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Crime is the Problem: Homicide, Acquisitive Crime, and Economic Conditions

Richard Rosenfeld

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Abstract A question that emerges from recent research on the relationship between economic conditions and street crimes committed for monetary gain concerns the effect of changing economic conditions on violent crime. I propose that the economy stimulates violent crime indirectly through its effect on acquisitive crime. This hypothesis is evaluated in fixed-effects panel models of change in acquisitive crime and homicide rates between 1970 and 2006. The analysis indicates that collective perceptions of economic conditions have a significant effect on an index of acquisitive crime and an indirect effect, through acquisitive crime, on homicide. Consistent with this result, the effect of collective economic perceptions is stronger for felony than argument-related homicides. A promising focus for future research is the role of underground markets in the production of both property and violent crime.

Keywords Homicide · Property crime · Economy · Underground markets

> Nothing is lost, nothing is created, everything is transformed.
>
> Antoine Lavoisier[1]

Following a long trail of mixed and inconclusive results, recent research on the relationship between macroeconomic conditions and crime is beginning to produce a consistent story line: Temporal change in crime rates is associated with swings in the business cycle. Crime rates rise during economic downturns and fall with improvements in the economy. An important reason for the more consistent results in recent studies appears to be the use of economic indicators other than the unemployment rate, which dominated the earlier research. Indicators measuring total economic output and collective perceptions of economic conditions yield stronger effects on crime rates than does unemployment in studies

[1] Quoted in Saviano (2007: 15).

R. Rosenfeld (✉)
University of Missouri-St. Louis, St. Louis, MO, USA
e-mail: richard_rosenfeld@umsl.edu

comparing alternative measures of economic change (Arvanites and Defina 2006; Rosenfeld and Fornango 2007).

The recent research on the economy and crime either focuses on property crime exclusively or concludes that economic conditions have no effect on violent crimes other than robbery. But it would be incorrect or at least premature to conclude that violent crime and economic conditions are unrelated, if economic conditions affect criminal violence through their impact on property crime.

The current study investigates the impact of the economy on temporal change in homicide. I hypothesize that economic conditions influence homicide rates through their effect on the "acquisitive" crimes of robbery, burglary, and motor vehicle theft. Good theoretical reasons exist for positing a direct effect of acquisitive crime on homicide. Routine activity and opportunity theories predict increases in violence as more persons adopt "risky" criminal lifestyles (Cohen and Felson 1979; Felson 2002). Pure sociology predicts that violence will be used to enforce social control by persons, such as criminals, with limited access to lawful means for resolving disputes (Black 1976, 1983). These perspectives imply a *causal* relationship between acquisitive crime and homicide and, as such, are at odds with influential statements which hold that property and violent crime are spuriously associated (Gottfredson and Hirschi 1990) or wholly unrelated (Zimring and Hawkins 1997).

In sum, this paper extends recent research on the economy and property crime trends to explain temporal change in homicide. I argue that economic downturns spur increases acquisitive crime. Increases in acquisitive crime, in turn, produce increases in homicide by exposing more people to the risks of criminal lifestyles and to situations in which non-violent means of resolving disputes are unavailable. I evaluate the empirical implications of these arguments in panel models of regional crime rates in the US between 1970 and 2006.

Background

Extensive research on the relationship between the economy and crime has produced mixed, conflicting, or null results (see Fielding et al. 2000, for an excellent review). A half century ago, a research review concluded that "the general relations of economic conditions and criminality are so indefinite that no clear or definite conclusions can be drawn" (Vold 1958: 181). For a time Cantor and Land's (1985) study of the "motivation" and "opportunity" effects of unemployment on crime trends offered hope of new insights regarding the economy-crime connection, but substantive and methodological criticisms soon surfaced (Hale and Sabbagh 1991). By the turn of the century, debate over measurement and modeling issues had returned in full force (Greenberg 2001; Cantor and Land 2001).[2]

Given this grim history, caution must be exercised in heralding a new chapter in research on the economy and crime. Nevertheless, recent research based on indicators other than the unemployment rate has begun to produce consistent results regarding the impact of economic conditions on crime trends. Several studies reveal robust relationships between crime rates and wages, GDP, and collective perceptions of economic conditions (Arvanites and Defina 2006; Gould et al. 2002; Grogger 1998; Rosenfeld and Fornango 2007).

[2] An entire issue of the Journal of Quantitative Criminology in 2001 (vol 17, issue number 4) was devoted to Cantor and Land's research on temporal change in unemployment and crime rates.

Although some studies also find significant effects of unemployment rates on crime (e.g., Raphael and Winter-Ebmer 2001), studies comparing the effects of unemployment with those of alternative economic indicators either find weaker or less consistent unemployment effects (Gould et al. 2002; Rosenfeld and Fornango 2007) or no effects (Arvanites and Defina 2006).

One reason for the more consistent findings from the recent research is the use of alternative indicators of economic conditions. The unemployment rate is a comparatively narrow measure of economic activity and cannot reveal how changing economic conditions affect individual or collective *perceptions* of current or anticipated conditions (Greenberg 2001; Rosenfeld and Fornango 2007). Yet, economic and sociological theories maintain that economic change affects crime by altering persons' views of the relative costs and benefits of criminal and lawful behavior (Becker 1968; Merton 1938; Pyle 2000).[3] Of course, the unemployment rate is no different than wages, GDP, or other "objective" economic indicators in not disclosing the subjective experience of economic change. Prior research has shown that a measure of "consumer sentiment," which does provide such information, exhibits stronger and more robust effects on robbery and property crime rates than either the unemployment rate or GDP (Rosenfeld and Fornango 2007).

If the recent research tells a more consistent story regarding the impact of economic change on crime rates, it shares with the earlier studies of unemployment and crime a selective focus on property crime, or it finds no effect of economic conditions on violent crimes other than robbery. This is a good news, bad news story. The good news is that the economic indicators display reassuring discriminant validity by affecting temporal change in only those crimes with a manifest economic motivation. The bad news is that the research literature implies that economic conditions have little or no effect on violent crime. Such a conclusion would be incorrect if economic conditions influenced violent crime indirectly, that is, through their effect on property crimes.

The Relationship Between Property and Violent Crime

Influential arguments in contemporary criminology consider the relationship between property and violent crime to be spurious—the product of antecedent factors related to both—or nonexistent. Gottfredson and Hirschi (1990) maintain that criminal behavior of all kinds results from low self control. Individual criminals generally do not specialize in one type of offense to the exclusion of others but, opportunities permitting, will engage in all manner of acts of force and fraud in pursuit of fun or profit. At the macro level of analysis, LaFree (1998) observes that property and violent crime rates track one another closely over time and he explains the joint trend as resulting from corresponding changes in institutional legitimacy. When basic social institutions (the family, economy, and political system) are in crisis, as during the 1960s and 1970s in the US, both property and violent crimes turn up; when these institutions regain legitimacy or other institutions (criminal justice, education) are strengthened, crime rates fall. Both the individual- and macro-level arguments can explain why property and violent crime rates move together

[3] The sociological theories augment the standard economic account by proposing that individual cost-benefit calculations are subject to cultural and social constraints. Additionally, not all sociological theories hold that criminal behavior is preceded by perceptual change (see Rosenfeld and Fornango 2007: 509).

over time, but neither emphasizes or even acknowledges the possibility of a *causal* connection between the trends.

Zimring and Hawkins (1997) reject any connection, spurious or causal, between property and violent crime, specifically homicide. Drawing mainly from cross-national comparisons, they argue that the US stands apart from other developed industrial nations only in its high rate of lethal violence, which they attribute primarily to the greater availability of firearms and their use in violent crime. As for time trends in the US, whereas LaFree (1998) sees a common trend in property and violent crime rates, Zimring and Hawkins see divergence.

By attributing violent crime to the same goal frustrations, aversive stimuli, or weakened social bonds that give rise to property crime, strain and social control theories in criminology also imply that violent and property crime are spuriously associated. But other perspectives suggest that violent crime should track the trend in property crime because involvement in property crime exposes offenders to dangerous persons and situations. Criminal activity typically occurs during the evening hours, away from the home, and in the company of likeminded others, especially among youthful offenders. These activity patterns and associated proximity to offenders raise the probability of violent victimization (Hindelang et al. 1978). Violent crime may result directly from property crime, as when a burglar assaults a homeowner who interrupts his plans.[4] Co-offenders assault and rob one another; criminals sometimes attack or intimidate witnesses, suspected "snitches," or others with incriminating information. In these and other ways, violent crime "feeds off" property crime (Felson 2002: 105–119).

Prior research indicates that involvement in property crime is in fact an important risk factor for violent victimization, including homicide. Dobrin (2001) finds that individuals who have been arrested for property crimes are significantly more likely than others to become the victim of a homicide, controlling for age, race, sex, and local socioeconomic conditions. Not surprisingly, prior involvement in violent crime also increases the chances of being killed, but the homicide victimization risks associated with property and violent offending are roughly equal.

The plausibility of assuming a causal connection between acquisitive crime and homicide rests in part on the huge disparity in the incidence of these offenses. For example, in 2000 the Uniform Crime Reports (UCR) recorded a combined total of ~3.6 million robberies, burglaries, and motor vehicle thefts in the US (computed from offense counts in http://www.fbi.gov/ucr/00cius.htm). The UCR recorded 15,517 homicides during the same year, or one homicide for every 234 acquisitive crimes. If only .02% of acquisitive crimes result in a homicide, they would have accounted for 720 homicides in 2000 or about 4.6% of the total. That is roughly equal to the annual percentage decrease in homicides between 1993 and 2000, the period of the crime decline. If robberies, burglaries, and motor vehicle thefts not reported to the police are counted, the disparity between acquisitive crime and homicide grows and the fraction of acquisitive crimes that would have produced 4–5% of the homicides in 2000 becomes even smaller.[5] It takes a very small proportion of

[4] For example, "A man with a record for attempted burglary and receiving stolen property was charged Thursday with shooting an off-duty city firefighter who interrupted intruders in his home the day before" (Ratcliffe 2009).

[5] The National Crime Victimization Survey estimated that roughly 5.2 million robberies, burglaries, and motor vehicle thefts occurred in 2000, a ratio of 338 acquisitive crimes for each homicide (Rennison 2001). If .014% of these victimizations resulted in a homicide, they would have accounted for 4.6% of the homicides in 2000.

acquisitive crimes, in other words, to generate a sizable proportion of the homicides committed in a given year.

The spuriousness hypothesis notwithstanding, then, both theory and evidence provide a basis for inferring a causal link between property and violent crime. In addition, a key reason property offending leads to violence is that it occurs in "stateless" social spaces where formal means of resolving disputes are generally unavailable. Underground markets constitute the principal stateless location in which property and violent crime come together.

Violence in Underground Markets

Robbers, burglars, and thieves must trade or sell the non-cash spoils of their crimes that they do not consume themselves. Markets for stolen goods and for goods and services that cannot be purchased legally, such as illicit drugs and prostitution, are widespread in both developed and developing societies (Portes et al. 1989).[6] They are utterly pervasive in economically depressed areas of large cities. A vivid descriptive literature exists on the underground or "shady" economies of American inner cities (Drake and Cayton 1945; Valentine 1978; Venkatesh 2006; Wacquant 1998). These studies are particularly salient for understanding the role of underground markets in the generation of violent crime: Illegal markets are subject to little formal regulation, prompting the use of violence as a means of social control.

In the absence of authoritative and effective rules, procedures, and agents for resolving interpersonal disputes, violence is likely to be used by disputants as a means of social control (Black 1976, 1983, 1998; Tedeschi and Felson 1994). Such violence, which Black (1983) has aptly termed "self help," may be deployed in self-defense, to enforce agreements, to eliminate rivals, to uphold honor, to save face, as a warning, as a preemptory strike, or to punish wrongdoing. This perspective on interpersonal violence has been used to explain the historical decline of homicide rates as the state gained an effective monopoly over the means of violence in Western societies (Eisner 2001; Elias 1994 [1939]; Gurr 1989). It also has been invoked to explain the "systemic" violence in illegal drug markets, especially the crack cocaine markets that emerged in American cities during the 1980s (Baumer et al. 1998; Blumstein 1995; Goldstein 1989; Ousey and Lee 2002).

The application of self help to illicit drug markets is straightforward: Given the illegal nature of the transactions, buyers and sellers cannot as a rule turn to regulatory agencies, the police, or courts to enforce agreements or settle disputes over price, purity, quantity, and other terms of exchange. They must settle matters informally, and the willing and effective use of violence is a powerful enforcement mechanism. Moreover, the legal vulnerability of drug sellers and buyers makes them attractive targets for street robbers, one of whom told a researcher that robbing crack dealers is like "taking stick candy from a baby" (Jacobs 1999: 76; see, also, Jacobs 2000). Finally, the "stateless" character of drug markets is heavily one-sided: participants have limited access to law for settling disputes or protection, yet they are engaged in activity carrying severe legal penalties. This, too,

[6] The term "underground market" encompasses a broad range of undocumented economic activities, many of which do not entail serious law violations, such as failing to report small amounts of taxable income. I use the term in a more restricted sense in this paper to refer to the marketing of illegal products and selling and receiving stolen goods.

increases the risk for violence by strengthening the incentives for snitching and further endangering suspected snitches (Rosenfeld et al. 2003).

The same principles apply to any underground market, including markets for stolen goods. An ethnographer observes that "a purchaser of stolen goods may haggle with the seller, but no court would adjudicate the transaction" (Venkatesh 2006: 175). The absence of compelling regulatory mechanisms and legal recourse in underground markets attracts both moralistic and predatory violence, the former to enforce "justice" in exchange relations and the latter in response to the legal vulnerability of market participants and the cash and property they possess. When street traders compete with one another for choice business space, "disagreements and conflicts inevitably ensue… there is also harassment by other traders and customers for which courts and police do not provide recourse" (Venkatesh 2006: 171–172). Street transactions are ruled by mistrust, and the "hustler" continually faces the "choice between duping and being duped, killing or being killed" (Wacquant 1998: 13).

One difference between illicit drug markets and markets for stolen goods involves the severity of the legal sanctions attached to market transactions. The manufacture, distribution, and sale of illegal drugs carry heavier penalties, especially after the sentencing reforms of the past two decades, than selling and receiving stolen property or theft, except for theft accompanied by force in robbery. That likely is one reason for the elevated levels of violence in drug markets, but it also is an object lesson for policies that would toughen sanctions for property crime.

Underground Markets and Acquisitive Crime

Underground markets, then, are fertile social settings for violence. But they also are intrinsic to the commission of property crimes and robbery. The existing literature does not precisely specify the social or economic linkages between changing economic conditions and property crime. But prior research has shown that underground markets, particularly the market for stolen goods, offer important incentives for committing property crime and outlets for the proceeds (Sutton 1995, 1998).

The assumption that criminal offenders respond to incentives is a staple of the economic approach to the study of crime (Becker 1968; Ehrlich 1973; Fielding et al. 2000). Abundant anecdotal evidence supports it. Thefts of copper pipe and wire have increased with the rising price of copper in recent years (Johnson 2007; Rondeaux and Morse 2007). Breweries report that they lose about 300,000 beer kegs a year to thieves motivated by the soaring price of scrap metal on the world market (Fredrix 2007). Even street criminals whose primary motivation is to get high and "keep the party going" are somewhat sensitive to price (Wright and Decker 1997). Street robbers and burglars prize cell phones, digital music players, car stereos, laptops, and other popular electronic items, especially before the market clears and their retail prices begin to fall. All else equal, market prices determine the returns to acquisitive crime.

Underground markets thrive among consumers who cannot afford or are unwilling to pay the lowest prices available to them on the formal market, which explains why underground markets are especially prevalent in low-income communities (Felson 2002: 74–76; Sullivan 1989: 128–129). Underground markets offer goods and services available on the formal market, and then some. Were a catalog available, it would include food, clothing, cleaning supplies, kitchenware, furniture, electronic equipment, pens and paper, hairstyling and hair-care products, refrigerators, balloons, cologne, cigarettes,

liquor, illicit drugs, jewelry, counseling and psychic services, pirated movies, social security cards, state ID cards, firearms, knives, and ammunition (Venkatesh 2006; Wacquant 1998).

The descriptive literature offers a vivid but somewhat static portrait of the size, functions, and operation of the underground economy. We learn that underground markets are omnipresent in disadvantaged urban areas, that poor households depend on them for income, goods and services, and that they are symbiotically integrated with the lowest layers of the legitimate employment and product markets (Venkatesh 2006: 94, 281, 317–318, 370). But we know little about how they change over time or how those changes are related to broader economic conditions and shape incentives for the acquisitive crimes that feed them.[7] If consumers rely for goods, services, and income on underground sources because they have been priced out of the formal economy, we should expect underground demand to rise with current or anticipated increases in unemployment and reductions in income. This assumption is consistent with evidence that low-income consumers are more likely than others to be offered stolen goods for purchase (Cromwell and McElrath 1994) and with the phenomenon of "trading down" in legitimate consumer markets (Silverstein and Butman 2006). The bottom end of the mass retail market tends to expand and the middle shrinks during economic downturns as consumers trade down in search of lower prices. Trading down benefits large one-stop discount chains such as Wal-Mart and Costco (Burke 2008).

But where do consumers who can no longer afford Wal-Mart's prices trade down? Many turn to the commercial demimonde of rent-to-own outlets, thrift stores, pawnshops, and "dollar" stores that ring low-income neighborhoods. Sales at thrift stores operated by Goodwill Industries and the Salvation Army increased substantially during the economic slowdown in 2008. The manager of a Salvation Army outlet, where sales increased 12% in 2008, said some customers had told him: "I just cannot afford even Wal-Mart or Kmart or discount stores right now" (Rosenbloom 2008: C1). By the same logic, during economic downturns some consumers turn to underground markets supplied by purveyors of stolen goods.

As demand in the underground markets increases rates of property crime and robbery should rise accordingly. The goods must come from somewhere and must be sold at a steep discount from current retail prices to attract low-income consumers. Even so, the real price of products on the underground market should rise and fall in relation to changing consumer demand. As demand grows, so should the returns to acquisitive crime and, as economic theory holds, rising returns should stimulate more crime (Ehrlich 1973).

Hypotheses

I have argued that the dynamics of markets for stolen goods explain: (1) the relationship between changing economic conditions and rates of acquisitive crime; and (2) the relationship between acquisitive and violent crime. When economic conditions worsen, demand for stolen goods expands, and rates of acquisitive crime increase. When conditions

[7] Little has changed since the President's Commission on Law Enforcement and Administration of Justice wrote in 1967: "More information is needed about the nature of the market for illicit goods and the extent to which the demand for various types of goods affects the incidence of theft. More should be learned about the relationship of legitimate and illegitimate markets" (quoted in Klockars 1974: 1).

improve, demand for stolen goods shrinks, and acquisitive crime drops. Changes in acquisitive crime produce corresponding changes in violent crime because underground markets, subject to little formal regulation or legal protection, attract predatory violence and moralistic violence as a substitute form of social control. Therefore, we should expect to observe a direct, negative relationship between temporal change in economic conditions, especially as measured by collective perceptions, and rates of acquisitive crime. Second, we should observe a direct, positive relationship between temporal change in rates of acquisitive and violent crime. Third, any observed relationship between violent crime and economic conditions should be fully or substantially mediated by acquisitive crime. Economic change, in other words, should influence violent crime indirectly, through its effect on acquisitive crime. I test these hypotheses with time-series data on homicide, property crimes and robbery, several measures of economic conditions, and other predictors for the four US census regions between 1970 and 2006, a period of major swings in US crime rates.

Data and Methods

Although the hypotheses under examination specify effects of acquisitive crime on "violent" crime, the empirical analysis is limited to the offense of criminal homicide, the most serious and best measured violent offense compiled in the UCR. Additional analyses are conducted on felony and argument-related homicides with data from the Supplementary Homicide Reports (SHR; Fox and Swatt 2008). Felony homicides include killings associated with robbery, burglary, motor vehicle theft, and other serious felonies, plus gambling, drug, and commercialized vice offenses. The inclusion of drug-related homicides in the felony category captures changes in lethal violence associated with the illicit drug trade (Blumstein 1995). Argument homicides include those connected with alcohol- and drug-related brawls and other arguments.[8]

Given its strong economic motivation, robbery is included among the "acquisitive crimes" in the analysis. The other two UCR violent offenses, rape and aggravated assault, are omitted on both theoretical and methodological grounds. The social sources of rape and sexual assault extend well beyond the dynamics of underground markets (Baron and Strauss 1989). In addition, rape is poorly measured in the UCR; fewer than a third of rapes and other sexual assaults are reported to the police (Hart and Rennison 2003). The police are more likely to be notified of aggravated assaults, but changes in offense classification and recording reduce the reliability of the UCR aggravated assault time series data during the period under investigation (Rosenfeld 2007).

The acquisitive crimes in the analysis include burglary and motor vehicle theft, in addition to robbery, and exclude larceny. Larceny is omitted because it is an extremely heterogeneous offense category that is not well measured in the UCR. Only 29% of larcenies are reported to the police, compared with 53% of household burglaries, 60% of robberies, and 81% of motor vehicle thefts (Hart and Rennison 2003).[9] The robbery,

[8] Personal correspondence with Marc Swatt (February 18, 2009). The Fox and Swatt (2008) SHR data set also includes homicides associated with other circumstances, including gang killings and "suspected felony type." They have been combined with felony homicides in the current analysis.

[9] Data from the National Crime Victimization Survey (NCVS) are not subject to this source of measurement error but are unavailable for the current analysis because they cannot be disaggregated by census region prior to 1986. The UCR crime data used in the analysis are from the Bureau of Justice Statistics (http://bjsdata.ojp.usdoj.gov/dataonline/).

burglary, and motor vehicle theft rates per 100,000 population were summed to form an index of acquisitive crime (A_Crime).

Three measures of economic conditions are included in the analysis: the unemployment rate, real GDP per capita, and the Index of Consumer Sentiment (ICS). The ICS is a summary measure of consumer confidence and expectations composed of items from monthly surveys of the US adult population (see Rosenfeld and Fornango 2007, for a detailed description).[10] Rosenfeld and Fornango (2007) found both contemporaneous and lagged effects of the ICS on robbery and property crimes, and so the one-period lagged ICS also is included in the current study. As controls for other crime determinants used in prior research on crime trends (Blumstein and Wallman 2005; Levitt 2004; Rosenfeld and Fornango 2007), the analysis includes the number of police officers per 100,000 population from the UCR; state prisoners per 100,000 population lagged one period, from the Bureau of Justice Statistics; the percentage of the population between the ages of 15- and 24-years-old (age) and the percentage black (race), both from the Census. All variables are transformed to their natural logs, which yields coefficients representing the percentage change in the outcome given a 1% change in the predictor.

Estimation

The annual data were aggregated to the four US census regions (Northeast, Midwest, South, and West) and analyzed in fixed-effects panel models of regional crime rates over the period 1970–2006. Conducting the analysis on states, metropolitan areas, or cities would be desirable to maximize cross-sectional variation, but the consumer sentiment data are unavailable for these population aggregates. Tests for a unit root in the regional crime series showed that each series is non-stationary in log levels. The series were transformed to first differences, and additional tests revealed that the transformed series are difference stationary.[11] Consequently, the analyses were performed on the first-differenced logged outcome and predictor variables.

Inspection of the first-differenced outcome series revealed the presence of first-order serially correlated errors in each of the series. Therefore, all models were fit with a fixed-effects estimator for AR(1) disturbances using the *xtregar* routine implemented in STATA 10.1 (StataCorp 2009). My main focus is on models that also contain dummy variables representing year effects in addition to the region fixed effects. The year and region fixed effects absorb unmeasured sources of heterogeneity in the dependent variables and improve model fit. Given the small sample size in relation to the number of predictors with the year effects included in the models, statistical significance is reported at the .10 as well as the .05 level and the results of models with linear and quadratic trend terms substituted for the year effects are presented for comparison.

[10] The unemployment data are from the Bureau of Labor Statistics (http://www.bls.gov/); the GDP data are from the Bureau of Economic Analysis (http://www.bea.gov/index.htm); and the ICS data are from the Reuters-University of Michigan Surveys of Consumers (http://www.sca.isr.umich.edu/).

[11] Regression analysis of nonstationary time series can produce spurious results (Raffalovich 1994). Augmented Dickey-Fuller and Phillips-Perron tests for a unit root were conducted on the A-Crime, homicide, felony homicide and argument homicide regional time series. The null hypothesis of a unit root could not be rejected for any of the series. When transformed to first differences, all series are difference stationary. Results available from the author on request.

Results

Bivariate correlations and descriptive statistics for the crime, economic, criminal justice, and demographic indicators are shown in Table 1. The contemporaneous consumer sentiment (ICS), GDP, and unemployment indicators are significantly correlated with one another and with both homicide and the acquisitive crime index. The lagged measure of consumer sentiment (ICS-1) also is significantly associated with homicide and acquisitive crime and has a stronger relationship with GDP and unemployment than does the contemporaneous consumer sentiment indicator. This result corresponds with evidence that consumer sentiment predicts future changes in the economy (Curtin 2002, 2003). The two consumer sentiment indicators are significantly related to the felony homicide rate (fel_hom) but only the contemporaneous measure of consumer sentiment is significantly correlated with the argument homicide rate (arg_hom). Among the other variables, only the state imprisonment rate (prison-1) is significantly correlated with acquisitive crime and homicide, but not with felony or argument homicide. Finally, these relationships largely reflect the temporal patterns in the data. Comparing the "within" standard deviations computed on the regional time series with the "between" standard deviations based on the pooled regional differences in crime, economic conditions, and the other factors indicates that the overall variance in the data is dominated by changes within regions rather than differences between them.

Consistent with expectations, homicide and acquisitive crime are strongly correlated ($r = .708$). Figure 1 displays the two national time series in levels (panel A) and first differences (panel B) for the period 1970–2006. Major swings in homicide and acquisitive crime correspond closely until the late 1980s, when homicide increases outpaced those in the acquisitive crime index. The timing of the divergence in the trends coincides with the increase in firearm violence attributed to the expansion of crack cocaine markets in large cities during the late 1980s and early 1990s (Baumer et al. 1998; Blumstein 1995; Cork 1999; Messner et al. 2005). Consistent with this interpretation, when the crack epidemic abated in the mid-1990s, the homicide and acquisitive crime series began to re-converge.

The bivariate results offer suggestive evidence consistent with the hypotheses linking homicide and acquisitive crime rates and acquisitive crime, in turn, to changing economic conditions. The multivariate results, presented below, largely confirm these expectations.

Multivariate Results

The results of the panel models of year-over-year change in the index of acquisitive crime and homicide rates are presented in Table 2. The results of the acquisitive crime model including the fixed effects are shown in column (1). Only three of the predictors, the contemporaneous and lagged measures of consumer sentiment (ICS and ICS-1) and the lagged state imprisonment rate (pris-1), have significant effects on acquisitive crime in this model. Increases in acquisitive crime are associated with declines in consumer optimism and imprisonment.

Column (2) of Table 2 displays the acquisitive crime equation with linear and quadratic trend terms substituted for the year effects. This model also reveals significant effects of the consumer sentiment and prison indicators on acquisitive crime. In addition, the GDP and unemployment measures also are significant in this model. Increases in acquisitive crime are associated with declines in GDP and declines in unemployment. Although the latter effect is small, it is consistent with the opportunity interpretation of the

Table 1 Correlation matrix and descriptive statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. A_Crime	–											
2. Homicide	.708*	–										
3. Fel_Hom	.420*	.632*	–									
4. Arg_Hom	.391*	.570*	.470*	–								
5. ICS	−.505*	−.428*	−.369*	−.223*	–							
6. ICS-1	−.436*	−.281*	−.245*	−.165	.153	–						
7. GDP	−.387*	−.217*	−.229*	−.178	.416*	.602*	–					
8. Unem	.283*	.182*	.176	.154	−.243*	−.478*	−.617*	–				
9. Prison-1	−.223*	−.244*	−.014	.018	.119	.064	−.098	.015	–			
10. Police	.011	−.014	−.088	−.109	−.100	.166	.124	−.145	.120	–		
11. Race	−.032	.024	−.005	−.021	.048	−.046	−.152	.065	.058	−.227*	–	
12. Age	.091	.089	−.008	−.049	−.026	.022	.070	.034	−.360*	−.096	.181*	–
Mean	−.011	−.008	−.011	−.017	.004	.004	.015	−.002	.045	.004	.006	−.006
Sd_{within}	.059	.067	.115	.100	.103	.105	.027	.126	.054	.020	.008	.018
$SD_{between}$	.010	.004	.006	.008	.001	.001	.002	.006	.003	.004	.004	.001
N	144	144	116	116	144	140	144	144	140	144	144	144

Logged (base e) variables in first differences

* $p < .05$

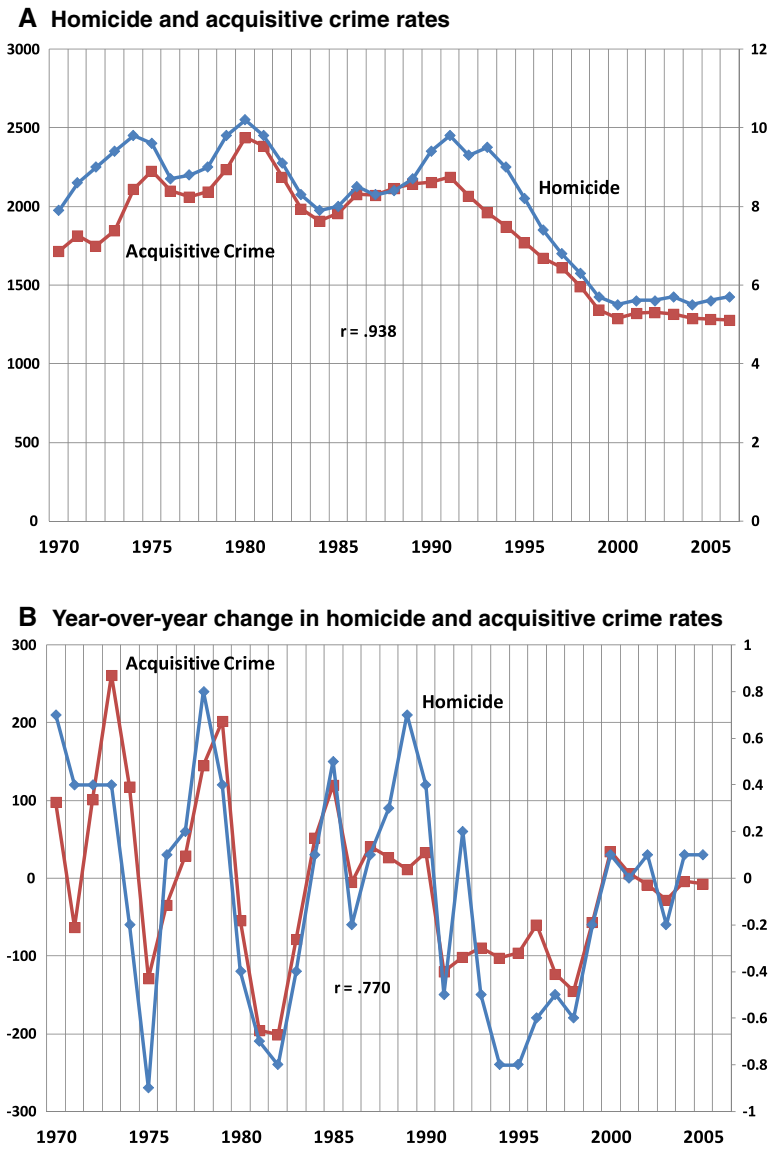

Fig. 1 Homicides and acquisitive crimes per 100,000 US population in levels and first differences, 1970–2006

unemployment-crime relationship, whereby decreases in unemployment increase criminal opportunities as homes are left unguarded and persons carry more of value with them when outside the home (Cantor and Land 1985; Cohen and Felson 1979). The significant GDP and unemployment effects, however, could be an artifact of omitted variable bias resulting from the elimination of the year effects from the equation. Including the year effects improves model fit by about 42% in the acquisitive crime models shown in Table 2.

Table 2 Acquisitive crime and homicide panel models, 1970–2006 ($N = 136$)

	(1) A_Crime	(2) A_Crime	(3) Homicide	(4) Homicide	(5) Homicide	(6) Homicide
A_Crime	–	–	–	–	.539*	.778*
	–	–	–	–	(.145)	(.114)
ICS	−.251*	−.208*	−.314#	−.293*	−.153	−.118*
	(.104)	(.035)	(.160)	(.052)	(.157)	(.051)
ICS-1	−.245*	−.170*	−.212	−.177*	−.065	−.029
	(.098)	(.035)	(.157)	(.055)	(.152)	(.052)
GDP	−.229	−.454*	.386	−.136	.507	.162
	(.231)	(.179)	(.351)	(.277)	(.336)	(.240)
Unem	−.044	−.095*	−.172#	−.116*	−.143	−.031
	(.068)	(.034)	(.101)	(.051)	(.097)	(.045)
Pris-1	−.314*	−.373*	−.332*	−.224#	−.148	.038
	(.076)	(.081)	(.116)	(.121)	(.120)	(.110)
Police	−.215	−.012	−.300	−.118	−.105	−.046
	(.156)	(.155)	(.251)	(.245)	(.239)	(.210)
Race	−.002	.021	.210	.104	.122	.120
	(.378)	(.383)	(.569)	(.589)	(.543)	(.502)
Age	−.115	−.265	.269	−.442	.348	−.092
	(.221)	(.255)	(.353)	(.382)	(.332)	(.330)
$R^2_{(\text{within})}$						
Ye	.839	–	.768	–	.782	–
Pe	–	.589	–	.370	–	.546

Fixed effects AR(1) models. *Ye* = year effects (not shown) in models (1), (3), and (5); *Pe* = linear and quadratic period effects (not shown) in models (2), (4), and (6). All variables logged (base e) and in first differences. Standard errors in parentheses

* $p < .05$; # $p < .10$

In contrast with prior research using different economic indicators, we observe a marginally significant effect of the contemporaneous measure of consumer sentiment on homicide in column (3) of Table 2. The state imprisonment rate has a significant effect on homicide and the unemployment effect, again negative, also is marginally significant in this model. These results are comparable to those obtained from the same equation without the year effects (column 4), although the lagged consumer sentiment measure is also is significant. Model fit is substantially reduced, by 52%, with the year effects omitted. The question remains whether the effect of economic change on homicide is mediated by acquisitive crime.

The effect of acquisitive crime on homicide is shown in column (5) of Table 2. The effect is significant and sizable ($b = .539$, $p < .05$). With acquisitive crime in the model, the effect of consumer sentiment on homicide is reduced by 51% and no longer is significant. Unexpectedly, the measure of acquisitive crime also mediates the effect of state imprisonment on homicide. The imprisonment effect is reduced by 55% and is not significant in the model that includes the acquisitive crime index. The effect sizes of the consumer sentiment and imprisonment indicators are reduced in the model without the year dummies (column 6). The effect of the contemporaneous consumer sentiment measure is significant in the latter specification, but the effect of state imprisonment is not. As in the

previous estimations, model fit is reduced considerably (by about 30%) in the model without the year effects, as shown in the bottom rows of Table 2.

The significant results from the fixed-effect models are summarized in Fig. 2. Collective perceptions of economic conditions and state imprisonment rates both have significant effects on acquisitive crime which, in turn, affects homicide rates. As expected, acquisitive crime mediates the relationship between economic conditions and homicide. But acquisitive crime also mediates the relationship between imprisonment and homicide, an unexpected finding with important implications for future research on incarceration and crime trends.

Model Sensitivity, Validity, and Confidence Intervals

The variance inflation factors (VIF) for the models without the year and region fixed effects shown in Table 2 show little indication of multicollinearity. The largest VIF for the equations displayed in columns (2), (4), and (6) has a value of 2.69. Nonetheless, the strong correlation between GDP and unemployment shown in Table 1 ($r = -.617$) could affect the estimates for these indicators. I re-estimated the fixed-effects models with GDP and unemployment alternately removed and found no substantive differences from the results presented in Table 2.

As a check on the sensitivity of the significant findings to the inclusion of the non-significant covariates in the fixed-effects models, the models were re-estimated with the non-significant ($p > .10$) covariates removed (the year and region fixed effects were retained). No substantive differences in results were found.

The hypotheses under investigation assume that economic conditions influence acquisitive crime and not vice versa. But it is plausible that crime could affect changes in consumer attitudes and perceptions. For example, consumer confidence dropped after the terrorist attacks on New York and Washington in 2001. To check on possible simultaneity in the relationship between crime and consumer sentiment, prior research used Gallup Poll data on public concern with crime as an instrument to identify the causal direction of the relationship between collective economic perceptions and property crime and robbery over the period 1970–2002 (Rosenfeld and Fornango 2007). The results validate the expected causal direction from consumer sentiment to crime.

The current study finds that collective economic perceptions influence homicide indirectly through their effect on acquisitive crime. If the underlying logic of the hypothesis is correct, economic perceptions should have a greater effect on homicides committed for economic gain than on those resulting from arguments with little connection to economic conditions, such as alcohol induced brawls or lovers' triangles. As noted, the Fox and Swatt (2008) SHR data set partitions homicide circumstances into killings related to burglaries, robberies, and other felonies, on the one hand, and arguments, on the other. The

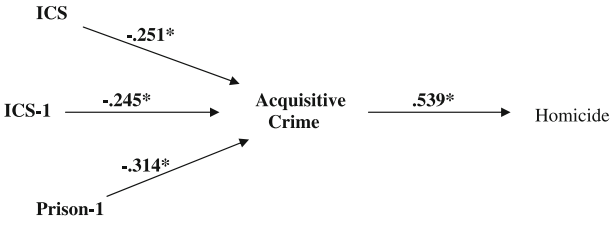

Fig. 2 Effects of consumer sentiment and imprisonment on acquisitive crime and homicide

Table 3 Felony and argument homicide panel models, 1976–2005 ($N = 112$)

	Felony homicide	Argument homicide
ICS	−.463*	−.193
	(.129)	(.117)
ICS-1	−.446*	−.294*
	(.140)	(.126)
GDP	.195	−.356
	(.691)	(.625)
Unem	−.067	−.077
	(.130)	(.118)
Prison-1	.231	.193
	(.353)	(.320)
Police	.048	−.216
	(.582)	(.521)
Race	−.420	−.438
	(1.275)	(1.149)
Age	.069	−.718
	(.855)	(.772)
$R^2_{(\text{within})}$	.227	.145

Fixed effects AR(1) models including linear and quadratic period effects (not shown). All variables logged (base e) and in first differences. Standard errors in parentheses

* $p < .05$

partition is not perfect for present purposes because some arguments resulting in homicide may be economically motivated. For example, "argument over money or property" is included in the "argument" circumstance code.[12] Nonetheless, we should expect to observe stronger effects of economic perceptions on felony homicides, most of which are committed in connection with crimes for pecuniary gain, than with homicides resulting from arguments, many or most of which involve conflicts over other matters.

Table 3 displays the results of fixed effects AR(1) equations that regress felony and argument homicides on the consumer sentiment indicators and other predictors. Because the SHR data are available only for the years 1976–2005, reducing the degrees of freedom in the analysis, the equations do not contain the 36 year dummies; linear and quadratic time trends are included in their place. In line with expectations, the results show stronger effects of collective economic perceptions on felony homicides than on argument homicides. The effects of the contemporaneous and lagged consumer sentiment indicators on felony homicide are significant and sizable ($b = -.463$ and $-.446$, respectively). In contrast, the contemporaneous consumer sentiment measure does not have a significant effect on argument homicide. The lagged consumer sentiment coefficient is significant but its magnitude is only about two-thirds as large as that for the lagged sentiment measure in the felony equation. This significant result could reflect the inclusion in argument homicides of economically motivated disputes or the effects of economic conditions on non-pecuniary homicides attributable to stress, alcohol use, or other responses to economically-induced strain (Agnew 1992).

These results should be interpreted with caution. They are based on a reduced number of cases and could be subject to omitted variable bias. Neither model exhibits a strong fit to the data and the missing SHR data are imputed, which could introduce measurement error in the homicide circumstance codes (see Fox and Swatt 2008). But the error or bias these limitations introduce is likely to affect the measurement and modeling of *both* felony and

[12] Personal correspondence with Marc Swatt (February 18, 2009).

argument homicides. The results of this validation exercise, then, lend support to the theoretical expectation that collective economic perceptions exert a stronger influence on economically-motivated homicides than on other homicides (see Pratt and Lowenkamp 2002, for similar findings).

Finally, the effect of collective economic perceptions on acquisitive crime and the effect of acquisitive crime on homicide, although statistically significant, are contained within broad confidence intervals. For example, the 95% confidence interval for the effect of ICS on A_crime in the fixed-effects estimation shown in column (1) of Table 2 ($b = -.251$) ranges from $-.044$ to $-.458$. The effect of A_crime on homicide shown in column (5) of Table 2 ($b = .539$) could be as high as .828 or as low as .250 at the 95% confidence level. The corresponding intervals around these estimates in the equations without the fixed effects are narrower. As noted earlier, the efficiency of the estimates is reduced by including the year effects in the equations. Therefore, although the results lend support to the hypotheses under investigation, the point estimates may be appreciably larger or smaller than those reported.

Conclusion

Recent investigations have begun to reveal consistent effects of economic change on rates of property crime: Property crime rises during economic downturns and falls during recoveries (Arvanites and Defina 2006; Gould et al. 2002; Grogger 1998; Raphael and Winter-Ebmer 2001; Rosenfeld and Fornango 2007). The current study builds on that research by evaluating the effect of multiple indicators of economic conditions on an index of acquisitive crime (robbery, burglary, and motor vehicle theft) and the indirect effect of economic conditions, through acquisitive crime, on homicide rates. I find a significant effect of collective perceptions of economic conditions on acquisitive crime and a significant effect of acquisitive crime on homicide. Acquisitive crime mediates the relationship between collective economic perceptions and homicide.

The association found between homicide and acquisitive crime has important implications for future research on homicide and perhaps other violent crimes. The results suggest that analyses of homicide that omit acquisitive crimes as predictors may be biased and subject to misleading conclusions about the impact of acquisitive crimes and, by extension, the economy on homicide trends. The same may be true of analyses of incarceration effects on homicide that fail to investigate the indirect influence of acquisitive crime. Prior research has revealed significant effects of imprisonment on both property and violent crime rates (Levitt 1996; Liedka et al. 2006; Marvell and Moody 1994). The current results suggest that the effect of imprisonment on homicide, like that of the economy, is largely indirect and mediated by acquisitive crime. To avoid potentially serious specification error, future research on homicide should incorporate acquisitive crimes and investigate the indirect effects of changing economic conditions and incarceration rates on the production and control of lethal violence.

I have proposed that a key mechanism linking acquisitive crime to homicide and to the economy is the underground market, particularly the market for stolen goods. The risks of underground markets are well documented in the descriptive literature (Venkatesh 2006; Wacquant 1998). The relative absence of formal regulation and legal recourse in underground markets raises the probability that violence will be used to settle disputes (Black 1976, 1983; Tedeschi and Felson 1994). The legal vulnerability of market participants also makes them attractive targets for predatory victimization (Felson 2002; Jacobs 2000). Prior

research indicates that involvement in property crime increases homicide risk (Dobrin 2001). These considerations imply that rates of violence should increase with expansions in underground markets and that changing rates of violent crime are causally related to corresponding changes in acquisitive crime.

The leading alternative interpretation of a connection between property crime and violent crime is that the relationship is spurious, the result of common causes. Part of the observed association is undoubtedly attributable to the influence of other factors. Yet with age, race, police strength, imprisonment, several economic indicators, and time and region fixed effects controlled, a sizable effect of property crime on homicide persists in the current study. Some other factor not captured by the fixed effects or strongly correlated with the substantive variables may yet explain this relationship. Illicit drug markets could be one such factor that should be explored in future research.[13] But the robustness of the association between acquisitive and violent crime—and its basis in theory, logic, and prior research—place constructive pressure on arguments that deny a causal association between changes in crimes committed for pecuniary gain and violence.

The mechanisms linking crime increases to economic downturns remain poorly understood. A particularly fruitful area of inquiry is the role of underground markets in stimulating temporal change in crime rates. If demand in underground markets increases with downswings in the formal economy, the incentives for thieves to supply those markets with stolen goods should increase, thereby generating rising rates of property crime and robbery during periods of economic decline. By definition, underground markets are not subject to formal regulation. As the volume of transactions expands with increased demand, so too will the number of violent disputes and the amount of violent predation. Even if only a small fraction of underground transactions leads directly or indirectly to violence, they can result in sizable increases in homicide rates.

The available evidence connecting economic conditions, underground markets, and crime is indirect and circumstantial but nonetheless suggestive. Economic theory predicts that participation in illegal activity expands with rising returns per unit of effort (Becker 1968; Ehrlich 1973). Interviews with property offenders indicate that they are sensitive to changes in the price of stolen goods (Sutton 1995, 1998). Evidence that consumers "trade down" during economic contractions implies that some will turn to underground sources when they can no longer afford to pay prevailing retail prices. The evidence in this and prior research connecting crime rates to changing economic conditions will remain merely suggestive of the role of underground markets until future research unearths a more direct linkage between prices and participation in the underground and legitimate economy.

If the hypothesized criminogenic role of the underground economy is confirmed in future research, both criminological theory and crime control policy should benefit. The gains to theory lie in the development of a unified explanation of temporal change in crime rates. The explanation joins economic and sociological perspectives on crime, the dynamics of formal and informal markets, and the unregulated risks of criminal lifestyles to both moralistic and predatory violence. The message for policymakers is to proceed with caution in the forcible suppression of underground economic activity. Toughening the penalties for selling and receiving stolen goods might deter participation in underground

[13] A serious measurement challenge that must be overcome is the use of drug arrests (e.g., Ousey and Lee 2002) or drug overdoses (e.g., Martinez et al. 2008) as proxies for drug market activity. The former indicator confounds drug market activity with drug enforcement efforts and the latter does not distinguish between drug transactions and drug use.

markets, but driving the markets further underground could encourage even more violence as a substitute means of social control.

Finally, policy should be based on careful consideration of the economic functions of markets for stolen goods. As the President's Commission on Law Enforcement and the Administration of Justice wrote in 1967:

> The redistribution of goods through theft might constitute a significant subsidy to certain groups in our society; its curtailment might have significant side effects which should be explored (quoted in Klockars 1974: 1).

The best policies will reduce demand in underground markets by increasing the capacity of the poor to participate, as workers and consumers, in the legitimate economy.

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