

**The Economic Value of the Carroll County, Maryland,
Public School System:
Dollars & Cents and Beyond**

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Prepared by:

BEACON
Business Economic and Community Outreach Network
At Salisbury University

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Executive Summary

Carroll County Public Schools (CCPS) is ranked as one of Maryland's top performing school systems. The teachers and school systems are nationally recognized for their excellent standards and innovative approaches to education. Carroll County also boasts consistent above average standardized test scores, graduation rates, and lowest dropout rates in the state of Maryland. Carroll County schools also have constant goals to improve student achievement through technological, environmental, and educational advancements.

This study estimated the economic, employment, and where appropriate, fiscal impacts of CCPS. The study examined the value of the degrees awarded, the impact on local wealth, and the value of reduced future public costs.

The four major categories of economic value examined were:

Economic Value 1. Economic and Employment Benefits from CCPS Operations

Every \$1.00 in operational monies spent by CCPS and retained in the county results in total spending locally of \$1.44.

Every \$1 in capital spending that is retained in the county results in total spending locally of \$1.51. For every \$1 million in CCPS capital spending, 9.1 additional jobs are supported in the county. Every \$1 in capital spending that is spent and retained in the state of Maryland results in total spending locally of \$1.79.

Economic Value 2. Economic Value of Degrees Awarded

In recent years, CCPS has annually graduated students who will realize an additional lifetime earnings of approximately \$92.39 million (estimated total present value). The present value of the county income tax to be paid on these additional earnings is approximately \$2 million per graduating class.

Based on the improved college-readiness of CCPS seniors, approximately \$484.11 million in additional lifetime earnings can be attributed to CCPS graduates that are forecasted to successfully graduate college. The present value of the county income tax to be paid on these additional earnings is approximately \$10.53 million per graduating class.

Economic Value 3. Economic Development Impacts

The additional economic activity generated by CCPS graduates who work and spend in the county positively impacts property values and property tax revenues. Each graduating class is estimated to add over \$46 million in real property values and \$471,135 in real property tax revenues.

Economic Value 4. Reduction in Public Costs

Over the past five years, each CCPS graduating class has been associated with approximately \$85 million in savings in future public health-care costs, over \$156 million in savings in future crime related costs, and over \$6 Million in future welfare costs.

Introduction

Carroll County Public Schools (CCPS) is ranked as one of Maryland's top performing school systems. The teachers and school systems are nationally recognized for their excellent standards and innovative approaches to education. Carroll County also boasts consistent above average standardized test scores, graduation rates, and lowest dropout rates in the state of Maryland. Carroll County schools also have constant goals to improve student achievement through technological, environmental, and educational advancements.

This study estimates the economic, employment¹, and where appropriate, fiscal impacts of CCPS. Furthermore, this study examines the value of the degrees awarded, the impact on local wealth, and the value of reduced future public costs. Each of these types of values generated by CCPS is explained in further detail below.

Value 1. Economic and Employment from CCPS Operations

These impacts include the direct, indirect, and induced impact of the dollars spent by CCPS including salaries of employees, supplies, and services provided by local vendors. The direct spending (the initial payments made by CCPS) that stays within the county will then create a "multiplier" or "trickle down" effect as money is respent in the local economy. This recirculation of money generates indirect and induced effects. The economic and employment impacts are estimated separately for CCPS' annual operating and capital budgets.

Value 2. Economic Value of Degrees Awarded

A higher level of educational attainment is associated with a higher economic value in the job market. Graduates of CCPS will have a higher lifetime earning potential than non-graduates. Furthermore, an improvement in the academic achievement of CCPS students increases the likelihood of successfully completing a college degree. Therefore, a portion of the increased lifetime earnings of those students from CCPS who go on to graduate from college can be attributed to the education provided by CCPS.

¹ Jobs as reported by IMPLAN include all full-time, part-time, and temporary positions supported in the local economy.

Value 3. Economic Development Impacts

CCPS impacts local wealth through enhancing the ability of the county to attract and/or retain families with skilled and/or professional workers who are net wealth creators. Some of these benefits include:

- Quality-of-Life measures that encourage parents to use school quality as a residential location factor which adds a premium to the local property values;
- Quality-of-Life issues that are based on a "Sense of Well Being" for parents who believe high quality public education is essential to the success of their child's transition from high school to higher education or the labor market;
- Property value enhancements attributable to the presence of good local public schools;
- Productivity enhancements in local businesses due to quality K-12 education;
- Business, economic, workforce, and community enhancements due to increases in the number of post-secondary institution graduates in a jurisdiction due to quality K-12 education.

Value 4. Reduction in Public Costs

Research has shown that high school graduation rates are negatively correlated with crime, public health care costs, and welfare expenditures. This means that as graduation rates go up, these public expenses go down. This study estimates the impact that CCPS graduates have on these public costs.

The primary economy of interest in this study is Carroll County, hereafter referred to as the "the county." In some instances, where appropriate, impacts will also be examined at the state level. Examining the impacts at the state level allows the model to capture some of the leakage that leaves the county but goes to surrounding counties within the state. Each type of impact will be addressed in a separate section of the report following an overview of the economic trends in Carroll County.

Carroll County Overview

Carroll County is located in the northern part of Maryland. The county serves as the home of over 167,000 residents². The gross regional product (the value of all final goods and services produced) in Carroll County was approximately \$5.6 billion (2013)³. This accounts for approximately 2% of the GDP of the state⁴.

Figure 1. Map of Carroll County in Maryland



Table 1. Employment Structure, 2013		
Industry	Percent of Total Employment	
	Carroll County	Maryland
Federal Government	0.48%	5.71%
State Government	2.40%	3.96%
Local Government	11.91%	9.56%
Natural Resources and Mining	0.72%	0.25%
Construction	9.09%	5.77%
Manufacturing	7.22%	4.21%
Trade, Transportation, and Utilities	20.11%	17.59%
Information	0.77%	1.56%
Financial Activities	2.84%	5.46%
Professional and Business Services	11.69%	16.47%
Education and Health Services	17.03%	15.92%
Leisure and Hospitality	11.68%	10.04%
Other Services	4.07%	3.50%

The unemployment rate has increased steadily from 2.8% in 2011 to 3.3% in 2012 and 3.6% in 2013.

Table 1 shows the employment structure in Carroll County and Maryland. As can be seen in the table, the employment patterns in the county follow very closely to those of the state. The notable differences are the slightly heavier concentration of employment in the local government sector in the county, and the heavier concentrations in the construction sector, the manufacturing sector, the trade, transportation, and utilities sectors as well as the education and health services sector. There is also a notable difference in the federal government sector compared to the state.

Table 2 compares key socioeconomic and demographic information between the county, the state, and the nation. Median income is quite a bit higher in Carroll County as compared to the rest of the state, and is significantly higher than that of the nation. However, these figures are not adjusted for any cost-of-living differences. There is a nearly equal percentage of the population over the age of 65 in all three geographies. The county has a higher percentage of adults with a high school degree and adults with a bachelor's degree or higher as compared to both the state and the nation.

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² Carroll County Government

³ IMPLAN

⁴ U.S. Bureau of Economic Analysis

Table 2. Socioeconomic and Demographic Comparisons, 2012			
	Carroll County	Maryland	U.S.
Population	167,261	5,834,299	311,536,594
Median Income	\$84,790	\$73,538	\$53,046
% of population aged 65 and over	14%	13%	13%
% persons aged 25 and over with a high school degree	31%	26%	28%
% of persons aged 25 and over with a bachelor's degree or higher	33%	27%	29%

Source: U.S. Census Bureau

IMPLAN

To estimate the economic impact of the public school systems, the IMPLAN software package (produced by the Minnesota IMPLAN Group, Inc) was utilized. The IMPLAN model includes all economic effects when calculating total output/employment (i.e. this includes “direct” plus “indirect” plus “induced” (ripple effect) impacts). The IMPLAN model is based on Input-Output (IO) theory, for which Wassily Leontief was awarded the Nobel Prize in Economics in 1973. In IO models, the “jobs supported” estimates are the number of jobs that are needed to produce the current level of local output at the average productivity levels of workers in their respective industries. The IMPLAN model is based on actual Carroll County data from 2012 inflated to 2014 figures. The principle advantage of the IO IMPLAN model is in its utilization of state and county-specific data. The Social Accounting Matrixes in IMPLAN provide the multipliers or estimates of additional effects of the indirect and induced economic and employment impacts.

Value 1. Economic and Employment Impacts from CCPS Operations

Economic and employment impacts are separated into three categories: direct, indirect, and induced.

The *direct economic impact* includes the initial spending by CCPS to its employees, through salaries, or to businesses selling directly to the school system.

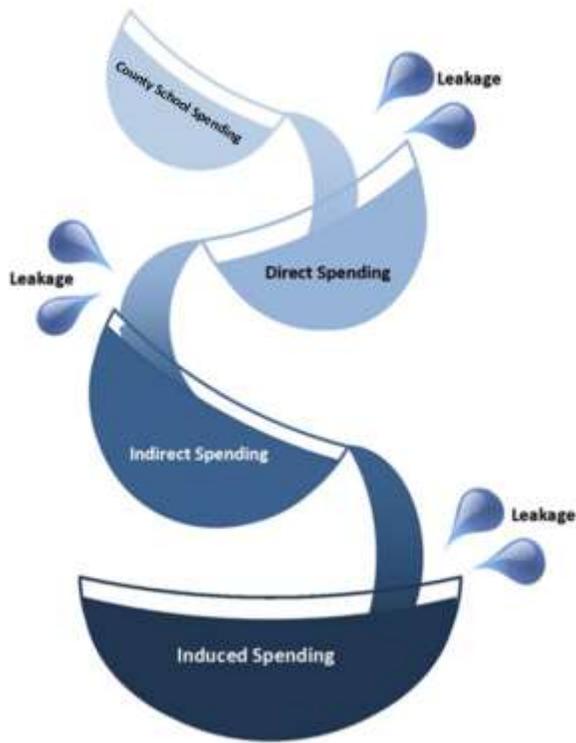
The *indirect economic impact* accounts for the additional spending and jobs supported in the local economy from the spending to local suppliers. These local suppliers pay salaries to their employees from the money received from contracts with CCPS. Additionally, they contract with other local firms for goods and services.

The *induced economic impact* accounts for the additional spending and jobs supported in the local economy from consumer retail spending associated with the direct and indirect effects. For example, employees of CCPS and those of the firms contracting with CCPS will spend a significant portion of their salaries in the local economy. This spending supports additional jobs at local firms.

At each level of impact, there is “leakage.” Leakage accounts for the spending that goes to employees and vendors outside of the county. Once this money exits the county, it is not available for re-spending or recirculating within the county. The different levels of impacts and leakage are graphically represented in Figure 2 below.

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Figure 2. Graphical Representation of CCPS Spending Impacts



Impact of the CCPS Operating Budget

Every \$1.00 in operational monies spent by CCPS and retained in the county results in total spending locally of \$1.44.

The operating budget of CCPS is substantial; nearly \$330 million budgeted for FY 14. The significance of these spending increases as the multiplier effect of the money being spent is taken into consideration. Many individuals and business receive funds from the school system and spend the money again in the local economy. Nearly 60% of the CCPS operating budget goes directly to employee salaries. Including benefits, total employee compensation makes up approximately 80% of the CCPS operating budget. The portion of spending that stays within the county is calculated in the model through use of the Social Accounting Matrix, which estimates the percent of each expenditure category that stays within the defined geography.

Table 3 shows the estimated annual economic and employment impact of the CCPS operating budget for FY 14. After accounting for leakage, the direct impact of CCPS is estimated to be \$305.96 million. In other words, for every \$1 spent on operations by CCPS, nearly \$.93 is retained in Carroll County. This spending creates an indirect impact of \$6.11 million and an induced impact of \$128.16 million for a total economic impact of \$440.22 million.

Table 3. Economic and Employment Impact of CCPS Operating Budget		
	Economic (\$ millions)	Employment ⁵
Direct Effect	\$305.96	4,129
Indirect Effect	\$6.11	59
Induced Effect	\$128.16	1,179
Total Effect	\$440.22	5,367

The employment impacts in the local economy are also significant. In addition to the 4,129 people CCPS employs that reside within the county, another 59 indirect jobs and 1,179 induced jobs are supported in the local economy through the operational spending of the CCPS.

The impact of CCPS’ operational spending spreads throughout the local economy. Given the number of economic sectors that are significantly impacted by this spending; only the top six sectors impacted in regards to spending and the top five sectors impacted in regards to employment are provided here⁶. After private households, the top six sectors impacted, reported in order of spending impacts, are: real estate establishments; offices of physicians, dentists, and other health practitioners; food services and drinking places; wholesale trade businesses; private hospitals; and securities, commodity contracts, investments, and related activities. Given that private households

⁵ The employment estimates are “jobs supported” estimates. The direct employment effect estimated by the IMPLAN model is greater than the actual number of CCPS employees as it includes all full-time and part-time jobs needed to produce the estimated output.

⁶ The sectors most impacted by CCPS’ operations in regards to economic versus employment impacts are not the same. This is due to the fact that the spending within each of the sectors impacted follows a distinct pattern and, therefore, supporting a different number of jobs.

represent the sector that is most affected by CCPS operational spending, it makes sense that the other sectors most impacted are sectors that serve or supply private households. Reported in order of employment impacts, the top five sectors most affected are: food services and drinking places; offices of physicians, dentists, and other health practitioners; transit and ground passenger transportation; real estate establishments; and retail stores-general merchandise.

While a significant portion of the impacts remain within the county, as can be seen by the limited leakage of approximately 7%, some of the impact that leaks out of Carroll County will flow to surrounding counties in the state. This includes the spending of CCPS employees. Therefore, the impact to the state as a whole is larger than that of Carroll County.

Impact of the CCPS Capital Budget

Every \$1 in capital spending that is retained in the county results in total spending locally of \$1.51. For every \$1 million in CCPS capital spending, 9.1 additional jobs are supported in the county. Every \$1 in capital spending that is spent and retained in the state of Maryland results in total spending locally of \$1.79.

CCPS also makes substantial capital expenditures that have impacts within the county and state. Capital expenditures include both those for updating and modernizing existing schools as well as the construction of new school buildings.

Capital expenditures are not consistent from year to year. Therefore, rather than examining the impact for one given year, the impact of the average capital expenditures is examined here for projects completed over the last ten years.

CCPS spent an average of \$27.8 million for capital projects per year between 2004 and 2014.

Table 4 shows the total impact of the average capital spending of CCPS over the last ten years at the county level is over \$0.77 million and 7 additional jobs supported. This means that for every \$1 million in CCPS capital spending, 9.1 additional jobs are supported in the local economy. At the state level, the total economic impact is \$1.02 million with 8 additional jobs supported. This means that every \$1 million in capital

spending that is retained in the state supports 7.84 Maryland jobs.

Table 4. Economic Impact of CCPS Average Annual Capital Spending (10 Year Average) (\$ millions)

Impact	Carroll County	Maryland
Direct Effect	\$0.51	\$0.57
Indirect Effect	\$0.11	\$0.16
Induced Effect	\$0.16	\$0.29
Total Effect	\$0.77	\$1.02

Table 5 shows the economic sectors, as reported by IMPLAN, that are impacted the most by CCPS' capital spending.

Table 5. Impact of CCPS Capital Spending by Economic Sector-State Level

Sector	Spending (\$ Thousands)
Construction of other new nonresidential structures	\$567.41
Architectural, engineering, and related services	\$40.47
Food services and drinking places	\$16.57
Offices of physicians, dentists, and other health practitioners	\$16.45
Private hospitals	\$17.68
Real estate establishments	\$25.29
Retail stores-food and beverage	\$6.38
Wholesale trade businesses	\$17.76
Retail stores-general merchandise	\$5.15
Employment services	\$4.30

In summary, at the state level there is a 35% economic activity return on Carroll County's investments in the Capital Budget for the public schools. The key question is whether such expenditures improve the quality of education while introducing efficiencies to the school system's operations. The analysis presented in this report by the BEACON team shows this to be the case. Since such improvements in effectiveness and efficiency have high returns on investment, the payback period for such investments can be seen as being significantly shorter than the nominal twenty-year horizon normally associated with such capital projects. While direct comparisons with private industry are difficult to make, the multiplier effect of an investment in public education tends to be higher

than that of a private sector investment, precisely because the benefit accrues to the larger “public” rather than to the more focused “private” beneficiaries.

Value 2. Economic Value of Degrees Awarded

The goal of any educational system is to produce knowledgeable and skilled individuals. These individuals are then able to contribute more human capital, creating higher returns for them throughout their careers and higher returns for their communities as they are able to be more successful and work at higher skilled jobs which earn higher salaries. The availability of both a trained and trainable workforce in the community helps to attract and/or retain businesses that utilize this workforce.

The value of an education system cannot be fully understood without examining the impact of the “product” the system helps to create. The first aspect of this value that will be examined is the increased earning potential of students who graduate from CCPS. The second aspect of this value that will be examined is the further increased lifetime earning potential of CCPS graduates that go on to graduate college.

An analysis of the findings from this study shows that the total economic value of K-12 public education in Carroll County is directly related to the number of students who are retained in the county upon graduation, including those students who return to the county after further (Post-Secondary) education or early career employment elsewhere. This direct relationship means that retention and return of former students is an important public policy issue as well as being an economic imperative.

Incremental Lifetime Earning of CCPS Graduates

In recent years, CCPS has annually graduated students who will realize an additional lifetime earnings of approximately \$92.39 million (estimated total present value). The present value of the county income tax to be paid on these additional earnings is approximately \$2 million per graduating class.

Data shows that high school graduates are more likely to earn a higher income than non-graduates. It is noted that a CCPS education cannot be deemed as the sole

reason for graduates’ performance and successful graduation. Other factors may include parental or mentor guidance and tutoring, the inherent abilities of the individual students, the influence of other school systems or educational programs, etc.

The additional lifetime earning potential of CCPS graduates will be calculated as the incremental difference in lifetime earnings of graduates as compared to non-graduates over their expected work life. This estimate will be calculated for each of the last five graduating classes (2009 to 2013). A retirement age of 65 is assumed in this study and, therefore, a work life of 47 years is assumed (age 18 to 65). The U.S. Census indicates that non-graduates in Carroll County earned approximately \$29,000 in 2014 while high school graduates earned approximately \$30,893 in 2014. The difference in salaries is about \$1,893, which is assumed to be maintained throughout the work lifespan. The present value of the additional annual earnings is calculated using a discount rate of 3.34%, the annual rate on a 30-year constant maturity Treasury Bond in 2014⁷. For a detailed explanation of how these estimates were calculated, refer to Appendix A. Table 6 shows the number of graduating seniors per year and the present value of the incremental lifetime earnings of the sum of graduates for each year.

Table 6. Present Value of Additional Lifetime Earnings of CCPS Graduates as Compared to Non-Graduates		
Year	Number of Graduates	Present Value of Additional Earnings (\$ millions)
2014	2,113	\$92.39
2013	2,182	\$95.41
2012	2,268	\$99.17
2011	2,245	\$98.17
2010	2,261	\$98.87

Assuming that 70% of the additional future income is subject to local tax each year, the present value of the additional county income taxes over the work lifespan is estimated to be around \$2 million per graduating class.

⁷ Federal Reserve System Historical Data on Selected Interest Rates, www.federalreserve.gov

The incremental lifetime earnings of CCPS graduates are significant. However, not all graduates are expected to remain within the county for their entire work life. Some will leave for college and not return; other will exit at other points in their lifetime. Some may stay within the state of Maryland even if they leave the county and others may leave the state entirely. On the other hand, graduates from elsewhere will migrate into the county and state from other school systems. Even if only a fraction of graduates stay within the county throughout their work life, the impact is still very significant.

Incremental Lifetime Earnings of CCPS Graduates that go on to Graduate College

Based on the improved college-readiness of CCPS seniors, approximately \$484.11 million in additional lifetime earnings can be attributed to CCPS graduates that are forecasted to successfully graduate college. The present value of the county income tax to be paid on these additional earnings is approximately \$10.53 million per graduating class.

Following successful graduation from CCPS, many graduates go on to attend and graduate college. Students who obtain a college degree increase their lifetime earning potential even further above those who obtain a high school degree. The incremental annual earnings of those in Carroll County who have a bachelor's degree compared to those with a high school degree or equivalent is \$15,842⁸. This difference in salaries is assumed to be maintained throughout the work lifespan.

Beyond just a desire to go to college, students must also meet certain academic requirements in order to successfully matriculate into college. For the purposes of this study, this measure is determined to be the best indicator of students' likelihood of success at college⁹. CCPS can "claim" some of the additional lifetime earnings of the students that the system has prepared for success in college.

The additional lifetime earning potential of CCPS graduates who go on to graduate college will be calculated as the incremental difference in lifetime earnings of those with bachelor's degrees compared to

those with high school degrees over their expected work life. This estimate will be calculated using data for the last two graduating classes. Given the assumed retirement age of 65, a traditional college graduate will have a work life of 43 years (age 22 to 65). To determine the portion of these students' future lifetime earnings that can be attributed to CCPS, the annual incremental earnings will be multiplied by the difference in the percent of students meeting the college entry requirements and having declared their intention of attending college across the last two academic years. The present value of the additional annual earnings is again calculated using a discount rate of 3.34%. For a detailed explanation of how these estimates were calculated refer to Appendix B.

The present value of the additional lifetime earnings attributable to CCPS for the graduating class of 2014 is approximately \$484.11 million. Assuming, as before, that 70% of the additional future income is subject to local tax each year, the present value of the additional county income taxes over the work lifespan is estimated to be approximately \$10.53 million.

Value 3. Economic Development Impacts

The meta-analysis presented in this report shows that quality of public education, measured on an educational attainment and outcome basis, is directly related to individual earnings. This, in turn, results in increased economic activity through the enhanced churning of those increased earnings in the locality. It can also be said that the distribution of skills in a jurisdiction is closely related to the distribution of income. The ripple effects do not end there. Quality public education drives other well-functioning economic institutions such as established property values, open labor and product markets, and participation in international markets.

Given the productivity-enhancing effects of education discussed in this report, it is possible to assert that quality education, and any improvement thereof, will add to the long-term economic growth of a jurisdiction. This growth manifests itself in the form of the attractiveness of the jurisdiction as a place to start or grow a business (business retention and relocation), and as a place where productive individuals and members of the "Creative Class" (and their families) would prefer living. This, in turn, increases the locality's ratio of net economic value (wealth) creators to net public service users.

⁸ United States Census Bureau, 2009-2013 American Community Survey 5-Year Estimates

⁹ See Appendix B for additional detail

Overall, public investments in infrastructure tend to have higher economic impacts in the aggregate than specific project investments. This is natural and to be expected. Infrastructure investments have much higher numbers of beneficiaries than specific project investments. In fact, infrastructure investments are prerequisites to project investments. Among public infrastructure investments, transportation investments (roads, bridges, ports, etc.) on the hard infrastructure side and investments in public education, on the soft infrastructure side, have the two largest numbers of beneficiaries and the two highest levels of economic impacts.

Real Property Values and Taxes

The additional economic activity generated by CCPS graduates who work and spend in the county positively impacts property values and property tax revenues. Each graduating class is estimated to add over \$46 million in real property values and \$471,135 in real property tax revenues.

The higher lifetime earnings of high school graduates, and even higher lifetime earnings of those who go on to graduate college, also impact the local economy through higher spending. Additional spending within the local economy generates further economic activity. This higher economic activity impacts local property values through making the county more attractive as a place to live and a place to do business. The availability of a trained and trainable workforce creates added incentive for businesses as these individuals can serve their workforce needs. To estimate the additional real property value, the method utilized by Walden (2011)¹⁰ was followed here. First the ratio of Carroll County real property values (\$17.95 billion¹¹) to local income (\$8.29 billion¹²) for 2013 was calculated as 2.17. This indicates that each additional dollar of income translates into an additional \$2.01 in real property values. Thus, each graduating class is estimated to generate an increase in real property values of \$46.28 million¹³. This assumes that the

graduating class will remain living and working in the county. Although some students will leave and not return, others will migrate into the county. With the county's growth rate and its proximity to several major metropolitan areas, the county has traditionally benefitted from a net in-migration of residents¹⁴.

Given the Carroll County real property tax rate, currently set at \$1.018 per \$100 in assessed value, the estimated impact on real property taxes from this increased value is approximately \$471,135 million.

Residential Property Value and Taxes

Research has indicated the positive impact that quality education has on property values. In terms of residential property, one of the major concerns in buying is location, including location within a high quality school district. The high demand for residential property within such districts increases the home prices within the community while the higher purchasing power of graduates helps to further increase prices. By continuing to prove itself as a high quality school system and increasing the test scores and GPAs of its students, CCPS will help to increase the residential property values and residential property taxes within the county.

Value 4. Reduction in Public Costs

There is a large and growing body of research on the positive societal outcomes associated with educational attainment. Many of these societal impacts have associated cost savings which are important to consider when looking at educational investments. The specific societal outcomes and their associated public cost savings that will be examined in this report include: public health-care costs, crime costs, and welfare costs.

Health-care Costs

Over the past five years, each CCPS graduating class has been associated with over \$85 million in savings in future public health-care costs.

¹⁰ Walden, M. L. (2011). *The Economic Impact of the Virginia Beach City Public School System*.

¹¹ Maryland State Department of Assessments and Taxation

¹² U.S Bureau of Economic Analysis

¹³ See Appendix C for calculation details.

¹⁴ U.S. Census Bureau, American Community Survey

A study conducted by Cutler and Lleras-Muney (2006)¹⁵ has found that health status improves and mortality rates are lower for high school graduates as compared to non-graduates. These improvements are even greater for college graduates. As suggested by Levin, Belfield, Muennig, and Rouse (2007)¹⁶, those with higher educational attainment are less likely to use public programs. Furthermore, the higher quality jobs that graduates are more likely to have typically provide health insurance. Based on their extensive research into health outcomes, Medicaid and Medicare enrollment, graduation rates, and present value calculations of per capita health care costs across different levels of educational attainment, Levin et al. estimate the lifetime health benefits savings from graduation to equal approximately \$40,500 per student. Using this estimate, Table 7 provides the estimated public health care costs saved for each graduating class over their lifetime from 2010 to 2014.

Table 7. Present Value of Estimated Lifetime Savings in Public Healthcare Costs

Year	Number of Graduates	Present Value of Lifetime Public Healthcare Costs Savings for Graduating Class (\$ millions)
2014	2,113	\$85.58
2013	2,182	\$88.37
2012	2,268	\$91.85
2011	2,245	\$90.92
2010	2,261	\$91.57

Crime Costs

Over the past five years, each CCPS graduating class has been associated with over \$56 million in savings in future crime related costs.

Research indicates that educational attainment is also related to a reduction in crime, both by juveniles and adults (Levin et al., 2007). Although it is unclear whether this is due to behavioral or financial mechanisms, the end result is clear: a reduction in public costs to manage crime. Levin et al. outline four main public costs of crime: the criminal justice costs for policing and trials; incarceration costs (including parole and probation); state-funded victim costs (medical and from lost tax revenue); and expenditures of government crime prevention agencies. Based on the crime rates for different types of crime for high school dropouts of 20 years and older, the estimated cost per crime (based on type of crime), and the expected decrease in crime rates due to high school graduation, Levin et al. estimate the average lifetime savings due to reduced crime to be \$26,600 per graduate.

Table 8 shows the total expected lifetime savings in public cost savings due to reduced crime for the last

Table 8. Present Value of Estimated Lifetime Savings in Public Crime Costs

Year	Number of Graduates	Present Value of Lifetime Public Crime Cost Savings of the Graduating Class (\$ millions)
2014	2,113	\$56.21
2013	2,182	\$58.04
2012	2,268	\$60.33
2011	2,245	\$59.72
2010	2,261	\$60.14

five graduating classes. Each graduating class has saved the public over \$56 million in costs associated with crime.

¹⁵ Cutler, D, & Lleras-Muney, A. (2006). *Education and health: evaluating theories and evidence*. NBER Working Paper.

¹⁶ Levin, H., Belfield, C., Muennig, P., & Rouse, C. (2007). *The Costs and Benefits of an Excellent Education for All of America's Children*. Columbia University.

Welfare Costs

Over the past five years, each CCPS graduating class is associated with approximately \$6 million in savings in future welfare costs.

High school graduates are also less likely to require public assistance in the form of welfare (including Temporary Assistance for Needy Families or TANF, food stamps, and housing assistance). Levin et al. (2007) calculated the present value of the estimated lifetime welfare cost savings of high school graduates to be \$3,000 on average. Their analysis focuses on state-level benefits and excludes assistance from federal programs. Table 9 below shows the total estimated welfare cost savings over the lifetime of the last five graduating classes.

Table 9. Present Value of Estimated Lifetime Savings in Welfare Costs		
Year	Number of Graduates	Present Value of Lifetime Welfare Cost Savings of the Graduating Class (\$ millions)
2014	2,113	\$6.34
2013	2,182	\$6.55
2012	2,268	\$6.80
2011	2,245	\$6.74
2010	2,261	\$6.78

Summary and Conclusions

CCPS has a significant impact within both the county and the state. The economic and employment impact created by the operational and capital spending alone is substantial. Every \$1.00 in operational monies spent by CCPS and retained in the county results in total spending locally of \$1.44. CCPS is a major employer in the county with a majority of its employees residing within the county. By providing additional incentives for employees residing outside of the county to reside in Carroll County, more of the impact from employee salaries and spending can be retained within the county.

In terms of capital expenditures, every \$1 in capital spending that retained in the county results in total spending locally of \$1.51. For every \$1 million in CCPS capital spending, 9.1 additional jobs are supported in the county. Every \$1 in capital spending that is spent

and retained in the state of Maryland results in total spending locally of \$1.79.

Beyond the economic and employment impacts generated through CCPS operations, its graduates generate many additional positive societal and economic benefits in the local economy. The value of a more educated population and trainable workforce manifests itself in many ways. The three main categories examined in this study include: the increased lifetime earning of graduates, the economic development impacts, and the reduction in public costs.

Current data indicates that high school graduates earn a higher annual income than non-graduates; college graduates earn an even higher annual income. The lifetime value of the incremental earnings for high school graduates is approximately \$92.39 million. The present value of the county income tax to be paid on these additional earnings is approximately \$2 million per graduating class. A significant portion of CCPS graduates intend to go on to college and meet the requirements to enter a four year in-state public school of higher education. If these students go on to successfully complete college, they will earn an estimated \$484.11 million additional in income over their lifetime. The present value of the county income tax to be paid on these additional earnings is approximately \$10.53 million per graduating class.

A trained and trainable workforce positively impacts the economic development of a region in many ways including:

- Quality-of-Life measures that push parents to use school quality as a residential location factor which adds a premium to the local property values;
- Quality-of-Life issues that are based on a “Sense of Well Being” for parents who believe high quality public education is essential to the success of their child’s transition from high school to higher education or the labor market;
- Property value enhancements attributable to the presence of good local public schools;
- Productivity enhancements in local businesses due to quality K–12 education;
- Business, economic, workforce, and community enhancements due to increases in the number of

post-secondary institution graduates in a jurisdiction due to quality K-12 education.

Of these benefits, the increased real property values and real property taxes are quantified in this study. The additional economic activity generated by CCPS graduates who work and spend in the county positively impacts property values and property tax revenues. Each graduating class is estimated to add nearly \$46 million in real property values and \$471,135 in real property tax revenues.

Lastly, a more educated population has been found to result in lower public costs including public healthcare, public crime costs, and welfare costs. For each graduating class, public cost savings are estimated as follows:

- \$85 million in future public healthcare cost savings
- \$156 million in future public crime cost savings
- \$6 million in future welfare cost savings

Although it can be argued that public school systems are a cost to the public, such expenses should more properly be thought of as an investment. In addition to the significant and widespread economic activity generated by the operations of CCPS, the benefits to the county are multiplied when also considering the impact of the educated population produced by the school system, and the added benefits of higher educational outcomes when they are attained. Based on these findings, it is important to note that, such benefits are directly linked to the number of graduates choosing to stay in the County or to return to the County after either further education or work experiences. When Carroll County's public school graduates leave the County and do not return, most of these benefits accrue to the jurisdictions where they choose to reside. These facts indicate the need for a concerted public-private effort to retain the graduates in Carroll County and encourage those who left to return.

Appendix A: Calculating the Additional Lifetime Earnings of Graduates of CCPS Compared to Non-Graduates

The present value of the incremental lifetime earnings of graduates as compared to non-graduates were calculated as follows. First the incremental annual income of \$1,893 was multiplied by the number of graduates in the given year.

Second, the present value of the total incremental income for the whole graduating class was calculated. The discount rate of 3.34% was utilized for each of the 47 years of the work life. The present value was calculated for each year’s incremental income as

$$= \text{total incremental income} / (1.0334^{\text{Number of years in the future that the income payment occurs}})$$

Lastly, the present values for each year were summed to obtain the present value of the entire stream of future cash flows. This is the value reported in Table 6.

Appendix B: Calculating the Impact of Improved High School Performance on the Lifetime Earnings of College Graduates

Table 10 provides the percent of students that meet the following criteria: 1) Voluntarily declare their intentions to go on to an a four year college upon graduation at the time of their exit survey,

2) Voluntarily declare their intentions to go on to an a four year college upon graduation at the time of their exit survey,

3) Have met the minimum graduation requirements established by the State for graduation from a Maryland public K-12 school system

Table 10. CCPS Graduating Seniors Planning to Attend College			
Year	Graduates	% of Graduates Planning to Attend a Four Year College	% of Graduates Planning to Attend a Two Year College
2013-2014	≥95%	53.9%	27.7%
2012-2013	≥95%	53.0%	29.6%
2011-2012	≥95%	48.2%	32.4%
2010-2011	≥95%	50.9%	29.1%
2009-2010	≥95%	53.3%	27.0%

To determine the portion of the incremental lifetime earning of college graduates that can be attributable to FCPS, the following formula was utilized:

$$PV = ((\%GTC \times \$5,690) + (\%GFC \times \$15,842))$$

%GTC= the percent graduates planning to attend a two year college

%GFC= the percent graduates planning to attend a four year college

#CRG= the number graduates in the academic year

\$5,690= the incremental annual earnings of two year college graduates (Associate’s Degree) in Carroll County compared to those with a high school degree

\$15,842= the incremental annual earnings of four year college graduates (Bachelor’s Degree) in Carroll County compared to those with a high school degree

PV= present value of the incremental future cash flows, calculated with a discount rate of 3.34% and a work life of 43 years (22 years old to 65 years old) beginning four years out from the year of high school graduation

Appendix C: Calculating the Impact of an Educated Population on Property Values and Property Taxes

To estimate the increase in the real property value attributable to the higher earning and spending of FCPS graduates, the number of graduating seniors was multiplied by the incremental annual earnings per student. This figure was then multiplied by the ratio of real property value to personal income (2.17).

of graduates X incremental annual earnings X real property to personal income ratio= additional real property value

The estimated real property value taxes were calculated by multiplying the tax rate of \$1.018 per \$100 in assessed value by the additional real property value calculated previously.

additional real property value X real property tax rate= additional real property taxes

Appendix D:

“PRE--K-12 Education in the U.S. Economy”

Summary and Excerpts from

“K–12 Education in the U.S. Economy”

A Monograph by Thomas L. Hungerford and Robert W. Wassmer (2004)

This appendix summarizes/excerpts a 2004 monograph titled “K–12 Education in the U.S. Economy: Its Impact on Economic Development, Earnings, and Housing Values” by Thomas L. Hungerford and Robert W. Wassmer. The complete text of the monograph can be found at: <http://www.nea.org/assets/docs/HE/economy.pdf>

Parents worry over the quality of the schools their children attend because a good primary and secondary education is essential to the success of their child’s transition from high school to higher education or the labor market.

Homeowners, even if they do not have children in public schools, are anxious about the quality of local public schools because they know the direct positive effect it has on the resale value of their property.

Finally, business owners recognize that a quality K–12 education makes the workers they employ more productive.

When faced with budget deficits, lobbyists claiming to represent the state’s business and economic interests have argued that revenue enhancement to balance a government budget is a less-preferred option than cutting state expenditures, including support for primary and secondary education. They cite the possible detrimental effects a tax increase would have on the state’s economic development.

The argument, which is theoretically correct, is that higher taxes will discourage businesses and entrepreneurs from locating in the state and, consequently, reduce the amount of income and employment generated there.

Often left out of this lobbying cry is the fact that a reduction in the quality of K–12 public education will also induce a decline in a state’s long-term economic vitality.

The question, then, is whether the negative economic effects of raising taxes to support quality K–12 public education are greater or less than the alternative of cutting statewide public support for primary and secondary education.

This monograph offers evidence on the economic benefits of a quality K–12 public education.

Overall, the authors conclude that if faced with the choice of (1) increasing revenue statewide to continue supporting the provision of quality public K–12 education or (2) cutting support statewide to public K–12 education to forestall a tax increase, a state’s long-term economic interests are better served by increasing revenue.

In support of this conclusion, the authors examine the evidence on the large spillover benefits of a quality public education beyond the direct benefit to those who receive it, the direct data-based evidence of the influence that various taxes and fees and K–12 education expenditures have on economic development, and the empirical evidence on how a quality public education influences an individual’s lifetime earnings and the value of homes in the school district where it is provided.

The provision of a quality K–12 public education plays a crucial role in the individual and economy-wide acquisition of “human capital.” The economic payoff to individuals of increased schooling is higher earnings throughout their lifetime—a market-based individual benefit.

In addition, a considerable number of benefits from a quality K–12 public education (the spillover effects) extend beyond individuals. Respected economists noted for their efforts to put a monetary value on some of education’s spillover effects argue that the value of these spillovers for individuals and the

economy is significant and that it may be as large as education's market-based individual benefits.

Economic development, as used in this report, is any dollar-based increase in economic activity within a state. Such increased economic activity can occur through two channels:

First, a given economy (with a fixed number of workers, land, raw materials, machinery, and other physical inputs) is able to produce a greater dollar value of output because of the increased productivity of one or more of the existing inputs.

Second, an economy produces a greater dollar value of total output by adding more inputs to its production processes. Improving the quality of a state's public K–12 education can result in greater economic development through both of these channels.

Improving public education costs money and often results in increasing taxes which depresses economic development.

The authors' review of the research indicates that in most circumstances the negative influence of cutting K–12 public education expenditure by an amount that forestalls a statewide revenue increase of an equivalent amount exerts a greater negative influence on the state's economic development than if the revenue increase were put in place to maintain educational expenditures.

The authors conclude that school resources can lead to improved student outcomes and higher-quality schools.

Additional funding for public primary and secondary schools, however, will not generate greater student achievement unless the funds are used wisely.

Furthermore, it must be recognized that other factors—such as student, parent, and neighborhood characteristics—also influence student outcomes and, hence, school quality.

Many of these factors are outside the control of teachers, school administrators, and school boards.

The preponderance of statistical evidence shows a positive correlation between the quality of local public K–12 education and the value of homes in that neighborhood.

This finding is important because it demonstrates yet another way that the provision of a quality elementary, middle, or high school education yields a tangible economic impact that would be lost with a decline in the quality of this service.

The empirical findings in this literature reinforce the notion that spending per student is not how parents identify a quality public K–12 education. But the findings presented here do not dismiss the possibility that higher spending is necessary for the provision of quality education.

Most states have had to deal with projected budget deficits for a number of years now. Many states have wisely addressed this revenue shortfall by avoiding significant decreases in public K–12 education spending that could compromise educational quality. Even so, the authors believe that pressure to deal with projected budget deficits through decreases in state expenditures, which could include K–12 education, will continue.

Furthermore, the pressure to cut taxes in good times could cause state and local politicians to question the merits of increasing or even maintaining primary and secondary education spending at current levels. The authors provide evidence that suggests that reduced public spending on primary and secondary education could have an array of consequences in several economic areas. Here are some examples of the type and magnitude of the effects, as derived from the studies reviewed:

- Economic development decline caused by a decrease in in-migration of potential laborers (short run), loss of productivity of future laborers (long run), or both. Cutting statewide public K–12 expenditure by \$1 per \$1,000 state's personal income would (1) reduce the state's personal income by about 0.3 percent in the short run and 3.2 percent in the long run; (2) reduce the state's manufacturing investment in the long run by 0.9 percent and manufacturing employment by 0.4 percent. Cutting statewide public K–12 education per student by \$1 would reduce small business starts by 0.4 percent in the long run. Cutting statewide public K–12 expenditure by one percentage point of the state's personal income would reduce the state's employment by 0.7 percent in the short run and by 1.4 percent in the long run.
- Reduction in a state's aggregate home values if a reduction in statewide public school spending yields a

decline in standardized public school test scores, if in the long run people leave or do not enter the state because of test-score declines. A 10 percent reduction

in various standardized test scores would yield between a 2 percent and a 10 percent reduction in aggregate home values in the long run.

- Reduction in a state's aggregate personal income, if a reduction in statewide public school spending yields a decline in "quality" of public education produced and a long-run decrease in earning potential of the state's residents. A 10 percent reduction in school expenditures could yield a 1 to 2 percent decrease in post-school annual earnings in the long run. A 10 percent increase in the student-teacher ratio would lead to a 1 to 2 percent decrease in high school graduation rates and to a decrease in standardized test scores.