

COUNTING DOLLARS AND CENTS:

The Economic Impact of a Statewide Education
Savings Account Program in Tennessee



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EXECUTIVE SUMMARY

The Volunteer State has a great opportunity to improve its economic conditions through implementing an Education Savings Account (ESA) program in 2019 that gives all Tennessee families access to a quality, customized education for their children. Using the most rigorous scientific evidence available on private school choice programs in the United States, we forecast the effects of a statewide ESA program on Tennessee society over the next two decades. Our analysis monetizes the expected societal benefits of such a program accrued through a reduction in future criminal activity, an increase in high school graduation rates, and lifetime earnings. Of course, each of these three outcomes could affect one another in theory (e.g. high school graduation could reduce criminal activity and increase lifetime earnings). Because these outcomes are related to one another, the economic benefits associated with each of them should be considered separately. The most conservative model suggests that a statewide ESA program in Tennessee would:

- Increase the number of high school graduates in the state by 13,480, leading to \$2.9 billion in economic benefits by 2038.
- Increase overall personal income in the state by \$683 million by 2038.
- Reduce the number of felons in the state by 15,451 and the number of misdemeanants by 21,380, producing societal benefits of \$685 million by 2038.

Our model assuming more robust rates of ESA program participation suggests that the program would:

- Increase the number of high school graduates in the state by 20,618, leading to \$4.5 billion in social benefits by 2038.
- Increase overall personal income in the state by over \$1 billion by 2038.
- Reduce the number of felons in the state by 24,730 and the number of misdemeanants by 34,219, producing societal benefits of \$1.1 billion by 2038.

Keywords: private school; school choice; education savings account; economic analysis

JEL Classifications: I28, I20

INTRODUCTION

Private school choice programs allow children to exit their residentially assigned public schools that are not working for them – for whatever reason – to attend private schools chosen by their families. The first private school voucher programs started in Maine and Vermont in the late 19th century, and 63 private school choice programs exist in the U.S. today.

Educational choice programs can improve education quality while reducing costs by introducing competitive pressures into the education system (Chubb & Moe, 1988; Chubb & Moe, 1990; Hoxby, 2003). After all, private schools must cater to the needs of individual students to attract customers; traditional public schools, on the other hand, exercise strong monopoly power because families are residentially assigned to them (Friedman, 1955; Friedman, 1997). In addition, public schools do not have strong financial incentives to do a good job. Indeed, if a traditional public school does a great job educating children in one year, they will still generally receive around the same amount of funding per child from the government the following year. And many public schools are given additional perverse financial incentives when they receive compensatory funding from the government for performing poorly. Moreover, because traditional public schools generally do not lose 100 percent of their per-pupil funding when children exit – while they lose all of the costs associated with educating those children – they financially benefit when their customers leave (DeAngelis & Trivitt, 2016; Scafidi, 2012).

If a family decides that the traditional public school is not working for their child, they only have three options: (1) they can pay for a private school out of pocket, in addition to what they continue to pay for the public school in property taxes, (2) they can move to a house that is residentially assigned to another public school that also holds a geographic monopoly, or (3) they can keep their child in the “free” public school even though it isn’t meeting their child’s needs. Because options one and two are extremely costly, most families – especially the least advantaged – are stuck with option three.

Education Savings Accounts (ESAs) introduce new competition into the market for education services. However, ESAs are an improvement on private school vouchers because they allow families to fully customize the educations for each of their children individually. ESAs could further improve education quality because they provide better matches between children and education providers (DeAngelis & Holmes Erickson, 2018). When a residentially assigned school is not working for a family, a portion of the dollars already spent to educate that child are placed into a savings account. The parent can then use those funds to pay for private school tuition and fees as well as other education expenses, such as private tutoring, textbooks, online courses, and special needs therapies. Funds can be rolled over from year to year and can be used for college if any money is left over after the child graduates high school. In this sense, ESAs grant families true education choice, while private school vouchers merely give families school choice.

Six ESA programs currently exist in the U.S. The Volunteer State enacted the nation's fourth ESA program – the Individualized Education Account Program – in 2015. The program is available to students enrolled in kindergarten through 12th grade that have an Individualized Education Plan (IEP) and are diagnosed with autism, deaf-blindness, a hearing impairment, a traumatic brain injury, developmental delay, visual impairment, or multiple disabilities. In order to qualify, students must also have been enrolled in a public school in Tennessee during the previous school year, be attending a public school in Tennessee for the first time, or have received an Individual Education Account (IEA) in the previous school year. Only two percent of students in the state are eligible for this program, and only 87 students participated in the program in the 2017-18 school year (EdChoice, 2018; TN Code § 49-10-1401, 2017). What would happen if Tennessee expanded access to education freedom for all school-aged children in the state starting in 2019? What effects would a statewide ESA program have on society overall?

Using the strongest existing scientific evidence linking educational choice to crime, graduation, and personal income, we estimate the effects of a broad-based, statewide ESA program on the Tennessee economy over the next two decades. Our most conservative estimates suggest that expanding access to choice for all students in the state would produce billions of dollars in social benefits for the citizens of Tennessee. In particular, a statewide ESA program in Tennessee is expected to produce \$850 million in social benefits from increasing graduation rates, \$199 million from increasing math achievement, and \$150 million from reducing crime by 2028. These social benefits are expected to reach \$2.9 billion from increasing graduation rates, \$683 million from improving math achievement, and \$685 million from reducing crime by 2038.

LITERATURE REVIEW

Economic Impacts

Only three studies have estimated the economic impacts of universal educational choice programs in the U.S. Flanders and DeAngelis (2018; forthcoming) estimate that students using the Milwaukee Parental Choice Program will generate \$473 million in additional economic benefits associated with higher graduation rates and \$26 million associated with fewer felonies and misdemeanors relative to their peers in public schools between 2016 and 2035. Flanders and DeAngelis (2018) estimated that the state of Mississippi would have generated an additional \$1 billion in personal income and reduced crime costs by \$238 million by 2036 if they had launched a universal ESA program in 2018. DeAngelis and Wolf (2016b) estimated that Texas would have generated an additional \$194 million in social benefits associated with crime reduction by 2035 if they had launched an ESA program benefitting all families in the state in 2016. The current study uses methodology that is similar to these three previous reports.

Four other analyses have examined the cost-effectiveness of public schools of choice relative

to traditional public schools. All three studies conclude that charter schools produce large benefits to taxpayers overall. Batdorff et al. (2014) found that public charter schools across the United States are about 40 percent more cost-effective than nearby traditional public schools. Flanders (2017) found that charter schools in Milwaukee with greater independence from the district achieve significantly higher proficiency gains on state exams per tax dollar spent. Similarly, DeAngelis et al. (2018) found that public charter schools across eight U.S. locations were about 35 percent more cost effective than nearby traditional public schools. Finally, DeAngelis and DeGrow (2018) found that charter schools across the state of Michigan were 32 percent more cost effective than traditional public schools even after controlling for sector differences such as the percent of students with special needs, percent of economically disadvantaged students, percent of English language learner students, and percent of minority students.

Graduation, Crime, and Personal Income

Two studies that are either experimental or quasi-experimental link private school choice programs to high school graduation in the United States. The more rigorous of the two evaluations – using random-assignment methodology – finds that the D.C. voucher program increases the likelihood that choice students graduate from high school by 21 percentage points (Wolf et al., 2013). The other evaluation – using a rigorous quasi-experimental matching design – finds that the Milwaukee voucher program increases the likelihood that choice students graduate from high school by four percentage points (Cowen et al., 2013). Our study relies on the far smaller estimate of the two – the four-percentage point increase observed by Cowen et al. (2013) – to provide a lower bound of the expected effect of a statewide ESA program on high school graduation rates.

Only one study links educational choice to criminal activity. DeAngelis and Wolf (2016a) used a sophisticated matching procedure that is known to replicate (Bifulco, 2012) experimental results when an experimental setting is not available. They found that children that who persisted for at least four years in the Milwaukee Parental Choice Program and completed 12th grade have a 3.44-percentage point lower likelihood of committing a felony and a 4.76-percentage point lower likelihood of committing a misdemeanor due to their improved education. Two other studies have examined the relationship between public charter school choice and crime, finding similarly large reductions in the likelihood of incarceration for choice students (Deming, 2011; Dobbie & Fryer, 2015). Indeed, Dobbie and Fryer (2015) found that the charter schools in the Harlem Children’s Zone reduced the likelihood of incarceration by 4.4 percentage points (a 100 percent reduction) for male students. We use the estimates from DeAngelis and Wolf (2016a) in our forecast for Tennessee and weight them by the difference in felony incidence across the two locations.

Stanford economist Eric Hanushek (2011) observed that a one standard deviation increase in student achievement is associated with a 13 percent increase in lifetime earnings. We combine the Hanushek (2011) estimate with the meta-analysis of all of the experimental studies linking educational choice programs to student test scores in the United States

(Shakeel, Anderson, & Wolf, 2016). In particular, our models assume that a statewide ESA program in Tennessee would have around a seven percent standard deviation increase on student math achievement – as observed in the Shakeel, Anderson, and Wolf (2016) meta-analysis. Of course, effects on standardized test scores do not always predict effects on long-term outcomes such as high school graduation, college enrollment, or lifetime earnings (Beuermann & Jackson, 2018; DeAngelis, 2018b; Hitt, McShane, & Wolf, 2018). Because test scores are not always strong proxies for long-term outcomes, our estimated effects on lifetime earnings should be considered with caution.

DATA AND METHODS

Graduation and Crime

We estimate the economic benefits associated with the effects of a statewide educational choice program on adult crime and high school graduation using the following equation:

$$Benefit_t = N_t * C_{2018} * R_t$$

Where the outcome variable of interest, *Benefit*, is the forecasted net economic benefit produced by such a choice program relative to a system of traditional public schools by year *t*. We produce estimates for the program's economic impact based on its expected reduction in felonies and misdemeanors and its expected increase in high school graduation rates. Because receiving a high school diploma can reduce the likelihood of committing crimes, and because juvenile crime can reduce the likelihood that students finish high school, we report the economic benefits of reducing crime and increasing graduation rates separately. Combining the economic benefits in each area would potentially inflate the overall economic benefit by double and triple counting portions of it.

The total number of students that received access to the school choice program and exited high school by year *t* is represented by *N*. We use data from Table 203.20 in the Digest of Education Statistics to estimate the total number of Tennessee students for 2019, the initial year of the analysis.¹ Our forecast assumes that the total number of students in Tennessee will increase by 2.2 percent per year – the historical growth rate of Tennessee students from 2008 to 2013 – as shown in column 15 of Table 203.20. Because the Digest of Education Statistics projects that the actual student growth rate between 2014 and 2025 will be 5.8 percent – as shown in the last column of Table 203.20 – our estimates of economic impacts are considered conservative. Our analyses assume that the total number of students is evenly distributed across the thirteen grade levels from kindergarten to 12th grade. Our base model assumes that five percent of the eligible public school students in Tennessee will participate in the first year and 10 percent will participate in the second year. We assume conservative one percent annual growth rate in participation for each school year after the second. As noted by DeAngelis and Wolf (2016b), these growth rates

1 Table 203.20. Enrollment in public elementary and secondary schools, by region, state, and jurisdiction: Selected years, fall 1990 through fall 2025. Digest of Education Statistics. Retrieved from https://nces.ed.gov/programs/digest/d15/tables/dt15_203.20.asp?current=yes.

mirror those found in the D.C. voucher program (Wolf et al., 2010) and the Milwaukee Parental Choice Program (Wolf, 2012). Because initial participation rates can vary widely across programs, we also estimate a model with more robust program participation. The second model assumes that 10 percent of the eligible public school students in Tennessee will participate in the first year and 20 percent will participate in the second year with a steady growth rate of one percent in subsequent years.

The estimated percentage point change in student outcomes (adult crime and high school graduation) resulting from a statewide program is represented by R . We use estimates from DeAngelis and Wolf (2016a) for expected reductions in felonies and misdemeanors. DeAngelis and Wolf (2016a) found that the Milwaukee Parental Choice Program reduced the likelihood that students would commit felonies as adults by 3.44 percentage points and misdemeanors by 4.76 percentage points. Because the incidence rate of felonies is about 8.26 percent in Tennessee (Uggen, Larson, & Shannon, 2016), and only 4.09 percent in the Milwaukee sample examined by DeAngelis and Wolf (2016a), we weight the estimated effects accordingly. In other words, the estimated reduction in felonies in Tennessee is about 6.95 percentage points ($3.44 * (8.26 / 4.09)$) and the estimated reduction in misdemeanors in Tennessee is about 9.61 percentage points ($4.76 * (8.26/4.09)$). We use estimates from Cowen et al. (2013) for expected increases in high school graduation rates. Cowen et al. (2013) found that the Milwaukee Parental Choice Program increased the likelihood that voucher students graduated high school by four percentage points.

The reduced social costs (in constant 2018 dollars) associated with fewer criminals and high school drop outs is represented by C . For the societal costs of criminal activity, we use recent estimates produced by McCollister, French, and Fang (2010) for felonies and Aos et al. (2001) for misdemeanors. McCollister, French, and Fang (2010) gathered data from the 2005 Justice Expenditure and Employment report by the Bureau of Justice Statistics and estimated mortality costs of crimes by gathering data on lifetime earnings and employment. McCollister, French, and Fang (2010) also used work by Cohen (1988) which provided cost estimates of jury compensation. The authors combine data from these sources and then estimate average costs of various types of crimes to society. In order to provide conservative estimates, our analysis excludes the two most costly types of crime: rape and murder. The Aos et al. (2001) estimates we use for misdemeanors only include the costs of police work and court administration, so these cost reductions could be thought of as a lower bound estimate of the true social benefit associated with a reduction in misdemeanors.

The estimated economic benefit is calculated by taking the product of N , C , and R by forecast year t ; that is, the benefit is calculated by monetizing the expected reduction in criminals and increase in high school graduates by the forecasted year.

Personal Income

We draw from research by Stanford economist Eric Hanushek linking student achievement to lifetime earnings. Hanushek (2011) found that a one standard deviation increase in

standardized test scores is associated with a 13 percent increase in lifetime earnings. We combine the Hanushek estimate with the meta-analysis of 19 random-assignment studies by Shakeel, Anderson, and Wolf (2016) finding that the scientific evidence overall shows that educational choice programs in the United States improve student math achievement by 7 percent of a standard deviation. Since 70 percent of learning is retained from one year to the next over the 13 years of K-12 schooling, we can forecast the impact of a statewide ESA program in Tennessee on lifetime earnings by the following equations:

$$\text{Avg Lifetime Earnings} * [1 + (0.07 \text{ SD}) * (0.13/\text{SD}) * (0.70)]^{13} = \text{ESA Lifetime Earnings} \quad (1)$$

$$\text{ESA Lifetime Earnings} - \text{Avg Lifetime Earnings} = \text{ESA Gain in Lifetime Earnings} \quad (2)$$

In calculating the net present value of lifetime earnings, we assume that each student will work for 46 years, or from the age of 25 to the age of 70. Using a discount rate of three percent, and the average wage in Tennessee in 2017 (\$43,550) from the U.S. Department of Labor Bureau of Labor Statistics,² the net present value of the average lifetime earnings in Tennessee is \$1,083,666. Because Tennessee does not have a near-universal educational choice program today, this is the best approximation of the net present value of lifetime earnings that results from 13 years of education received from the traditional public-school system in the state. This methodology is consistent with the previous literature (DeAngelis, 2018a; DeAngelis et al., 2018; DeAngelis & DeGrow, 2018; Flanders & DeAngelis, 2018; Wolf et al., 2014).

Plugging this information into equation one yields an expected net present value of lifetime earnings for ESA students to be \$1,176,916:

$$\$1,083,666 * [1 + (0.07 \text{ SD}) * (0.13/\text{SD}) * (0.70)]^{13} = \mathbf{\$1,176,916} \quad (1)$$

Plugging this into equation two gives us a gain in lifetime earnings of \$93,250 per child participating in an ESA program in Tennessee:

$$\$1,176,916 - \$1,083,666 = \mathbf{\$93,250} \quad (2)$$

Assuming that this gain in lifetime earnings is evenly distributed across students' 46 years of employment, we estimate that the ESA produces social benefits of around \$2,027 per year (\$93,250 / 46) per participating student. Our models use this estimate when forecasting yearly economic benefits associated with higher personal income.

RESULTS

Graduation Increase

Based on a combination of the estimates of the impact of the Milwaukee Parental Choice

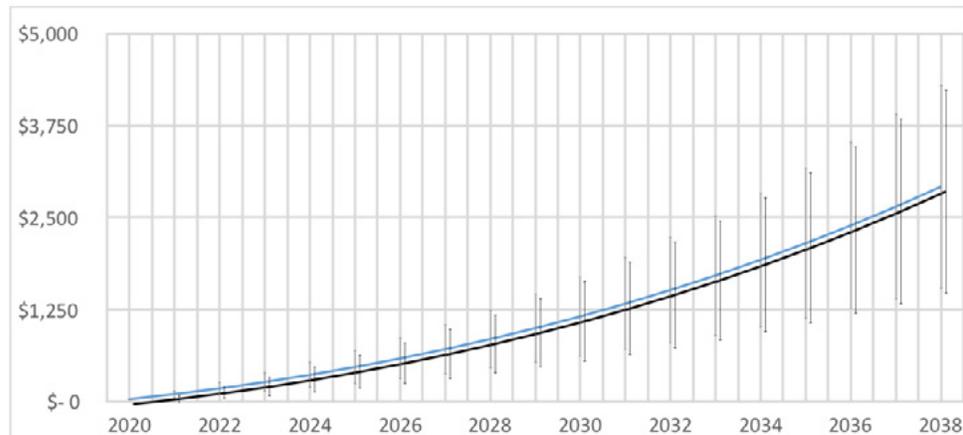
² May 2017 State Occupational Employment and Wage Estimates Tennessee. Occupational Employment Statistics. Bureau of Labor Statistics. United States Department of Labor. Retrieved from https://www.bls.gov/oes/current/oes_tn.htm

Program on graduation rates in Milwaukee (Cowen et al., 2013), combined with the projections of Levin (2009) on the effect of high school graduation on economic benefits, we make projections of the potential benefits of an ESA program for the state of Tennessee. The results reported in Table 1 below are the forecasted effects of a universal ESA on high school graduation rates. Figure 1 below shows the 95 percent confidence interval of these estimated benefits for each year. Under this projection, we expect Tennessee to experience an increase of 13,480 in the number of students graduating from high school in the state over the next two decades. This increase in the likelihood high school graduation in Tennessee is expected to result in an economic benefit of about \$2.9 billion dollars over the lifetime of these students. Alternative estimates from more robust program participation can be found in the Appendix.

Table 1: Graduation Increase from a Universal ESA

Variable	2019-2023	2019-2028	2019-2038
Total Completed	30,965	98,152	337,003
Change in Number of Graduates	1,238	3,926	13,480
Economic Benefits (Millions of 2018 Dollars)	\$268.107	\$849.854	\$2,917.950

Figure 1: Economic Benefits from Increased Graduation Rates



Crime Reduction

We combine the expected effects of school choice on crime from DeAngelis and Wolf (2016a) with social cost estimates produced by McCollister, French, and Fang (2010) for felonies and Aos et al. (2001) for misdemeanors. As shown in Table 2 below, our base model suggests that Tennessee would experience 272 fewer felons and 377 fewer misdemeanants

on the streets by 2023, leading to social cost reductions of about \$10.8 million over the same period. Our estimates suggest these social benefits would increase to around \$150 million by 2028 and \$685 million by 2038. Ninety-five percent confidence intervals of these estimates – based on standard errors reported in DeAngelis and Wolf (2016a) – can be found in Figures 2 and 3 below, and alternative estimates based on more robust program participation can be found in the Appendix.

Table 2: Felony and Misdemeanor Reductions from a Universal ESA

Variable	2019-2023	2019-2028	2019-2038
Total Completed (Four Years)	3,918	42,077	222,401
Change in Number of Felonies	272	3,773	17,262
Economic Benefits from Reduced Felonies (Millions of 2018 Dollars)	10.084	139.786	639.541
Change in Number of Misdemeanors	377	5,221	23,885
Economic Benefits (Millions of 2018 Dollars)	0.714	9.893	45.263
Total Economic Benefits (Millions of 2018 Dollars)	10.798	149.679	684.804

Figure 2: Reduction in Felony Costs to Society from Full ESA Participation by Year

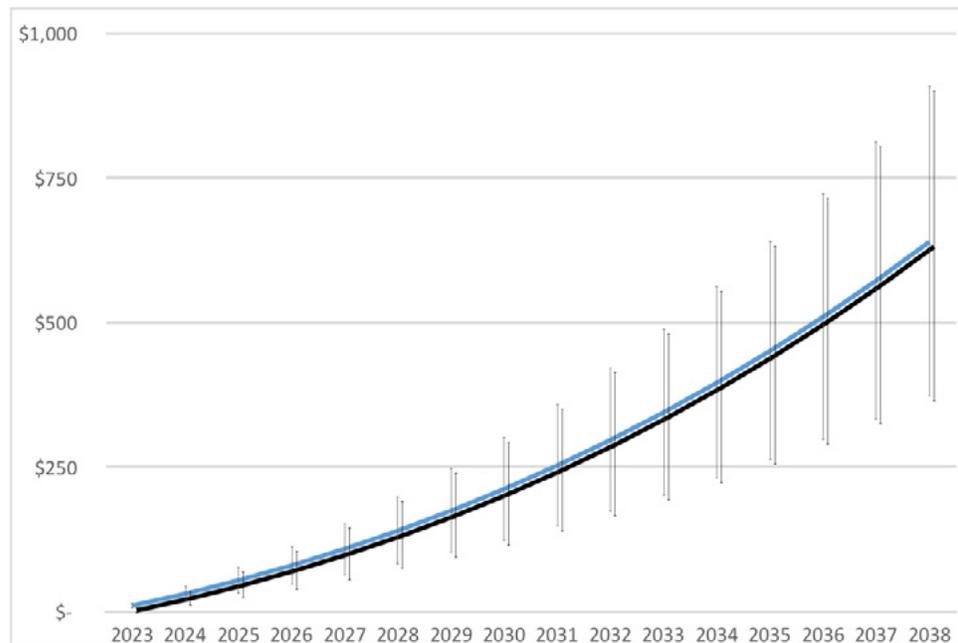
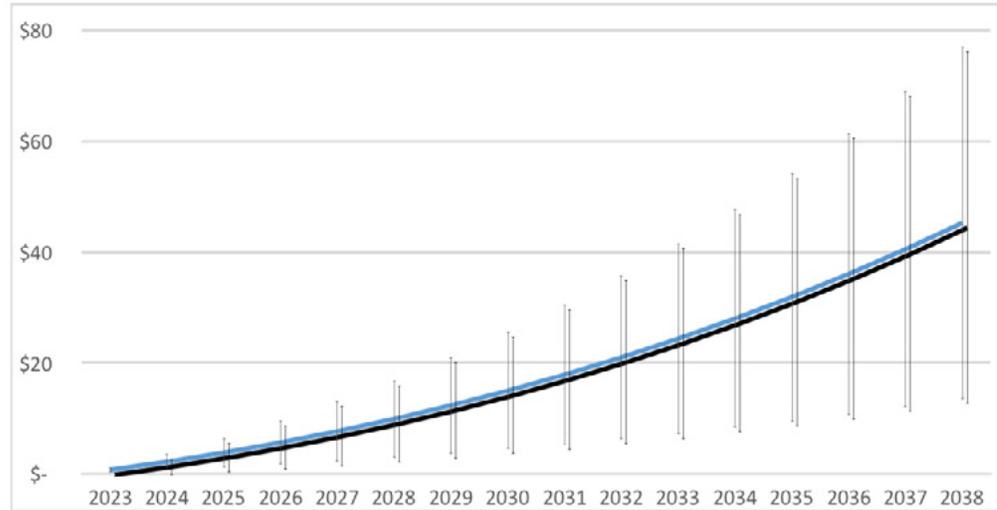


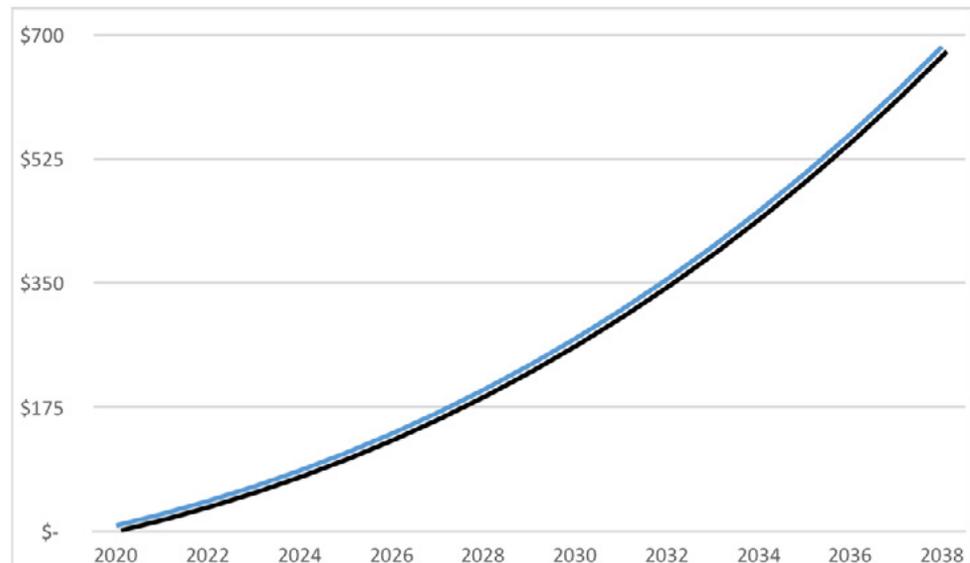
Figure 3: Reduction in Misdemeanor Costs to Society from Full ESA Participation by Year



Personal Income

Our personal income models combine the estimated effects of educational choice on student math achievement by Skakeel, Anderson, and Wolf (2016) with Hanushek’s (2011) estimates of the relationship between student achievement and lifetime earnings. As shown in Figure 4 below, our results suggest that a universal ESA in Tennessee would lead to around \$63 million in additional lifetime earnings for students using the program by 2023. These benefits are expected to expand to \$199 million by 2028 and \$683 million by 2038. Alternative results – based on more robust program participation in initial years – can be found in the Appendix.

Figure 4: Projected Increase in Total Personal Income by Year



CONSERVATIVE ESTIMATES

Of course, studies that rely on assumptions about the future have limitations. We do not know for certain that the social benefits found from other school choice programs in the United States will materialize in the same way in Tennessee. However, we have taken a number of steps to make our assumptions conservative as possible in order to produce lower-bound estimates of the true effects a statewide ESA program would have in Tennessee over the next two decades.

Because DeAngelis and Wolf (2016a) first started observing criminal activity outcomes when children were 22 years old (four years after high school) we assume no crime reduction benefits accrue for the first four years of the ESA program. We also rely on the smaller estimates for crime reduction found by DeAngelis and Wolf (2016), while an experimental evaluation by Dobbie and Fryer (2015) found that winning the lottery to attend a school of choice completely eliminated the incidence of incarceration for males (a 100 percent reduction). Our estimations of the costs of crimes exclude murders and rapes – the two crimes with the highest societal costs estimates by McCollister, French, and Fang (2010). In addition, our estimates for the costs of misdemeanors – from Aos et al. (2018) – only include the costs of police work and court administration.

Although the last column of Digest of Education Statistics Table 203.20 projects that student enrollment growth will be 5.8 percent between 2014 and 2025 in Tennessee, our models assume that future student enrollment growth rate will mirror the 2.2 percent growth rate observed in the state between 2008 and 2013. We also use the lowest effect available from the evidence linking school choice to high school graduation (Cowen et al., 2013) – four percent – even though the more rigorous gold-standard evaluation on the subject found a much larger increase of 21 percentage points (Wolf et al., 2013).

We exclude other social benefits that are difficult to monetize without more information. The preponderance of the evidence suggests that choice also: (1) increases racial integration by allowing children to escape racially segregated neighborhood schools (Forster, 2013; Swanson, 2017), (2) improves civic outcomes such as charitable activity, volunteerism, and political knowledge (DeAngelis, 2017; Wolf, 2007), (3) saves taxpayer money overall (Forster, 2013; Lueken, 2018a; Lueken, 2018b; Trivitt & DeAngelis, 2016; Trivitt & DeAngelis, 2017), and leads to greater school safety (Dynarski et al., 2018; Howell & Peterson, 2006; Shakeel & DeAngelis, 2018; Witte et al., 2008; Wolf et al., 2013).

DISCUSSION

This report highlights the substantial economic benefits that the state of Tennessee could realize through the implementation of a statewide ESA. Over the next two decades, a statewide ESA is expected to lead to economic benefits in excess of \$2.9 billion through improvements in graduation rates, \$613 million through reductions in felony and

misdemeanor commission, and \$683 million from additional personal income. Of course, each of these three outcomes could affect one another, in theory. Because these outcomes are related to one another, the economic benefits associated with each of them should be considered separately. These numbers represent expected additional dollars in the pockets of Tennesseans as well as additional taxpayer revenue for the state itself that could be used for other meaningful reforms. But even more importantly, the numbers serve as stand-ins for the meaningful improvements to quality of life brought about by a better education. For policymakers, this study suggests that the implementation of a universal or statewide ESA is not only the right one when one considers the tangible academic benefits that accrue to choice participants, but also from the perspective of continuing to expand Tennessee's position as an economic engine of the southeast and the nation as a whole.

APPENDIX

Table A1: Graduation Increase from Universal ESA (Robust Model)

Variable	2019-2023	2019-2028	2019-2038
Total Completed	59,438	171,288	515,455
Change in Number of Graduates	2,378	6,852	20,618
Economic Benefits (Millions of 2018 Dollars)	\$514.64	\$1,483.10	\$4,463.08

Figure A1: Economic Benefits from Increased Graduation Rates (Robust Model)

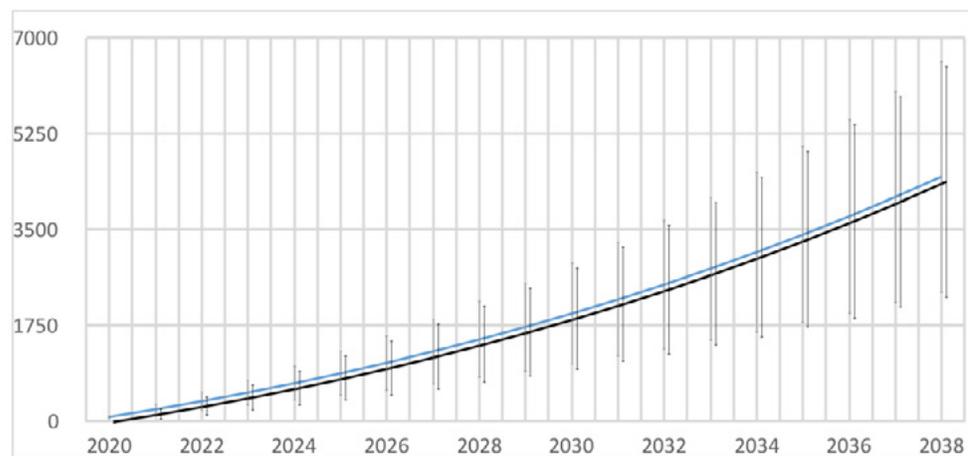


Table A2: Felony and Misdemeanor Reductions from a Universal ESA (Robust Model)

Variable	2019-2023	2019-2028	2019-2038
Total Completed	7,835	100,065	392,883
Change in Number of Felonies	544	6,952	27,295
Economic Benefits (Millions of 2018 Dollars)	20.168	257.564	1,011.268
Change in Number of Misdemeanors	753	9,619	37,768
Economic Benefits (Millions of 2018 Dollars)	1.427	18.229	71.571
Total Economic Benefits (Millions of 2018 Dollars)	21.595	275.793	1,082.839

Figure A2: Reduction in Felony Costs to Society from Full ESA Participation by Year (Robust Model)

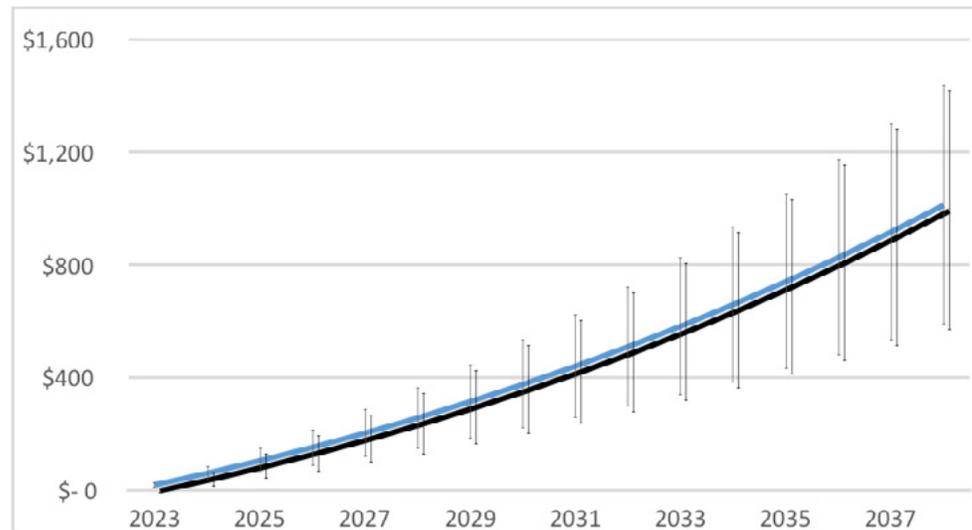


Figure A3: Reduction in Misdemeanor Costs to Society from Full ESA Participation by Year (Robust Model)

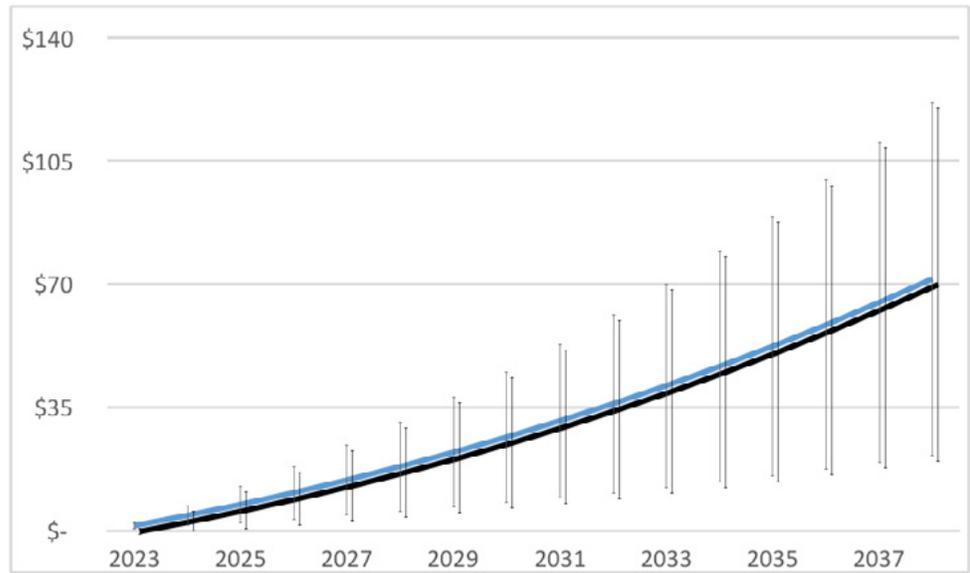
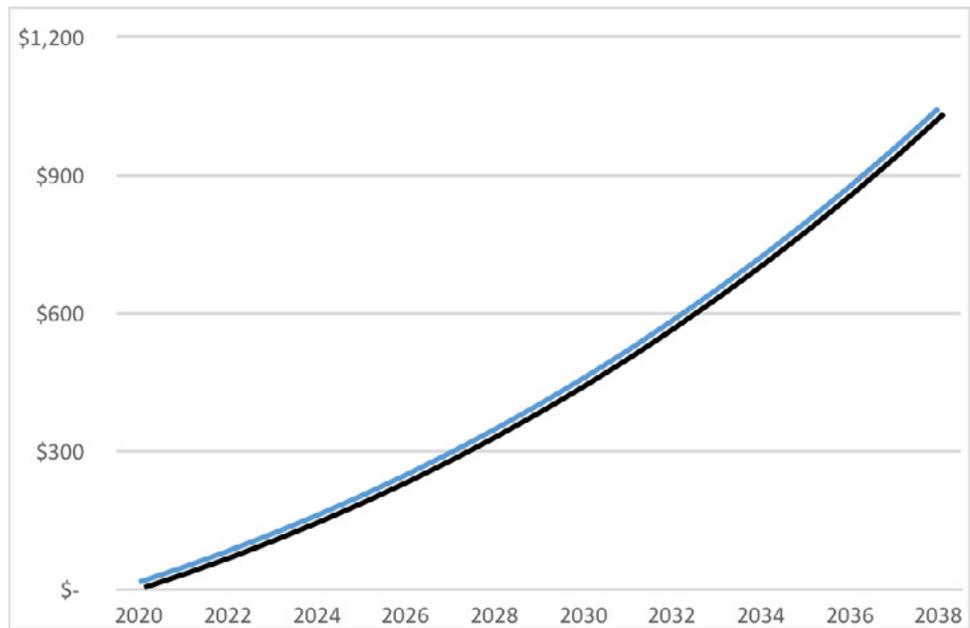


Figure A4: Projected Increase in Total Personal Income by Year (Robust Model)



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