better environmental qualities, better life for children, lower cost of living, and access to recreational opportunities (Dissart and Deller 2000). In this *Special Issue on Best Practices in Rural Development and Policy*, Partridge, Ali, and Olfert (2010) find strong evidence of what they call the "deconcentration

*Steven Deller is a professor and community development specialist in the Department of Agricultural and Applied Economics at the University of Wisconsin-Madison/Extension. His e-mail address is scdeller@wisc.edu. Melissa Deller is a senior lecturer in the Department of Sociology, Anthropology and Criminal Justice at the University of Wisconsin-Whitewater. Her e-mail address is dellerm@uw.edu. Support for this work was provided in part by the Wisconsin Agricultural Experiment Station, University of Wisconsin-Madison. An earlier version of this study was presented at the Annual Meetings of the North American Regional Science Association, San Francisco, CA, November 2009. We appreciate the helpful comments of Tim Wojan and the research assistance of Lindsay Amiel. The reviewers of Growth and Change provided invaluable comments, and for their insightful and helpful comments we are appreciative. All errors are the responsibility of the authors.*

hypothesis” in Canada where people move to rural areas for quality of life and the rural lifestyle but maintain urban jobs. A focal point of using the rural lifestyle as a comparative advantage in promoting rural economic growth and development is lower levels of crime relative to urban.

Blair (1998) and Luger (1996) note that crime or notions of public safety are widely used in popular press rankings of places. Almost universally, places with lower crime rates are perceived as having higher quality of life. These ratings, which are widely referenced in the popular press, are often used to promote economic growth and development. Although the relationship between these and other ratings of “business climate” and economic growth and development have come under attack in the academic literature (e.g., Lane, Glennon, and McCabe 1989; Plaut and Pluta 1983), they remain widely popular and directly influence how communities approach economic growth and development policy (Chapple et al. 2004a,b; Gottlieb 2004). One lesson learned by local policy makers is that to promote higher quality of life, and thus economic growth and development, one must work on reducing local crime rates.

Berg and DeLisi (2005), Barnett and Mencken (2002), Lee and Bartkowski (2004), Osgood and Chambers (2000), and Weisheit and Donnermeyer (2000), among others, have correctly argued that criminologists have tended to ignore rural crime. Because of the “rural mystique” and perceived homogeneity of rural America, criminologists have viewed rural crime as an uninteresting topic. As a result, the vast theoretical and empirical criminology literature has focused almost exclusively on urban areas (Bouffard and Muftic 2006). Traditionally, the theoretical and empirical results of urban studies have been extended to rural in an almost linear fashion: what applies to urban must, by extension, apply to rural. But one of the most remarkable trends in the U.S. over the past 20 has been the convergence of rural and urban crime rates (Figure 1).<sup>1</sup> If one looks at the change in the total crime rate for urban counties from 1987 to 2002 there was an overall decline of 29.9 percent. This includes a 24.2 percent decline for violent crime and 30.7 percent for property crime. Over the same time period total crime for rural counties actually increased by half a percent, with property crime declining by 1.5 percent, but violent crime increased by 19.7 percent.

This rural–urban convergence pattern raises several issues from a criminology as well as a rural growth and development policy perspective. If our understanding of crime from urban studies is transferable to rural then why has the remarkable decline in urban crime not being experienced in rural crime? Clearly, there needs to be more theoretical and empirical attention paid to rural crime patterns. In addition, if a lower level of crime is an important element in marketing the “rural mystique” for economic growth and development, is the convergence in rural–

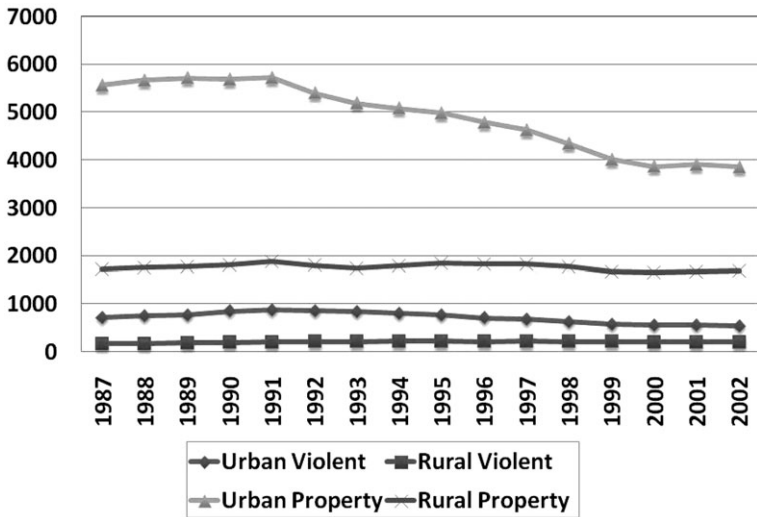


FIGURE 1. RURAL AND URBAN CRIME TRENDS.

urban crime rates undermining a rural comparative advantage? If crime is a disamenity and negatively impacts the growth and development prospect of rural areas, then a better understanding of the determinants of crime and policies that discourage criminal activity is necessary to craft effective rural growth and development policy. This study adds to the handful of studies that rigorously look at rural crime in the U.S. such as Wilkinson (1984a,b), Arthur (1991), Freudenburg and Jones (1991), Petee and Kowalski (1993), Jobes (1999), Mencken and Barnett (1999), Rephann (1999), Reising and Cancino (2004), Wells and Weisheit (2004), Deller and Deller (2007), and Li (2009).

The impact of crime on economic growth and development, unfortunately, is not clear. There are several survey-based studies (e.g., Foster 1977) that find that crime is an important social factor when firms make location decisions. In a study of the location decision of rural firms in proximity to Yellowstone national park, Johnson and Rasker (1995) find that low crime was ranked in the middle of 15 characteristics but was consistently ranked more important than economic values such as overall tax structure and cost of doing business. In their survey of Philadelphia residents, Greenberg and Schneider (1994) find that disamenities, especially crime, have a negative impact on overall perception of neighborhood quality. Gill (1991) finds similar results for economic stress in a rural Canadian mining town.

But studies that empirically modeled the relationship between crime and economic growth and development have had mixed results. In a classic model of regional economic growth, Carlino and Mills (1987) find that crime, their sole measure of amenities, was not a significant predictor of either population or employment growth. In a study of rural U.S. counties Deller et al. (2001) find that crime rates are positively associated with higher levels of population and employment growth but not income growth. In subsequent work Deller and Lledo (2007) use a Bayesian Model Averaging approach to identify drivers of rural growth and find that crime does not influence population, employment, or income growth.

In the examination of migration patterns Cebula, Kohn, and Vedder (1973) find that crime has a weak negative impact on migration, whereas Porell (1982) and Voith (1991) find that crime has a positive influence on migration. Clark and Hunter (1992) found that types of crime matter; assaults have a negative impact on migration yet burglaries had a positive influence. Ferguson et al. (2007) find some evidence that property crime has a positive influence on rural population growth, but violent crime has a negative influence. When specific age groups are examined, Ferguson et al. find that property crime positively influences population growth for youth but is negative for adults and older persons while violent crime negatively impacts youth and elderly population growth. In a study of migration patterns of older persons across U.S. counties, Jensen and Deller (2007) find that those age 55–75 appear to be moving into higher-crime counties while those over 75 are moving out of higher-crime areas. In essence, the relationship between rural economic growth and development and crime has not been systematically examined. Studies that do examine the role of crime often approach it as a secondary issue and not as central to the research.

In the literature that explores the influence of economic growth on rural crime, the results are more consistent. As noted by Barnett and Mencken (2002), population growth, the simplest metric of growth, is a consistent predictor of higher rural crime rates. As discussed in detail below, social norms and the notions of acceptable behavior as well as the social capital that helps define the community are disrupted in rural communities that are experiencing significant growth. The theory, and the available rural empirical literature, suggests that if rural communities are successful in promoting economic growth, it may come at the cost of increased crime. Indeed, there is anecdotal evidence that many rural communities shun economic growth and development because of the perceived negative costs associated with “big city crime.” At a minimum, rural communities that successfully promote economic growth and development must be prepared to address potential problems with crime. If these communities do not plan for growth-induced crime, future successes in promoting growth and development may be put at risk.

From both the theoretical and empirical evidence it is clear that there is an important interplay between crime and rural economic growth and development, but the literature is not sufficiently developed to provide specific policy recommendations. To help craft rural economic growth and development policy researchers and policy analysts must have a better understanding of the drivers of rural crime; it has become clear over the past few decades that the lessons from urban may not translate to rural. Although the literature focusing on rural crime is relatively small, there is vast theoretical and empirical literature that can be drawn upon (Deller and Deller 2007; Li 2009). For the purposes of this study there are three core theoretical approaches: social disorganization, anomie or strain, and rational choice theories. Although each approach tackles crime from a different direction, there are significant and important overlaps.

Social disorganization or social cohesion theory emphasizes social, economic, and political forces at the ecological or community level and has tended to be at the core of the most recent rural crime literature (e.g., Bouffard and Muftic 2006; Jobes et al. 2004; Lee and Bartkowski 2004; Li 2009). Attention has been focused on the socio-economic deterioration of neighborhoods and the social ties that link neighbors (Donnermeyer 2007; Lederman, Loayza, Menéndez 2002; Thorbecke and Charumilind 2002). As social norms, social networks, and integration or density of acquaintance decline or are initially lacking, social controls over criminal activity weakens and crime increases (Barnett and Mencken 2002; Freudenburg 1986; Kornhauser 1978). Unlike social disorganization theory, which takes an ecological perspective, anomie or strain theory tends to focus on individuals and the behavior of those individuals within the community. Here the notion of social norms or more directly acceptable behavior on the part of the individual is discussed. How the individual fits into the community and his or her ability to function are at the core of anomie/strain theory. Rational choice theory lays a microeconomic foundation where individuals compare the costs and benefits of committing a crime. If the perceived benefits of the crime outweigh the costs, committing the crime is a rational choice. All three broad theories of criminology have some common overlaps, many of which are economic, such as poverty, unemployment, and income inequality, but social capital broadly defined plays an equally important role (Messner, Baumer, and Rosenfeld 2004).

This study builds on these three theories of criminology with a focus on social capital. As argued above, one of the qualities that rural areas offer as a “selling point” in economic growth and development policy is the rural mystique, rural lifestyle, and/or quality of life. Key elements of this lifestyle could be described as the social norms that define the rural lifestyle or rural way of life and are

fundamental to social disorganization, anomie/strain, and rational choice theories. More broadly, certain elements of social capital are embodied in the rural lifestyle. The perception is that people know each other (e.g., density of acquaintance), are more likely to be involved in local government activities (e.g., attend meetings, run for elected office), and support local community activities (i.e., Tönnies's *Gemeinschaft*).

In a way, this rural lifestyle is central to rural social capital, which in turn plays a unique role in rural crime patterns. Taken at face value, if rural lifestyles reflect higher levels of social capital than historically lower crime rates in rural areas, relative to urban, is a natural outcome. But unless the relative stance of rural social capital is declining relative to urban, the rural lifestyle cannot explain why urban crime rates are declining while rural crime rates are at best stagnate and may be increasing. A fundamental problem to proceeding is how to define and measure social capital. While much of the current theoretical and empirical work on rural crime emphasizes social capital through the theoretical lenses of social disorganization theory (e.g., Berg and DeLisi 2005; Jobes 1999; Li 2009; Mencken and Barnett 1999; Osgood and Chambers 2000; Reisig and Cancino 2004; Wells and Weisheit 2004) there have been no attempts to directly link empirical measures of social capital to crime.

This study advances our understanding of the drivers of rural crime on three levels. First, a formal model of how social capital can directly influence crime patterns within the rational economic choice model is presented. Second, four unique sets of social capital measures are outlined. As noted by Rupasingha, Goetz, and Freshwater (2006), Rupasingha and Goetz (2007), and Goetz and Rupasingha (2006), one of the biggest challenges of modeling social capital is developing reasonable empirical measures of social capital. Using firm count data from County Business Patterns (CBPs), the number of cooperatives by type, along with the number of churches by denomination, and then the number of nonprofits that have filed form 990 with the IRS in 2005 are used as separate proxies of social capital. Third, the empirical models are aimed at explaining rural crime using an annual average crime rates across 2005, 2007, and 2008 Federal Bureau of Investigation (FBI) county crime rate data.

Beyond these introductory comments the manuscript is composed of four additional sections. In the next section a more detailed discussion of the three core or umbrella theories of criminology is provided followed by a presentation of a formal theory of rational economic choice with the presence of social capital. The empirical models, along with the four measures of social capital and estimation methods, are then presented and discussed. The empirical results are discussed in the fourth section of the study. The study is closed with a review of contributions

along with a discussion of how the study findings contribute to a better understanding of rural growth and development policy options.

### **Overview of criminology theory**

Criminology is both blessed and cursed with a vast range of theoretical perspectives (Berger, Free, and Searles 2005). Theoretical approaches to thinking about crime are as large and complex as the parent disciplines of criminology (e.g., sociology, economics, political science, anthropology, and psychology). By having an array of different theoretical approaches, crime researchers have a rich literature upon which to draw. At the same time, this richness has led to conflicting opinions and as a result conflicting policy options. As observed by Vold, Bernard, and Snipes (2002) there is disagreement within the criminology literature whether theorists should work on triangulating competing theories looking for common ground or whether a falsification process should be followed where competing theories are pitted against each other and the theories with the greater predictive powers are allowed to stand.

Broad theories of crime 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 and postmodern criminology and the National Deviancy Conference (Vold, Bernard, and Snipes 2002).<sup>2</sup> Today the vast majority of the empirical literature is based on strain/anomie, social disorganization, and rational choice theories. In a sense these could be described as broad "core" or "umbrella" theories from which many more focused theories are based. These comprehensive theories provide frameworks that allow for direct scientific testing and have provided the backbone to most rigorous empirical studies.

Rational choice theory was introduced into the economic literature by Fleisher (1963, 1966a,b), Becker (1968, 1993) and Ehrlich (1973, 1975). Although the rational choice theory is broadly attributed to Becker (1968, 1993), the theory has been within the sociology literature in one form or another for many years and can be traced back to Beccaris' writings in 1764. The theory argues that crime is 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 or other consequences, such as social stigmatism. If the potential gain or "loot" from crime is sufficiently large and the risk of arrest sufficiently small then the choice to commit a crime is rational. Economists who study criminology maintain that the rational choice theory provides a microeconomic foundation to strain/anomie theory. Economists further

maintain 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.

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 public investments in law enforcement will increase the cost side of the criminal equation. In this framework, “get tough on crime” policies find theoretical support. Second, unemployment, economic marginalization, or 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 lower-income persons in close proximity to high-income individuals provides rational incentives and opportunities to commit crime.

Social disorganization theory, or social cohesion theory, widely known as the Chicago School of Criminology because of 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 ecological 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. Local institutions that can foster social ties include churches, business associations such as chamber of commerce or labor unions, social clubs ranging from card playing groups to the Elks to veterans associations, and volunteer organizations such as local parent–teacher organizations. As noted by Shaffer, Deller, and Marcouiller (2004), social capital involves social networks that allow for civic engagement. As social capital or social cohesion of a community deteriorates or is initially weak, the social controls that put limits on criminal activity deteriorates (Bouffard and Muftic 2006; Lederman, Loayza, and Menéndez 2002; Thorbecke and Charumilind 2002) and/or the ability of the community to come together to solve common problems is undermined (Jobes et al. 2004).

Conflicting social or cultural values lead to breakdowns or shifts in social controls, again allowing for criminal activity. This is most evident in communities that are undergoing social and economic changes. For example, the immigration of Hispanics into traditionally white-dominated rural communities. In essence the social norms of a community go through change, resulting in community



instability of which crime is a potential outcome (Barnett and Mencken 2002). Studies of rural “boom-towns,” including those by Dixon (1978), Freudenburg (1978), Krannich, Greider, and Little (1985), Freudenburg 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. Alternatively, as Goetz et al. (2010) report in this *Special Issue* geographically expanding commuting sheds there can be a decline in social coherence because commuters have a weakened sense of place. The central hypothesis is that the social norms or social cohesion of the community are disrupted and crime is a byproduct.

Within the ecological empirical literature the social disorganization theory tends to be characterized by five elements (Bouffard and Muftic 2006; Jobes et al. 2004): residential instability, family disruption, low socio-economic status, ethnic heterogeneity, and population size/density. These are generally proxied in empirical studies with poverty levels, youth poverty levels in particular, racial-ethnic heterogeneity, residential turnover and/or mobility, unemployment, economic instability, and income and/or wealth inequality, among others. As previously noted, much of the empirical rural crime work is rooted in social disorganization theory (e.g., Berg and DeLisi 2005; Li 2009; Osgood and Chambers 2000; Reisig and Cancino 2004; Wells and Weisheit 2004).

Anomie or strain theory is the third “core” theory and focuses on conflicts between goals and means to achieve those goals at the level of the individual (Fay 1993; Vold, Bernard, and Snipes 2002). Unequal distribution of wealth and/or income creates an “envy affect” where those at the lower socio-economic spectrum are resentful of those that have higher socio-economic status (Kelly 2000). 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 and social and personal controls from the individual’s perspective come into question and the strain results in criminal activity.

An additional element of the theory is the explicit allowance of acceptable alternative means to achieving an end, referred to as innovation by Merton (1968). In the intercity economic opportunities are few and the draw of illegal drug activity is powerful. While drugs are generally associated with urban crime, the rise of methamphetamine in many rural communities is creating a rural parallel (Weisheit 2008). Low-income persons, generally youth and young adults, face the choice of achieving limited economic success through low-paying service jobs or the potentially highly profitable illegal drug trade. Any means possible to achieve one’s goals becomes acceptable within the community.

Donnermeyer and DeKeseredy (2008) lay out critical criminology framework for rural areas in which they argue that economic growth and development policies can be crafted as a crime prevention policy as opposed to “get tough on crime” punitive policies aimed at deterring crime. A drawback to this perspective is that it does not explain participation in illegal activities by those who are not financially disadvantaged. What separates anomie/strain and rational choice theories is the role of socially acceptable behavior. In anomie/strain theory social norms play an important role, but in rational choice theory norms are delegated to the back burner.

While each of these main comprehensive theoretical approaches offers unique perspectives on explaining crime, there are several common elements that are present in each (Figure 2). First, economic marginalization, often measured

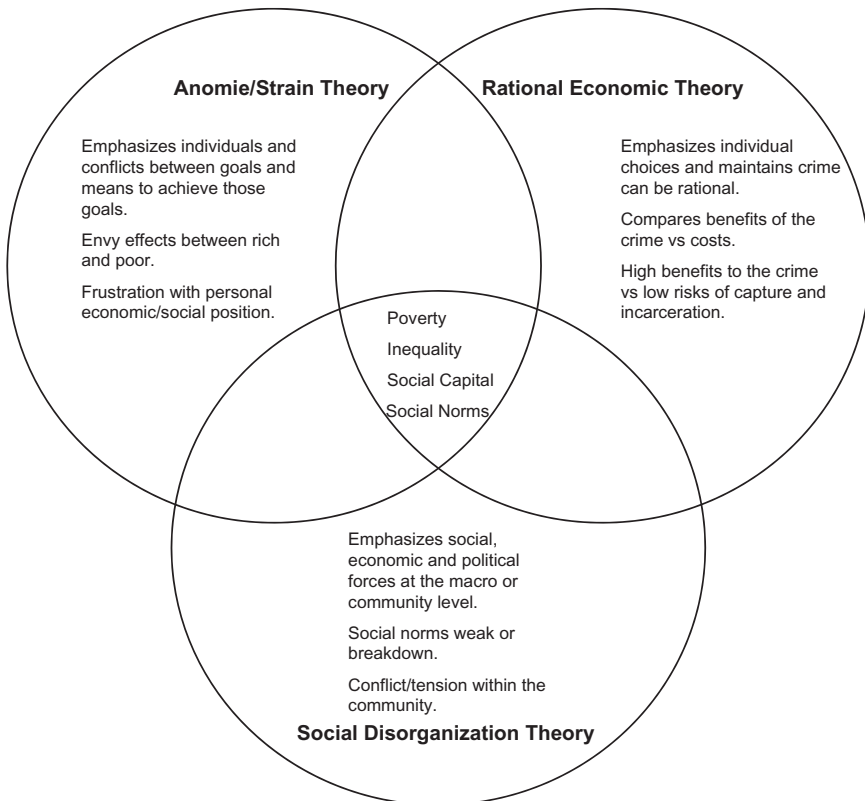


FIGURE 2. TRIANGULATION OF THE CORE THEORIES OF CRIMINOLOGY.

through poverty data, plays a role in each theoretical approach. In social disorganization theory poverty is associated with populations where social capital and 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. Alternatively, in Hirschi's (1969) social control theory people who are marginalized lack the social ties to the broader community. In rational choice theory people in poverty may see a greater benefit from crime than forgone opportunities if arrested and prosecuted. Second, unemployment, or more precisely 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 critical criminology sense, Marxian-type class conflict results in lower levels of social cohesion, making crime a direct product. From strain theory, people in the lower economic structure are frustrated by the economic success of those around them. If rural communities are successful in fostering economic growth and development, unless all residents within the community benefit, the likelihood of social disorganization and strain within the community increases and conflict is possible. In short, people who view themselves as unsuccessful or as having limited abilities to achieve success become alienated from society and then in turn commit crime. In rational choice theory the higher the inequality within a community increases the likelihood of low-income persons being in close spatial proximity to higher-income people, who make ready targets for criminal activity.

The fourth and fifth areas of overlap outlined in Figure 2 are social capital and social norms; the latter define the types of behavior that are acceptable within the community. Social capital in the broadest sense is at the core of social disorganization theory and an important element of strain theory. Within a rational choice framework Lederman, Loayza, and Menéndez (2002) offer a number of ways in which social capital can reduce the incident of crime. First, they argue that social capital decreases the costs of social transactions. This, they maintain, allows for more peaceful resolutions to conflict and follows the idea that in many rural areas people prefer to resolve issues themselves and not draw law enforcement agencies into conflicts. Second, they argue that stronger ties within and across the community (i.e., higher levels of social capital, social cohesion, or density of acquaintance) helps the community overcome the problem of free riders within collective action. Higher levels of social capital decrease the ability of individuals to engage

in opportunistic behavior. Following rational choice theory, lower levels of social capital allow for a greater degree of anonymity, hence enhancing the likely positive payoff of criminal behavior.

The level of anonymity can also be used to help explain lower levels of crime in rural areas. Going back to the original work of Durkheim and Tönnies, one can use the framework of *gemeinschaft*, or the notion of an “intimate community,” where everyone knows everyone else. The application of anomie/strain theory, a framework in which individuals are isolated within a social construct, are adrift from others and/or lack a common bond that makes them part of the community, making criminal activity for those disposed to committing crime more justifiable.

While social capital and social norms are not directly discussed in the original formulation of rational choice theory, there have been several attempts to formally introduce social capital into rational choice theory (Fajnzylber, Lederman, and Loayza 2002; Lederman, Loayza, and Menéndez 2002; Matsueda, Kreager, and Huizinga 2006; Messner, Baumer, and Rosenfeld 2004). Here social capital directly enters into the likelihood of being captured; communities with higher levels of social capital are more likely to have neighbor watch-type programs or are willing to work with law enforcement agencies when investigating a crime. Potential criminals will explicitly consider levels of social capital and avoid communities with high levels. In essence, enhanced levels of social capital increases the risk of being caught, hence reducing the incentive to commit crime. In addition, one can argue that higher levels of social capital can increase the moral threshold of the potential criminal, which in turn reduces the likelihood of committing crime.

Consider a community composed of three individuals ( $i$ ,  $j$ , and  $z$ ). The net benefit ( $nb_{ij}$ ) for potential criminal  $i$  of committing a crime against individual  $j$  depends on the expected payoff or loot ( $l_j$ ) minus forgone wages through legitimate economic activity ( $w_i$ ) coupled with the risk of being caught ( $C_i$ ) and the moral threshold of the potential criminal ( $M_i$ ). The basic calculus potential criminal  $i$  faces is expressed as

$$nb_{ij} = l_j - w_i - C_i \geq M_i \quad (1)$$

The size of the potential loot ( $l_j$ ) is a function of the earning power of person  $j$  and is in turn a function of the human capital of  $j$  ( $k_j$ ) and social capital of  $j$  ( $sk_j$ ):

$$w_j = w(k_j, sk_j). \quad (2)$$

Wages are not solely dependent on the initiate ability of the individual (i.e., human capital) but also on the ability of the individual to network within the

community. Here higher levels of social capital allow the individual to be more connected with economic opportunities that may exist in the community.<sup>3</sup>

The loot is specifically defined as a fraction of the income of the potential victim, or

$$l_j = \alpha[w(k_j, sk_j)] \quad 0 < \alpha < 1. \quad (3)$$

In a similar manner the forgone wages of the potential criminal is also a function of the person's personal or human capital and social capital:

$$w_i = w(k_i, sk_i). \quad (4)$$

Here people with low levels of human capital and are likely living in poverty have lower opportunity costs when considering committing a crime. This framework explicitly recognizes the interplay between the human capital offered by the individual and the social capital that is found within the community. Individual and social capitals are both positively related to wages.

The risk of being caught is a function of the initiate skills of the potential criminal as well as the social capital of the community:

$$C(k_i, sk_i) \quad (5)$$

A more skilled ( $k_i$ ) potential criminal has a lower potential for being caught, but at the same time higher levels of social capital ( $sk_i$ ) increases the potential for being caught.<sup>4</sup> Here social capital enters through social networks such as neighborhood crime watch programs and the presence and use of effective law enforcement agencies. Because of higher levels of civic engagement, people will be more willing to come forth and work with local law enforcement agencies. Simply stated, communities with higher levels of social capital, based on social disorganization theory, are more likely to be actively engaged in deterring crime and pursuing criminals.

The moral threshold of the potential criminal is a function of the social capital of the community:

$$M_i = M(sk_i). \quad (6)$$

A community with higher levels of social capital is assumed to produce individuals with higher morals, and hence as social capital within the community increases, the willingness of the potential criminal to undertake criminal activity decreases because of moral reasons. Conversely, communities with lower levels of social capital are likely to produce people with lower moral thresholds and hence experience more crime.

Substituting equations (3–6) into equation (1) and rearranging yields

$$nb_{ij} = \alpha [w(k_j, sk_j)] - w(k_i, sk_i) - C(k_i, sk_i) - M(sk_i) \geq 0 \tag{7}$$

Equation (7) explicitly lays out how social capital, both on the part of the potential criminal and victim, enters into and influences the decision to commit a crime. At issue now is how social capital within the community is determined.

Modeling social capital within both empirical and theoretical frameworks is at best difficult, and to operationalize the approach outline here some strong simplifying assumptions are required. The social capital of individual *i* depends on the relationship this individual has with others within the community. Social capital in its simplest form is a function of the relationship between the individual of interest, or the potential criminal, and the other individuals in the community:

$$sk_i = g_{ij}(r_{ij}) + g_{iz}(r_{iz}) \tag{8}$$

where *r* is the level of connection with others within the community or density of acquaintance. Lederman, Loayza, and Menéndez (2002) also note that *r* captures what they call sympathy, perhaps empathy, or concern the individual has for others within the community.<sup>5</sup> Higher levels of *r* are associated with higher levels of social capital, broadly defined.

Substituting equation (8) into the expanded version of equation (1) presented in (7) yields

$$nb_{ij} = \alpha [w\{k_j, (g_{ji}(r_{ji}) + g_{jz}(r_{jz}))\}] - w\{k_i, (g_{ij}(r_{ij}) + g_{iz}(r_{iz}))\} - C\{k_i, (g_{ij}(r_{ij}) + g_{iz}(r_{iz}))\} - M\{(g_{ij}(r_{ij}) + g_{iz}(r_{iz}))\} \geq 0. \tag{9}$$

Assuming that individual human capital (*k*) is fixed the question centers on how a change in social capital influences the decision of *i* on whether or not to commit a crime against *j*. The change in the net benefit of committing a crime is associated with changes in the social capital received by *i* is:

$$\Delta nb_{ij} = \alpha \left[ \frac{\partial l}{\partial r_{ji}} * \Delta r_{ji} + \frac{\partial l}{\partial r_{jz}} * \Delta r_{jz} \right] - \left[ \frac{\partial w_i}{\partial r_{ij}} * \Delta r_{ij} + \frac{\partial w_i}{\partial r_{iz}} * \Delta r_{iz} \right] - \left[ \frac{\partial C}{\partial r_{ij}} * \Delta r_{ij} + \frac{\partial C}{\partial r_{iz}} * \Delta r_{iz} \right] - \left[ \frac{\partial M}{\partial r_{ij}} * \Delta r_{ij} + \frac{\partial M}{\partial r_{iz}} * \Delta r_{iz} \right] \tag{10}$$

The first bracketed term captures how change in social capital or social networks and/or density of acquaintance influences the potential value of the crime (i.e., loot). Given equations (3) and (8), increases in social capital within the community will increase the potential value of the crime. In the simplest sense, increases in social capital increases the wages of the victim, which increases the

potential loot. The second bracketed term captures how a change in social capital will affect foregone wages of the criminal. Again, increases in social capital increases the opportunity costs of committing the crime through foregone wages. The third bracketed term captures how a change in social capital affects the likelihood of being captured for the crime and prosecuted. From social disorganization theory, an increase in social capital is associated with an increase in the willingness of people to engage with law enforcement, hence increasing the likelihood of the criminal being captured. The final bracketed term captures how a change in social capital influences the moral threshold of the potential criminal. From anomie/strain and social disorganization theory, increases in social capital should elevate the potential criminal's sense of community and raise the moral threshold, which in turn reduces the likelihood of committing a crime.

To simplify equation (10), assume that the influence of others within the community, represented by  $z$ , is assumed to be zero, or  $\Delta r_{iz} = \Delta r_{jz} = 0$ . Equation (10) reduces to

$$\Delta nb_{ij} = \alpha \left[ \frac{\partial l}{\partial r_{ji}} * \Delta r_{ji} \right] - \left[ \frac{\partial w_i}{\partial r_{ij}} * \Delta r_{ij} \right] - \left[ \frac{\partial C}{\partial r_{ij}} * \Delta r_{ij} \right] - \left[ \frac{\partial M}{\partial r_{ij}} * \Delta r_{ij} \right]. \quad (11)$$

As before, each of the terms in brackets in equation (11) is positive: increases in social capital will increase the income of individual  $j$  and correspondingly the loot associated with  $j$ , the level of forgone wages of the potential criminal  $i$ , the likelihood of being captured (or cost), along with the moral threshold of the potential criminal. Recalling that  $0 < \alpha < 1$ , it seems reasonable to conclude that the latter three terms will dominate a fractional value of the first term, resulting in  $\Delta nb_{ij}$  being negative. Here an increase in social capital, social networks, and/or density of acquaintance reduces the likelihood of individual  $i$  committing a crime against individual  $j$ .

### Empirical models

Empirically estimating the relationship between social capital and crime outlined above presents several problems. First, social capital is a complex issue and very difficult to measure empirically. As mentioned above, within rural crime literature the focus has been on social disorganization theory and empirically measured through community stability (e.g., economic growth and development), economic marginalization (e.g., poverty, unemployment, and low levels of education), ethnic heterogeneity, family stability, and to a less extent population size and density. For example, in a study of rural crime across U.S. counties Mencken and Barnett (1999) uses factor analysis to combine family poverty rates, percent of households headed by a woman, percent of the population of

African-Americans, and percent of the population age 16–21 into a “Social Disorganization Index.” None of these are a direct measure of social capital, and almost all are indirect proxies of social capital.

Second, from the empirical criminology literature, particularly ecological studies that use community-level data, the evidence is often inconclusive at best and contradictory at worst (Barnett and Mencken 2002; Bausman and Goe 2004; Chiricos 1987; Patterson 1991; Phillips 2006). For example, earlier studies tended to suffer from aggregation bias where violent and property crimes were added together (Chiricos 1987; Patterson 1991), and more current work tends to measure key variables inconsistently. In their discussion of rational choice theory Chisholm and Choe (2004) observe that income and income inequality are defined and measured inconsistently from one study to the next. Simply changing the definition of income from per capita to family to household can alter results. Empirical inconsistencies from such minor changes in model specification have cast a cloud over much of the ecological-based literature.

Another problem area within the empirical literature is the nature of causation between crime and the wide range of socio-economic variables hypothesized to be associated with crime (Messner, Baumer, and Rosenfeld 2004). As noted in the introductory comments to this study, some studies of regional economic growth and development find that crime is a disamenity and a deterrent to growth. In a dynamic system, once crime hits some threshold the interplay between crime and growth and development can cause a community to spiral out of control. At the same time, social disorganization theory tells us that community change, such as economic growth and development, is a primary driver of increases in crime. Indeed, Barnett and Mencken (2002) note that in the limited available studies on rural crime, socio-economic change, traditionally measured by population change, is the one consistent finding. In Robert Putnam’s influential book *Bowling Alone* his discussion of social capital suggests that the arrows of causation are “as tangled as well-tossed spaghetti” (2000:137).

A more fundamental problem for ecological studies of crime in the U.S. is that the FBI’s Uniform Crime Reports (UCR), which is the primary source of data for community-level studies, tends to underreport actual crime (Weisheit and Donnermeyer 2000).<sup>6</sup> As noted by Berger, Free, and Searles (2005), people often do not report criminal activities to local law enforcement authorities because they think the crime does not warrant reporting or that law enforcement cannot or will not do anything about the crime.<sup>7</sup> Others may be unsure if what they witnessed may actually be a crime, may have fear of reprisal, or may have embarrassment about their own victimization. These latter two points are particularly relevant in violent crime against women and has become a central thrust in the feminist



criminology literature (Vold, Bernard, and Snipes 2002). Consistent with critical criminology, lower-income people or minorities may find it not worth their time to report crime to law enforcement agencies, which are frequently viewed as being biased against them.

The problems with the FBI's UCR are particularly acute for rural areas and this study. 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 impact. There is also evidence that rural areas are more governed by informal social control (i.e., social norms). Smith (1980) found that shoplifting and rural theft was rarely reported to the police and in most cases handled informally. Smith also 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, or density of acquaintance one dimension of social capital can be described as high, people are more inclined to deal with crime through informal mechanisms (Weisheit and Donnermeyer 2000).

If there is a fundamental problem with the UCR, it is that the program is voluntary and local law enforcement agencies are not required to provide data. Reiman (1998) suggests that there are strong political and practical reasons for misreporting crime. In the name of economic growth and development as well as political self-preservation, local officials have a strong incentive to underreport crime in an attempt to make their community appear to have a higher quality of life than may be the case. There is the more practical problem of having adequate staff within the local law enforcement agency to compile the data and submit the correct reports. Larger urban areas are more likely than smaller rural areas to have the staff and resources to comply with the voluntary program.

Despite these serious limitations, the FBI UCR is the best data for rural crime that is available in the U.S. and is widely used to inform and craft policy. This study follows other ecological studies of rural crime patterns and use the UCR data (e.g., Arthur 1991; Barnett and Mencken 2002; Bouffard and Muftic 2006; Deller and Deller 2007; Lee and Bartkowski 2004; Li 2009; Mencken and Barnett 1999; Osgood and Chambers 2000; Petee and Kowalski 1993; Rephann 1999; Wilkinson 1984a,b). Both violent and property crime rates (number of incidents dividend by population adjusted to 10,000 persons), robberies, assaults, burglary, larceny, and motor vehicle rates are modeled with annual crime data for 2008, 2007, and 2006. Here the dependent variables in the model are an annual average over the three years. By taking an average, any unusual spikes in the annual crime data are removed, particularly for violent crime. Once missing data are accounted

for, the final sample size is 1,469. Much of the missing data come from gaps in the FBI UCR reports.

***Measures of social capital.*** Following the work of Coleman (1988), Flora and Flora (1993), Putnam (1993, 1995), and Turner (1999), Shaffer, Deller, and Marcouiller (2004) offer the following definition of social capital:

Social capital refers to features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit. Networks of civic engagement foster norms of general reciprocity and encourage the emergence of social trust. Social capital consists of the social networks in a community, the level of trust between community members, and local norms. These networks, norms and trusts help local people work together for their mutual benefit. (pp. 203–204)

Such a broad definition of social capital is attractive from a conceptual perspective, but it creates serious problems for research interested in developing specific empirical metrics. Indeed, Reisig and Cancino (2004) argue that social capital is too broad of a concept with respect to crime and should be more narrowly focused.

Many empirical studies that have specifically modeled the relationship between crime and social capital have tended to rely on survey data of individuals where questions aimed at measuring social capital can be more easily crafted (e.g., Gatti, Tremblay, and Larocque 2003; Kennedy et al. 1998; Messner, Baumer, and Rosenfeld 2004; Rosenfeld, Messner, and Baumer 2001). Glaeser et al. (2000), however, raise questions about the reliability of survey data measuring social capital. In a laboratory setting they found that subjects who reported that they are trusting, an important dimension of social capital, did not cooperate in a standard trust game. Generally, there are no standards in terms of how to phrase questions related to social capital in survey design, and results will vary depending on the manner in which questions are worded and how they are asked.

This study follows an approach outlined in Rupasingha, Goetz, and Freshwater (2006), Rupasingha and Goetz (2007), and Goetz and Rupasingha (2006) and uses a range of secondary data sources to build a set of proxy measures of social capital.<sup>8</sup> Putnam (1993, 1995, 2007) and other researchers argue that social capital manifests itself through involvement with and support of associational activities. For example, participation in political activities, volunteering with nonprofit organizations or providing financial support to agencies or businesses that support community well-being are all indicators of social engagement and social capital. The question then is how one measures the level of support for these types of activities. Like Rupasingha and his colleagues, this study uses CBP data compiled by the Census Bureau to develop an extensive set of variables representing a range of enterprises that represent social capital. Data are also drawn from the National

Center for Charitable Statistics for the number of nonprofits. The study also follows Lee and Bartkowski's (2004) study of rural crime and uses data on religious organizations that are drawn from the Association of Religion Data Archives. Finally, a fourth block of social capital metrics draw data from a new data set on cooperative business enterprises compiled by the University of Wisconsin Center for Cooperatives. Each block or set of metrics is now discussed in turn.

The CBP provides detailed data on enterprises for all U.S. counties annually for a range of business types. Data include number of enterprises by employment size along with total employment for all enterprises. The specific sectors included in this study's measure of social capital include

- artisans and cultural per 1,000 population;
- youth and family services per 1,000 population;
- sports and recreational per 1,000 population;
- business, professional, and labor (union) associations per 1 K population;
- food banks per 1,000 population;
- temporary shelters per 1,000 population;
- civic and social organization per 1,000 population;
- barber and beauty shops per 1 K population.

Each measure is the number of establishments adjusted to reflect the population size of the county. Arts and cultural-focused establishments are designed to reflect communities that may be loosely described as more bohemian while the number of barber and beauty shops capture informal gathering places for men and women, respectively. Communities that tend to have higher levels of social capital are likely to have a larger number of youth and family services-oriented firms along with sports and recreational firms. Business, professional, and labor organizations, along with civic and social organizations, are viewed as perhaps the most direct and traditional measure of social capital. A larger number of these types of institutions are almost by definition deemed to have higher levels of social capital. Food banks and temporary shelters may be viewed as dependent on poverty and unemployment which may be indirectly driven by crime levels. There could be reverse causation related to crime with these latter two measures of social capital. On the contrary, however, communities that are more likely to support these types of establishments are reflective of communities more willing to provide services to the disadvantaged, which is a measure of social capital.

The establishments captured in the CBPs may be either for-profit businesses or nonprofit organizations. The CBP reflects establishments that file tax returns and does not reflect the structure of the enterprise. From a social capital perspective it

could be argued that there are fundamental differences between for-profit and nonprofit establishments. For-profit businesses are motivated by a different set of objectives than nonprofits where the latter is more concerned with making sure a service is available in the community regardless of the economic viability of the enterprise. Data from the National Center for Charitable Statistics provide detailed data on the number of nonprofits along with number of nonprofits that have filed IRS form 990. The difference between the two is relative levels of activity. There are numerous in-active nonprofits that are included in the database, but those that file with the IRS are deemed to be active. Hence, the establishment count data are limited to just those nonprofits that have filed a 990. These include:

- arts, culture, and humanities nonprofits per 1 K population;
- educational nonprofits per 1,000 population;
- environmental nonprofits per 1,000 population;
- human services nonprofits per 1,000 population;
- public and social benefit nonprofits per 1,000 population;
- crime and legal nonprofits per 1,000 population;
- sports and recreation nonprofits per 1,000 population;
- youth development nonprofits per 1,000 population;
- civil rights, social action, and advocacy nonprofits per 1,000 population;
- community improvement and capacity building nonprofits per 1,000 population.

Unfortunately, the classification schemes of the CBP and nonprofits database do not directly coincide. Specifically, the nonprofit data do not follow the North American Industrial Classification System and are grouped by a stand-alone classification system. In addition, Wojan, McGranahan, and Lambert (2009) found in a study of nonprofits and rural governance that 64.4 percent of rural nonprofits in the National Center for Charitable Statistics system were unclassified. As a result, these measures will undercount the number of nonprofits and the scale of the undercount is unknown. For example, what percent of the undercounted nonprofits are nothing more than a “letterhead?” Despite these limitations, a larger number of nonprofits per 1,000 persons is expected to be associated with higher levels of social capital.

The third set of social capital measures is number of churches by denomination per 1,000 persons. Churches are widely discussed in the social capital literature (e.g., Smidt 2003) as not only a gathering and networking place but also a local institution that can provide volunteer opportunities and provide services to the community such as food pantries, child care, clothing and thrift shops, and educational opportunities, among others (Lee and Bartkowski 2004).<sup>9</sup> Coleman (2003:33) claims that “[i]t has become now almost cliché that religion in the

United States generates more ‘social capital’ than any other American institution.” Different denominations view their role within the community differently. Some denominations take a more aggressive role in providing services within the community while others are more internally focused. Thus, for this study, the concentration of congregation across different types of religions is a measure of social capital:

- evangelical church congregations per 1,000 population;
- Catholic church congregations per 1,000 population;
- Jewish synagogues per 1,000 population;
- other congregations per 1,000 population.

Again, a higher concentration of churches is expected to be associated with higher levels of social capital and in turn lower levels of crime.

The fourth and final set of social capital measures utilizes a new data set recently developed by the University of Wisconsin Center for Cooperatives.<sup>10</sup> Cooperatives, or “co-ops,” are a unique business model where the business enterprise is owned by the users of the cooperative. The International Co-operative Alliance (ICA) defines a cooperative as “an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise.” While cooperatives are most commonly associated with agriculture, there is a wide range of cooperatives from credit unions to grocery store cooperatives to child-care centers structured as cooperatives to housing cooperatives. As documented in Deller et al. (2009), cooperatives are present in almost every state in the U.S. But because of variations in how cooperatives are treated in state tax codes, there are some states where cooperatives tend to cluster, such as utility cooperatives in Mississippi and social and public services cooperatives in Massachusetts.

Because of the unique structure of cooperatives the creation and operation of a cooperative may be an indicator of social capital. From the ICA definition above, people “unite voluntarily” to address a common economic or social need. This requires members of the community to not only identify a common need but to organize in a structured manner to address that need. Although larger cooperatives, particularly large credit unions and agricultural marketing cooperatives, can appear to be member-owned in practice they operate more like a traditional corporation with the member-owner being treated like a stockholder. In a collection of small case studies, however, Stofferahn (2009) found that for counties in North Dakota that had a relatively large number of New Generation Co-ops, the types of cooperatives often associated with community development (e.g., Nadeau and Wilson 2001) did not experience an increase in social capital, measured via

crime rates and small claim court filings. Unfortunately, Stofferahn does not discuss why this unexpected result is found for North Dakota but does note that the notion of social capital within the framework of cooperative development has not been adequately explored.

Although there are 17 different types of cooperative (by services provided) within the University of Wisconsin Center for Cooperative's database, for this study the analysis is limited to four:

- number of arts cooperatives per 1,000 population;
- number of child-care cooperatives per 1,000 population;
- number of educational cooperatives per 1,000 population;
- number of grocery store cooperatives per 1,000 population.

There are two reasons for the focus on these four types of cooperatives. First, these cooperatives tend to be focusing on specific community needs as opposed to the larger agricultural or financial cooperatives. Thus, these cooperatives are more closely aligned with the explicit interest in measuring social capital. Second, these cooperatives tend to be smaller in scale and more focused on individual community needs.

Although the data sources used here include measures of size, such as employment with the CBP, number of people actively involved within certain religious congregations, and revenues and assets of non-profits and cooperatives, establishment counts per one thousand persons define the measures of social capital. This is done for consistency across the four groups of social capital measures which allow for direct comparisons of results across different specifications of the models. Five sets of models are estimated: a base model without social capital measures, then one for each of the four sets of measures.

Unlike Rupasingha and his colleagues and so many other studies of social capital, the data are not aggregated into a single index of social capital. This is done in order to gain additional insights into the potential policy implications of the study. An aggregate measure of social capital will mask policy insights. For example, if certain types of nonprofits influence crime rates while others do not, more focused policy recommendation can be made. The counterargument against using disaggregated data is the introduction of measurement error along with the introduction of multicollinearity. Measurement error in the sense that as the classification scheme becomes more refined the possibility of misclassifying a particular business or nonprofit is exacerbated.

**Control variables.** As mentioned above there is a wealth of empirical literature that seeks to explore the drivers of regional crime rates. In extensive reviews of the empirical literature Chiricos (1987), Land, McCall and Cohen (1990),

Patterson (1991), Chisholm and Choe (2004), Phillips (2006), and Li (2009) find that most common variables fall into four groupings: measures of income, wealth, and inequality, age, as well as racial-ethnicity profiles, economic base, and increasingly proxies for social capital. At the same time the ecological empirical literature that has focused on rural areas emphasis social disorganization theory tends to focus on five elements (Bouffard and Muftic 2006; Jobes et al. 2004): residential instability, family disruption, low socio-economic status, ethnic heterogeneity, and population size/density. Beyond our social capital measures this studies, control variables can be grouped into three categories: demographic or social profiles, economic, and change. Data are drawn from the most recent edition of the City and County Data Book, the Bureau of Economic Analysis, Regional Economic Information System, and the U.S. Census and are for non-metropolitan counties. Each block of variables is discussed in turn.

The social profile variables capture the size of the community, age profile, ethnic, and education and include:

- population 2006;
- population density 2006;
- adjacent to a metro county;
- percent of population aged 15–24 years;
- percent of population aged 65 and over
- percent of the population African-American;
- percent of the population Asian;
- percent of the population Native American;
- percent of the population Hispanic;
- percent of population 25 years and over with at least a high school degree;
- percent of the population foreign born;
- percent of the population that speaks non-English at home.

Population and population density captures the size and “urbaness” of the county and expect crime rates to be higher in larger and more densely populated rural areas. A simple dummy variable captures if the rural county is adjacent to an urban county. The question is if there is a spatial spillover of crime from a neighboring urban county. Given the findings of Goetz et al. (2010) in this *Special Issue* on commuting patterns the proximity to growing metro areas may have a very strong effect on rural crime patterns. It is expected that crime rates, particularly property crime, will be higher in areas with a large young adult population. This is measured by the percent of the population aged 15–24. Data tracking arrest patterns tend to show that young adults, particularly young men, are more likely to be involved in criminal activity, whereas as people age the tendency to be involved with crime declines. By this

logic, a county with an older population, measured in this study as the percent of the population aged 65 and older, should experience lower levels of crime. The breakout of population across racial-ethnic groups is intended to reflect differences in social norms.<sup>11</sup> Percent of the population foreign born and percent of the population that speaks non-English at home are also intended to capture differences in social norms. We do not offer any hypotheses on specific racial-ethnic groups. Crime rates are expected to decline as education levels increase. Generally, as education levels raise the economic opportunities to people expand, lowering the need to commit crime. But as Corcoran, Faggian, and McCann (2010) report in this *Special Issue* rural areas often have a hard time attracting and retaining more highly educated people.

The measures of economic based are aimed at controlling for income and wealth. The six measures used include

- per capita income 2005;
- unemployment rate 2006;
- Gini coefficient of income equality 1999;
- percent of persons in the same home between 1995 and 2000;
- poverty rate 2004;
- number of banks per 10,000 persons.

Per capita income, the poverty rate, unemployment rate, and Gini coefficient of income inequality are standard variables that are perhaps the most widely studied in the empirical criminology literature. The percent of persons in the same home between 1995 and 2000 serves as a proxy of community stability. Finally, number of banks per 10,000 persons is a proxy of community wealth.

A key dimension of social disorganization and strain theory is change within the community. This can be rapid economic change such as a loss of employment opportunities, or widening income gaps or changes in the social makeup of the community. For this study this dimension is measured by

- change in population 2000–2006;
- change in per capita income 2000–2006;
- change in the unemployment rate 2000–2006;
- percent change in the Gini coefficient 1989–1999.

The growth in population is expected to be associated with higher crime rates whereas growth in per capita income should be linked to lower crime rates. Rising unemployment rates and widening income inequality should also be associated with higher levels of crime.



Again, five versions of the model are estimated: a base model with none of the social capital variables included then one model for each of the four different measures of social capital. By comparing the overall performance of the expanded models to the base model the importance of the social capital variables as a block in explaining rural crime rates can be tested. Further, by examining individual measures further insights into potential policy options can be gained.

Finally, there have been several ecological studies using the county FBI UCR data that have documented the presence of spatial dependency within the data (e.g., Mencken and Barnett 1999; Messner et al. 1999). In addition, the analysis of commuting patterns by Goetz et al. (2010) and Partidge, Ali, and Olfert (2010) reported elsewhere in this *Special Issue* strongly suggests that the use of counties as the unit of analysis will mask important regional influences. LeSage and Pace (2009) outline several possible directions to address spatial dependency within the data including the simple spatial lag model as used by Morenoff, Sampson, and Raudenbush (2001) to study urban violence and also used by Mencken and Barnett (1999) and their analysis of mid-southern counties in the U.S. The empirical model used in this study then can be expressed as  $C_i = \alpha_o + \rho WC_i + \sum_j \beta X_{ji} + \varepsilon_i$ , where  $W$  is a spatial weight matrix based on a simple adjacency scheme and  $\rho$  is the spatial dependency parameter,  $C$  is the crime rate, and  $X_j$  are the control and social capital variables.

### Empirical Results

The results of the modeling effort are provided in Tables 1–6 with the base model results presented in Table 1 and each subsequent model containing a different block of social capital measures. Consider first the overall performance of the base model, then the control variables, and then turn attention to the social capital results.

**Control variable results.** Based on the estimated spatial lag coefficient ( $\rho$ ) and corresponding standard error along with the standard Moran's  $I$ -test statistic for spatial dependency, it is clear that there is spatial dependency in the data, and not correcting for that dependency would lead to biased, inconsistent, and inefficient estimates. The base model (Table 1) performs reasonably well with  $R^2$ 's ranging from 0.1366 for larceny to 0.2956 for burglaries. Given the cross-sectional nature of the data and the current rural-focused literature these levels of explanatory power are as expected (e.g., Barnett and Mencken 2002; Rephann 1999).

To determine levels of multicollinearity conditions indices were calculated for all five specifications of the model (base model plus four social capital augmented models), and these ranged from 173.08 for the base model to 204.27 for the nonprofit augmented social capital model. Although the threshold level for

TABLE 1. RURAL CRIME BASE MODEL.

|   | Violent<br>crime rate | Robbery<br>rate    | Assault<br>rate    | Property<br>crime rate | Burglary<br>rate   | Larceny<br>rate    | Motor<br>vehicle crime |
|---|-----------------------|--------------------|--------------------|------------------------|--------------------|--------------------|------------------------|
| Intercept   | 1.32920<br>(0.18)     | -0.20477<br>(0.08) | 1.76866<br>(0.04)  | 0.48670<br>(0.93)      | -0.22353<br>(0.91) | 0.17291<br>(0.97)  | 1.16817<br>(0.02)      |
| Change in population 2000-2006                      | 0.00002<br>(0.09)     | 0.00000<br>(0.28)  | 0.00002<br>(0.07)  | 0.00029<br>(0.00)      | 0.00010<br>(0.00)  | 0.00019<br>(0.00)  | 0.00002<br>(0.00)      |
| Change in per capita income 2000-2006               | 0.00006<br>(0.00)     | 0.00001<br>(0.01)  | 0.00005<br>(0.00)  | 0.00018<br>(0.03)      | 0.00006<br>(0.04)  | 0.00012<br>(0.05)  | 0.00001<br>(0.26)      |
| Change in the unemployment rate<br>2000-2006        | -0.04255<br>(0.10)    | -0.00287<br>(0.33) | -0.03764<br>(0.09) | -0.36852<br>(0.01)     | -0.06159<br>(0.21) | -0.30772<br>(0.00) | -0.02329<br>(0.07)     |
| Percent change in the Gini coefficient<br>1989-1999 | 0.33232<br>(0.25)     | 0.05691<br>(0.08)  | 0.17333<br>(0.48)  | 1.60172<br>(0.32)      | 1.36998<br>(0.01)  | -0.04625<br>(0.97) | 0.15341<br>(0.28)      |
| Population 2006                                     | 0.00000<br>(0.36)     | 0.00000<br>(0.12)  | 0.00000<br>(0.25)  | -0.00003<br>(0.00)     | 0.00000<br>(0.26)  | -0.00003<br>(0.00) | 0.00000<br>(0.45)      |
| Population density 2006                             | -0.00073<br>(0.46)    | 0.00014<br>(0.25)  | -0.00071<br>(0.42) | 0.01517<br>(0.01)      | 0.00264<br>(0.17)  | 0.01277<br>(0.00)  | 0.00053<br>(0.29)      |
| Per capita income 2005                              | -0.00003<br>(0.00)    | 0.00000<br>(0.00)  | -0.00003<br>(0.00) | -0.00010<br>(0.00)     | -0.00003<br>(0.00) | -0.00007<br>(0.00) | -0.00001<br>(0.01)     |
| Poverty rate 2004                                   | -0.01552<br>(0.33)    | 0.00136<br>(0.45)  | -0.01513<br>(0.27) | -0.02691<br>(0.76)     | -0.00860<br>(0.77) | -0.01395<br>(0.82) | -0.01076<br>(0.17)     |
| Unemployment rate 2006                              | 0.04667<br>(0.03)     | 0.00207<br>(0.40)  | 0.04052<br>(0.03)  | 0.43406<br>(0.00)      | 0.14221<br>(0.00)  | 0.29098<br>(0.00)  | 0.02318<br>(0.03)      |
| Gini coefficient of income equality<br>1999         | 1.82395<br>(0.24)     | 0.35013<br>(0.05)  | 0.83500<br>(0.54)  | 9.16584<br>(0.30)      | 2.24448<br>(0.45)  | 7.79393<br>(0.21)  | -0.64102<br>(0.41)     |
| Percent of population age 15-24 years<br>of age     | -0.01796<br>(0.11)    | -0.00039<br>(0.76) | -0.01910<br>(0.05) | -0.18629<br>(0.00)     | -0.03646<br>(0.08) | -0.14018<br>(0.00) | -0.01356<br>(0.02)     |



TABLE 2. *F*-TESTS FOR SOCIAL CAPITAL.

|  | Violent<br>crime rate | Robbery<br>rate | Assault<br>rate | Property<br>crime rate | Burglary<br>rate | Larceny<br>rate | Motor<br>vehicle crime |
|--|-----------------------|-----------------|-----------------|------------------------|------------------|-----------------|------------------------|
| Social capital proxied by<br>business concentration    | 1.993<br>(0.06)       | 0.600<br>(0.88) | 2.027<br>(0.04) | 4.055<br>(0.01)        | 3.539<br>(0.01)  | 3.848<br>(0.01) | 3.046<br>(0.01)        |
| Social capital proxied by<br>church concentration      | 0.000<br>(0.99)       | 5.066<br>(0.01) | 0.212<br>(0.93) | 1.560<br>(0.18)        | 3.947<br>(0.01)  | 0.715<br>(0.68) | 1.341<br>(0.25)        |
| Social capital proxied by<br>cooperative concentration | 0.042<br>(0.99)       | 0.147<br>(0.96) | 0.079<br>(0.99) | 0.220<br>(0.93)        | 0.129<br>(0.97)  | 0.715<br>(0.68) | 2.045<br>(0.09)        |
| Social capital proxied by<br>nonprofit concentration   | 0.864<br>(0.77)       | 0.248<br>(0.99) | 0.912<br>(0.52) | 3.483<br>(0.01)        | 2.715<br>(0.01)  | 4.631<br>(0.01) | 0.707<br>(0.72)        |

Marginal significance in parantheses (p-values).

TABLE 3. RURAL CRIME BUSINESS ENHANCED MODEL.

|   | Violent<br>crime rate | Robbery<br>rate    | Assault<br>rate    | Property<br>crime rate | Burglary<br>rate   | Larceny<br>rate    | Motor<br>vehicle crime |
|---|-----------------------|--------------------|--------------------|------------------------|--------------------|--------------------|------------------------|
| Intercept   | 1.06243<br>(0.30)     | -0.19377<br>(0.10) | 1.57117<br>(0.08)  | -2.36799<br>(0.68)     | -1.11581<br>(0.56) | -1.74357<br>(0.66) | 0.94886<br>(0.07)      |
| Change in population 2000–2006                      | 0.00002<br>(0.21)     | 0.00000<br>(0.36)  | 0.00002<br>(0.15)  | 0.00025<br>(0.00)      | 0.00009<br>(0.00)  | 0.00016<br>(0.00)  | 0.00002<br>(0.01)      |
| Change in per capita income 2000–2006               | 0.00006<br>(0.00)     | 0.00001<br>(0.01)  | 0.00005<br>(0.00)  | 0.00019<br>(0.03)      | 0.00006<br>(0.06)  | 0.00013<br>(0.03)  | 0.00001<br>(0.25)      |
| Change in the unemployment rate<br>2000–2006        | -0.03550<br>(0.17)    | -0.00260<br>(0.38) | -0.03320<br>(0.14) | -0.32943<br>(0.02)     | -0.05490<br>(0.26) | -0.27493<br>(0.01) | -0.01810<br>(0.16)     |
| Percent change in the Gini coefficient<br>1989–1999 | 0.32530<br>(0.26)     | 0.05100<br>(0.12)  | 0.19670<br>(0.43)  | 1.44111<br>(0.37)      | 1.42642<br>(0.01)  | -0.23562<br>(0.83) | 0.14783<br>(0.30)      |
| Population 2006                                     | 0.00000<br>(0.61)     | 0.00000<br>(0.08)  | 0.00000<br>(0.47)  | -0.00003<br>(0.01)     | 0.00000<br>(0.40)  | -0.00003<br>(0.00) | 0.00000<br>(0.72)      |
| Population density 2006                             | -0.00067<br>(0.50)    | 0.00013<br>(0.27)  | -0.00071<br>(0.42) | 0.01520<br>(0.01)      | 0.00270<br>(0.16)  | 0.01260<br>(0.00)  | 0.00056<br>(0.27)      |
| Per capita income 2005                              | -0.00003<br>(0.00)    | 0.00000<br>(0.00)  | -0.00002<br>(0.00) | -0.00010<br>(0.00)     | -0.00002<br>(0.00) | -0.00007<br>(0.00) | -0.00001<br>(0.01)     |
| Poverty rate 2004                                   | -0.01436<br>(0.37)    | 0.00160<br>(0.38)  | -0.01622<br>(0.24) | -0.00140<br>(0.99)     | -0.00765<br>(0.80) | 0.00941<br>(0.88)  | -0.00815<br>(0.31)     |
| Unemployment rate 2006                              | 0.04134<br>(0.05)     | 0.00169<br>(0.49)  | 0.03766<br>(0.04)  | 0.40591<br>(0.00)      | 0.14082<br>(0.00)  | 0.26335<br>(0.00)  | 0.01913<br>(0.08)      |
| Gini coefficient of income equality 1999            | 1.96989<br>(0.21)     | 0.37791<br>(0.04)  | 0.88540<br>(0.52)  | 12.36590<br>(0.17)     | 2.50365<br>(0.40)  | 10.41573<br>(0.09) | -0.27163<br>(0.73)     |
| Percent of population aged 15–24 years              | -0.01601<br>(0.16)    | -0.00037<br>(0.78) | -0.01632<br>(0.10) | -0.15484<br>(0.02)     | -0.02861<br>(0.18) | -0.11780<br>(0.01) | -0.01078<br>(0.06)     |

TABLE 3. (CONTINUED)

|   | Violent<br>crime rate | Robbery<br>rate    | Assault<br>rate    | Property<br>crime rate | Burglary<br>rate   | Larceny<br>rate    | Motor<br>vehicle crime |
|---|-----------------------|--------------------|--------------------|------------------------|--------------------|--------------------|------------------------|
| Percent of population aged 65 and over                                      | -0.00117<br>(0.91)    | 0.00133<br>(0.26)  | -0.00410<br>(0.64) | 0.08148<br>(0.16)      | 0.05646<br>(0.00)  | 0.02397<br>(0.55)  | 0.00238<br>(0.64)      |
| Percent of the population African-American                                  | 0.01301<br>(0.00)     | 0.00309<br>(0.00)  | 0.01022<br>(0.00)  | 0.05119<br>(0.00)      | 0.01856<br>(0.00)  | 0.03059<br>(0.00)  | 0.00540<br>(0.00)      |
| Per cent of the population Asian  | 0.00507<br>(0.94)     | -0.00341<br>(0.64) | 0.00547<br>(0.92)  | -0.34937<br>(0.33)     | -0.11411<br>(0.34) | -0.15785<br>(0.53) | -0.06726<br>(0.04)     |
| Percent of the population Native American                                   | 0.01055<br>(0.03)     | 0.00122<br>(0.03)  | 0.00926<br>(0.03)  | 0.00769<br>(0.78)      | 0.01254<br>(0.18)  | -0.01115<br>(0.56) | 0.00707<br>(0.00)      |
| Percent of the population Hispanic  | 0.00180<br>(0.78)     | 0.00136<br>(0.07)  | 0.00031<br>(0.96)  | 0.03126<br>(0.40)      | 0.02685<br>(0.03)  | 0.00041<br>(0.99)  | 0.00320<br>(0.33)      |
| Percent of population 25 years and over<br>with at least high school degree | -0.00546<br>(0.41)    | -0.00029<br>(0.71) | -0.00564<br>(0.33) | 0.02608<br>(0.49)      | -0.00374<br>(0.77) | 0.03354<br>(0.20)  | -0.00452<br>(0.18)     |
| Percent of the population foreign born                                      | 0.00737<br>(0.52)     | 0.00435<br>(0.00)  | 0.00166<br>(0.87)  | 0.07234<br>(0.27)      | 0.03700<br>(0.09)  | 0.02694<br>(0.55)  | 0.01319<br>(0.02)      |
| Percent of the population speaks<br>non-English at home                     | -0.00428<br>(0.58)    | -0.00231<br>(0.01) | -0.00124<br>(0.85) | -0.06080<br>(0.16)     | -0.04154<br>(0.00) | -0.01231<br>(0.68) | -0.00827<br>(0.03)     |
| Percent of persons in same home between<br>1995 and 2000                    | -0.00346<br>(0.54)    | 0.00090<br>(0.16)  | -0.00551<br>(0.25) | 0.00946<br>(0.76)      | 0.01044<br>(0.32)  | 0.00008<br>(1.00)  | -0.00185<br>(0.51)     |
| Adjacent to metro county  | 0.09038<br>(0.11)     | 0.00872<br>(0.18)  | 0.09345<br>(0.06)  | 0.92758<br>(0.00)      | 0.41688<br>(0.00)  | 0.42469<br>(0.06)  | 0.10809<br>(0.00)      |
| Number of banks per 10,000 persons  | -0.00560<br>(0.64)    | -0.00064<br>(0.64) | -0.00182<br>(0.86) | 0.03829<br>(0.57)      | -0.00007<br>(1.00) | 0.02552<br>(0.58)  | 0.00761<br>(0.20)      |
| Artisans and cultural per 1,000 population                                  | 0.20554<br>(0.30)     | 0.01960<br>(0.38)  | 0.21428<br>(0.21)  | 3.80446<br>(0.00)      | 0.70252<br>(0.06)  | 2.88988<br>(0.00)  | 0.28942<br>(0.00)      |

|   |                    |                    |                    |                    |                    |                    |                    |
|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Youth and family services per 1,000 population                              | 0.02786<br>(0.84)  | 0.01452<br>(0.36)  | -0.00037<br>(1.00) | -0.99218<br>(0.21) | -0.28970<br>(0.27) | -0.67131<br>(0.22) | -0.04145<br>(0.55) |
| Sports and recreational per 1,000 population                                | -0.02751<br>(0.86) | 0.01420<br>(0.41)  | 0.01578<br>(0.90)  | -0.64980<br>(0.45) | -0.35297<br>(0.21) | -0.30000<br>(0.61) | -0.01311<br>(0.86) |
| Business, professional, and labor (union) associations per 1,000 population | -0.13602<br>(0.44) | -0.01965<br>(0.34) | -0.11809<br>(0.45) | -2.40977<br>(0.02) | -0.37893<br>(0.26) | -1.87274<br>(0.01) | -0.18362<br>(0.04) |
| Food banks per 1,000 population   | -0.08318<br>(0.87) | -0.06026<br>(0.29) | 0.04483<br>(0.92)  | -3.07126<br>(0.27) | -0.60053<br>(0.52) | -2.33295<br>(0.23) | -0.09353<br>(0.71) |
| Temporary shelters per 1,000 population                                     | -0.47571<br>(0.59) | -0.11036<br>(0.27) | -0.38020<br>(0.62) | -3.78533<br>(0.44) | -0.33677<br>(0.84) | -3.06323<br>(0.37) | -0.16409<br>(0.71) |
| Civic and social organization per 1,000 population                          | -0.30720<br>(0.10) | 0.01356<br>(0.48)  | -0.23922<br>(0.10) | -0.74707<br>(0.43) | -0.64248<br>(0.04) | -0.18004<br>(0.78) | 0.07435<br>(0.38)  |
| Barber and beauty shops per 1,000 population                                | -0.37964<br>(0.02) | -0.00219<br>(0.91) | -0.34244<br>(0.02) | -1.27223<br>(0.18) | -0.40791<br>(0.20) | -0.68057<br>(0.30) | -0.21152<br>(0.01) |
| Rho   | 0.52796<br>(0.00)  | 0.38498<br>(0.00)  | 0.51396<br>(0.00)  | 0.48697<br>(0.00)  | 0.48597<br>(0.00)  | 0.42798<br>(0.00)  | 0.49899<br>(0.00)  |
| R <sup>2</sup>  | 0.2146             | 0.2979             | 0.1953             | 0.2133             | 0.2755             | 0.1547             | 0.2252             |
| Moran I-statistic   | 18.239             | 11.796             | 17.585             | 15.125             | 14.598             | 12.664             | 16.639             |
| Marginal probability  | (0.00)             | (0.00)             | (0.00)             | (0.00)             | (0.00)             | (0.00)             | (0.00)             |

Marginal significance in parantheses (p-values).

TABLE 4. RURAL CRIME RELIGION ENHANCED MODEL.

|   | Violent<br>crime rate | Robbery<br>rate    | Assault<br>rate    | Property<br>crime rate | Burglary<br>rate   | Larceny<br>rate    | Motor<br>vehicle crime |
|---|-----------------------|--------------------|--------------------|------------------------|--------------------|--------------------|------------------------|
| Intercept   | 1.60378<br>(0.13)     | -0.12982<br>(0.29) | 2.06408<br>(0.03)  | -2.50838<br>(0.68)     | -1.19321<br>(0.55) | -1.47295<br>(0.73) | 1.29417<br>(0.02)      |
| Change in population 2000–2006                      | 0.00002<br>(0.11)     | 0.00000<br>(0.39)  | 0.00002<br>(0.06)  | 0.00026<br>(0.00)      | 0.00010<br>(0.00)  | 0.00018<br>(0.00)  | 0.00002<br>(0.00)      |
| Change in per capita income 2000–2006               | 0.00006<br>(0.00)     | 0.00000<br>(0.01)  | 0.00005<br>(0.00)  | 0.00017<br>(0.05)      | 0.00006<br>(0.05)  | 0.00011<br>(0.07)  | 0.00001<br>(0.27)      |
| Change in the unemployment rate<br>2000–2006        | -0.03969<br>(0.13)    | -0.00235<br>(0.43) | -0.03533<br>(0.12) | -0.38246<br>(0.01)     | -0.07791<br>(0.11) | -0.32246<br>(0.00) | -0.02256<br>(0.09)     |
| Percent change in the Gini coefficient<br>1989–1999 | 0.34064<br>(0.24)     | 0.06144<br>(0.06)  | 0.16698<br>(0.50)  | 1.84607<br>(0.25)      | 1.44675<br>(0.01)  | 0.07428<br>(0.95)  | 0.15062<br>(0.29)      |
| Population 2006                                     | 0.00000<br>(0.33)     | 0.00000<br>(0.09)  | 0.00000<br>(0.20)  | -0.00003<br>(0.01)     | 0.00000<br>(0.49)  | -0.00003<br>(0.00) | 0.00000<br>(0.39)      |
| Population density 2006                             | -0.00076<br>(0.45)    | 0.00013<br>(0.27)  | -0.00074<br>(0.40) | 0.01510<br>(0.01)      | 0.00284<br>(0.14)  | 0.01302<br>(0.00)  | 0.00051<br>(0.32)      |
| Per capita income 2005                              | -0.00003<br>(0.00)    | 0.00000<br>(0.00)  | -0.00003<br>(0.00) | -0.00009<br>(0.00)     | -0.00003<br>(0.00) | -0.00006<br>(0.00) | 0.00000<br>(0.02)      |
| Poverty rate 2004                                   | -0.01573<br>(0.33)    | 0.00187<br>(0.30)  | -0.01611<br>(0.24) | -0.00081<br>(0.99)     | -0.00301<br>(0.92) | 0.00047<br>(0.99)  | -0.01120<br>(0.16)     |
| Unemployment rate 2006                              | 0.04393<br>(0.04)     | 0.00141<br>(0.57)  | 0.03824<br>(0.04)  | 0.44717<br>(0.00)      | 0.15964<br>(0.00)  | 0.30622<br>(0.00)  | 0.02203<br>(0.04)      |
| Gini coefficient of income equality 1999            | 1.62904<br>(0.31)     | 0.35322<br>(0.06)  | 0.57885<br>(0.68)  | 12.71399<br>(0.16)     | 3.44023<br>(0.26)  | 10.21710<br>(0.11) | -0.81191<br>(0.32)     |
| Percent of population aged 15–24 years              | -0.01793<br>(0.11)    | -0.00061<br>(0.64) | -0.01917<br>(0.05) | -0.18828<br>(0.00)     | -0.03880<br>(0.07) | -0.14211<br>(0.00) | -0.01371<br>(0.02)     |
| Percent of population aged 65 and over              | -0.00465<br>(0.64)    | 0.00163<br>(0.16)  | -0.00633<br>(0.47) | 0.02891<br>(0.61)      | 0.04102<br>(0.03)  | -0.00914<br>(0.82) | 0.00064<br>(0.90)      |
| Percent of the population African-American          | 0.01268<br>(0.00)     | 0.00309<br>(0.00)  | 0.01004<br>(0.00)  | 0.05236<br>(0.00)      | 0.02042<br>(0.00)  | 0.03440<br>(0.00)  | 0.00559<br>(0.00)      |
| Per cent of the population Asian                    | -0.00019<br>(1.00)    | -0.00463<br>(0.52) | -0.00485<br>(0.93) | -0.40352<br>(0.26)     | -0.12094<br>(0.31) | -0.18438<br>(0.46) | -0.07046<br>(0.03)     |



|  |                    |                    |                    |                     |                    |                    |                    |
|--|--------------------|--------------------|--------------------|---------------------|--------------------|--------------------|--------------------|
| Percent of the population Native American                                | 0.01176<br>(0.02)  | 0.00118<br>(0.04)  | 0.01041<br>(0.01)  | 0.00315<br>(0.91)   | 0.01194<br>(0.20)  | -0.01388<br>(0.48) | 0.00775<br>(0.00)  |
| Percent of the population Hispanic                                       | 0.00533<br>(0.41)  | 0.00145<br>(0.05)  | 0.00295<br>(0.60)  | 0.02486<br>(0.50)   | 0.02890<br>(0.02)  | -0.00811<br>(0.75) | 0.00322<br>(0.33)  |
| Percent of population 25 years and over with at least high school degree | -0.00905<br>(0.19) | -0.00077<br>(0.33) | -0.00809<br>(0.18) | 0.03117<br>(0.42)   | -0.00398<br>(0.76) | 0.03811<br>(0.16)  | -0.00484<br>(0.16) |
| Percent of the population foreign born                                   | 0.00608<br>(0.60)  | 0.00435<br>(0.00)  | 0.00112<br>(0.91)  | 0.07340<br>(0.27)   | 0.03467<br>(0.12)  | 0.03578<br>(0.44)  | 0.01302<br>(0.03)  |
| Percent of the population speaks non-English at home                     | -0.00883<br>(0.25) | -0.00260<br>(0.00) | -0.00466<br>(0.50) | -0.04767<br>(0.28)  | -0.04042<br>(0.01) | -0.00213<br>(0.95) | -0.00810<br>(0.04) |
| Percent of persons in same home between 1995 and 2000                    | -0.00407<br>(0.49) | 0.00044<br>(0.51)  | -0.00654<br>(0.20) | -0.01237<br>(0.71)  | 0.00318<br>(0.77)  | -0.01506<br>(0.51) | -0.00277<br>(0.34) |
| Adjacent to metro county   | 0.10902<br>(0.05)  | 0.00853<br>(0.18)  | 0.10930<br>(0.02)  | 1.01486<br>(0.00)   | 0.45597<br>(0.00)  | 0.49466<br>(0.03)  | 0.11209<br>(0.00)  |
| Number of banks per 10,000 persons                                       | -0.00533<br>(0.68) | -0.00145<br>(0.33) | 0.00042<br>(0.97)  | -0.02514<br>(0.73)  | -0.02219<br>(0.37) | -0.02059<br>(0.69) | 0.00817<br>(0.22)  |
| Number of evangelical church congregations per 1,000 population          | -0.03450<br>(0.37) | -0.00821<br>(0.07) | -0.03319<br>(0.33) | 0.26971<br>(0.22)   | 0.10315<br>(0.16)  | 0.18637<br>(0.23)  | -0.01595<br>(0.42) |
| Number of Catholic church congregations per 1,000 population             | -0.01714<br>(0.85) | 0.00792<br>(0.46)  | -0.03086<br>(0.70) | 0.21703<br>(0.68)   | -0.11597<br>(0.51) | 0.29163<br>(0.43)  | -0.02581<br>(0.58) |
| Number of Jewish synagogues per 1,000 population                         | -0.28851<br>(0.83) | -0.39603<br>(0.01) | 0.21662<br>(0.86)  | -10.16647<br>(0.20) | -5.23309<br>(0.05) | -5.52640<br>(0.32) | -0.58405<br>(0.41) |
| Number of other congregations per 1,000 population                       | 0.00548<br>(0.92)  | 0.00818<br>(0.19)  | -0.00564<br>(0.91) | 0.41175<br>(0.18)   | 0.20537<br>(0.05)  | 0.20983<br>(0.33)  | -0.00585<br>(0.83) |
| Rho  | 0.55098<br>(0.00)  | 0.37299<br>(0.00)  | 0.52794<br>(0.00)  | 0.52800<br>(0.00)   | 0.49000<br>(0.00)  | 0.42599<br>(0.00)  | 0.50395<br>(0.00)  |
| R <sup>2</sup>   | 0.2059<br>18.172   | 0.3053<br>11.297   | 0.1867<br>17.569   | 0.1991<br>15.078    | 0.2693<br>14.553   | 0.1383<br>12.737   | 0.215<br>16.588    |
| Moran I-statistic  |                    |                    |                    |                     |                    |                    |                    |
| Marginal probability   | (0.00)             | (0.00)             | (0.00)             | (0.00)              | (0.00)             | (0.00)             | (0.00)             |

Marginal significance in parantheses (p-values).

TABLE 5. RURAL CRIME COOPERATIVE ENHANCED MODEL.

|   | Violent<br>crime rate | Robbery<br>rate    | Assault<br>rate    | Property<br>crime rate | Burglary<br>rate   | Larceny<br>rate    | Motor<br>vehicle crime |
|---|-----------------------|--------------------|--------------------|------------------------|--------------------|--------------------|------------------------|
| Intercept   | 1.31158<br>(0.19)     | -0.21167<br>(0.07) | 1.73610<br>(0.05)  | -0.28667<br>(0.96)     | -0.34683<br>(0.86) | -0.47462<br>(0.91) | 1.06363<br>(0.04)      |
| Change in population 2000–2006                      | 0.00002<br>(0.09)     | 0.00000<br>(0.28)  | 0.00002<br>(0.07)  | 0.00029<br>(0.00)      | 0.00010<br>(0.00)  | 0.00018<br>(0.00)  | 0.00002<br>(0.00)      |
| Change in per capita income 2000–2006               | 0.00006<br>(0.00)     | 0.00001<br>(0.01)  | 0.00005<br>(0.00)  | 0.00018<br>(0.03)      | 0.00006<br>(0.04)  | 0.00012<br>(0.04)  | 0.00001<br>(0.26)      |
| Change in the unemployment rate<br>2000–2006        | -0.04105<br>(0.11)    | -0.00273<br>(0.36) | -0.03624<br>(0.11) | -0.35061<br>(0.02)     | -0.05834<br>(0.23) | -0.29142<br>(0.00) | -0.02148<br>(0.10)     |
| Percent change in the Gini coefficient<br>1989–1999 | 0.33586<br>(0.24)     | 0.05834<br>(0.07)  | 0.18279<br>(0.46)  | 1.76978<br>(0.27)      | 1.39677<br>(0.01)  | 0.09250<br>(0.93)  | 0.17174<br>(0.23)      |
| Population 2006                                     | 0.00000<br>(0.35)     | 0.00000<br>(0.12)  | 0.00000<br>(0.24)  | -0.00003<br>(0.00)     | 0.00000<br>(0.25)  | -0.00003<br>(0.00) | 0.00000<br>(0.46)      |
| Population density 2006                             | -0.00078<br>(0.43)    | 0.00013<br>(0.26)  | -0.00076<br>(0.39) | 0.01484<br>(0.01)      | 0.00258<br>(0.18)  | 0.01247<br>(0.00)  | 0.00046<br>(0.36)      |
| Per capita income 2005                              | -0.00003<br>(0.00)    | 0.00000<br>(0.00)  | -0.00003<br>(0.00) | -0.00010<br>(0.00)     | -0.00004<br>(0.00) | -0.00007<br>(0.00) | 0.00000<br>(0.02)      |
| Poverty rate 2004                                   | -0.01468<br>(0.36)    | 0.00139<br>(0.44)  | -0.01425<br>(0.30) | -0.02004<br>(0.82)     | -0.00658<br>(0.82) | -0.00891<br>(0.89) | -0.01016<br>(0.20)     |
| Unemployment rate 2006                              | 0.04587<br>(0.04)     | 0.00212<br>(0.40)  | 0.03994<br>(0.03)  | 0.43358<br>(0.00)      | 0.14152<br>(0.00)  | 0.28657<br>(0.00)  | 0.02454<br>(0.02)      |
| Gini coefficient of income equality 1999            | 1.85987<br>(0.23)     | 0.35328<br>(0.05)  | 0.88220<br>(0.51)  | 9.59577<br>(0.28)      | 2.37209<br>(0.42)  | 7.97913<br>(0.20)  | -0.56545<br>(0.47)     |
| Percent of population aged 15–24 years of<br>age    | -0.01847<br>(0.11)    | -0.00032<br>(0.80) | -0.01996<br>(0.04) | -0.18225<br>(0.00)     | -0.03765<br>(0.08) | -0.13442<br>(0.00) | -0.01321<br>(0.02)     |
| Percent of population aged 65 and over              | -0.00494<br>(0.62)    | 0.00145<br>(0.21)  | -0.00712<br>(0.41) | 0.04422<br>(0.44)      | 0.04367<br>(0.02)  | 0.00060<br>(0.99)  | 0.00080<br>(0.87)      |
| Percent of the population African-American          | 0.01330<br>(0.00)     | 0.00311<br>(0.00)  | 0.01031<br>(0.00)  | 0.05317<br>(0.00)      | 0.01927<br>(0.00)  | 0.03200<br>(0.00)  | 0.00541<br>(0.00)      |
| Per cent of the population Asian                    | 0.00470<br>(0.94)     | -0.00382<br>(0.60) | 0.00105<br>(0.98)  | -0.39657<br>(0.27)     | -0.12454<br>(0.30) | -0.19597<br>(0.43) | -0.06609<br>(0.04)     |

|  |                    |                    |                     |                    |                     |                    |
|--|--------------------|--------------------|---------------------|--------------------|---------------------|--------------------|
| Percent of the population Native American                                | 0.01126<br>(0.02)  | 0.00979<br>(0.02)  | 0.01172<br>(0.67)   | 0.01397<br>(0.13)  | -0.00878<br>(0.65)  | 0.00745<br>(0.00)  |
| Percent of the population Hispanic                                       | 0.00415<br>(0.51)  | 0.00180<br>(0.75)  | 0.02833<br>(0.44)   | 0.02929<br>(0.02)  | -0.00448<br>(0.86)  | 0.00282<br>(0.38)  |
| Percent of population 25 years and over with at least high school degree | -0.00709<br>(0.27) | -0.00630<br>(0.26) | 0.02467<br>(0.50)   | -0.00749<br>(0.54) | 0.03538<br>(0.16)   | -0.00395<br>(0.22) |
| Percent of the population foreign born                                   | 0.00717<br>(0.53)  | 0.00191<br>(0.85)  | 0.08160<br>(0.21)   | 0.03819<br>(0.08)  | 0.03473<br>(0.45)   | 0.01370<br>(0.02)  |
| Percent of the population speaks non-English at home                     | -0.00696<br>(0.35) | -0.00295<br>(0.66) | -0.05758<br>(0.18)  | -0.04473<br>(0.00) | -0.00673<br>(0.82)  | -0.00759<br>(0.05) |
| Percent of persons in same home between 1995 and 2000                    | -0.00371<br>(0.50) | -0.00647<br>(0.17) | -0.00278<br>(0.93)  | 0.00685<br>(0.51)  | -0.00812<br>(0.71)  | -0.00273<br>(0.32) |
| Adjacent to metro county   | 0.11121<br>(0.05)  | 0.10964<br>(0.02)  | 0.99879<br>(0.00)   | 0.45306<br>(0.00)  | 0.45913<br>(0.04)   | 0.10927<br>(0.00)  |
| Number of banks per 10,000 persons                                       | -0.00602<br>(0.61) | -0.00064<br>(0.64) | 0.03719<br>(0.58)   | 0.00025<br>(0.99)  | 0.02424<br>(0.60)   | 0.00663<br>(0.26)  |
| Number of arts cooperatives per 1,000 population                         | -0.70020<br>(0.36) | -0.99054<br>(0.14) | -2.48686<br>(0.57)  | -1.57637<br>(0.28) | -0.35553<br>(0.91)  | -0.31951<br>(0.41) |
| Number of child-care cooperatives per 1,000 population                   | -1.02163<br>(0.75) | -0.94961<br>(0.72) | -17.25934<br>(0.32) | -2.51065<br>(0.66) | -11.81088<br>(0.33) | -2.92627<br>(0.06) |
| Number of educational cooperatives per 1,000 population                  | -0.02516<br>(0.98) | -0.10090<br>(0.47) | -12.18601<br>(0.07) | -1.19324<br>(0.60) | -10.27513<br>(0.03) | -0.56344<br>(0.35) |
| Number of grocery store cooperatives per 1,000 population                | -0.42245<br>(0.38) | -0.02063<br>(0.71) | -1.65825<br>(0.54)  | -0.30734<br>(0.73) | -1.05205<br>(0.58)  | -0.28217<br>(0.24) |
| Rho  | 0.53396<br>(0.00)  | 0.37498<br>(0.00)  | 0.49699<br>(0.00)   | 0.49398<br>(0.00)  | 0.43700<br>(0.00)   | 0.51200<br>(0.00)  |
| R <sup>2</sup>   | 0.2058             | 0.2958             | 0.1961              | 0.261              | 0.1383              | 0.2166             |
| Moran I-statistic  | 18.304             | 17.720             | 15.353              | 15.026             | 12.845              | 16.650             |
| Marginal probability   | (0.00)             | (0.00)             | (0.00)              | (0.00)             | (0.00)              | (0.00)             |

Marginal significance in parantheses (p-values).

TABLE 6. RURAL CRIME NONPROFIT ENHANCED MODELS.

|  | Violent<br>crime rate | Robbery<br>rate    | Assault<br>rate    | Property<br>crime rate | Burglary<br>rate   | Larceny<br>rate    | Motor<br>vehicle crime |
|--|-----------------------|--------------------|--------------------|------------------------|--------------------|--------------------|------------------------|
| Intercept  | 1.37006<br>(0.17)     | -0.19370<br>(0.10) | 1.73283<br>(0.05)  | -1.41210<br>(0.80)     | -0.68341<br>(0.72) | -0.63607<br>(0.87) | 1.07577<br>(0.04)      |
| Change in population 2000–2006                   | 0.00002<br>(0.17)     | 0.00000<br>(0.31)  | 0.00002<br>(0.14)  | 0.00023<br>(0.00)      | 0.00009<br>(0.00)  | 0.00016<br>(0.00)  | 0.00002<br>(0.01)      |
| Change in per capita income 2000–2006            | 0.00007<br>(0.00)     | 0.00001<br>(0.01)  | 0.00005<br>(0.00)  | 0.00017<br>(0.04)      | 0.00006<br>(0.06)  | 0.00012<br>(0.05)  | 0.00001<br>(0.32)      |
| Change in the unemployment rate 2000–2006        | -0.03610<br>(0.16)    | -0.00257<br>(0.39) | -0.03164<br>(0.16) | -0.30256<br>(0.04)     | -0.05219<br>(0.28) | -0.26435<br>(0.01) | -0.02253<br>(0.08)     |
| Percent change in the Gini coefficient 1989–1999 | 0.32063<br>(0.27)     | 0.05782<br>(0.08)  | 0.17088<br>(0.49)  | 1.71863<br>(0.28)      | 1.40408<br>(0.01)  | 0.01833<br>(0.99)  | 0.14885<br>(0.30)      |
| Population 2006                                  | 0.00000<br>(0.65)     | 0.00000<br>(0.09)  | 0.00000<br>(0.52)  | -0.00002<br>(0.02)     | 0.00000<br>(0.45)  | -0.00002<br>(0.00) | 0.00000<br>(0.69)      |
| Population density 2006                          | -0.00076<br>(0.45)    | 0.00013<br>(0.25)  | -0.00077<br>(0.38) | 0.01392<br>(0.01)      | 0.00229<br>(0.23)  | 0.01241<br>(0.00)  | 0.00047<br>(0.35)      |
| Per capita income 2005                           | -0.00003<br>(0.00)    | 0.00000<br>(0.00)  | -0.00003<br>(0.00) | -0.00008<br>(0.00)     | -0.00003<br>(0.00) | -0.00006<br>(0.00) | 0.00000<br>(0.12)      |
| Poverty rate 2004                                | -0.01690<br>(0.29)    | 0.00123<br>(0.50)  | -0.01658<br>(0.23) | -0.02437<br>(0.78)     | -0.00931<br>(0.75) | -0.01704<br>(0.78) | -0.01036<br>(0.19)     |
| Unemployment rate 2006                           | 0.03323<br>(0.13)     | 0.00156<br>(0.53)  | 0.02950<br>(0.12)  | 0.32848<br>(0.01)      | 0.12960<br>(0.00)  | 0.21607<br>(0.01)  | 0.02077<br>(0.06)      |
| Gini coefficient of income equality 1999         | 2.19800<br>(0.16)     | 0.35843<br>(0.05)  | 1.28865<br>(0.34)  | 13.06829<br>(0.14)     | 3.39546<br>(0.25)  | 10.40532<br>(0.09) | -0.50075<br>(0.53)     |
| Percent of population aged 15–24 years of age    | -0.01159<br>(0.32)    | -0.00003<br>(0.98) | -0.01233<br>(0.22) | -0.11091<br>(0.09)     | -0.02785<br>(0.20) | -0.07708<br>(0.09) | -0.01093<br>(0.06)     |

|  |                    |                    |                    |                    |                    |                    |                    |
|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Percent of population aged 65 and over                                   | 0.00024<br>(0.98)  | 0.00151<br>(0.20)  | -0.00179<br>(0.84) | 0.09327<br>(0.10)  | 0.05593<br>(0.00)  | 0.04004<br>(0.31)  | 0.00169<br>(0.74)  |
| Percent of the population African-American                               | 0.01328<br>(0.00)  | 0.00308<br>(0.00)  | 0.01020<br>(0.00)  | 0.04911<br>(0.00)  | 0.01934<br>(0.00)  | 0.03187<br>(0.00)  | 0.00534<br>(0.00)  |
| Per cent of the population Asian   | 0.00651<br>(0.92)  | -0.00359<br>(0.62) | 0.00255<br>(0.96)  | -0.34737<br>(0.33) | -0.12781<br>(0.28) | -0.12722<br>(0.61) | -0.06633<br>(0.04) |
| Percent of the population Native American                                | 0.01216<br>(0.01)  | 0.00119<br>(0.03)  | 0.01072<br>(0.01)  | 0.01482<br>(0.59)  | 0.01426<br>(0.12)  | -0.00450<br>(0.81) | 0.00751<br>(0.00)  |
| Percent of the population Hispanic                                       | 0.00594<br>(0.35)  | 0.00133<br>(0.07)  | 0.00375<br>(0.50)  | 0.04072<br>(0.26)  | 0.03030<br>(0.01)  | 0.00684<br>(0.79)  | 0.00330<br>(0.31)  |
| Percent of population 25 years and over with at least high school degree | -0.01215<br>(0.07) | -0.00045<br>(0.57) | -0.01131<br>(0.05) | -0.01450<br>(0.70) | -0.01374<br>(0.28) | 0.00099<br>(0.97)  | -0.00513<br>(0.13) |
| Percent of the population foreign born                                   | 0.00320<br>(0.78)  | 0.00416<br>(0.00)  | -0.00159<br>(0.87) | 0.04660<br>(0.47)  | 0.03246<br>(0.14)  | 0.01257<br>(0.78)  | 0.01205<br>(0.04)  |
| Percent of the population speaks non-english at home                     | -0.00867<br>(0.25) | -0.00224<br>(0.01) | -0.00502<br>(0.45) | -0.06692<br>(0.12) | -0.04423<br>(0.00) | -0.01921<br>(0.52) | -0.00796<br>(0.04) |
| Percent of persons in same home between 1995 and 2000                    | -0.00169<br>(0.76) | 0.00109<br>(0.09)  | -0.00412<br>(0.39) | 0.01445<br>(0.64)  | 0.00961<br>(0.36)  | 0.00515<br>(0.81)  | -0.00244<br>(0.38) |
| Adjacent to metro county   | 0.10906<br>(0.05)  | 0.00937<br>(0.15)  | 0.10620<br>(0.03)  | 0.96372<br>(0.00)  | 0.43007<br>(0.00)  | 0.47343<br>(0.03)  | 0.10788<br>(0.00)  |
| Number of banks per 10,000 persons                                       | -0.00741<br>(0.53) | -0.00087<br>(0.52) | -0.00270<br>(0.79) | 0.01432<br>(0.83)  | -0.00131<br>(0.95) | -0.00083<br>(0.99) | 0.00451<br>(0.45)  |
| Number of arts, culture, and humanities nonprofits per 1,000 population  | 0.08109<br>(0.58)  | 0.01491<br>(0.37)  | 0.13149<br>(0.30)  | 2.80693<br>(0.00)  | 0.39214<br>(0.15)  | 2.36074<br>(0.00)  | 0.13621<br>(0.06)  |
| Number of educational nonprofits per 1,000 population                    | 0.05708<br>(0.72)  | 0.00402<br>(0.82)  | 0.03797<br>(0.77)  | -0.92723<br>(0.28) | 0.10605<br>(0.71)  | -0.91746<br>(0.12) | -0.06365<br>(0.41) |
| Number of environmental nonprofits per 1,000 population                  | 0.61888<br>(0.00)  | 0.00984<br>(0.68)  | 0.57342<br>(0.00)  | 2.99028<br>(0.01)  | 1.03234<br>(0.01)  | 1.95190<br>(0.02)  | 0.02994<br>(0.78)  |

TABLE 6. (CONTINUED)

|   | Violent<br>crime rate | Robbery<br>rate    | Assault<br>rate    | Property<br>crime rate | Burglary<br>rate   | Larceny<br>rate    | Motor<br>vehicle crime |
|---|-----------------------|--------------------|--------------------|------------------------|--------------------|--------------------|------------------------|
| Number of human services nonprofits per 1,000 population                              | -0.00182<br>(0.98)    | 0.00237<br>(0.83)  | 0.00105<br>(0.99)  | 0.28450<br>(0.58)      | 0.09851<br>(0.57)  | 0.11130<br>(0.76)  | 0.02594<br>(0.58)      |
| Number of public and social benefit nonprofits per 1,000 population                   | -0.22947<br>(0.03)    | -0.00948<br>(0.45) | -0.20024<br>(0.03) | -2.11472<br>(0.00)     | -0.58248<br>(0.00) | -1.54747<br>(0.00) | -0.05101<br>(0.35)     |
| Number of crime and legal nonprofits per 1,000 population                             | -0.28870<br>(0.59)    | -0.02248<br>(0.72) | -0.26931<br>(0.56) | -1.61985<br>(0.59)     | 0.21635<br>(0.83)  | -1.89470<br>(0.37) | -0.09632<br>(0.72)     |
| Number of sports and recreation nonprofits per 1,000 population                       | 0.11988<br>(0.53)     | 0.01100<br>(0.62)  | 0.03059<br>(0.85)  | -0.13725<br>(0.90)     | -0.55116<br>(0.13) | 0.52224<br>(0.48)  | -0.05798<br>(0.55)     |
| Number of youth development nonprofits per 1,000 population                           | -1.01884<br>(0.04)    | -0.04832<br>(0.40) | -0.77946<br>(0.07) | -5.85342<br>(0.03)     | -1.16583<br>(0.21) | -4.00016<br>(0.04) | -0.45249<br>(0.07)     |
| Number of civil rights, social action, and advocacy nonprofits per 1,000 population   | -1.08820<br>(0.28)    | 0.01124<br>(0.92)  | -1.13428<br>(0.19) | -7.94649<br>(0.16)     | -1.77954<br>(0.35) | -5.13766<br>(0.19) | -0.84018<br>(0.10)     |
| Number of community improvement and capacity building nonprofits per 1,000 population | 0.23463<br>(0.19)     | 0.01151<br>(0.58)  | 0.19646<br>(0.21)  | 1.76364<br>(0.08)      | 0.35418<br>(0.30)  | 1.40404<br>(0.04)  | 0.05387<br>(0.55)      |
| Rho   | 0.53596<br>(0.00)     | 0.38398<br>(0.00)  | 0.52797<br>(0.00)  | 0.52800<br>(0.00)      | 0.48796<br>(0.00)  | 0.42697<br>(0.00)  | 0.51897<br>(0.00)      |
| R <sup>2</sup>  | 0.2106                | 0.2968             | 0.1914             | 0.2146                 | 0.275              | 0.1636             | 0.2160                 |
| Moran I-statistic   | 18.74                 | 11.84              | 18.15              | 15.69                  | 14.86              | 13.31              | 16.90                  |
| Marginal probability  | (0.00)                | (0.00)             | (0.00)             | (0.00)                 | (0.00)             | (0.00)             | (0.00)                 |

Marginal significance in parantheses (p-values).

collinearity-related problems remains debated in the econometric literature, there is general agreement that value of the index less than 30 implies no collinearity and value greater than 90 suggests that problems may be present. Given the range of control variables it is not surprising that several are highly correlated such as employment and population growth, some of the ethnic profiles and poverty, education and poverty, and the Gini coefficient of income equality and poverty. As discussed below the general stability of the results across the different specifications of the models suggests that the results are reasonable.

Consider first the change or growth variables that are widely used to proxy social disorganization and are of particular interest to the interplay between economic growth and development and crime patterns. In all types of crime, except for robberies, rural counties that are experiencing population growth also experience higher rates of crime. The same is true for growth in per capita income, except for motor vehicle thefts. These results are as expected and are consistent with the rural criminology literature and social disorganization theory.

Increases in the unemployment rate, however, tends to be associated with lower crime rates, except for robberies and burglaries where the negative coefficient is statistically insignificant. The unexpected result on unemployment can be explained by the work of Bausman and Goe (2004), who maintain that systemic or chronic unemployment is more important than temporary unemployment that may occur because of cycles in the national economy. Unfortunately, the measures of unemployment used in this study cannot capture systemic unemployment.<sup>12</sup>

The change in income equality, measured by the percent change in the Gini coefficient from 1989 to 1999, is statistically significant in only two categories of crime including robberies and burglaries. In both of these two categories an increase in the Gini coefficient, an indicator of widening income inequality, results in higher crime, which is as expected. The weak results for the change in income equality might be due to the timing of the available data at the county level; change over the 1990s may be too long of a lag to explain levels of crime in the mid-to-late 2000s.

The implications of these findings for rural economic growth and development policy are considerable. If a rural community pursues an aggressive economic growth and development policy the community must plan for and be prepared for increased pressure on criminal activity. If they do not and higher crime is a result, future economic growth and development efforts may be put at risk.

Population and population density in and of themselves do not appear to be particularly strong predictors of rural crime levels. Population is statistically significant in overall property crimes and in particular larcenies but in an inverse manner. All else held constant, simply being a larger rural county, as measured by

population, does not necessarily mean that crime rates will be higher, and indeed may be slightly lower in some cases. Population density, however, has the opposite effect than population; more densely populated rural counties is associated with higher levels of overall property crime, specifically larcenies. Population density does not appear to influence other types of crime in rural counties.

Per capita income has a strong dampening effect on all types of crime except for robberies where higher per capita income is associated with higher levels of crime. One could argue that this latter result is driven by criminals attracted to higher-income areas (i.e., higher “loot” potential from our above theoretical discussion), but one would expect the same result for burglaries which is not found. Despite the widely held perception that poverty is a primary determinant of crime, the results suggest that poverty in and of itself is not a driver of rural crime. Higher unemployment, however, is associated with higher levels of all types of crime except for robberies which is statistically insignificant. Unlike the findings concerning the change in unemployment discussed above, these results are more consistent with the predictions of theory. The Gini coefficient of income equality is statistically significant in only the robbery model and insignificant in all other types of crime. But the results are as expected; higher levels of income inequality will be associated with higher rates of robbery, and this result is consistent with the change in the Gini coefficient discussed above.

When the results for the economic level variables are compared with the change variables some interesting policy implications are revealed. The promotion of economic growth and development may in the long term place downward pressure on crime. This is consistent with the policy recommendations advanced by Donnermeyer and DeKeseredy (2008) and their critical criminology framework. This is evident by the negative association between income, income inequality, and unemployment on crime. The growth process, however, may lead to increased pressure on crime in rural counties. In other words, while higher levels of economic development will reduce crime, the growth process of moving to those higher levels will be associated with increased crime. As such, a comprehensive approach to rural economic development and growth much contain elements to minimum upward pressure on crime.

Some of the demographic variables, such as age profiles and ethnic profiles yield results that are not completely consistent with prior expectations. A higher share of the population that is aged 15–24 is generally viewed within the literature as a predictor of higher crime. This age group is more likely to be involved in “youthful indiscretion” such as petty vandalism and drug-related activity. The result for the rural U.S., however, suggests that the opposite may hold. For all seven categories of crime the estimated coefficient is negative and statistically



significant in five. Only in robberies is the coefficient strongly insignificant and for overall violent crime it is weakly insignificant. For all types of property crime the negative relationship is statistically significant. This strongly suggests that the “youth result” for urban-focused studies may not transfer to rural. The older the population, measured by the share of the population over the age of 65, tends not to be statistically linked to crime rates except for burglaries where there is a positive relationship. This latter result may indicate that households occupied by older persons may be more attractive to some criminals.

The ethnic-based variables also provide valuable insights into explaining rural crime patterns. The higher the share of the population within the rural county that is classified as African-American the higher the crime rate in all seven crime classifications. A similar pattern is found for the share of the county’s population that is classified as Native American where higher concentrations are statistically associated with higher crime in four of seven categories including all three violent crime categories. Although a smaller share of the rural population, a higher concentration of Asians does not appear to influence crime except for motor vehicle-related crimes where a higher share of Asians is associated with lower levels. A higher share of the population that is Hispanic does not appear to influence rural crime rates except for burglaries where there is a statistically significant positive relationship. This latter result is particularly important for many rural communities in the U.S. that have experienced significant in-migration of Hispanics, particularly in the rural Midwest. Based on social disorganization theory one would expect to find a growing Hispanic population to alter the social capital as well as social norms of the community, creating conflict and crime. While the simple measure used in this study does not reflect changes in the Hispanic population the result casts some doubt on a belief widely held in some rural communities that the growth in the Hispanic population is a concern.<sup>13</sup>

To further explore the ethnic diversity issue the percent of the population that is foreign born as well as the percent of the population that speaks non-English at home is also explored. For the former, the results suggest that a higher share of the rural population foreign born is statistically associated with higher levels of robberies, burglaries, and motor vehicle crime but not the remaining four categories of crime. This result is somewhat consistent with the theoretical construct and is as expected. But the opposite result with percent of the population that speaks non-English at home is uncovered. For this variable the estimated coefficients are consistently negative but statistically significant for only robberies, burglaries, and motor vehicle crime. While on face value these two sets of results appear to contradict each other, the inconsistency within the empirical ecological studies of crime discussed above provides some insights. As noted by others, what may

appear to be subtle differences in variable definitions can result in inconsistent findings. As noted by Chisholm and Choe (2004), subtle differences in definitions of income in rational choice-based empirical models can alter basic results. These types of inconsistencies point to the complexities of understanding rural crime patterns and reinforce the argument that broad generalizations about rural crime can be blatantly wrong and misdirect policy options.

Education level, measured as percent of the population over the age of 25 with at least a high school degree, is not a statistically significant predictor of rural crime. Although the negative coefficients are consistent with expectations, the lack of statistical significance leads us to conclude that in rural areas education plays a smaller role in explaining crime. Similar results are found with number of banks per 10,000 persons. Although the consistently negative coefficients are consistent with expectations, the lack of statistical significance leads us to conclude that the concentration of banks, a simple measure of wealth, does not influence rural crime patterns. The percent of persons living in the same home between 1995 and 2000, a measure of residential stability, is generally not statistically significant. It may be the case, as with the change in income equality metric discussed above, that the lag time of this measure of stability may be inappropriate. Given that both the residential stability and Gini coefficients are available only with the decennial census these are the most current accessible data.

Adjacency to a metropolitan county is statistically significant in six of the seven categories of crime examined in this study. Proximity to a metropolitan county appears to not influence robberies but has a positive impact on all other types of crimes. This positive relationship can be explained in two ways. First, there could be spatial spillover from the metro to the nonmetro (i.e., rural) counties. It is clear from the spatial dependency results discussed above that counties are influenced by their neighbors and from the adjacency result rural counties are particularly influenced by their proximity to urban counties. As noted by Goetz et al. (2010) the county is a somewhat arbitrary unit of observation, and county boundaries do not necessarily reflect the relevant socio-economic region.<sup>14</sup> Second, some of the fastest-growing rural counties are those that are adjacent to metropolitan areas. Given social disorganization theory we would expect to find higher crime rates in adjacent rural counties.

***Social capital results.*** The central focus of this study is the examination of how different measures of social capital influence rural crime rates. In this study there are four blocks of different types of social capital, all measured as the number of establishments per 1,000 persons. The data include number of firms by type of services associated with social capital (Table 3), churches by congregation type (Table 4), cooperatives by type (Table 5), and nonprofits that are currently

activity by type (Table 6). First consider the overall contribution of each set of social capital variables then the performance of each individual measure in explaining crime rates. Space prohibits a detailed discussion of changes in the control variables across the different social capital models, but in general there are no radical changes in the overall results of the controls that warrant discussion.

To test for the overall contribution of each set of social capital variables a simple F statistic is computed where the null hypothesis states that the addition of the specific block of social capital variables does not add to our understanding of rural crime patterns. The test results are presented in Table 2, and each of the four blocks of social capital variables is statistically significant in explaining at least one category of crime. The block based on CBPs' firm count data is statistically significant for six of the seven categories of crime. Social capital measured by this block of variables is statistically insignificant in only the robbery rate. Social capital proxied by the block of religious congregations is statistically significant in helping explain robbery and burglary rates but is insignificant in the remaining five categories of crime. The presence of cooperatives is weakly significant in helping to understand motor vehicle crimes, but none of the other six crime categories. The block of nonprofits is significant in explaining overall property crime, burglaries, and larceny but none of the violent crime categories or motor vehicle crimes. One can conclude here that social capital, proxied by the four blocks of variables used in this study, does influence crime patterns but in a complex way: the influence varies by the type of social capital proxy as well as by the type of crime being examined. As with the observations on the ethnic control variables above, one cannot make broad generalized statements that social capital either does or does not influence rural crime. Now consider the individual components within each separate block of social capital measures.

The first block of social capital measures, drawn from CBPs, includes a range of firms such as artisan and cultural services, sports and recreational firms to civic and social organization firms (Table 3). Of the 56 combinations (eight types of businesses by seven categories of crime) 13 are statistically significant at or above the 10 percent level of significance, and these are tied to four specific types of businesses including artisans and cultural; business, professional, and labor associations; civic and social organizations; and barber and beauty shops. It is worth noting that within this block of 56 coefficients nearly all have the expected negative sign despite the vast majority being statistically insignificant.

The only firm type that has consistently positive coefficients is the number of artisans and cultural firms per 1,000 persons. Here more artisans and cultural firms are associated with higher levels of all forms of property crime but is statistically insignificant with respect to violent crimes. This result is opposite of

what is expected, and given the simplicity of the metric, it is difficult to speculate as to what is driving this result. This result needs further examination beyond what can be provided in this particular study. Because many rural communities are looking to the arts and cultural-based businesses as part of their economic growth and development strategies, this finding may have important implications: if rural communities are successful in developing such an economic base, higher levels of property crime may be a by-product.

A higher number business, professional, and labor associations per 1,000 persons has a dampening effect on overall property crime rates, and in particular larceny and motor vehicle crimes, but has no statistically significant influence on violent crime. Similarly, a higher concentration of civic and social organizations is associated with lower rates of burglaries and weakly with lower levels of violent crimes and assaults. A higher concentration of barber and beauty shops has a negative impact on the overall violent crime rate, specifically assaults, as well as motor vehicle crimes, but not other types of property crime. All three of these types of businesses or organizations reflect gathering places where people come together, hence building higher levels of density of acquaintance and social capital.

Youth and family services, sports and recreational-focused firms, food banks, and temporary shelters are not statistically tied to crime rates. These latter findings may not be surprising as youth-family services, food banks, and shelters are generally associated with services offered to low-income persons. But the consistently negative, albeit statistically insignificant, coefficients lend some evidence to the notion that communities that are likely to invest and support these types of services have higher levels of social capital.

In terms of the results on religion (Table 4) there is very little evidence that a higher concentration of churches and/or synagogues has a negative influence on crime through a social capital lens. Given the 28 possible combinations (four types of religions and seven crime categories) only four are statistically significant. A higher concentration of evangelical congregations is associated with lower rate of robberies, but no other type of crime, and a higher concentration of Jewish synagogues is also associated with lower robbery rates as well as lower rates of burglary but not other types of crime. Concentration of Catholic churches has no influence on any types of crime, and the general "other" category of religious congregations is tied to higher levels of burglaries but no other categories of crime. Consistent with the *F*-tests on religious organizations as a block (Table 2), a higher concentration of religious congregations does not influence overall violent or property crime rates, assaults, larceny, or motor vehicle crime rates. Given the work of Smidt (2003) and Lee and Bartkowski (2004), among others,

the lack of findings here is somewhat surprising. It may be that the simple metric of counting the number of congregations is not sufficient to reflect the size of the congregations or the level of community involvement.

In terms of the role of cooperatives, the one unique proxy measure of social capital used in this study, in helping explain rural crime there is very weak statistical evidence. From the *F*-tests (Table 2) cooperatives as a group of social capital proxy measures do not improve the statistical performance of the base model in six of seven categories of crime. Only in the case of motor vehicle crimes do the presence of cooperatives matter. When examining the individual coefficients for each type of cooperative across the different types of crime observed nearly all of the estimate coefficients are negative as expected. This lends some evidence to the argument that cooperatives offer a unique manner in which to think about social capital. But somewhat consistent with Stofferahn (2009), of the 28 individual coefficients only 3 are statistically significant at or above the 10 percent level of confidence. Here the number of child-care cooperatives per 1,000 persons is associated with lower levels of motor vehicle crimes, and the concentration of educational cooperatives is tied to lower levels of the overall property crime rate and specifically larceny crimes. While one cannot draw strong conclusions concerning cooperatives as a proxy for social capital and its role in rural crime, the introduction of this new data set opens the door to further analysis.

The final block of social capital measures, the number of active nonprofits across 10 different service types, performed reasonably well, particularly with respect to different types of property crimes (Tables 2 and 6). Before proceeding with a discussion of the results it is important to note that there is significant overlap in the firm count data from CBPs and the nonprofit data collected and reported by the National Center for Charitable Statistics. If the nonprofit has paid employees they will also appear in the CBPs data. As noted above, the two classification schemes do not overlap perfectly, but for some of our groupings, there is significant overlap. Of the 70 individual estimated coefficients, 21 are statistically significant at or above the 10 percent threshold. Of the 10 types of nonprofits examined, 3 do not influence any category of crime: educational nonprofits, human services nonprofits, and sports and recreational nonprofits. The lack of statistical significance for the sports and recreational nonprofits is consistent with the lack of findings with sports and recreational organizations from the CBPs. It appears that in rural areas, these types of organizations do not provide the same type of social capital building capacity as perhaps in urban areas. Because so many of these types of organizations are aimed at youth, these results are also consistent with the finding on the share of the population that is aged 15–24. The findings on educational nonprofits are also consistent with the findings for

educational cooperatives. For the latter educational cooperative had a dampening effect on overall property crime rates and larceny in particular, and for nonprofits the coefficients are negative although not significant.

Given the statistically significant coefficients there is evidence that different types of nonprofits have both negative and positive impacts on rural crime rates. Consistent with the artisans and cultural results from the CBPs data, a higher concentration of arts, culture, and humanities nonprofits has a positive influence on overall property crime and specifically larceny and motor vehicle crimes. Although each of the coefficients on the other categories of crime are positive, they are not statistically significant. The positive coefficients are not as expected (although the art cooperatives are negative but insignificant), and the role of the arts in rural crime needs further exploration, particularly for rural communities that seek to promote economic growth and development along the arts.

The number of environmentally focused nonprofits and community improvement and capacity building nonprofits tend to be positively associated with certain types of crime. Environmental nonprofits have a positive and statistically significant association with five of the seven categories of crime. It is not clear why this pattern is present in the data, and the relationship would need to be further explored before specific policy recommendations could be advanced. The concentration of community improvement and capacity building nonprofits is positively associated with overall property crime rates and larceny and again not as expected. Unlike environmental cooperatives, there may be a causation issue here with respect to these types of nonprofits. It may be that these types of nonprofits, community improvement, and capacity building are more likely to be in communities that struggle with crime.

Nonprofits that classify themselves as public and social benefit-focused organizations, along with youth development nonprofits, have a strong dampening effect on many different types of crime. Public and social benefit nonprofits (these would include community foundations and voluntarism promotion organizations, among others) have a strong dampening impact on all types of crime except robberies and motor vehicle thefts, and youth development nonprofits have a strong negative impact on all types of crime except robbery and burglary. Note that this latter result does not contradict the results based on the CBPs data because in those results (Table 3) youth services are combined with family services. Here the different classification schemes between the CBPs and the National Center for Charitable Statistics does not allow for a direct comparison between the two sets of results. Finally, a higher concentration of civil rights, social action, and advocacy nonprofits appears to have a dampening effect on most types of crime but is only statistically significant with respect to motor vehicles.

The results for social capital are encouraging. As predicted by the theory, certain elements of social capital have a strong negative association with rural crime rates. But great care must be taken with respect to how to think about and measure social capital and/or proxies of social disorganization theory. While the results of this study suggest that higher levels of social capital have a dampening effect on rural crime, it depends on how one measures social capital. Following the approach outlined in Rupasingha, Goetz, and Freshwater (2006), Rupasingha and Goetz (2007), and Goetz and Rupasingha (2006), one can indeed develop reasonable proxies of social capital with widely available secondary data. This research strongly suggests that there is as much art in constructing the measures of social capital as there is science.

### **Conclusions**

This study has attempted to move our thinking about rural crime forward on several fronts. First, the work adds to a modest empirical literature that seeks to better understand the drivers of rural crime. Second, the work focuses attention on the role of social capital on rural crime. Third, the work broadens our thinking about what social capital is and is not in light of rural crime and how to develop empirical measures. Fourth, the study sheds light on a range of potential policy options that rural communities could pursue to reduce crime in the name of community and economic growth and development.

But why should those who are worried about rural growth and development policy be concerned with rural crime? First, crime is generally considered a disamenity that can create barriers to economic growth and development. Second, social disorganization theory, along with the formulation of a social capital augmented rational choice model, suggests that the changes within the community that come with economic growth and development will create an environment that is conducive to more crime. The empirical findings confirm what other studies of rural crime have found: the process of growth and the community change associated with that growth are a major determinant of rural crime patterns. Rural economic growth and development and rural crime patterns are two sides to the same coin, and they have a strong feedback on each other. Donnermeyer and DeKeseredy's (2008) critical criminology framework helps us to think about how rural policies should be crafted. To pursue economic growth and development without an eye to crime will result in changes the community will reject. Community leaders need to think about who within the community is the target of the economic growth and development policies. Will all people within the community be able to benefit from the economic growth and development policies? Is there a segment of the local



population that will be precluded from benefiting from economic growth and development?

But from a policy perspective, what can rural community do to minimize the impact of economic growth and development activities on the possibility of increased crime? While the research finds that social capital matters both theoretically and empirically, policy options are much more subtle. There is strong evidence that a higher concentration of organizations that allow for networking, such as professional, business, and labor organizations (e.g., chambers of commerce and labor unions), as well as civic, social, and community benefit-focused organizations (e.g., community foundations, fraternal organizations, and alumni associations), is associated with lower rural crime rates. At the same time a higher concentration of other types of organizations, such as those promoting the arts (e.g., arts councils and performing arts groups), are actually associated with higher levels of rural crime. Based on this latter result it would be an error to suggest that rural communities should not pursue the arts and cultural activities; our results suggest that care must be taken. Here, rather than assuming that all such organizations contribute to social capital in the same way, greater care must be taken in terms of what specific types of services these organizations are providing.

The results presented here support Reising and Cancino (2004), who argue that social capital is too broad of a concept with respect to crime and should be more focused on notions of collective value or social norms. Highly organized and effective criminal enterprises could be described as having high levels of social capital. Wojan, McGranahan, and Lambert (2009) make a distinction between civic capacity and social capital. Consider a local chamber of commerce that can provide a range of services to its membership from networking to educational opportunities to avenues for engagement in local governance. Some chambers of commerce are little more than social organizations that offer networking opportunities. Other chambers of commerce provide leadership in economic growth and development initiatives at the community level. Some chambers of commerce even organize and run neighborhood watch programs specifically aimed at reducing criminal activity in business areas. Clearly not all chambers of commerce are created equally.

With respect to rural crime, the research finds that social capital matters, but to move to policy one must think more deeply. What does social capital mean as a deterrent to crime? Does it mean networking opportunities and density of acquaintance, or does it involve notions of civic capacity and civic engagement? Simply having a chamber of commerce or fraternal organizations or religious-based social organizations is not sufficient to deter rural crime. In essence, social



capital is necessary but not sufficient to deter crime. By examining why social capital is not sufficient we are beginning to remove the layers of a very complex problem.

### NOTES

1. Although there are numerous definitions of rural, for this study rural is defined as nonmetropolitan. In this *Special Issue* Goetz et al. (2010) find that because of dynamic commuting patterns the distinction between rural and urban or metropolitan and nonmetropolitan is becoming increasingly arbitrary.
2. The National Deviance Conference was a multiyear (1968–1975) effort by British criminologists to critically re-evaluate the way in which criminology was being taught in Europe and the Americas. Although a casual reading of this literature might lead one to equate critical criminologist with Marxism, the group was a reflection of the political-cultural thinking of the time. One could almost argue that critical criminology takes an institutional approach, focusing attention on criminal justice institutions such as the war on drugs.
3. This is an explicit statement of the old adage “it’s not what you know but who you know.”
4. An interesting problem here is the difference between a “smart” and “dumb” criminal. It is possible for a potential criminal to have high levels of human capital (i.e., a “smart” criminal) yet still elect to commit crime.
5. Lederman, Loayza, and Menéndez (2002) develop a slightly different version of social capital. They suggest that social capital is not only a function of sympathy but also the level of connection or social distance between the individuals. Their formulation of (8) is  $sk_i = g_{ij}(d_{ij}, r_{ij}) + g_{iz}(d_{iz}, r_{iz})$ , where  $d_{ij}$  measures the social distance between individuals  $i$  and  $j$  and  $sk$  is a decreasing function of distance ( $d$ ) and an increasing function of ( $r$ ). In their development of the theoretical approach they assume  $\Delta d$  to be zero, hence removing it from further consideration. To simplify our presentation we assume  $r$  captures all elements of social capital including social distance. Such an assumption does not distract from the final results.
6. See Lott and Whitley (2003) for a detailed discussion of problems with the county-level UCR data.
7. This is a central theme of the critical criminology literature that draws attention to institutional problems within the criminal justice system. Also, from anomie/strain and social disorganization theory, if people feel marginalized within their community they will be less likely to turn to the community for help, such as when a crime is committed.
8. In his 2006 Johan Skytte Prize Lecture Putnam (2007) commends the work of Rupasingha and his colleagues in their approach and resulting measures.
9. Lee and Bartkowski (2004) make a morality argument in their analysis of churches and rural crime patterns. In essence, the presences of a high concentration of religious organizations will influence moral thresholds outlined in equation (6). This may be true, but we are more interested in religious organizations building social networks and integration or density of acquaintance and providing a vehicle for citizen engagement.
10. Details of the project can be viewed at <http://reic.uwcc.wisc.edu/>
11. A common practice in the ecological studies of crime is to build an ethnic diversity index using an entropy-type measure. We elect to separate the ethnic profiles because of the wide perception that rural communities are becoming more ethnically diverse and this is driving rural crime. This is widely experienced through the in-migration of Hispanics, Asians, and other minorities. By

staying with simple ethnic profiles better insights can be gained into some of these widely held perceptions.

12. Another dimension that is generally not considered in the rural crime literature is the difference between unemployment and underemployment or even the rate of people who have left the workforce out of frustration. Caution should be taken when considering this result in a policy setting.
13. It is important to note that these data do not include undocumented workers which in some rural communities can be relatively large. There is, however, some antidotal evidence that undocumented workers tend to avoid criminal activities because of their legal status; undocumented workers do not want to draw the attention of law enforcement to themselves.
14. In many states the location of county boundaries and the county seat, the physical home of county government, were determined on a simple principal: people must be able to travel from their home to the county seat, conduct their business, and return home in one day. At the time, the mode of transportation was by horse. In today's economy, it becomes clear that county boundaries can be seen as arbitrary. But given the structure of county government and data reporting the county is the best unit of observation available.

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