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Measuring the Relationship Between Youth Criminal Participation and Household Economic Resources

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Abstract Using data from the NLSY97, this paper re-examines the empirical relationship between household economic resources and youth criminal participation. Previous estimates of this relationship have often suggested this relationship to be quite weak or even non-existent. However, this analysis suggests that much of the strength of the relationship between household economic resources and youth criminal participation may be obscured due to non-linearities in this relationship, the fact that this relationship is isolated to crimes of a serious nature only, and especially because of measurement error with respect to measuring household economic resources. I show that adjusting for these issues substantially increases the estimated strength of this relationship. Indeed, the results in this paper show that the differences in serious criminal participation between youth from households in the upper parts of the income distribution and youth from households in the lower parts of the income distribution appear to be greater than the difference in serious criminal participation between genders.

Keywords Crime · Poverty · Youth · Multiple Indicators

Introduction

Household economic resources have been shown to be a very strong correlate to a variety of youth outcomes and behaviors (Duncan et al. 1994; Smith et al. 1997; Mayer 1997). Surprisingly, however, the empirical evidence for a strong relationship between household economic resources and youth criminal participation is quite mixed. In fact, in their analysis of 35 studies and 363 separate estimates of the class/crime relation, Tittle et al. (1978) concluded that the assumed negative correlation

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between social class and criminality was a ''myth.'' However, the analysis in this paper suggests this conclusion may be too strong.

The seeming lack of a strong empirical connection between youth criminal activity and household economic resources is puzzling given the key role household income, and economic class more generally, play in many theoretical models of crime and delinquency (examples include Merton 1957; Wolfgang and Ferracuti 1967; Wiatrowski et al. 1981; Weiss 1987), and especially given that other aspects of crime generally appear to play much more prominent roles in the lives of those who live in poorer households compared to those who live in richer households. For example, in 2004, individuals from households earning less than $15,000/yr were roughly twice as likely to have been the victim of an aggravated assault, and roughly three times as likely to have been robbed, than individuals coming from households that earned more than $35,000/yr (BJS, 2005). Moreover, the National Center for State Courts reports that between 80% and 90% of all people charged with criminal offenses in America qualify for indigent defense services.

In response to the conclusions reached by Tittle et al. (1978), numerous researchers have proposed a variety of explanations for this apparent puzzle. Reckless (1967), Clelland and Carter (1980), Johnson (1980), Brown (1984) and others have implicitly or explicitly examined the hypothesis that the relationship between household economic resources and youth criminal participation may be understated because this relationship is non-linear, with those growing up in households on the very bottom of the income distribution being substantially more crime prone than youth growing up in middle class households, but very little differences in criminal proclivity between youth from rich households and youth from middle class households. Other hypotheses regarding the lack of a measured relationship between household income and criminal participation have included: that it is frequency of criminal activity rather than simply participation that is the key variable to analyze (Elliot and Ageton 1980), that the relationship only exists in urban settings (Hagan 1985; Krohn et al. 1980) or is context specific (Johnstone 1978), and that criminal participation data from self-reports is unreliable for this type of analysis (Kleck 1982; Nettler 1978). Relatedly, Clelland and Carter (1980) and Hindelang et al. (1981) suggest that relationship between household income and criminal participation is confined to criminal activity of a serious nature, suggesting that ''trivial items in self-report scales tend to swamp more serious items when, as is common, global simple sum scales are used''. Studies have also examined whether youth criminal participation has a stronger relationship with other measures of socio-economic status rather than household income (Thornberry and Farnworth 1982; Brownfield 1986; Brown 1984).

While the points raised by these studies discussed above have certainly presented legitimate concerns, and lead to some different results, Tittle and Meier (1990) convincingly argue that, in general, these studies still do not definitively confirm a strong systematic link between household economic resources and youth criminal participation. Indeed, they conclude their summary of these results by saying that the studies discussed above ''suggest again that there is no pervasive relationship between SES (socio-economic status) and delinquency.''

More recently, Wright et al. (1999) weigh in on this issue. They examine a sample of youth from a moderate sized New Zealand city and argue that economic status has both positive and negative effects on youth criminal participation. They suggest

that these offsetting effects then account for the lack of an overall empirical relationship between economic status and youth criminal participation.

One issue that has not been discussed in this literature, however, is fact that household income, or household economic status more broadly, is generally measured with substantial error. Most notably, earnings from one particular year will likely provide a relatively imprecise picture of a household's true economic condition. It is well known that the presence of such measurement error can lead to a substantial attenuation bias, resulting in an understatement of the true relationship between the two variables of interest (Fuller 1987).

In this paper, I show that the strength of the relationship between youth criminal participation and household economic resources will tend to be underestimated if issues such as the non-linearity of this relationship, racial differences in this relationship, and differences in this relationship by severity of crime are not accounted for. However, I show that even after accounting for such issues, the estimated relationship is still relatively weak.

On the other hand, using instrumental variables (IV) methods to account for *measurement error* with respect to household economic resources substantially increases the magnitude of the estimated relationship between household economic resources and youth criminal participation, and suggest that the relationship is indeed very strong.[1] For example, the results of this analysis suggest that the difference in criminal participation between youth from households in the second quintile of the income distribution and youth from households in the fourth quintile of the income distribution is greater than the difference in criminal participation between genders, which is often considered to be the strongest predictor of youth criminal behavior.[2] Moreover, these IV results also provide further evidence that the relationship between household economic resources and youth criminal participation is constrained to participation in crimes only of a serious nature, with no apparent empirical link existing between household economic resources and youth participation in more trivial crimes such as petty theft and vandalism.

Data

This analysis uses data from the National Longitudinal Survey of Youth 1997 (NLSY97). The NLSY97 is particularly suited for studying the relationship between youth criminal participation and household economic resources for several reasons. First, the sampled group was large, consisting of over 8,000 respondents, resulting in substantial sample variation in responses for even relatively infrequent behavior such as criminal participation. Second, the NLSY97 sample is constructed to be representative of all American youth born between 1980 and 1984. Hence, the findings obtained using the NLSY97 data can be more convincingly extended to the youth population as a whole than findings obtained using a sample of ''at risk'' or otherwise selectively sampled youth.

[1] It should be emphasized the IV methods used in this paper are used to adjust for *measurement error* only, and are not meant to shed any light on the existence or magnitude of *causal* effects of household economic resources on youth criminal participation.

[2] See Steffensmeier and Allan (1996) for a discussion of male/famale differences in criminality.

A third benefit of the NLSY97 is that the questions regarding criminal activity were asked using a self-administered questionnaire via a laptop computer rather than through a written survey or a face-to-face interview. Given the personal nature of these questions, the increased privacy and confidentiality offered by the laptop may elicit substantially more truthful responses than many previously available from self-reported data sources. Indeed, Turner et al. (1998) provide substantial evidence that youth are much more likely to report risky personal behaviors (including sexual experiences, drug use, and violent acts) when surveyed via a self-administered audio computer interface than responding to self-administered questions on paper. The computer interface used in the NLSY97 was very similar to self-administered audio computer interface examined by Turner et al. (1998), in that it both provided an optional audio interface (where the respondents could listen to questions using headphones), and automatically took respondents through the appropriate questioning loops. Therefore, while there certainly still may be under-reporting of sensitive issues such as participation in criminal activity, the degree of such under-reporting is likely to be substantially less in the NLSY97 than many previous surveys including the NLSY79 (which asked criminal participation questions via a self-administered paper and pencil instrument).

For the subsequent analysis, criminal participation is measured using responses from the second round interview, roughly covering 1997.[3] A youth will be said to have participated in crime in the previous year if he or she answered in the affirmative to any of the following criminal activity questions:[4] Have you carried a handgun since the date of last interview? Since the date of last interview, have you purposely damaged or destroyed property that did not belong to you? Since the date of last interview, have you stolen something from a store or something that did not belong to you worth less than 50 dollars? Since the date of last interview, have you stolen something from a store, person or house, or something that did not belong to you worth 50 dollars or more including a car? Since the date of last interview, have you committed other property crimes such as fencing, receiving, possessing or selling stolen property, or cheated someone by selling them something that was worthless or worth much less than you said it was? Since the date of last interview, have you attacked someone with the idea of seriously hurting them or have had a situation end up in a serious fight or assault of some kind? Since the date of last interview, have you sold or helped to sell marijuana (pot, grass), hashish (hash) or other hard drugs such as heroin, cocaine or LSD?

[3] Technically, this ''observation year'' will be more than one year, as respondents in the sample used in this analysis were interviewed an average of 19.9 months after completing the first round interview. The length of this ''observation year'' does not appear to differ substantially across the household income distribution, with the mean length for the youth from the poorest third of the household wealth distribution averaging 20.0 months between the first and second round interviews, youth from the middle third of the household wealth distribution averaging 19.7 months between interviews, and youth from the richest third of the household wealth distribution also averaging 19.8 months between interviews. Therefore, while observation year for youth from the poorest third of the household wealth distribution does cover activity over a slightly longer period of time, the difference works out to only about 3/10 of a month or 9 days.

[4] A few individuals refused to answer a crime question or answered ''don't know.'' However, since all of these respondents who refused to answer or answered ''don't know'' to a particular crime question answered in the affirmative to a different crime question, it does not matter whether these ambiguous responses are treated as affirmatives or negatives since I will only be looking at whether an individual participated in a crime during the time between the first and second round interviews.

The Seemingly Weak Relationship Between Youth Criminal Participation and Household Economic Resources

The simplest way to measure the empirical relationship between household economic resources and youth criminal participation is to regress an indicator of criminal participation for each youth on reported household income for a particular year, as well as a female indicator dummy to account for gender differences in criminal participation, using OLS. Reported household income from 1997 income (measured in units of $10,000) is used here since that was the only year in which such information was collected directly from a parent of the responding youth.[5]

The coefficient on the household income variable resulting from this regression is – 0.005 with a standard error of 0.001 (this result as well as analogous results for each race separately are shown in the first column of Table 1).[6] While this coefficient is significantly negative at any standard significance level, it is very small in magnitude. For example, it indicates that youth from households reporting 1997 earnings of around $25,000 are estimated to have only a one and a half percentage point greater criminal participation rate in 1998 than youth from households reporting 1997 earnings of $55,000. Given the overall rate of criminal participation among the youth in this sample is 0.27, such an estimate suggests only very small differences in behavior across the income distribution. By way of comparison, the coefficient on the female indicator variable is – 0.124, meaning that females are estimated to have a criminal participation rate over 12 percentage points lower than their male counterparts. Hence, the results of this simple regression specification seem to correspond to Tittle and Meier's (1990) assertion that youth criminal participation has at best a weak relationship to household economic resources.

A Closer Look at the Relationship Between Youth Criminal Participation and Household Economic Resources

As discussed above, much of the theoretical crime literature suggests that the relationship between household economic resources and criminal participation may be non-linear. Specifically, differences in youth criminal participation across the income distribution may not be constant as income increases. A simple way to examine this is to look at youth criminal participation rates by $20,000 income intervals as shown in Fig. 1. While there does appear to be a downward trend in criminal participation rates as we move up income intervals, there also appears to be some degree of non-linearity in this relationship.

[5] Individuals who were not interviewed in the second round or for which there was no data on household income and/or wealth from 1997 were dropped from the sample used for this analysis. This latter criteria left 5,577 of the 8,386 NLSY97 individuals who had second round interviews. As shown in Appendix Table 4, these individuals who were excluded from the analysis appear to be generally similar to those remaining in the analysis with respect to numerous characteristics. Moreover, all OLS regression results remains essentially unchanged if these individuals are kept in the sample and multiple imputation is used to account for the missing data (results available from the author upon request).

[6] All regression results reported in this paper are weighted using the NLSY97 individual weights, and standard errors clustered at the household level.

Table 1 OLS and 2SLS regression results for youth criminal participation

	OLS				IV Adj. for measurement error via 2SLS		
	(1) All crime	(2) All crime	(3) Serious crime only	(4) Minor crime only	(5) All crime	(6) Serious crime only	(7) Minor crime only
All youth							
HH income	– 0.005*** [0.002]	–	–	–	–	–	–
HH Inc. Quintile	–	– 0.016*** [0.005]	– 0.021*** [0.004]	0.005 [0.004]	– 0.036*** [0.007]	– 0.043*** [0.006]	0.006 [0.006]
Female	– 0.117*** [0.013]	– 0.118*** [0.013]	– 0.070*** [0.011]	– 0.049*** [0.01]	– 0.118*** [0.013]	– 0.071*** [0.011]	– 0.049*** [0.010]
White youth only							
HH income	– 0.006*** [0.002]	–	–	–	–	–	–
HH Inc. Quintile	–	– 0.023*** [0.006]	– 0.023*** [0.005]	0.000 [0.005]	– 0.054*** [0.01]	– 0.048*** [0.008]	– 0.006 [0.008]
Female	– 0.118*** [0.016]	– 0.119*** [0.016]	– 0.071*** [0.013]	– 0.049*** [0.012]	– 0.120*** [0.016]	– 0.072*** [0.013]	– 0.049*** [0.012]
Black youth only							
HH income	– 0.010** [0.005]	–	–	–	–	–	–
HH Inc. Quintile	–	– 0.017 [0.011]	– 0.011 [0.01]	– 0.008 [0.006]	– 0.034* [0.019]	– 0.032** [0.016]	– 0.005 [0.013]
Female	– 0.112*** [0.03]	– 0.112*** [0.03]	– 0.079*** [0.026]	– 0.038* [0.021]	– 0.112*** [0.03]	– 0.079*** [0.026]	– 0.038* [0.021]
Hispanic youth only							
HH income	0.001 [0.005]	–	–	–	–	–	–
HH Inc. Quintile	–	0.005 [0.013]	– 0.013 [0.009]	0.018* [0.01]	0.005 [0.022]	– 0.051*** [0.015]	0.056*** [0.018]
Female	– 0.126*** [0.033]	– 0.126*** [0.033]	– 0.060** [0.028]	– 0.065*** [0.025]	– 0.126*** [0.033]	– 0.060** [0.028]	– 0.065** [0.025]

Sample consists of all NLSY97 respondents that were interviewed in the second round and had valid household income and household net wealth data from the first round. Serious crimes include breaking and entering to steal, using a weapon to steal, assault, selling narcotics, earning more than $500 in previous year from drug sales, and car theft. All statistics are weighted using NLSY97 round 2 individual weights. Standard errors are clustered by household and shown in brackets. One asterisk indicates significance at the 10% level, two asterisks indicate significance at the 5% level, and three asterisk indicates significance at the 1% level

Given the substantial right skew of the household income distribution, one simple way to account for the non-linearity discussed above is to look at criminal participation rates by location in the income distribution. For example, Fig. 2 shows youth criminal participation rates by quintile of the income distribution. There again seems to be a negative relationship between these two variables, and moreover, this relationship does appear to be quite linear. Therefore, it appears that a very simple way to adjust for non-linearities in the relationship between household income and youth criminal participation is to use household income quintile rather than simply household income level as the key regressor with respect to in youth criminal participation.

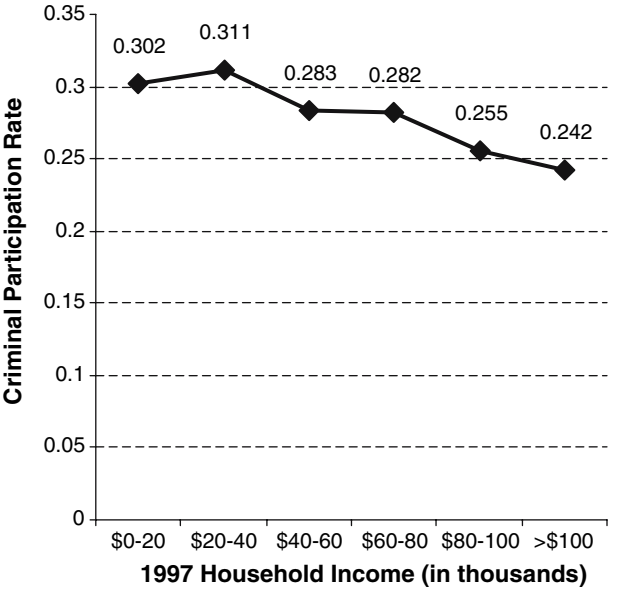

Fig. 1 Criminal participation rates by house hold income

The results from regressing youth criminal participation on household income quintile and a female indicator variable are reported in column 2 at the top of Table 1. Once again, the coefficient on the income quintile variable is significantly less than zero at any standard significance level. Moreover, the relationship between household economic resources and youth criminal participation appears to be somewhat stronger under this specification where household economic resources are

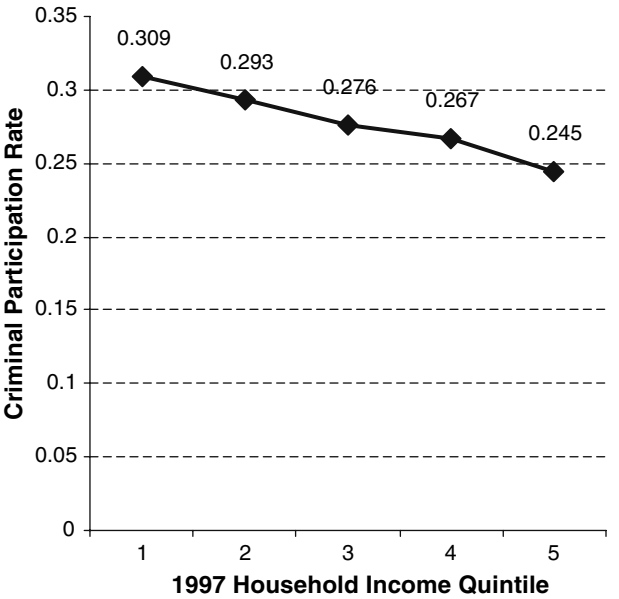

Fig. 2 Criminal participation rates by income Quintile

measured by household income quintile, than it was under the previous specification where household economic resources were measured by household income in dollars. By way of illustration, the estimated coefficient of –0.016 under this specification suggests that youth from households with reported income in the *second* quintile of the income distribution have over a three percentage point greater criminal participation rate in 1998 than youth from households with reported income in the *fourth* quintile of the income distribution. Given the lower cutoff points for the second income quintile and the fourth income quintile are roughly $25,000 and $55,000,[7] this estimated relationship between household income and youth criminal participation is roughly twice as large as the initial estimate reported in the previous section. Hence, specification error does appear to lead to somewhat of a downward bias in this context. However, even after adjusting for such specification error, this estimated relationship between household economic resources and youth criminal participation still appears to be relatively weak. The coefficient on the female indicator variable is essentially the same under this specification as under the specification discussed in the previous section.

Given the far different arrest rates across juveniles of different races (Snyder and Sickmund 1999), the relationship between household economic resources and crime may also differ across races. The NLSY97 certainly allows us to explore this hypothesis. The lower sections of rows in the first and second columns of numbers in Table 1 show how the results differ by race. Indeed, the relationship between household economic resources and youth criminal participation looks to be somewhat stronger for whites than blacks, and essentially non-existent for Hispanics. It should be noted however, that these differences across races are not statistically significant, and moreover, any such differences across races might reflect differences in reporting error across races, not true differences in the relationship of interest across races (see Hindelang et al. 1981 for more discussion on racial differences in criminal reporting behavior). The results with respect to the coefficient on the female indicator variable with respect to reported criminal participation appears to be relatively constant across racial groups.

As discussed previously, several authors have suggested that another reason for why the relationship between household economic resources and youth criminal participation is often estimated to be small or negligible in magnitude is that this relationship really only exists with respect to serious crimes. As stated by Clelland and Carter (1980) ''...the self-report measure systematically underestimates serious criminality'' which suggests that ''self-report studies serve only to demonstrate that social status is not related to youthful peccadillos.''

Given that the NSLY97 asks about participation in different types of criminal activity separately by type of crime, we can also directly examine whether the relationship between household economic resources and youth participation in serious crimes differs from the relationship between household economic resources and youth participation in more minor crimes. Specifically, let us define ''serious crimes'' to be breaking and entering a locked building to steal, stealing with a weapon or use of force, stealing a car, assault, selling ''hard drugs'' (e.g., heroin, cocaine, or other drugs not including marijuana), or earning over $500 from drug sales—all of which can be distinguished using the NLSY97 data. This means ''minor crimes'' include stealing from a store or a purse or wallet without force or threat of

[7] The actual cutoffs were $19,000 for the second quintile and $51,000 for the fourth quintile.

force, property destruction, earning less than $500 from marijuana drug sales, and ''other'' property crimes not included in serious crimes. Interestingly, columns three and four in Table 1 show that separating out criminal activity by severity of crime appears to have little qualitative effect. Indeed, the estimated relationship between household economic resources and youth criminal participation is relatively weak across all races, even with respect to participation in serious criminal activity.

In general, this section shows that the relationship between household economic resources and youth criminal participation may be somewhat clouded by specification error, differences across races, and possibly how criminal behavior is defined, but the estimated relationship still remains relatively weak even after adjusting for these issues.

Adjusting for Measurement Error Bias

As stated in the introduction, a prominent concern regarding estimates of the relationship between household economic resources and youth criminal participation that has seen little discussion is attenuation bias due to measurement error with respect to household economic resources. While using household income quintile may lessen some of the measurement error associated with misreports of income from a particular year, what we truly want to measure is the general economic well-being of the youth's household, which may reflect many things besides simply income from the most recent year. Specifically, the general economic well-being of a household depends not only on income from the most recent year, but also savings from past years, returns on investments, debts owed, past and expected inheritances, government transfers, and many other things. Therefore, even accurate reports of household income (or household income quintile) from the most recent year will be somewhat of an imprecise measure of the general household economic well-being of the household over the course of the previous year.

The consequences of such measurement error can be formally summarized as follows. Say that the underlying model we are interested in estimating is of the form

$$C = \beta_0 + \beta_1 Y + \varepsilon, \tag{1}$$

where C indicates criminal participation, Y captures the general economic resources of a youth's household, and ε is a random mean zero idiosyncratic error term uncorrelated with Y. The coefficient of interest is β_1, but the problem is that we cannot directly observe Y for each individual. Rather, we can only observe a noisy indicator of Y, for example a household's quintile in the income distribution in a particular year, which we can denote y, where $y = \delta_0 + \delta_1 Y + \mathrm{v}$ and $\mathrm{Cov}(Y, \mathrm{v}) = 0$.

If instead of the true variable of interest Y, we use this noisy indicator y as our regressor in a regression of the form

$$C = b_0 + b_1 y + \mathrm{u}, \tag{2}$$

it will be the case that $b_1 = B_1[1 - \sigma_\mathrm{v}/(\sigma_\mathrm{Y} + \sigma_\mathrm{v})]$, where σ_v is the variance of v and σ_Y is the variance of Y. In words, measurement error will bias the coefficient of interest toward zero, where this bias is proportional to the noise to total variance ratio $(\sigma_\mathrm{v}/\sigma_\mathrm{Y})$.

This issue of measurement error bias has been thoroughly discussed in the econometrics literature (see Bound et al. 2001 and the cites therein). The relevant question for this analysis is whether this bias is large enough to be important in the context examined here. A priori, it is difficult to say. However, there are examples in the economics literature on intergenerational mobility that suggest that the measurement error bias that arises when using a income from a single year to measure an individual's overall economic status can be very large and lead to erroneous conclusions (see Solon 1992; Zimmerman 1992).

One method to adjust for measurement error bias that may be relevant to this context is often referred to as the *multiple indicator method*.[8] Specifically, say that in addition to y, we have another indicator for Y that we can denote as w, where $w = \rho_0 + \rho_1 Y + z$ and $\text{Cov}(Y, z) = 0$. If it is true that $\text{Cov}(v, z) = 0$, meaning that any correlation between the two indicator variables arises only due to their common dependence on Y, we can then obtain a consistent estimate of β_1 by estimating a specification of the form given by Eq. 2, but instrumenting for y with w in a Two-Stage Least Squares framework. Intuitively, we can use the common relationship between the indicators y and w to the underlying true variable of interest Y to disattenuate the estimate of β_1 that would arise from simply using y as a proxy for Y.

If household income quintile is a noisy measure of our true variable of interest (i.e., the economic resources of the child's family), then one candidate for a second indicator variable for use in the multiple indicator IV method is quintile of reported household wealth, also obtained from the parental questionnaire in the first round NLSY97 interview. This variable comes from the household net worth variable created by NLSY97 survey staff, and equals the sum of the values of any owned real estate (including own dwelling), vehicles, businesses, stocks, bonds, savings, retirement accounts, pensions, household furnishings, and ''other assets,'' minus any remaining vehicle debt, other non-educational loans, and ''other'' debts.

As discussed above, for this household wealth variable to be a valid candidate for a second indicator in the multiple indicator solution, it must be the case there is correlation between household wealth and our household income that arises only due to their common dependence on a household's overall economic situation. Not surprisingly, household income quintile and household wealth quintile are indeed correlated. A first stage regression of quintile of household income on quintile of household wealth (and gender) gives a coefficient on the quintile of household wealth variable that is positive and significant at any relevant confidence level percent level (t-statistic of 46.97), indicating that indeed there is substantial correlation between household income quintile and household wealth quintile. The question that remains is whether it is plausible that this correlation arises only due to their common dependence on a household's overall economic situation.

I would argue that it is. To understand why, note that income in a given year largely depends on the number of hours worked, pay increases associated with promotion, and possibly changes in government transfer programs. Alternatively, net wealth in any given year is an accumulated stock of assets acquired over time. Given much of wealth is held in the form of property, housing, and retirement savings, such stocks of assets are likely to primarily reflect household preferences for saving and accumulation of such assets given household income over the past several

[8] This method is discussed in a variety of sources, including Grilches and Hausman (1986), Bound et al. (2001), Wooldridge (2002).

years, rather than follow income swings from year to year. Hence, while both are clearly correlated to a household's overall economic condition over some time period, they are likely subject to generally unrelated fluctuations in any given year. Moreover, as discussed by Bound et al. (2001), even if there is correlation between the error terms of the indicators (i.e., $Cov(v, z) \neq 0$), the multiple indicator IV solution will still generally be a more consistent estimator of the true parameter of interest than simple OLS estimation using the noisy indicator.

As alluded to in a footnote above, it should be noted that the IV method used here is only used to adjust for measurement error when estimating the *empirical* relationship between household economic resources and youth criminal participation, not to estimate any *causal* effects as IV methods are more commonly used for. In particular, while the methods used here may be able to more accurately reveal the degree to which household economic resources are correlated with youth criminal participation, they cannot reveal whether such correlation is due to a direct effect of household economic resources on youth criminal activity, or whether household economic resources are simply correlated with a host of other unmeasured household attributes that are actually the key household characteristics that affect youth criminal participation.

The fifth through seventh columns of numbers in Table 1 show the results from the Two-Stage Least Squares (2SLS) regressions used to implement the multiple indicator IV method discussed above to mitigate the effects of measurement error with respect to household economic resources. Comparing the results with respect to participation in any crime (columns two and five), we can see that across all races, the estimated coefficients on household income quintile are over twice as large when using the 2SLS IV method as opposed to OLS. For the all-youth sample, a Hausman test reveals that the difference between the 2SLS results are significantly different than the OLS results at the one percent level (chi-squared statistic with two degrees of freedom of 9.69). The results for whites only are very similar, with the 2SLS results revealing a statistically significantly stronger relationship between household income quintile and youth criminal participation than the OLS results (Hausman test gives a chi-squared statistic with two degrees of freedom of 15.77). These IV coefficients from the 2SLS estimates also translate into relatively large differences in the likelihood of criminal participation between youth from households at different places in the income distribution. For example, the estimates suggest that white youth from households earning $25,000 in 1997 (near the lower bound cutoff for the second quintile of the sample income distribution) are over 10 percentage points more likely to have participated in criminal activity in 1998 than youth from households earning $55,000 in 1997 (near the lower bound cutoff for the fourth quintile of the sample income distribution). By way of comparison, this difference is almost as large as the difference in criminal participation for white youth between genders as suggested by the coefficient estimate of –0.120 shown in the fourth column of numbers.

The differences between the 2SLS results and the OLS results are not as dramatic for black and Hispanic youths however. In both cases a Hausman test cannot reject equality of the coefficients across the 2SLS and OLS specifications at any standard level of significance, and for Hispanic youths, the coefficient on household income quintile does not even differ across specifications.

Columns six and seven of Table 1 further reveal that all of the negative relationship between household economic resources and youth criminal participation

appears to be confined to participation in serious crimes only. While the 2SLS coefficient estimates on household income quintile are significantly negative for all racial groups with respect to criminal participation in serious crimes, none of the estimated coefficients are significantly negative with respect to participation in minor crimes.[9] Moreover, Hausman tests reveal that the results of the 2SLS regressions in column six are significantly different from the OLS results in column 2 at the one percent level for the combined sample, as well as for whites and Hispanics (chi-square statistics with two degrees of freedom of 49.31, 16.65, and 10.18, respectively). However, once again, while larger in absolute magnitude, the 2SLS results for blacks in column six are not statistically distinguishable from the OLS results in column 3.

Further Robustness Checks

How robust are the results highlighted in Table 1? One concern may be that using household income quintile is somehow special, and the results are not as strong under other ranking categories. Table 2 shows that this does not appear to be a large concern. Specifically, Table 2 replicates the regressions performed in Table 1, but uses decile of household income rather than quintile (and uses decile of household wealth, as opposed to quintile of household wealth, as the instrument in the 2SLS regressions). These results are qualitatively the same as those in Table 1. Namely, the 2SLS IV results reveal a negative relationship between household income and youth criminal participation that is almost twice as large the estimates obtained using OLS that do not account for the fact that household income in a given year, or even decile of household income in a given year, is an error ridden measure of the actual economic resources of a household. Moreover, like with respect to Tables 1, Table 2 reveals that all of this relationship is due to the negative relationship between household economic resources and youth participation serious criminal activity as opposed to more minor offenses.

Another possible concern with the results in Table 1 is that no account is taken for family size. In particular, if we are truly interested in understanding whether poorer youth are indeed more likely to participate in crime than youth from better off families, we should use income measures on the per household member basis, rather than for the household as a whole. Indeed, failing to account for household size introduces even greater measurement error that can be avoided.

Table 3 performs identical regressions to those in Table 1, but uses per household member measures of income (and a per household member measure of wealth in the case of the 2SLS results). As Table 3 shows, these results reveal an even stronger relationship between the economic resources of a household and youth criminal participation than do those in Table 1. The coefficient estimates with respect to participation in serious crime for the 2SLS specification for all youth (top section of column 6) suggest that the difference in criminality between a youths from households earning $25,000 in 1997 (near the lower bound cutoff for the second quintile of the sample income distribution) and youths from a households earning $55,000 in 1997 (near the lower bound cutoff for the fourth quintile of the sample income distribution) is over twice as large as the difference in serious criminal participation

[9] Interestingly, the estimated coefficient is actually significantly positive for Hispanic youth with respect to participation in minor crime.

Table 2 OLS and 2SLS regression results for youth criminal participation (by income decile)

	OLS			IV Adj. for measurement error via 2SLS		
	(1) All crime	(2) Serious crime only	(3) Minor crime only	(4) All crime	(5) Serious crime only	(6) Minor crime only
All youth						
HH Inc. Decile	– 0.008***	– 0.010***	0.002	– 0.018***	– 0.021***	0.003
	[0.002]	[0.002]	[0.002]	[0.004]	[0.003]	[0.003]
Female	– 0.118***	– 0.070***	– 0.049***	– 0.118***	– 0.071***	– 0.049***
	[0.013]	[0.011]	[0.01]	[0.013]	[0.011]	[0.01]
White youth only						
HH Inc. Decile	– 0.012***	– 0.011***	0	– 0.027***	– 0.024***	– 0.003
	[0.003]	[0.002]	[0.002]	[0.005]	[0.004]	[0.004]
Female	– 0.119***	– 0.071***	– 0.049***	– 0.120***	– 0.072***	– 0.049***
	[0.016]	[0.013]	[0.012]	[0.016]	[0.013]	[0.012]
Black youth only						
HH Inc. Decile	– 0.009	– 0.007	– 0.003	– 0.017*	– 0.016**	– 0.003
	[0.006]	[0.005]	[0.003]	[0.009]	[0.007]	[0.006]
Female	– 0.111***	– 0.079***	– 0.038*	– 0.111***	– 0.079***	– 0.038*
	[0.03]	[0.026]	[0.021]	[0.03]	[0.026]	[0.021]
Hispanic youth only						
HH Inc. Decile	0.002	– 0.008*	0.010**	0.003	– 0.023***	0.026***
	[0.006]	[0.005]	[0.005]	[0.01]	[0.007]	[0.008]
Female	– 0.126***	– 0.060**	– 0.065***	– 0.126***	– 0.060**	– 0.065***
	[0.033]	[0.028]	[0.025]	[0.033]	[0.028]	[0.025]

All statistics are weighted using NLSY97 round 2 individual weights. Standard errors are clustered by household and shown in brackets. One asterisk indicates significance at the 10% level, two asterisks indicate significance at the 5% level, and three asterisk indicates significance at the 1% level. See Table 1 for discussion of sample

between genders. The fact that the strength of the estimated relationship between household economic resources and youth criminal participation is stronger in Table 3 than Table 1 is not necessarily surprising given that per capita household income is arguably a less noisy measure of the economic situation of a household, which means the estimates in Table 3 likely reflect an even smaller degree of attenuation bias due to measurement error than those in Table 1.

Conclusion

The analysis in this paper reveals the difficulties associated with measuring the relationship between household economic resources and youth criminal participation, and why these difficulties may account for some of the disagreement regarding the strength of this relationship that exists in the previous literature. Consistent with previous work, using data from the NLSY97 I find that a simple regression of youth criminal participation on reported household income from the previous year reveals a weak negative relationship between the two. However, this simple specification appears to understate the magnitude of true relationship for a variety of reasons. For one, there may be non-linearities in the relationship between household economic resources and youth criminal participation. Accounting for such non-linearities by

Table 3 OLS and 2SLS regression results for youth criminal participation (Income per household member)

	OLS				IV Adj. for measurement error via 2SLS		
	(1) All crime	(2) All crime	(3) Serious crime only	(4) Minor crime only	(5) All crime	(6) Serious crime only	(7) Minor crime only
All youth							
HH income	– 0.011*	–	–	–	–	–	–
	[0.006]						
HH Inc. Quintile	–	– 0.017***	– 0.019***	0.002	– 0.074***	– 0.086***	0.012
		[0.006]	[0.006]	[0.004]	[0.016]	[0.013]	[0.012]
Female	– 0.117***	– 0.118***	– 0.070***	– 0.049***	– 0.119***	– 0.072***	– 0.049***
	[0.013]	[0.013]	[0.011]	[0.01]	[0.013]	[0.011]	[0.01]
White youth only							
HH income	– 0.012*	–	–	–	–	–	–
	[0.007]						
HH Inc. Quintile	–	– 0.036***	– 0.026***	– 0.01	– 0.157***	– 0.132***	– 0.024
		[0.01]	[0.009]	[0.008]	[0.033]	[0.027]	[0.024]
Female	– 0.118***	– 0.120***	– 0.071***	– 0.049***	– 0.126***	– 0.077***	– 0.050***
	[0.016]	[0.016]	[0.013]	[0.012]	[0.017]	[0.014]	[0.013]
Black youth only							
HH income	– 0.044**	–	–	–	–	–	–
	[0.018]						
HH Inc. Quintile	–	– 0.011	– 0.014	0.002	– 0.053**	– 0.052***	– 0.006
		[0.012]	[0.012]	[0.006]	[0.025]	[0.02]	[0.019]
Female	– 0.113***	– 0.111***	– 0.078***	– 0.038*	– 0.109***	– 0.077***	– 0.037*
	[0.03]	[0.03]	[0.026]	[0.021]	[0.03]	[0.025]	[0.021]
Hispanic youth only							
HH income	0.012	–	–	–	–	–	–
	[0.018]						
HH Inc. Quintile	–	0.008	– 0.004	0.011	0.024	– 0.065***	0.087***
		[0.012]	[0.011]	[0.009]	[0.033]	[0.023]	[0.027]
Female	– 0.126***	– 0.126***	– 0.060**	– 0.066***	– 0.127***	– 0.056**	– 0.070***
	[0.033]	[0.033]	[0.028]	[0.025]	[0.033]	[0.028]	[0.026]

All statistics are weighted using NLSY97 round 2 individual weights. Standard errors are clustered by household and shown in brackets. One asterisk indicates significance at the 10% level, two asterisks indicate significance at the 5% level, and three asterisk indicates significance at the 1% level. See Table 1 for discussion of sample

using household income quintile rather than simply household income level to measure household economic resources leads to modest increases in the estimated relationship between household economic resources and youth criminal participation. Furthermore, the relationship may be stronger for white youth than minority youth, and appears to be stronger with respect to participation in serious crimes than more minor criminal activity. However, adjusting for these issues leads to only negligible changes in results.

On the other hand, the key results of this paper suggest that the most quantitatively important issue with respect to estimating the relationship between household economic resources and youth criminal participation is accounting for error with respect to measuring household economic resources. Intuitively, household income from a particular year, or even household income quintile from a particular year, is

likely a relatively imprecise measure of a household's overall economic resources, which is arguably the relevant conceptual variable. Such measurement error can severely bias estimation. To adjust for such measurement error, I used an instrumental variable (IV) method in conjunction with other information about each household's economic resources, namely reported household net-wealth. The results from this IV analysis suggest that the relationship between household economic resources and youth criminal participation is actually very strong, especially for white youth. Indeed, the difference in criminal participation between youths whose households' incomes differ by two or more quintiles of the income distribution appears to be greater than or equal to the difference in criminal participation between genders. Moreover, the IV results strongly confirm that the relationship between household economic resources and youth criminal participation is restricted to crimes of a serious nature only, with crimes of a more trivial nature apparently having little relation to household economic resources.

Given the strong relationship between household economic resources and youth participation in serious criminal activity, a clear and important avenue for additional research is to further identify what mechanisms account for this relationship. Namely, it is important for future research to examine how, and to what extent, household economic resources directly affect youth criminal activity, and to what extent household economic resources are simply correlated with other household characteristics that are actually the key factors that affect youth criminality.

Appendix

Table 4 Differences between sample and those excluded from sample due to missing income data

Variable	Household income/wealth			Variable	Household income/wealth		
	Valid	Missing	Diff		Valid	Missing	Diff
Crime	0.28	0.27	0.02	> 90% prob. h.s. degree by age 20	0.86	0.87	– 0.01
	[0.007]	[0.010]	[0.012]		[0.008]	[0.011]	[0.014]
	n = 5,577	2,809			n = 2,125	1,109	
Female	0.49	0.47	0.02*	Relgiosity index	2.85	2.85	0.00
	[0.008]	[0.011]	[0.013]		[0.019]	[0.027]	[0.033]
	n = 5,577	2,809			n = 3,975	2,011	
Black	0.14	0.19	– 0.04***	Computer in household	0.57	0.61	– 0.04**
	[0.006]	[0.009]	[0.010]		[0.010]	[0.014]	[0.018]
	n = 5,577	2,809			n = 3,432	1,675	
Hispanic	0.12	0.14	– 0.02**	Dictionary in household	0.95	0.96	– 0.01
	[0.005]	[0.008]	[0.009]		[0.004]	[0.005]	[0.006]
	n = 5,577	2,809			n = 3,428	1,675	
Feel safe at school	0.88	0.87	0.01	Dance, music, or language class	0.28	0.28	0.00
	[0.005]	[0.007]	[0.009]		[0.009]	[0.013]	[0.016]
	n = 5,564	2,801			n = 3,417	1,664	

Table 4 continued

Variable	Household income/wealth			Variable	Household income/wealth		
	Valid	Missing	Diff		Valid	Missing	Diff
> 75% of peers drink	0.17	0.17	– 0.01	Highest grade birth mother	12.81	12.50	0.3**
	[0.006]	[0.008]	[0.008]		[0.069]	[0.109]	[0.128]
	n = 5,487	2,725			*n* = 5,351	2,555	
> 75% of peers use drugs	0.20	0.19	0.01	Highest grade birth father	12.30	11.95	0.34**
	[0.006]	[0.009]	[0.011]		[0.089]	[0.146]	[0.170]
	n = 5,470	2,707			*n* = 4,922	2,352	
> 75% of peers skip school	0.19	0.20	– 0.01	Two parent household [in 1997]	0.67	0.69	– 0.02**
	[0.006]	[0.009]	[0.011]		[0.008]	[0.012]	[0.014]
	n = 5,545	2,784			*n* = 5,577	2,809	
Gangs in neighborhood	0.42	0.41	0.01	Mother's age at first birth	23.15	23.34	– 0.19
	[0.008]	[0.011]	[0.014]		[0.085]	[0.128]	[0.153]
	n = 5,541	2,777			*n* = 5,209	2,513	
House broken into < age 12	0.14	0.14	0.00				
	[0.060]	[0.008]	[0.010]				
	n = 5,485	2,759					
Seen someone shot < age 12	0.09	0.09	0.00				
	[0.004]	[0.006]	[0.007]				
	n = 5,495	2,759					
> 10% prob. of being victim of crime in 1 year	0.33	0.32	0.01				
	[0.011]	[0.016]	[0.020]				
	n = 2,106	1,095					

Standard errors are clustered by household and shown in brackets. One asterisk indicates significance at the 10% level, two asterisks indicate significance at the 5% level, and three asterisk indicates significance at the 1% level

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