

THE IMPACT OF ECONOMIC CONDITIONS ON ROBBERY AND PROPERTY CRIME: THE ROLE OF CONSUMER SENTIMENT*

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Despite its long history in criminology, research on the relationship between macroeconomic conditions and rates of common crime remains limited. That is in part because many analysts doubt that any systematic relationship exists and in part because of disagreement with regard to the validity of the indicators typically used to measure economic conditions. We argue in this article that good theoretical reasons exist to expect macroeconomic effects on crime rates, but many theories imply that collective perceptions of economic hardship should have effects on crime that are independent of those of more "objective" economic indicators. To evaluate this argument, we examine the relationships between the Index of Consumer Sentiment and regional robbery, burglary, larceny, and motor vehicle theft rates in the United States between 1970 and 2003, which was a period of large swings in both consumer sentiment and instrumental crime. Controlling for several factors thought to influence temporal variation in crime rates, we find that consumer sentiment had significant effects on robbery and property crime rates over the period that were largely independent of the

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effects of unemployment and economic growth. We also find that consumer sentiment accounted for a sizable fraction of the crime decline during the 1990s and yields reasonably accurate predictions of changes in the four offenses in 2004 and in two of the four offenses in 2005. We conclude that the effects of collective economic perceptions should become an important focus of future research on crime trends.

We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago?

University of Michigan's "Surveys of Consumers"¹

. . . being broke, man, you don't feel good. You ain't got nothing in your pocket, so you want to take something out of someone else's pocket.

Bill Williams, armed robber²

Do changes in macroeconomic conditions over time influence the rate of street crime? A common-sense answer is "yes." As economic conditions deteriorate, people are thrown out of work, and their incomes fall, some of them will turn to income-generating criminal activity in response. As conditions improve and incomes rise, the same logic holds that crime rates will fall. So goes a common view. That view is elaborated in well-known economic and sociological theories (Becker, 1968; Merton, 1938), but it is far from the consensus position in contemporary social science. Some analysts predict that crime will drop as deteriorating economic conditions reduce the value or availability of crime targets (Cohen and Felson, 1979). Others point to the paradox of "crime amidst plenty" as evidence that crime rates and economic conditions are unrelated (Wilson, 1975). And even among researchers who accept a connection between street crime and the economy, disagreement exists over how best to measure the economic conditions that are most relevant to criminal activity.

The unemployment rate is by far the economic indicator of choice in research on the impact of economic conditions on crime rates. A generation of research on the impact of unemployment on crime has produced mixed results and has led some researchers to question the validity of the unemployment rate as an indicator of the full range of economic conditions that may influence crime rates (Arvanites and Defina, 2006). We agree with this view and propose in the current article that aggregate *consumer sentiment* should have an important effect on crime rates that is independent of other influences, including those of more "objective"

1. www.sca.isr.umich.edu.

2. Quoted in Wright and Decker (1997: 33).

THE ROLE OF CONSUMER SENTIMENT

737

macroeconomic indicators. We find support for this argument in an analysis of robbery and property crime rates in the United States between 1970 and 2003. We conclude that changing consumer attitudes help to explain temporal variation in crime rates, which include the dramatic decline during the 1990s, and should no longer be overlooked in research on economic conditions and crime.

BACKGROUND

The idea that crime rates rise and fall with changing economic conditions has a long pedigree in criminology. Early studies sought to connect crime rates to the changing prices of staple commodities such as wheat or rye (Cook and Zarkin, 1985: 118). More recent research has used the unemployment rate to measure economic performance or outcomes. A trail of mixed results and a lack of scholarly consensus brought the study of unemployment and crime to something of a stalemate by the 1980s (Chiricos, 1987), when interest in the topic was rejuvenated by the publication of Cantor and Land's (1985) time-series analysis of the effects of unemployment on U.S. crime rates.

Cantor and Land (1985) maintained that the mixed and often null findings of prior research resulted from the failure to distinguish between so-called opportunity and motivation effects of unemployment on crime. The former, they argued, reduces crime when unemployment rates are high by reducing target attractiveness and by increasing guardianship (Cohen and Felson, 1979; Cohen, Felson, and Land, 1980). The latter effect, rooted in the more traditional sociological notions of legitimate and illegitimate opportunities, is reflected in increased crime when unemployment blocks access to legitimate income-producing opportunities (Cloward and Ohlin, 1960; Merton, 1938). The results of Cantor and Land's annual time-series analysis offered support for both effects (see, also, Cantor and Land, 2001: 334).

Although Cantor and Land's (1985) paper injected new life into the study of unemployment and crime, it did not eliminate debate over the correct specification of the unemployment-crime relationship or the measurement of unemployment (see, e.g., Britt, 2001; Cantor and Land, 2001; Greenberg, 2001; Levitt, 2001; O'Brien, 2001; Paternoster and Bushway, 2001³; see, also, Hale and Sabbagh, 1991; Kleck and Chiricos, 2002). Greenberg (2001) criticized the use of the official unemployment rate in studies of crime because it omits discouraged workers who have dropped out of the labor force, part-time workers who want full-time jobs, and full-

3. These papers were published in a special issue of the *Journal of Quantitative Criminology* devoted to Cantor and Land's (1985) conceptual framework and empirical assumptions.

time workers in low-wage jobs. “To use the official unemployment statistics,” he argues, “is therefore to risk serious systematic bias in the analysis” (Greenberg, 2001: 317). Beyond taking into account the duration of unemployment, however, Greenberg did not propose an alternative indicator with greater face validity to represent the range and diversity of economic conditions expected to influence crime rates.

MEASURING GENERAL ECONOMIC CONDITIONS

Cantor and Land (1985, 2001) did not maintain that the unemployment rate is the only or the best available measure of crime-relevant economic conditions, nor did they suggest that the effects of unemployment on crime rates are solely a function of changes in the behavior of the unemployed. Rather, they regard the unemployment rate as a “coincident indicator” of broader economic changes that affect persons in the labor force with and without a job (and presumably those not in the labor force as well). They write: “As the economy deteriorates, one’s ability to meet their financial and emotional needs, *regardless of her/his employment status*, may become strained” (2001: 331, emphasis added). Cantor and Land’s major concern is the extent to which “economic hardship,” and not unemployment per se, influences crime rates. These considerations raise the important question of whether the unemployment rate is the best indicator of “how a booming (or tightening) economy affects the population as a whole” (Cantor and Land, 2001: 331).

Arvanites and Defina (2006) argued persuasively for the use of a broader indicator than the unemployment rate to measure crime-relevant economic conditions. In their analysis of U.S. state crime rates, they use real Gross State Product (GSP) per capita, which is a state-level analog for Gross Domestic Product (GDP), to represent the totality of economic conditions with a potential influence on crime. Controlling for race composition, age composition, and imprisonment rates, they found significant negative effects of the GSP on state property crime and robbery rates in fixed-effects panel models for the period 1986–2000. Their results support Cantor and Land’s motivational hypothesis, as applied to property crimes and robbery, but they do not support the opportunity hypothesis. Their supportive findings, however, do not extend to Cantor and Land’s preferred indicator of economic conditions. In a separate set of panel regressions, Arvanites and Defina (2006) found no significant effects of unemployment rates on state crime rates.

We agree that a broad-based measure of general economic activity captures more accurately the logic of Cantor and Land’s argument that links crime rates to changing economic conditions than does the unemployment rate. But a measure such as the GSP is also open to challenge. In some ways, it is the mirror image of the unemployment rate. If unemployment is

THE ROLE OF CONSUMER SENTIMENT 739

too narrow a measure of general economic conditions relevant to crime, the GSP is overly broad. Crime declines could result from a rising GSP for a variety of reasons, which include the possibility that incomes are rising, unemployment is falling, social or criminal justice spending is increasing, part-time workers are finding full-time jobs, or some combination of these and other changes. This problem is solvable in principle by examining the relationship between GSP and more specific economic measures and, in turn, their impact on crime rates.

But a more fundamental problem limits the validity of both general and specific indicators of economic conditions used in prior studies of crime rates. No indicator measures the impact of unemployment, income, or other conditions on *collective perceptions* of economic hardship. Researchers surmise, for example, that rising unemployment poses financial and emotional “strain” and falling unemployment makes people feel better about their economic status and opportunities. Although intuitively appealing and sometimes informed by research evidence, such assumptions may be wide of the mark with respect to critical issues, such as the time lag between an increase in unemployment and generalized feelings of “hardship,” or the relationship between current economic conditions and expectations for the future.

Public expectations and attitudes often befuddle economists when they fail to conform to objective indicators of economic performance (Gross, 2006). The objective economic measures tell us about the behavior of the economy, but in the study of crime, we are interested in the behavior of people and how economic conditions influence criminal behavior. Rather than having to speculate about the subjective experience of objective economic conditions, it would be useful to have more direct data on collective economic perceptions that could be linked to crime rates. Fortunately, we do.

CONSUMER SENTIMENT

For over a half-century, researchers at the University of Michigan have collected survey data regularly on public perceptions, attitudes, and expectations related to the economy. The monthly “Surveys of Consumers” cover three broad areas of consumer sentiment: assessments of changes in personal finances and expectations for the future; attitudes toward overall business conditions in the near and long term; and evaluations of current market conditions for purchasing household durables, vehicles, and houses.⁴ Specific items ask respondents to gauge changes in inflation, unemployment, interest rates, and overall economic conditions over the

4. Unless indicated otherwise, the description of the Michigan consumer surveys is from www.sca.isr.umich.edu.

next 12 months. These forecasts have proven to be relatively accurate predictors of subsequent changes in real GDP (Golinelli and Parigi, 2004). Aggregate consumer expectations derived from the surveys outperform formal economic models and the forecasts of professional economists to predict future unemployment and inflation trends (Curtin, 2002, 2003). The Index of Consumer Expectations, taken from the monthly consumer surveys, is included in the Leading Indicator Composite Index published by the Bureau of Economic Analysis of the U.S. Department of Commerce.

The Index of Consumer Sentiment (ICS) is a summary indicator that consists of five items from the monthly consumer surveys that measure respondents' perceptions of change in their financial situation during the previous year and expected change over the next 12 months; outlook for the economy over the near and long term; and appraisal of buying conditions for household durables. The items are weighted equally, and the Index is normed to its 1966 level, which is set to 100 (see appendix A for item descriptions).

In the current study, we use the annualized ICS values as our measure of consumer sentiment. The ICS has some notable advantages over the unemployment rate and global indicators such as the gross state product or GDP in the study of crime rates and economic conditions. By asking respondents to compare their current financial situation with that of a year before, it incorporates year-to-year change directly into the measure of current conditions. By asking about general economic conditions in addition to the respondent's personal financial situation, it encompasses "contextual" as well as individual economic effects (Cantor and Land, 2001). Because it contains items to measure respondents' expectations of future economic conditions, both personal and aggregate, it is not fully endogenous and yields information not available from standard economic indicators, which necessarily are based on current or past conditions (Curtin, 2004).

The most important advantage of the consumer surveys over the standard measures of economic conditions, as noted, is that they measure the *subjective experience* of economic hardship and change. Individual consumers may, of course, misjudge the timing or significance of various economic conditions, although prior research has shown that aggregate consumer expectations provide comparatively accurate predictions of future economic trends (Curtin, 2002, 2003). But survey respondents are likely to be more reliable guides to their own perceptions of economic conditions than researchers who must rely on more or less informed assumptions about those perceptions. The consumer surveys offer the opportunity to apply W. I. Thomas's famous dictum to the study of the

THE ROLE OF CONSUMER SENTIMENT 741

economy and crime: "If men define situations as real, they are real in their consequences" (Thomas and Thomas, 1929: 572).

HYPOTHESES

Robbery and property crime are forms of parasitical consumption: Offenders subsist directly on the income and the consumption of others. Both economic and sociological theories of crime predict that illegitimate or parasitical consumption will increase as perceived legitimate consumption opportunities deteriorate (Becker, 1968; Cloward and Ohlin, 1960; Merton, 1938). From an economic perspective, actors respond to the benefits and costs of alternative behavior choices. To the extent that the rewards of conforming behavior exceed those of nonconforming behavior, and nonconformity is costly, actors will conform. As the rewards of conformity decrease relative to those of nonconformity, we should expect to observe an increase in nonconforming behavior, assuming no change in the costs of nonconformity such as legal punishment for criminal behavior (Becker, 1968; Pyle, 2000). All else being equal, it follows that robbery and property crime rates should increase as legitimate consumption opportunities decline with deteriorating economic conditions.

Sociological theories are similar in their presumption that actors behave rationally by considering the relative costs and benefits of alternative behaviors. But generally, sociologists are more interested than economists in the cultural and structural contexts in which behavioral choices are made. The anomie tradition in sociology directs attention to the cultural stimulation of deviant or illegal behaviors in societies that extol the virtues of economic success and place correspondingly less emphasis on the normative status of the means for attaining success (Merton, 1938; Messner and Rosenfeld, 2007). Anomie theorists hold that limited economic opportunities produce increased rates of acquisitive crime in such a cultural context. The social disorganization tradition focuses on the weakening of social bonds and attendant criminal behavior that result from economic deprivation, population instability, and cultural heterogeneity (Bursik and Grasmick, 1993; Shaw and McKay, 1969). Both sociological traditions predict that crime will increase when economic conditions limit consumption opportunities. As noted, however, other sociological perspectives predict just the opposite: Rates of robbery and other acquisitive crime should decline with diminishing legitimate consumption opportunities, as potential victims spend more time at home and carry less of value with them when they are outside of the home (Cantor and Land, 1985; Cohen and Felson, 1979; Cohen, Felson, and Land, 1980).

Research on markets for cheap second-hand and stolen goods also

implies a negative relationship between legitimate consumption opportunities and economically motivated street crime. With the exception of thefts for personal use or cash, offenders must convert goods received in robberies and property crimes into cash or trade them for desired goods. As legitimate consumption opportunities deteriorate, demand for cheaper stolen goods should increase, thereby increasing incentives to commit thefts for resale or barter in secondary markets (Sutton, 1995; Venkatesh, 2006).

Prior theory and research offer plausible accounts of how economic conditions can affect rates of instrumental crime, and they do not necessarily conflict with individual-level explanations of criminal behavior. Their plausibility rests in part on the weak assumptions they make with regard to the number of potential offenders or victims required to alter their behavior to produce sizable changes in crime rates. Consider, for example, the increase in robberies between 2004 and 2005. The Uniform Crime Reports (UCR) recorded 401,470 robberies in 2004 and 417,122 robberies in 2005, which was an increase of 3.9 percent. If we restrict the pool of actual and potential street robbers to males between the ages of 15 and 39 years, the pool numbered an estimated 52.3 million persons in 2004.⁵ Assuming that each UCR robbery was committed by a separate and lone offender, only about .03 percent of the pool of potential street robbers, 15,652 persons, had to begin committing robberies or increase the number of robberies they committed to account for the 3.9 percent increase in UCR robberies between 2004 and 2005. It is not implausible, although of course it may be untrue, that even a small drop in consumer sentiment could have had this effect.

The reason such a story is not inconsistent with individual-level theories of criminality is that it directs attention to the behavior of the *marginal* consumer. It is very unlikely that the current or the future street criminals constitute a random draw from the age-eligible population. We might expect, depending on the perspective, that the potential offenders on average have longer criminal careers, misbehaved more in school, have greater difficulties with self-control, have lower resting pulse rates, or have lower incomes than the nonoffenders. Such persons might constitute a very large fraction of the population of street criminals. All that is required by the macro theories is that some of these persons and perhaps others will alter their crime-committing behavior in response to changing economic conditions.

Economic and sociological theories yield several hypotheses regarding

5. The data for this exercise are from the Bureau of Justice Statistics (<http://bjsdata.ojp.usdoj.gov/dataonline>) and the Census Bureau (<http://www.census.gov/popest/estimates.php>).

THE ROLE OF CONSUMER SENTIMENT 743

the relationship between economic conditions and rates of economically motivated crime over time in the United States:

1. *Robbery and property crime rates rise with deteriorating economic conditions and fall with improving economic conditions.* We test this hypothesis using the ICS to measure economic conditions. We expect that the ICS should have a significant, negative effect on robbery and property crime rates (high values on the ICS represent greater consumer confidence and optimism).

2. *The effects of the ICS on robbery and property crime rates are independent of those of unemployment, wages, and economic growth.* Because it captures collective perceptions of consumption opportunities and perceived future changes in economic conditions, we expect that the effect of the ICS will remain significant when entered simultaneously with the more “objective” economic indicators into models of robbery and property crime rates. Economic theory and the anomie perspective in sociology would seem to require that actors define their own consumption opportunities or general economic conditions as unrewarding to motivate criminal behavior. Therefore, these theories imply that a perceptual measure of consumption opportunities such as the ICS should have independent and perhaps stronger effects on crime rates than the more objective indicators such as unemployment or GDP. In addition, because the ICS reflects *anticipated* as well as current changes in economic conditions, it may have both contemporaneous and lagged effects on crime rates (i.e., crime at time t is a function of ICS at t and $t - 1$).

We leave open the question of the effects of unemployment, wages, and economic growth on crime rates. Good theoretical reasons exist for doing so. To the extent that economic conditions affect crime without altering collective perceptions, the more objective economic indicators may have significant effects, either “opportunity” or “motivation” effects, on crime rates that are independent of the influence of consumer sentiment. For example, social disorganization theories, both contemporary and classic (Bursik and Grasmick, 1993; Shaw and McKay, 1969), do not assume that economic conditions affect crime by altering individual or collective sentiments. These theories require only that 1) economic conditions affect social ties and 2) persons respond to diminished social ties with heightened criminal activity; they make no particular assumptions about actors’ perceptions, feelings, or attitudes.

3. *Growing consumer confidence and optimism explain a substantial fraction of the decline in robbery and property crime rates during the 1990s.* The booming economy of the 1990s buoyed consumer confidence and arguably was the most important source of what one analyst has termed “the great American crime decline” (Zimring, 2006). To disclose the effect of improving economic conditions on the drop in robbery and property

crime rates, however, other conditions that affect crime must be controlled. Imprisonment and police hiring expanded during the 1990s, and these factors have been linked to the crime decline (Levitt, 2004). We examine the effects of these and other conditions in panel models of regional robbery and property crime rates in the United States between 1970 and 2003.

Finally, although we do not offer specific hypotheses, we use the parameter estimates from our models to generate predicted changes in crime rates for 2004 and 2005. Comparing these “out-of-sample” predictions with the observed changes for those years is an additional way of assessing the explanatory capacity of the models.

DATA AND METHODS

The outcome measures in our analyses are the annual robbery, burglary, larceny, and motor vehicle theft rates per 100,000 population, which were obtained from the FBI’s UCR.⁶ The explanatory variable of central interest is the University of Michigan’s ICS. The consumer data are collected using a monthly rotating panel design of approximately 500 U.S. households. A representative cross section of households is sampled monthly and then reinterviewed 6 months later. The ICS is computed from the following equation:

$$\text{ICS} = \frac{X_1 + X_2 + X_3 + X_4 + X_5}{6.7758} + 2.0 \quad (1)$$

where $X_{1..5}$ represent the relative scores for each of the five ICS survey items (see appendix A). The sum of the relative scores is divided by the 1966 base total of 6.7758, and 2 is added to correct for prior sample design changes.⁷ We use the annualized ICS values in our analysis. Our models include lagged as well as contemporaneous values of the ICS to determine whether collective perceptions of future economic conditions are related to crime rates in addition to any effects of perceptions of current conditions.

We compare the effects of the ICS on robbery and property crime rates with those of three additional economic indicators: To measure access to legitimate income-producing opportunities, we use the percentage of the civilian labor force unemployed; to measure consumption opportunities conditional on employment, we use average yearly earnings of production

6. Sources: <http://www.fbi.gov/ucr/ucr.htm>; <http://bjsdata.ojp.usdoj.gov/dataonline/>.

7. For a detailed description of the survey sample, design, and index calculations, see the documentation available at <http://www.sca.isr.umich.edu/documents.php?c=I>.

THE ROLE OF CONSUMER SENTIMENT 745

and nonsupervisory workers. Our measure of aggregate economic activity is yearly real GDP per capita.⁸

Our models also include indicators that represent several of the leading explanations for changes in crime rates over time and the 1990s crime drop in particular (Blumstein and Wallman, 2005; Levitt, 2004; Rosenfeld, 2004). Among the candidate factors, in addition to changing economic conditions, are growth in police per capita and incarceration rates and shifts in the age and race composition of the population.⁹ The models include the number of police per 100,000 population from the UCR (police) and the 1-year lagged state imprisonment rates per 100,000 from the Bureau of Justice Statistics (prisoners). The demographic indicators, from the U.S. Census Bureau, include the percentage of the population between the ages of 15 and 24 years (age) and the percentage black (race). The variables are log transformed (base e), which yields coefficients that represent the percentage change in the outcome measures given a 1 percent change in predictors. (Table 1 presents summary definitions and descriptive statistics for the variables in our analysis).

ESTIMATION STRATEGY

We examine robbery and property crime rates from 1970 through 2003 to capture fully not only the decline in crime during the 1990s but also the substantial crime increases in prior decades. Whereas prior research has used state-level panel models to estimate the effect of economic conditions on crime rates (Arvanites and Defina, 2006; Levitt, 2001; Raphael and Winter-Ebmer, 2001), the ICS is not available at the state level. It is available, however, for the four census regions. Therefore, we estimate our models on data for the four regions over a period of 34 years (1970–2003), yielding 136 observations for the analysis. We retain the years 2004 and 2005 for the purposes of evaluating out-of-sample model predictions.

Ordinary least-squares (OLS) regression on pooled (time \times place) data assumes that the error variance is identical (homoskedastic) and uncorrelated across units and over time. When these assumptions are violated, coefficient estimates will be biased and inefficient (Kennedy, 2003). Tests performed on initial OLS regressions of the robbery and property crime rates on the explanatory variables revealed correlated error terms and

8. The unemployment and earnings 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>).

9. Levitt (2004) argues that the legalization of abortion in the 1970s also played a major role in the 1990s crime drop. The contribution of abortion reforms to crime rate changes, however, is far from settled in the research literature (see Donohue and Levitt, 2001, 2004; Foote and Goetz, 2005; Joyce, 2004; Zimring, 2006) and is not included in our analyses.

Table 1. Variable Definitions and Descriptive Statistics**a. Variable Definitions**

Robbery	Robbery rate per 100,000 population
Burglary	Burglary rate per 100,000 population
Larceny	Larceny rate per 100,000 population
MV Theft	Motor vehicle theft per 100,000 population
ICS	Index of Consumer Sentiment (1966 = 100)
Unemployment	Percent unemployed in civilian labor force
GDPs	Population-weighted real state gross domestic product (1982 dollars) per capita
Police	Police officers per 100,000 population
Prison	State prisoners per 100,000 population
Age	Percent age 15–24 years
Race	Percent black

b. Descriptive statistics (N = 136)^a

	Mean	SD	Minimum	Maximum
Robbery	214.30	59.12	119.25	390.88
Burglary	1210.03	377.42	447.47	2076.48
Larceny	2825.43	569.31	1547.69	3998.27
MV Theft	514.59	130.83	291.34	817.76
ICS	85.67	12.08	59.08	108.60
Unemployment	6.34	1.51	3.60	11.10
GDPs	16724.24	2378.36	11606.06	21740.19
Police	214.71	32.82	169.19	294.69
Prison	229.50	132.95	56.37	543.00
Age	16.19	2.14	12.43	19.38
Race	11.17	4.98	4.89	19.78

^a Computed on 1970–2003 pooled data for variables in original metrics.

heteroskedasticity across regions. Therefore, we use a feasible, generalized least-squares (FGLS) estimator that yields unbiased and consistent parameter estimates in the presence of correlated and heteroskedastic error terms across the panels. We performed a series of stationarity tests on the outcome and explanatory variables and found all measures to contain a unit root (i.e., they are nonstationary in levels). We converted each measure to its first difference to induce stationarity. Subsequent tests confirmed stationarity in the first differences of each measure, which are entered into the estimation models.¹⁰

Finally, our models include a linear trend indicator, which is shown in preliminary analyses to improve model fit, and a region dummy variable. We also include on the right-hand side one-year lagged values of the outcome measures to capture the effects on crime rate changes of omitted

10. The stationarity tests include the augmented Dickey–Fuller, Phillips–Perron, and a modified Dickey–Fuller test in which the series is transformed using GLS regression (Hamilton, 1994). Results available on request.

THE ROLE OF CONSUMER SENTIMENT

747

variables. Including the lagged outcome as a control effectively removes serial correlation in the within-panel errors of the outcomes. The Prais–Winsten and Cochrane–Orcutt tests confirmed no significant first-order autocorrelation with the lagged outcomes in the model.¹¹

RESULTS

Bivariate correlations among the variables included in the analysis computed on the data pooled across regions are displayed in table 2. The results show a moderate, negative correlation between the ICS and each crime measure (all correlations significant at $p < .01$, two-tailed). In other words, year-over-year improvements in consumer sentiment are associated with year-over-year reductions in robbery, burglary, larceny, and motor vehicle rates. The lagged values of the ICS also are correlated significantly with the crime rates in the same direction and at roughly the same magnitude as the contemporaneous measures. The single exception is for motor vehicle theft, which is not associated significantly with the lagged ICS ($r = -.165$, $p > .05$). Moreover, given the small and nonsignificant relationship between current and prior values of the ICS ($r = .143$, $p > .05$), it seems that their relationships with current changes in crime rates are largely independent of one another. This result is consistent with the assumption that changes in the ICS are leading as well as coincident indicators of changes in robbery and property crime rates, with the exception of motor vehicle theft.

The other economic indicators are associated less consistently or strongly with the crime measures. The earnings measure, not shown,¹² is highly collinear with the GDP indicator and exhibited no significant effects on the crime outcomes in subsequent multivariate models. It has been dropped from the models presented in this article. Generally, the police, age, and race indicators have negligible and nonsignificant associations with the crime measures. The imprisonment indicator has a somewhat stronger association with the outcomes, especially burglary. These controls are retained in the multivariate estimations. The correlations among the explanatory variables do not indicate serious problems with multicollinearity, with the possible exception of the associations between the lagged value of the ICS and unemployment and GDP, which are discussed below.

11. Results available on request. All models were estimated using the XTGLS procedure in Stata 9.0.

12. All results “not shown” are available from the authors on request.

Table 2. Correlation Matrix (N = 136)^a

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Robbery	1.000															
2 Robbery-1	.480**	1.000														
3 Burglary	.796**	.422**	1.000													
4 Burglary-1	.387**	.808**	.527**	1.000												
5 Larceny	.644**	.384**	.789**	.498**	1.000											
6 Larceny-1	.284**	.664**	.387**	.806**	.442**	1.000										
7 MV Theft	.648**	.179*	.562**	.127	.548**	.077	1.000									
8 MV Theft-1	.549**	.654**	.465**	.567**	.466**	.554**	.502**	1.000								
9 ICS	-.472**	-.041	-.461**	-.001	-.412**	.231*	-.445**	-.153*	1.000							
10 ICS-1	-.513**	-.515**	-.495**	-.499**	-.463**	-.453**	-.165	-.462**	.143	1.000						
11 Unemployment	.271**	.471**	.266**	.387**	.244**	.342**	-.023	.221**	-.229**	-.522**	1.000					
12 GDPs	-.484**	-.374**	-.385**	-.257**	-.461**	-.275**	-.179*	-.363**	.419**	.598**	-.653**	1.000				
13 Police	.008	-.189*	.053	-.146	.065	-.083	-.018	-.080	-.113	.127	-.164	.109	1.000			
14 Prison-1	-.174	-.071	-.348**	-.179*	-.029	.081	-.028	.072	.100	.110	-.028	-.105	.070	1.000		
15 Age	.001	.010	.279**	.272**	.161	.175*	-.169	-.162	-.077	-.143	.119	.108	-.042	-.445**	1.000	
16 Race	-.018	-.053	-.136	-.164	-.068	-.114	-.104	-.096	.035	-.027	-.007	-.044	-.268**	.021	.061	1.000

^a Correlations computed on first-differences of each series using pooled 1970-2003 data. -1 represents variable lagged 1 year.

* $p < .05$; ** $p < .01$.

THE ROLE OF CONSUMER SENTIMENT

MULTIVARIATE MODELS

Table 3 presents the results from an FGLS estimation of the effects on 1970–2003 yearly changes in regional robbery rates of yearly changes in the ICS and other explanatory variables. The results indicate that consumer sentiment has significant negative effects on robbery and property crime over the three-decade period. The lagged effects of the ICS also are significant and slightly smaller than the contemporaneous effects. The exception is the weak and nonsignificant effect of ICS-1 on motor vehicle theft. The effect sizes differ somewhat across the crime types. The weakest

Table 3. FGLS Models of Change in Crime Rates by Change in Consumer Sentiment, Age Composition, Racial Composition, Police Per Capita, and Imprisonment Rate, U.S. Regions, 1970–2003 (N = 136)^a

	Robbery	Burglary	Larceny	MV Theft
Crime-1	.113 (.072)	.135 (.074)	.183* (.081)	.349*** (.077)
ICS	-.331*** (.056)	-.265*** (.045)	-.196*** (.044)	-.300*** (.051)
ICS-1	-.269*** (.061)	-.203*** (.048)	-.149*** (.045)	.082 (.056)
Age	-.072** (.023)	.003 (.018)	-.010 (.017)	-.062** (.022)
Race	.055 (.051)	-.043 (.036)	-.008 (.028)	-.027 (.051)
Police	-.148 (.236)	.017 (.155)	.037 (.117)	-.110 (.203)
Prison	-.290*** (.073)	-.289*** (.055)	-.091* (.040)	-.254*** (.075)
Constant	.048** (.016)	.053*** (.013)	.032* (.013)	.035** (.014)
LL	221.61	271.24	296.91	235.17
Wald χ^2	133.76***	157.62***	76.51***	111.66***
AIC	-419.22	-518.48	-569.83	-446.34
$\sim R^2$.618	.678	.539	.433

NOTES: Coefficients represent the percentage change in the outcome given a 1 percent change in the predictor. Models also include a region dummy variable and linear trend indicator; results suppressed. Standard errors in parentheses.

ABBREVIATIONS: AIC = Akaike Information Criterion; LL = log likelihood; $\sim R^2$ = square of correlation between predicted and observed values; Wald χ^2 = computed with 11 degrees of freedom.

^a FGLS heteroskedastic models with cross-sectional correlation. All measures in first-differences.

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed).

significant coefficient is the lagged effect of consumer sentiment on larceny. A 10 percent increase in ICS-1 yields about a 1.5 percent reduction in the first difference of the current log larceny rate.

An immediate challenge to these results is the possibility of simultaneity bias in the relationship between collective economic perceptions and crime. Consumer sentiment may influence robbery and property crime, but the reverse is also possible: High or escalating rates of crime may lead persons to worry about general economic circumstances as well as their own. Of course, the lagged effect of consumer sentiment on crime rates is not subject to simultaneity bias, but the contemporaneous effect could be. Past changes in consumer sentiment could influence current crime rates that, in turn, may affect current consumer sentiment.

We addressed the possible simultaneity bias in our analysis in two ways. We performed Granger causality tests on the relationship between the ICS and each offense. The results (not shown) indicated consistently that consumer sentiment leads or “Granger causes” year-over-year changes in the crime rates, and not the reverse. We also addressed the possibility that crime rates influence collective economic perceptions by regressing the year-over-year change in the ICS on the percentage of Gallup Poll respondents who designate “violence and crime” as the most significant problem facing the country. The residuals from this regression, which represent the change in consumer sentiment not associated with change in crime perceptions, were then substituted for the consumer sentiment measures in the crime models shown in table 3. The results (not shown) are nearly identical to those presented in the table. These tests indicate little simultaneity bias in the estimated effects of consumer sentiment on changes in robbery and property crime rates.

The only other variable shown in table 3 with generally consistent effects on the crime measures is imprisonment. A 10 percent increase in imprisonment produces about a 2.5 percent to 3 percent reduction in the first difference of robbery, burglary, and motor vehicle theft. A much weaker effect of imprisonment is found for larceny, which may reflect the low imprisonment risk of larcenists compared with that of other offenders. The lagged year-over-year difference in the log crime rates has only a weak effect on the current difference. Here again, motor vehicle theft is the exception ($b = .349, p < .001$). Finally, in results not shown, the linear trend indicator has a small but significant negative effect on the crime outcomes, and with few exceptions, the region effects are nonsignificant.

The fit statistics reveal significant and moderately strong model fit for each crime measure. We have computed a rough-and-ready measure of the degree to which the models fit the observed data ($\sim R^2$) by squaring the correlation between the observed values of the crime measures and the predicted values from the models. These results show that the models

THE ROLE OF CONSUMER SENTIMENT

751

explain over half of the variation in the observed values of the robbery, burglary, and larceny measures and about 46 percent of the variation in the observed values of the motor vehicle theft measure.

EFFECTS OF ALTERNATIVE MEASURES OF ECONOMIC CONDITIONS

The results presented thus far support our first hypothesis. Reductions in robbery and property crime are related to improvements in economic conditions, as measured by the ICS. It remains to be observed whether these results hold when alternative economic indicators are included in the estimation. If the consumer sentiment effects remain unchanged when the unemployment and economic growth indicators are entered, we can conclude that the effects of consumer sentiment on robbery and property crime are independent of those of unemployment or growth. If the consumer sentiment effects are reduced greatly or disappear with the other economic indicators in the model, we may conclude either that the consumer sentiment effects are spurious or that they are mediated by unemployment or GDP. Table 4 presents the FGLS results for equations that contain the consumer sentiment measures and the alternative economic indicators. The other explanatory variables were included in the estimations. Because our focus is on the effects of the alternative economic indicators, the results for the other covariates are suppressed.

With the unemployment and economic growth indicators in the model, consumer sentiment continues to exert significant, negative effects on the crime measures. In most instances, these effects are only slightly weaker than those from the estimations that do not include the other economic indicators (see table 3), and the effect of the contemporaneous measure of consumer sentiment on motor vehicle theft actually increases by about 13 percent with unemployment and GDP in the model. These results support our second hypothesis that the influence of consumer sentiment on crime rates is largely independent of the effects of unemployment and economic growth.

The effects of unemployment and GDP are mixed across the four crime types. Unemployment has very small, significant effects on two of the four crime measures and no significant effects on the others. The negative direction of the unemployment effects is consistent with the "opportunity" hypothesis that greater unemployment reduces target availability or attractiveness (Cantor and Land, 1985; Cohen and Felson, 1979; Cohen, Felson, and Land, 1980). GDP also has a significant impact on two crime types, robbery and larceny, and these effects are of moderate size ($b = -.544$ and $-.432$, respectively).¹³ Because the relatively strong relationship

13. In analyses not shown, we estimated 1-year lagged effects of the unemployment

Table 4. FGLS Models of Change in Crime Rates by Change in Consumer Sentiment, Unemployment, and Real GDP Per Capita, U.S. Regions, 1970–2003 (N = 136)^a

	Robbery	Burglary	Larceny	MV Theft
ICS	-.308*** (.056)	-.241*** (.046)	-.176*** (.046)	-.340*** (.050)
ICS-1	-.278*** (.065)	-.195*** (.050)	-.133** (.045)	.021 (.059)
Unemployment	-.023** (.009)	-.008 (.007)	-.010 (.006)	-.022** (.007)
GDPs	-.544* (.274)	-.349 (.191)	-.432** (.155)	.012 (.229)
Constant	.060*** (.016)	.061*** (.013)	.040*** (.012)	.040*** (.013)
LL	224.47	272.65	300.16	239.94
Wald χ^2	166.51***	176.28***	91.52***	157.96***
AIC	-420.94	-517.30	-572.32	-451.88
$\sim R^2$.650	.699	.593	.456

NOTES: Coefficients represent the percentage change in the outcome given a 1 percent change in the predictor. Models also include lagged first-differenced log crime rate, Age, Race, Police, Prison, a region dummy variable, and linear trend indicator; results suppressed. Standard errors in parentheses.

ABBREVIATIONS: AIC = Akaike Information Criterion; LL = log likelihood; $\sim R^2$ = square of correlation between predicted and observed values; Wald χ^2 = computed with 13 degrees of freedom.

^a FGLS heteroskedastic models with cross-sectional correlation. All measures in first-differences.

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed).

between unemployment and GDP ($r = -.653$) could reduce the efficiency of these estimates, we reestimated the models, retaining one of these indicators and dropping the other. The results (not shown) are substantively similar to those presented in table 4.

Finally, we estimated restricted forms of the models shown in table 4 from which the consumer sentiment measures were excluded. Model fit is reduced significantly in these estimations from that shown in table 4, which ranges from a 31 percent decrease in $\sim R^2$ in the larceny model to a 44 percent decrease in the motor vehicle theft model. Generally, the results for the unemployment measure in the restricted model are consistent with those in table 4. By contrast, for three of the crime types, the GDP effects are appreciably larger. The GDP coefficient increases to -1.03 ($p < .001$) in the restricted robbery model from $-.544$ ($p < .001$) in

and GDP indicators in models with and without the current measures. We found no significant effects of the lagged values of these measures on any crime types.

THE ROLE OF CONSUMER SENTIMENT

753

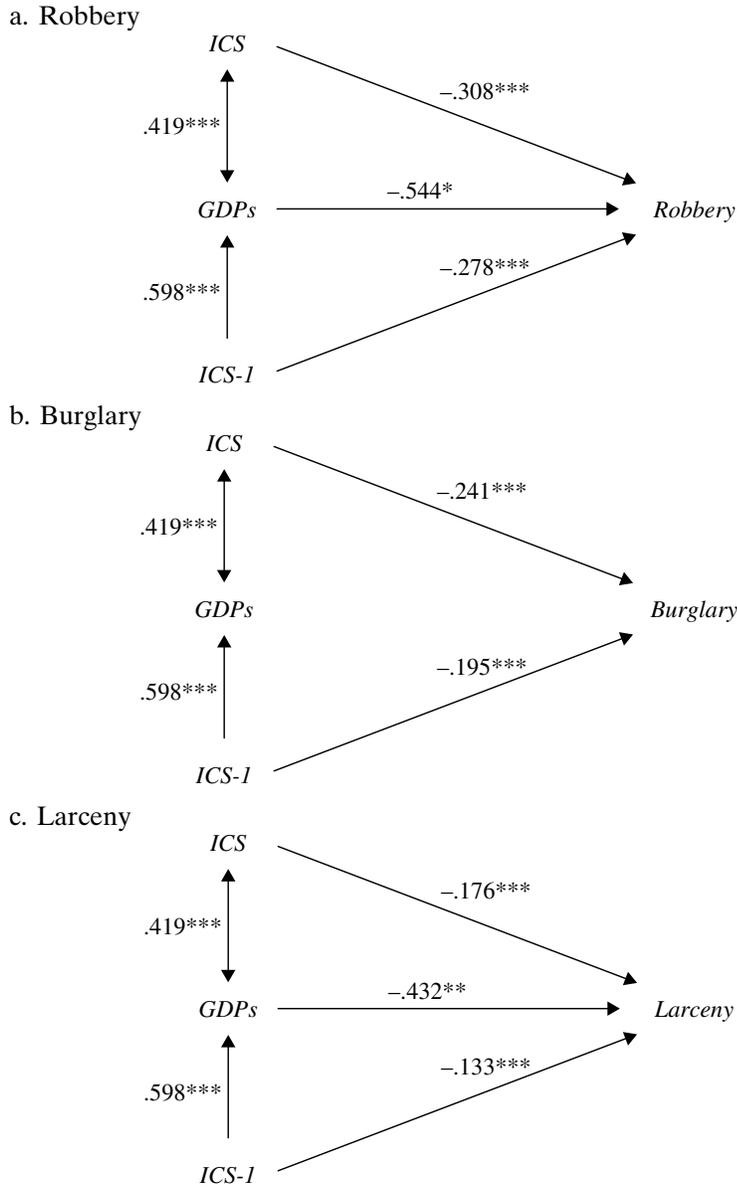
the full model shown in table 4, which is an 89 percent increase. The GDP coefficient in the restricted burglary model is $-.469$ ($p < .05$) but is not significant in the full model. The GDP coefficient increases to $-.518$ ($p < .001$) in the restricted larceny model from $-.432$ ($p < .01$) in the full model shown in table 4, which is an increase of about 20 percent. The effect of GDP on motor vehicle theft is not significant in either the restricted or the full model.

These results suggest that part of the effect of GDP on robbery, burglary, and larceny is a function of the relationship between GDP and consumer sentiment. Figure 1 depicts the results in path diagrams of the effects of the GDP and consumer sentiment indicators on robbery, burglary, and larceny.

Panel a of the figure summarizes the effects of the two economic indicators on robbery between 1970 and 2003. The direct effects, from table 4, have been discussed, but the diagram reveals the indirect effects of each economic indicator through the other, based on the correlations shown in table 2. GDP and the contemporaneous consumer sentiment measure influence robbery indirectly through their relationship with one another ($r = .419$, $p < .001$). In addition, the lagged consumer sentiment measure influences robbery rates through its effect on the current measure of GDP ($r = .598$, $p < .001$). Obviously, current GDP can have no indirect effect through that relationship given its time order. Finally, as noted, the lagged and current consumer sentiment indicators are not related to each other significantly, and so a connecting arrow is not shown. These results indicate that both economic indicators have direct and indirect effects on robbery and that, consistent with prior research, consumer sentiment is a leading as well as a coincident indicator of GDP (Golinelli and Parigi, 2004). Finally, the direct effect of GDP on robbery is mediated partially by consumer sentiment, but as noted, the effect of consumer sentiment on robbery is not mediated by GDP.

Panels b and c of figure 1 summarize the effects of the two economic indicators on burglary and larceny. We find that the direct effect of GDP on burglary is mediated fully by consumer sentiment. GDP has an indirect effect on burglary through its association with current consumer sentiment, and the lagged value of consumer sentiment has an indirect effect on burglary through its effect on current GDP and, in turn, the association between GDP and current consumer sentiment. The results for larceny are similar to those for robbery. GDP has a direct effect on larceny and an indirect effect through its association with current consumer sentiment. Consumer sentiment has both contemporaneous and lagged direct effects on larceny, indirect effects as a leading and coincident indicator of GDP,

Figure 1. Effects of Consumer Sentiment and GDP on Robbery, Burglary, and Larceny Rates, 1970–2003



NOTES: Results shown from tables 2 and 4.

* $p < .05$; ** $p < .01$; *** $p < .001$.

THE ROLE OF CONSUMER SENTIMENT 755

and a small mediating effect on the relationship between GDP and larceny.¹⁴

These results are consistent with those from Arvanites and Defina's (2006) state-level investigation of the effects of GDP on robbery and larceny rates, but they are not consistent with their findings for burglary and motor vehicle theft. They find significant GDP effects on these offenses, and we do not. The difference in results could result from the use of differing units of analysis, time periods, estimation procedures, or model specifications. The disparate results, however, likely result from the inclusion of the consumer sentiment indicator in our analyses. Our results suggest that the subjective ICS indicator may be a better measure of crime-relevant macroeconomic conditions, at least for certain crime types, than the objective GDP indicator. But the distinction between the two indicators is arguably more than a measurement issue. The findings imply that collective economic perceptions matter as much as or more than objective economic conditions to shape the decision to engage in criminal activity.

THE 1990S CRIME DECLINE

The final hypothesis under consideration directs attention to the dramatic decline in crime rates during the 1990s (Blumstein and Wallman, 2005; Zimring, 2006). Consumer optimism and confidence rose at the same time, which suggests that public response to the 1990s economic boom may have contributed to the drop in robbery rates. After peaking in 1991, UCR robbery rates fell at an average annual rate of 7.16 percent between 1992 and 2000. Burglary, larceny, and motor vehicle theft rates fell at annual rates of 5.70 percent, 2.75 percent, and 5.16 percent, respectively, over the same period. The ICS rose over the same period at an annual rate of 4.32 percent.

The percentage reduction in robbery rates between 1992 and 2000 attributable to the ICS can be obtained by applying the ICS coefficient from table 4 ($b = -.308$) to the annual percentage change in the ICS. The increase in the ICS was responsible for an estimated 1.33 percent ($-.308 \times 4.32$) yearly drop in robbery rates, or 18.58 percent $[(1.33 / 7.16) \times 100]$ of the observed yearly reduction in robbery rates between 1992 and 2000. The contribution of the lagged consumer sentiment indicator is computed in like fashion. Combining the two effects, we estimate that the increase in consumer sentiment reduced robbery rates by 35.34 percent between 1992

14. Although we find no direct effect of GDP on motor vehicle theft, an indirect effect exists through the association between GDP and current consumer sentiment (not shown).

and 2000. The percentage reductions in each offense attributable to growing consumer confidence and optimism during the 1990s are presented in table 5.

Table 5. Percentage Reduction in Crime Rates between 1992 and 2000 Attributable to Consumer Sentiment, GDP, and Imprisonment (N = 136)

	Robbery	Burglary	Larceny	MV Theft
ICS	18.58	18.26	27.65	28.46
ICS-1	16.77	14.78	20.89	—
Subtotal	35.35	33.04	48.54	28.46
GDPs	18.92	—	39.12	—
Prison	18.67	22.71	—	23.00
Total	72.94	55.75	87.66	51.46

NOTES: “—” effect not estimated.

The results shown in table 5 suggest that consumer confidence and optimism were responsible for roughly one third of the decline in robbery and burglary rates, nearly half of the decline in larceny rates, and over a quarter of the decline in motor vehicle theft rates between 1992 and 2000. GDP growth accounted for about 19 percent of the robbery decline and 39 percent of the drop in larceny.¹⁵ The escalation in imprisonment contributed roughly one fifth to one quarter of the reduction in the three offenses for which we found a significant imprisonment effect. The joint impact of these variables accounted for just over half of the reduction in burglary and motor vehicle theft, nearly three quarters of the decline in robbery, and 88 percent of the larceny decline from 1992 to the end of the century.

Two caveats must be applied to these estimates of the contribution of consumer sentiment, GDP, and imprisonment to the decrease in robbery and property crime rates during the 1990s. First, the estimates risk bias from overfitting to the data generating them. We would have greater confidence in the accuracy of the results shown in table 5 if they were similar to those generated from data before the 1990s crime drop. Second, although statistically significant, the coefficients are estimated from 136 observations and are subject to potentially large sampling error. Rather than rely on a single, and perhaps falsely precise, point estimate, it would seem advisable to bound our estimates of the percentage reduction in robbery and property crime rates attributable to consumer sentiment, GDP,

15. The estimated impact of consumer sentiment and GDP on the crime reductions are based on the direct effects of each predictor on the crime rates and do not reflect the indirect effects discussed above.

THE ROLE OF CONSUMER SENTIMENT

757

and imprisonment with upper and lower limits obtained from the standard error of the estimates.

To address the first issue, we reestimated the model displayed in table 4 on the panel data for the period between 1970 and 1991 of generally increasing robbery and property crime rates and obtained the parameter estimates of the effects of consumer sentiment, GDP, and imprisonment (results not shown). The findings for larceny and motor vehicle theft are substantially similar to those shown in table 5, whereas those for robbery and burglary reveal somewhat smaller but still significant effects of the consumer sentiment indicators. Consumer sentiment explains about one quarter of the reduction in robbery and burglary rates during the 1990s, as compared with about one third of the reduction using the coefficients estimated from the full 1970–2003 data series. The impact of GDP on the 1990s robbery reduction increases to about 29 percent when based on the coefficient from the restricted series. The GDP effect on the burglary decline becomes significant when estimated from the restricted series, and GDP explains about 23 percent of the burglary reduction during the 1990s using this estimate. When estimated from the restricted series, the contribution of imprisonment to the robbery and burglary declines is very similar to the results shown in table 5.

To evaluate the precision of the estimated effect of consumer sentiment on the 1990s crime drop, we used the sampling errors of the consumer sentiment coefficients to construct upper and lower limits around the percentage of the 1992–2000 robbery and property crime declines attributable to the combined impact of ICS and ICS-1. Not surprisingly, given the number of data points on which they are based, the 95 percent confidence interval for the point estimates are wide. Using the upper limits of the estimates, we find that consumer sentiment explains about one half of the reduction in robbery and burglary, about three quarters of the drop in larceny, and just over one third of the drop in motor vehicle theft between 1992 and 2000. Using the lower limits of the estimates, consumer sentiment explains about 20 percent of the reduction in each offense.¹⁶

Although these checks on the sensitivity of our estimations to overfitting and sample size do not yield marked departures from the results presented above, they do warrant caution in interpreting the estimated impact of consumer confidence and optimism on the robbery and property crime declines of the 1990s. When we use the estimated effects from the 1970–1991 period, the proportionate reduction in robbery and burglary

16. Because our primary focus is on the role of consumer sentiment and to conserve space, we do not discuss the precision of the estimated GDP and imprisonment effects on the crime reductions during the 1990s. The point estimates for GDP and imprisonment, however, are no more precise than those for consumer sentiment.

attributable to consumer sentiment drops from about one third to one quarter. When based on the lower bounds of confidence intervals, the estimated impact of consumer sentiment drops to about 20 percent of the observed reductions in all four offenses; the upper bounds of course yield larger impacts. A reasonable conclusion from the sensitivity tests is that improving consumer sentiment probably contributed to one fifth to one half of the reduction in robbery and property crime during the 1990s.

OUT-OF-SAMPLE PREDICTIONS FOR 2004 AND 2005

The analyses presented thus far offer support for our hypotheses that changes in consumer sentiment had significant effects on changes in robbery and property crime rates, independent of other influences, between 1970 and 2003. It remains to be determined whether our models provide accurate predictions of crime changes occurring in 2004 and 2005.

To assess the use of the models to predict crime rate changes in 2004 and 2005, it first is necessary to determine whether they yield reasonably accurate estimates of the crime changes between 1970 and 2003. If the models do not fit the data used to generate them, they are unlikely to produce accurate out-of-sample predictions. We generated population-weighted national estimates of year-to-year change in the log crime rates from the models shown in table 4 and compare them with the observed changes in figures 2–5. The figures display the model predictions for both the in-sample and the out-of-sample time periods.

Figure 2. Year-Over-Year Change in Observed and Predicted Log Robbery Rates, 1970–2005 (Out-of-Sample Predictions for 2004 and 2005)

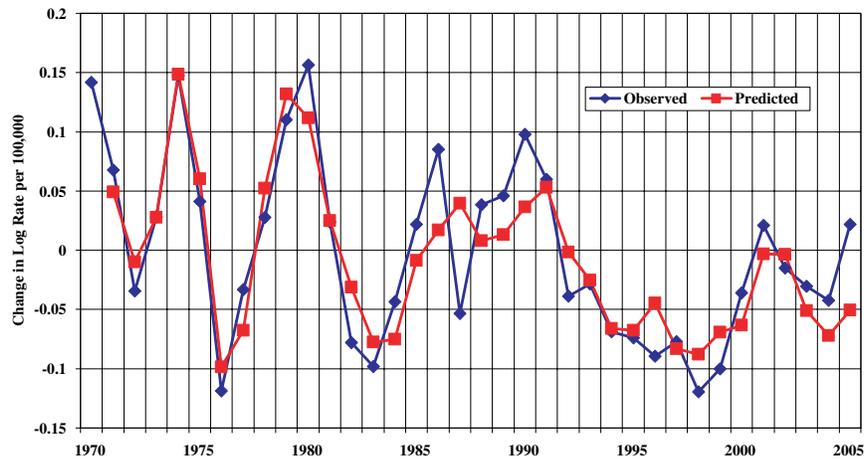


Figure 3. Year-Over-Year Change in Observed and Predicted Log Burglary Rates, 1970–2005 (Out-of-Sample Predictions for 2004 and 2005)

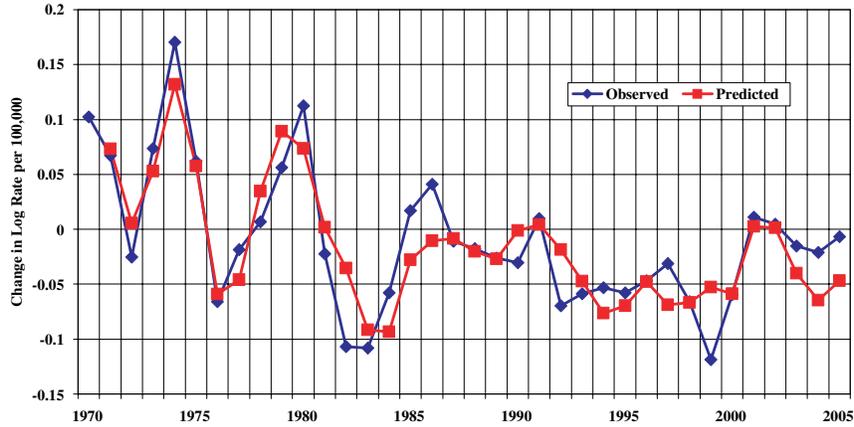
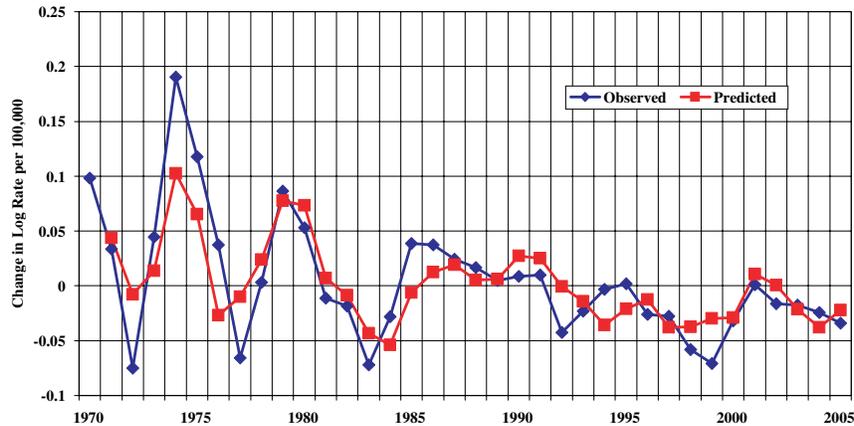
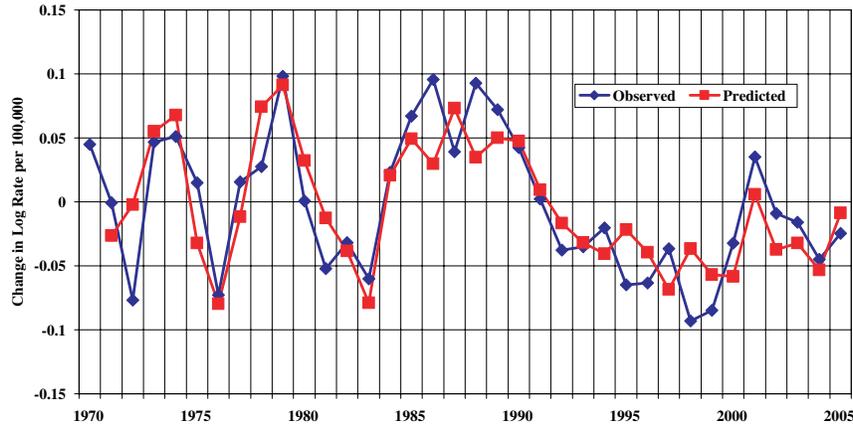


Figure 4. Year-Over-Year Change in Observed and Predicted Log Larceny Rates, 1970–2005 (Out-of-Sample Predictions for 2004 and 2005)



The figures indicate that the predicted crime changes capture the major swings in robbery and property crime rates since 1970. The predicted and observed series share the same peaks and troughs, especially in the large swings through the mid-1980s. The year-to-year fluctuations in the two series, however, often diverge in rate of change and in direction. For example, the predicted series does not pick up the 1987 drop in robbery or

Figure 5. Year-Over-Year Change in Observed and Predicted Log Motor Vehicle Theft Rates, 1970–2005 (Out-of-Sample Predictions for 2004 and 2005)



the extent of the larceny decline from 1995 to 1999. But the model estimates fit the observed crime changes closely enough to warrant their use to predict the robbery and property crime changes in 2004 and 2005.

For the out-of-sample period, we applied the 1970–2003 model parameters for consumer sentiment, GDP, and imprisonment to recent changes in these factors and compared the resulting predicted changes in crime with the observed changes in table 6. We used only the significant and sizable model estimates in this exercise to highlight the relative contribution of each factor to the predicted crime changes. The procedure is similar to our assessment of the impact of consumer sentiment and the other factors on the crime drop of the 1990s, except that the parameter estimates are applied to out-of-sample 2004 and 2005 data.

Table 6 presents predicted changes in the four offenses based on the coefficients for ICS, ICS-1, GDPs, and Prison shown in table 4.¹⁷ The predicted crime changes are the product of the coefficients and the observed changes in the four predictors. For example, the ICS increased by 8.61 percent between 2003 and 2004, which yields a predicted change in robbery for 2004 of -2.65 percent (-308×8.61). During the previous year, consumer sentiment declined by -2.23 percent, and so ICS-1 contributed $.62$ percent ($-.278 \times -2.23$) to the predicted change in robbery for 2004.

17. The Prison coefficients for robbery, burglary, larceny, and motor vehicle theft, not shown in table 4, are -285 , -276 , -073 , and -253 , respectively. All are significant at $p < .001$, except the coefficient for larceny ($p > .05$).

Table 6. Predicted Percentage Change in Crime Rates Attributable to Consumer Sentiment, GDP, and Imprisonment, 2003–2004 and 2004–2005

	Robbery	Burglary	Larceny	MV Theft
2003–2004				
Predicted				
ICS	-2.65	-2.08	-1.52	-2.93
ICS-1	.62	.44	.30	—
Subtotal	-2.03	-1.64	-1.82	-2.93
GDPs	-1.75	—	-1.39	—
Prison	-.36	-.35	—	-.32
Total	-4.14	-1.99	-3.21	-3.25
Observed	-4.10	-1.50	-2.10	-2.90
Error (P-O)	-.04	-.49	-1.11	-.35
Average Error = .50%				
2004–2005				
Predicted				
ICS	2.15	1.68	1.23	2.37
ICS-1	-2.39	-1.68	-1.14	—
Subtotal	-.24	.00	.09	2.37
GDPs	-1.39	—	-1.11	—
Prison	-.24	-.23	—	-.21
Total	-1.87	-.23	-1.02	2.16
Observed	2.90	-.50	-3.20	-1.10
Error (P-O)	-4.77	.27	2.18	3.26
Average Error = 2.62%				

NOTES: “—“ effect not estimated. Average error calculated from absolute value of crime-specific errors. Predictions estimated from 1970 to 2003 data (*N* = 136).

The combined effects of current and lagged consumer sentiment yield a -2.03 percent predicted decline in robbery between 2003 and 2004. Real GDP per capita, which grew by 3.2 percent in 2004, produced a predicted -1.75 percent drop in robbery in 2004. Finally, imprisonment, which grew a scant 1.26 percent between 2002 and 2003, contributed -.36 percent to the 2004 robbery decline. The combined effects of consumer sentiment, GDP, and imprisonment yield a predicted decrease in robbery between 2003 and 2004 virtually identical to the actual decrease of -4.1 percent.

The parameter estimates for consumer sentiment, GDP, and imprisonment yield accurate predictions of the 2004 decline in the four offenses, diverging from the observed crime changes by just over 1 percentage point for larceny and by less than 1 percentage point for the other offenses. In each instance, consumer sentiment accounts for half or more of the observed change in crime. The same is not the case, however, for 2005. The predicted 2005 decrease in burglary is very close to the observed

change (−.23 percent vs. −.50 percent). The predicted decrease in larceny of −1.02 percent is about 2 percentage points smaller than the observed change of −3.20 percent. But the predicted 2005 changes for robbery and motor vehicle theft are in the opposite direction of the observed changes. The parameter estimates imply a continuing drop in the robbery rate of −1.87 percent, whereas the robbery rate actually increased by 2.90 percent between 2004 and 2005. The parameter estimates predict a 2.16 percent increase in motor vehicle theft in 2005, whereas the motor vehicle theft rate dropped by −1.10 percent.

The results of the prediction exercise, then, are mixed. We obtained accurate predictions for changes in the four offenses in 2004 and for changes in two offenses in 2005. The model estimates do not predict correctly the direction of the 2004–2005 changes in robbery and motor vehicle theft, however, and the prediction error of nearly 5 percentage points for robbery is sizable. Given the continuing rise in the robbery rate during the first half of 2006, and resulting concerns about a turnaround in the nation's crime drop (Washington Post, 2006), these findings warrant caution in using the model estimates to predict short-run changes in robbery rates.

DISCUSSION

We have argued in this article that collective economic perceptions and attitudes influence robbery and property crime rates and have evaluated this argument using the ICS to measure variation in economic confidence and optimism over the past three decades in the United States. We find that consumer sentiment has significant negative effects on robbery and property crime rates in 1970–2003 region-level panel models, incorporating controls for other crime determinants, including unemployment and real GDP per capita. The effect of consumer sentiment on robbery rates remains significant in models that contain both measures and may interpret some of the GDP effect, which is a finding consistent with crime theories that imply *perceived* economic conditions are as important, or more important, than objective circumstances in their effect on crime rates.

We estimate that about one third of the drop in robbery and burglary rates, one half of the drop in larceny, and one quarter of the decline in motor vehicle theft during the 1990s may be attributed to improving consumer sentiment, although the estimates are the midpoints of broad confidence intervals that indicate that the true effects could be appreciably smaller or larger. Additionally, the 1970–2003 model estimates for consumer sentiment, GDP, and imprisonment yield accurate predictions for 2004 robbery and property crime rates and 2005 burglary and larceny rates but much less accurate predictions for the 2005 rates of robbery and motor vehicle theft.

THE ROLE OF CONSUMER SENTIMENT

763

Generally, our main results are robust against several sensitivity tests. Granger cause tests and instrumental variable estimations provide no evidence of simultaneity bias in the association between changes in current consumer sentiment and current crime rates. We continue to find a substantively significant impact of consumer sentiment on the 1990s crime drop when based on the coefficients estimated from the 1970–1991 data. Finally, as noted, the consumer sentiment effects remain significant in the presence of controls for changes in age and race composition, police per capita, imprisonment rates, trend and region effects, lagged crime changes, and alternative measures of economic conditions.

Our results are limited in several respects. We restricted the analysis to robbery and property crimes on the assumption that economic conditions are more likely to affect crimes with a transparent economic motivation than so-called expressive crimes, including a large proportion of homicides and serious assaults. Prior research confirms this expectation (Arvanites and Defina, 2006; Raphael and Winter-Ebmer, 2001). But whether subjective perceptions of economic distress influence economically motivated violent crimes, in addition to robbery, is still unknown. Many drug-related and felony-related homicides fall into this category, and they can be analyzed separately from other homicides using the UCR's Supplementary Homicide Data.

We have used a summary index to measure consumer sentiment, which combines perceptions of economic conditions over the preceding year with future expectations. Future research might focus on these components separately as an alternative way of evaluating consumer sentiment as a possible leading indicator of future crime rate changes.

Ideally, the effect of collective economic perceptions on crime should be evaluated with alternative crime data sources that do not rely on the reporting of crimes to the police and subsequent police recording practices. The National Crime Victimization Survey (NCVS) provides crime data based on general population surveys that are not subject to variation in crime reporting and recording. We could not use the NCVS data in the current study because region-level NCVS data have been available only since the mid-1980s. Over time, however, the NCVS should become an important alternative source of crime data for pooled time-series analyses of the effect of economic conditions on crime.

The use of a longer time series also should improve the precision of the estimated effects of economic conditions on crime. Our estimates of the impact of consumer sentiment on robbery and property crime reductions during the 1990s are contained within broad confidence intervals that encompass estimates that vary from about one fifth to nearly three quarters of the reduction in robbery and property crime rates. In addition,

the ICS data are from sample surveys subject to both sampling and non-sampling error. Although consumer sentiment likely had an appreciable impact on the crime decline, we cannot determine with confidence the magnitude of the effect. We regard this conclusion as reflecting both the weakness and the strength of the current analysis. The weakness obviously stems from the imprecision of the estimate. Future research based on a larger number of data points may be able to estimate more efficiently the effect of consumer sentiment on crime rates.

But we urge other researchers to bound their estimates of the impact of economic and other factors on crime rates, as we have, within the limits imposed by the available data and appropriate estimation methods. Given the nature of the time series under investigation, we chose an estimation method that relaxes the assumptions about the error properties of the data made by traditional OLS regression. The tradeoff for a more forgiving model is less efficient estimation and wider confidence intervals around the resulting point estimates, including those that are highly “significant.” This issue is hardly unique to the current research. Focusing only on the point estimates and accompanying p -values, which is common practice in criminology, can result in misleading interpretations of research results that misinform both criminological theory and crime-control policy. We suggest that criminologists follow the lead of biomedical researchers and routinely report the confidence intervals for the point estimates generated in research on crime and its causes.

Finally, our out-of-sample predictions for crime changes in 2004 and 2005 are on target for each offense in 2004 but not for robbery and motor vehicle theft in 2005. The mixed results for these offenses may reflect the omission of relevant covariates. Many car thefts are committed for “joy riding” without direct economic motivation. Street robbers often prey on drug dealers and buyers carrying cash and drugs (Jacobs, 2000), which suggests that indicators of illicit drug activity should be included in future studies of changes in robbery rates.

Notwithstanding these several cautions, the current results seem promising enough to warrant additional investigations of the impact of collective economic perceptions on crime rates. Our work on consumer sentiment builds on prior research to show that broad economic conditions, beyond the unemployment rate, are implicated in the crime rate changes of recent decades (Arvanites and Defina, 2006). Despite its long history in criminology, however, research on crime and economic conditions remains limited, perhaps because of continuing skepticism among many economists that crime rates respond in any systematic or substantial way to short-run changes in the economy (Cook and Zarkin, 1985). In an assessment of labor market-oriented policy interventions to reduce crime, two public

THE ROLE OF CONSUMER SENTIMENT 765

policy analysts exclude “general macroeconomic policies” from their evaluation, even though they acknowledge such policies have a “modest” effect on crime. The analysts focus instead exclusively on programs that target “high risk” people and places, which they conclude have had hardly any effect on crime (Bushway and Reuter, 2002). Our hope is that the current research will help to stimulate renewed interest by economists and other social scientists in the effects on crime rates of macroeconomic conditions in general and the role of collective perceptions of economic hardship in particular.

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THE ROLE OF CONSUMER SENTIMENT 767

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Appendix A. Index of Consumer Sentiment Items

Q1 = “We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago?”

Q2 = “Now looking ahead—do you think that a year from now you (and your family living there) will be better off financially, or worse off, or just about the same as now?”

Q3 = “Now turning to business conditions in the country as a whole—do you think that during the next 12 months we’ll have good times financially, or bad times, or what?”

Q4 = “Looking ahead, which would you say is more likely—that in the country as a whole we’ll have continuous good times during the next 5 years or so, or that we will have periods of widespread unemployment or depression, or what?”

Q5 = “About the big things people buy for their homes—such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or bad time for people to buy major household items?”

Source: Surveys of Consumers, University of Michigan (www.sca.isr.umich.edu).