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Are Gangs an Alternative to Legitimate Employment? Investigating the Impact of Labor Market Effects on Gang Affiliation

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Abstract: This paper adds to the literature estimates of local labor market effects on gang participation. I use data from the 1997 cohort of the National Longitudinal Survey of Youth (NLSY97) to model the probability of gang involvement. The effect of the local unemployment rate is statistically significant and positive, across a wide-range of model specifications. However, robustness checks reveal gang participation of individuals less than sixteen years-of-age (the legal minimum age for most jobs) is not responsive to the local unemployment rate. Gang participation among individuals with lower ASVAB scores is more sensitive to the local unemployment rate.

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1. Introduction

Street gangs are a common element of the urban landscape. The U.S. Department of Justice estimates there are 21,500 gangs, with 731,500 members, currently operating in the United States.[1] Gangs are thought to be the leading distributors of illegal drugs and to account for approximately six percent of all violent crime in the United States.[2] Deterrence of gang activity through policing is often ineffective because law enforcement officials can not control the factors generally attributed to gang participation, such as poor economic opportunity, inadequate family structure, and cultural isolation (Jankowski 1991; Padilla 1992; Klein 1995; Hagedorn 1998).[3]

A key empirical question yet to be answered is whether gang participation depends on economic incentives. Members of the crack-selling gang that Levitt and Venkatesh (2000) study faced life-threatening working conditions, but generally made little more than the minimum wage. The authors postulate that the possibility of future financial gain motivates gang members, but they also admit that, given their bizarre results, gang participation may be inconsistent with utility-maximizing behavior. With a few exceptions, sociology studies have completely rejected a rational-agent framework to explain gang participation.[4]

The literature shows a negative relationship between wage incentives and youth criminal behavior (Grogger 1998; Gould et al. 2002). However, it is difficult to separate

[1] Statistics from the Dept. of Justice (2005 National Gang Threat Assessment).
[2] Ibid.
[3] Los Angeles mayor Antonio Villaraigosa recently stated, "there is a connection between poverty, low education levels, lack of job opportunities and gang membership," and he went on to say that, "these root issues needed to be addressed as part of a solution to gang violence in the United States and elsewhere" (BBC News).
[4] Jankowski (1991) insists that gang participation is the product of rational calculation. Padilla (1992) espouses a similar theoretical construction of gang participation. However, most gang researchers, such as Hagedorn (1998), have not adopted a rational agent theory of gang participation but rely on more traditional sociological theories.

the economic return of gang membership from the potential return to individual criminal activity, because many gangs may not be organized sufficiently to reduce transaction costs in an illicit market (Klein 1995; Hagedorn 1998). The local unemployment rate may be a better predictor of gang participation than prevailing market wages because young people are likely to be qualified only for low-paying jobs in the service economy, which generally are the least stable (Wilson 1987; Hagedorn 1998).

I exploit exogenous variation in unemployment rates across time and counties to identify the effect of economic incentives on gang participation.[5] I estimate the probability of gang involvement for males with data from the 1997 cohort of the National Longitudinal Survey of Youth (NLSY97).[6] The NLSY97 is a unique data set for the study of youth gang activity in the United States because it annually collects detailed information on gang participation and is both nationally representative and current. The NLSY97 also collects extensive information on family, community, and individual characteristics (including detailed criminal activity for each year of the survey), which many other studies of youth criminal behavior lack (See Mocan and Rees 1999).

I also examine the effects of economic incentives on the gang participation of different age groups. The age profile of gang members in the NLSY97 suggests that individual gang careers are relatively short-lived, which is important, because it also implies that gangs require a steady supply of new recruits to remain extant. FIGURE 1A shows gang participation rises until age sixteen, which is also the minimum legal age required to work most jobs, and then gradually declines. It is possible that many individuals are unable to find legitimate employment before age sixteen, perhaps because

[5] Gould et al. (2002) use average local wages of young men. However, this data is not collected annually.
[6] Much of the early literature on crime and economic conditions investigates the effect of unemployment on crime rates (e.g., Cantor and Land 1985).

of age requirements or transportation constraints, and join gangs to generate income (or pass the time). After age sixteen, the opportunity cost of gang participation may be higher because legitimate economic opportunities are more plentiful.

In an extension, I examine the relationship between economic opportunity and cognitive ability, as measured by ASVAB scores from the NLSY97, on gang participation. Disparity in cognitive ability, which has already been linked to criminal behavior (see Wilson and Hernstein 1985), provides a possible explanation for the variance in gang participation among individuals from similar socio-economic backgrounds.

The degree of diversity among both gangs and the communities in which gangs operate makes it difficult to construct generalizable public policies meant to deter gang activity. The analysis presented here advances the etiological discussion, as to the impact of economic opportunity on gang participation in the United States. Consistent with many earlier studies of economic incentives and criminal behavior, a statistically significant and positive relationship is found between gang participation and the local unemployment rate.[7] The most notable result in support of gang affiliation being a rational economic decision is that the local unemployment rate only affects individuals who are at least sixteen years old. I also find that gang participation among individuals

[7] Among gang researchers, there is contention as to whether the definition of a gang should include criminal or deviant behavior. This is because all groups who engage in criminal activity (i.e. lynch mobs, unruly sports fans, etc.) should not necessarily be categorized as gangs. Furthermore, time spent committing crimes--assault, robbery, murder, rape, extortion, distributing illegal drugs, and burglary--generally associated with gangs and gang members, constitutes a relatively small fraction of gang activity (Klein 1995; Jankowski 1991; Hagedorn 1998). This presents an obstacle to the gang researcher, as well as agencies reporting crime statistics associated with gangs. Because this study is limited to the examination of existing survey data, I follow the survey's specific definition for a gang. I discuss the gang definition at length in Section 3. See Klein (1995, ch. 2) for an overview of the debate on the definition of a gang.

with lower measured cognitive ability is particularly sensitive to local labor market conditions.

The rest of the paper is organized as follows. Section 2 outlines the theoretical framework for gang participation. Section 3 describes the data and specific variables used in the analysis. The econometric strategy used to estimate the probability of gang membership is explained in Section 4. The results of the analysis are presented in Section 5. Section 6 provides an extension of the gang participation model to include a measure of cognitive ability. Section 7 concludes.

2. Theoretical Background

For the past 80 years, ethnographic research has linked the behavioral patterns of the urban under-privileged to street gang formation and manifestation (e.g., Thrasher 1927; Short and Strodtbeck 1965; Moore 1978; Horowitz 1983; Padilla 1992; Klein 1995; Hagedorn 1998; Venkatesh 2000). With the aid of an extraordinary financial record, Levitt and Venkatesh (2000) present the only detailed economic analysis of a drug-selling street gang. The data set used by Levitt and Venkatesh (2000) also corresponds time-wise with the emergence of the "corporate-gang structure" in Chicago, where highly organized gangs marshaled to take advantage of the lucrative crack-cocaine trade. Levitt and Venkatesh (2000) find that the average wage (percentage of profits) for gang members is just above that of the legal market. Yet, income variation within the gang is "highly skewed", and similar in proportion to the wage disparity found in legal franchises, where the vast majority of gang members earn approximately the minimum

wage (Levitt and Venkatesh 2000).[8] The authors also report an average annual mortality rate of seven percent for gang members during the sample period (Levitt and Venkatesh 2000).

The findings of Levitt and Venkatesh (2000) are peculiar, given the disparity between economic return and risk-of-death for gang members. It is important to note that residents of the gang's neighborhood during the sample period also report extreme levels of poverty and unemployment rates as high as 35 percent (Levitt and Venkatesh 2000). Approximately 40-50 percent of the "foot soldiers" in the gang are legally employed at any time during the sample period (Levitt and Venkatesh 2000).[9] Since so many gang members are simultaneously employed in the legal sector, the authors postulate that gang participation may be responsive to changes in legitimate labor market opportunities (Levitt and Venkatesh 2000). Levitt and Venkatesh (2000) conclude that the potential for future financial gain provides the economic impetus to join and stay in the gang. However, the authors' results are limited to a single entrepreneurial gang, which may not be an accurate representation of gang activity across the United States.[10]

Labor Market Effects on Criminal Participation

According to the economic model of crime, rational agents commit crimes when the expected benefits of doing so outweigh the expected costs (Becker 1968).[11] Grogger (1998) estimates a structural model of the economic return to crime (compared to

[8] Padilla (1992) and Bourgois (2003) report similar findings in their ethnographic studies.
[9] The term "foot soldiers" refers to average street-level-drug dealers for the gang.
[10] In another article, Venkatesh and Levitt (2000) chronicle the history of a Chicago gang from one centered on fictive kinship to a full-fledged illicit enterprise during the crack epidemic of the 1990's.
[11] See Ehrlich (1973, 1975, 1996) and Levitt (1996, 1997, 1998a) for studies that estimate the impact of deterrence measures on criminal activity.

legitimate employment), using data from the 1979 cohort of the NLSY (NLSY79), for young males and concludes that a rise in youth crime rates could be attributable to a decrease in earnings of male youths. Grogger (1998) shows that poor youth labor market conditions may account for the hump-shaped relationship between crime and age.[12] Grogger (1998) also concludes that the high incidence of black criminal offenders may be a result of the black/white earnings gap. Williams and Sickles (2002), with data from a 1968 Philadelphia birth cohort, extend Grogger's (1998) framework to include proxy measures of social capital, and report a negative relationship between individual earnings capacity and criminal activity.

In both Grogger (1998) and Williams and Sickles (2002), crime is modeled as "work" and therefore is associated with disutility through reduction of leisure time. The "crime-as-work model" best predicts criminal behavior that generates economic return (i.e. drug-dealing, burglary, robbery).[13] However, gang participation does not always imply the gang member receives remuneration from gang crimes (in fact, it does not necessarily imply criminality of the individual), because many gangs may not be well enough organized to offer members economic rents.[14] It is possible that gang participation is a more subtle economic decision, which also is influenced by the utility from social interactions with friends (other gang members) and/or an ethnic bond with a

[12] Criminal behavior has been observed, in a wide range of environments, to rapidly increase in adolescence and gradually decline\ in adulthood (Hirschi and Gottfredson 1983).

[13] See Block and Heineke (1975). Kelly (2000) gives an empirical test of several criminological theories and finds that the economic model crime is a good predictor of property crime rates.

[14] Institutionalized or culturally entrenched gangs often become criminal business enterprises, which provide economic opportunity for gang members (Hagedorn 2006). Hagedorn (1998) in a 2nd edition to a study from the 1980's in Milwaukee finds crack-cocaine very quickly became an enterprise in which gang members profited greatly. This is a relatively recent trend, as many studies in the gang literature assert that most street gangs are not entrepreneurial, and less still are organized sufficiently to sustain a profitable drug business (e.g., Decker and Van Winkle 1994; Klein 1995).

certain group.[15] Hence, gang participation could be both "work" and leisure (taking drugs and hanging out with other gang members). Nevertheless, the decision to spend one's time hanging out with gangsters and/or "working" at criminal enterprise is to eschew legitimate employment.

In contrast with Grogger (1998) and Williams and Sickles' (2002) studies of crime, I examine the effect of local unemployment on gang participation. My hypothesis is that the local unemployment rate is positively related to male gang participation, as the availability of legitimate jobs is a key indicator of economic prospects for low-skilled workers. I take advantage of exogenous variation in annual county unemployment rates to capture this effect.[16] To lend more credence to the estimates I also include other variables suggested by the gang literature that theoretically influence the gang participation decision.

3 Data

I use data from the 1997 cohort of the National Longitudinal Survey of Youth (NLSY97), which is collected annually to document the educational and labor market experiences of a cohort of youths who were born between 1980 and 1984. The NLSY97 also collects information on a wide array of demographic, family, and personal characteristics. The survey is designed to be representative of the population aged 12-16 living in the United States in 1997. There were 8,984 individuals in the initial sample of the NLSY97, composed of 6,748 respondents reflecting the overall racial/ethnic makeup of the population in 1997, with an over-sample of 2,236 Black and Hispanic respondents.

[15] Padilla (1992) notes how cultural kinships can promote the cohesiveness necessary to maintain successful illicit enterprises, such as drug trafficking and distribution.
[16] Levitt (2001) recommends a similar strategy to identify the unemployment/crime relationship.

The NLSY97 offers a rich set of variables related to criminal activity for each year of the survey. Few studies of youth crime have used data as comprehensive as the NLSY97.[17] For example, Grogger (1998) uses nationally representative data from the NLSY79, but only has one year of data on criminal activity.

The NLSY97 defines a gang as the following:

> By gangs, we mean a group that hangs out together, wears gang colors or clothes, has set clear boundaries of its territory or turf, protects its members and turf against other rival gangs through fighting or threats.

Using this definition of a gang, respondents provide information on gangs for each year of the survey including gang activity in the respondent's neighborhood or school and whether the respondent has ever been in a gang. If respondents answered yes to the latter, then they were asked the age they first joined a gang and whether they had been in a gang in the last twelve months. From this information, I created the key outcome variable, a dummy variable for respondents who admit ever being in a gang and also admit gang activity in the last twelve months. So, a person who admits gang activity, but not in the last twelve months, will receive a zero for that observation-year, the same as a person who never admits gang activity. This specification measures only current gang participation and incorporates the behavior of individuals who sporadically participate in gangs.[18]

[17] A notable exception is Mocan and Rees (1999).
[18] This type of behavior has been documented by Jankowski (1991) and Bourgois (2003).

Respondents who admit gang activity, at some point in their lives, constitute 12.24 percent of the initial sample of 8,984. Of these 12.24 percent who report gang activity, 71.7 percent are male, 24.7 percent are Hispanic, and 34.7 percent are Black.[19] After deleting observations with missing values, 55.9 percent of the sub-sample who ever report gang membership also report gang activity within the last 12 months of completing a survey.[20] Males reporting current gang membership account for 5.28 percent of the initial sample of 8,984 respondents in the NLSY97.[21] The sample retention rate for male gang members in the NLSY97 (95.99 percent as of the 2003 survey) is higher than the rest of the NLSY97 sample (86.33 percent as of the 2003 survey).

Although the definition of a gang in the NLSY97 does mention fighting and intimidation, it does not specifically address the criminal nature of the gang. Unfortunately, the NLSY97 does not supply information on crimes directly attributable to gang activity (i.e. those activities directed by the gang). However, TABLE 1 shows that the self-reported incidence of drug-dealing among male gang members is over five-times greater than the rest of the sample and that the incidence of theft is almost ten-times greater. According to TABLE 1, gang members also appear to be considerably more violent than the population of people not currently in a gang.

TABLE 2 displays sample means. Because ethnic minority groups are the primary progenitors of gangs in the United States (Thrasher 1927; Horowitz 1983; Jankowski 1991; Padilla 1992; Klein 1995; Venkatesh 2000; Hagedorn ed. 2006), I control for the

[19] The average age reported for first joining a gang was thirteen.
[20] There were 641 (58.3 percent of the sub-sample of respondents who had ever reported gang activity) respondents who admitted gang participation in the last twelve months. List-wise deletion left 455 (out of 474) male respondents or 70.9 percent of those who had admitted gang activity in the last twelve months.
[21] For the rest of the paper, I will refer to persons admitting gang membership in the last twelve months of a survey simply as gang members.

race of respondents with the dummy variables *black* and *hispanic*. The *age* of respondents is a control for the potential biological effects of age on gang participation (Hirschi and Gottfredson 1983).[22] FIGURE 1A shows that gang participation rapidly increases in early adolescence and gradually declines in early adulthood. It is likely that gangs experience high member-turnover rates as a result of relatively short individual gang careers. Public policies that inhibit individual gang participation (particularly initial gang participation) are likely to generate positive results because gangs need new members to remain viable. FIGURE 1B depicts a steady decline of male gang activity as the survey progresses, which is probably due to the aging of respondents but could also be attributable to the increasing economic well-being that often accompanies getting older. However, the decline of gang members in the sample does not appear to be a result of more rapid attrition from the sample, as evidenced by the high retention rate among male gang members.

I use the continuous annual county *unemployment rate* as a proxy for the relative scarcity of legitimate employment. Wilson's (1987) influential study cites a lack of opportunity for low-skilled workers in the post-industrial economy and the resulting unemployment (or underemployment) of those workers as the fundamental cause of urban poverty in the United States.[23] In the counties of residence for gang members between the ages of fourteen and twenty-three, FIGURE 2 shows the *unemployment rate* is greater than or equal to the *unemployment rate* in the counties of residence for non-gang

[22] According to Thrasher (1927) most young gang members would mature out of the gang and either move on to organized crime or to legitimate work.

[23] Wilson (1987, 1996) and Freeman (1991, 1996) also illustrate that unemployment (or underemployment) of young adult males in the service economy is the primary contributor to many of the problems endemic to poor neighborhoods such as high crime rates, disproportionate numbers of unwed mothers (i.e. female-headed households), abnormally high incidence of drug and alcohol addiction, inadequate schools, and persistent welfare dependency of the population.

members. FIGURE 1A shows gang participation peaks for NLSY97 respondents at age sixteen, the minimum legal working age for all non-hazardous occupations, and then begins to decline. The rise in gang participation until age sixteen could be the result of economic opportunity provided by gangs to those unable to find legitimate employment. The decline in gang participation after age sixteen could be due to the increased availability of legitimate employment for that age group.

A relative scarcity of public resources such as community centers, youth counseling services, police protection, and even churches and schools necessary to service large populations is endemic to urban ghettos where street gangs flourish (Jacobs 1961; Jankowski 1991; Anderson 1999; Venkatesh 2000; Bourgois 2003). I account for available community resources with the variable *doctors*--the number of doctors per 100,000 county residents. The neighborhoods where gang activity is prominent are also crime ridden, which I control for with the variable *crime rate*--serious crimes per 100,000 residents of the respondent's county of residence.

To control for the potential effect of not having a male figure present in the household, the variable *father* is included which is a dummy for whether the respondent was living with his father (or father figure) at the time of the first survey-year. I also use self-reported measures of the respondent's exposure to violent situations before entering the NLSY97 survey with the variables *shot* and *bully*.[24] Similarly, Williams and Sickles (2002) use youth arrests and family criminal history to predict adult criminal involvement. TABLE 1 illustrates the differences in home and neighborhood environment

[24] *shot* is a dummy variable for whether the respondent had witnessed someone being shot before the respondent was 12 years of age. The variable *bully* is a dummy for whether or not age the respondent had been bullied by someone in his neighborhood before the he was twelve-years-old. The NLSY97 provides information on each of these two occurrences for all survey years. However, to minimize problems with endogeneity, I have included only the occurrences which pre-date the first survey.

for gang members and non-gang members. Gang members report an astonishingly high rate of gun violence (34.9 percent) in their childhood environment compared with non-gang members.[25] The rate of fatherless homes is also much higher among gang members than for non-gang members.

TABLE 1 indicates neither school enrollment nor labor force participation is mutually exclusive of gang participation, which is consistent with the findings of Levitt and Venkatesh (2000). The frequencies for school participation and labor force participation are also much lower for gang members than non-gang members. I include school *enrollment* to control for social access to gang activity: gangs could be operating in schools or high school drop-outs could be more exposed to gang activity.[26] The respondent's *highest-grade-completed* is a control for human capital acquisition. Gang members report an average of 9.5 for *highest-grade-completed*, while non-gang members report an average of 10.5 for *highest-grade-completed*.[27] There is a potential for omitted variable bias with the education variables, because ability is possibly correlated with educational attainment and delinquency is perhaps correlated with enrollment. It could be that gang members, on average, are less employable than the rest of the population and sort into gangs because they have a lower opportunity cost for committing crimes. I address this potential issue in section 6.

[25] This statistic may seem unreasonably high. However, Katz et al. (2005) in an analysis of the Moving to Opportunity (MTO) Experiment in Boston report approximately 25 percent of households they study contained a member who had been "assaulted, beaten, or shot within the past six months."

[26] The NLSY97 does ask respondents if gangs are present in their neighborhood or school. Whether or not gangs are in a respondent's neighborhood could represent a resource constraint for gang participation. However, the question was not answered by a large segment of the respondents for the years 1998 and 1999. I employed a model-based univariate imputation technique using the statistical package STATA to account for the missing observations. I then estimated a selection equation based upon the assumption that the sample was selected on whether or not a gang was present in the respondent's neighborhood. However, the final results were not significantly different from the ones I report later in the paper; so, I have omitted these estimates.

[27] This could also be attributable to gang members being, on average, half a year younger than non-gang members.

4 Econometric Method

I use a logit specification to estimate the probability of gang participation in a given year. The equation below characterizes the basic econometric model of gang participation:

$$Gang_{i,t} = \beta_1 + \beta_2 X_{i,t} + \beta_3 \Gamma_i + \beta_4 \Phi_i + \beta_5 unemployment_{i,t} + \beta_6 D_t + \beta_7 state_{i,t} + \beta_8 D_t * state_{i,t} + e_{i,t}.$$

$Gang_{i,t}$ is a (0,1) indicator for current gang participation; X is a vector of respondent *i's* individual characteristics in time *t*; Γ is a vector of characteristics which indicate family composition; Φ is a vector of variables which measure the level of crime and violence in the individual's childhood environment; $unemployment_{i,t}$ is a continuous unemployment rate for person *i's* county of residence; D_t is a vector of time dummies; *e* captures the idiosyncratic utility attributable to gang participation and is assumed to follow a standard logistic distribution. I include state dummy variables and state-time interactions because some states have a long history of gang problems (e.g., California, Illinois, and New York) and over time have developed their own strategies to combat gang crime.[28]

5 Results

[28] For instance, Grogger (2002) studies the effects of civil gang injunctions, a new anti-gang tactic, implemented in Los Angeles. Civil gang injunctions are meant to "prohibit specifically named individuals from engaging in particular activities within a clearly defined target area" (Grogger 2002). Also see Decker et al. (1998) for the differences in gangs between established and emerging gang cities.

TABLE 3 presents estimation results for gang participation. Models 1, 2, and 3 are the most parsimonious and do not contain likely endogenous regressors. In Models 1 and 5, dummy variables for the respondent's region of residence are included in lieu of state dummies.

The local *unemployment rate* has a positive coefficient and is statistically significant at the one percent confidence interval for all models except Models 2 and 5 in TABLE 3, where it is only significant at a ten percent confidence interval. Adding the state-time interaction terms increases the size of the coefficients for the *unemployment rate* in both Models 3 and 6. In Model 6, at the bottom of TABLE 3, when the *unemployment rate* changes from five to ten percent the predicted probability of gang participation changes from 0.033 to 0.042 (a 27.2 percent increase).

The two indicators for race are positive and statistically significant for all models. Having a *father* (or father figure) present in the child's household in pre-adolescence has a statistically significant and negative effect on gang involvement, which is contrary to Jankowski's (1991) finding that gang members are just as likely to come from stable two-parent homes. The county characteristics *doctors* and *crime rate* are statistically significant with negative and positive coefficients respectively, indicating that gang members are more likely to come from high-crime areas with fewer public resources. The coefficients for the violence indicators *shot* and *bully* are both positive and statistically significant in Models 4, 5, and 6, which suggests that living in a physically threatening environment during pre-adolescence increases the probability of future gang membership considerably. The variables *highest-grade-completed* and *enrolled* are likely endogenous. Limiting the interpretation to the signs on the coefficients of *highest-grade-*

completed in Models 4, 5, and 6 indicates that the opportunity cost of gang involvement increases with each year of education. Being *enrolled* in school has a negative effect on the probability of gang participation.

I square the *age* variable in each model to test for a non-linear relationship with gang participation. The *age* variable is positive and statistically significant for all models, while the variable *age-squared* is negative and statistically significant for all models indicating that gang participation displays the same hump-shaped relationship with age as regular criminal activity.

Juveniles have a lower opportunity cost for committing crimes because criminal punishment in the United States is more severe for the adult population (Levitt 1998b). Gangs often require participation in activities which impose high costs (e.g., fights with other gangs, drive-by shootings, and meetings) that may not directly benefit individual members (Jankowski 1991). Even though members can reap financial gains from gang crimes, those who are old enough to have more economic opportunity outside the gang may weigh the costs of gang membership differently. The average *age* of those who admit gang participation in the last twelve months is 17.2; however, 35.8 percent of this sub-sample is also below the age of sixteen at some point during the survey.[29] If gang members respond to economic incentives, the *unemployment rate* should have a greater effect on the gang participation decision for those who are legally eligible to work most jobs.

[29] Levitt and Venkatesh (2000) argue that gang participation can be explained in context of a tournament, where individual gang members compete for large shares of the gang's revenue. Early entry to the gang could increase the chances of future leadership positions within the gang, which could lead to greater share of the wealth generated through the gang. Additionally, some of the current sociology literature on gangs is concerned with gang members who are unable to mature out of the gang (see Moore 1991 and Venkatesh and Levitt 2000).

TABLE 4 presents estimates for gang participation by *age* of respondent. The *unemployment rate* is statistically significant at the one percent confidence interval for all six models where *age* ≥ *16*. In Model 6 of TABLE 4, when the *unemployment rate* changes from five to ten percent the predicted probability of gang membership changes from 0.035 to 0.047 (a 34.3 percent increase), which indicates the sub-sample where *age* ≥ *16* are affected more by the local labor market. I also estimate a model where *age* < *16* and find no statistically significant effect for the *unemployment rate* in any of the six models.[30] Although estimates of the *unemployment rate* where *16* ≤ *age* < *18* are only statistically significant in three of the six models (and the other three models are marginally statistically insignificant), all of the coefficients are positive.

My results indicate juveniles most eligible for legitimate employment take into account outside opportunities when deciding to participate in gang activities. The statistical insignificance of the *unemployment rate* where *age* < *16* and the statistically significant and positive effect on gang participation for individuals who are sixteen and seventeen is compelling evidence of rational decision-making among gang members.

6 Analyzing the Effects of Cognitive Ability on Gang Participation

An extensive literature investigates the effect of cognitive ability on individual social and economic outcomes (Hernstein and Murray 1994; Heckman 1995). Wilson and Hernstein (1985) and Levitt and Lochner (2000) report a negative relationship between cognitive ability and criminal behavior. In this section, I investigate the

[30] The sample size for these estimates was smaller than for the sample *age* ≥ *16*. However, the variables *black*, *hispanic*, *shot*, and *bully* were all statistically significant and positive in the corresponding models to the reported sample.

relationship between economic opportunity and cognitive ability, as measured by Armed Services Vocational Aptitude Battery (ASVAB) scores from the NLSY97, on gang participation.

I use a percentile score for specific age cohorts, within the sample, based upon four components of the ASVAB which attempt to measure mathematical and verbal ability.[31] This percentile score is similar to the Armed Forces Qualification Test (AFQT) scores produced by the U.S. Department of Defense. 7,093 respondents, or 78.9 percent of the initial sample, had taken all four parts of the ASVAB used to calculate the percentile score. Of the 455 individuals who report gang activity within the past twelve months of the survey, 340 (74.7 percent) of this sub-sample have reported ASVAB scores. The mean score (on a scale of 0-100) for individuals reporting gang activity in the past twelve months is 27.66, while the mean score for those reporting no gang activity in the past twelve months is 45.68. The mean score of a respondent who admits joining a gang at some point but reports no gang activity in the last twelve months is 30.67. FIGURE 3 shows that the ASVAB scores for gang members are concentrated in the lower-percentile ranges, as compared with a relatively even distribution of scores for non-gang members.

TABLE 5 displays estimation results with *asvab* scores and the interaction of *asvab* with *unemployment rate* as additional regressors in the gang participation equation. The coefficient of *unemployment rate* is positive, statistically significant and also larger in models accounting for cognitive ability.[32] The interaction term *asvab***unemployment rate* is negative and statistically significant at the one percent confidence interval, except

[31] See the NLSY97 User's Guide (4.1.2 Administration of the *CAT-ASVAB*) for information regarding the calculation of the percentile score.
[32] I also find that *unemployment rate* is statistically significant and positive for all models in this sample when I do not include *asvab* scores.

for Models 3 and 6 where it is negative and significant at the five percent confidence interval.[33] Based upon the predicted probabilities at the bottom of TABLE 5, gang participation of persons with lower measured cognitive ability is much more sensitive to the local *unemployment rate*. For example in Model 6 of TABLE 5, moving from an *unemployment rate* of five to ten percent for a person scoring twenty on the ASVAB (i.e. the twentieth percentile) corresponds to a 1.4 percentage point change (a 40 percent increase). The same change in the *unemployment rate* for a person scoring in the eightieth percentile on the ASVAB corresponds to a 0.2 percentage point change (a 10.5 percent decrease).

It could be that individuals with lower cognitive ability sort into gangs because they face a lower opportunity cost for criminal behavior. Lower levels of labor force participation, lower educational attainment, and higher levels of criminal activity observed in the data among gang members could be correlated with cognitive ability. According to these estimates, and given the contrast between gang members and non-gang members' scores on the ASVAB tests, cognitive ability appears to be strongly related to gang participation. If the NLSY97 is an accurate depiction of the population of gang members in the United States, individuals with lower cognitive ability are disproportionately represented in gangs.

7 Conclusion

Empirical research on street gangs is sparse. This paper adds to the literature estimates of local labor market effects on gang participation. The local unemployment

[33] The sign and statistical significance of the interaction term was also confirmed using the method developed in Ai and Norton (2003).

rate's effect is statistically significant and positive, across a wide-range of model specifications for gang participation. However, robustness checks reveal gang participation of individuals less than sixteen years old (the legal minimum age for most jobs) is not responsive to the local unemployment rate. For individuals sixteen and older, a change from five to ten percent in the local unemployment rate corresponds to a 34.3 percent increase in the predicted probability of gang participation. The effect of the local unemployment rate on sixteen and seventeen year olds is statistically significant and positive, which suggests juvenile gang participation depends on economic incentives.

Gang participation of individuals with lower measured cognitive ability is more sensitive to the local unemployment rate. The predicted probability of gang participation increases by 40 percent for persons with ASVAB scores in the twentieth percentile when the local unemployment rate increases from five to ten percent. If ASVAB scores are good predictors of aptitude for skill acquisition, individuals with lower ability (and one could argue lower opportunity cost of time) are more likely to participate in gangs.

Because individual gang careers are relatively short, street gangs are heavily dependent on new recruits. Programs designed to increase economic opportunity among disadvantaged youth could greatly reduce gang participation and, as a result, gang-related crime.

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TABLE 1: FREQUENCY OF CRIMINAL BEHAVIOR, LABOR FORCE PARTICIPATION, AND SCHOOL ENROLLMENT BY GANG AFFILIATION

Percent	Currently in a Gang	Not Currently in a Gang
Sell Drugs?	39.54	7.01
Steal Property > $50?	30.69	4.05
Attack Someone?	56.28	10.96
Carry A Gun?	45.43	8.95
Work?	33.16	46.07
Enrolled in School?	57.4	67.11

Notes: Frequencies are derived from the sample used in estimation, which contains 27,186 observations for males with 455 current gang members. The heading "Currently in a Gang" represents males who admit gang participation in the last twelve months of the survey date. All frequencies are tabulated across time and each variable, except for the first survey year, is representative of behavior since the date of their last interview (i.e. "Sell drugs since date of last interview?"). Tabulations for "Carry A Gun?" are computed from a slightly smaller sample of 27,135 observations and 453 current gang members.

TABLE 2: SAMPLE MEANS BY GANG PARTICIPATION (STANDARD DEVIATION)

	Full Sample	Gang Members	Non-Gang Members
gang	0.029 (0.167)	--	--
black	0.253 (0.435)	0.422 (0.494)	0.248 (0.432)
hispanic	0.207 (0.405)	0.300 (0.458)	0.204 (0.403)
highest-grade-completed	10.44 (2.222)	9.499 (1.867)	10.468 (2.226)
age	17.684 (2.596)	17.219 (2.408)	17.698 (2.600)
enrolled	0.668 (0.471)	0.574 (0.495)	0.671 (0.470)
father	0.742 (0.470)	0.615 (0.487)	0.746 (0.435)
shot	0.131 (0.337)	0.349 (0.477)	0.124 (0.330)
bully	0.219 (0.414)	0.341 (0.474)	0.215 (0.411)
crime rate	5762.593 (2899.822)	6272.835 (2897.438)	5747.441 (2898.575)
doctors	210.13 (141.255)	214.943 (127.647)	209.987 (141.639)
unemployment rate	5.131 (2.234)	5.365 (2.566)	5.124 (2.223)

Note: The sample contains only males with 27,186 observations for all variables. The sub-sample of gang members contains 784 observations. The sub-sample for non-gang members contains 26,402 observations. The variables *crime rate* and *doctors* are collected by the Census Bureau and are supplied with the Geocode supplement of the NLSY97.

TABLE 3: ESTIMATION RESULTS FOR GANG PARTICIPATION

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
black	1.223***	1.208***	1.232***	0.811***	0.795***	0.800***
	(0.094)	(0.103)	(0.104)	(0.107)	(0.118)	(0.118)
hispanic	1.006***	1.048***	1.057***	0.770***	0.778***	0.779***
	(0.099)	(0.105)	(0.107)	(0.107)	(0.111)	(0.112)
age	0.680***	0.667***	0.715***	1.545***	1.550***	2.017***
	(0.211)	(0.214)	(0.215)	(0.233)	(0.235)	(0.538)
age-squared	-0.020***	-0.020***	-0.021***	-0.041***	-0.041***	-0.054***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.015)
highest-grade-completed	.	.	.	-0.327***	-0.333***	-0.351***
				(0.032)	(0.033)	(0.039)
enrolled	.	.	.	-0.579***	-0.586***	-0.547***
				(0.109)	(0.110)	(0.116)
father	.	.	.	-0.216***	-0.243***	-0.243***
				(0.082)	(0.083)	(0.084)
shot	.	.	.	0.862***	0.863***	0.898***
				(0.086)	(0.086)	(0.086)
bully	.	.	.	0.612***	0.601***	0.624***
				(0.080)	(0.081)	(0.082)
crime	.	.	.	0.003**	0.006***	0.005***
				(0.002)	(0.002)	(0.002)
doctors	.	.	.	-0.055*	-0.117***	-0.106***
				(0.031)	(0.036)	(0.035)
unemployment rate	0.043***	0.030*	0.051***	0.048***	0.030*	0.055***
	(0.015)	(0.017)	(0.018)	(0.016)	(0.018)	(0.019)
time dummies	yes	yes	yes	yes	yes	yes
region dummies	yes	no	no	yes	no	no
state dummies	no	yes	yes	no	yes	yes
state time-trends	no	no	yes	no	no	yes
pseudo R-square	0.041	0.054	0.053	0.099	0.112	0.112
predicted probabilities						
unemployment rate = 5%	0.028	0.029	0.030	0.028	0.029	0.033
unemployment rate = 10%	0.035	0.033	0.038	0.036	0.033	0.042
unemployment rate = 15%	0.043	0.038	0.047	0.044	0.038	0.054

Note: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Robust standard errors in parentheses. Gang participation in the last twelve months of a survey is the dependent variable for all models. All models are estimated using logistic regression. Model 1 and Model 4 each have 27,186 observations. Model 2 and Model 5 have 27,091 observations. Model 3 and Model 6 have 23,835 observations.

TABLE 4: EFFECTS OF LOCAL UNEMPLOYMENT ON GANG PARTICIPATION BY AGE OF RESPONDENTS

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
unemployment rate (age ≥ 16)	0.100*** (0.020)	0.082*** (0.022)	0.091*** (0.022)	0.100*** (0.020)	0.075*** (0.022)	0.081*** (0.022)
unemployment rate (age < 16)	-0.003 (0.029)	-0.025 (0.036)	-0.004 (0.040)	0.0028 (0.031)	-0.020 (0.039)	0.008 (.045)
unemployment rate (16 ≤ age < 18)	0.043 (0.028)	0.041 (0.030)	0.050* (0.030)	0.059** (0.030)	0.049 (0.032)	0.067** (0.034)
social variables	No	No	No	Yes	Yes	Yes
time dummies	Yes	Yes	Yes	Yes	Yes	Yes
region dummies	Yes	No	No	Yes	No	No
state dummies	No	Yes	Yes	No	Yes	Yes
state time-trends	No	No	Yes	No	No	Yes
pseudo R-square	0.052	0.063	0.068	0.113	0.127	0.133
Predicted Probabilities						
unemployment rate = 5%	0.027	0.028	0.030	0.0274	0.028	0.035
unemployment rate = 10%	0.038	0.036	0.041	0.0379	0.036	0.047
unemployment rate = 15%	0.051	0.047	0.056	0.052	0.045	0.063

Note: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Robust standard errors in parentheses. Pseudo R-square and predicted probabilities are from the *unemployment rate (age ≥ 16)* models. Predicted probabilities are calculated from the models where *unemployment rate (age ≥ 16).* Gang participation in the last twelve months of a survey is the dependent variable for all models. All models are estimated using logistic regression. The Model specifications are the same as in Table 3, where social variables represent: *highest-grade completed, enrolled, father, shot, bully, crime, doctors*. For age ≥ 16, Models 1 and 4 each have 21,304 observations; Models 2 and 5 have 20,846 observations; Models 3 and 6 have 17,846 observations. For age < 16, Models 1 and 4 each have 5,855 observations; Models 2 and 5 have 5,425 observations; Models 3 and 6 have 4,705 observations. For 16 ≤ age < 18 , Models 1 and 4 each have 6,776 observations; Models 2 and 5 have 6,609 observations; Models 3 and 6 have 5,372 observations.

TABLE 5: ESTIMATION RESULTS FOR ASVAB SCORES

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
unemployment rate	0.100***	0.091***	0.091***	0.116***	0.095***	0.104***
	(0.025)	(0.027)	(0.027)	(0.024)	(0.027)	(0.004)
asvab	-0.008*	-0.009**	-0.010**	0.001	-0.001	-0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.029)
*unemployment rate*asvab*	-0.002***	-0.002***	-0.002**	-0.002***	-0.002***	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
social variables	No	No	No	Yes	Yes	Yes
time dummies	Yes	Yes	Yes	Yes	Yes	Yes
region dummies	Yes	No	No	Yes	No	No
state dummies	No	Yes	Yes	No	Yes	Yes
state time-trends	No	No	Yes	No	No	Yes
pseudo R-square	0.066	0.083	0.085	0.113	0.130	0.126
Predicted Probabilities where *asvab* = 20						
unemployment rate = 5%	0.034	0.034	0.037	0.029	0.030	0.035
unemployment rate = 10%	0.044	0.044	0.048	0.041	0.039	0.049
unemployment rate = 15%	0.058	0.056	0.062	0.057	0.050	0.067
Predicted Probabilities where *asvab* = 80						
unemployment rate = 5%	0.012	0.012	0.013	0.016	0.016	0.019
unemployment rate = 10%	0.008	0.009	0.010	0.012	0.013	0.017
unemployment rate = 15%	0.006	0.006	0.008	0.009	0.010	0.015

Note: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Robust standard errors in parentheses. Gang participation in the last twelve months of a survey is the dependent variable for all models. All models are estimated using logistic regression. The Model specifications are the same as in Table 3, where social variables represent: *highest-grade completed, enrolled, father, shot, bully, crime, doctors*. Models 1 and 4 each have 21,869 observations; Models 2 and 5 have 21,720 observations; Models 3 and 6 have 18,387 observations.

Figure 1a: Gang Participation by Age

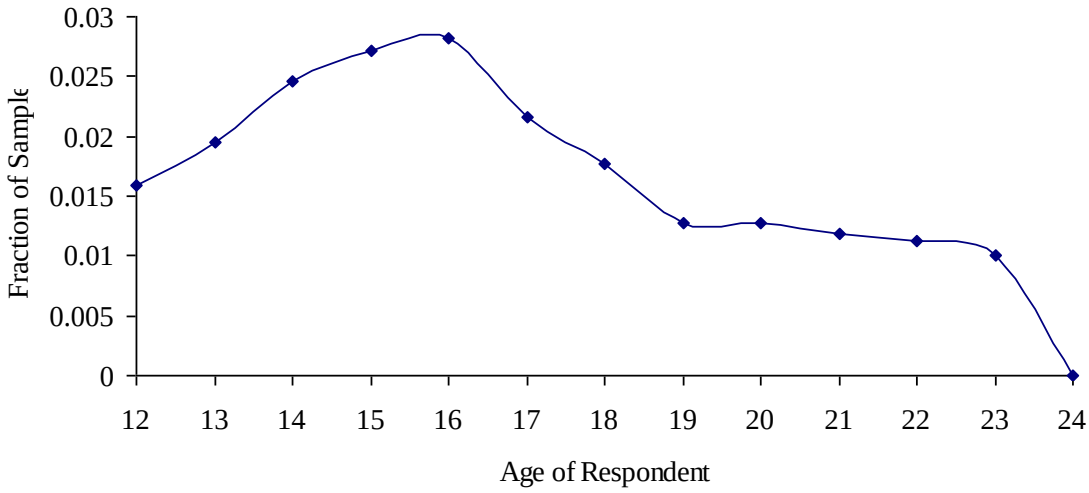
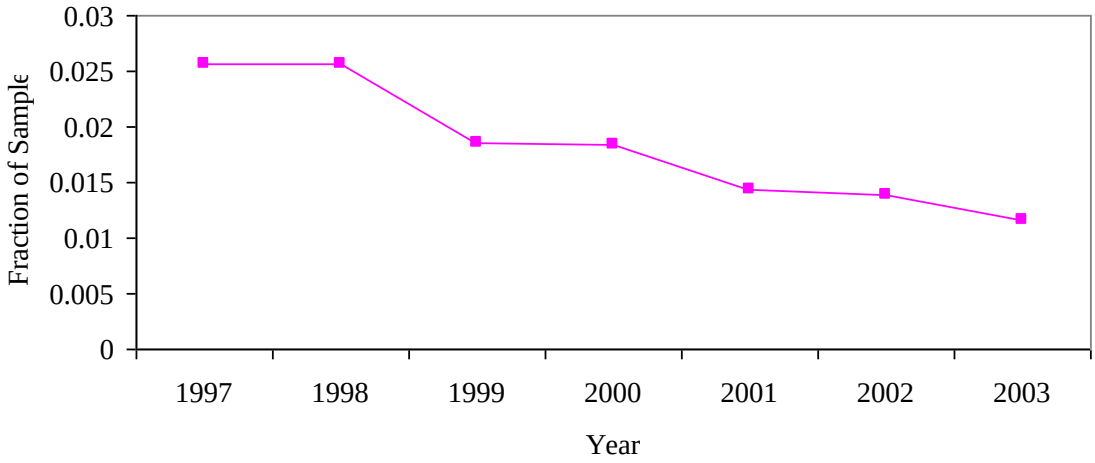


Figure 1b: Gang Participation by Year



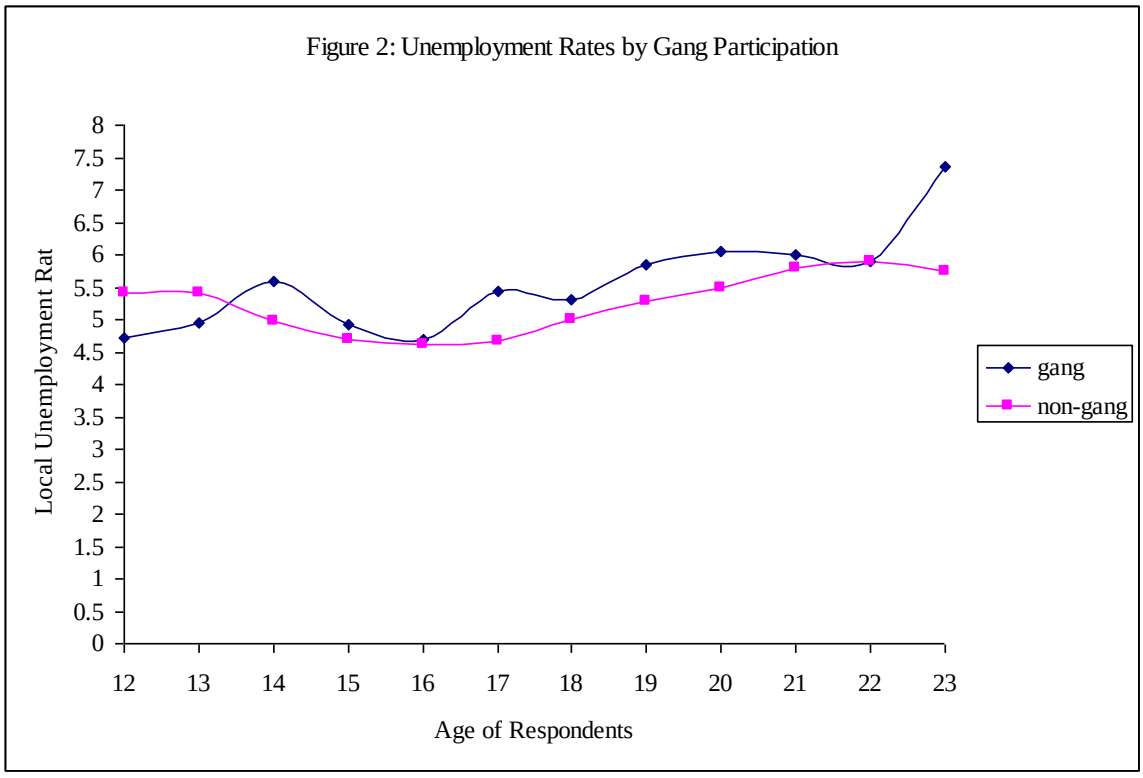


Figure 2: Unemployment Rates by Gang Participation
Local Unemployment Rat
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
12
13
14
15
16
17
18
19
20
21
22
23
Age of Respondents
gang
non-gang

Figure 3: Distribution of ASVAB Scores by Gang Participation