The Effect of Grants for Higher Education on Property Crime: Differentiating Need and Merit

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Abstract

This paper seeks to build on the limited research that has been done looking at the effect of financial aid on crime. I pose the hypothesis that an increase in college grant aid will lead to a decrease in the property crime rate. Given that students who demonstrate financial need are the least likely to attend college in the absence of this aid, I form a second hypothesis that grants targeted at students with financial need will result in a larger impact on property crime than merit-based grants. While additional analysis is needed, I find that government grants for higher education do have an impact. A 1% increase in grant aid per full-time undergraduate student brought a 0.13% reduction in the property crime rate when estimating via OLS. Under a one-way fixed effects model, this result becomes stronger at 0.19%, showing that OLS may have underestimated the true impact of grant aid on crime. After specifying the model between need and merit-based grants, reductions in property crime are only observed with an increase in need-based grants, satisfying the second hypothesis of my research.

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I. Introduction

As the price to attend college across the United States continues to rise, the availability of financial aid has become increasingly important. The inflation-adjusted cost of attending college has doubled since 1986, far outpacing rising health care costs and median family income. Increased education brings with it many benefits for the individual, including higher wages and better labor market opportunities. Besides these effects, an overall increase in educational attainment has been demonstrated to have positive external effects on society. Among these effects are higher worker productivity, reductions in unemployment, and reductions in crime.

My research seeks to determine the effect government grants for higher education have on property crime rates, as well as the differing impact of need and merit-based programs. In the 2009-10 academic year, an average of more than $187 million in state government funds were distributed via grant programs for higher education. This is in addition to the average of roughly $555 million in Federal Pell Grant funds across the U.S. In total, a combined $37 billion was spent on state grant programs and the Federal Pell Grant (Baum et al. 2012). With such a large sum of government funds being directed at higher education, federal and state governments expect to see positive outcomes of their investment in the country's future.

While the sole aim of the Federal Pell Grant is to get aid to students with the most financial need, some states have made a significantly smaller commitment to these students. In the 2009-10 school year, Georgia, Mississippi, and Louisiana gave 0%, 14%, and 16% of their grant aid based on financial need respectively (Baum et al., 2012). This leaves a larger percentage of funds being directed toward merit-based programs, and a heavier burden for students from low-income families trying to fund an education. It can be argued that students who demonstrate financial need are the most at-risk for committing crimes, given their lower

opportunity cost of such behavior. There has been extensive literature on the crime-reducing nature of education. Considering that crime is something all governments have a vested interest in reducing, it is my hope that this study identifies methods of funding higher education that can have an impact.

II. Literature Review

The effect of financial aid on crime rates builds on two different areas of empirical work; the effect of financial aid on the decision for educational attainment, and the effect of education level on crime. Except for Park (2011), nobody has looked directly at the effect of financial aid for higher education on crime. While research looking at this relationship is limited, the work done in these related areas provide the background for why it is a relevant question to study. In this section, I will review first the literature on the effect of financial aid on educational attainment, and then results from studies looking at the effect of education on crime.

Bound and Turner (2002) looked at the effects of the G.I. Bill on college enrollment post-World War II. They found there was a stronger effect on college attainment for white men than for African Americans, potentially speaking to the limited college choice and segregation that existed in the south throughout the time period the study was analyzing. Using a quasi-experimental methodology Dynarski (2002) estimated that the availability of an additional $1,000 in subsidies for post-secondary schooling resulted in an increase of 4% in college attendance. An important contribution in this area of research is that the availability of financial aid not only affects your decision to enroll in school but also to remain there. Bettinger (2004) found that an additional $1,000 in Federal Pell Grant access resulted in a 6.4% reduction in college withdrawals. Outside of the findings for returning African American soldiers in the south

at the inception of the G.I. Bill, researchers have unanimously supported the fact that increased subsidies for higher education increase an individual's college attainment decision. This is an important first step in developing a relationship between financial aid and crime.

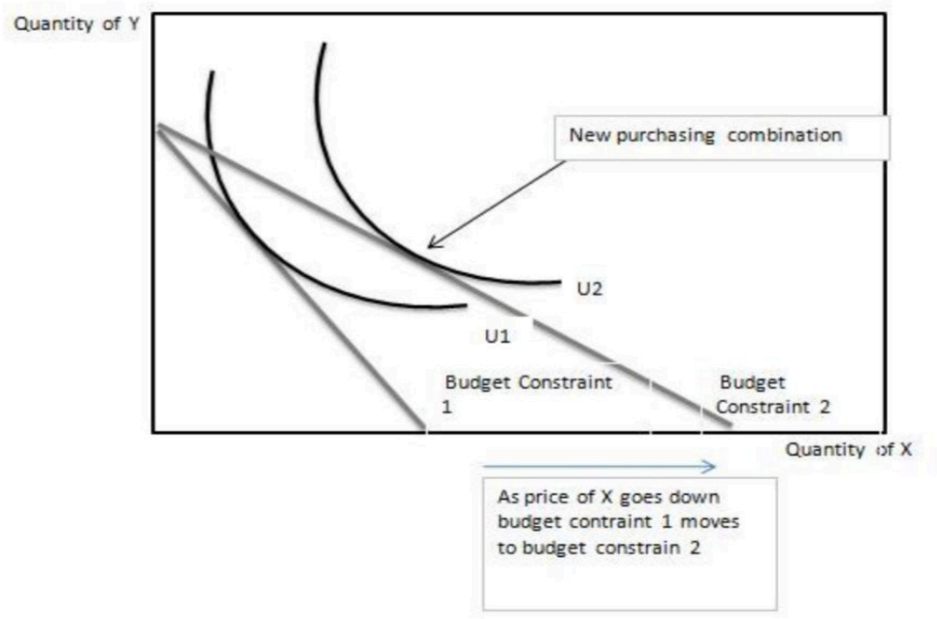
The relationship between education level and crime has been extensively examined. Fella and Gallipoli (2014) looked at education and crime over the life cycle. They found that increasing high school graduation rates had a larger impact on reducing crime than increasing prison sentences for offenders. This result is in line with prior research that found up to a 60% reduction in crime participation for 19-year-old men who completed high school (Lochner, 2004). Lochner and Moretti (2006) find that an additional year of schooling leads to a decrease in the probability of incarceration, by 0.14% for whites and 0.41% for African Americans respectively. Looking at youth crime in the UK, Machin, Marie, and Vujic (2012) found that a 1% increase in the proportion of male students participating in post-compulsory education resulted in a 1.9% decrease in male crime. Education has been consistently found to decrease levels of criminal activity; Buonanno and Leonida (2009) find that the effect of education on crime operates beyond the simple increase in labor market opportunities associated with higher levels of education.

Park (2011) is the only study that has looked at the relationship between financial aid and crime rates. Violent, property, and white-collar crimes were looked at using OLS estimation. All three were shown to decrease with more financial aid, by 0.06%, 0.14%, and 0.81% respectfully. I will contribute to the existing literature by running both OLS and fixed effects estimations of the effect of grant aid on property crimes. In addition to controlling for state fixed effects, I provide theoretical reasoning to believe need-based aid will show a larger impact than merit-based, a contribution to the existing literature.

III. Economic Theory and Testable Hypotheses

Starting with a standard utility maximization model, Park (2011) has helped affirm the economic theory behind the relationship of financial aid and crime. After deriving demand for education, Becker's (1968) rational offender theory will supply the framework for my research.

A utility maximization model is used to begin to explain the expected negative financial aid-crime relationship. Figure 1 represents the choices of a representative consumer who has to decide the optimal level of consumption between two goods subject to a budget constraint. Assume good X is the level of education, while Y can represent a number of other goods and services. In the absence of financial aid, the budget constraint is represented by *budget constraint 1*.



Park (2011)

With financial aid, the original budget constraint rotates to *budget constraint 2* and the consumer can now reach a higher level of utility. A lower net price of education is what creates this rotation in the budget constraint for the consumer, the net price of education being tuition cost

less the financial aid received. At the new equilibrium bundle, the consumer chooses to pursue more education than at the old equilibrium bundle. From the utility maximization problem depicted in Figure 1, we can derive demand for education:

Educational attainment = f (net price of education, price of other goods and services, income)

There are several reasons why a college education could lower the probability of committing a property crime. One is the enhanced labor market outcomes that raise the opportunity cost of committing crimes for a rational criminal. In addition, an education may increase psychic cost (anxiety, guilt) and alter an individual's preferences over time (Lochner and Moretti, 2006).

Decision of committing a property crime = f (education level, returns from crime, costs of crime, socioeconomic characteristics)

Since it's been established through the utility maximization model that the net price of education is a determinant of one's decision to reach a higher level of education, net price of education can be substituted for education level giving the following model:

Decision of committing a property crime = f (net price of education, returns from crime, costs of crime, socioeconomic characteristics).

The theory implies that aid targeting students with a greater financial need should have a larger impact on property crime since they are the least likely to attend college in the absence of aid, and also have the lowest opportunity cost of committing these crimes. As such the model leads to the following testable hypotheses: An increase in grant aid for higher education will lead to a decrease in reported property crime rates. Second, grants targeted at students with financial need will result in a larger impact on property crime than merit-based grants.

IV. Data and Empirical Methodology

Using panel data from the 50 states in three different years, my examination of grant aid's effect on property crime will be split into two separate models. The first model combines all observed sources of aid as one variable, and the second splits this aid into need and merit-based. Since Becker's rational offender theory is most directly applicable in modeling property crimes, I have forgone estimations of other types of crime. All variables except *unemployment*, *africanamerican, hispanic, male,* and *youth* are taken with a natural logarithm. In the following models i is an identifier for each state in the U.S. while t denotes the year of crime observed:

$$lnpcrate_{it} = \beta_0 + \beta_1 lngrants_{it-5} + \beta_2 lntuition_{it-5} + \beta_3 lnincome_{it} + \beta_4 unemployment_{it} + \beta_5 lnlawenforce_{it-1} + \beta_6 africanamerican_{it} + \beta_7 hispanic_{it} + \beta_8 male_{it} + \beta_9 youth_{it} + \varepsilon_{it}$$

$$lnpcrate_{it} = \beta_0 + \beta_1 lnneedgrants_{it-5} + \beta_2 lnmeritgrants_{it-5} + \beta_3 lntuition_{it-5} + \beta_4 lnincome_{it} + \beta_5 unemployment_{it} + \beta_6 lnlawenforce_{it-1} + \beta_7 africanamerican_{it} + \beta_8 hispanic_{it} + \beta_9 male_{it} + \beta_{10} youth_{it} + \varepsilon_{it}$$

Where:

lnpcrate is the dependent variable measuring the total reported occurrences of property crimes (burglary, larceny-theft, motor vehicle theft) per 100,000 state residents. This variable comes from the FBI Uniform Crime Reports, where I collect property crimes from 2010, 2012, and 2014. *lngrants* is the combination of state grants and the Federal Pell Grant per full-time equivalent undergraduate student. *lnneedgrants* is the combination of state grant funding that is dispersed solely on the basis of financial need and Federal Pell Grant funds per full-time equivalent undergraduate student. *lnmeritgrants* is the remaining grant aid observed that was not dispersed on the basis of need per full-time equivalent undergraduate student. Grant data collected for this study is sourced from a combination of the National Association of State Student Grant & Aid Programs for state grant aid and the U.S. Department of Education for federal grant aid. This data is collected at a five-year time lag behind crime. Receiving grant aid would not elicit an immediate increase in educational attainment, a five-year lag presents roughly the average time it takes a freshman undergraduate to complete a bachelor's degree.

lntuition is the average cost of tuition plus fees at four-year public colleges in each state. Within the utility maximization framework, an increase in tuition will decrease an individual's educational attainment decision, thus a positive expectation of an increase in tuition's effect on property crime. Tuition data is collected from the College Board for the same academic years as grant aid in the model.

Except for *lnlawenforce,* the remaining variables in the model are observed for the same years as property crime. *lnincome* is the median household income in 2014 CPI adjusted dollars by state. Within Becker's framework an increase in median income represents an increase in the

opportunity cost of committing a crime, thus a negative expectation of income's effect on property crime. Income data is collected from the U.S. Census Bureau.

unemployment is the annual average rate of unemployment in each state. An increase in the unemployment rate represents an increase in the number of people with a reduced cost of engaging in criminal behavior. Thus, a positive coefficient on the unemployment rate variable is expected. I gather unemployment data from the Bureau of Labor Statistics.

lnlawenforce is the number of full-time law enforcement officers per 100,000 state residents. More law enforcement presents an increased likelihood of being arrested. As such it is expected to have a negative effect on property crime rates. This variable was collected at a one-year time lag to the crime rates in the model to correct for endogeneity. The problem of endogeneity when looking at the relationship between the amount of law enforcement and crime has been well established in prior economic literature. As it is not the main concern of my study, I employ this one-year lag to try to correct the issue. Data for this variable is collected from the FBI Uniform Crime Reports.

To take into account state-specific demographics, the following variables were used. *africanamerican* is the percentage of the state population that is African American. *hispanic* is the percentage of the state population that is Hispanic or Latino. *male* is the percentage of the state population that is male. *youth* is the percentage of the state population between the age of 15 and 24. All demographics data is collected from the U.S. Census Bureau. Variable definitions and sources are provided in Table 1 of the appendix, descriptive statistics are provided in Table 2.

V. Empirical Results

In attempt to answer whether grant aid can affect property crime and if need-based aid has a different impact than merit-based, both OLS and a one-way fixed effects model were used. In the first econometric model, an F-test comparing the one-way fixed effects model to OLS showed $F(49,91)=30.00$, $p=0.0001$, leading me to reject the null hypothesis of no fixed effects. Similarly, for the second model $F(49,90)=27.97$, $p=0.0001$. While these results suggest the models will be enhanced when controlling for state fixed effects, it needs to be noted that additional statistical analyses may have been able to identify a better estimation technique. I will first discuss the results of the model where I observe grant aid as one variable, then I will discuss the results when this aid is split into need and merit-based.

In the first model, using OLS estimation I observed a 0.13% decrease in the property crime rate with a 1% increase in grant aid per undergraduate student. This estimate was significant at the 95% level. This estimation strengthened to a 0.19% decrease in the one-way fixed effects model, significant at the 99% level. This result is both in line with economic theory and an economically significant find. The change observed between the OLS and fixed effects models show that OLS may have underestimated the true effect of grant aid on property crime.

There were several other statistically significant variables in the first model. Using OLS a 1% increase in income brought a 0.50% reduction in property crime. However, this observation became statistically insignificant in the fixed effects model. Using OLS a 1% increase in per capita law enforcement reduced property crime by 0.19%. Under fixed effects this observation became positive and significant. It is likely that endogeneity is not being sufficiently accounted for by taking the number of law enforcement officers from the year prior to the observed crime rate, as I had done.

As the percentage of the state population that was African American rose by 1%, property crime increased by 0.01% in the OLS estimation. However, under fixed effects a 1% increase brought a 0.04% decrease in property crime. As the percentage of the state population that was Hispanic rose by 1%, an increase of 0.01% for property crime was observed through OLS estimation. Under fixed effects no significant effect was observed. The male population variable was shown to be insignificant in the OLS estimation, but under fixed effects a 1% increase in the male population brought a 0.17% increase in property crime. Aside from what was observed when switching from OLS to fixed effects for the law enforcement observations, variables found to be significant in the first model were largely in line with economic theory.

In the second model that splits grants into need and merit-based, the reductions in property crime observed with additional grant aid in the first model is picked up only with need-based aid. As need-based grants rose by 1% the property crime rate fell by 0.15% in the OLS estimation, and 0.18% under the fixed effects model. Merit-based grant aid had no effect on property crime in either the OLS or the fixed effects estimations. Need-based aid having a stronger effect than merit-based is in line with theory. There were slight changes of significance and strength of estimations when changing the econometric model specification, results can be found in Table 3 and Table 4 of the appendix.

VI. Conclusions and Limitations

Grant aid was shown to reduce property crime, satisfying the first hypothesis of my research. When separated into need and merit-based, this effect was only observed for need-based aid, satisfying my second hypothesis. While additional analysis is required, there are several policy implications that can potentially be drawn from these findings. The first is that

providing grants for higher education can to some degree be incorporated as a crime-reducing expense of government. With that stated, these grants only show an effect on property crime when they are directed toward students who have demonstrated financial need. In terms of crime reduction, society would benefit most if grant aid was concentrated on students having the hardest time funding a college education. Merit-based grants that seek to attract and maintain highly skilled students within the borders of the state may be useful, but governments should emphasize helping those with financial needs.

There are several limitations of my research. One is that individual-level data would be preferred to aggregate state level data. Obtaining individual-level data for the hypotheses of this study would require respondents to give very personal information, and may have recall bias, yet it provides an estimation more in line with Becker's rational offender theory. Along with this, it is a limitation to not have the ability to fully measure the returns and costs of crime for offenders, nor all forms of financial aid for students that determine the net price of education. Having this data would provide better estimation within the theoretical framework. Future studies could attempt to amend this analysis to individual-level data.

Another limitation of my research is the endogeneity present for the law enforcement variable. While I tried to correct this issue, finding a proper instrumental variable may be more appropriate. A more thorough assessment of estimation techniques through additional statistical testing would ultimately improve upon this research. In addition, there are likely several omitted variables that would be beneficial to bring into the models. Identifying these variables could add to the explanatory power and reduce omitted variable bias.

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Appendix

Table 1: Variable Definitions and Sources		
Variable	**Definition**	**Source**
lnpcrate	Total occurrences of property crime (burglary, larceny-theft, motor vehicle theft) per 100,000 state residents	FBI UCR (2010,2012,2014)
lngrants	State grant aid plus Pell Grant aid per full-time equivalent undergraduate student by state	NASSGAP (2005-06, 2007-08,2009-10) U.S. Department of Education (2005-06, 2007-08,2009-10)
lnneedgrants	State grant aid based on need plus Pell Grant aid per full-time equivalent undergraduate student by state	NASSGAP (2005-06, 2007-08,2009-10) U.S. Department of Education (2005-06, 2007-08,2009-10)
lnmeritgrants	State grant aid not based on need per full-time equivalent undergraduate student by state	NASSGAP (2005-06, 2007-08,2009-10)
lntuition	Tuition and fees, four-year public colleges by state	College Board (2005-06, 2007-08,2009-10)
lnincome	Median household income in 2014 CPI adjusted dollars by state	U.S Census Bureau (2010, 2012,2014)
unemployment	Annual Average unemployment rate by state	Bureau of Labor Statistics (2010,2012,2014)
lnlawenforce	Number of full-time law enforcement employees per 100,000 state residents	FBI UCR (2009,2011,2013)
africanamerican	% of state population that is African American	U.S. Census Bureau (2010,2012,2014)
hispanic	% of state population Hispanic or Latino	U.S Census Bureau (2010,2012,2014)
male	% of state Population that is Male	U.S. Census Bureau (2010,2012,2014)
youth	% of state Population aged 15-24	U.S. Census Bureau (2010,2012,2014)
note: prefix *ln* denotes a natural logarithm was taken		

Table 2: Descriptive Statistics					
Variable	N	Mean	Std Dev	Min	Max
pcrate	150	2740.81	580.51	1524.40	3900.40
grants	150	1865.57	738.18	629.23	4190.57
needgrants	150	1686.33	612.47	629.23	3205.82
meritgrants	150	179.24	349.29	0	1762.25
tuition	150	6092.25	1933.81	2590.00	12016.00
income	150	54159.44	8551.55	35521.00	76165.00
unemployment	150	7.28	2.09	2.80	13.50
lawenforce	150	322.75	66.52	210.06	585.44
africanamerican	150	10.68	9.52	0.40	37.50
hispanic	150	11.02	10.03	1.20	47.70
male	150	49.39	0.77	48.30	52.60
youth	150	13.95	0.71	12.08	16.23
note: 50 states in 3 observed crime years (2010,2012,2014). all descriptive statistics are shown prior to taking logs					

Table 3: Combined Grants		
	OLS	FE
	lnpcrate	
Intercept	**14.216*** (6.44)**	**-1.720 (-0.51)**
lngrants	**-0.128** (-2.45)**	**-0.193*** (-4.84)**
lntuition	**-0.088 (-1.31)**	**0.032 (0.40)**
lnincome	**-0.505*** (-3.87)**	**-0.098 (-0.75)**
unemployment	**0.008 (0.97)**	**0.008 (0.95)**
lnlawenforce	**-0.187** (-2.02)**	**0.349*** (3.80)**
africanamerican	**0.012*** (4.65)**	**-0.045* (-1.65)**
hispanic	**0.007*** (3.76)**	**0.050 (1.46)**
male	**0.039 (1.33)**	**0.173** (2.28)**
youth	**-0.017 (-0.77)**	**0.019 (0.48)**
N	**150**	**150**
R-Squared	**0.3681**	**0.9654**
F-Value	**10.64**	**30.00**
note: t-values are in parentheses. *,, and *** denote significance at the 90 percent, 95 percent, and 99 percent level, respectively**		

Table 4: Need vs. Merit-Based Grants		
	OLS	FE
	lnpcrate	
Intercept	**14.976*** (6.79)**	**-0.142 (-0.04)**
lnneedgrants	**-0.150*** (-2.74)**	**-0.177*** (-4.43)**
lnmeritgrants	**-0.008 (-1.07)**	**0.004 (0.48)**
lntuition	**-0.077 (-1.11)**	**0.036 (0.45)**
lnincome	**-0.544*** (-4.22)**	**-0.130 (-0.98)**
unemployment	**0.006 (0.62)**	**0.006 (0.71)**
lnlawenforce	**-0.198** (-2.15)**	**0.363*** (3.85)**
africanamerican	**0.012*** (4.78)**	**-0.049* (-1.75)**
hispanic	**0.007*** (3.94)**	**0.049 (1.41)**
male	**0.036 (1.24)**	**0.143* (1.87)**
youth	**-0.019 (-0.89)**	**0.024 (0.60)**
N	**150**	**150**
R-Squared	**0.3789**	**0.9643**
F-Value	**10.09**	**27.97**
note: t-values are in parentheses. *,, and *** denote significance at the 90 percent, 95 percent, and 99 percent level, respectively**		

SAS Code

```
proc means data = work.aid;
var pcrate grants needgrants meritgrants tuition income
unemployment lawenforce africanamerican hispanic male
youth;
run;
data aid;
set work.aid;
lnpcrate = log(pcrate);
lngrants = log(grants);
lnneedgrants = log(needgrants);
lnmeritgrants = log(meritgrants+1);
lntuition = log(tuition);
lnincome = log(income);
lnlawenforce = log(lawenforce);
run;
proc reg data=aid;
model lnpcrate = lngrants lntuition lnincome unemployment
lnlawenforce africanamerican hispanic male youth;
run;
proc reg data=aid;
model lnpcrate = lnneedgrants lnmeritgrants lntuition
lnincome unemployment lnlawenforce africanamerican
hispanic male youth;
run;
proc sort;
by state year;
run;
proc panel data=aid;
id state year;
model lnpcrate = lngrants lntuition lnincome unemployment
lnlawenforce africanamerican hispanic male youth/FIXONE;
run;
proc panel data=aid;
id state year;
model lnpcrate = lnneedgrants lnmeritgrants lntuition
lnincome unemployment lnlawenforce africanamerican
hispanic male youth/FIXONE;
run;
```