
THE CONTEMPORANEOUS EFFECT OF UNEMPLOYMENT ON CRIME RATES: THE CASE OF INDIANA

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ABSTRACT

This paper examines the contemporaneous effect of unemployment on crime rates in the State of Indiana. This study uses a fixed-effect model and employs a balanced panel data of 23 sample counties in the State of Indiana from year 2006-2013. After controlling for population size and demographic, socioeconomic, and county-specific characteristics, results of this paper show that unemployment has a negative contemporaneous effect on violent crime rate and a null influence on property crime rate. This finding is consistent with the criminal opportunity effect of Cantor and Land (1985). Results of this paper also show that male and youth of age group 14-25 positively contribute to both violent crime and property crime in the State of Indiana.

JEL Classification: J60, K42

INTRODUCTION

There has been a long history of studying the relationship between unemployment and crime behaviors in economics and sociology (e.g., Bonger, 1916; Gillin, 1924; and Thomas, 1925). However, empirical studies have only obtained inconclusive results on how unemployment affects crime rates. Some researchers found that unemployment is positively related to crime rates (e.g., Raphael and Winter-Ebmer, 2001; and Lin, 2008) while others found that unemployment is negatively related to crime rates (e.g. Cohen et. al, 1980) or has no significant influence on crime rates (e.g. Kleck, 1979).

Cantor and Land (1985) indicated that previous empirical studies on the relationship between unemployment and crime rates did not reach a consensus because unemployment affects crime activities in two opposite ways. They introduced a comprehensive structural model to analyze the overall impact of unemployment on crime behaviors, including motivated offenders, suitable targets (individuals or properties), and the situation of lack of proper guardians. On the one hand, a higher unemployment rate may increase the aggregated probability of crime offenses committed because those unemployed individuals are more likely to commit crimes

in order to maintain their standard of living in the situations of lack of income. On the other hand, a higher unemployment rate slows down the circulation of people and properties. As a result, people are able to spend more time on guarding their properties. Therefore, a higher unemployment rate reduces the suitable targets of crime activities and deters crime. The former positive impact of unemployment on crime rates is known as the criminal motivation effect and the latter negative impact is known as the criminal opportunity effect. The overall effect of unemployment on crime rates depends on the magnitudes of these two opposite effects. Using the U.S. state-level panel data, Cantor and Land found that unemployment has a negative contemporaneous effect on crime rates while in the long run unemployment is more likely to have a positive effect on crime rates.

The objective of this research is to analyze the contemporaneous effect of unemployment on crime rates in the State of Indiana. This study employs a balanced panel dataset of 23 sample counties in the State of Indiana during year 2006-2013. After controlling for population size, demographic, socioeconomic, and county-specific characteristics, results of the regression model show that unemployment has a negative contemporaneous effect on the violent crime rate and a null effect on the property crime rate, which are consistent with the work of Cantor and Land (1985). Furthermore, this study shows that the numbers of male and youth are positively correlated with both the violent crime rate and the property crime rate. This paper contributes to the existing literature by providing further evidence for the negative contemporaneous effect of unemployment on crime rates to support the criminal opportunity effect theory. To the best of our knowledge, this work is the first to study how unemployment affects crime rates in the State of Indiana. It is appropriate to conduct a regional study to examine the relationship between unemployment and crime rates using county-level data within a state because the unemployment rate and crime rates are associated with geographic-specific features and socioeconomic characteristics of a region (Buonanno and Montolio, 2008; and Frederick et. al., 2016). Moreover, since law enforcement is usually implemented locally within a jurisdiction, the empirical results of this study provide practical insights for the policy makers in the State of Indiana.

The rest of this paper proceeds as follows. Section 2 reviews the related literature. Section 3 presents the econometric model. Section 4 describes the data. Section 5 discusses the empirical results. Section 6 concludes.

RELATED LITERATURE

According to Cantor and Land (1985), unemployment influences crime rates in two opposite ways through the criminal motivation effect and the criminal opportunity effect. Whether unemployment positively or negatively affects crime rates depends on the magnitudes of these two effects. In the short run, the overall impact of unemployment on crime rates tends to be negative: the criminal opportunity effect is likely to be more significant than the criminal motivation effect because unemployment reduces the circulation of people and properties and consequently brings down the potential number of victims and targeted properties. Conversely, in the long run, the overall impact tends to be positive because the longer an individual is unemployed, the more likely that the individual is going to commit a crime in order to maintain the same standard of living.

In addition to unemployment rate, other factors such as population size, demographic characteristics, and socioeconomic status of the residents also affect the crime rate of a region. For example, Nolan (2004) found that there is a positive relationship between the population size and the crime rate of a jurisdiction. A number of theoretical and empirical studies have confirmed that socioeconomic and demographic characteristics affect the crime rate of a jurisdiction as well (e.g., Ehrlich, 1973; and Entorf and Spengler, 2000). For example, Entorf and Spengler (2000) found that the number of youth between age 15-24 years old is positively related to crime rates in Germany.

Moreover, other exogenous variables such as environmental parameters and law-enforcement activities also affect crime rates. These factors are not included in the model specification of this paper. Environmental data such as temperature, rainfall, and pollution are not included because the variations in these variables are not well captured by the yearly level data. Variables of law-enforcement activities are not included due to data unavailability. Instead, a fixed-effect model is employed to capture county-specific characteristics to replace these exogenous variables.

EMPIRICAL MODEL

The following model was used to explore the impact of unemployment and other factors on various types of crime rates

$$Crimerate_{it} = \beta_0 + \beta_1 Unemp_{it} + \beta_2 Pop_{it} + \beta_3 Male_{it} + \beta_4 Age_{it} + \beta_5 White_{it} + \beta_6 Edu_{it} + \beta_7 Poverty_{it} + \beta_8 Medhhinc_{it} + \beta_9 Medhhval_{it} + \beta_{10} Medhhval_{it}^2 + \delta_i + \varepsilon_{it} \quad (1)$$

where i is the county indicator and t is the time indicator. ε_{it} is the error term. captures the unobserved county-specific characteristics. The dependent variable, *Crimerate*, is the rate of all types of crime offenses, violent crime offenses, and property crime offenses committed per 100,000 residents in a county, respectively. Based on the Uniform Crime Reporting (UCR) Program of the Federal Bureau of Investigation (FBI), there are seven types of crime activities: murder, rape, robbery, aggravated assault, burglary, larceny-theft, and motor vehicle theft and arson. Violent crime is composed of the first four types and property crime includes the last three types. *Unemp* is the unemployment rate in a county.

This model also includes variables of demographic and socioeconomic factors. Variables such as population (*Pop*), gender (*Male*), age (*Age*), race (*White*), and education level (*Edu*) are included to capture the demographic characteristics of a county. *Pop* is the number of residents in a county measured in thousand. *Male* is the number of male residents in a county measured in thousand. *Age* is the percentage of residents belonging to five age groups, including less than or equal to 14 years old, between the age of 15-24, 25-39, 40-59, and equal to or greater than 60 years old. *White* is the percentage of residents who are white. *Edu* captures the highest education level attained among the population of age 25 and above, including high school dropout, high school diploma, associate degree and some college, bachelor degree, and graduate degree and professional degree, measured in percentage.

Four variables, *Poverty*, *Medhhinc*, *Medhhval*, and *Medhhval*² are included to

capture the socioeconomic status of a county. *Poverty* is the percentage of households whose annual income is below the poverty line in a county. *Medhhinc* is the median household income measured in thousand dollars. *Medhhval* and *Medhhval*² are the median property value in a county and the squared term of the median property value, respectively, both measured in thousand dollars.

DATA AND DESCRIPTIVE STATISTICS

The crime data was obtained from FBI. The rest of the data was obtained from the American Community Survey (ACS) of the U.S. Census Bureau. All the data are at the yearly level. A balanced panel dataset was constructed to include 23 sample counties in the State of Indiana during year 2006-2013 with a total number of 165 observations. These 23 sample counties are the most densely populated ones in the State of Indiana. The average population of these counties is 205,600 with an average unemployment rate of 8.452% across all the years. The average crime rates are 0.0994%, 0.0315%, and 0.0678% per 100,000 residents for total crimes, violent crimes, and property crimes, respectively. Demographically, the majority of the population in these counties is white, which composes 82.86% of the total population. The minority groups count as 17.13% of the total population. Regarding the population age, there are more people in the age group of 40-59 and fewer people in the age group of 15-24. Among the population of age 25 and above, 33.74% are high school dropouts, 15.97% have a high school diploma, 9.55% have an associate degree or some college education, 12.15% have a bachelor's degree, and 28.59% have a graduate or professional degree. The average poverty rate is 14.90% among all the counties. On average, the median household income is \$47,790 per year and the median property value is about \$127,600. Table 1 provides the means, standard deviations, maximum values, and minimum values of all the variables.

ESTIMATION RESULTS

The estimated results of Model (1) are presented in Table 2. It shows that unemployment has a negative impact on the violent crime rate, as shown in Column (2) of Table 2. If the unemployment rate increases by 1%, the violent crime rate decreases by 0.000411% per 100,000 people and this result is significant at 5% level. In other words, there tend to be 41.1 fewer cases of violent crime offenses per year if the unemployment rate increases by 1%. This result is in accordance with Cantor and Land (1985) that there is a negative contemporaneous effect of unemployment on crime rates: the criminal opportunity effect exceeds the criminal motivation effect in the short run regarding the violent crime rate. This is because during unemployment people are less likely to be outside but more like to stay within their properties. Therefore, a higher unemployment rate reduces the number of potential targets of violent crime activities. This study found that there is a null effect of unemployment on the total crime rate and the property crime rate, which is shown in Column (1) and Column (3) of Table 2, respectively. These results imply that in the short run, the criminal opportunity effect and the criminal motivation effect may have the same magnitude in terms of the total crime rate and the property crime rate.

The empirical results of this paper also show that males positively contribute to crime rates. On average, if the number of male residents increases by 1000, there tends to be 0.00381% more total crime offenses committed per 100,000 population. In other words, there tend to be 381 more cases of total crime offenses committed if a county holds 1000 more male residents, *ceteris paribus*. Specifically, having 1000 more males leads to 174 and 206 more violent and property crime offenses, respectively. These results are significant at 5% level. This result is consistent with previous studies that males positively contribute to crime rates.

Furthermore, compared to the baseline age group of 25-39, people in the age group of 15-24 are more likely to commit crimes. A 1% increase in the age group of 15-24 leads to a 0.00324% increase in the total crime rate, a 0.00122% increase in the violent crime rate, and a 0.00202% increase in the property crime rate, respectively. In other words, if the number of people in group 15-24 increases by 1%, there tend to be 324 more cases of total crime offenses, 122 more cases of violent crime offenses, and 202 more cases of property crime offenses, respectively. These results are significant at 1%, 5%, and 5% level, respectively. This finding is consistent with previous studies that youth positively affects crime rates.

Other factors such as population size, race, education level, and socioeconomic status do not have a significant impact on crime rates in the case of the State of Indiana. This is because the data used in this study are at the aggregated level. For example, although education level is more likely to have a deterrence effect on the potential crime activities conducted by an individual from the perspectives of human capital accumulation and the cost-benefit analysis of legal and illegal incomes, the same result may not hold true on the aggregated level. Intuitively, a town with a relatively lower education level is not necessarily less safe compared to a town with a relatively higher education level, holding other things equal. For example, Trumbull (1989) found that education negatively influences crime rates when using individual-level data; while using aggregated data, education has a null influence on crime rates.

CONCLUSION AND DISCUSSION

This paper uses a fixed-effect model to analyze how unemployment affects crime rates at the yearly level in the State of Indiana. Using a balanced panel dataset of 23 sample counties during year 2006-2013, results of this study show that there is a negative contemporaneous effect of unemployment on violent crimes, after controlling for demographic, socioeconomic, and county-specific characteristics. It is also found that males and youths of age 14-25 positively contribute to both violent crimes and property crimes.

Results of this research provide empirical evidence to support the criminal opportunity effect theory. This study offers insights for law-enforcement sectors and policy makers in the State of Indiana. In order to reduce the crime rate, more crime deterrence policies should be focused on specific groups such as youth and male. A limitation of this paper is that results of this study only reveal the contemporaneous effect of unemployment on crime rates in the State of Indiana. Further studies would be necessary to examine the long-term impact of unemployment on crime rates.

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TABLE 1. DESCRIPTIVE STATISTICS

VARIABLES	N	mean	s.d.	min	max
<u>Crime rate (per 100,000 residents)</u>					
Total Crime Rate	165	0.0994	0.145	0.0128	0.718
Violent Crime Rate	165	0.0315	0.0538	0.00270	0.267
Property Crime Rate	165	0.0678	0.0917	0.00964	0.458
<u>Unemployment rate</u>					
	165	8.452	2.744	3	16.10
<u>Demographic</u>					
Population (in thousand)	165	205.6	187.1	68.26	928.3
Male (in thousand)	165	100.6	90.24	32.63	447.9
<u>Race</u>					
% White	165	82.86	9.105	54.80	94.77
% Others	165	17.13	9.094	5.233	45.30
<u>Age</u>					
% ≤ 14 yrs old	165	19.83	2.461	13.20	25.70
% 15 - 24 yrs old	165	15.63	5.281	10.50	32.90
% 25 - 39 yrs old	165	19.43	1.777	14.50	24
% 40 - 59 yrs old	165	27.01	2.425	19.60	30.80
% ≥ 60 yrs old	165	18.11	2.810	10.60	24.20
<u>Education level (25 yrs and older)</u>					
% High school dropout	165	33.74	5.773	15.50	44.30
% High school diploma	165	15.97	5.681	8.400	38.50
% Associate degree/some college	165	9.547	4.214	4.400	23.70
% Bachelor degree	165	12.15	3.829	3.200	22.60
% Graduate/professional degree	165	28.59	2.781	22.30	34.20
<u>Socioeconomic status</u>					
% Below Poverty	165	14.90	5.350	3.600	27.30
Median Household Income (in thousand)	165	47.79	10.80	34.52	85.57
Median House Value (in thousand)	165	127.6	29.52	80.60	225

TABLE 2. REGRESSION RESULTS

<i>Variables</i>	<i>(1) Crime rate</i>	<i>(2) Violent crime rate</i>	<i>(3) Property crime rate</i>
Population	-0.00114 (0.000618)	-0.000308 (0.000228)	-0.000834 (0.000458)
Unemployment	-0.000359 (0.000353)	-0.000411** (0.000155)	5.24e-05 (0.000292)
Male	0.00381** (0.00152)	0.00174** (0.000797)	0.00206** (0.000969)
White	-0.00247 (0.00138)	-0.00136 (0.000860)	-0.00112 (0.000810)
≤ 14 yrs old	0.00325 (0.00187)	0.000881 (0.000812)	0.00237 (0.00138)
15-24 yrs old	0.00324*** (0.00115)	0.00122** (0.000551)	0.00202** (0.000857)
40-59 yrs old	-0.000344 (0.000677)	-0.000329 (0.000314)	-1.43e-05 (0.000571)
≥ 60 yrs old	-0.000973 (0.00129)	2.36e-05 (0.000316)	-0.000997 (0.00120)
High school diploma	-0.000658 (0.000613)	-0.000163 (0.000204)	-0.000495 (0.000467)
Associate degree	-0.000739 (0.000763)	-0.000154 (0.000334)	-0.000585 (0.000526)
Bachelor degree	0.000461 (0.000612)	0.000457 (0.000346)	4.28e-06 (0.000358)
Graduate degree	-0.00118 (0.000890)	-0.000235 (0.000342)	-0.000944 (0.000653)
Median hh income	0.000430 (0.000305)	4.19e-05 (0.000119)	0.000388 (0.000235)
Median property value	0.000703 (0.000701)	0.000439 (0.000269)	0.000264 (0.000514)
Median property value ²	-2.59e-06 (2.37e-06)	-2.17e-06 (1.07e-06)	-4.17e-07 (1.72e-06)

Poverty rate	-0.000250 (0.000352)	2.41e-07 (0.000187)	-0.000250 (0.000216)
Constant	-0.106 (0.133)	-0.0978 (0.0526)	-0.00852 (0.104)
Observations	165	165	165
R-squared	0.300	0.283	0.316
Number of id2	23	23	23

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05.

