The Economic Impact of High School Non-completion in Georgia

(Revised)

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EXECUTIVE SUMMARY

In December 1995, the Bureau of Business Research and Economic Development (BBRED) released a study entitled, "The Economic Impact of High School Non-completion in Georgia"[1] (hereafter the Rickman Study). That study's findings produced a county-by-county estimate of the income lost due to non-completion of high school. The Rickman Study estimated the state-wide economic impact of the earnings foregone due to non-completion of high school at $11 billion in 1991 dollars. This report revisits that study, updates the findings based on the 2000 Census, and estimates that the state-wide direct economic impact of high school non-completion is $17.6 billion annually in 2000 dollars. Further, this report shows that if each county in the state attained a goal of a non-completion of high school rate equivalent to the national average of 16%, the direct loss from non-completion of high school state-wide would be cut to $4.5 billion.

This report also examines the direct benefits of a college degree. State-wide the direct economic impact of college graduation is $74.9 billion annually in year 2000 dollars. If each county in the state attained a goal of a college graduation rate equivalent to the national average of 26%, the direct benefit state-wide would be an expansion in the economy of $24.5 billion annually in year 2000 dollars.

Investments in education are investments in the State's economic development. To place the

[1] The study was directed by Dr. Dan Rickman for the Middle Coastal Unified Economic Development Authority (MCUDA).

above in perspective, the proposed Daimler Chrysler plant, if built, will have an annual payroll estimated at $155.1 million, only 63% of the economic development impact of attaining the national average rate of college completion of 26%. Alternatively, attaining a goal of a high school non-completion rate of 16% would in three years produce as much income as the proposed Daimler Chrysler plant. The investments in education have one advantage over other economic development activities; the policies and programs are entirely within the control of Georgia.

Other Findings and Facts

According to the 1980 U.S. Census, Georgia's rate of high school non-completion was 10.2% higher than the national average. According to the 2000 U.S. Census, Georgia had reduced that gap to only 2%. However, only 28 counties had high school completion rates equal to or less than the national average; the remaining 131 counties had high school non-completion rates of 22% or more.

Non-graduates of high school earn $200,000 less than high school graduates over a 40-year, full-time, year-round work life. In 1975, non-graduates of high school earned 90% as much as high school graduates. By 1999, non-graduates of high school earned 70% as much as high school graduates. On the other hand, college graduates in 1999 earned 2.1 times more than the non-graduate of high school.

The estimates of variation in county per capita personal income in Georgia explained by the variation in the percent of county population with less than a high school education and the percent of a county population with a college education show:

- For every 1% of a county's population with less than a high school education, county per capita personal income is reduced by $98.20 in 2000 dollars;
- For those counties with rates of non-completion of high school above the state average of 21.4%, the per capita cost of non-completion is between $2,160 and $4,321 per person per year; and,
- For every 1% of a county's population with a college education, county per capita personal income is increased by $400.00 in 2000 dollars.

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INTRODUCTION

In December 1995, the Bureau of Business Research and Economic Development (BBRED) released a study entitled, "The Economic Impact of High School Non-completion in Georgia"[2] (hereafter the Rickman Study). That study's findings produced a county-by-county estimate of the income lost due to non-completion of high school. The Rickman Study estimated the state-wide economic impact of the earnings foregone due to non-completion of high school at $11 billion in 1991 dollars. This report revisits that study and updates the findings based on the 2000 Census.

There are several reasons for revisiting the question of the cost of high school non-completion. First,[3] in the last two decades, 1980 to 2000, the returns paid for higher levels of education relative to the returns paid to those without a high school education have diverged. Between 1980 and 2000, the real hourly wage for those with less than a high school education dropped from $11.27 per hour to $9.40 per hour, a decrease of 17% in real hourly wages. Over the same period, the real hourly wage for college graduates increased from $18.00 per hour to $22.10 per hour, an increase of 23%. The gap between the real hourly wage paid to those with less than a high school education and the wage paid to those who have completed college increased by 40%. Second, in 2002, BBRED completed a study for the Savannah Economic Development Authority

[2] The study was directed by Dr. Dan Rickman for the Middle Coastal Unified Economic Development Authority (MCUDA).

[3] The following calculations are based on estimated hourly wages prepared by the Employment Policy Institute. The data can be found on their website, www.epinet.org.

(SEDA), "An Economic and Demographic Outlook: A Twenty-Year Projection," which presented a 20-year prediction of employment opportunities by occupation for State Service Delivery Regions 7, 9, 11, and 12. The study showed that job growth for occupations requiring less than a high school education will have no growth or high rates of decline over the next 20 years. The economy in Regions 7, 9, 11, and 12 will simply not be supplying large numbers of jobs for those without a high school education. Conversely, the study showed that growth in jobs for those occupations requiring some college and college degrees would far exceed growth in all other types of occupation in Regions 7, 9, 11, and 12. These findings are an echo of analysis at the national level showing that demand for higher levels of educational attainment will outstrip the supply of graduates.[4]

In examining the aggregate statistics on non-completion of high school, Georgia appears to have closed the gap between the state's rate of non-completion of high school and that of the U.S. In the 1980 U.S. Census, the national average for non-completion of high school for the population age 25 and over was 33.5%. For Georgia in 1980, based on the U.S. Census, the rate of non-completion of high school for the population age 25 and over was 43.7%, a gap of 10.2% relative to the national average. According to the 1990 U.S. Census, the rate of non-completion of high school nation-wide had dropped to 24.8%, and the rate of non-completion of high school in Georgia had dropped to 29.1%. In the 2000 U.S. Census, the rate of non-completion of high

[4] See Employment Policy Foundation, EPF News Release, August 28, 2002, "Labor Day 2002: American Workplace Faces Difficult Year, Next 30 Years Filled With More Challenges." EPF predicts that the demand for labor will increasingly outstrip the supply of labor and that the educational system is producing too few graduates to meet the demand with a potential 33% short-fall in graduates with a four-year degree or higher. "The American workplace will be 6 million new graduates short to fill new jobs and replace retirees."

school nation-wide had again declined, reaching 19.6%, and in Georgia the rate of non-completion had dropped to 21.4%. This suggests that over the 20-year period of 1980 to 2000, Georgia had reduced a 10% gap to approximately a 2% gap. However, this analysis hides the true picture of non-completion of high school in Georgia.

FIGURE 1.1
Percent 25 Years or Older
Without a HS Degree (2000)

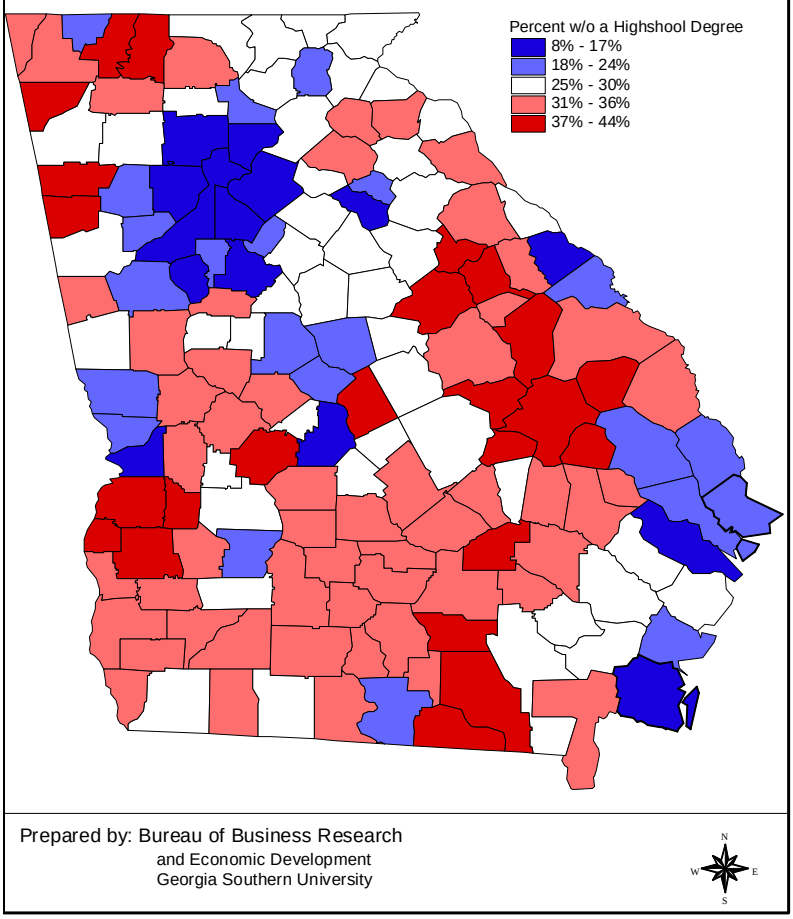


Figure 1.1 shows that counties with low rates of non-completion of high school are concentrated around the urban areas, Atlanta in particular. In fact, only 28 counties have rates of non-completion of high school of 21% or less. One hundred and thirty one (131) counties have non-completion of high school rates in excess of 21%, with the range of non-completion of high school rates between 22% up to nearly 44%. Figure 1.2 shows per capita income by county, and there is a striking correlation between counties with high rates of non-completion of high school and counties with low per capita incomes. Figure 1.3 shows the

correlation of high rates of non-completion of high school and per capita incomes lower than the state average in 2000. The empirical analysis of this study will provide a quantitative estimate of how much of the variation in county per capita income is explained by the variation in the rate of high school non-completion.

FIGURE 1.2
Per Capita Income (99$)

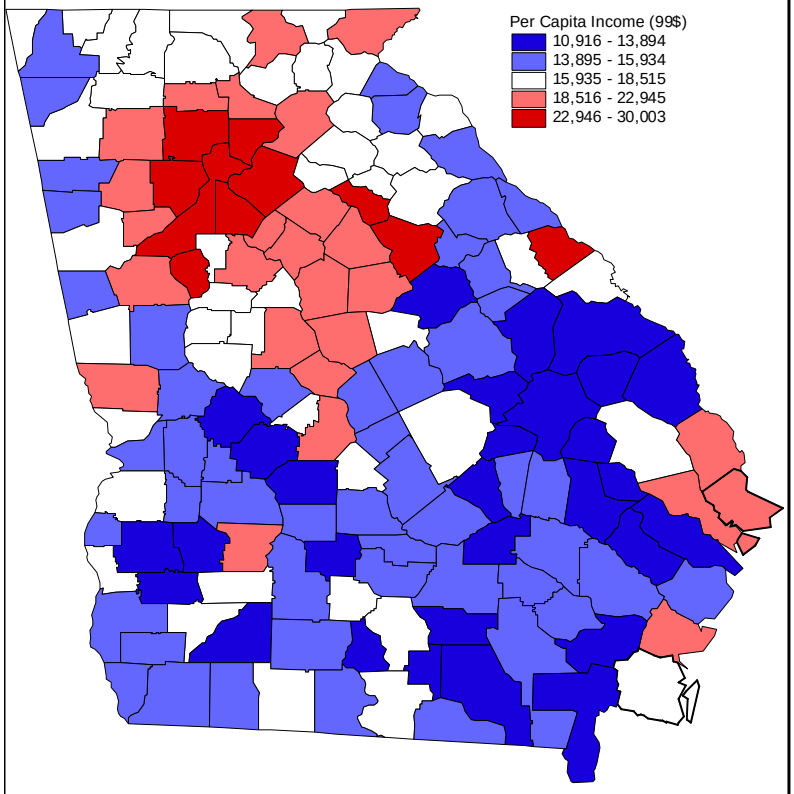
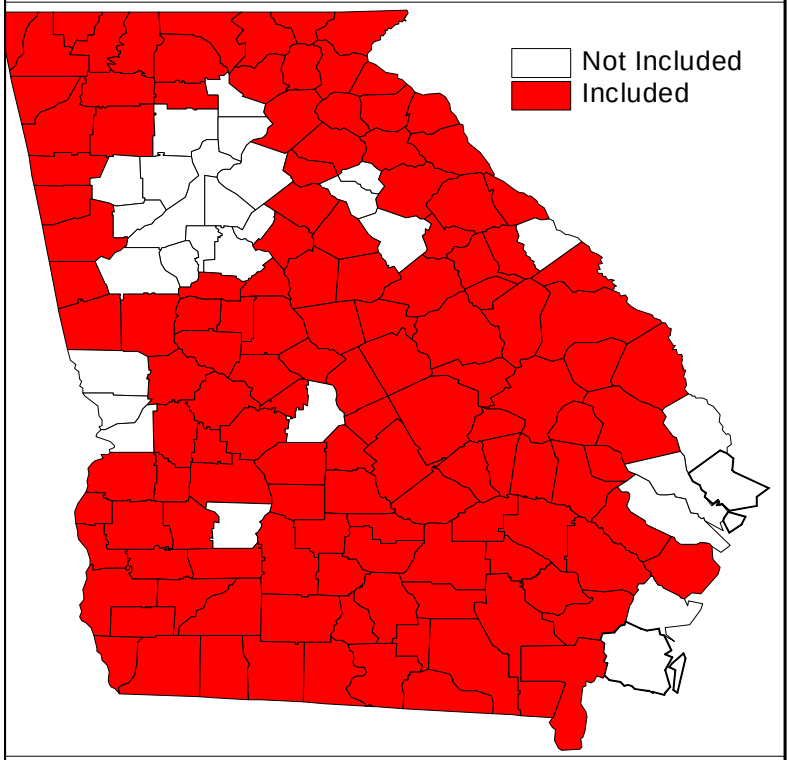


FIGURE 1.3
Counties with a Combination of a Higher HS Non-completion Rate and Lower Per Capita Income than the State Average



Several studies at the national level confirm the BBRED 2002 study findings[5] of increasingly poor opportunities for the high school non-graduates and accelerating opportunities for college graduates. These studies will be reviewed in Chapter Two. They also provide background

[5] "An Economic and Demographic Outlook: A Twenty-Year Projection," prepared by BBRED in 2002.

critical to understanding the methodology employed in this study to estimate the economic loss associated with the non-completion of high school.

Chapter Three will present the economic theory of returns to human capital, education and experience. This describes the means by which the cost of non-graduation will be estimated and presents the revised and updated results on lost income due to high school non-completion in Georgia.

High school non-completion carries not only a loss for the individual, but results in spillover losses for the entire community. Chapter Four presents the estimates of the economic impact of non-completion for each of the 12 State Service Delivery Regions.

This study also highlights the growing return to college graduation and, consistent with other findings, a reduction in the returns for those with only some college. The growing return to college completion for the individual also has a spillover effect. Chapter Five presents the estimates of the economic impact of college completion for each of the 12 State Service Delivery Regions.

THE PAYOFF TO EDUCATION: RECENT FINDINGS

The Current Population Survey (CPS) is a monthly survey of households conducted by the Bureau of the Census for the Bureau of Labor Statistics. The survey has been conducted for more than 50 years and is the primary source of information on the labor force. The basic monthly survey collects information on employment, earnings, and hours worked. Annually, the March survey includes supplemental questions on income, educational attainment, full- and part-time work and age.

The Consumer Income and Poverty series, the P60 series, provides a systematic presentation of the information from the March CPS on the relationship of incomes to age, race, family size, education, occupation and work experience. Based on the P60 series the Economics and Statistics Administration (ESA) periodically produces special studies. One of the periodic reports produced by ESA is on educational attainment and estimates work-life earnings. The most recent of these studies was prepared in July 2002.[6] Among the findings of interest to this study are:[7]

1. For adults ages 25 to 64, the lower the level of educational attainment, the less likely it is that the individual works full-time;

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[6] "The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings." Current Population Reports, Special Series, P23-210, by Jennifer Cheeseman Day and Eric C. Newburger. Available at www.census.gov.

[7] *ibid.*, "The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings," pages 2-3.

2. Among adults ages 25 to 64, high school non-graduates working full-time year-round have average annual earnings of $23,400, or $7,000 less than the average annual earnings for a high school graduate;

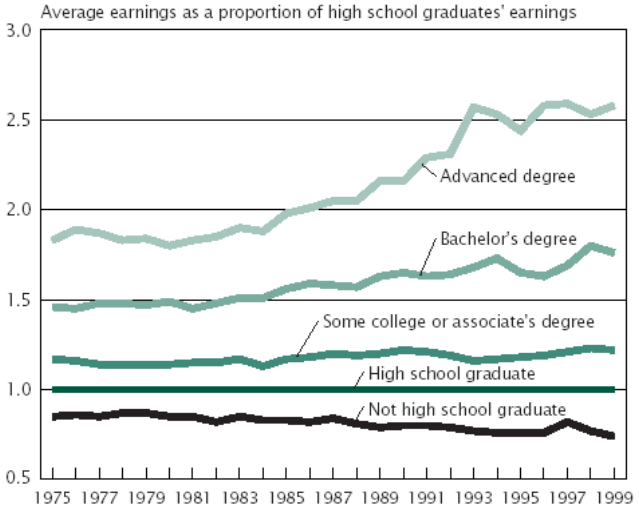
3. Among adults ages 25 to 64, graduates with a bachelor's degree working full-time year-round have average annual earnings of $52,200, or $21,000 more than the average annual earnings for a high school graduate.

Historically, higher levels of education have always been correlated with higher average wages, but the size of the premium paid for higher levels of education has varied. Figure 2.1 is reproduced from "The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings."[8] Graphed in Figure 2.1 is the index of average annual earnings for full-time working adults with different levels of educational attainment to the average annual earnings of high school graduates. Figure 2.1 shows that in 1975, high school non-graduates earned approximately 90% of what high school graduates earned. By 1999, a non-graduate of high school earned only 70% of what a high school graduate earned.

The rate of change in average earnings for levels of educational attainment above high school was flat for the period of the 1970s and early 1980s.

FIGURE 2.1

Average Earnings of Full-Time, Year-Round Workers as a Proportion of the Average Earnings of High School Graduates by Educational Attainment: 1975 to 1999



Source: U.S. Census Bureau, Current Population Surveys, March 1976-2000.

[8] *ibid.*, page 3.

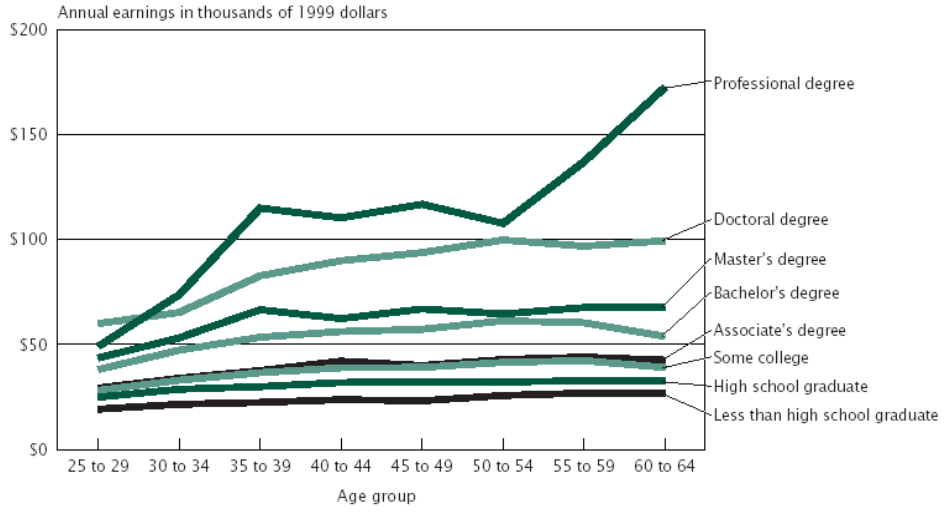
However, the slope since the 1982 recession, as shown in Figure 2.1, has become steeper, indicating a steady rate of growth. The flat growth in the premium paid for additional levels of educational attainment in the 70s and early 80s is attributed to the rapid increase in the supply of college graduates from the baby boom combined with the era of stagflation which resulted in relatively slow growth in the economy. In 1975, graduates with a bachelor's degree earned approximately 1.5 times more than a high school graduate. By 1999, a bachelor's degree holder earned 1.8 times more than a high school graduate and 2.1 times more than a high school non-graduate.

Synthetic earnings are estimates of the present value of work-life earnings. The construction of synthetic earnings is fairly straightforward. First, the average annual earnings for each age group for each level of educational attainment for full-time year-round work are estimated from the March CPS. For the purposes of "The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings," the average annual earnings for each age and each level of educational attainment category were estimated from the March CPS for 1998, 1999, and 2000.

The second step in estimating synthetic earnings is the process of adjusting the average annual earnings for the base period, in this case 1998-2000, for expected increases in productivity, and for each age cohort adjusting the average annual earnings by expected increases in earnings due to added experience. Figure 2.2 shows the growth path of earnings based on experience. Of interest to the present study is that over a working life, the payoff for experience increases for higher levels of educational attainment faster than the gains from experience for lower levels of educational attainment; this is pronounced toward the end of the work-life. This means that there is an additional incentive to stay in the workforce longer for those with higher levels of educational attainment. The additional years in the workforce, of course, add to life-time earnings and increase post retirement incomes for those with higher educational attainment.

FIGURE 2.2

Earnings Trajectories for Full-Time, Year-Round Workers by Educational Attainment Based on 1997-1999 Work Experience



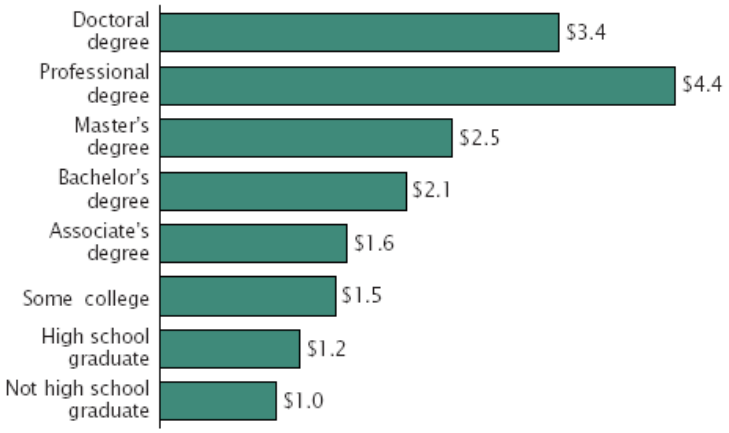
Source: U.S. Census Bureau, Current Population Surveys, March 1998, 1999, and 2000.

The third step is the calculation of the present discounted value of each year's adjusted annual earnings over a 40-year work-life for full-time, year-round work by educational attainment. The results of this calculation from "The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings," are shown in Figure 2.3. Relative to a high school graduate, over a 40-year, full-time, year-round work-life, *the cost to the individual* for non-completion of high school is $200,000. Over a 40-year, full-time, year-round work-life, a bachelor's degree pays approximately twice the return of a high school education.

FIGURE 2.3

Synthetic Work-Life Earnings Estimates for Full-Time, Year-Round Workers by Educational Attainment Based on 1997-1999 Work Experience

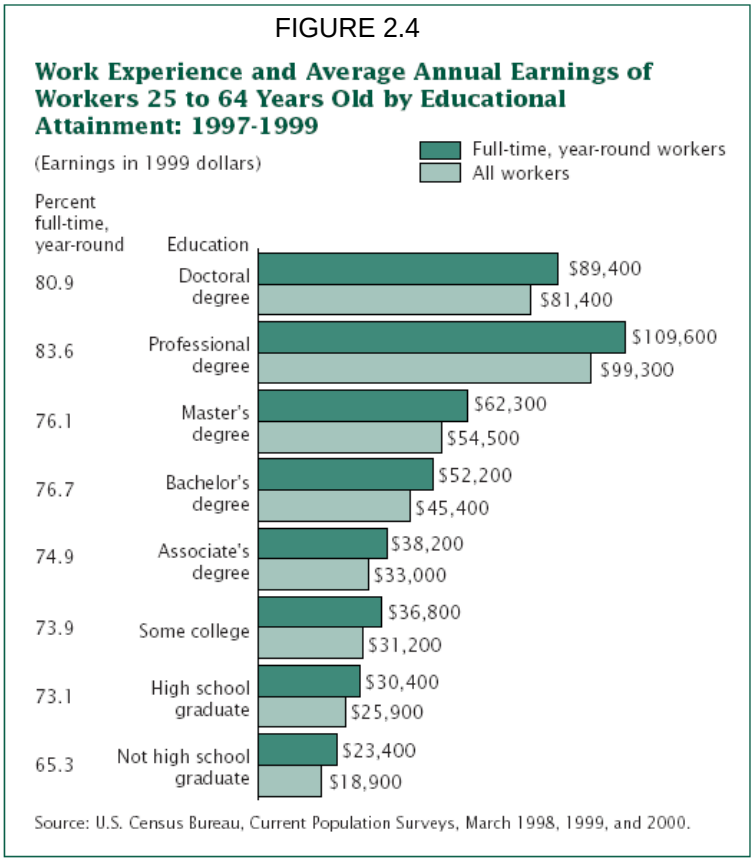
(In millions of 1999 dollars)



Source: U.S. Census Bureau, Current Population Surveys, March 1998, 1999, and 2000.

It should be noted that the method of estimating synthetic work-life tables results in an over-estimation of the expected 40-year earnings for lower levels of educational attainment. The bias is introduced in that synthetic earnings are based on an assumption of full-time, year-round and uninterrupted work-life over 40 years. Figure 2.4 shows the differences in average annual earnings for full-time, year-round workers versus all workers. Of those high school non-graduates working during the periods of survey, only 65.3% were working full-time, a much lower percent of full-time workers than for any other level of educational attainment. Hence, the estimated synthetic earnings for a high school non-graduate is less representative of the typical earnings for non-completion of high school than for any other level of educational attainment.

FIGURE 2.4



This weakness, the bias toward over-estimation of life-time earnings for those with lower levels of educational attainment in estimated synthetic earnings as a measure, raises issues related to several of the many aspects of the cost of high school non-graduation. In addition to lower earnings due to lower education, compared to those with higher levels of educational attainment, the high school non-graduate is likely to experience:

1. More frequent periods of unemployment; and,
2. Periods of unemployment longer in duration.

In April 2003, the Employment Policy Foundation[9] released an assessment of the changes in the labor market in early 2003. For persons with a college degree or higher, 76.1% of the total population age 16 or older, including retirees, were employed, and the unemployment rate for college graduates in the workforce was 3.1%. Conversely, for persons with less than a high school education, only 41.3% of the total population age 16 or older, including retirees, were employed, and the unemployment rate among those with less than a high school education was 8.5%.

FIGURE 2.5
Unemployment Rates in Georgia (2000)

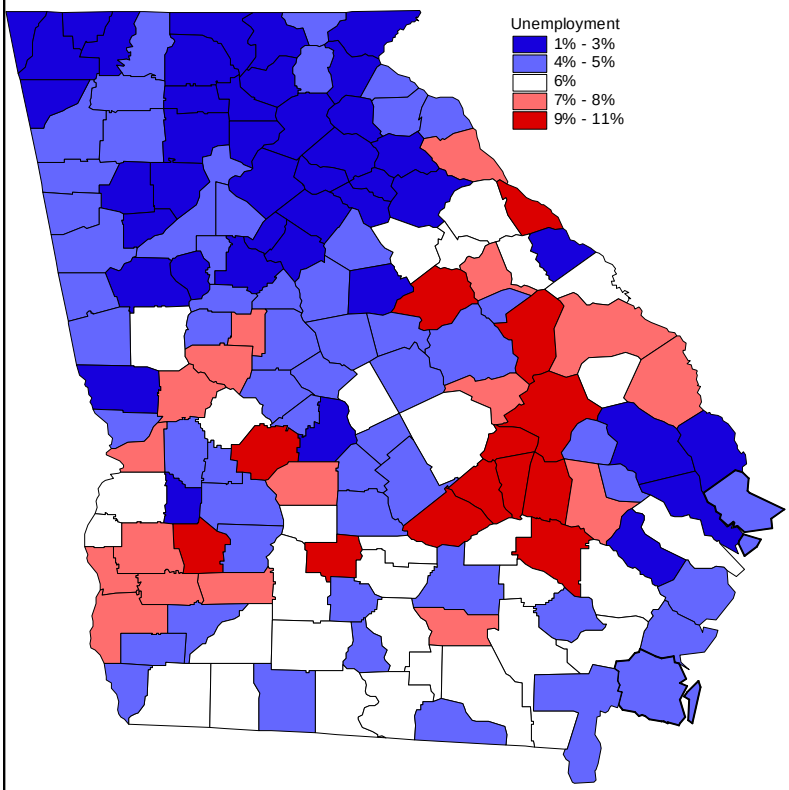
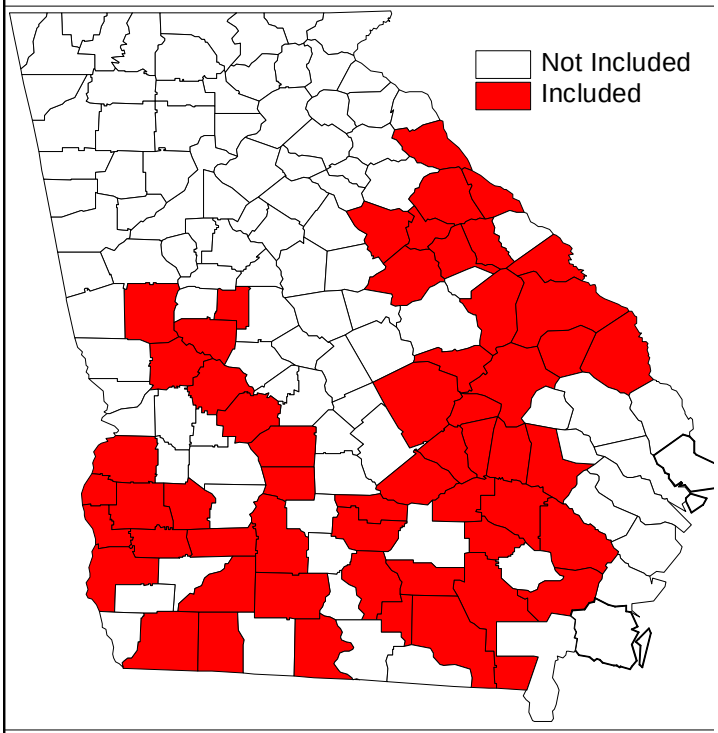


Figure 2.5 shows the unemployment rate by county for Georgia in 2000. State-wide, the average unemployment rate in 2000 was 5.4%. Figure 2.6 shows the correlation between high rates of high school non-completion and unemployment rates higher than the state average. As with the case of per capita

[9] See EPF News Release, "400,000 New Jobs for College Graduates in March."

income lower than the state average and high rates of high school non-completion,[10] there is a striking correlation between high rates of high school non-completion and higher than average unemployment.

FIGURE 2.6
Counties with a Combination of a Higher HS Non-completion Rate and Higher Unemployment Rate than the State Average



A measure which captures the combined effects of frequency and duration of unemployment is the Capacity Utilization Rate (CUR).[11] CUR measures the extent to which people are utilizing their human capital at capacity when the person works at a level commonly accepted to be full-time year-round work, and if they supply their labor to the market at a wage rate consistent with the productivity implied by their characteristics, education, experience, etc. Figure 2.7 shows the trend in CUR over the period 1975 to 2000. The CUR for the total working-age population has increased from slightly more than 40% in 1975 to more than 60% in 2000. The CUR for women has increased relative to the CUR for men. In 1975, the CUR for women was approximately

[10] See Figure 1.3 of this study.

[11] See *Human Capital in the United States from 1975 to 2000: Patterns of Growth and Utilization*, by Robert H. Haverman, Andrew Bershadker and Jonathan A. Schwabish.

13% lower than for men. By 2002, the CUR for women had increased and was only about 8% less than for men. The peaks and troughs in the CUR represent the effects of boom and recession in the economy.

FIGURE 2.7

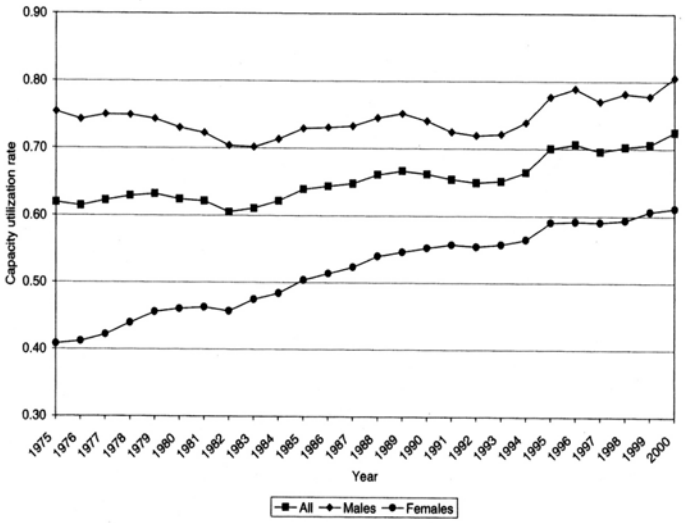
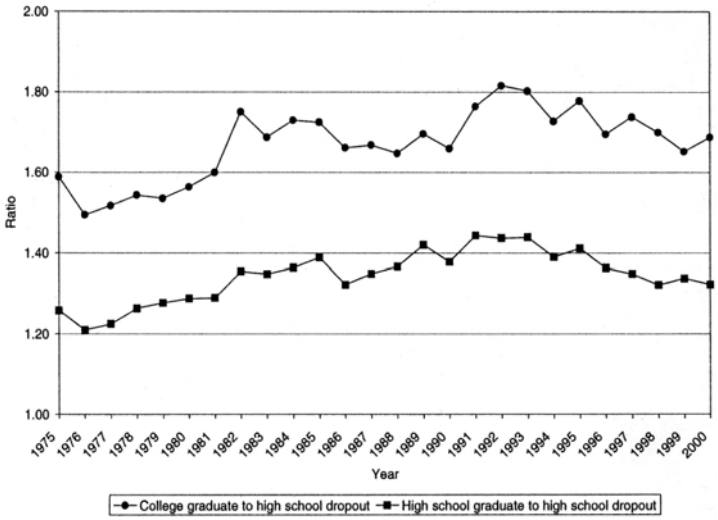


Figure 2.8 shows CUR for different levels of educational attainment. Between 1975 and 2000, the percent of capacity utilization for those with educational attainment of less than high school has never been more than 50%, with peak utilization in the economic boom periods of 1977-78 and 2000. For most of the period, CUR for those with less than a high school education was between 40% and 45%. Unemployment accounts for between 20% and 30% of unrealized potential income.[12]

FIGURE 2.8



Summary

[12] *ibid*., page 105.

The Economic Impact of High School Non-completion in Georgia

High school non-completion costs the individual in the form of lower lifetime earnings. Over a 40-year, full-time work-life, the high school non-graduate earns $200,000 less than a high school graduate. The non-graduate of high school is also less likely to be employed full-time than workers with any other level of educational attainment. Compared to workers with other levels of educational attainment, the non-graduate of high school is more likely to experience greater frequency in unemployment and spells of unemployment which last longer on average.

MEASURING THE ECONOMIC VALUE OF HUMAN CAPITAL

Human capital is the stock of knowledge, training, skills, experience and other productivity-enhancing traits[13] held by a nation's current and potential labor force. A concept first introduced in 1958 by Jacob Mincer,[14] today human capital theory is central to much of the understanding of the labor market. Human capital theory provides the main explanation for variations in wages, salaries and unemployment by differences in age, occupation and educational attainment, which measures the stock of acquired skills. For example, Mincer[15] posed a simple hypothesis: if abilities (talent, innate abilities) are normally distributed in the population, then income should also be normally distributed. Since the income distribution is positively skewed, meaning that a small portion of the labor force on average earns significantly more than the majority of the labor force, what factors explain the divergence between income distribution and ability? His answer was investment in human capital, such as investments in schooling, training and experience gained by time in the labor force. The following discussion of the theory of human capital is provided only to facilitate the discussion of the empirical analysis of the impact on non-completion of high school on per capita income in Georgia.

[13] Investments in health, family care, and labor market information are also part of the stock of human capital.

[14] See "Investment in Human Capital and Personal Income Distribution," *Journal of Political Economy*, 1958.

[15] *ibid.*

Human Capital Theory: Measuring Variations in Per Capita Income and Educational Attainment in Georgia

There is a strong analogy between the investment in human capital and investments made in physical capital.[16] Individuals make decisions about spending resources to acquire schooling, training, health and other productivity-enhancing activities based on costs relative to the expected gain in returns. A portion of the gains from the investment in human capital is measured by the expected increase in earnings, but gains may also include intangible benefits such as higher job satisfaction, greater choice in job and/or greater choice in the location of work, etc.

The demand for labor is derived demand. Firms hire workers because there is a demand for the goods and services produced by that labor. The wage a firm is willing to pay for a unit of labor depends on the amount of additional revenue the unit of labor will bring to the firm. Additional revenue is dependent on the market price of the good or service sold by the firm and the additional quantities of goods or services produced by the additional unit of labor. Hence, the wage a firm is willing to pay for any particular unit of labor is the market price of the good or service, *P*, multiplied by the quantity of additional product produced, the marginal product, *MP*, where $P * MP = VMP$, the value of the marginal product. Investments in human capital increase the productivity of a unit of labor, and, therefore, increase the value of the marginal product of labor, increasing the wage a firm is willing to pay.

The actual wage earned depends on the interaction of both the supply of labor and the demand

[16] Human capital differs from physical capital in two respects. First, human capital is not collateral; it cannot be sold. Second, the individual cannot spread risk in the same manner as owners of physical capital.

for labor. The investments made by individuals in human capital result in product differentiation on the supply side of the labor market. Firms search for labor with specific bundles of skills that will result in the highest productivity. Actual earnings are determined by the demand for the various bundles of skills relative to the supply of those bundles of skills most closely matching the demand.

The goal of this study is to identify and measure the relationship between non-completion of high school and per capita income. In order to do this, one must control for the whole complex of human capital-enhancing investments as well as those forces which shape the demand side for the labor side of the market.

Following the Rickman approach, this study estimates the variation in per capita county income as a function of:

- educational attainment measured by percent of county population age 25 and older with less than a high school education, percent of county population with some college, and percent of county population with a college education;[17]
- experience measured by the percent of the population under 18 and the percent of the population over age 64;[18]

[17] The percent of county population with a high school education is not explicitly included in the estimating equation to avoid perfect multicollinearity. Therefore, the coefficients for each level of education will measure the return to that educational level relative to the return to a high school education.

[18] Recall that real earnings increase over the work life and that in particular for higher levels of education, the very high returns to work later in life reduce the rates of retirement.

- percent of labor force which is male; and,[19]
- two dummy variables, Atlanta Metro and Other Metro, to measure the potential effects of high wages paid in metropolitan labor markets.[20]

The set of explanatory labor market variables replicates those included in the Rickman study. However, this study does differ from the Rickman study in one way. This study will pool data from two separate census years, 1990 and 2000. Pooling time-series and cross-sections will require additional dummy variables for time and county effects. The study also re-estimates the Rickman equation for 1990. This permits a test to determine if there is a change in the structure of the economy between the two time periods.

Education as a Public Good: Using Per Capita Personal Income to Measure the Return to Human Capital

Synthetic earnings are a measure of the potential earnings capacity for the average individual with a given stock of human capital. Differences in potential earning capacity provide a

[19] In general, for the same level of educational attainment, men on average have higher earnings than females. However, there remains substantial gender bias in occupational choice, and given that men generally have higher rates of labor force participation than women, there may be downward pressure on the premium paid to men at the level of a county labor market if more 'male' labor is supplied than demanded.

[20] Wages and income tend to be higher in metropolitan areas partially due to higher costs of living. They may also be high due to higher labor market efficiency, such as anticipated in the New Economic Geography, which suggests that the diversity of skills in an urban labor market means that firms can more easily find close fits between the bundle of skills needed and the bundle of skills supplied. This raises the productivity of urban firms relative to more rural competitors and increases the wage urban firms are willing to offer.

cumulative cost to the individual of under-investment in human capital over a 40-year, full-time work-life. Synthetic earnings are a microeconomic measure. Once the return to each level of human capital is calculated, the gap between the earnings of those with a high school education and those with less than high school can be determined. The cost of non-completion of high school could be estimated by summing the loss over all those with less than a high school education.

In theory, synthetic earnings could be estimated for Georgia and each of Georgia's counties. However, the CPS March survey does not provide state level data, so that additional assumptions would be required in order to extrapolate county level synthetic earnings from the nationally estimated synthetic earnings.[21] Further, as noted, synthetic earnings estimates tend to be biased, providing estimates of work-life earnings in excess of the realized earnings due to the assumption of full-time work.

The present study takes a more macroeconomic approach to estimating the cost of high school non-completion. Per capita personal income varies widely across Georgia's counties. As described above, this study will determine how much of the variation in per capita personal income can be explained by the variation in the rate of high school non-completion. This approach has one advantage and one weakness.

The weakness is that in addition to salaries and wages, per capita personal income includes a variety of other sources of income such as transfer payments, interest, and dividends. Among transfer payments, which would be included in per capita personal income, are unemployment compensation and welfare payments. As noted, those with less than a high school education are

[21] The Bureau has calculated synthetic earnings for several counties, but considers this approach too cumbersome to develop for state-wide applications.

more frequently unemployed than those with higher levels of education. The payment of transfer for unemployment and welfare artificially reduces the gap in incomes between those with less than a high school education and those with high school or more education. In fact, these payments are part of the external costs non-graduates impose on the rest of society.

The advantage to using per capita personal income is that it focuses on the costs imposed at the local level on everyone by the non-graduate. Education[22] is a mixed public good. On the one hand, individuals invest in education because it is the individual who reaps the majority of the benefits in the form of higher income and greater job satisfaction. However, there are spillover benefits when individuals invest in education. Education increases productivity, and as productivity increases, more goods and services and/or higher quality goods and services can be produced with the same amount of labor. Greater efficiency contributes to everyone's economic welfare. However, since some of the benefits of investing in education are not captured by the individual making the investment decision, there is under-investment in education.

Summary

From a policy perspective, the use in the present study of variations in per capita personal income, as explained by variations in educational attainment and other human capital investment, focuses on the collective or social costs of high school non-completion. Non-completion of high school imposes a cost on everyone, and, as measured in this study, on everyone within the local community where most decisions about spending on education are made. The cost imposed on the local community justifies the expenditure of public dollars to implement policies which

[22] Education here should be interpreted broadly to include not only formal education, but all investment in human capital.

reduce levels of non-completion of high school. Non-completion of high school is not just a problem for the individual who chooses not to continue their basic education. It is not just a problem for the school system or the parents of the non-graduate. The local economy suffers and society is a collective loser.

THE COST OF HIGH SCHOOL NON-GRADUATION: FINDINGS

Following the Rickman Study and the discussion in the previous chapter, this chapter presents the estimates of the relationship between variation in county per capita personal income and the variation by county in the rate of non-completion of high school. The estimates are accomplished by means of multiple regression. Estimates were prepared for each of the time periods, 1990 and 2000, and for both time periods combined in a pooled cross-section and time-series for all of Georgia's counties. The results of the regression estimates were then employed to calculate the total economic impact of non-completion of high school for each of the State's 12 Service Delivery Regions.

The Estimating Equation

Per capita personal income is a function both of the decisions made by the suppliers of labor and the firms demanding labor. Individuals make decisions about investment in human capital which affect their productivity, but the return to that investment depends on the supply of a given type of human capital relative to the demand for that type of human capital. Hence, as discussed in the previous chapter, estimating per capita personal income requires that the estimating equation contains controls for both human capital investment and for relative demand.

The equation which is estimated here is:
CPCPY = F (CPNC, CPSC, CPC, CPU18, CPO64, CPM, ATLMETRO, OTHERMETRO, CENTRAL, *or COUNTY & TIME*[23])

[23] County and time dummies were included only in the pooled cross-section and time

where:

- CPCPY is county per capital personal income;
- CPNC is county percent of the population age 25 or older with less than a high school education;
- CPSC is the county percent of population age 25 or older with some college;
- CPC is the county percent of the population age 25 and older with a college degree;[24]
- CPU18 is the county percent of population under the age of 18;
- CPO64 is the percent of the county population over age 64;
- CPM is the percent of the county male population;
- ATLMETRO and OTHERMETRO are dummy variables for the counties in the metropolitan areas;
- CENTRAL is a dummy variable for each county in which the principle city of a metropolitan area is located;
- *COUNTY* is a series of 158 dummy variables representing each county, used only in the pooled cross-section time series;[25] and,
- *TIME* is a dummy for 1990 or 2000, used only in the pooled cross-section time series.

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series estimates.

[24] To avoid perfect multicollinearity, the percent of county population with a high school education is excluded from the equation. This means that the coefficient on each educational category measures the effect of that level of educational attainment relative to high school graduation.

[25] Worth County is excluded from the equation to avoid perfect multicollinearity. This means that the coefficient on each county measures the effect of the county relative to Worth County.

The data measuring each of the variables was taken from the U.S. Census for 1990 and 2000.[26] The equation was estimated for 1990, for 2000, and then pooled across both years.

CPNC, CPSC and CPC are measures of the investment in human capital. It is expected that the sign on CPNC, the measure of non-completion of high school, will be negative in terms of county per capita personal income. Those counties with high rates of non-completion of high school are expected to be lower than county per capita personal incomes where there are lower rates of high school non-completion. Conversely, it is expected that the sign on CPSC and CPC will be positive. Counties with populations that have higher rates of investment in human capital beyond high school are expected to have higher county per capita personal incomes relative to those with lower levels of investment.

Experience also contributes to human capital. A county with a high percent of inexperienced work force population, as well as a high percent of dependent children, will be expected to have lower per capita personal income than one with a more experienced work force. Hence, it is expected that the sign on CPU18 will be negative.

The sign on CPO64 is not so easily predicted. On the one hand, this age group is more experienced, but their incomes may be lower due to retirement. However, as noted, for highly educated workers returns increase dramatically with experience. This results in an incentive for highly educated workers to remain in the work force long after customary retirement age. The high returns for higher educated workers who remain in the work force may outweigh the effect of lower incomes for retirees.

CPM is the percent of the population which is male and again this sign on this variable is

[26] U.S. Census 1990 and 2000, Summary File 3.

difficult to predict. On average, for any given level of education, men earn more than women. However, there remains strong gender bias in choice of occupation so that if there are a large number of men relative to the number of those jobs which are traditionally viewed as men's jobs, the excess supply may reduce earnings and per capita personal incomes might be lower where there is a large male work force.

The two dummy variables, ATLMETRO and OTHERMETRO, are controls for the potentially higher per capita personal incomes associated with higher costs of living in urban areas relative to smaller and rural communities. Additionally, these dummy variables will capture the potentially higher per capita personal incomes due to agglomerations effects. See footnote 19.

The dummy variable CENTRAL is a control for the possibility that although the cost of living in the core urban center of a metropolitan area may be high, central cities are often places where there are high concentrations of low income populations. In this case, the sign on CENTRAL should be negative. The dummy variables for COUNTY and TIME effects appear only in the pooled cross-section time series regression.

Findings for the Original 1990 Study Period

As noted in chapter one, Georgia has closed the gap with the nation on the state-wide percent of the population age 25 and older without a high school education, but the closing of the gap is attributable to a significant increase in high school completion rates in only a few metropolitan counties. This study seeks to compare the 1990 results with those from 2000. To do this, it was necessary to establish a source of data which was consistent across both time periods. Use of an alternative data set for 1990 resulted in estimates which differed slightly from those originally

estimated by Rickman.[27] The findings for the Rickman estimation and the re-estimation are presented below, and the differences in the results are discussed. The re-estimation of the Rickman formulation is consistent with the original findings, but results in a far larger effect of non-completion of high school than estimated in the original study.

The Rickman equation was re-estimated for 1990. The results differed slightly from the original Rickman report. The original results and the re-estimated results are shown below.

As originally estimated Rickman reported that:[28]

$$CPCPY_{Rickman} = -59.0\ CPNC + .7\ CPSC + 144.8\ CPC + 43.0\ CPO64 - 107.8\ CPU18$$
$$(1.8) \quad (1.5) \quad (3.3) \quad (.7) \quad (1.9)$$
$$-157.8\ CPM + 2239.5\ ATLMETRO - 594.1\ OTHERMETRO$$
$$(3.4) \quad (4.9) \quad (1.2)$$
$$+ 1282.4\ CENTRAL$$
$$(1.8)$$

The overall fit of the regression as measured by the R-Square was 63%. Only CPC, CPM, and ATLMETRO were statistically significant at the 95% level of confidence as indicated by a t-statistic greater than 1.96. Several other variables would be significant at the 99% level of confidence of 1.64, including CPNC and CENTRAL. The signs on the variables are as expected:

[27] It should be noted that Rickman used several different data sources from different years.

[28] See the Rickman Study, page 11. Please note that no constant term was reported, but Dr. Rickman confirms the inclusion of a constant in the original estimation.

negative for non-completion of high school; positive for some college, and for college graduation; and, positive for ATLMETRO. However, the negative sign on OTHERMETRO and CENTRAL makes the question of premium for higher cost of living questionable. There is a direct and positive effect for the percent of the population over age 64, and county per capital personal income is lower where there is a large percent of the population under age 18. Additionally, a high percent of county male population lowers county per capita incomes.

The coefficient on CPNC of -59.0 means that for every 1% of county population ages 25 and older with less than a high school education, county per capita personal income is reduced by $59. For a county with a percent of the population with less than a high school education equivalent to the state-wide average in 1990 of 29.1%, the cost of non-completion of high school would be $1,717 per person.

The re-estimation yielded slightly different results in terms of the magnitude of the coefficients and the overall fit of the regression equation. The change in results is due to slight differences in the sources of data. In particular, it should be noted that estimates of per capita personal income for a census year are frequently revised after the following census.

The re-estimated Rickman equation for 1990 using only U.S. Census data as published in 2003 was:

$$CPCPY_{\text{Re-estimated}} = \$42{,}120 - 108\,CPNC + 55.3\,CPSC + 31.6\,CPC - 180\,CPO64$$
$$(9.36) \quad (3.77) \quad (1.38) \quad (1.09) \quad (3.79)$$
$$-319\,CPU18 - 356\,CPM + 176\,ATLMETRO + 358\,OTHERMETRO$$
$$(7.12) \quad (6.22) \quad (6.32) \quad (1.08)$$
$$-1123\,CENTRAL$$
$$(2.38)$$

The Adjusted R-Square for the re-estimated Rickman equation was 81.3%, significantly higher for the same sample size and number of variables than the R-Square reported by Rickman. The t-statistics, shown below the coefficients, are significant at the 95% level of confidence for: the constant term; CPNC; CPO64; CPU18; CPM; ATLMETRO; and CENTRAL. Compared to the Rickman estimation, it should be noted that the signs on the variables are stable except for: CPO64, which was positive but insignificant in the original Rickman estimates and is negative and significant in the re-estimated Rickman equation; and OTHERMETRO and CENTRAL, which have reversed signs (OTHERMETRO was negative in the original Rickman estimates and is positive in the re-estimation; CENTRAL was positive in the original Rickman estimation and is negative and significant in the re-estimation).[29]

The coefficient on CPNC of -108.0 in the re-estimation is approximately twice the size of the coefficient in the original Rickman equation. The interpretation of the coefficient is the same. For every 1% of a county's population age 25 or older without a high school education, the county's per capita personal income is reduced by $108. This means that for a county with the 1990 state-wide average for non-completion of high school of 29.1%, county per capita income was reduced by $3,142. This is approximately 1.8 times larger than the effect originally estimated by Rickman.

Findings: 2000

The original Rickman formulation was also estimated for 2000. The source of data for the 2000 estimates was the same as the source for the re-estimation of the Rickman equation for 1990.

[29] The re-estimated Rickman equation confirms the *a priori* assumption that the higher poverty of the central city in a metropolitan area makes that area's labor market distinct from the rest of the region.

For 2000 the estimates were:

$$CPCPY_{2000} = \$24{,}318 - 159.31\,CPNC - 42.2\,CPSC + 232\,CPC + 93.9\,CPO64 - 40.6\,CPU18 - 120\,CPM + 3188\,ATLMETRO + 629\,OTHERMETRO - 1332\,CENTRAL$$

(3.69) (2.89) (.68) (5.97) (1.18) (.49) (1.50) (5.67) (1.21) (1.63)

The Adjusted R-Square for the estimates for 2000 was 74%. Compared to the re-estimated 1990 equation the findings include that:

- CPNC remains significant and negative; high rates of non-completion of high school explain lower levels of county per capital personal income;
- CPSC is now inversely related to higher county per capita personal incomes, but remains statistically insignificant;
- CPC remains positive and is significant;
- CPO64 switched from negative to positive, but is no longer significant;
- CPU18 and CPM remain negative, but both are insignificant;
- the signs and significance of ATLMETRO and OTHERMETRO remain the same; and,
- the sign on CENTRAL remains negative, but the variable is insignificant.

The coefficient on CPNC of -153.0 is slightly larger than the -108.0 coefficient in the re-estimated 1990 equation. Inflation between 1990 and 2000 was approximately 26%. If labor market conditions for non-graduates of high school had remained the same, real county per capita personal incomes might have declined to -136.0. A coefficient of -153.0 means that there

were additional real losses due to non-completion of high school in county per capita personal income of about 12.5%.

The interpretation of the coefficient on CPNC of -153.0 is the same as previously discussed. For every 1% of a county's population age 25 or older without a high school education, the county's per capital personal income is reduced by $153. This means that for a county with the 1990 state-wide average for non-completion of high school of 29.1%, county per capita income would have been reduced by $4,452, an increased loss of $1,310 over the 1990 estimated cost of $3,142. If a county had reduced its non-completion rate from the 1990 average of 29.1% to the average rate of non-completion in 2000 of 21.4%, non-completion of high school would have reduced county per capita personal income by $3,274. As previously noted, only 28 counties in 2000 had non-completion rates of 21.4% or less. The other 131 counties had non-completion rates of between 22% and 44%, meaning that the per capita cost of non-completion of high school ranged from $3,366 to $6,732.

Findings: Pooled Cross-section and Time Series

Using the Rickman specification for separately estimating the cost of high school non-completion for both time periods, 1990 and 2000, suggested that there was an increase in the real cost of high school non-completion between 1990 and 2000. However, overall the variables in the Rickman formulation explain less of the variation in county per capita personal income in 2000 than in 1990.

The results of the pooled cross-section time series equation were:

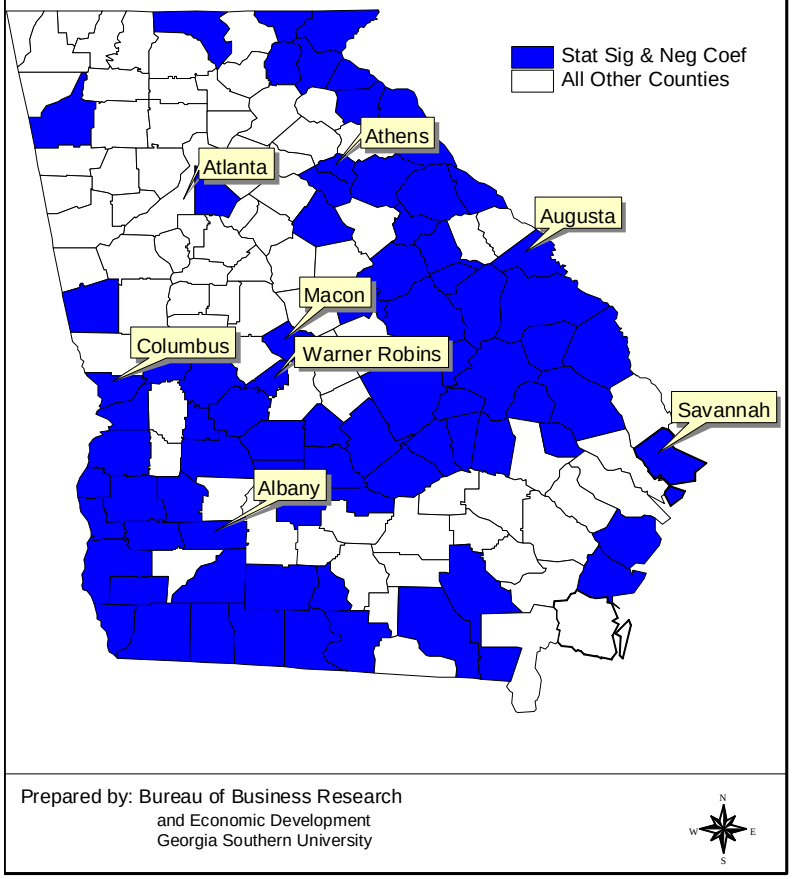
$$CPCPY_{pooled} = \$17{,}552 - 98.2\ CPNC - 82.1\ CPSC + 400\ CPC + 239.0\ CPO64$$
$$(3.11) \quad (2.93) \quad (1.63) \quad (9.30) \quad (2.60)$$
$$- 141.0\ CPU18 - 70.1\ CPM + 86\ ATLMETRO_{2000} + 26\ OTHERMETRO_{2000}$$
$$(1.92) \quad (1.08) \quad (.14) \quad (.06)$$
$$- 953\ ATLMETRO1990 - 337\ OTHERMETRO1990 + 3{,}974\ YEAR$$
$$(1.55) \quad (.67) \quad (11.46)$$
$$+ \text{ or } - (COUNTY\ EFFECTS^{30})$$

The Adjusted R-Square for the pooled cross-section time series estimation was 96.4%, the best overall fit of any of the equations estimated. The t-statistics shown under the coefficients are significant for CPNC, CPC, CPO64, and YEAR. For 86 counties, the dummy for the county effect was statistically significant. Figure 4.1 shows those counties for which the dummy for the county effect was negative and statistically significant. The pattern shows that central cities like Atlanta, Savannah and Macon have per capita incomes like those of poorer rural counties. Rickman's dummy for CENTRAL is captured by the pooled cross-section time series equation along with the effect of distressed rural counties. This partially explains the better overall performance of the pooled cross-section equation.

The coefficient on CPNC of - 98.2 contains no effect of time or inflation, which is captured in the trend coefficient, YEAR. The interpretation of the coefficient is the same as previously discussed. For every 1% of a county's population age 25 or older without a high school

[30] See Appendix A.

FIGURE 4.1
Counties With a Statistically Significant
T Value and a Negative Coefficient



education, the county's per capita personal income is reduced by $98.20. This means that for a county with the 1990 state-wide average for non-completion of high school of 29.1%, county per capita income would have been reduced by $2,858. If a county had reduced its non-completion rate from the 1990 average of 29.1% to the average rate of non-completion in 2000 of 21.4%, non-completion of high school would have reduced county per capita personal income by $2,101. As previously noted in 2000, only 28 counties had non-completion rates of 21.4% or

less. The other 131 counties had non-completion rates of between 22% and 44%, meaning that the per capita costs of non-completion of high school ranged from $2,160 to $4,321.

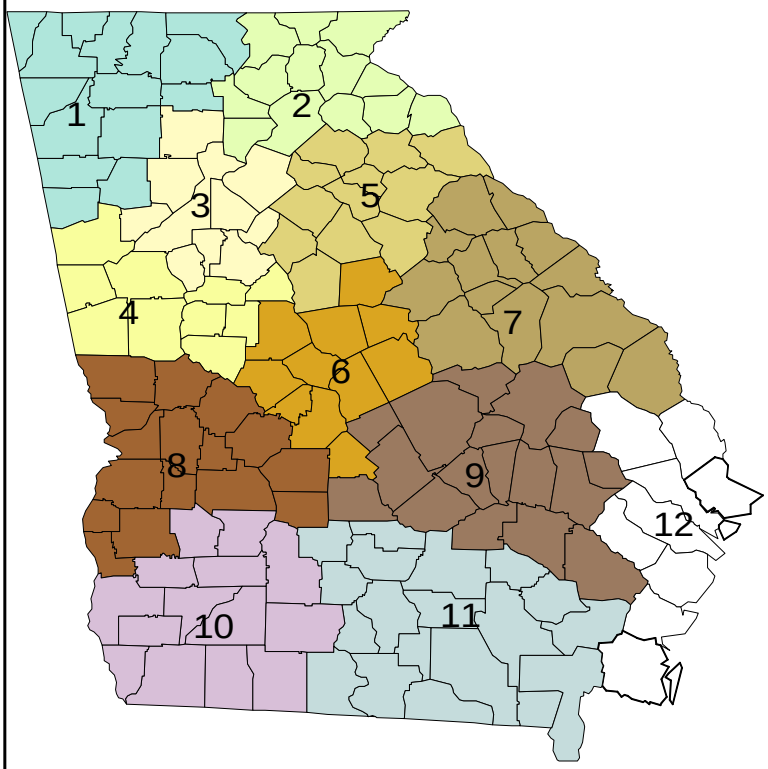
The Total Economic Impact of Non-completion of High School

As discussed in the previous chapter, there are spillover benefits when individuals invest in education. Education increases productivity and, as productivity increases, more goods and services and/or higher quality goods and services can be produced with the same amount of labor. Greater efficiency contributes to everyone's economic welfare. Everyone is impoverished when any one individual in society does not achieve his/her true potential. In this section of the report, the extent of that impoverishment is given a price tag.

The total economic impact of the loss of per capita income due to non-completion of high school was estimated using the regional Input-Output model IMPLAN.[31] Employing the IMPLAN modeling system for Georgia for 2000, counties were grouped into regional economies by State Service Delivery Region. Figure 4.2 shows the State Service Delivery Regions.

[31] A product of the Minnesota IMPLAN Group.

FIGURE 4.2
State Service Delivery Regions



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Input-output models are designed to show the multiple effects of an event which impacts an economy. For example, if a company expands its operation to meet growing demand for its product, a regional input-output model can be used to calculate the multiple effects of increased output. The growing expenditures on the company's products represent an increase in direct demand, which adds income for the company. In order to meet the additional demand for output, the company must buy more of the inputs required to make the product. The purchases of additional inputs create new demand for other firms, increasing revenues and expenditures. This

is the indirect effect and expands the region's economy beyond the initial impact. Firms also buy goods and services, particularly labor, from the region's households. The spending associated with the additional income paid to households is measured by the induced effect. The total impact of an increase in direct expenditures is the direct effect plus the indirect and induced effect.

To measure the total economic impact of non-completion of high school, the total direct loss in county income from non-completion of high school was calculated for each county. For example, for a county with 30% of the population age 25 and older, without a high school education, and population of 50,000, the total annual loss in county income due to non-completion of high school was calculated as 30% CPNC multiplied by $98.20 Reduction in County Per Capita Personal Income multiplied by a Population of 50,000 which equals a total loss of $147,300,000. This represents the foregone income by households due to non-completion of high school.

Total foregone income for all of the counties in each of the 12 Service Delivery Regions is shown in Table 4.1. The direct loss from foregone income state-wide in 2000 dollars was calculated at $17.6 billion dollars per year.

The total economic impact of the foregone income is also shown in Table 4.1. Lower per capita income means reduced demand for the goods and services produced in each region's economy. This in turn means lower demand for the firms that supply inputs to those firms providing products for final demand. The indirect effect creates additional reductions in each region's economy of $2.1 billion. Lower demand for the products of firms providing inputs to the producers of final products also means that those firms pay less to all of their employees, causing a further reduction in household demand. The induced effect adds to each region's loss by $2.3

TABLE 4.1
Income Foregone From High School Non-Completion (2000$)

	Direct	Indirect	Induced	Total*
Region 1	-2,161,872,389	-223,738,268	-255,921,318	-2,641,531,991
Region 2	-1,162,042,991	-150,335,440	-158,822,873	-1,471,201,310
Region 3	-4,083,772,708	-686,617,535	-770,863,098	-5,541,253,354
Region 4	-1,113,328,330	-111,371,612	-128,395,742	-1,353,095,677
Region 5	-1,099,501,092	-65,668,133	-53,946,298	-1,219,115,520
Region 6	-996,966,632	-107,945,236	-136,992,346	-1,241,904,214
Region 7	-1,068,537,873	-127,689,615	-146,112,394	-1,342,339,880
Region 8	-897,957,984	-98,966,014	-110,073,067	-1,106,997,067
Region 9	-911,086,602	-67,378,730	-76,538,127	-1,055,003,459
Region 10	-1,951,800,380	-198,550,594	-241,513,368	-2,391,864,344
Region 11	-1,113,940,233	-105,245,996	-123,872,328	-1,343,058,555
Region 12	-1,048,405,499	-125,298,079	-136,874,390	-1,310,577,970
Total	**-17,609,212,713**	**-2,068,805,252**	**-2,339,925,349**	**-22,017,943,341**
GA	**-17,610,785,498**	**-3,238,793,366**	**-3,797,978,238**	**-24,647,557,210**

*Totals may not add up due to rounding

billion. Hence, the $17.6 billion in foregone income results in a total economic impact of $22.0.

Losses may be exported from one region to another region and, therefore, summing the losses for each region may result in an under-estimation of the total loss in the Georgia economy from non-completion of high school. To estimate total state-wide losses, the $17.6 billion in foregone income was used to calculate the impact in the state-wide input-output model. The result was a total loss of $24.6 billion.

The above impacts estimate the cost of high school non-completion against a base of 100% completion of high school by everyone age 25 or over. It may not be reasonable to expect that 100% of the population over age 25 will complete high school. In 2003, the March CPS sample showed that nation-wide, 16% of the population age 25 and older was without a high school education. Table 4.2 shows the total costs of non-completion of high school rates which are higher than the 2003 nation-wide average rate of non-completion of 16%.

TABLE 4.2

Income Foregone From High School Non-Completion-National Level 16% (2000$)

	Direct	Indirect	Induced	Total*
Region 1	-1,041,370,600	-107,774,400	-123,276,900	-1,272,421,800
Region 2	-430,462,400	-55,689,600	-58,833,700	-544,985,800
Region 3	401,631,500	67,527,600	75,813,000	544,972,000
Region 4	-464,327,000	-46,448,900	-53,549,000	-564,324,800
Region 5	-396,875,000	-46,748,600	-52,806,000	-496,429,600
Region 6	-289,841,100	-31,382,200	-39,826,800	-361,050,000
Region 7	-369,627,200	-44,170,200	-50,543,000	-464,340,400
Region 8	-330,366,500	-36,410,500	-40,496,800	-407,273,800
Region 9	-472,638,300	-34,953,600	-39,705,200	-547,297,100
Region 10	-360,393,900	-36,661,700	-44,594,700	-441,650,300
Region 11	-527,629,200	-49,850,800	-58,673,400	-636,153,500
Region 12	-176,026,800	-21,037,500	-22,981,100	-220,045,400
	-4,457,926,500	-443,600,400	-509,473,600	-5,411,000,500
GA	-4,457,926,700	-819,855,700	-961,405,600	-6,239,188,000

*Totals may not add up due to rounding

If each region could reduce its non-completion rate to 16%, direct losses from foregone income would be cut from $17.6 billion in 2000 dollars to $4.5 billion in year 2000 dollars, and total regional losses could be cut from $22.0 billion to $5.4 billion. If impact of the direct loss of $4.5 billion is estimated in the state-wide model, the total impact increases to $6.2 billion, compared to $24.6 billion for a 100% completion rate. By any of these measures, reducing the rate of non-completion of high school in each county and each region to the national average of 16% would result in a 4 fold reduction in the direct and total loss of income due to non-completion of high school.

Conclusion

Non-completion of high school costs not only the individual, but also costs society. The estimates developed in this study show that for every 1% of the population age 25 and older that does not complete high school, per capita income in Georgia's counties is lowered by $98.20. Total direct losses in the form of foregone income amounts to $17.6 billion per year. If a goal of a rate for non-completion of high school of 16% could be achieved state-wide, loss could be cut by 4 fold to $4.5 billion. Achieving this goal must be among the State's top economic development priorities.

THE VALUE OF A COLLEGE EDUCATION: FINDINGS

In all but one version of the equations estimating the variation in county per capita personal income and variation in human capital investment, the return to college graduation was positive and significant. This chapter will look at the economic benefit of college graduation. As with the cost of non-completion of high school the estimated benefits are not those which accrue to the individual, but are estimates of the spillover benefits from higher productivity.

Review: The Future of Labor Market Opportunities

In "College at Work: Outlook and Earnings for College Graduates, 2000-10,"[32] authors Dohm and Wyatt estimate 13 million potential job openings for college graduates in only two groups of occupations:[33] Management, Business and Financial occupations; and, Professional and Related occupations. These 13 million job openings represent 22% of the 58 million job openings stemming from the combined effects of economic growth and net replacement needs over 2000-2010.[34] Further job openings in other occupations such as sales in technology, advertising, and financial fields are showing increasing preferences for college educated workers. Job openings

[32] By Arlene Dohm and Ian Wyatt, *Occupational Outlook Quarterly*, Fall 2002.

[33] Seventy-two percent of all college graduates are employed in these two groups of occupations., *ibid*. page 13.

[34] *ibid*. page 13.

for 43 occupations in which college graduates make up 50% or more of the work force are projected to grow by much faster than the 15% projected average growth in job openings for 2000-2010.

Non-completion of high school or its equivalents forecloses all opportunity to participate in not only the high earnings sectors of the economy, but also the high growth sectors. In fact, non-completion of high school limits the supply of potential college graduates and raises the return to college graduation. As noted previously, the Employment Policy Foundation predicts a 33% short-fall in graduates with a four-year degree or higher over the next three decades.[35] So long as the demand for college graduates exceeds the supply of college graduates, the return to graduation with at least a four-year degree will continue to grow. The combination of high rates of non-completion of high school and a widening gap between the supply of and demand for college graduates will widen the economic gap in earnings.[36]

The Total Economic Impact of College Graduation

Education is a mixed public good. The individual is the most direct beneficiary of the education, but society is also a beneficiary of the individual's investment. Education raises productivity, and as productivity increases result, more goods and services and/or higher quality goods and services can be produced with the same amount of labor. This greater efficiency contributes to everyone's economic welfare. Here, the spillover benefits of a college education are calculated using the methodology of input-output modeling as discussed in the previous chapter.

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[35] EPA News Release, August 28, 2002, "Labor Day 2002: American Workplace Faces Difficult Year, Next 30 Years Filled with More Challenges."

[36] The gap between earnings for those with less than a high school education and those with a college degree increased by 40% between 1975 and 2000. See footnote 2.

Table 5.1 shows the total economic impact of college graduation for each State Service Delivery Region as measured by the sum of the total county personal income of college graduates in each region. For example, for a county with 15% of the population age 25 or older with a college degree and a population of 50,000, the total annual county income due to college graduation was calculated as, 15% CPC multiplied by $400 Increase in County Per Capita Personal Income multiplied by a Population of 50,000 equals $300,000,000.[37] This represents the additional county per capita income explained by college graduation and measures the extra spending

TABLE 5.1
Income Gained From College Graduates (2000$)

	Direct	Indirect	Induced	Total*
Region 1	3,546,379,733	367,024,842	419,818,559	4,333,223,130
Region 2	3,761,614,041	486,646,298	514,120,697	4,762,381,025
Region 3	39,186,999,427	6,588,633,087	7,397,035,532	53,172,668,199
Region 4	2,553,332,960	255,422,238	294,465,769	3,103,220,951
Region 5	3,731,710,295	439,564,770	496,520,923	4,667,795,988
Region 6	3,253,147,605	352,230,281	447,012,283	4,052,390,167
Region 7	3,301,219,462	394,493,664	451,410,376	4,147,123,517
Region 8	2,564,300,925	282,617,487	314,335,938	3,161,254,344
Region 9	1,204,800,841	89,100,150	101,212,335	1,395,113,328
Region 10	5,151,875,337	524,084,277	637,486,705	6,313,446,323
Region 11	1,890,535,054	178,619,309	210,231,186	2,279,385,553
Region 12	4,733,126,569	565,670,121	617,932,473	5,916,729,181
Total	**74,879,042,249**	**10,524,106,524**	**11,901,582,776**	**97,304,731,706**
GA	**74,879,044,152**	**13,770,978,206**	**16,148,568,548**	**104,798,591,065**

*Totals may not add up due to rounding

power of the household sector.

As shown in Table 5.1, the direct income benefit of college graduation for all 12 State Service Delivery Regions. The direct benefit state-wide of college graduation is $74.9 billion dollars. The total benefit including the indirect and induced effect is $104.8 billion.

[37] The $400 Increase in County Per Capita Income is the coefficient on the CPC in the pooled cross-section time series equation.

Table 5.2 shows the direct and total impact if each county within each State Service Delivery Region attained the national average for college graduation of 26% of the population age 25 and older.[38] The direct impact of attaining a college graduation rate of 26% would increase state-wide personal income by $24.5 billion dollars. The total impact, including the indirect and induced effects, would raise state-wide personal income by $34.3 billion dollars.

TABLE 5.2

Potential Income Gained From College Graduates- National Level 26% (2000$)

	Direct	Indirect	Induced	Total*
Region 1	3,870,384,600	400,557,000	458,174,100	4,729,115,700
Region 2	1,426,405,400	184,536,500	194,954,800	1,805,896,600
Region 3	1,552,272,900	260,988,500	293,010,900	2,106,272,300
Region 4	1,742,500,700	174,310,800	200,955,700	2,117,767,100
Region 5	1,651,184,500	194,495,900	219,697,600	2,065,378,000
Region 6	1,427,418,700	154,551,900	196,140,400	1,778,110,900
Region 7	1,542,301,500	184,304,100	210,895,100	1,937,500,600
Region 8	1,192,671,200	131,447,000	146,199,500	1,470,317,700
Region 9	1,697,352,000	125,526,400	142,590,300	1,965,468,800
Region 10	5,381,874,000	547,481,300	665,946,500	6,595,301,800
Region 11	1,990,342,300	188,049,200	221,330,000	2,399,721,500
Region 12	1,041,274,600	124,445,800	135,943,400	1,301,663,800
Total	24,515,982,400	2,670,694,400	3,085,838,300	30,272,514,800
	24,515,983,400	4,508,726,000	5,287,167,400	34,311,876,700

Conclusions

Investments in college education have a significant payoff to the state. If a goal of a rate of college graduation of 26% could be achieved state-wide, the state's economy would grow by

[38] Some counties exceed the 26%. For those counties the calculation of the rate of completion was set at 26%.

$34.3 billion. Further, this finding only serves to emphasize the paramount importance of reducing the rate of non-completion of high school. Investments in education must be the foundation of all economic development policies in Georgia.