INCREASING PUBLIC EDUCATION FUNDING IS CRITICAL TO GROWING ARIZONA'S ECONOMY

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I. Executive Summary

Over the past ten years, Arizona’s policymakers have treated public school funding as a cost that needs to be contained, rather than an asset that needs to be maximized. This approach has led to Arizona being one of the poorest performing states when it comes to primary and secondary education.¹

Arizona’s residents understand the value of a strong public-school system. Public polls have shown Arizona voters want more funding for public education.² And thanks to a teacher-led effort in the spring of 2018, Arizona’s policymakers are beginning to listen to voters. However, many elected officials still view teachers and schools as expenses.

This view is evident in the cuts to public education over the past 10 years. Data for Arizona between 2000 and 2018 shows how troubling the state’s policy on education funding has been. Since 2009:

- Teacher salaries have decreased at a rate of 3.5 percent per year.
- The number of teachers in the state has decreased at an annual rate of 1.5 percent.
- Arizona’s student-teacher ratio has increased at a rate of 1.7 percent annually.
- Total per pupil spending and per pupil spending on instruction are down over 1 percent per year.
- State funding of public education has decreased at a rate of almost 2.5 percent per year.
- On an inflation adjusted basis, total spending on instruction has decreased at a rate of over 2 percent annually.

Many of these cuts were justified to the public as responses to the Great Recession. However, data for the same period clearly shows Arizona’s economy was already in a post-recession growth path when the public education cuts occurred. Consider that since 2009:

- Arizona’s Real GDP grew at an annual rate of 2.8 percent.
- Real per capita income in the state grew by 1.4 percent per year. Between 2009 and 2018, real per capita income grew over 13 percent.
- Employment in Arizona grew at a rate of 1.8 percent per year.
- Average annual earnings in the state grew over 3 percent per year.

In other words, Arizona’s economy was already growing, yet state lawmakers continued to cut away at funding for public-school teachers and students as if the state was still in a recession.

Furthermore, in 2011, Arizona’s legislature enacted corporate tax cuts that further reduced the amounts available for investment in public education. These cuts reduced state revenues available for public education by hundreds of millions of dollars every year. By reducing spending on public-schools, Arizona elected officials were also reducing Arizona’s economic potential.

Recent economic research has unequivocally demonstrated the economic benefits from increased spending on public schools. We use the findings from these studies to show the potential impact to Arizona’s economy from restoring the $1.9 billion in funding cuts to public schools since 2009. ³

For example:

- In the long-run Arizona’s productivity could potentially grow between 1.8 percent per year and almost 4 percent per year.
- These productivity gains translate into gains to Arizona’s Gross Domestic Product.
- Arizona’s standard of living would increase.
- Better school funding would result in less Arizonans below the poverty line.
- Each additional dollar increase in public-school funding, could increase Arizona’s economy by a factor of between 1.5 and 3.

In other words, investments in public education pay off for Arizona in teacher retention, current and future earnings, and worker productivity. The sooner we restore funding to our public schools, the sooner our economy grows to its full potential.

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³ We focus on direct impacts from restoring public school funding. We do not include any induced effects from Arizona’s residents spending the direct economic gains. We also focus only on increasing public schools’ operational budgets, not capital budgets. Additional expenditures on capital budgets would also have additional benefits from direct and induced spending, and from employment gains. In other words, our assessment of the economic benefits from increased public-school spending are biased downward, suggesting much larger potential total economic benefits.
II. Introduction

In March of 2018, a small group of teachers came together on social media to address the declining state of public education in Arizona. That group quickly grew into a 30,000 plus teacher movement, Arizona Educations United, fighting for better teacher pay and the restoration of funding to public education in the state.\(^4\)

After a six-day statewide teacher walkout, the Governor and the Legislature approved a funding package that was less than adequate. This package included a 20 percent pay increase to teachers (spread out over multiple years) and partially restored $400 million in education spending that was previously cut.\(^5\) Business leaders, education advocates, and most voters in the state agreed this additional funding was not enough.\(^6\) By some estimates, it will take four times the $400 million increase just to restore public education funding in Arizona to the level it was a decade ago.\(^7\)

Adequately funding public education is not only the right thing to do for our children, but also the right thing to do for our economy. This policy report outlines the benefits to our state economy from having robust funding of our public education system and will present estimates of these benefits. The more individuals realize the significant positive impact to our economy from investing in public education, the more they will demand their elected officials to do the right thing now and in the future for public education in Arizona.

The paper will first lay out the current state of public education in Arizona\(^8\), including looking at the recent historic trend in sources and uses of public education funds. It will then look at the economic foundations of investing in public education. Lastly, it will use these foundations to quantify the potential benefits to Arizona’s economy of adequately funding public education in the state.


\(^8\) We define public education as K-12 school districts. We include in our definition charter schools whose charters are held directly by a government or a government agency. We do not include charter schools whose charters are controlled by nongovernment entities.
III. The Current State of Public Education in Arizona

i. Enrollment

There were approximately 918,000 students in Arizona’s K-12 public schools in 2018. Figure 1 shows enrollment in Arizona’s public schools from 2000 to 2018. As the figure shows, enrollment has been essentially steady in the past six years, before declining in the last two years. However, enrollment in 2018 was about 7 percent lower than it was a decade before, when enrollment was at its highest level over this period.

![Arizona Public School Enrollment](image)

*Figure 1 Enrollment in Arizona's Public Schools*

The lower enrollment after 2006 is partly the result of the Great Recession of 2007-2009. Arizona was one of the states most adversely impacted by the recession, with foreclosures rates twice the national average. Many families who lost their homes to foreclosure moved away from the state, resulting in lower enrollment in Arizona’s public schools.

In addition to the impact from the Great Recession, enrollment in Arizona public schools also declined due to anti-immigration policies, like SB1070, enacted in 2010 by Arizona governor Jan Brewer and the state legislature. Notwithstanding this reduction in public school enrollment, over the 18-year period shown in Figure 1, enrollment in Arizona public schools grew at an annual rate of 0.4%.

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ii. Teachers

Figure 2 shows the number of teachers in Arizona’s public schools since 2000. In 2018, there were roughly 48,000 public school teachers. This number is 12.5 percent lower than the nearly 55,000 teachers in 2009.

The decline in public school teachers is the result of several factors, including retirement of older teachers, burnout from increased workload, and more importantly, teacher frustration with low wages.¹¹

![Figure 2 Number of Public School Teachers in Arizona](image)

According to data from the Arizona Department of Education, one out of five teachers hired between 2013 and 2015 left the profession after only one year.¹² And, according to Federal data, each year, one quarter of all Arizona teachers either move schools or leave the profession.¹³ Arizona’s teacher turnover rate of 24 percent is the highest in the country, more than three times greater than the state with the lowest turnover rate.¹⁴

Between 2009 and 2018, the number of teachers in Arizona’s public schools decreased at an annual rate of 1.5 percent, over twice the rate of decrease in enrollment during the same period. This has resulted in much higher student to teacher ratios in Arizona’s public schools since 2009.

¹⁴ Ibid.
Figure 3 shows Arizona had a student-teacher ratio of 23.2 in 2018, about 45 percent higher than the national student-teacher ratio. Since 2009, Arizona’s student-teacher ratio has increased at a 1.7 percent annual growth rate, almost 3.5 times the growth in the national student-teacher ratio over the same period.

Research shows the number of students in a class has a real impact on education outcomes. Over 20 years ago, the Tennessee’s STAR experiment led to multiple research studies demonstrating significant academic gains for K-3 grade students in smaller size classes.\(^{15}\) For example, students who start Kindergarten in classrooms with student-teacher ratios between 13-17 are two months ahead academically by the end of second grade, than their counterparts who began Kindergarten in classrooms with student-teacher ratios between 22-25.\(^{16}\)

Other studies have shown smaller class sizes benefit older students as well, including increasing the probability of graduating from high school. Furthermore, the benefits from smaller class sizes are greater for minorities and low-income students.\(^{17}\)


\(^{16}\) Ibid.

\(^{17}\) Ibid.
iii. Sources and Uses of Public Education Funds

Public education in Arizona is financed by federal, state, and local funds. Figure 4 shows these sources of revenue since 2001. In 2018, these funds totaled almost $8.5 billion in real terms. Federal funds contributed about 13 percent, state funds contributed about 40 percent, and local funds contributed about 47 percent.

Until 2008, state revenues made up almost half of all public education funding. Since then, budget cuts by the state legislature have significantly reduced state funding of public education. Because of these state funding cuts, local revenues are now the largest funding source of public education in Arizona.

![Figure 4 Sources of Revenue for Arizona's Public Schools](image)

State revenues for public education grew at an annual rate of almost 2 percent, from 2001 to 2008. But, between 2009 and 2018, state funding decreased at a 2.4 percent annual rate.

Adjusted for inflation, state public school revenues in 2018 were over 30 percent lower (over $800 million) than they were in 2008. Figure 5 shows state funding significantly dropped after 2009. Had state funding continued to grow at the annual 2 percent rate it was growing prior to 2009, state revenues would have been 49 percent higher in 2018. This means almost $1.9 billion in state funding needs to be restored to public education in Arizona.

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18 Our discussion of public education’s sources and uses of funds only refers to the operational budget of public schools; that is, it does not include capital expenditures which are primarily financed through debt.


20 This estimate is consistent in magnitude with other studies showing the amount of state funding that needs to be restored to public schools in Arizona. See, Dave Wells, “A Fiscal Analysis of Proposition 123 and Arizona’s Underinvestment in K-12 Education:
Figure 5 State Revenues for Public Education

Figure 6 shows how public schools in Arizona spend their funds between instruction, support services, and other spending. In 2018, Arizona’s public schools were spending significantly less in instruction than they did a decade ago. Spending on support services was slightly lower, and other spending was roughly the same, as 10 years before.

Instruction covers regular, special, and vocational programs offered in both the regular school year and summer school. Support services spending includes general administration, instructional support staff, operation and maintenance, pupil support, school administration, and pupil transportation services. Other spending includes food services, community services, enterprise operations, and adult education expenditures.


21 Instruction covers regular, special, and vocational programs offered in both the regular school year and summer school. Support services spending includes general administration, instructional support staff, operation and maintenance, pupil support, school administration, and pupil transportation services. Other spending includes food services, community services, enterprise operations, and adult education expenditures. See, US Census Bureau, Annual Survey of School System Finances, https://www.census.gov/programs-surveys/school-finances/data.html.
Since 2001, spending on instruction increased by less than 1 percent per year, while spending on support services increased by almost 1.5 percent, and other spending increased by just under 2 percent per year. However, since 2009, instruction spending decreased at a rate of over 2 percent per year, while support spending and other spending decreased by 1.4 percent and .5 percent per year, respectively.

The full magnitude of the reductions in public school spending is more apparent when looking at per pupil spending, especially, per pupil spending on instruction. Figure 7 shows total per pupil spending, while Figure 8 shows per pupil instruction spending.

In 2018, total real per pupil spending was $7,875, about 13 percent less than in 2009, the highest per pupil spending during the period. Between 2001 and 2008, per pupil spending grew at an annual rate of 3 percent, but after 2009, per pupil decreased at a rate of over 1 percent per year.
More significantly, the $4,441 in per pupil instruction spending in 2018 was 13 percent lower than it was in 2009. Since 2009, per pupil instruction spending decreased at an annual rate of 1.5 percent. Essentially reversing more than half the gains in per pupil funding between 2001-2008. Had per pupil instruction funding kept growing at the same growth rate after 2009 that it did before 2009, Arizona would today be investing nearly 50 percent more in instruction for each public-school student.

Arizona’s reductions in per pupil instruction have come at the expense not only of students but teachers as well. Figure 9 shows teacher salaries between 2000 and 2018. Teachers in 2018 made almost 9 percent less than they did a decade before. Since 2009, teacher salaries have decreased at an annual rate of 1.2 percent per year, in real terms.

Teacher salaries in Arizona are also not faring well when compared to teachers nationwide. In 2000, Arizona’s teachers earned 19 percent less than the national average. By 2018, this gap had grown to 25 percent. This was the result of national teacher salaries growing annually since 2000, while teacher salaries decreased at an annual rate.

These reductions in total per pupil spending, in per pupil instruction spending, and in teacher salaries are contributing factors to the teacher attrition Arizona has experienced recently. They also help explain the teacher frustration that gave rise to Arizona Educations United, and the ensuing statewide teacher walkout in the spring of 2018.

Arizona’s elected officials refer to the cuts to public education funding in the state since 2008 as “recession-era” cuts. However, it is important to note in the data presented earlier, that most of the reduction in funding began in 2009 and continued up to 5 years later.

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The National Bureau of Economic Research (NBER) determines the official beginning and ending dates of recessions, through their US Business Cycle Dating Committee. According to the NBER, the “Great Recession” officially began in the fourth quarter of 2007 and ended in the second quarter of 2009. Therefore, most public education cuts in Arizona occurred well after the recession had ended.

NBER calls the period immediately following the end of the recession “expansion,” meaning the economy is growing. Although the Arizona economy was one of the hardest hit during the recession (due to its reliance on housing and construction), the state economy was in expansion after the second quarter of 2009.

Figure 10 shows Arizona’s real gross domestic product (GDP) for the period 2000 to 2018. The shaded vertical bars indicate official recession dates. Between 2009 and 2018, the state’s economy grew at an annual rate of 2.3 percent.

![Figure 10 Arizona's Real GDP](image)

**Figure 10 Arizona's Real GDP**

Figure 11 shows Arizona’s real per capita income since 2000. Although per capita income in Arizona decreased about 3.5 percent between 2007 and 2009, it has grown at an annual rate of 1.4 percent since then. In 2018, per capita income was almost 9 percent greater than it was in 2009.

Figures 10 and 11 both show that Arizona’s economy was already expanding in 2009. Therefore, the question is why was it necessary to decrease funding for public education during a period of economic growth?

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23 Public Information Office, “US Business Cycle Expansions and Contractions,” (Cambridge, MA:
24 Ibid.
The short answer is that it was not necessary. What drove these substantial cuts to public education in Arizona was not the recession, but rather, an ideological shift at the governor’s office and the state legislature toward reducing public investment and enacting unnecessary income tax cuts.26

In 2011, in the midst of the state’s economic recovery, Arizona’s legislature enacted corporate tax cuts reducing the amount of resources available for investment in public education.27 These cuts reduced state revenues available for public education by hundreds of millions of dollars every year. By the time the full effect of these corporate tax cuts sets in, Arizona’s state revenues will be reduced by over half a billion dollars per year.28 These tax cuts were grounded in ideology, not economics. If policymakers really wanted to give the already growing Arizona economy a boost in 2011, the correct policy prescription would have been additional investment, such as increased funding for public education, not tax cuts to corporations.29

By reducing investment in public-schools, Arizona’s elected officials reduced the state’s economic potential. The funding cuts to the state’s public education system, not only cost valuable education resources for students, but also cost the state potential economic gains. It is to these economic effects that we now turn.

28 Ibid.
IV. Impact of Investment in Education on Arizona’s Economy

i. Education and Productivity

Productivity drives economic growth.\textsuperscript{30} Productivity is defined as output per hour worked, and economic growth is defined as an increase in the standard of living.\textsuperscript{31} Over 60 years ago, economist and Nobel Laureate Robert Solow identified three sources of increased productivity, and thus, of increased economic growth: 1) increases in the amount of physical capital available to workers (machinery, equipment, etc.); 2) increases in the size of the labor force; and 3) technological progress. The latter term refers to the economy’s “know how.” That is, how we produce things.\textsuperscript{32}

According to Solow, increasing levels of education, increase our technological progress, thereby increasing productivity, and ultimately, economic growth.\textsuperscript{33} Since this work by Solow, other economists have estimated the impact of education on productivity and economic growth.\textsuperscript{34}

For example, a study by Edward Denison estimated that increasing the level of education improved productivity by 30 percent for private sector workers (not including those working in the residential sector). Another study by Dale Jorgenson and Kevin Stiroh estimated that education improvements accounted for 13 percent of productivity growth between 1959 and 1998.\textsuperscript{35}

Figure 12 shows actual productivity in Arizona since 2000.\textsuperscript{36} Productivity decreased between 2007-2008, but was back on an upward trajectory by 2009. It began to level off again by 2012, and has remained pretty much constant since.

Figure 12 also shows a simulation of what productivity in 2018 would have looked like, if Arizona enjoyed productivity gains similar to the estimates from the studies by Denison, and Jorgensen and Stiroh, mentioned above.

The dotted line in Figure 12 simulates an increase in productivity between 2009 and 2018, assuming the 13% gains mentioned in the research from Jorgensen and Stiroh. A 13 percent increase over this period, implies productivity is growing at a 1.8 percent annual rate.


\textsuperscript{31} Ibid.


\textsuperscript{33} Ibid.


\textsuperscript{35} Ibid.

\textsuperscript{36} We calculate productivity by dividing Arizona’s Real GDP by the civilian labor force.
Similarly, the dashed line in Figure 12 simulates an increase in productivity between 2009 and 2018, using the 30 percent result from the research by Denison. A 30 percent increase in productivity implies annual productivity growth of 3.8 percent. At this growth rate, Arizona’s real GDP in 2018 could have been almost 40 percent higher, or almost over $100 billion in additional income to the state.

![Arizona’s Productivity](image)

**Figure 12 Arizona’s Productivity**

As stated earlier, productivity drives economic growth, and economic growth is reflected in increases in the standard of living. Standard of living is calculated as real GDP per capita. In 2018, real GDP per capita in Arizona was $43,546.

If Arizona can increase productivity through investments in public education, it will be able to also increase the standard of living of all Arizonans. For instance, assuming the boosts in productivity identified by Jorgensen and Stiroh, and by Denison, Arizona’s real GDP per capita would have been between $7,000 and $18,000 higher than it was in 2018.

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37 We calculate Arizona’s Real GDP per capita by dividing the state’s Real GDP divided by the state’s population.
ii. Increased Public School Funding and Economic Outcomes

Much of the economic literature on school spending focuses on whether additional spending impacts education outcomes, like performance on test scores, much of this research is inconclusive. However, recent economic research has focused on the link between public school spending and the economic outcomes of students, such as earnings.

In a 2016 study, researchers Jackson, Johnson, and Persico, examined the earnings at adulthood for students in school districts with and without court-ordered changes in school funding. The researchers found a strong relationship between increased school spending and positive educational and economic outcomes.

A ten percent increase in spending across all 12 years of public school, led to a 7 percent increase in graduation rates. Students who experienced this increase in public school spending received 7 percent higher wages as adults, and their risk of falling into adult poverty decreased by 3 percentage-points.

![Graph: Arizona Average Annual Earnings](image)

*Figure 13 Arizona Average Annual Earnings*

Figure 13 shows average annual earnings for Arizona since 2001. Earnings grew at a rate of .8 percent per year during this period, and since 2009, earnings growth was .9 percent annually. Figure 13 also shows what earnings would have looked like if Arizona

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39 Ibid.

40 Annual earnings are for total non-farm employment, and are derived by multiplying average weekly earnings by 50. Earnings are presented in 2016 dollars. We use earnings and wages interchangeably for our discussion, although the difference between the two can be substantial for some individuals that have various sources of non-wage income.
was able to enjoy the type of earnings growth (7 percent) estimated by Jackson, Johnson and Persico.

We must point out that Jackson, Johnson, and Persico’s estimates are long-run outcomes. Students who experienced 12 years (K-12) of increased public-school spending, and on average completed more years of schooling, experienced 7 percent higher wages in adulthood (age 40). However, this does not take away from the main point that increasing public school funding is justified from a cost-benefit basis.

In fact, Jackson, Johnson, and Persico also provide a cost-benefit calculation for increased public school spending: every additional dollar invested in public schools returns an additional $2 in future earnings for each student. Using these figures, an additional $714 million in public school funding in 2018, would have increased Arizona’s economy by $1.4 billion. Therefore, fully restoring the $1.9 billion in cuts to Arizona’s public schools since 2009, could potentially boost Arizona’s economy by $3.8 billion, if the state experiences the same returns estimated in the Jackson, Johnson, and Persico study.

Figure 14 shows the poverty rates for Arizona and the nation, between 2000 and 2018. The poverty rate is the percentage of the population below the poverty line. Arizona’s poverty rate has been above the national poverty rate throughout this period. In the past few years, Arizona has been in the top ten of states with the highest poverty rate. In 2018, about one million Arizonans, representing 14 percent of the state’s population, were below the poverty line. This was almost 7 percent higher than the national poverty rate of 13.1 percent.

Figure 14 also simulates Arizona’s poverty rate if it could have reduced poverty by three percentage points through increased public-school funding, as per the research by Jackson, Johnson, and Persico. Such a reduction in the poverty rate would bring Arizona’s poverty rate below the national rate. More importantly, achieving such a reduction in the poverty rate would have resulted in almost a quarter of a million Arizonan’s lifted out of poverty in 2018. Over the 2009 to 2018 period, more than 1.5 million Arizonans would have been taken out of poverty.

Clearly, the kinds of gains estimated by Jackson, Johnson and Persico are not guaranteed. We simply try to show how earnings and poverty could have improved if Arizona had experienced such gains from sustained investments in public education over the long-run.

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A 2018 study by Lafortune, Rothstein, and Schanzenbach is another recent study linking increased public-school funding and improved economic outcomes.\(^{44}\) Using an event study framework, the researchers estimate that a one dollar increase in funding will raise students’ adult earnings by more than one dollar in present value.\(^{45}\)

Based on these estimates, increasing public school funding in 2018 by 10 percent, or $737 million would generate $1.25 billion in additional income to Arizona. Increasing public school funding by the $1.9 billion cut between 2009 and 2018 could increase Arizona’s economy by $2.85 billion, assuming the kind of returns estimated by Lafortune, Rothstein, and Schanzenbach.

A third recent study estimated the economic benefits from recruiting and retaining quality teachers. Chetty, Friedman, Hilger, Saez, Schanzebach, and Yagan conducted an experiment where they randomly assigned students to different kindergarten teachers. The researchers found that improvements in kindergarten test scores translate into better educational and economic outcomes.\(^{46}\) They estimate that an above-average kindergarten teacher generates about $320,000 in total present value earnings than a below-average kindergarten teacher for a class of 20 students.

We calculate the present value of increasing per pupil spending by 10 percent (based on 2018 per pupil spending) each year from kindergarten through grade 12, assuming a 3 percent discount rate, and discounting the stream of spending to a student’s kindergarten


\(^{45}\) Ibid.

year. This results in a total per pupil spending of $8,632. When multiplied by enrollment in 2018, the total cost of this spending is $7.9 billion.

If Arizona were to invest this additional amount to recruit and retain better teachers (by providing adequate pay and benefits commensurate with the high value these teachers provide) the state could generate an additional $320,000 in earnings per 20 students. This translates into a total increase of almost $15 billion in present value earnings for Arizona. In other words, Arizona could potentially gain almost $2 for every additional $1 in per pupil spending.

These three recent economic studies unequivocally demonstrate the economic benefits from providing adequate funding for public schools. Table 1 summarizes these results.

As the table shows, the economic benefits of increasing per pupil spending clearly outweighs the costs. A simple average of the cost-to-benefit ratio column indicates every dollar in additional public-school funding results in an additional 1.8 dollars in economic benefits.

Table 1 Economic Benefit Estimates for Arizona

<table>
<thead>
<tr>
<th>Economic Study</th>
<th>Cost-to-Benefit Ratio</th>
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<tbody>
<tr>
<td>Jackson, Johnson, &amp; Persico</td>
<td>1-to-2</td>
</tr>
<tr>
<td>Lafortune, Rothstein, &amp; Schanzenbach</td>
<td>1-to-1.5</td>
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<tr>
<td>Chetty, Friedman, Hilger, Saez, Schanzebach, &amp; Yagan</td>
<td>1-to-2</td>
</tr>
</tbody>
</table>

The cost and benefits estimated based on this study represent 12 years of funding in present value terms. The table shows these amounts in a per year basis, so as to be comparable with the table’s two other entries.
V. Conclusion

For too many years, state policymakers have unnecessarily cut funding for Arizona’s students and teachers. These cuts to public-school funding occurred while Arizona’s economy was on the rise.

Recent economic studies demonstrate that spending on public schools has significant benefits to the economy. Another way of saying this is that cuts to public schools result in significant costs to the economy. State policy on public school funding over the last 10 years has resulted in a net cost to Arizona’s economy.

Our public schools, including our teachers, are assets. By restoring the $1.9 billion in cuts to Arizona’s public schools over the past decade, we will adequately invest in these assets, allowing our economy to experience significant returns, including gains in productivity, earnings, and standard of living.