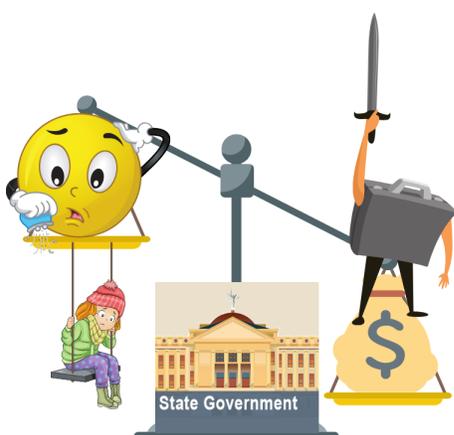


Key Findings

This analysis compares the return on investments in programs that support at-risk children relative to two proposed tax credit subsidies being considered by Arizona's legislature. Key findings are:

- Early childhood investments have strong returns both to government and society as well as the participants, strengthening families and reducing child abuse, drug use and criminal behavior.
- A proposed tax credit to grow Arizona's film industry is projected to generate a *far smaller return* per dollar of investment than investing in programs that support at-risk children due to future savings to government including less crime, less use of public assistance, better employment, and less child abuse—all admirable outcomes.
- Arizona's existing R&D tax credit program is largely ineffective at inducing research and development that would not have otherwise taken place with the exception of the refundable R&D tax credit for small firms that SB1643 doubles from \$5 to \$10 million annually.
- Arizona's larger R&D tax credit program should be phased out rather than made partially refundable subject to a cap as is proposed in SB1643 in the state legislature.



Summary

The common ground found among some Democrats and Republicans this legislative session has not been with investing in at-risk Children, but subsidizing corporations.

Investing in children is a winner. The Nurse-Family Partnership and Healthy Families Arizona are two programs that help assure that at-risk mothers have important in-house support both during their pregnancy and after birth, leading to better outcomes for both the mother and the child over a two-year period. From age 3, Child-Parent Centers

can continue providing community support for parents and their youngsters.

Net results across these two programs that invest in children include reduced rates of child abuse, less juvenile and adult crime and consequently fewer crime victims, stronger earnings, and less reliance on government services.

By contrast, corporate subsidies result in a mixed bag of outcomes for the broader community. Rather than provide direct assistance to help at-risk families, these pour resources into profitable corporations.

This analysis examines two corporate subsidies that the Arizona legislature is currently considering. A proposed film industry subsidy would likely induce some growth in that sector—but to the degree it is successful, it will also be costly. And the subsidy will also accrue to existing or already planned projects. While the bill could cost the state up to \$150 million a year by having taxpayers underwrite the cost of movie filming and production, GCI expects the cost to not exceed \$100 million. The second bill would subsidize corporations who have built up and been unable to fully utilize research and development tax credits and could cost another \$50 million.

While the film production refundable credit would likely entice some growth to the state, unlike the estimate by economist Jim Rounds, GCI does not forecast that the credit would pay for itself—rather GCI anticipates it will likely return only about 27 cents on the dollar. Studies repeatedly find these credits do not pay for themselves. While this credit is more tightly constructed to encourage the development of the film industry, it creates a very high bar to be able to pay for itself because it underwrites such a large portion of production costs.

Likewise, while GCI finds that doubling to \$10 million the refundable research and development (R&D) tax credit for employers with less than 150 employees is likely a good policy, extending the subsidy to larger corporations is unlikely to have economic development benefits—and will cost the state \$50 million annually. R&D in Arizona, while better than many states, has been declining despite a generous tax credit. Yet due to limited taxes on corporations in Arizona, nearly \$2 billion in used credits have been stockpiled. States like Missouri that have no R&D tax credit do just as well as Arizona. States that pay companies to engage in R&D such as Louisiana, New Hampshire and Nebraska have less than 1/3 of Arizona's economic activity. While the big players are California and Massachusetts, followed by Michigan and Minnesota.

Research indicates the return on corporate refundable tax credits is minimal—whereas investing in at-risk children has significant benefits in terms of savings to government, savings to the rest of society (such as reduced crime), and improved economic outcomes (such as higher high school graduation rates) for children.

Policymakers with Arizona's long-term future in mind should reverse course and invest in at-risk children instead of subsidizing corporations.

The Sure Thing: Investing in Children

Investing in at-risk children and their families is a proven winner. The Grand Canyon Institute (GCI) looks at three well-regarded programs as models. The Nurse-Family Partnership already exists in Arizona but lacks the capacity to reach the number of pregnant women and young mothers who could benefit from its services. GCI combines it with the largely similar program Healthy Families Arizona. These programs primarily focus on the first two and potentially three years after a birth.

Quality preschool programs for 3 and 4 years are modeled after the Chicago Parent-Center model which has had impressive longitudinal success.

While much attention focuses on the inadequate funding of K-12 education in Arizona, the first five years of life is a critical time for brain development.

No one is born a college graduate, drug addict, or a criminal, but the social environment during these early years steers children in different directions. GCI focuses especially on at-risk families where the greatest impact is seen.

Adverse childhood experiences (ACEs) also impact children, especially in their early years. ACEs include eight categories of traumatic or stressful life events experienced before the age of 18 years, including sexual abuse, physical abuse, emotional abuse, household adult mental illness, household substance abuse, domestic violence in the household, incarceration of a household member, and parental divorce or separation. Exposure to ACE's correlates with negative outcomes. The state should have the goal of seeking to limit them as a means to improve the quality of life for everyone as well as reduce future state expenses.

The 2018-2019 National Survey on Children's Health found Arizona was among the top 10 states with the highest proportion of children birth to age 5 who have experienced at least one ACE. In addition, these young children in Arizona are almost twice as likely to have two or more ACEs (15.5%) than children in the U.S. (8.6%).¹

About one third of children are born into families that have risk factors such as a mother without a high school degree, living below the poverty line, and/or having no parents securing full-time employment which results in income insecurity.² Arizona currently serves about 5,000 children under age 3 through the Nurse-Family Partnership and Healthy Families Arizona home visitation programs.³ This means about 55,000 additional children under age 2 could benefit from the home visitation service.⁴

¹ First Things First (2021), "Building Bright Future: Arizona's Early Childhood Opportunities Report," pp. 22, 88, <https://www.firstthingsfirst.org/wp-content/uploads/2021/12/State-Needs-and-Assets-Report-2021.pdf>.

² Healthy Families Arizona Annual Evaluation Report FY2020, https://dcs.az.gov/reports?field_category_tid=259

³ Healthy Families Arizona 2015 Evaluation Highlights, <https://pcaaz.org/wp-content/uploads/2016/03/HFAz-SFY2015-Program-Highlights.pdf>. Nurse-Family Partnership Arizona 2022 State Profile, https://www.nursefamilypartnership.org/wp-content/uploads/2021/06/AZ_2022-State-Profile.pdf.

⁴ Based on Census data about 90,000 children are at each age level under 5. See Census Arizona Quick Facts [U.S. Census Bureau QuickFacts: Arizona](https://www.census.gov/quickfacts/az)

A \$137.5 million appropriation would be required if Arizona were to set a goal of serving at least 25,000 of these children (half of the identified at-risk children), assuming a cost of \$5,500 per child (higher than the current per child average) per year. The return on investment far exceeds the cost. Future savings to the government alone, based on a discounted present value, is estimated at 45 cents per dollar, about half the cost of the investment. In addition, the return on investment per dollar is estimated to be about 25 cents in terms of savings to the rest of society (less consequences of ACEs), and more than one dollar for participants.⁵

The two-year program involves 25-35 visits during a woman's pregnancy and after birth designed to help improve healthy outcomes for the mother as well as to help guide her with the developmental needs of her children. Savings to government include less crime, less use of public assistance, better employment, and less child abuse—all admirable outcomes.⁶

Among 3 and 4 year olds, Arizona likely currently serves one third of the approximately 60,000 most at-risk children through either Head Start, Pre-K (eligibility to 200% of the FPL), or Special Education. Consequently, about 40,000 at-risk children currently are not reached.⁷ The state should set the goal of reaching half of these 40,000 children and that cost would also approximate \$120 million or up to \$140 million in order to improve the pay levels of teachers.

The Chicago Child-Parent Center (CPC) Pre-K Longitudinal Study is based on outcomes for children involved in the study when they reach the age of 26, compared to a similar at-risk demographic group that did not attend pre-school. Perhaps because it has followed participants much longer, it shows much stronger benefit-cost outcomes coming from improved school performance, improved earnings, less juvenile and adult crime, less child abuse, and less substance abuse—again admirable outcomes.

The CPC program extends to 3rd grade but the greatest impact is from the pre-K portion which is the focus here. The program dates from 1967 which has enabled the study to follow a cohort through age 26. It aims to provide a supportive learning environment for children in a collaboration involving parents, school staff, and the community.

The impacts of the programs are summarized in the chart below but show returns on investment that exceed \$1 in all categories: savings to government, benefits to the rest of society, and benefits to participants. These findings suggest that the dynamic effects

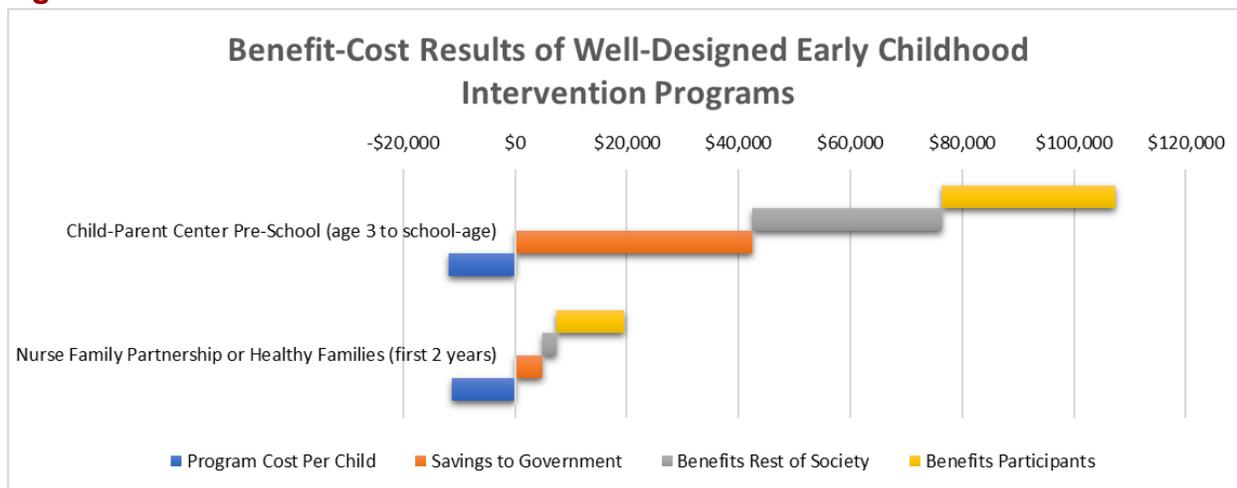
⁵ Estimates derived from Arizona's current expenditure per family in Healthy Families and Washington State Institute for Public Policy (2019) "Nurse-Family Partnership: Benefit-Cost Results," December, <http://www.wsipp.wa.gov/BenefitCost/ProgramPdf/35/Nurse-Family-Partnership>

⁶ Healthy Families Arizona Annual Evaluation Report FY2020, https://dcs.az.gov/reports?field_category_tid=259

⁷ National Institute for Early Education Research, 2019 Arizona Report Card, https://nieer.org/wp-content/uploads/2020/05/Arizona_YB2019.pdf.

easily pay for themselves due to reduced strain on government services, reduced involvement in the criminal justice system, and higher earnings.⁸

Figure 1



The Gamble—Motion Picture Subsidies

The Proposal⁹

SB1708 re-establishes a refundable tax credit for the motion picture industry capped at \$150 million, after the state ended a prior program in 2010. The new credit is tightly constructed. First, to even access the credit production facilities must be constructed in Arizona. The Rounds Consulting Group estimates that will entail at least \$300 million in construction expenditures yielding about \$20 million in revenue during the first two years after the credit is instituted. They are quite confident that expenditure will take place, if not more than that. If it does not occur, then the credit's use will likely be negligible.

In addition, only state taxable activity is eligible for the refundable tax credit. All wages are eligible—as even out-of-state actors will owe Arizona taxes for that portion of their income earned while they were in Arizona. Set construction would also count. But services purchased in the state that were not subject to the transaction privilege tax would be excluded as well as any services purchased outside of Arizona. Rental cost of the studio space would also be excluded. This tight construction of the credit from a

⁸ Reynolds, Arthur J. et al. (2011), "Age-26 Cost-Benefit Analysis of the Child-Parent Center Early Education Program, Child Development, Vol. 82, No. 1, Jan-Feb., <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3817956/>. Chart calculations pulled from Table 4.

⁹ GCI would like to thank Jim Rounds and his colleague Luis Cordova for walking through their model and responding to numerous questions related to their economic projections. Their model is what they consider "conservative" in the sense that their analysis leads them to believe the impacts could be larger. While GCI's estimate is lower, the cooperation was much appreciated.

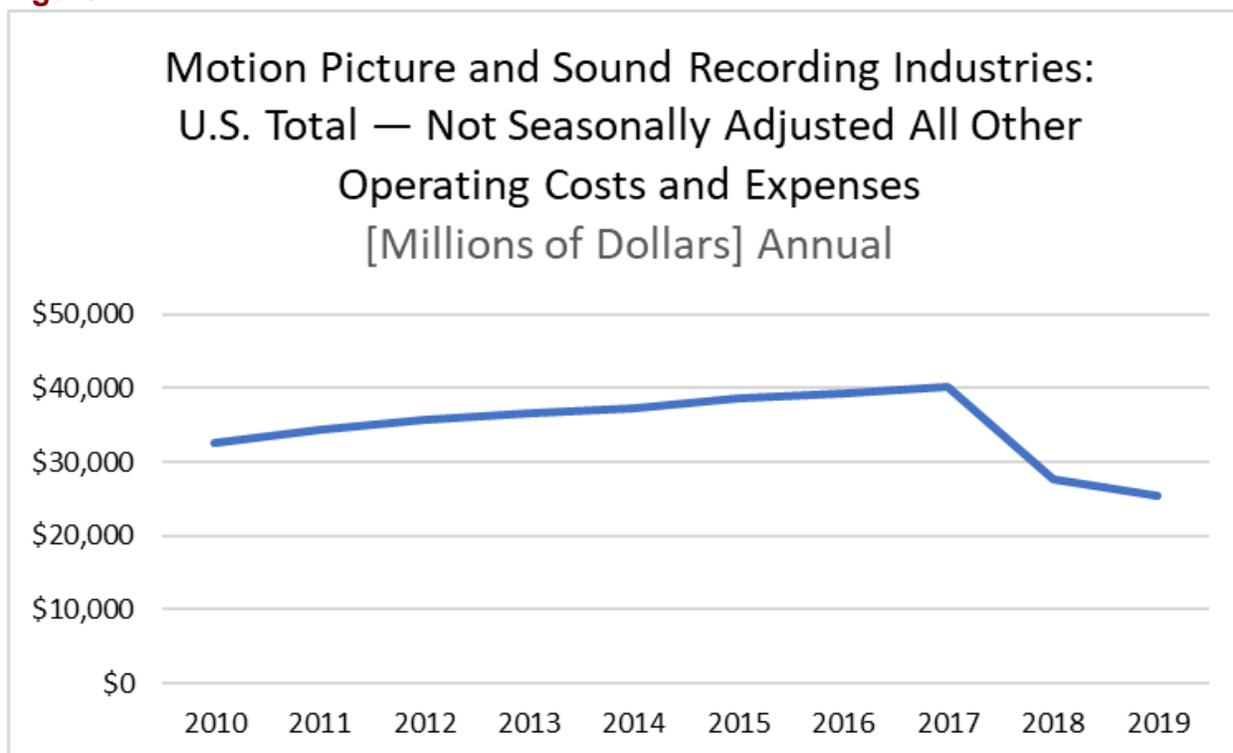
policy perspective is a strength, but it also diminishes the likelihood of its use, as other states with less onerous requirements would offer a more lucrative alternative.

Zero-Sum Game: More Studio Space, Not More Money

A robust growth in movie studio space is occurring. New major studio projects have been recently announced or nearing completion in Vancouver, Canada as well as Newark, New Jersey and elsewhere.¹⁰ The dynamics of the industry suggest they may be less lucrative, as the number of productions have proliferated with streaming services, these shows have smaller audiences and smaller budgets than when media options were more concentrated, so more shows doesn't necessarily equate to more money.

Some tax credits are designed based on the presumption that they build economic capacity. Film Incentive Programs have emerged in the last 20 years, but they only impact WHERE activity goes. However, overall expenses have been flat to declining over the last decade as noted below. "All other operating costs and expenses" includes expenses related to shooting and production. Note this industry category includes movie theaters, so it's broader than production alone. The amounts are in current dollars, not inflation-controlled dollars.

Figure 2



Source: U.S. Bureau of the Census, Quarterly Financial Reports

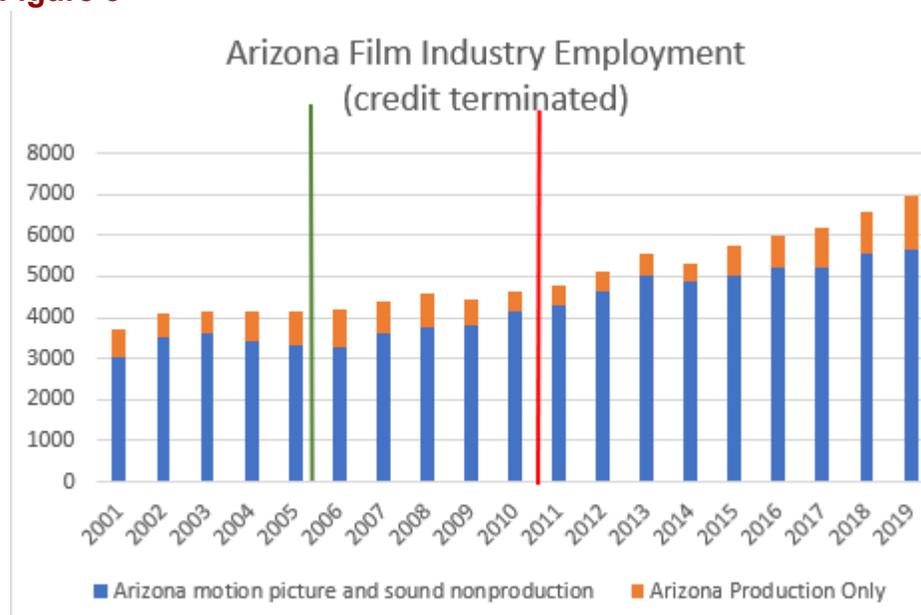
¹⁰ Kloster, Darron (2022), "Film-making surge expected with second sound-stage being built in Langford, two more planned," Times Colonist, April 13, [Film-making surge expected with sound-stage being built in Langford, two more planned - Victoria Times Colonist](#).

GCI examined five states to get a sense of how much film industry employment and specifically production employment increased after the implementation of tax credits. The states chosen include one state with no cap on the credit (Georgia), two states with high caps (New Mexico and Pennsylvania), one state with a low cap and a higher concentration of production employment (Utah), and Arizona which had a credit from 2005 to 2010, but had no cap. Green lines indicate when credits were established. In Georgia's case three different variations are noted. The red line in Arizona indicates the termination of the credit.

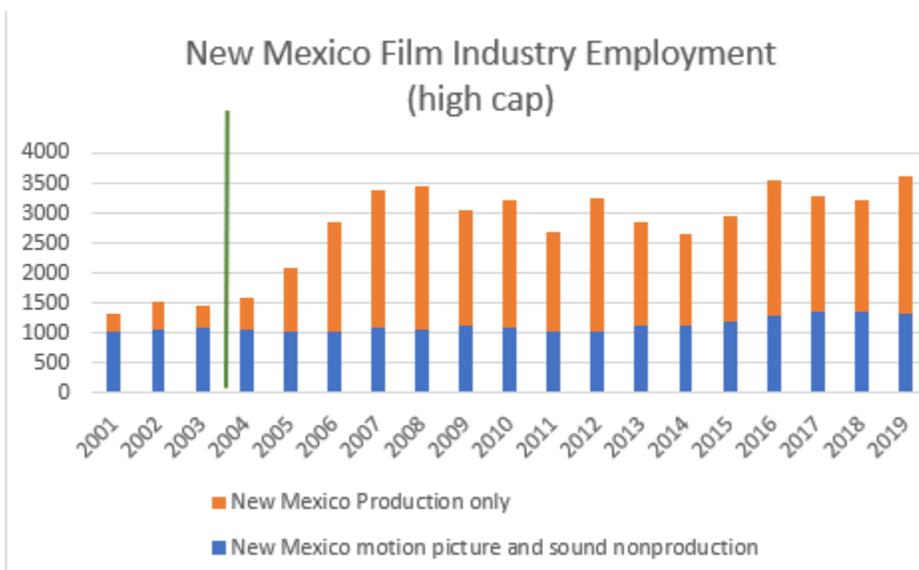
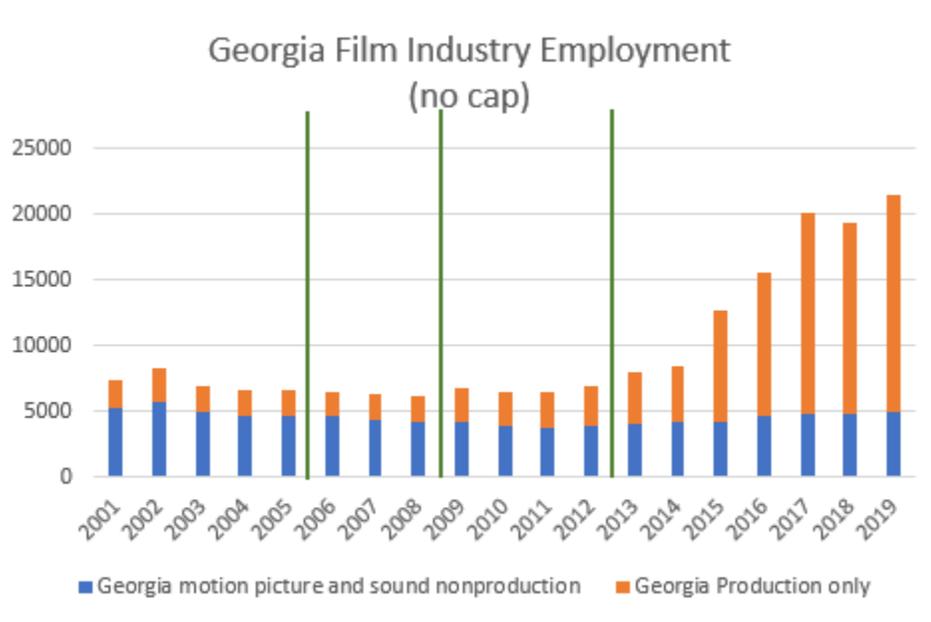
California and New York are the two states with an agglomeration of talent in this field. For any movement from California, Utah and New Mexico represent possible geographic competitors to Arizona due to their higher relative concentration of film employment. Utah's presence predates the use of film credits including the Sundance Film Festival which dates to 1978. New Mexico was early and aggressive when adopting film tax credits. Pennsylvania illustrates a state with a high cap located close to New York City. Finally, Georgia is the state that has seen the greatest impact of its film tax credit—though the cost had risen to \$800 million in 2018, leading the state to tighten eligibility requirements with a 2020 law.¹¹

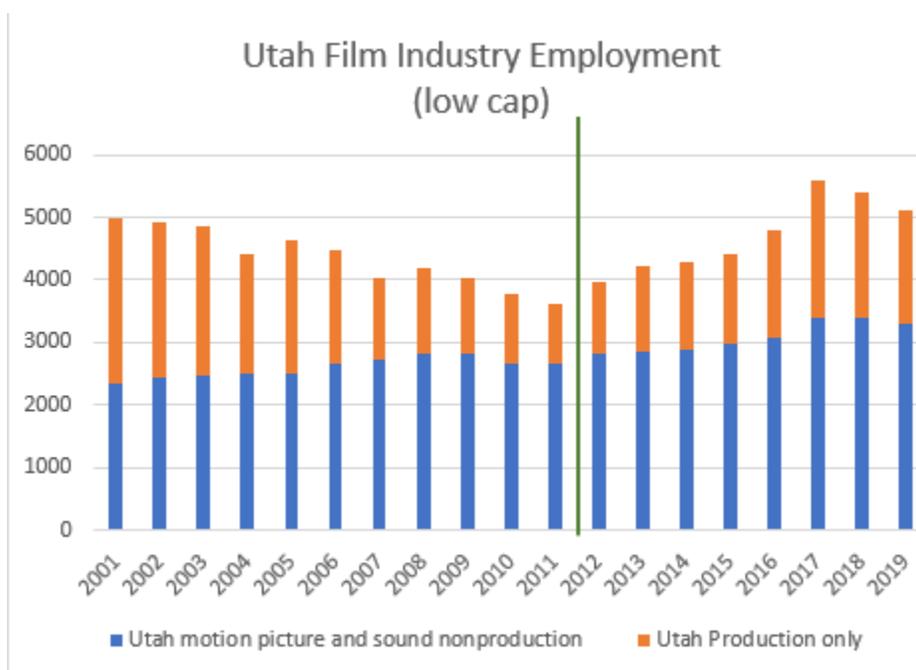
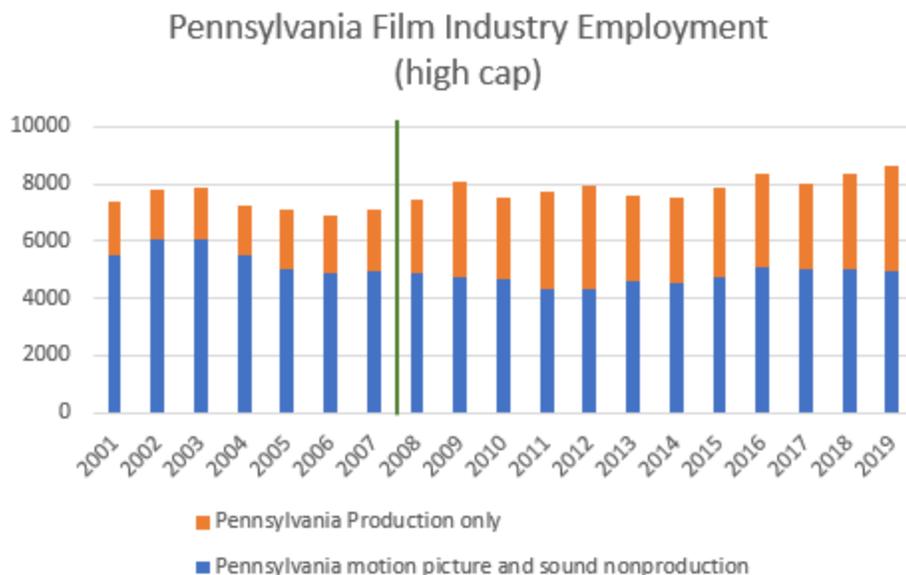
Each of the graphs below show levels of employment in the movie industry between nonproduction and production workers—with the latter having significantly higher compensation at about \$70,000 a year. Data comes from the Quarterly Census of Employment and Wages.

Figure 3



¹¹ \$800 million see Meares, Wesley et al. (2020), "Show Me the Money: An Analysis of Georgia's State Tax Credit Program," Questions in Politics, Vol. 7, http://gpsa-online.org/wp-content/uploads/2020/09/Meares_etal.pdf. New 2020 law: Goldsmith, Jill (2020), "Georgia Streamlines Multi Billion-Dollar Film & TV Tax Credit Process: Clearer Guidelines, Required Audits," Deadline, Aug. 5, [Georgia Streamlines Film & TV Tax Credit Process With Guidelines, Audits – Deadline](#)





Arizona and Georgia are the only states that have seen a growth in overall employment but unlike Arizona, the concentration in production has skyrocketed in Georgia.

New Mexico, Pennsylvania and Utah all have seen overall employment relatively flat. All three have a higher production portion than Arizona. Proportionally New Mexico and Utah have a higher portion of employment than Arizona suggesting that they have a stronger starting point for infrastructure.

Overall, this suggests that Arizona might be poised for growth, The Quarterly Employment Census suggests these positions would pay about \$70,000 a year. Collectively, this suggests Georgia is the best illustration of a program as it has created the largest production-base of any state outside New York and California.

Will the Incentives Pay for Themselves?

Studies that evaluate film incentive programs generally find these programs pay back 25 cents or less for each dollar expended.¹² Jim Rounds' estimates presented before the Senate Appropriation committee in February suggest the Arizona program would be different because the tax credit is more narrowly crafted.¹³

Studies which generate larger returns often make assumptions that overstate economic impacts:

- 1) **Assuming all projects that qualified would not have taken place without the subsidies.** Focus should be on growth from Arizona's current base—even though the base will also qualify for subsidies. So only the growth from the current baseline expectation should be attributed to the refundable tax credits when analyzing the impact of the tax credits should they be adopted.
- 2) **Assuming a large impact of film induced tourism (FIT).** First, many settings aren't filmed where they appear. The 2018 film "Arizona" was shot in Albuquerque. The 2017 film exploring the lives of the Granite Mountain Hotshots killed in the Yarnell fire was also almost entirely filmed in New Mexico. Even the iconic scene from 1991, when Thelma and Louise drive off the edge of the Grand Canyon was actually filmed in Moab, Utah.¹⁴ Second, very few tourists actually come because of film-related reasons. Some may choose to go to film locations as part of their itinerary. Florida's Office of Economic and Demographic Research (EDR) found no clear evidence of FIT.¹⁵ Likewise, a New Mexico report showcased just how poor much of the FIT research is. A 2021 study for the New Mexico Film Office, cited Breaking Bad tours in Albuquerque where the series that ended in 2013 was filmed as a breakout focus. The survey consisted of 32 past customers of a particular vendor (sampling bias), 16 (paltry subsample) of which lived outside of New Mexico, of which THREE indicated the Breaking Bad

¹² The Florida report on its tax credits found the ROI dropped from \$0.43 in its 2015 report to \$0.18 in the 2018 report to \$0.07 in 2021 and its summary of other studies found most studies in other states reported an ROI between \$.10 and \$.25. See Florida Office of Economic and Demographic Research (2021), "Return on Investment for the Entertainment Industry Incentive Programs," January, <http://edr.state.fl.us/Content/returnoninvestment/EntertainmentIndustryIncentivePrograms2021.pdf>. The Pennsylvania study in 2019 found a return of \$0.13 and of the 12 studies noted in other states, 10 had returns of \$0.25 or less. See Pennsylvania Independent Fiscal Office (2019), "Pennsylvania Film Production Tax Credit: An Evaluation of Program Performance," January, https://www.pafia.org/resources/Documents/TC_2019_Film_Production_Tax_Credit_Report.pdf.

¹³ Memos received from Jim Rounds, but not publicly posted. Presentation can be watched for the February 15, 2022 Senate Appropriations Committee Hearing here [Video Player \(azleg.gov\)](https://www.azleg.gov/video-player).

¹⁴ Mitchell, Garrett and Bill Goodykoontz (2018), "From 'Queenpins' to 'Wyatt Earp,' these 13 moves set in Arizona—but not made here," Arizona Republic, Aug. 14, [13 Arizona movies filmed in other states: 'Queenpins,' 'Star Is Born'](https://www.azcentral.com/story/news/local/arizona-republic/2018/08/14/13-arizona-movies-filmed-in-other-states-queenpins-star-is-born/) ([azcentral.com](https://www.azcentral.com)).

¹⁵ EDR, "Return on Investment for Entertainment and Industry Incentive Programs," January 2021, p. 11 <http://edr.state.fl.us/Content/returnoninvestment/EntertainmentIndustryIncentivePrograms2021.pdf>.

sites were the only reason they came to New Mexico.¹⁶ Very few studies give a good indication of FIT. Georgia’s audit of its film credit provided the best estimate of FIT. Here they primarily relied on a study funded by the Motion Picture Association that had noted that 0.78% of visitor spending in Georgia was FIT. But the study did not disclose its methodology.¹⁷

- 3) **Multipliers may be too high.** Economic effects include direct, indirect and induced impacts. Spending originating in Arizona is a direct expense. Indirect effects are created to the degree that other Arizona businesses benefit from these expenses. Induced effects result to the degree that Arizona households benefit. Collectively these create a multiplier effect. However, not every dollar spent is the same. The studies of Massachusetts tax credits do a good job of noting how much of qualified spending went to Massachusetts businesses and residents, while many other studies fail to make that distinction. They also noted that nearly one-fourth of qualified expenditures went for wages to people earning \$1 million or more who lived out of state.¹⁸ Expenditures from Arizona are qualified expenses—but many studies assume all spending that originates from work in the state is spent locally. Arizona’s current multiplier is estimated to be 1.3, while Utah and New Mexico, which have stronger infrastructure have estimates of 1.8. Georgia’s multiplier is estimated to be 2.0.¹⁹ The Georgia economic development department has exaggerated its tax credit’s impact as it has repeatedly used 3.57 in its releases.²⁰ That number was reduced to 1.84 for most of the direct expenditure by the Georgia audit.²¹

GCI compared three studies: The 2020 Georgia Audit which used 2016 data, the Rounds Consulting Group Year 6 estimate—as that was their breakeven year, and GCI’s own analysis for Year 6. Georgia’s tax credit is loosely constructed with no cap and has an annual cost that is approaching \$1 billion. The Georgia audit report found it only paid back 10 cents on the dollar—which related to two aspects, the revenue

**GCI estimates
a return on the
film industry
tax credit of 27
cents per
dollar, well
below break
even.**

¹⁶ Olsberg, SPI (2021), “Economic Impact of the New Mexico Film Production Tax Credit: A Study for the New Mexico Film Office,” p. 29,

https://nmfilm.com/assets/uploads/migrated/2021/11/NMFO_EconomicImpactStudy_NMFilmProductionIncentiveProgram_2021.pdf

¹⁷ Griffin, Greg S. (State Auditor) and Leslie McGuire (Director) (2020), “Impact of Georgia Film Tax Credit,” Georgia Department of Audits and Accounts: Performance Audit Division, January, [23536 \(ga.gov\)](https://www.ga.gov/23536), pp. 47-49.

¹⁸ Snyder, Geoffrey, E (2022), “Report on the Impact of Massachusetts Film Industry Tax Incentives through Calendar Year 2017,” Commonwealth of Massachusetts Dept. of Revenue, March 1, <https://www.mass.gov/doc/dor-report-on-the-impact-of-massachusetts-film-industry-tax-incentives-through-calendar-year-2017/download>

¹⁹ Rickman, Dan S. and Hongbo Wang (2020), “Assessing State Economic Development from Motion Picture and Television Production Incentives: Standardizing the Industry for Analysis,” Munich Personal RePEc Archive, Oct.26, See Table 4, https://mpra.ub.uni-muenchen.de/104052/1/MPRA_paper_104052.pdf.

²⁰ Hunt, April (2015), “Claim overstates film industry’s impact on Georgia economy,” Politifact, Aug. 7, <https://www.politifact.com/factchecks/2015/aug/07/georgia-department-economic-development/film-industrys-impact-georgia-economy-overstated/>

²¹ Griffin, Greg S. (State Auditor) and Leslie McGuire (Director) (2020), “Impact of Georgia Film Tax Credit,” Georgia Department of Audits and Accounts: Performance Audit Division, January, [23536 \(ga.gov\)](https://www.ga.gov/23536),

generated from the expenditures associated with the activity generated by the credit LESS the foregone revenue if the credit actually had paid for itself. In Georgia's case they presumed a significant portion was spent on healthcare (Georgia has not expanded Medicaid under the Affordable Care Act), so matching federal funds were also lost.

The Rounds Consulting Group estimate is approximated from calls with Jim Rounds and Luis Cordova. It includes a \$1.75 billion direct investment from the film industry plus they assume a 2% impact from FIT, where anticipated visitor spending is roughly \$30 billion, so that adds \$600 million.²² That figure might also include film-related construction. GCI backwards generated the total impact number based on Rounds' estimated tax collections. GCI uses a state taxes to state GDP ratio for Arizona multiplied by 65%. Total Expenditure includes intermediate inputs, so effectively double counts them, whereas GDP is purely value added.²³ From the Massachusetts study in this context GDP is approximately 65% of output.²⁴ The result of \$7.5 billion seems consistent with what they estimated.

Based on projections from Lionsgate Newark, which will create six sound stages, each at least 20,000 square feet, GCI foresees, about \$400 million in direct spending from a major project if the credit is successful.²⁵ If that is two-thirds of the total direct spending induced by the credit, then \$600 million would be the total amount—which GCI assumes translates into a \$100 million actual credit. GCI also anticipates noncredit activity related to tourism and construction. The Georgia audit estimated FIT at \$145 million. GCI noted that Legoland in Carlsbad before COVID had \$100 million in annual revenue, which includes two modest sized theme hotels.²⁶ Legoland exceeds any other theme park currently in Arizona and likely represents the higher end of possible FIT in Arizona if much of Arizona's FIT comes from a theme park with hotels. Therefore, GCI adds \$75 million in FIT plus \$35 million in film-related construction, or \$110 million to its direct expenditure estimate.

GCI presumes the building of infrastructure with a tightly designed credit increases the state's multiplier from 1.3 to 2.0 based on the work of Rickman and Wang.²⁷ GCI finds

²² Visitor Spending was \$25 billion in 2019. See "The Economic Impacts of Travel: Arizona," May 2021, [Economic Impact - Tourism AZ](#).

²³ Clouse, Candi (2019), "Output, Value-Added & Double Counting," IMPLAN Support, July 12, [Output, Value Added, & Double-Counting – IMPLAN - Support](#)

²⁴ Snyder, Geoffrey, E (2022), "Report on the Impact of Massachusetts Film Industry Tax Incentives through Calendar Year 2017," Commonwealth of Massachusetts Dept. of Revenue, March 1, <https://www.mass.gov/doc/dor-report-on-the-impact-of-massachusetts-film-industry-tax-incentives-through-calendar-year-2017/download>

²⁵ The total impact in for Lionsgate Newark is noted as \$800 million—assuming a multiplier of 2 that would mean \$400 million. Tulley, Tracy (2022), "\$100 Million Film Studio to Rise from Rubble of Ex-Public Housing Site," The New York Times, May 17, [\\$100 Million Film Studio to Rise From Rubble of Ex-Public Housing Site - The New York Times \(nytimes.com\)](#).

²⁶ Dunn & Bradstreet, "Legoland, California, LLC," [Legoland California, LLC Company Profile | Carlsbad, CA | Competitors, Financials & Contacts - Dun & Bradstreet \(dnb.com\)](#)

²⁷ Rickman, Dan S. and Hongbo Wang (2020), "Assessing State Economic Development from Motion Picture and Television Production Incentives: Standardizing the Industry for Analysis," Munich Personal RePEc Archive, Oct.26, See Table 4, https://mpra.ub.uni-muenchen.de/104052/1/MPRA_paper_104052.pdf.

that a \$100 million state tax credit only generates \$29 million in state taxes, and the \$71 million lost in state revenue if it had been invested in early childhood education would have resulted in an additional \$2 million in state taxes²⁸, so the net return on investment is only 27 cents on the dollar—far better than Georgia, but far less than breaking even.

According to the Rounds Consulting Group estimates, it's an investment that pays off. GCI notes that even the Georgia credit system doesn't provide \$150 million in added revenue with a similar direct impact starting point. While GCI commends the attempt to construct a much more tightly designed credit, it's still quite a gamble.

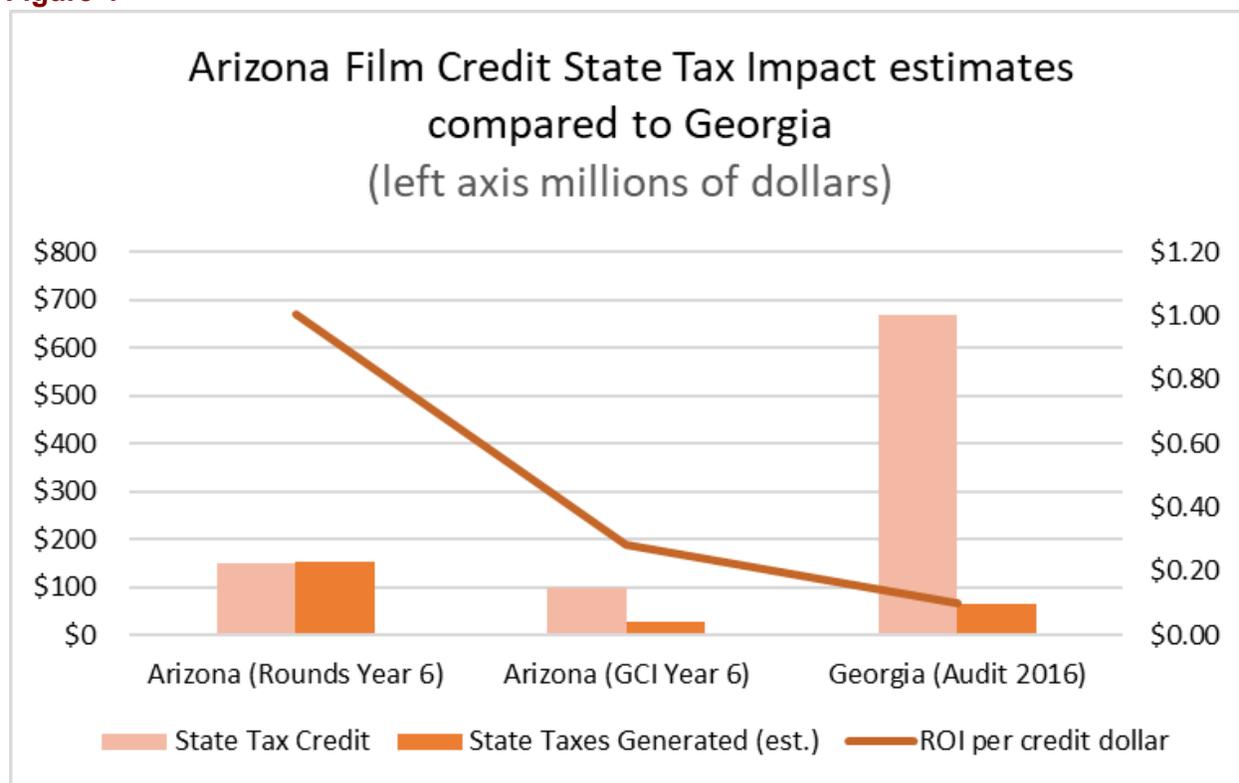
Table 1

Comparing Three Analyses of Effectiveness of Film Tax Credits (millions of dollars)

	State Tax Credit	Direct Impact	Total Impact	State Taxes Generated (est.)	State Taxes Lost (est.)	ROI per credit dollar
Arizona (Rounds Year 6)	\$150	\$2,350	\$7,505 ²⁹	\$151	\$0	\$1.01
Arizona (GCI Year 6)	\$100	\$710	\$1,420	\$29	\$2	\$0.27
Georgia (Audit 2016)	\$667	\$2,500	\$4,600	\$101	\$35	\$0.10

²⁸ Early Childhood Investment had a multiplier of 1.88 but a lower tax generated rate, most likely due to lower income of those employed. See Powell, Anna, Sarah Thomason, and Ken Jacobs. (2019), "Investing in Early Care and Education: The Benefits for California," UC Berkeley Labor Center, May 8, [Investing in Early Care and Education: The Economic Benefits for California - UC Berkeley Labor Center](#).

²⁹ As noted in the text, this number was backwards generated from the estimated tax revenue. Based on email correspondence, it likely matches quite well with what Rounds Consulting came up with, but their number may be slightly different.

Figure 4

Research & Development Tax Credits are Largely a Dud, Don't Make them Refundable

Corporations continue to accumulate more R&D tax credits as they exceed their annual tax liability. Consequently by 2018 \$1.9 billion in tax credits were banked up by corporations in Arizona for use in future tax years. This amount likely exceeds \$2 billion today.

The tax credits accumulate because of two reasons. First, Arizona's R&D tax credit is particularly generous. Second, corporations compiling the credit lack sufficient tax liability because of low corporate income taxes to utilize the credit, so they carry over.

However, the tax credits do not induce R&D activity as is demonstrated below.

When a tax credit is refundable, the state begins subsidizing operating expenses of a firm. While SB1643 limits the allowed expenses to certain categories, it doesn't establish an existing baseline, so any current expenditures or planned expenditures in these areas will simply be underwritten by taxpayers, for example:

- Sustainability or water capital projects
- Building/updating a taxpayer's R&D facilities

- Capital expenditure or workforce development projects with an institution of higher learning or a career and technical education district (CTED)
- Capital expenditure programs supported by matching funds from a federal or national grant program.

So, for instance, a company that installs solar equipment or low-flow toilets, can use taxpayer funds to pay for a new heat pump for its R&D facilities. In many cases, these are expenses the corporation would have incurred regardless. However, in some cases the incentive might drive the decision where the returns are more marginal. But, in general, taxpayers should expect that these incentives will primarily result in state funds underwriting operating expenditures of firms.

GCI's analysis finds the existing R&D tax credit program to be largely ineffective in that it actually does a poor job of inducing research and development that would not have otherwise taken place with the exception of the refundable R&D tax credit for small firms that SB1643 doubles from \$5 to \$10 million annually.

Rather than making the larger program refundable subject to a cap—the program should be phased out.

History of Arizona's R&D tax credits

Arizona's R&D tax credits are designed to encourage additional expenditure on research and development, which can boost local economic growth and increase high quality jobs. Arizona's R&D tax credit was first established in the early 1990s, and then revised to be unlimited in 2001. In recent years a restricted refundable credit for employers of 150 or less has also been instituted. Key findings from this research include:

- Arizona's corporations have accumulated more than \$1.9 billion in tax credits beyond what they can currently use. Some will not pay taxes for the next 15 years.
- Arizona's R&D tax credit is currently so generous that each year the amount of credit claimed is only one-fourth of the credit that corporations have accumulated.
- There's a lack of evidence that when states eliminate their R&D tax credit that it harms their R&D activity.
- From 2001 to 2019, company-funded research and development in Arizona declined relative to the nation as a whole, while nearly \$2 billion in credits were accumulated.
- GCI recommends that Arizona's main R&D tax credit be eliminated. However, the state's refundable R&D tax credit for firms with 150 or less employees does provide a meaningful targeted incentive with an expenditure cap of \$5 million and is therefore worth maintaining, and proposals to double the cap to \$10 million are reasonable.

R&D Tax Credit Legislation in Arizona

Arizona's R&D tax credit is calculated based on the amount of qualified research expenses that exceed a certain "base amount" (defined in the Internal Revenue Code). The credit has evolved through the following legislative changes:

- Prior to tax year (TY) 2010, the credit was calculated as 20 percent of up to \$2.5 million in qualified expenses and 11 percent of qualified expenses above \$2.5 million.
- In 2010, the Arizona legislature passed HB2162, Laws 2008, Chapter 290, which expanded the credit in TY 2010 through TY 2017, to 24 percent of up to \$2.5 million in qualified expenses and 15 percent of qualified expenses above \$2.5 million.
- In 2017, Arizona's legislature passed SB1416, Laws 2017, Chapter 340, which extended the availability of the enhanced credit rates from TY 2017 through TY 2021. Laws 2010, Chapter 312, changed the credit from being non refundable to refundable for those companies that employ less than 150 full-time employees. Specifically, the act provides that such taxpayers receive a refund equal to 75 percent of the amount by which the credit exceeds their liability. The refundable aspect of the credit has an annual cap of \$5.0 million cumulatively for the individual and corporate income tax and is effective retroactively from January 1, 2010. If, in any year, less than \$5.0 million of credits are filed collectively by all taxpayers, any unused amount rolls over to the next year.
- Laws 2011, 2nd Special Session, Chapter 1, expanded the tax credit, beginning in FY 2013, by increasing the credit calculation by 10 percent for university-related research. The credit is subject to an aggregate cap of \$10.0 million per year between individual and corporate income taxpayers. A 15-year carry forward of the credit is allowed [A.R.S. § 43-1168].

Because the benefits to innovation extend beyond the firm, the economic logic behind the tax credit was to incentivize research and development beyond what a firm would do on its own.

Prior Research on the Impact of R&D Tax Credits

Research on the impact of R&D tax credits

At the federal level, some research has suggested there may be truth to the assumption that there were benefits to innovation that extend beyond a firm. However, state incentives appear to be far less effective to not effective at all in research and development. Some literature also questions these results because R&D expenditures are too malleable—in that firms may try to classify expenditures as research and development purely for tax benefits.

Jason Fichtner of the right-leaning Mercatus Center at George Mason University and Adam Michel of the conservative Heritage Foundation argue that the R&D tax credit distorts the manner in which corporations report expenditures and does little to promote innovation, while complicating the tax code.³⁰

³⁰ Fichtner, Jason J and Michel, Adam N. (August 5, 2015). *The Research and Development Tax Credit Suffers from Design and Implementation Problems*. Mercatus Center, George Mason University. <https://www.mercatus.org/publications/government-spending/research-and-development-tax-credit-suffers-design-and>

These findings are consistent with a 2018 journal article from business school professors from the University of Wisconsin-Madison and University of California-Davis who found evidence that corporations do reclassify expenditures since research and development is inadequately defined—which allows for gaming the system. Note, that is within the tax code.³¹

While Wu (2005) is often cited as research backing state tax credits, his research actually provides weak support. He does obtain a statistically significant result when a state has a tax credit for research and development in some regressions, but it is sensitive to the variables he includes. His most consistent result is for per capita state gross national product (GNP) and that variable has an impact more than ten times as great as his R&D credit dummy variable. So at best, his research on the impact of R&D tax credits provides weak evidence.³²

Although R&D credits are dominated by very large firms, Mohnen and Lochshin argue they are more effective with small- and moderate-sized firms, consistent with the capped refundable portion of Arizona's current law³³.

Wheeler and Wallace found when controlling for the size of a state's GNP and other factors that company-funded research and development was not sensitive to the level of generosity in a state's R&D credit program.³⁴

Tim Bartik most recently in 2012 analyzed the impact of R&D tax credits in Washington state, where Microsoft and Boeing conduct a significant portion of the nation's research and development. He found that although Washington's tax credits encouraged additional research and development, they did so in quite an inefficient manner—costing the state about \$55,000 in lost revenue for each job created.³⁵ In response to this research, Washington state eliminated the credit in 2015.³⁶ In Maryland in 2017, the Office of Policy Analysis for the state concluded, "There Is No Evidence That the R&D Tax Credit Is Effective." The same holds true for Arizona.³⁷

³¹ Laplante, Stacie K., Skaife, H.A., Swenson, L.A., Wangerin, D.D. (March 2019). Limits of tax regulation: Evidence from strategic R&D classification and the R&D tax credit. *Journal of Accounting and Public Policy*. <https://doi.org/10.1016/j.jaccpubpol.2019.02.003>

³² Wu, Yonghong. (Sept. 2005). The effects of state R&D tax credits in stimulating private R&D expenditure: A cross-state empirical analysis. *The Journal of Policy Analysis and Management*. <https://doi.org/10.1002/pam.20138>

³³ Mohnen, Pierre and Lokshin, Boris. (Sept. 2009). What does it take for an R&D tax incentive policy to be effective? *Institut d'Economia de Barcelona*. <https://pdfs.semanticscholar.org/7b9a/3c3e7ecb5822e712904db2368c4f645aff3.pdf>

³⁴ Wheeler, Laura and Wallace, Sally. (2007). *Effect of state R&D tax credits in stimulating state industrial R&D activity*. 100th Annual Conference on Taxation. <https://www.ntanet.org/wp-content/uploads/proceedings/2007/047-wheeler-effect-state-rd-2007-nta-proceedings.pdf>

³⁵ Office of Policy Analysis. Department of Legislative Services. Annapolis, Maryland. (2017) *Evaluation of the Research and Development Tax Credit*. https://research.upjohn.org/up_workingpapers/187/

³⁶ Bartik, Timothy. (2019). *Making Sense of Incentives: Taming Business Incentives to Promote Prosperity*. Upjohn Institute, October, p. 68.

³⁷ Department of Legislative Services Office of Policy Analysis Annapolis, Maryland. (November 2017). *Evaluation of the Research and Development Tax Credit*. http://www.ncsl.org/Portals/1/Documents/fiscal/Fiscal_meetings/Maryland_Evaluation_of_the_Research_and_Development_Tax_Credit_32821.pdf

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The Generosity in Arizona’s R&D Tax Credit

The federal corporate tax rate is now 21 percent compared to Arizona’s rate of 4.9 percent, which is less than one-fourth of the federal rate. Arizona’s R&D tax credit is far more generous than the federal R&D tax credit when comparing it to the rate at which corporations are taxed.

The federal R&D tax credit was first established as part of the Economic Tax Recovery Act of 1981.³⁹ The act has been modified over the years as it has been renewed several times. In 2015, the federal R&D tax credit was set at 20 percent of the qualified amount of increased R&D expenditures.⁴⁰ In most circumstances tax credits can be carried forward for as long as 20 years and can be carried back one year (five years for some oil and gas production).⁴¹

Consequently, Arizona’s R&D tax credit should not exceed 5 percent of qualified expenses to be roughly proportional to the federal credit. That is not how it is pegged as noted by the Arizona Commerce Authority:

The 2011 through 2022 R&D tax credit is equal to 24% of the first \$2.5 million in qualifying expenses plus 15% of the qualifying expenses in excess of \$2.5 million. For 2023 and thereafter, the tax credit rates will be 20% of the first \$2.5 million in qualifying expenses plus 11% of the qualifying expenses in excess of \$2.5 million.⁴²

Combined with a 15-year carry forward on the credit, the result is a massive accumulation of credits and no incentive to do research and development, as it will have no impact on a corporation’s state income taxes for 15 years.

³⁸ Department of Legislative Services Office of Policy Analysis Annapolis, Maryland. (November 2017). *Evaluation of the Research and Development Tax Credit*.

http://www.ncsl.org/Portals/1/Documents/fiscal/Fiscal_meetings/Maryland_Evaluation_of_the_Research_and_Development_Tax_Credit_32821.pdf

³⁹ Wheeler, Laura and Wallace, Sally. (2007). *Effect of state R&D tax credits in stimulating state industrial R&D activity*. 100th Annual Conference on Taxation.

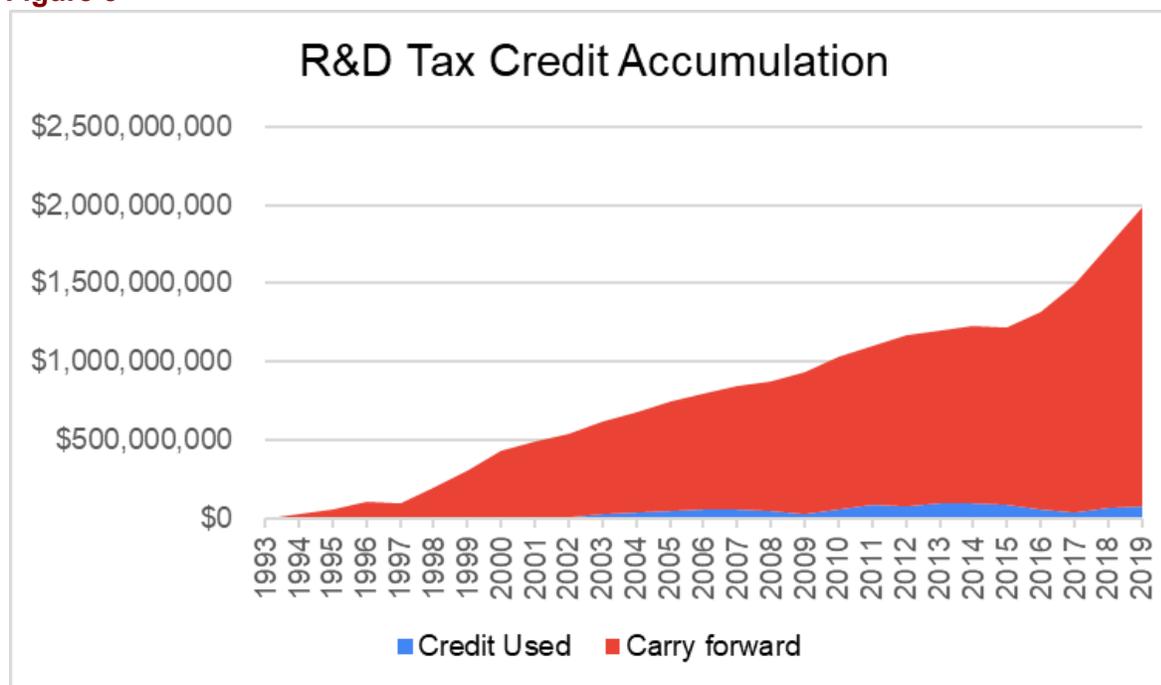
<https://www.ntanet.org/wp-content/uploads/proceedings/2007/047-wheeler-effect-state-rd-2007-nta-proceedings.pdf>

⁴⁰ Bishop, Steve. (June 2018). *Losing Out on Real Money? How Manufacturers Qualify for the R&D (Research) Tax Credit*. Bader Martin. <https://badermartin.com/manufacturers-qualify-research-rd-tax-credit/>

⁴¹ Instructions for Form 3800: General Business Credit. Department of the Treasury Internal Revenue Service. (2018) <https://www.irs.gov/pub/irs-prior/i3800--2018.pdf>

⁴² Arizona Commerce Authority. (n.d.). *Legislative Information, Research and Development*. <https://www.azcommerce.com/incentives/research-development>

Figure 5



Source: Arizona Department of Revenue Individual and Corporate Tax Credit Report (2021)

At the same time, R&D tax credits have not provided a noticeable benefit to the economy based on corporate-funded research and development as measured against state gross domestic product (GDP).

Location, Not Tax Credits, Drives Research and Development

In fact, location is more relevant than tax credits for incentivizing research and development. Corporate-funded research and development is quite disproportionately concentrated in just four states: California, Washington, Michigan and Massachusetts. Agglomeration is most important—meaning research and development will stay focused where the talent is most concentrated.

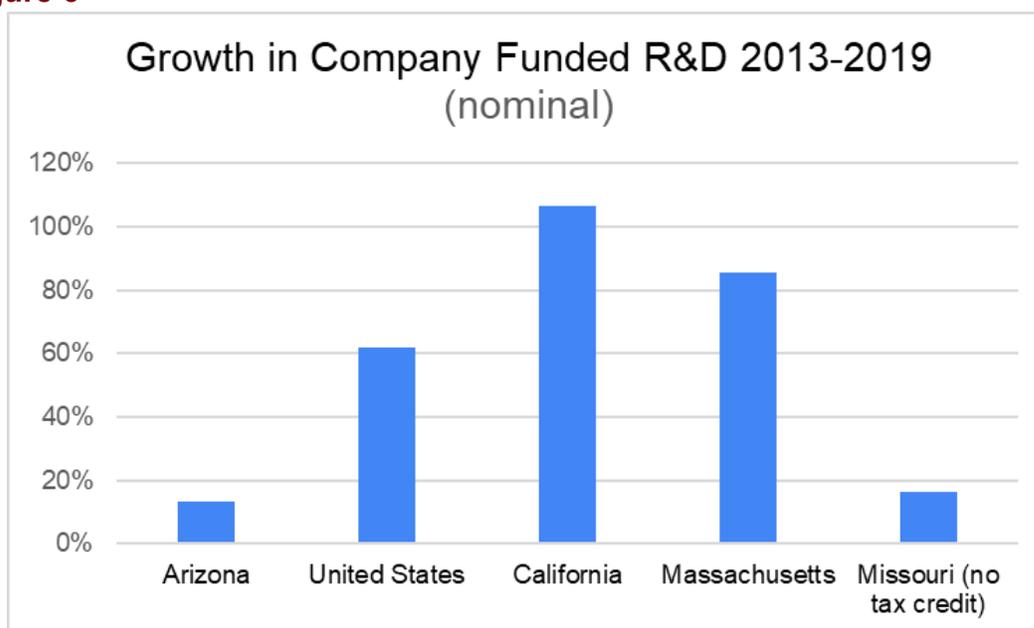
At least three of the states above would not necessarily be considered business-friendly—but all have a high concentration of key industry sectors focused on research and development. Arizona with its Silicon Desert is most similar in that regard to California with its larger Silicon Valley. So while these states have R&D tax credits (except Michigan which let its lapse in 2012), it is the location and industry concentration that drives research and development.

In 2019, manufacturing was the most critical sector driving company-funded research and development in Arizona accounting for 80 percent of the state's total. Not surprisingly 60 percent of the research and development and two-thirds of the manufacturing were related to computers and electronic products. Nearly half of Arizona's research and development came from companies with more than 25,000 employees overall (not just in Arizona). By comparison, California's R&D expenditures relative to state GDP have been normally more than twice that of Arizona's and in 2019

were four times the amount, with California having 5 percent of state GDP as research and development compared to 1.25 percent for Arizona.

On the flip side, when the Tax Foundation ranked the top states for lowest tax impacts for research and development, they identified three states where a sample firm would either pay no state taxes or even receive a net benefit: Nebraska, Hawaii and Louisiana.⁴³ These states have a combined state GDP that is slightly higher than Arizona, yet their total company-funded research and development is less than one-third of Arizona.

Figure 6



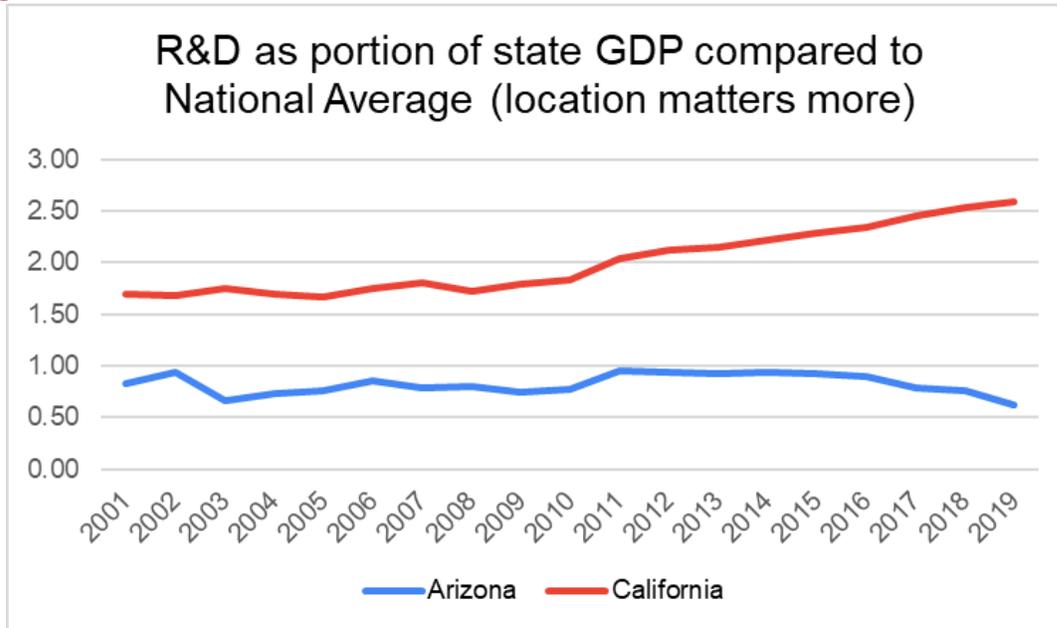
Source: National Science Foundation, Business Enterprise Research and Development Survey.

From 2013 to 2019, California’s research and development more than doubled in nominal (not inflation adjusted) terms, Massachusetts’ increased by more than 80 percent, while Arizona’s grew 13 percent, which was similar to Missouri, a state without an R&D tax credit. During the same time period, the country as a whole grew 60 percent.

Taking a longer view, state-level R&D expenditures in Arizona and California can be compared from 2001 to 2019. While Arizona can quantitatively argue it is a more “business friendly” state than California, that fact hasn’t been sufficient to change the distribution of company-funded R&D expenditures. R&D expenditures in California have grown at a significantly greater rate—even though Arizona shares a similar industry sector. The national average is 1.00 in the graph below. This is a clear indication that prime infrastructure and knowledge-base for research and development are important for driving growth in research and development.

⁴³ Tax Foundation. (2015) *Location Matter*. <https://taxfoundation.org/location-matters-2015>

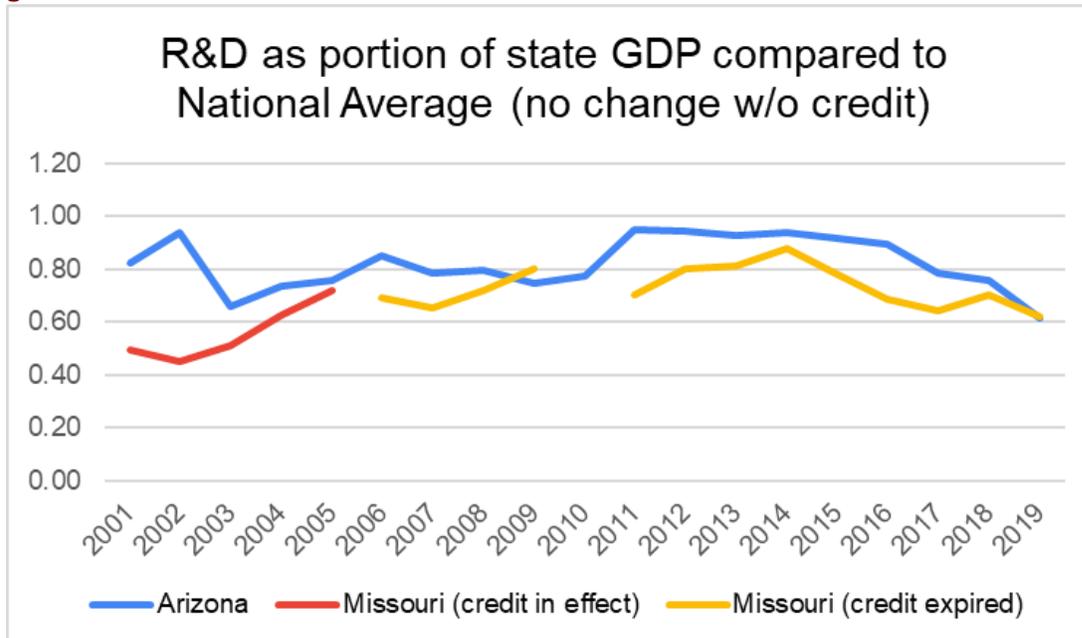
Figure 7



Source: National Science Foundation, Business Enterprise Research and Development Survey.

Missouri provides a good illustration of how eliminating the tax credit, which the state allowed to expire in 2005, has no discernable impact on R&D expenditure. Keep in mind that the particular industry mix in a given state will cause additional fluctuations relative to the national average. That can be seen in the diagram below.

Figure 8



Source: National Science Foundation, Business Enterprise Research and Development Survey.

Policies that help encourage industry-concentrated development or agglomeration, likely focused on university investments in STEM, would likely be far more effective than the current R&D tax credits in terms of growing Arizona's innovative future.

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