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Variations in Dropout Rates Across Virginia

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Abstract

Using Ordinary Least Squares (OLS) regression analysis, this study attempts to capture variation in dropout rates across Virginia counties and cities. With the respective dropout rates as the dependent variable, seven independent variables are used accordingly in order to provide as much explanatory power as possible. At the 10 percent significance level, four of seven variables are statistically significant with an adjusted R2 of .374. Important policy implications can be derived from the model and its statistically significant variables. The model finds that the percentage of blacks in the population, university access, the unemployment rate and single female-headed households to be statistically significant with coefficients that have a relatively large impact on dropout rates. Median household income, percentage of the population with advanced degrees, and student to teacher ratios were found to be insignificant. Using these regression results, local government can more effectively move funds to areas that will help to decrease dropout rates. Investigating into the black population and their increased propensity to drop out as well as focusing on mentoring programs to help relieve extra stress and decreased parental supervision found in single female-headed households will provide the most effective decrease in dropout rates the model.

Introduction

Communities that have relatively low high school dropout rates experience a number of quantifiable strengths over those communities with relatively higher dropout rates. Students who complete high school are less likely to be involved in crime, more likely to earn higher incomes, are less likely to be unemployed, have greater job opportunities as well as being less likely to receive public assistance[1]. These returns on an investment of completing a high school education stand to benefit everyone in a community. As crime falls, theory would suggest that the region would become more attractive relative to communities with higher crime rates. This would increase demand for housing, among many other things, pushing real estate prices up, thus increasing tax revenues for local government to invest in other areas of the community. As unemployment falls, higher incomes are earned and public assistance funds become

[1] Dearden, Lorraine ET. Al. "Education Subsidies and School Drop-Out Rates," The Institute For Fiscal Studies Wp05/11 (June 2005) EconLit Database (12 September 2006).

decreasingly necessary due to higher high school completion rates; the community stands to grow due to more productive human capital. For a community to reap the benefits of a large, high school educated workforce, it must make it a policy to keep dropout rates as low as possible. This study attempts to pinpoint what the determinants of dropout rates are across Virginia so that communities are able to frame the problem in the correct fashion, thus promoting the best interest for all its citizens.

In subsequent sections, the variations in dropout rates across Virginia counties and cities will be examined closely through regression analysis in order to tease out the significant determinants of dropout rates. This will allow communities to correct or confirm their current course of action in the prevention of high dropout rates, thus allowing the region to experience all the benefits of a relatively higher educated workforce.

Literature Review

This O.L.S. regression model determines the factors that are significant in affecting dropout rates. The independent variable Black accounts for a potential race aspect to dropout rates. Median household income will account for a level of income that may have an effect on dropout rates. Included is an independent variable that will capture the higher educational achievement as a percentage of the population, thus dictating if a community with large percentages of the population with advanced degrees has any effect on dropout rates. A dummy variable is used to determine if local university access has any statistically significant effect on dropout rates. Previous literature on the same subject has suggested that communities with high percentage levels

of single female-headed households are prone to experiencing relatively higher dropout rates, this too will be included as an explanatory variable. Student to teacher ratios are taken into account to capture any variation in dropout rates due to different school sizes across Virginia counties and cities. Lastly, the unemployment rate is taken into consideration for theory would suggest an inverse relationship between unemployment rates and dropouts. As a community experiences a decrease in the unemployment rates, theory suggests that students that are contemplating dropping out will have decrease costs, relative to the potential benefits, resulting in increased dropouts because finding a job will be easier now than with the previously higher unemployment rates.

There are many factors in a local economy, school life, and aspects of young adulthood that affect the decision to drop out of high school. In the quest to uncover what the determinants of dropout rates are and which of these determinants has the most influence, it is imperative that previous literature and studies be consulted. These scholarly journals and peer-reviewed articles are able to provide insight into dropout rates and previously tested theoretical models that will enable an increased effectiveness of this study. In the articles to be discussed, there are wide varieties of variables that are tested and analyzed in their connection to dropout rates in regions across the world. Some researchers consulted suggest dropout rates are highly correlated with race and income, while others determine that the education level of the students' parents is the predominating determinant of dropout rates. These wide-ranging research journals allow a focused analysis of the determinants of dropout rates across Virginia cities and counties.

Kelly Bedard (2001) tests how signaling models, human capital theory and increasing university access affect high school dropout rates. "[E]ducation also acts as a signaling, or screening, device for unobservable ability. More specifically, firms infer ability from education, and students choose an education level to signal their ability to potential employers."(Bedard, pg. 1) Students who drop out of school are signaling to their potential employers their lower abilities relative to high school graduates and university attendees alike. His theory suggests that as university access increases, dropout rates will increase as well. As some students are now admitted into a university who previously were constrained from attending due to limited access, there is a decreased "incentive to hide behind the remaining 'constrained' high school graduates." (Bedard, pg. 1) His justifications is as follows:

> "If fewer high-ability people are constrained from entering university, the skill pool of high school graduates is reduced, and the incentive to obtain the designation high school graduate is diminished. The least able graduates therefore become dropouts and the most able enroll in university" (Bedard, pg. 3)

School districts with greater university access, ceteris paribus, will have relatively higher dropout rates, per the Bedard (2001) study. In this study, I will test the opposite, the more conventional economic theory that suggests the opposite of his hypothesis. As university access is opened up in an area, more students will likely complete high school as to have a chance at gaining admittance into a university. Using a dummy variable for whether or not a county or city has a school of higher learning in itself, I will be able to capture additional variation in dropout rates across Virginia.

Behrman and Deolalikar (1991) look at the real rate of return on education. They cite the World Bank's research that suggests as education attainment increases, so will

total real wages, exactly what economic theory suggests. Yet, Behrman and Deolalikar (1991) suggest that because of school repetition and dropouts, these estimates of rates of return are overestimated because they do not take into account the extra social costs that repetition of grade levels and high school dropouts pose. This is very important for my study for, if these rates of return are indeed inflated and later corrected, there will be an observable increase in dropout rates. As a student decides whether or not to drop out of school, he/she invariably takes into account future earning potential. There are relatively higher short-run costs to staying in school with the potential for greater long-run wages if the student stays in school. If he/she perceives these long-run wages to be relatively higher than a high school dropout, they may indeed stay in school to collect on this relatively higher benefit. Yet, if they find these numbers to be inflated and real long-run wages of a high school education are decreased, a student may deem it beneficial for him/her to drop out of school to avoid the additional short-run costs that staying in high school imposes.

Behrman and Deolalikar (1991) test this hypothesis in Indonesia, a developing country, for they find that these inflated rates of return are more predominate in these types of sample groups. In their study, they do find that the World Bank indeed had inflated rate of return figures for repetition and school dropout rates, because their associated private and social costs were not taken into account. This, in turn, will affect how different organizations, such as the World Bank, create policy to increase investments in primary education when the new adjusted values are taken into consideration.

In areas with lower than average income and relatively higher poverty rates, government subsidies are prevalent throughout the local population. In a strategy to increase productive human capital, subsides given to high school students to complete high school have been suggested in the past. Lorraine Dearden et al. (2005) tested the hypothesis whether "means-tested grants paid to secondary students are an effective way of reducing the proportion of school dropouts." (Dearden, pg. 1) Economic theory suggests that as students receive subsides, the cost of an education has been decreased relative to its benefits. This decrease in relative costs would allow for fewer students to drop out, thus lowering the dropout rate in the specified region. These cash allotments were given to students who were entering the compulsory years of high school, 11^{th} and 12^{th} grade. They found that students who came from the poorest of socio-economic backgrounds were affected the most by these subsides, especially in the second year. Lorraine Dearden et al. (2005) also found that these subsides had a greater effect on males than females. Their study concluded from this that these subsides could allow for the closing of the gap that exists between male and female dropout rates. Additionally, they were able to observe that those who received the full allotment had higher retention rates than those who only received a portion. This would suggest that the dollar amount is positively correlated with participation rates.

This research and hypothesis is incorporated in my model indirectly. Although I am not testing subsides, their theoretical model and results suggest those students from relatively poorer communities are more likely to drop out. So, as the Virginia public schools system enrolls greater percentages of students with lower household incomes, in turn they will indeed experience increased dropout rates.

Black students also have a positive correlation to dropout rates. As more black students enroll in Virginia public schools, the drop out rate will increase. This presumably will be highly correlated with the median household income variable and advanced degree variable. This is the case for historically, blacks have not had the opportunity to become as well educated as their white counter-parts, thus giving them lower wages, exacerbating the current effect it has on dropout rates. One aspect that has helped to rectify this situation was the desegregation of schools, as suggested by Jonathan Guryan (2004) in his paper "Desegregation and Black Dropout Rates." His paper analyzes what the effect the desegregation of the public school system had on the dropout rates of black students. He uncovered that desegregation in fact, allowed for a two to three percentage point reduction in dropout rates of black students. He suggests three possible explanations for these results. Desegregation will reassign students to different school districts to achieve the desired racial composition, thus changing the peers that black students would associate with. Additionally, "If whites attended better schools than blacks did before integration, then on average desegregation should improve the quality of schools blacks attend." (Guryan, pg. 7) Lastly, parents would become more involved in their child's education due to an increase in available information, thus "reap[ing] the benefits of the fight they have recently won." (Guryan, pg. 7) This would suggest that the further policy makers go to promote equality, the public school system would see decreased dropout rates. As more black students complete high school, earn the increased wages associated with higher education and have a higher percentage of black parents with advanced degrees there will be a decrease in dropout rates, ceteris paribus.

As this happens, future studies may deem the race variable statistically insignificant, thus denoting growth in social equality.

The amount of income generated by a family, as well as their education level, is paramount in determining the success of a student. Stanley Masters (1969) in his paper "The Effect Of Family Income On Children's Education: Some Findings On Inequality Of Opportunity," finds that students that come from relatively lower incomes or from family backgrounds in which their parents have little education are 20 times more likely to fall behind or drop out of school. Masters (1969) uses a series of dummy variables to determine total family income as well as education level of the parents. He admittedly leaves out a certain "natural ability" of the various students for it is unable to be obtained from available data. He suggests that family income is an important variable to be included in his regression analysis because students who come from relatively lower income households might be under additional pressure to drop out of high school as to get a full-time job, thus helping out the family. This is the exact same reasoning I have in including my median household income variable. As a family becomes more financially stable, there will be less pressure on the children to feel the need to work. As incomes rises, the benefit of dropping out of school decreases relative to its costs, therefore, Masters' (1969) suggests that fewer students will drop out. Interestingly enough, Masters' (1969) regression revels that:

> "Although there is a strong positive relation between low family income and the retardation rate, there is a negative relation between low family income and the dropout rate. Perhaps this negative relation results from the exclusion of those dropouts who have left home [...] or from the omission of many young Negroes from the entire Census. Or perhaps the answer lies with welfare eligibility criteria and the fear of reporting dropouts to interviewers." (Masters, pg. 12)

This has been taken closely into consideration when adding median household income and percentage of the population with advanced degrees into my regression model. I have decided to stick to the theory and suggest an inverse relationship between income and dropout rates, as well as an inverse relationship between percentages of the population with advanced degrees and dropout rates.

Marnie Shaul (2002), in her study, continues to reiterate that point that "students from low income [...] and less-educated families often enter school less prepared than children from more affluent, better educated families and subsequently drop out at a much higher rate than other students do." (Shaul, pg. 18) Additionally, she recognizes the differences in dropout rates among the various races, as did Guryan (2004). "Socioeconomic status, most commonly measured by parental income and education, bears the strongest relation to dropping out, according to the results of a number of studies." (Shaul, pg. 18) Once again there is a connection to family income and parental education being leading indicators of high school attainment abilities of particular students.

Additionally, Shaul (2002) suggests that dropping out is a long-term process of disengagement between the student and the school system. To allow for this variation in my model I have included student to teacher ratios for each county and city in Virginia. This proxy will allow for my model to explain the disengagement a student in a larger classroom would feel versus a child in a smaller classroom environment.

Astone and McLanahan (1991) suggest that students coming from single parent households, exacerbated with female headed households, are more likely to drop out of high school. Even if the single parent is able to earn enough income to be above the

poverty line, "income insecurity is commonplace" (Astone and McLanahan, pg. 1) Their results, tabulated from surveys and interviews, suggest that students who come from single parent households, especially female, do have a higher tendency to drop out of high school. "Children from nonintact families report lower educational expectations on the part of their parents, less monitoring of school work by mothers and fathers, and less overall supervision of social activities than children from intact families." (Astone and McLanahan, pg. 10) Using the same theoritcal basis, this model will include single female-headed households as a percentage of the population in the regression equation in order to capture the variation caused by these students living situations.

From the literature I am able to ascertain a variety of determinants that have been used to analyze dropout rates. Most common among these are income and parent education levels. Subsequently, I can draw inferences that race, student to teacher ratios, students coming from single parent homes along with the unemployment rate all being necessary variables for a regression model to successfully tease out the determinants of dropout rates.

Theoretical Model

As discussed in the above literature review, there is no concrete consensus on the exact determinants of high school dropout rates. Yet, there are variables that are common to most models discussed, race and income for example. I have developed a theoretical model in which encompasses a variety of determinants that should be able to give Virginia better insight to the variations in dropout rates across the state.

Economic theory suggests that as percentages of the population with advanced degrees rise, dropout rates will fall. This inverse correlation can be attributed to the fact that persons with high educational attainment tend to value education more relative to those with less education. Parents with bachelors degrees will instill education as a staple in a student's life. Alternatively, students whose parents have less education might not be taught the value of a higher education, thus they would be more prone to dropping out. It is unlikely that college educated parents would be passive or indifferent to their child dropping out of high school. Conversely, less educated parents might not see a problem with a student longing to drop out of high school to obtain gainful employment. It is these factors in which I have justified my use of an advanced degree variable which encompasses the percentage of the population with a BA/BS degree. This will capture the variation in dropout rates caused by parents education attainment levels.

A race variable must be included in the model for economic theory suggests that higher percentages of minorities in public schools will cause the dropout rate to be relatively higher than those school districts with predominately white students. This suggests that as the percentage of blacks rise in a community, so will the dropout rates. Ceteris paribus, black students are more likely to drop out relative to white students. Black students are more likely to come from homes in which receive less net income than whites because of lower educational achievements of black parents relative to white parents. Black students are also more likely to come from homes in which there are a single female head of household. These factors could cause black students to drop out at higher rates than whites. Parents of lower educational attainment will not value education as highly as those with advanced degrees, thus black parents of low educational

attainment will not pressure their children to stay in school relative to white parents, ceteris paribus. There is a larger percentage of black students coming from single, female headed households, therefore these students will not receive the increased parental influence that a student from a traditional family unit would receive. Additionally, single parents earn less income than traditional families. Single female-headed households earn even fewer dollars. This extra income pressure is positively correlated with increased percentages of black students dropping out. These factors allow for the assumption that as the percentage of blacks rise, so too will dropout rates in a given community.

As discussed in Bedard (2001), university access will have effects on dropout rates. Finding that an increase in university access causes dropout rates to increase are quite interesting for they are counter to the pure human capital model. Although his data suggests dropout rates and university access are positively correlated, my study will consist of a variable that suggests university access is inversely related to dropout rates. As university access grows in a community, the local university will be able to grant admission to more students. As this happens, the benefits of staying of high school increase relative to its costs. Rationally minded students (in which every student is) will reevaluate the benefits and costs of dropping out based on the increased university access, determine that the benefits of staying in school are now greater for their chances of being admitted into a college are greater, thus fewer students will opt to drop out. My model uses a dummy variable in which tracts whether or not a county or city has a university or college within its political entity. This will allow the model to capture the areas that have university access and those that do not, with respect to dropout rates, thus determining the significance of university access.

Economic theory suggests that dropout rates will decrease relative to an increase in income. This inverse relationship exists because when family incomes rise there is a decrease in incentives to drop out. As family income increase, the family will become relatively more financially stable. When this is the case, students will not feel the same pressure as lower income students do to drop out, gain employment, thus helping the family. When family incomes rise to high enough levels, the benefit of dropping out to help the family is eliminated. This causes the costs of dropping out to increase relative to its benefits. When these costs rise, students will be less likely to drop out. The use of median household income in this model will be the best measure of income, as opposed to per capita, for it allows the model to capture the income generated by a household unit, not individuals.

Single female-headed households earn relatively lower incomes compared to traditional family units as well as single male-headed households. Students coming from these families are generally more prone to dropping out because of two reasons. One, in general, females earn fewer dollars than males therefore students will be more likely to drop out to help their mother financially, instead of completing high school. The other being that students who come from single parent homes do not receive as much parental influence as those students who come from traditional family units. This decrease in attention and influence will cause the student not to be fully aware of the benefits and costs to dropping out of school. The value of a high school education is less likely to be instilled in the child, therefore the costs of dropping out of school are not fully realized by the student. This factor, along with relatively lower net family income, allows for students from these family situations to be much more likely to drop out. The benefits of

dropping out are higher relative to its costs, thus a community will see an increase in dropout rates as the percentage of the single female-headed households rise in the population.

The size of a school will also have an affect on dropout rates. Economic theory suggests that as school size increases, students may lose the connection they have with teachers, faculty, staff and administration. As the student transforms from a person to a number, the connection to the school that might have been a factor in keeping them in school is no longer there. In loco parentis (in the place of a parent) becomes more prevalent now in being an influencing factor in keeping students in school. As stated before, students who have single parents experience decreased positive influence and therefore are more likely to drop out. As the school losses its ability to act in place of the parents due to its growth, students will lose this positive influence as well. This will make it more likely for students to drop out for the influence the school will have on them has been diminished. As an area grows and schools become larger, economic theory suggests there will be an increase in dropout rates. My model will use student to teacher ratios to capture the affect of growth in school size on dropout rates across the counties and cities of Virginia

This model will also use unemployment rates to capture the variation in dropout rates across Virginia. There is an inverse relationship between dropout rates and unemployment rates. If students see that unemployment is high, they are more likely to stay in school. Alternatively, if they see low unemployment numbers, they might choose to drop out of school and seek work. As unemployment decreases, benefits of dropping out increase. With low unemployment, businesses are hiring and it is much more likely

that these students, with their limited skills, will be able to obtain employment. If unemployment is on the rise, students will be more likely to defer employment to pursue finishing high school for the costs of dropping out and not finding work far exceed the benefits. This inverse relationship suggests that as communities grow and employment is easier to obtain, the community will see an increase in its dropout rate. This model uses unemployment data obtained from the Bureau of Labor Statistics to determine the significance and explanatory power of unemployment rates on Virginia dropout rates.

Empirical Analysis and Results

The model consists of 130 observations from cities and counties across Virginia. Each observation is from year 2000 data with the exception of student to teacher ratio data. This data was extracted from the 2001 superintendents annual report. Although this is data from a different year, student to teacher ratios do not change drastically from year to year, thus any concerns of data complications are eliminated. The data in this model was taken from 2000 census data with the exception of the dropout rate, student to teacher ratio and the unemployment rate which were taken from Virginia Department of Education, 2001 Superintendent annual report and the Bureau of Labor Statistics, respectively. Each variable is defined as listed in the appendix.

Expectations

The equation below shows the model in a general mathematical form.

$$\text{Dropout} = \beta_0 + \beta_1*\text{advdegree} + \beta_2*\text{black} + \beta_3*\text{collegelocation} + \beta_4*\text{medincome} + \beta_5*\text{sfhouse} + \beta_6*\text{stratio} + \beta_7*\text{unemploy} + \epsilon$$

Noting the appendix, Figure 2 shows the expected signs of each independent variable. Figure 3 shows the null hypothesis for each independent variable in the model. Below, Figure 1 is the regression results obtained from the proposed model. The correlation matrix, descriptive statistics as well as the residuals are printed in the appendix for reference.

Figure 1: **Regression Results**

Dependent Variable: DROPOUT
Method: Least Squares
Date: 11/06/06 Time: 21:05
Sample: 1 130
Included observations: 130

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.580598	0.987602	1.600440	0.1121
ADVDEGREE	-0.008756	0.044570	-0.196464	0.8446
BLACK	0.021488	0.007222	2.975313	0.0035
COLLEGELOCATION	-0.449720	0.261322	-1.720940	0.0878
MEDINCOME	-1.42E-05	1.58E-05	-0.900752	0.3695
SFHOUSE	0.553992	0.137255	4.036236	0.0001
STRATIO	0.014460	0.038250	0.378040	0.7061
UNEMPLOY	-0.203030	0.108836	-1.865467	0.0645

R-squared	0.408166	Mean dependent var	2.318923
Adjusted R-squared	0.374209	S.D. dependent var	1.321044
S.E. of regression	1.045038	Akaike info criterion	2.985547
Sum squared resid	133.2368	Schwarz criterion	3.162011
Log likelihood	-186.0606	F-statistic	12.01986
Durbin-Watson stat	2.185568	Prob(F-statistic)	0.000000

Regression Analysis

The regression above shows some very interesting results, some expected, others counterintuitive. With a critical T score of 1.654 at a 5 percent significance level and 122 degrees of freedom, only two variables were found to be statistically significant, Black and Sfhouse. At the 10 percent level, collegelocation and unemploy are statistically significant. Each of the four variables that were significant at the 10 percent level all have the proper sign, probability value (sufficiently low enough probability value to

reject the null hypothesis) as well as t-scores that exceed the critical T value. Advdegree, medincome, and stratio are all found to be statistically insignificant. The regression suggests that the percentage of college degrees in a population, student to teacher ratios and median household income have no effect on dropout rates. Conversely, the percentages of blacks and single female-headed households maintain statistical significance at the 5 percent level.

This model has no severe multicollinearity per the outcome of the VIF tests although, the variable medincome did exhibit high levels (VIF of 4) but not high enough to be considered severe (VIF > 5). This variable is also highly correlated with advdegree, which can be seen in the correlation matrix in figure 5. This is to be expected for the number of persons who hold college degrees will directly affect incomes in a population because those persons with higher levels of education generally receive higher incomes than those lower levels. No other variables are sufficiently correlated to have doubts about the models predictive capabilities.

The Durbin-Watson statistic is within an acceptable range of 2.18 so there is no worry of serial correlation. Additionally, in figure 6, the residuals are sufficiently random and no pattern can be determined, therefore I have concluded that heteroskedasticity is not a problem in this model.

The adjusted R squared of .37 can only be attributed to the Sfhouse, Black, collegelocation and unemploy variables. This suggests that the percentage of blacks, percentage of single female-headed households in the population, local university access and the unemployment rate captures 37 percent of the variation in dropout rates across

Virginia counties and cities. This has some serious policy implications that shall be discussed subsequent sections.

Although Black and Sfhouse are statistically significant, their actual effects on dropout rates are quite different. Single female-headed households have a much greater impact on dropout rates than do the percentage of blacks in a community. A marginal increase in single female-headed households will lead to a .55 percent increase in the dropout rate. While a marginal increase in the percentage of blacks in a community will only lead to a .02 percent increase in the dropout rate. If we allow the 10 percent significance level to be the guiding level then collegelocation holds heavy influence on dropout rates. If a college is added to a county or a city, this model suggests that there will be a decrease in the dropout rate by .44 percent. The unemployment rate also has a negative impact on dropout rates at the 10 percent significance level. A marginal increase in the unemployment rate will cause a .2 decrease in dropout rates. This suggests that as local economies move into recessions, students will be more likely to stay in school which is exactly what economic theory would suggest.

The model adjusted for statistically insignificant variables at 5 percent is:

$$\text{Dropout} = .021*\text{black} + .553*\text{sfhouse} + \epsilon$$

The model adjusted for statistically insignificant variables at 10 percent is:

$$\text{Dropout} = .021*\text{black} + -.449*\text{collegelocation} + .553*\text{sfhouse} + -.203*\text{unemploy} + \epsilon$$

Policy Implications

As stated in the previous section, at the 5 percent level, only two variables were significant, black and sfhouse. Allowing for the 10 percent level, I can allow

collegelocation and unempoly to have some influence on my policy recommendations. Each of these four determinants of dropout rates requires a different solution in order to decrease dropout rates across Virginia counties and cities.

First, in order to decrease the effect single female-headed households have on dropout rates, a policy of subsidizing expenses of the single mother, such as W.I.C.(Women with Infant Children), while providing funds to and supporting organizations such as The Boys and Girls Club of America will allow for a number of things to change. Organizations like this will allow for increased positive influence on these students. This relationship can improve the student's outlook on their current situation, which presumably is not favorable, as well as help to provide them with some insight to life without a high school diploma. This additional encouragement, coupled with a decrease in expenses by the single mother should sufficiently allow for single female-headed households to not have such a great impact on dropout rates.

Referencing figure 5, the black variable is moderately correlated with the single female-headed household variable. Much of the solution to keeping more black students in school is the same as the solution suggested for single female-headed households. Supporting and subsidizing black student's expenses will allow for a slow generational change in which more and more black students will graduate high school, some will continue onto college and higher levels of education. As this happens, the subsidizing and public programs devoted to these families can be slowly phased out because as the parents of future black students become better educated and receive higher incomes, there will be less of a correlation between blacks and high school dropouts. As these parents

begin to value education more than previously, there will be additional support and encouragement for future generations of black students to stay in school.

The dummy variable collegelocation provides some great insight into what a community can do to decrease dropout rates. For this variable, I used traditional 4-year institutions as well as community colleges and nontraditional colleges. A community can instantly reduce its dropout rate by starting an area community college or getting a larger state school to start a satellite campus within their district. This model suggests that when a school of higher learning is introduced into an area, dropout rates will fall by .44 percent. This is a great way for an area to lower dropout rates as well as help to produce more skilled labor in which it can now "grow" from within its district instead of trying to import it from other counties, cites and states.

Although dropout rates drop .2 percent with a marginal increase in unemployment rates, it is detrimental to attempt to hold unemployment at higher rates to keep students in school. I highly doubt any town would consider this a viable solution to dropout rates, yet the theory and model does suggest that this would indeed help to lower dropout rates. In reality, a solution could be for the school system to get together with local business and try to provide internships and after school jobs that allow the students to work and still stay in school. If local business and the school system get together and develop these internships and other programs, students will not feel the extra pressure to get a full time job and will be receiving additional income. In addition to this policy, local business could set up job offers that are contingent on graduation of high school, thus encouraging students to hold off dropping out of school so as to guarantee themselves a job once they have a high school diploma.

Conclusions

Although variables that surfaced as statistically insignificant, I am unable to ignore them completely based on the regression. These independent variables have such theoretical strength that they cannot be glossed over as having no effect on dropout rates. Further analysis and studies are pertinent in obtaining a better sense of the effect of advanced degrees, school size and income on dropout rates. Taking the regression results from this study, any county or city in Virginia will be better equipped to attack the problem of dropout rates in their respective locations. Focusing efforts and funding on the policies prescribed above, local government should be able to move positively in the direction of decreasing their public schools dropout rates, thus improving all aspects of their respective districts.

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Appendix

Dependent Variable:

Dropout: Dropout Rate = Number of dropouts / total students

Independent Variables:

Advdegree: Percentage of the population with an advanced degree = persons with a BA/BS / total county or city population

Black: Percentage of the population that is black = total blacks / total county or city population

Collegelocation: Dummy Variable = assigned 1 if the town has a college within its limits. Assigned 0 if it does not

Medincome: Median household Income = median household income figure for each observation per the 2000 census.

Sfhouse: Single Female-headed household = total single female-headed households / total county or city population

Stratio: Students to Teacher ratio = total students / total teachers in each county or city

Unemploy: Unemployment rate = total unemployed / total county or city labor force

Figure 2: **Expected Signs**

Coefficient	β 1	β2	β3	β4	β5	β 6	β7
Sign +/-	-	+	-	-	+	+	-

Figure 3: **Null Hypotheses**

$H_0: \beta_1 \geq 0$ $H_A: \beta_1 < 0$ | $H_0: \beta_2 \leq 0$ $H_A: \beta_2 > 0$ | $H_0: \beta_3 = 0$ $H_A: \beta_3 \neq 0$

$H_0: \beta_4 \geq 0$ $H_A: \beta_4 < 0$ | $H_0: \beta_5 \leq 0$ $H_A: \beta_5 > 0$ | $H_0: \beta_6 \leq 0$ $H_A: \beta_6 > 0$

$H_0: \beta_7 \geq 0$ $H_A: \beta_7 < 0$

Figure 4: **Descriptive Statistics**

	Advdegree	**Black**	**Collegelocation**	**Dropout**
Mean	8.078992	19.30174	0.238462	2.318923
Median	7.243793	13.80653	0.000000	2.100000
Maximum	22.03877	78.30172	1.000000	6.870000
Minimum	3.402773	0.078864	0.000000	0.000000
Std. Dev.	3.843914	16.95725	0.427791	1.321044
Skewness	1.662714	0.952348	1.227469	1.134042
Kurtosis	6.317012	3.257645	2.506680	4.814105
Jarque-Bera	119.4973	20.01052	33.96295	45.69055
Probability	0.000000	0.000045	0.000000	0.000000
Observations	130	130	130	130

	Medincome	**Sfhouse**	**Stratio**	**Unemploy**
Mean	39378.85	2.441569	19.06615	2.796923
Median	36602.00	2.214464	19.00000	2.500000
Maximum	80978.00	5.969176	26.90000	7.800000
Minimum	22026.00	1.148970	13.20000	1.100000
Std. Dev.	11908.65	0.960396	2.574820	1.139491
Skewness	1.251665	1.411681	-0.095032	1.355310
Kurtosis	4.435921	5.052640	2.944010	5.230183
Jarque-Bera	45.11288	66.00044	0.212653	66.73969
Probability	0.000000	0.000000	0.899131	0.000000
Observations	130	130	130	130

Figure 5: **Correlation Matrix**

	ADVDEGRE	BLACK	COLLEGELO	DROPOUT	MEDINCOM	SFHOUSE	STRATIO	UNEMPLOY
ADVDEGRE	1.000000	-0.151571	0.386158	-0.170825	0.771958	-0.100324	0.181575	-0.495351
BLACK	-0.151571	1.000000	0.049619	0.539021	-0.186656	0.637730	0.134694	0.102546
OLLEGELO	0.386158	0.049619	1.000000	-0.040419	0.076155	0.265813	0.093948	-0.008025
DROPOUT	-0.170825	0.539021	-0.040419	1.000000	-0.203799	0.553298	0.093971	0.013186
MEDINCOM	0.771958	-0.186656	0.076155	-0.203799	1.000000	-0.292160	0.265928	-0.665551
SFHOUSE	-0.100324	0.637730	0.265813	0.553298	-0.292160	1.000000	0.100297	0.167892
STRATIO	0.181575	0.134694	0.093948	0.093971	0.265928	0.100297	1.000000	-0.231670
UNEMPLOY	-0.495351	0.102546	-0.008025	0.013186	-0.665551	0.167892	-0.231670	1.000000

Figure 6: **Residuals**