

THESIS

THE BROKEN PROMISE OF MOBILITY:
HIGHER EDUCATION'S FUNDING IMPACT ON POVERTY AND COLLEGE DEBT

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ABSTRACT

THE BROKEN PROMISE OF MOBILITY: HIGHER EDUCATION'S FUNDING IMPACT ON POVERTY AND COLLEGE DEBT

Following findings of increased poverty over time among Coloradans with college experience, I estimate the impact of Higher Education spending on poverty and debt outcomes for groups of individuals who have completed at least their post-secondary bachelor's degree. I hypothesize that the current level of Higher Education funding at the state level has contributed to the growing poverty and student debt. Using regression models with state and year fixed effects for poverty and additional institution-level fixed effects for debt, I find that an increase of \$1 in spending on per capita Higher Education would reduce poverty by 0.03% and debt by \$1.18 per student each year. The reduction in debt per student would be both proactive in reducing future debt and contribute to reducing current debt every fiscal cycle. Additionally, the relationship between debt and state spending indicates that growth in GDP and median income would reduce both the poverty rate and personal debt for college graduates. The impact of state supports on debt, in particular, validates the hypothesis that state spending on post-secondary institutions is currently failing to address the shifting cost-benefit value of a degree.

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INTRODUCTION

A recent study on the impact of state spending on economic mobility found that Colorado residents with 4-years of post-secondary education, conditional on being at or below the poverty line, grew by 71% over the last decade (Pena & Singleton, 2020). Given the prominence of the college experience in American culture, this finding portends future increases in poverty among those with college degrees. Many traditional mechanisms offer potential causal explanations for this shift in poverty: increasing tuition and fees, wage stagnation, increased cost of living, and declining public investments. The focus of this paper is on commonly understood financial mechanisms controlled by policymakers that impact the overall financial health of individual students. The primary focus is on the overall spending choices within a state that increases or decreases the level of debt and poverty among college graduates in order to highlight the shifting value of a college education.

This paper incorporates panel data from all 50 states and the District of Columbia from 2010 to 2018 to explore the relationship between post-secondary education spending on poverty and debt of students with a bachelor's degree. Current political discourse is focused on the negative economic impacts of rising student loan debt, and how the role of public investment on poverty provides the most direct mechanism for informing public policy on Higher Education. The research herein focuses on metrics and mechanisms familiar to economic policy interests with the intent to simplify the conclusions for policymakers. This study shows the relationship between a refocused funding mechanism for Higher Education and negative economic mobility measures of poverty and debt.

Section 2 focuses on the cyclical history of public support for post-secondary education, the impact that has had on the college wage premium, the labor supply of college graduates, and the cost-benefit valuation of a degree. Additionally, this paper aims to examine Colorado's budget history and significant challenges from the unique tax expenditure limiting Tax Payer Bill of Rights (TABOR) laws that have significantly impacted the state's ability to unilaterally fund priorities such as Higher Education. Data and Methods, Section 3, describes the variables used to illustrate the relationship between economic health measures and public financing of Higher Education. This section focuses on modeling iterations for poverty and debt that show the impact of within state, year, and institution variability. The results in Section 4 show how changing state expenditures impact the individual health of residents in each state. Finally, Section 5 lays out potential extensions for further research on this topic. As all politics are local, the policy implications of this research will describe basic impacts before focusing on the state of Colorado. Taken as a whole, this study intends to establish correlations between state funding and the financial health of individual students while providing a road map for future causal work.

HISTORY AND MOTIVATION

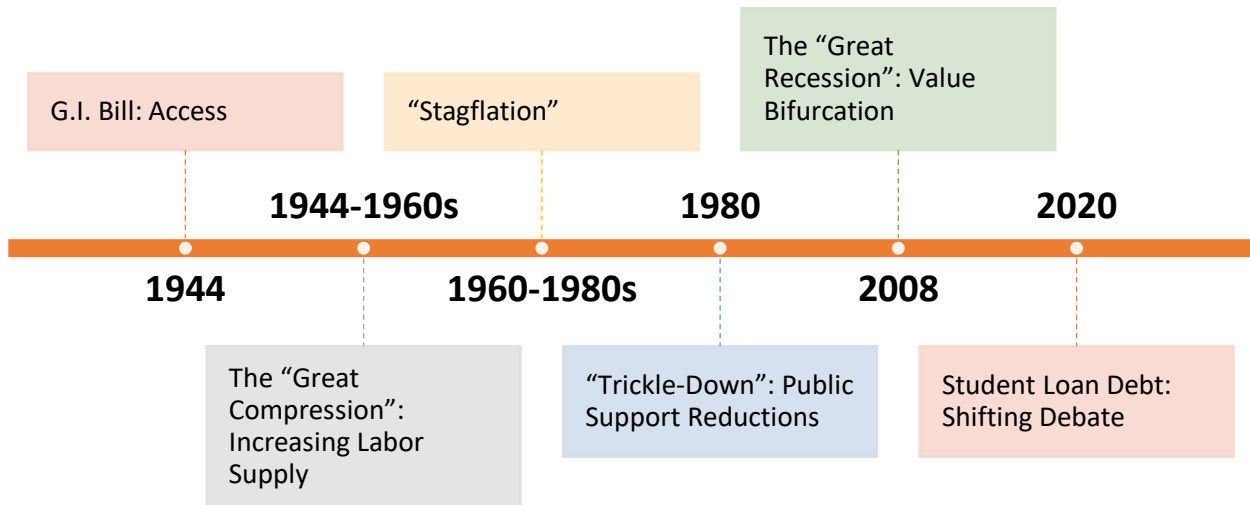


Figure 1 - Source: Author's research of relevant literature on the history of public Higher Education funding and student prioritization (citations in text).

Higher education has represented a pathway to upward economic mobility for generations of Americans. Parents and society have promoted the benefits of education to improve one's lot in life. As shown in the timeline in Figure 1, President Franklin D. Roosevelt signed the Servicemen's Readjustment Act (G.I. Bill) into law in 1944 with the express purpose of subsidizing post-secondary education to expand the middle-class (History.com Editors, 2010). Roosevelt knew then what has borne out over the subsequent decade; increasing the supply of educated workers would increase their wage premiums and over time would increase the middle-class. It is inarguable that the period of Americana that followed exhibited the fruits of this and other socially conscious policies. The income shares for the middle-class increased significantly from the 1940s until the adoption of more fiscally conservative policies in the mid-1980s, under which they began to decline even with a persistent college wage premium.

“The Great Compression” was a term coined to describe the period between post-World War II and the rise of “trickle-down economics” that saw the income gap between the upper and the middle class in America compress considerably (Goldin & Margo, 1991; Quiggin, 2010). This period of reduced inequality was partially the result of the increased enrollment in post-secondary education and subsequent wage increases from a more skilled workforce. Importantly, the rise in wages, as a result of the college wage premium, followed labor supply and demand dynamics. As more Americans obtained post-secondary educations, average wages grew until a large influx of college graduates entered the workforce around 1960 (Autor, 2014; Carnevale, 2008; Day & Newburger, 2002). The result was decades of stagnating wage growth that discouraged the supply of future collegians. During this time another shift occurred, a push to reduce the social welfare support system. As Noam Chomsky put it, “Nixon’s dismantling of the postwar economic system...led to more pressure on corporate profits...and, subsequently to a big attack on social welfare gains” (Chomsky, 2011). Significantly, the cessation of large-scale wars reduced the number of Americans taking advantage of government tuition subsidies such as the G.I. bill, the first step in reducing the supports for colleges that had guaranteed the positive economic valuation of a college degree. The wage premium gap grew again in the early 1980s with the median earnings gap of college-educated households over high school households rising by 192% by 2012 (Ibid, 2014; 2008; 2002).

The more recent acceleration of technological change reignited the premium for high-skill college labor, helping to further expand the wage premium gap. This beneficial trend for college graduates has been undermined by a stagnant federal minimum wage untethered to the inflating costs of everyday life (Day & Newburger, 2002), further inflating the pressures on potential collegians to pursue additional education, at any cost. Cementing the murky cost

assessment of a college degree, Carnevale's "College for all?" report describes "college for all" as a "uniquely American mix of cultural and political biases" that culturally defines non-degree seeking options as "second best" (2008)¹. As technologically intensive jobs command higher and higher shares of the labor supply, higher levels of education and skill will be required to qualify. In short, the trends of the past two decades are unlikely to decelerate, nor change the market incentives for education.

The Value of a College Education

The cost-benefit value calculation of a post-secondary degree no longer holds the same weight it once did. In the American zeitgeist, there are two primary points of focus for causal mechanisms of the changing value of college: student debt and increasing costs. As discussed, attaining a post-secondary education has traditionally generated a wage premium. The past decade has shown this premium does not prevent income stagnation among the college-educated, Figure 2.

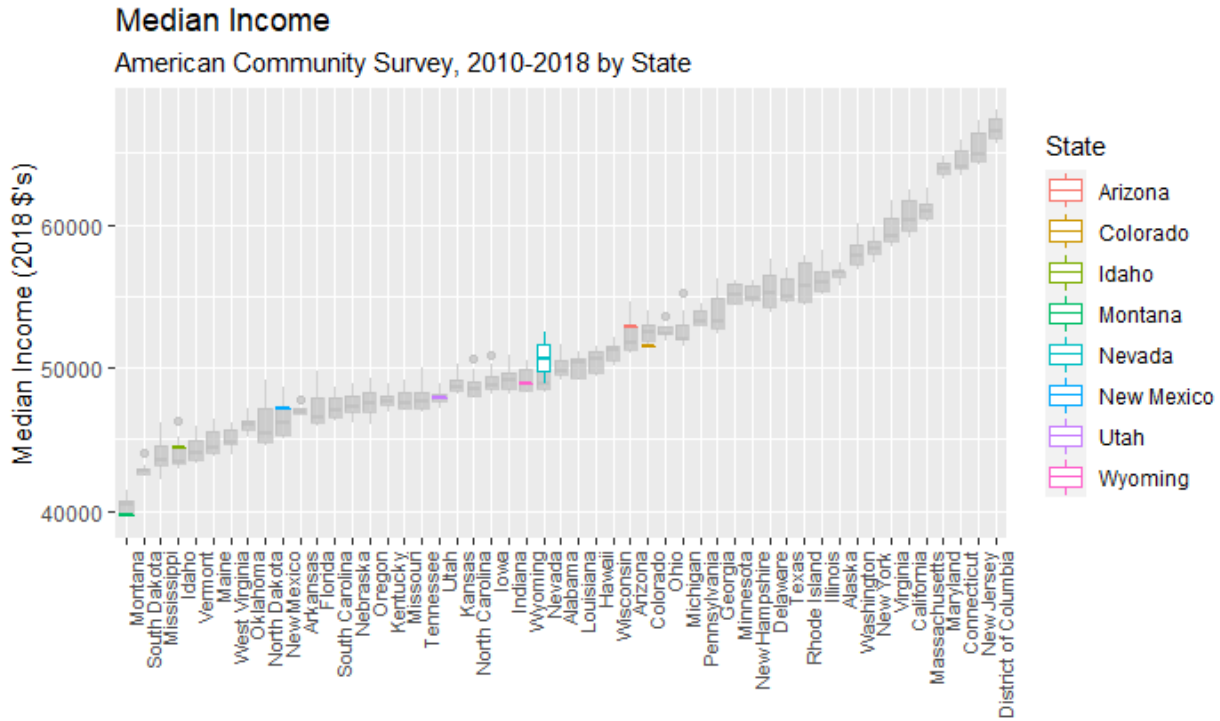


Figure 2 – Source: American Community Survey 2018 5-year historical data. Personal median income among college graduates in the U.S. (highlighting the Mountain West region of the U.S. Census Bureau).

The focus on the rising student debt, Figure 3, has become a political talking point that has raised the awareness of its impact on the macroeconomy (Bleemer, Brown, Lee, Strair, & Klaauw, 2021). Eliminating student debt in an ancient Roman-style politically charged forgiveness plan would be substantial for those holding large student debt that could trap individuals in a cycle of interest-only payments in perpetuity.² However, this is not viable at the state level, especially in states like Colorado that require ballot measures for any increased taxation that would be required for a lump sum wealth transfer. In lieu of debt cancellation, recent reports have studied the alternative method of restructuring student loan repayment. The non-partisan Congressional Budget Office (CBO) reviewed the student loan trend between 1995 and 2017 finding that income-driven repayment plans (IDR), focused on tailoring repayment amounts to wage income, led to increased debt accumulation from interest heavy payment

structures (Burk & Perry, 2020; Steinbaum, 2020). Similarly, many current student debt holders have faced shifting narratives, prioritization, and disparate experiences with their existing debt structures that have led to increased indebtedness during the downturn from Covid-19 (Friedman, 2020; Webster, 2021; Steinbaum, 2020).

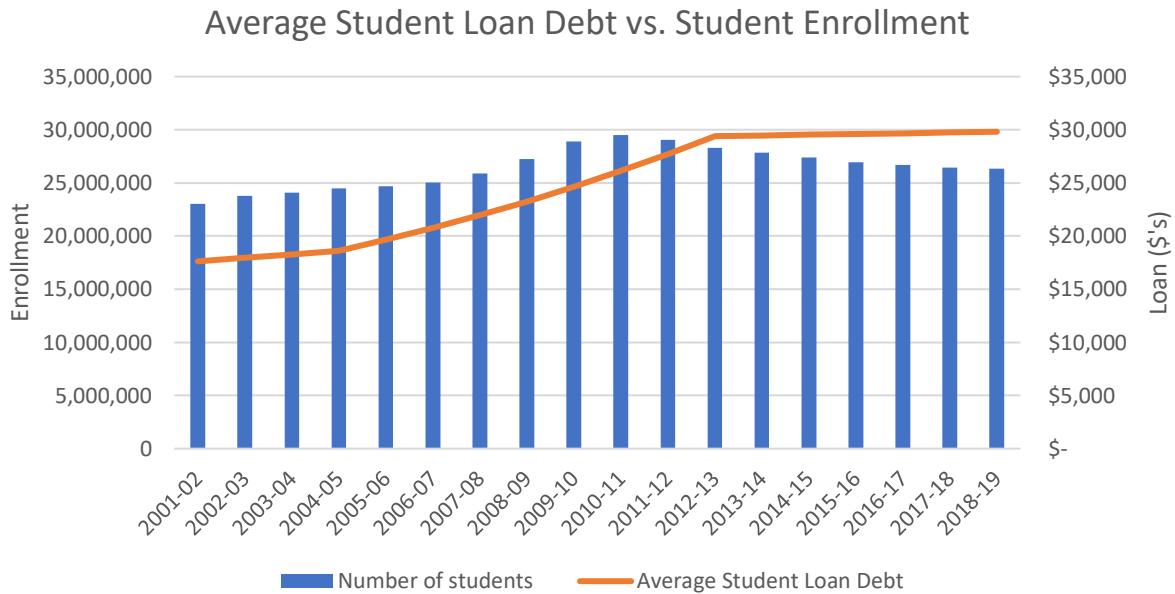


Figure 3 - Enrollment Source: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 12-month Enrollment component final data (2001-02 - 2017-18) and provisional data (2018-19). Loan Debt Source: Journal of Financial Planning, *Average Student Loan Debt By Year (Graduating Class) | 2020 Edition* (thecollegeinvestor.com).

Rising student debt affects more than just the individual’s quality of life and financial health. The impact of student debt can create unintended consequences for the overall strength of the economy, such as reduced homeownership rates and lower retirement savings. States with low educational supports that experience the negative mobility mechanisms of stagnant wages and rising tuition will likely experience lower GDP, a depressed housing market, and less consumer spending (Bleemer, Brown, Lee, Strair, & Klaauw, 2021). COVID-19’s negative impact on consumer demand in 2020 gives evidence of the consequences of shutting out a portion of

consumers from the market. The shutdown of businesses, and resulting unemployment rise primarily among lower-income individuals, created a drop in consumer spending and consumer confidence that created a drag on the overall economy (Trading Economics, 2021; Webster, 2021). Arguably, the increasing debt and rising tuition create the same economic dynamic targeted at a generation of college graduates. Less consumer capital will incentivize this generation to spend less on consumer goods, employ more austerity measures, delay homeownership, or fall further into debt. The cost of changing course is not cheap, especially if state budgets are the sole provider of additional economic supports. Balanced budget provisions may require taxation increases to make up the shortfall in the necessary funding. A federal subsidy could shore up any state budget shortfalls through a variety of mechanisms such as tax incentives, expanded grant programs, and budget appropriations. Conversely, universities could reduce their costs, but the provision of services costs are unlikely to create a financial incentive to do so. Short-term pain in order to expand economic participants creates fiscal and economic incentives for growth in the long run.

The average lifetime earnings premium found in a study on the economic value of a college education when compared with those attaining only a high school education was 84% (Carnevale, Strohl & Melton, 2011). Returns to college wages from earning a degree indicate a clear incentive to invest money into a college degree based on an expected increase in lifetime earnings. The Carnevale et. al. study finds that the choice of major within a degree path can increase the premium up to 314% (Ibid, 2011). Conversely, a common refrain regarding the rising student debt crisis in the U.S. argues that there are some categories of study that simply do not command high enough wages in the labor market to justify requiring a college degree. This argument is inherently paternalistic even if quantitatively accurate, as it generally ignores the

qualitative value of the college experience. A large discrepancy between college earning premiums would inevitably impact the cost-benefit ratio of college attainment, though not enough to imply a shift in the labor supply of college graduates in the market. An example of the fallacy of this type of cost-benefit analysis is the average wage earned by Early Childhood Education degrees. The median wage for this degree was \$36,000 a year in 2009 (Ibid, 2011). While the market rate may not support this degree type, public policy has mandated the need for these professionals to both exist and attain these degrees to teach our children. In an economic sense, market demand for a specific type of skill that does not command higher wages undermines the value proposition of a college degree.

The field of economics tends to view qualitative benefits as a nexus of personal utility and social welfare benefits. Many of the soft sciences have recognized the myriad of unquantifiable benefits to the individual and community from college-educated citizenry. Analytical thinking, cultural and intellectual exchange, autonomy, and exposure to cultural diversity are all tangible benefits from a post-secondary degree (Pescaru, 2013; Sweeney, Weaven, & Herington, 2008). Given the sizeable economic benefits of college education, not inclusive of the qualitative benefits, the United States has no discernable alternative for wage premium acquisition. Our K-12 education has become a preparatory feeder system built to prepare students to impress college admissions gatekeepers. Advanced Placement courses dominate where apprenticeships used to flourish (Carnevale, 2008). This shift in priority among aspiring collegians is not always mirrored by those in hiring positions. College is undoubtedly the pipeline to career opportunities, but each private business has its style, culture, and technical challenges that are not and cannot be taught at the institutional level. For example, a recruiter for a large multinational company told prospective applicants that “the only reason your degree is

relevant is that it proves you know how to learn”.³ The financial, personal, and societal benefits of a post-secondary education all reinforce the socially perceived value of a degree. Given these benefits and the lack of consistently viable alternatives for upward economic mobility, the choice of attaining a degree is no choice at all, regardless of rising costs.

Closer to Home: Colorado's Budget History

A study of Colorado provides background and inspiration for this paper. The state of Colorado is experiencing the second recession in the last decade that will result in a budget shortfall due to the economic shock of COVID-19. Historically this has led to reduced spending on socially desirable programs and categories. As a result of the 2008 recession, Colorado funding for Higher Education was reduced by \$62 million from FY 2010 and this has led to cutbacks at the state's institutions. While this is only a 1.29% decline in funding, that decrease alone still has not returned to pre-recession levels. In this example, the University of Colorado system laid off 79 employees in FY 2011, increased employee workloads, and required higher employee contributions to health and retirement benefits (Johnson, Oliff, & Williams, 2011). Figure 4 shows this shift in spending on a per person inflation-adjusted funding basis for the General Fund, the primary state appropriations source, for Higher Education.

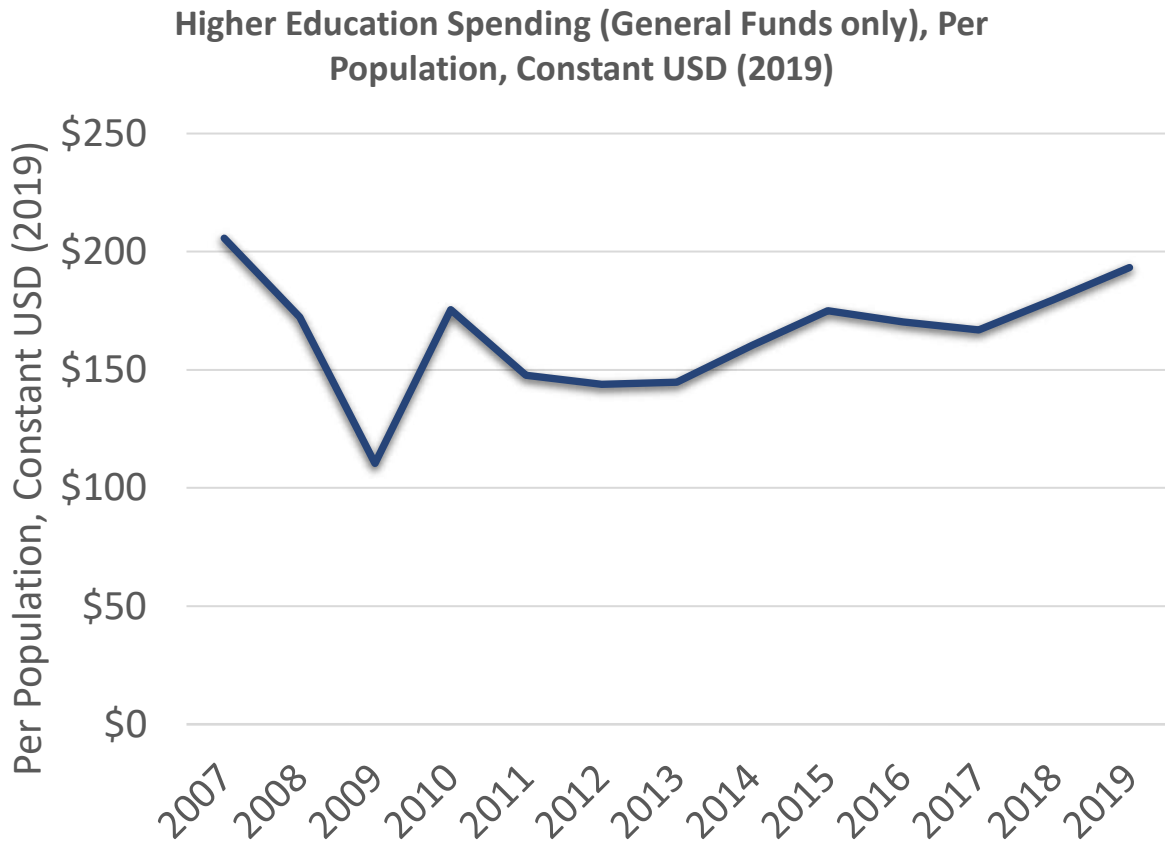


Figure 4 – Source: Bell Policy Report and authors calculations, state budget analysis from the Colorado Legislator’s Explore the Budget at [Home | Colorado State Budget](#).

In Colorado, legislators face additional and unique budget appropriations challenges due to the Taxpayer Bill of Rights law (TABOR). The stated purpose of the law was to introduce a tax and expenditure limitation (TEL) that would need “approval from voters in order to establish new taxes” with the intent to restrict spending from non-exempt sources (Sobetski, 2018). A larger sampling of TABOR studies shows a contentious assessment of the causal impact of these laws on economic growth and funding services (Bradley, 2005b). One 2018 study showed that TABOR both fails to reduce growth in legislative expenditure but also greatly reduces the governing body’s ability to respond to economic shocks (Eliason & Lutz, 2018), like the current Covid-19 outbreak. The argument that expenditures are not limited under TABOR is both

supported and undercut by the ability of Colorado legislatures to shift funding to other sources that are exempt from TABOR (Eliason & Lutz, 2018; (Eliason & Lutz, 2018; Rueben & McGuire, 2006; Bradley, Fiction and Fact: A Response to the Tax Foundation's Distortion of Colorado's TABOR, 2005). Specifically, the funding for Higher Education was significantly altered after the passage of Amendment 23 allowing for the exploitation of a TABOR loophole, enterprise-funded categories. This loophole in TABOR has led to enterprise spending growth, Figure 5, until 2020 when Coloradans voted to take ownership of enterprise fund growth and taxation through the approval of Colorado Proposition 117 (Ballotpedia, 2020).

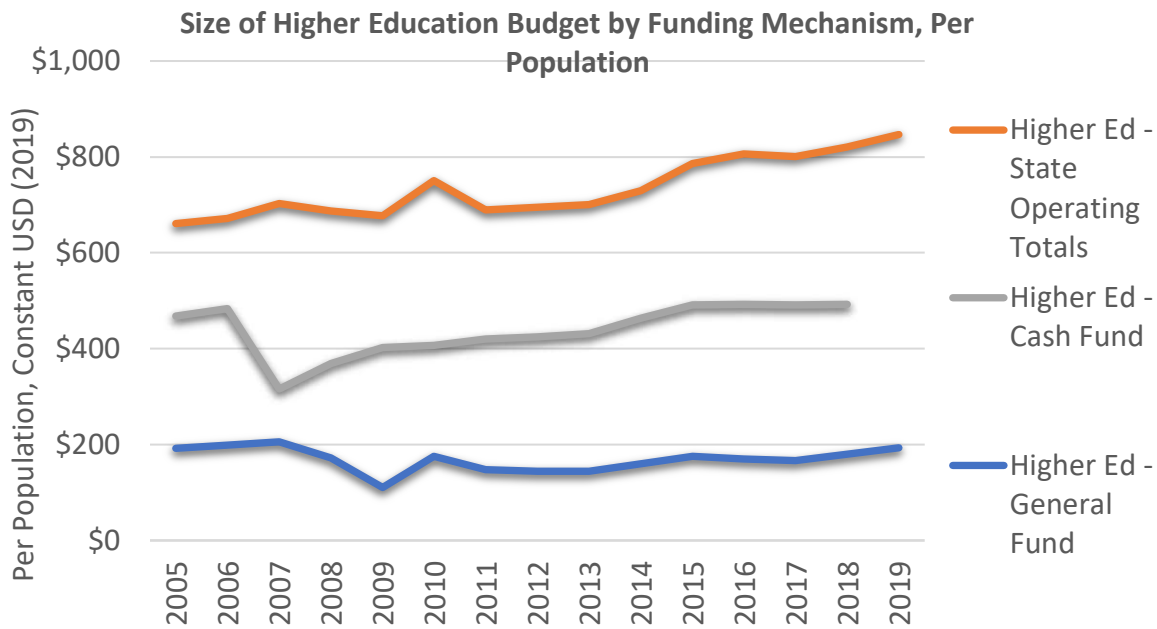


Figure 5 - Source: "Economic Mobility for Low-Income Families in Colorado: The Need for Increased Targeted Public Investment" data collected from author analysis of Operating, General, and Cash Fund data from the state of Colorado Joint Budget Committee.

The challenge of how to fund various public priorities created the incentive for the enterprise Cash Fund⁴, consisting of tuition, fees, and user costs, to subsidize the operating costs of local learning institutions. Unfortunately, this shift led to a \$1.2 billion decrease in state postsecondary education funding, when adjusted for inflation (Assembly, 2020). For comparison,

from 1976-2017, the state of California decreased its state funding from 18% to 12% while Colorado saw a similar-sized reduction in only the last two decades, 14% to 9% (Cook, 2017; Assembly, 2020). At the same time, the in-state cost of tuition and fees at Colorado State University increased from \$3,790 in 2004 to almost \$11,901 by 2019 (Assembly, 2020). A study of a potential TABOR-style TEL in Kansas found that the change would increase postsecondary education tuition by an average of \$1,400 (Bradley, 2005a) This shift of costs to the individual was not an accident, but instead the stated purpose of enterprise funds like the Cash Fund (Ballotpedia, 2020).

While the increasing costs of education indicate a market demand increase, over the same period, the increasing human capital ramped up the competition for higher wage work opportunities (Autor, 2014). The economy's supply of college-educated individuals created a potential cyclical wage premium growth cycle among an educated workforce (Ibid, 2014) that shifted based on college-educated labor shares. The college wage premium itself has remained intact, but college wage growth has generally mirrored the wage stagnation for all wage earners. Reduced support for college, increased population, a higher share of the workforce with postsecondary degrees, and the resulting wage stagnation have all contributed to the cost-benefit net value assessment of attending four years of post-secondary education. Empirical analysis has shown that individuals with at least four years of post-secondary education have increasingly slipped into poverty (Pena & Singleton, 2020). Subsequently, this study hypothesizes that the reduction in the net value of a postsecondary degree for Coloradans, due to reductions in public funding, has contributed to the increase in poverty among this cohort.

DATA AND METHODS

This paper makes use of publicly available governmental reporting for all variables used in the modeling. The data for poverty and median income was obtained from the American Community Survey (ACS) survey estimates. The ACS data used the five-year estimates to include smaller population counties, particularly relevant for rural Colorado. The Census Bureau uses five consecutive years of ACS estimates to build estimates for rural areas with a population less than 65,000.⁵ The initial mechanism for measuring the impact of Higher Education involved running a simple linear regression on the impacts of three variables of economic health within each state. I combined multiple data sources from 50 states and D.C. over nine years to estimate the impact of these macroeconomic variables on the individual rates of poverty.

Table 1 - Variable of Interest by definition and source.

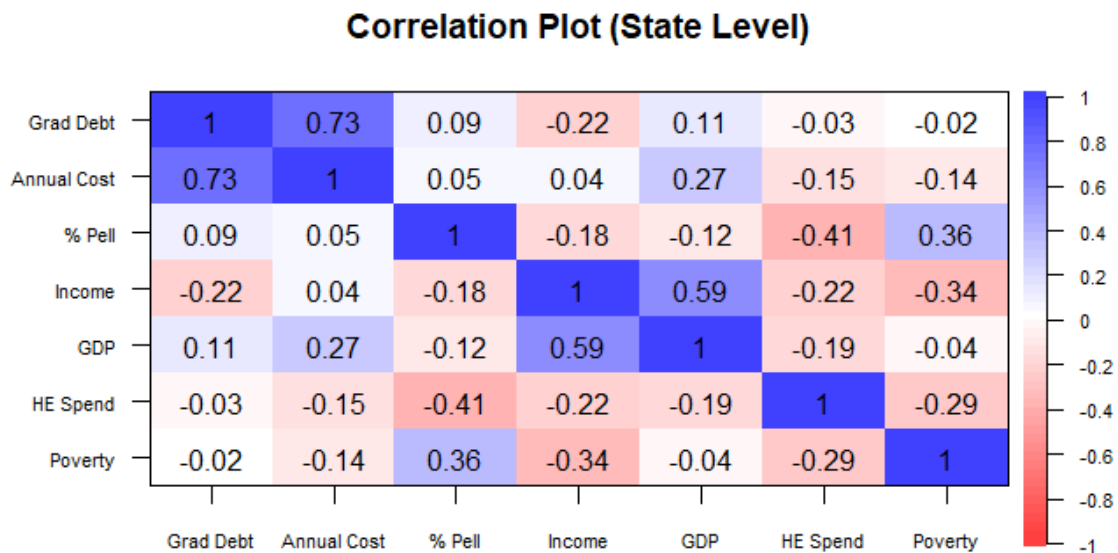
Variable	Definition	Source
<i>Pov_{s,t}</i>	The percentage of individuals at least 25 years old with at least a bachelor's degree. For each state, years 2010-2018.	American Community Survey, Column Name S1501_C02_058E, Estimate, Percent, Poverty
<i>HE_{s,t}</i>	Higher Educational spending, population-adjusted in each state, for the years 2010-2018. Constant 2018 \$'s.	Higher educational spending per state from the U.S. Census Bureau, Annual Surveys of State and Local Government Finances for each year. Line 71, Higher Education adjusted to 2018 \$'s (CPI-U)
<i>GDP_{s,t}</i>	Gross Domestic Product, population-adjusted in each state, for the years 2010-2018. Constant 2018 \$'s.	Bureau of Economic Analysis, real GDP in chained 2012 \$'s, adjusted to 2018 \$'s (CPI-U)
<i>Inc_{s,t}</i>	Median income earned in 12 month period by individuals at least 25 years old with at least a bachelor's degree. For each state, years 2010-2018. Constant 2018 \$'s.	American Community Survey, S1501_C01_063E, Estimate, Total, Median Earnings
<i>PELL_{c,s,t}</i>	Percentage (%) of undergraduates who received Pell Grant Aid. For each college, state, years 2010-2018.	College Scorecard, U.S Department of Education. Years 2010-2018 merged. PCTPELL
<i>Cost_{c,s,t}</i>	Annual cost of attendance includes tuition, fees, and housing. Data in the scorecard did not contain, tuition and fee-specific information. For each college, state, and years 2010-2018.	College Scorecard, U.S Department of Education. Years 2010-2018 merged. COSTT4_A
<i>Debt_{c,s,t}</i>	The median debt for students who have completed degrees. For each college, state, and years 2010-2018.	College Scorecard, U.S Department of Education. Years 2010-2018 merged. GRAD_DEBT_MDN

Table 2 - Summary Statistics - Mountain Division – Source: ACS, U.S Census Bureau, Bureau of Economic Analysis, and Department of Education.

Variables	Arizona, N = 181	Colorado, N = 242	Idaho, N = 69	Montana, N = 101	Nevada, N = 63	New Mexico, N = 216	Utah, N = 75	Wyoming, N = 69
Graduates in Poverty (%)	5.30 (0.40)	4.30 (0.19)	5.20 (0.39)	5.20 (0.16)	5.70 (0.53)	6.20 (0.60)	4.40 (0.23)	3.90 (0.38)
Higher Educational Spend perCapita (\$'s)	855 (43)	1,003 (83)	700 (42)	892 (33)	517 (26)	1,289 (48)	1,375 (82)	1,407 (98)
GDP perCapita(\$'s)	45,149 (1,283)	60,267 (2,945)	41,347 (1,773)	46,328 (1,050)	51,971 (1,143)	46,778 (1,221)	50,768 (2,480)	72,946 (1,866)
Median Income of Graduates (\$'s)	51,554 (1,128)	52,491 (748)	43,401 (992)	40,458 (606)	48,860 (1,419)	46,143 (1,152)	47,957 (525)	48,893 (800)
Pell Grants (%)	34 (10)	33 (12)	40 (10)	36 (8)	30 (7)	36 (12)	32 (7)	21 (5)
Graduate Debt (\$'s)	9,980 (5,761)	13,231 (6,007)	18,828 (6,657)	18,083 (5,153)	13,242 (5,062)	16,048 (4,946)	12,728 (3,960)	9,150 (3,667)
Annual Total Cost of College (\$'s)	13,179 (5,780)	17,962 (4,558)	17,118 (3,702)	15,806 (2,626)	14,211 (3,386)	12,939 (3,033)	15,554 (3,061)	12,127 (2,713)

¹Median (SD)

Table 3 - Correlation Plot at the State Level



$$Pov_{s,t} = \beta_0 + \beta_1 * HE_{s,t} + \beta_2 * GDP_{s,t} + \beta_3 * Inc_{s,t} + \gamma_s + \delta_t + \varepsilon_{s,t} \quad (1)$$

The poverty model uses the dependent variable, $Pov_{s,t}$, to capture the economic status of individuals over the age of 25 who had earned at least a bachelor’s degree, with the current status shown in Figure 6 and Figure 7. This poverty rate excludes students who did not attain their degree in order to reduce the impact of debt without the benefit of the college wage premium. A limitation to this variable is the inability to filter out the share of students fortunate enough to have access to inter-generational capital. Subsequently, the percent of individuals in poverty is likely to be biased against students without the means to pay for the collegiate process without loans, scholarships, or inter-generational wealth transfers.

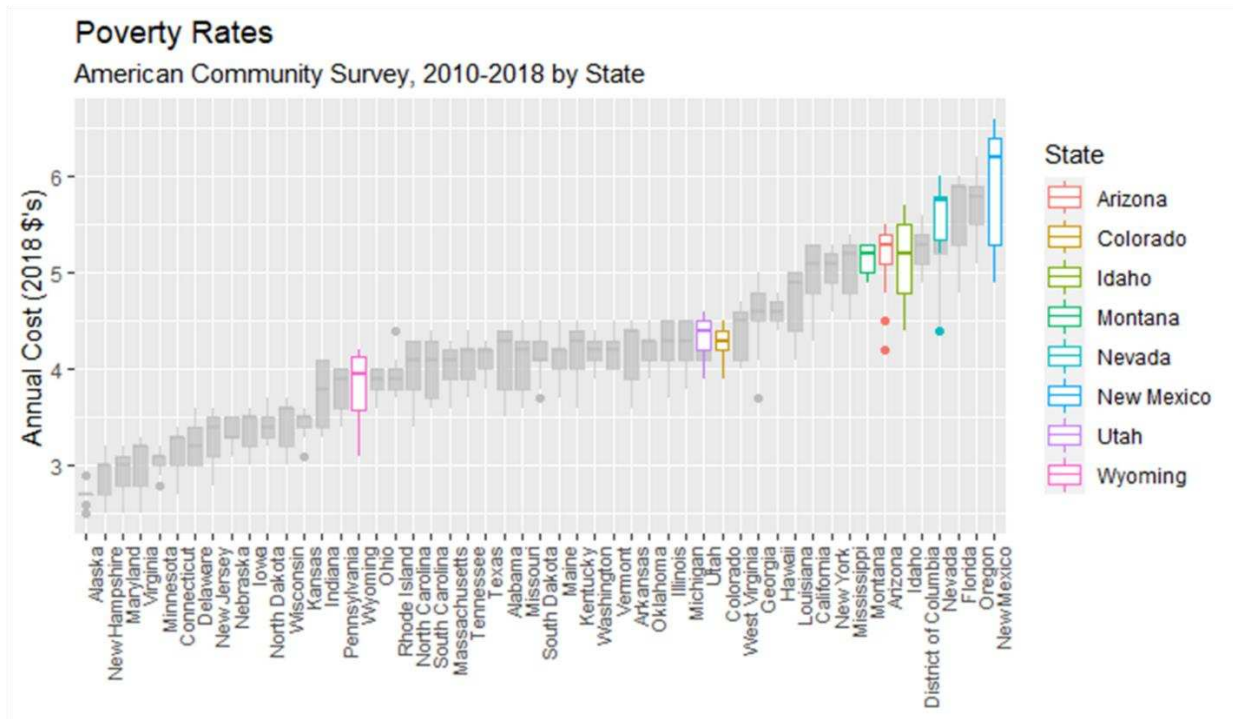


Figure 6 – Source: American Community Survey 5-year summary survey. The percentage of individuals at least 25 years old with at least a bachelor’s degree. For each state, years 2010-2018.

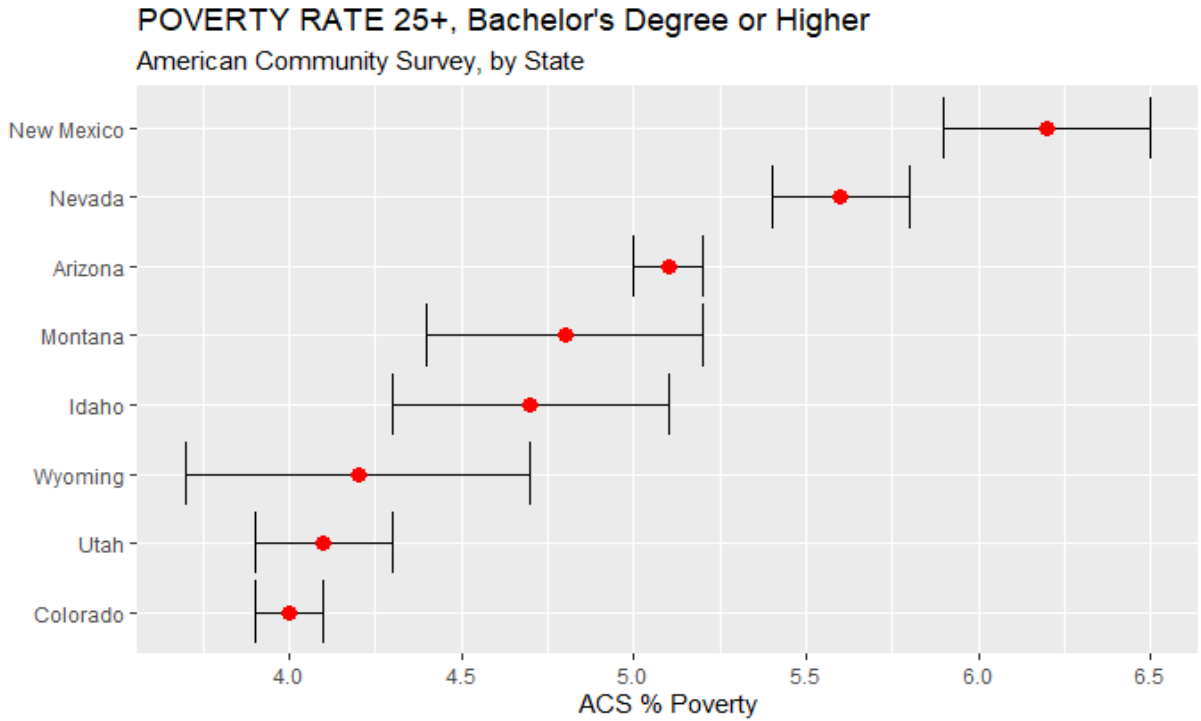


Figure 7 - Source: American Community Survey 5-year summary survey. The percentage of individuals at least 25 years old with at least a bachelor's degree. For each state, years 2010-2018.

Higher educational spending, Figure 8 and Figure 9, serves as a prioritization metric and the primary mechanism for public funding of post-secondary education within a given state. As noted previously, the limitations in the data is the conflation of operating budgets for institutions with the number of resources for the end customer, students. I defined the spending totals, per population, as the primary mechanism of the magnitude of appropriations used to offset the cost of attendance and operations at the university level. The regression coefficient for Higher Education spending is a clear indicator of the impact increased state funding could have on the poverty rate. Again, it is imperative to note that the increase in funding, if made up primarily of increased costs, would obscure any gains in the normative societal attempt at reducing poverty.

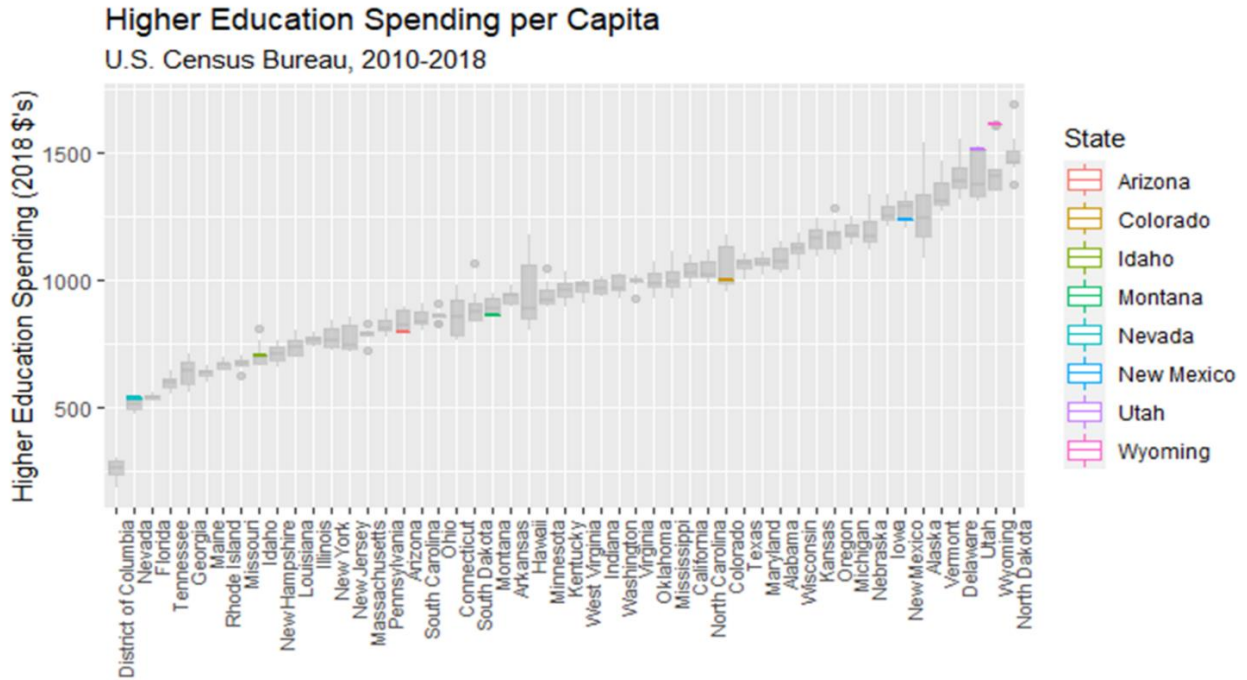


Figure 8 - Higher educational spending per state from the U.S. Census Bureau, Annual Surveys of State and Local Government Finances for each year. Line 71, Higher Education adjusted to 2018 \$'s (CPI-U)

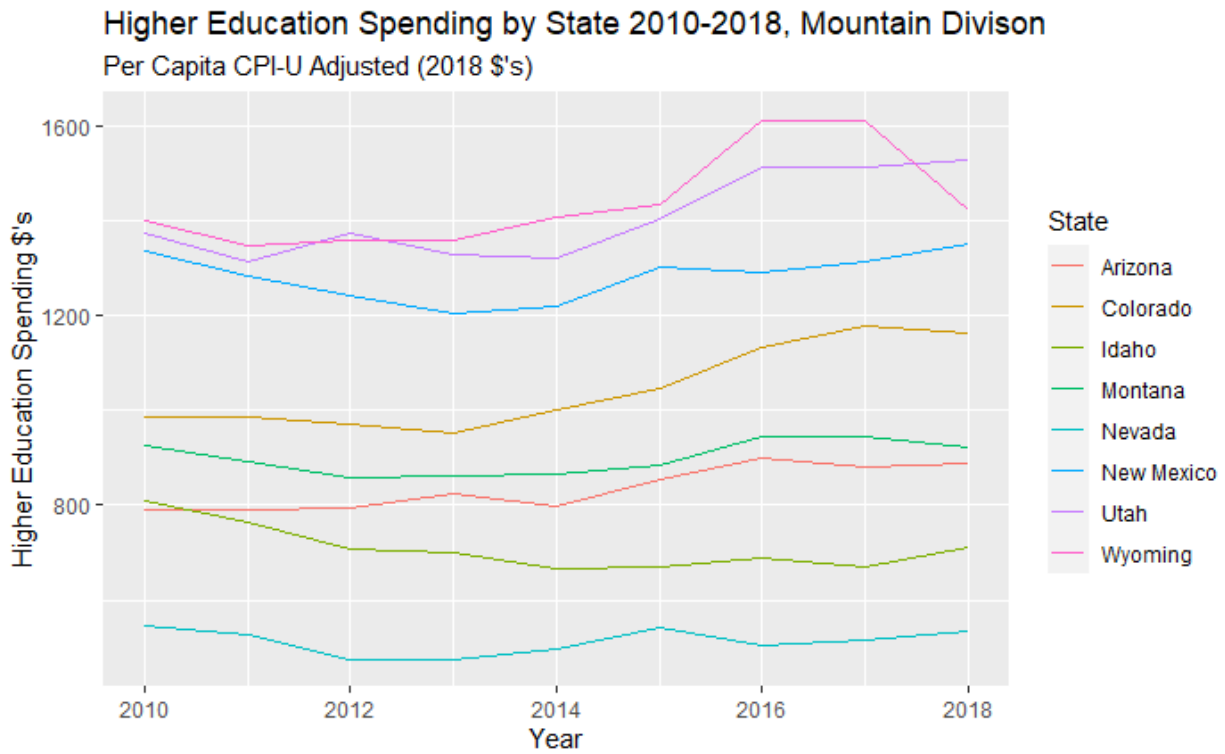


Figure 9 – Higher educational spending per state from the U.S. Census Bureau, Annual Surveys of State and Local Government Finances for each year. Line 71, Higher Education adjusted to 2018 \$'s (CPI-U)

Figure 10 and Figure 11 trends for Wyoming foundationally informed the parameters of the model for both poverty and debt. The cluster of institutions in Wyoming represents the lowest poverty rates (3.9%), the highest per capita Higher Education spending (\$1407), and the lowest median individual debt accumulated (\$9150). Without factoring in fixed effects at the state level this normative result is not visible.

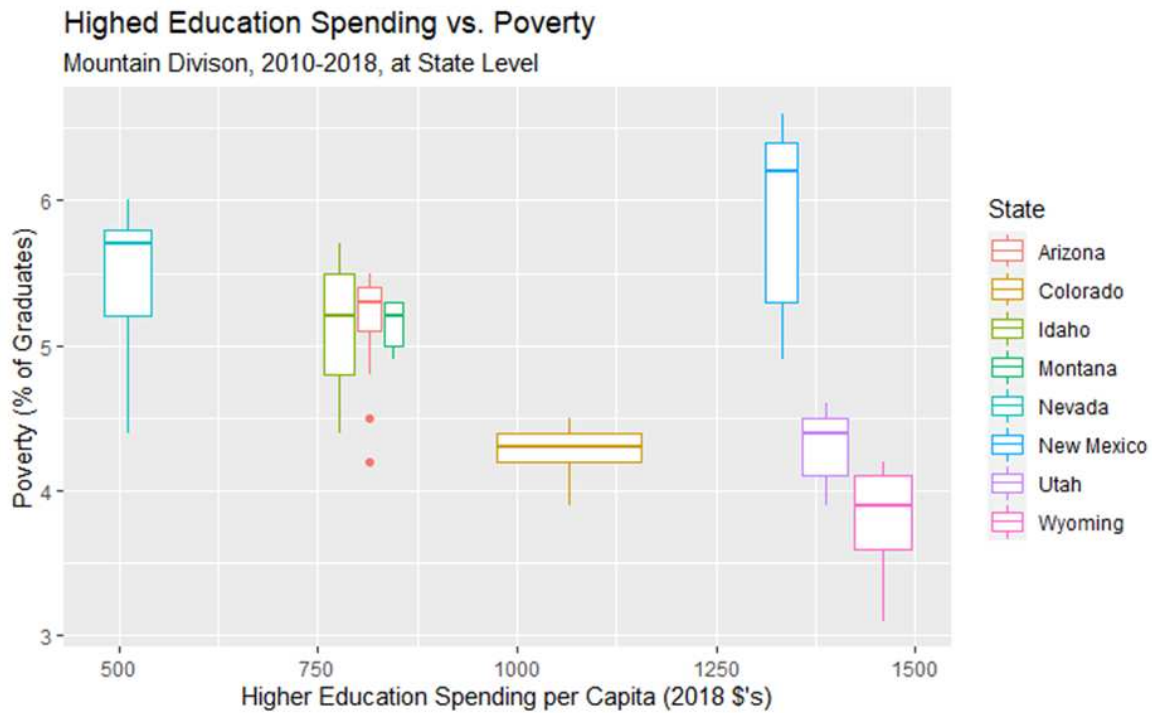


Figure 10 – Source: Higher educational spending per state from the U.S. Census Bureau, Annual Surveys of State and Local Government Finances for each year. Line 71, Higher Education adjusted to 2018 \$'s (CPI-U)

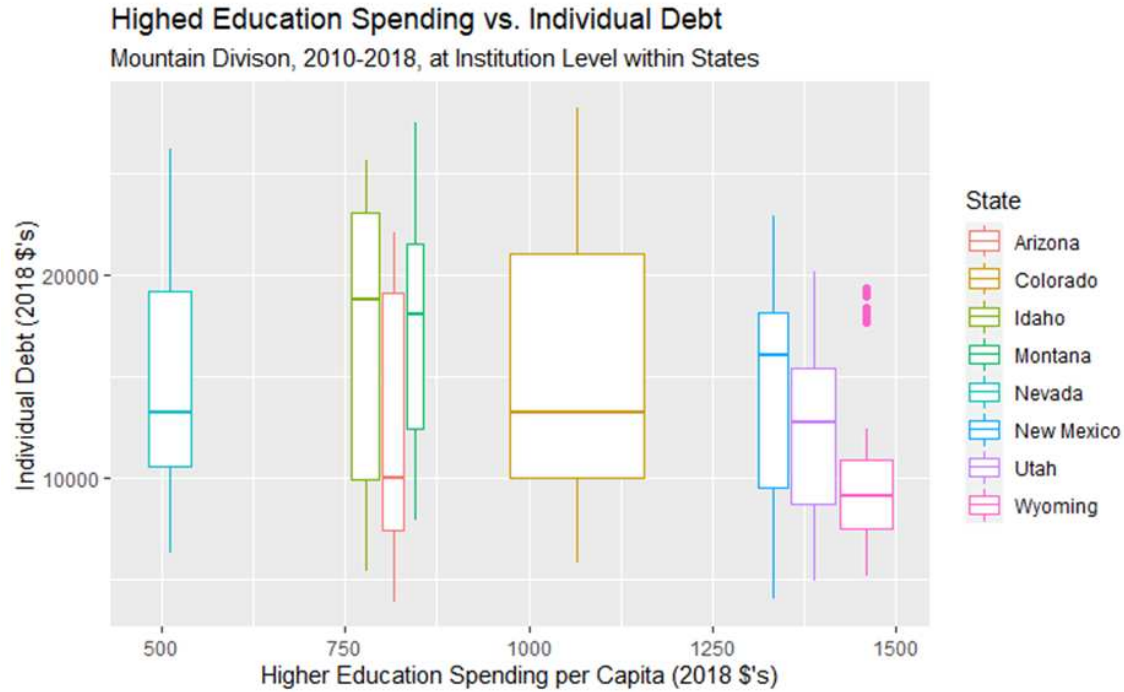


Figure 11 – Source: Higher educational spending per state from the U.S. Census Bureau, Annual Surveys of State and Local Government Finances for each year. Line 71, Higher Education adjusted to 2018 \$'s (CPI-U)

Ceteris paribus, the higher the baseline median income in a state, $Inc_{s,t}$, Figure 12, the lower the poverty rate; however, this correlation is potentially offset by federal, state, and familial subsidies. Each state has its own set of taxes and revenue distribution laws under consideration necessitating the use of fixed effects at the state level. Obtained from the Bureau of Economic Analysis, the remaining explanatory variable in this equation, $GDP_{s,t}$, is a lagging macroeconomic indicator of state level economic health. GDP serves as a weighting factor for total available spending. The poverty model used eschews lagging the GDP due to the potential for partisan election cycles to create a larger impact on funding shifts unrelated to growth or revenue.

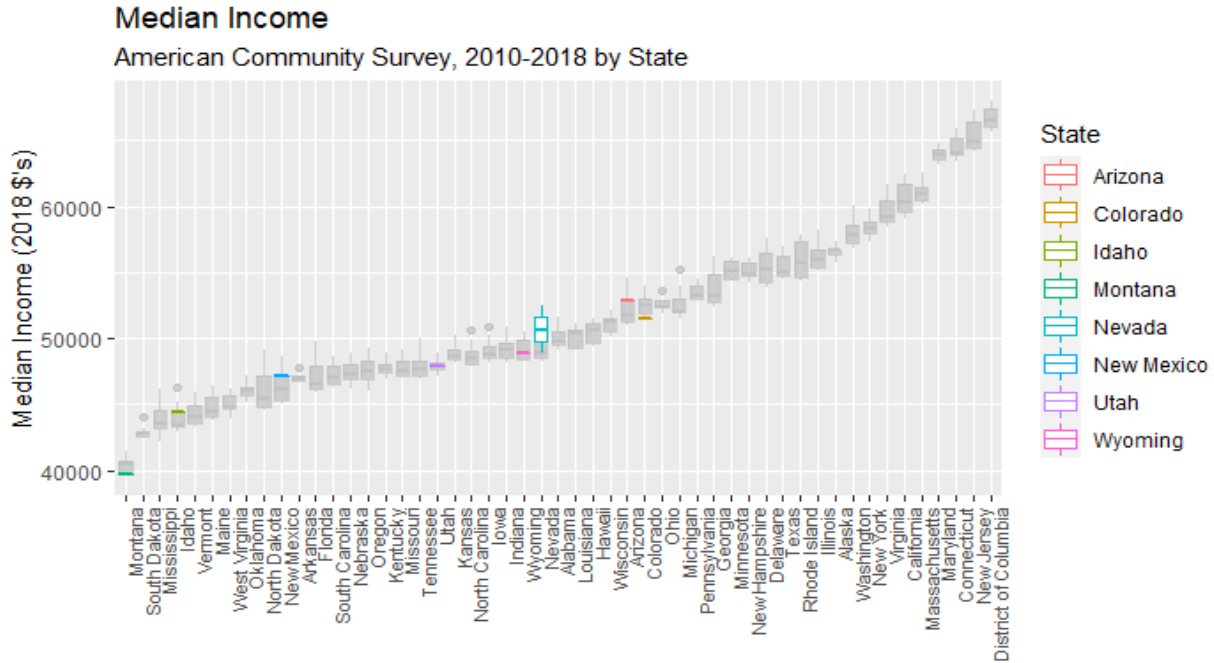


Figure 12 – Source: American Community Survey, Median income earned in 12 month period by individuals at least 25 years old with at least a bachelor’s degree. For each state, years 2010-2018. Constant 2018 \$’s.

Finally, the poverty model contains fixed effects for both state and time (year). The choice of these fixed effects helps to isolate changes within states from unique policy or legislative decisions that would not impact other state funding choices, such as changes to federal education policy. As discussed, Colorado in particular has a stringent set of TELs that define expenditure decisions more than policy prioritization.

$$Debt_{c,s,t} = \beta_0 + \beta_1 * HE_{s,t} + \beta_2 * GDP_{s,t} + \beta_3 * Inc_{s,t} + \beta_4 * PELL_{c,s,t} + \beta_5 * Cost_{c,s,t} + \gamma_s + \delta_t + \zeta_c + \epsilon_{c,s,t} \quad (2)$$

The model on poverty informed the primary model of interest, the average accumulated debt of students at each institution within a state and year, $Debt_{c,s,t}$. Reviewing the regional debt accumulation among degree earners in Figure 13 does not provide much clarity on trends within

the overall Higher Education system. Here I again use macroeconomic variables for income, GDP, and Higher Education spending.

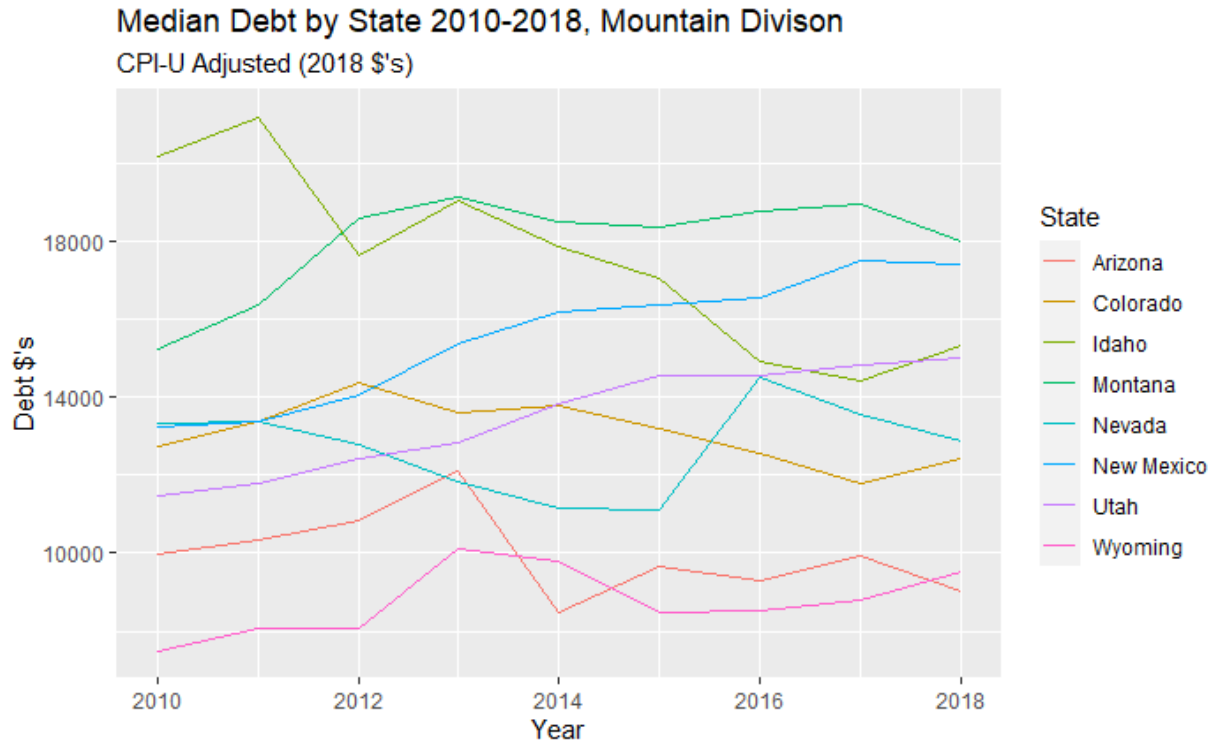


Figure 13 -Source: U.S. Department of Education's "College Scorecard", median debt for students who have completed degrees. For each college, state, and years 2010-2018.

The variable, $PELL_{c,s,t}$, was added as mechanism to measure the impact of uniquely federal subsidies. The current percentage of federal Pell grants, Figure 14, represents the share of students receiving federal subsidies, awarded to individuals who qualify based on financial need.

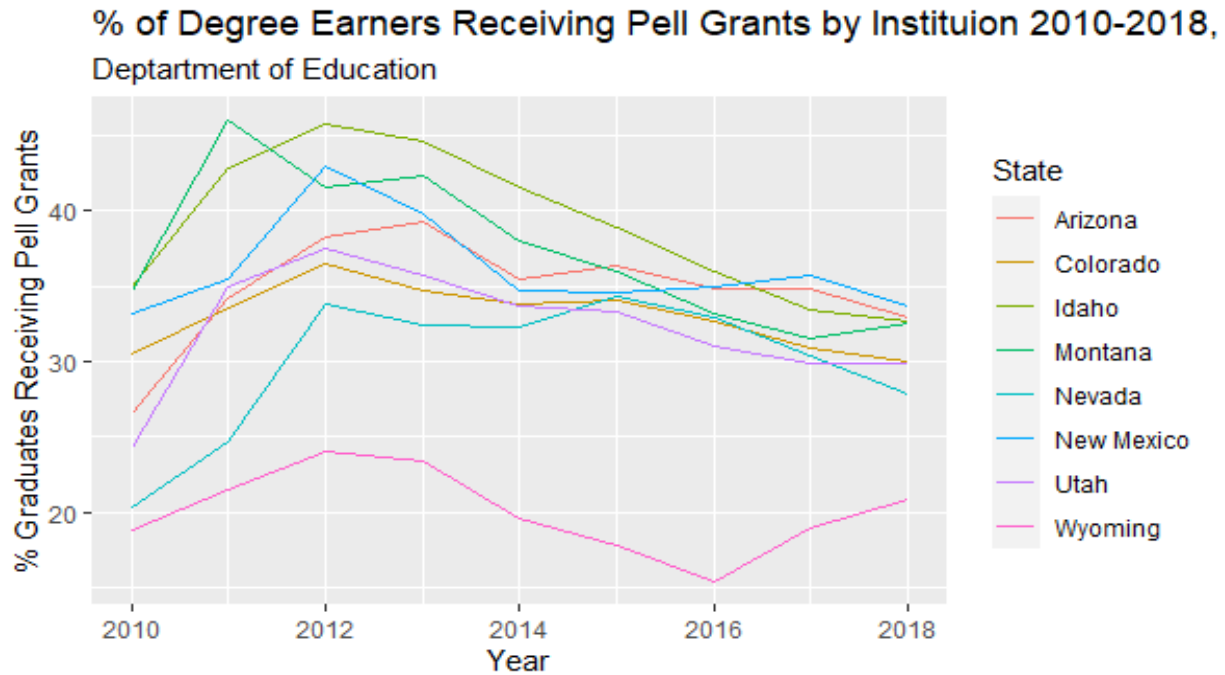


Figure 14 - Source: U.S. Department of Education’s “College Scorecard”, Percentage (%) of undergraduates who received Pell Grant Aid. For each college, state, years 2010-2018.

The final variable in this model is the average annual total cost of attendance at each institution, $Cost_{c,s,t}$. Each of these three variables contain state, year, and institution level observations, giving a clearer picture of the impact of Higher Education funding choices. As each institution can differ in size, quality, and outcomes, I included fixed effects at the institutional level. The data was obtained from the Department of Education’s “College Scorecard” and filtered for public schools only to eliminate bias from institutions that do not see appreciable public funding. Future work would benefit from isolating and weighting the costs by income categorization and institution metrics of size and outcome. Currently, the officially

reported values from the Department of Education obscure how funding is reported. Tuition and fees are combined with all other budgeting into an operating budget and reported as the total cost of attendance.

RESULTS

Poverty – Model (1)

Table 4 - Poverty Model (1)

OLS - Poverty

	Poverty % of No FE Model I	Bachelor's Year FE Model II	Degree Holders State/Year FE Model III
HE {s,t}	-0.001147*** (0.000126)	-0.001158*** (0.000123)	-0.000327** (0.000135)
GDP {s,t}	0.000008*** (0.000002)	0.000006*** (0.000002)	-0.000009** (0.000004)
Inc {s,t}	-0.000071*** (0.000006)	-0.000065*** (0.000006)	-0.000105*** (0.000011)
Constant	8.487141*** (0.333261)	7.930170*** (0.344805)	9.769720*** (0.555400)
Fixed Effects	NA	Year	State/Year
DF	455	447	397
N	459	459	459
R2	0.285388	0.342210	0.973610
Adjusted R2	0.280676	0.326023	0.969555
Residual Std. Error	0.694023	0.671791	0.142780
F Statistic	60.569720***	21.140770***	240.110500***

Note: ***p < .01; **p < .05; *p < .1

This paper has described the social and quantitative benefits of a post-secondary degree as a means of upward economic mobility. The model iterations shown in Table 4 show the change in poverty rates when Higher Educational funding (per capita), GDP (per capita), and

median income are regressed with various levels of fixed effects. Each iteration highlights the unobserved variance specifically at the state level. As expected, including fixed effects for the year reduces the unobserved variation that occurs when budgets change annually. As discussed, each state has unique laws and priorities that are unobservable across states, hence the state fixed effects. Higher Education funding at the state level is a competent mechanism for increasing upward mobility among college students. The model indicates a significant finding for the overall normative social desire to reduce poverty. Acknowledging the substantial cost inherent in this assessment, simply doubling the Higher Education budget would cut the poverty among college graduates by almost a third. Of note is the inverse relationship between the coefficients on Higher Education spending and poverty across all three poverty model iterations. While the first two versions capture macroeconomic trends in funding, the addition of the state fixed effects more adequately captures the true relationship while avoiding omitted variable biases.

The impact on poverty from an increase in median income is small but significant, as it was with Higher Education funding. An intuitive reduction in poverty with increases in the median income validates the positive assumption of income level defined poverty. In the poverty model (1), the median income of bachelor's students represents those who have benefited financially from the college wage premium. A reduction of poverty by 0.0105% for a \$1 increase in income is a clear and intuitive relation between two individual-level financial health variables. Within this regression, increasing income is an exogenous mechanism to reduce poverty. The ongoing discussion surrounding raising the federal minimum wage by more than 100% is meant as a direct policy mechanism to reduce poverty while raising living standards (Wolf, 2021). If implemented, this policy would indicate a new income floor that would at minimum raise the median earned wage in the U.S., and subsequently reduce poverty significantly.

Finally, we see in the raw data that the GDP has mostly increased over time in most states, per capita, Figure 15. The coefficients for GDP validate the state-level fixed effects by isolating the significant variation between states. Directionally, the resulting coefficient for GDP suggests that increasing the overall economic health in-state would reduce the level of poverty. Unsurprisingly, this impact is diffused throughout the economy with a very small impact on poverty. The increasing poverty shown in Figure 16 supports the assertion that Higher Education funding currently limits the potential gains from increasing GDP seen in Figure 14.

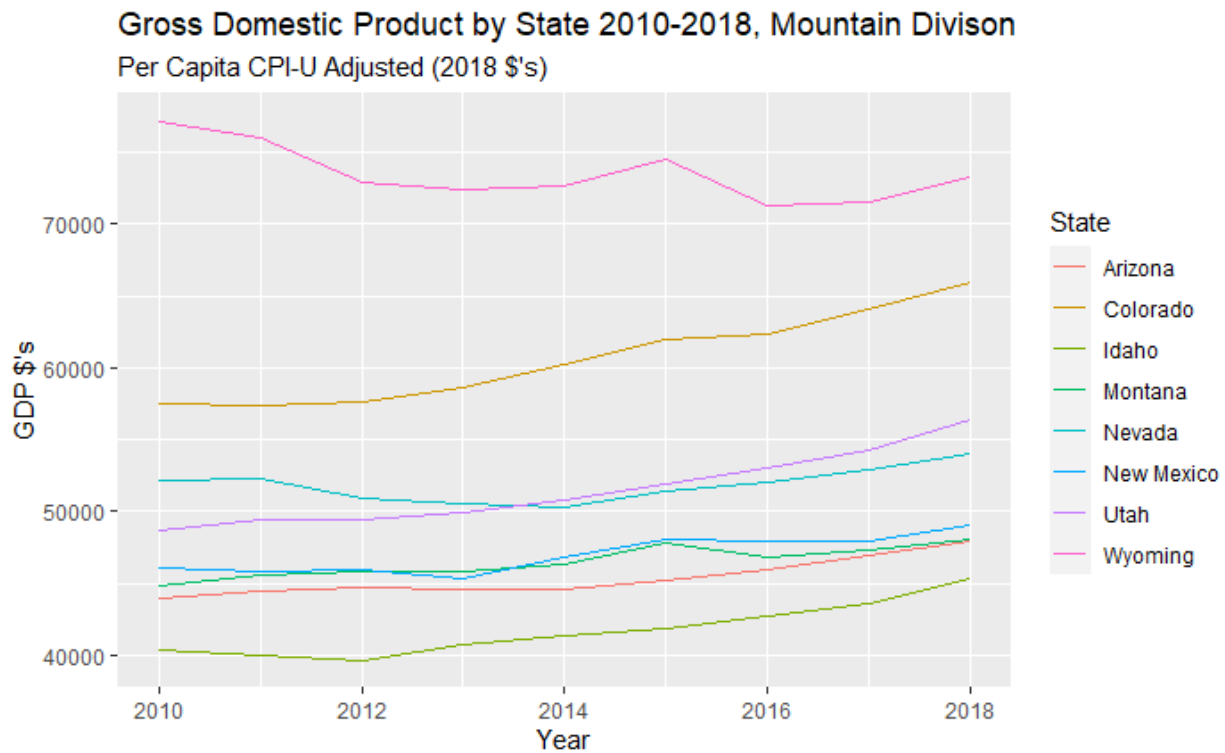


Figure 15 – Source: Bureau of Economic Analysis, real GDP in chained 2012 \$'s, adjusted to 2018 \$'s (CPI-U). Gross Domestic Product, the percentage of individuals at least 25 years old with at least a bachelor's degree. For each state, years 2010-2018.

% of Degree Earners in Poverty by State 2010-2018, Mountain Division
 American Community Survey

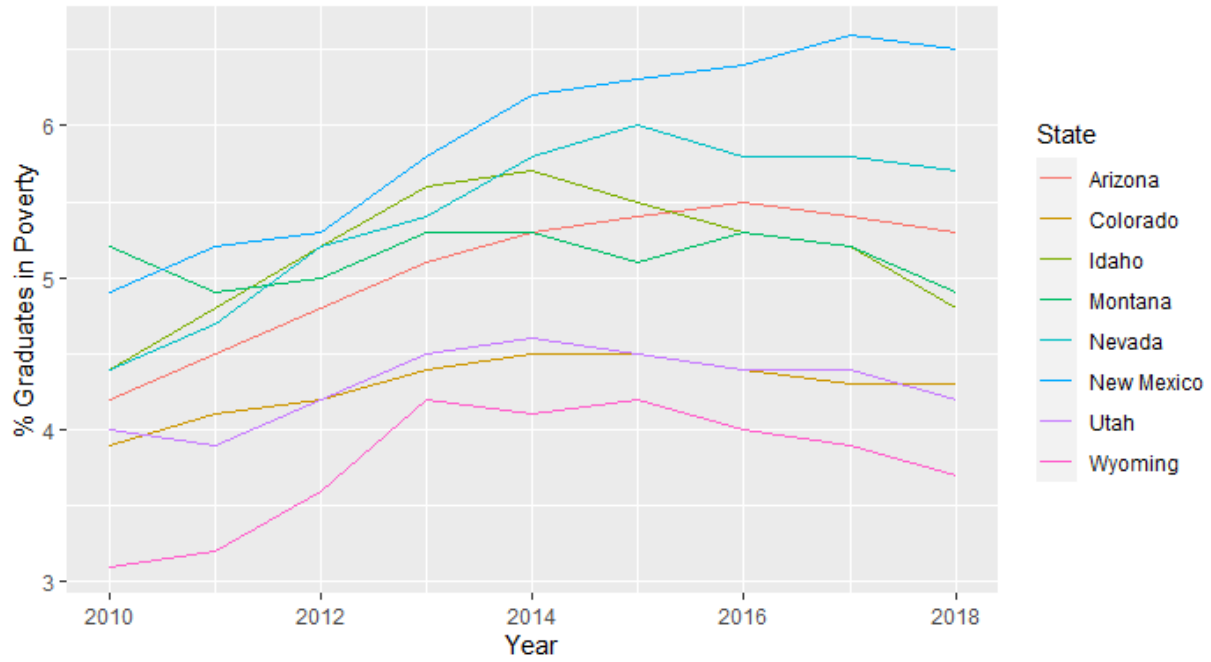


Figure 16 -Source: American Community Survey, percentage of individuals at least 25 years old with at least a bachelor's degree. For each state, years 2010-2018

Debt - Model (2)

Table 5 - Debt Model

Debt - OLS

	Debt of Bachelor's (or Higher) Degree Holders			
	NO FE Model I	Year FE Model II	Year/State FE Model III	Year/State/College FE Model IV
Higher Ed Spending PerCap	0.53633** (0.21959)	0.54670** (0.22002)	-0.59223 (0.97255)	-1.18956*** (0.31416)
GDP PerCap	-0.00916 (0.00612)	-0.00893 (0.00615)	0.03394 (0.02801)	-0.04208*** (0.00917)
Median Income of Bachelor's+	-0.16946*** (0.01112)	-0.16927*** (0.01125)	-0.11611 (0.07221)	-0.17866*** (0.02345)
%Pell Grants	47.34803*** (3.31927)	47.33920*** (3.36023)	33.19677*** (3.32508)	4.85659* (2.89430)
Annual Cost Attendance	0.98707*** (0.00784)	0.98688*** (0.00785)	0.94581*** (0.00762)	0.09566*** (0.01006)
Constant	5,974.58800*** (549.24060)	5,853.39800*** (568.78480)	4,727.69500 (3,666.86700)	32,217.47000*** (1,304.83100)
Fixed Effects	No 12,591	Yes(Year) 12,591	Yes(Year/State) 12,591	Yes(State/Year/College) 12,591
R^2	0.56477	0.56501	0.63857	0.96725
Adjusted R^2	0.56460	0.56456	0.63675	0.96270
Residual Std. Error	4,739.29500	4,739.50200	4,328.85600	1,387.20800
F Statistic	3,266.17200***	1,256.64100***	351.30320***	212.53340***

Note:

***p < .01; **p < .05; *p < .1

To expand the findings on poverty, I next modeled the median debt of individual college graduates, $Debt_{c,s,t}$, at the institutional, state, and year fixed effects level, limited to public institutions only. Here the relationship between spending on Higher Education and debt shows a dramatic impact on the amount of debt a student could eliminate with higher state support. Significantly, a \$1 increase in funding per capita would reduce the debt of a student by \$1.18. The additional external benefit of \$0.18 is possibly due to a reduction in loan interest on the debt. Of note is that the spending is calculated on a per resident scale and not on the individual student alone, indicating a potentially higher per student benefit if these subsidies were structured as

direct payment support. The United States' current economic system relies on growth for sustainability. Maintaining the cost of post-secondary education at the current levels would allow for normal economic growth that raises the quality of life for all. Achieving a \$1 increase in per capita GDP, an imminently achievable goal, would reduce an individual's debt by \$0.04. Though there is a normative directional association between the GDP and debt when fixed effects are applied at the institutional level, any changes to the GDP topline will automatically trigger increases in state spending. The key takeaway from this paper's findings is advocating for the increased GDP, through the tax revenue assumed to follow, to be applied to Higher Education spending to maximize the return to students. The change in debt from a \$1 increase in the median wage in a state could result in a reduction of debt by \$0.17. This is an intuitive finding and highlights that there are other factors that could affect debt that would be observable at the micro economic level. The cost results are the least surprising, as costs rise, debt will rise by \$0.09. While this is not a normative finding it potentially highlights the equity in cost factors that result in diluting the direct effect of cost increases.

Confoundingly, a 1% increase in Pell grants would raise individual debt by \$4.85. However, this could be the result of lowering the cost for the most vulnerable population but doing little to impact the cost side for the majority of students. Students receiving Pell grants are by definition from lower-income financial positions and are likely to take on debt to attend college. One possible mechanism for the increased debt from Pell grants could be increased tuition resulting from profit-maximizing institutions, though this correlation is tenuous at best (Heller, 2013). Figure 17 shows a scatterplot relationship between annualized student costs of attendance with the percentage of students at that institution receiving Pell grants, 2010 to 2018 at each institution in the Census Bureau's Mountain Division. The three categories of schools

considered are Public, Private (Non-Profit), and Private (For-Profit). As stated in the Data and Methods section, the models in consideration control for the Public institution to describe the relationship between public funding and schools. While Figure 16 supports the lack of correlation between increasing tuition as a result of higher shares of Pell grant recipients, it does show a large difference in the cost as a function of Pell grants at the three institution types. The causal interpretation of the model's increasing debt at higher rates is not evident without controlling for micro-level changes in each institution's operating costs, an area for future study.

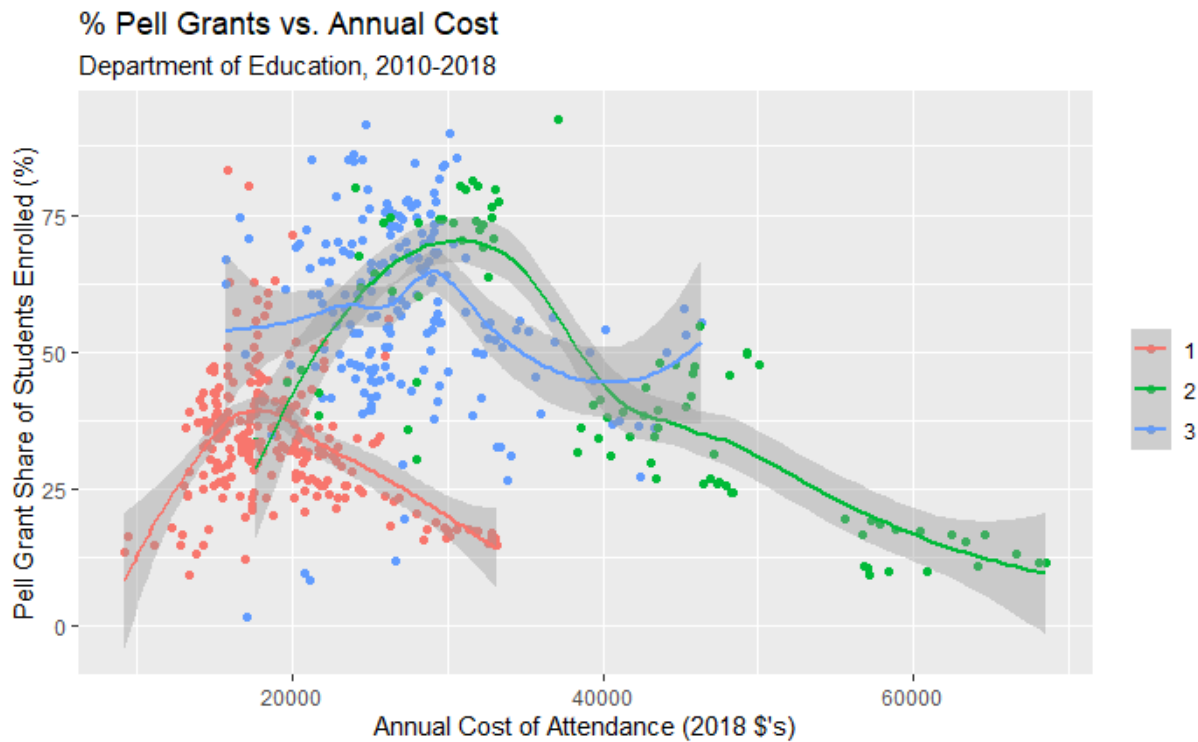


Figure 17 – Source: Department of Education's College Scorecard data. Cost vs % Pell Grants at each institution in Mountain Division (1) – Public Institutions, (2) – Private (Non-Profit), (3) – Private (For-Profit)

CONCLUSION

The intended contribution of the study is providing clarity to policymakers around the impact of a funding dollar on poverty, specifically for Higher Education. As the research continued, the data began to show a need for a deeper understanding of the true cost-benefit value of attaining a college wage premium. The current enterprise funding mechanism obscures both policymaker decisions and individual households trying to determine the best financial choice to make regarding college. Entering a budget crunch due to Covid-19, tough decisions will be made over the next few years that will establish the direction of public and personal expenditure in Colorado. Observational empirics have shown that the legislature has not provided enough resources to arrest the trend of college-educated resident's slide into poverty. This study aims to clarify some of the correlating factors for Coloradans not included in previous studies.

The results of this paper highlight the beneficial relationship between increasing the state funding for Higher Education and reductions in individual poverty and debt. The estimated \$1.18 reduction of individual debt for every \$1 spent on that individual in the form of Higher Education indicates a strong starting point for change. A limitation of this paper's finding is the conflation of operating budgets from tax revenue and the tuition and fees paid by the individual collegian. This poses a challenge for policymakers to ensure that this increased funding does not become regressive. If politicians only consider the top-line budget appropriation number for Higher Education, the trend of shifting the budget share onto individual students will continue further exacerbating the negative trends in poverty and debt.

Wages are stagnating, enrollment in universities is increasing or remained relatively constant, public funding has stagnated or decreased, and the cost-share of Higher Education is increasingly shifting onto the individual (Pena & Singleton, 2020). These factors have been exacerbated by the unique tax revenue limiting laws in Colorado, namely TABOR. The mechanism of these laws prioritizes limiting revenue growth over socially optimal or desired programs. A recent example of the conflicting goals of Colorado taxpayers was the 2020 ballot initiatives that approved a new publicly funded program while reducing the amount of taxable revenue to pay for the program. The funding of a public good becomes even more difficult when examining the shift away from Higher Education funding. As Americans, we have been taught that a college education is the truest way to rise above your station. However, the current cost-benefit analysis of educational benefits (wage premiums) versus the cost of educational attainment, has become buried under partisan political ideologies. The “take care of my own” ideology is a valid critique and undeniably American. Like all individualistic arguments, this one misses the big picture. The rising cost to individuals for education coupled with a lackluster wage premium has upended the net value calculus of our education system. The increasing levels of poverty amongst Coloradans with a college education undermine the utility gains assumed by enrollees. The American adage of a more prosperous future than the previous generation is quickly becoming a broken promise.

Future Work

It became clear early in this research that a more detailed dataset would be needed at the microeconomic level to properly establish causal links between the variables, specifically debt and Higher Education funding. The starting debt and access to capital of each student within an institution would greatly improve the magnitude changes from increased but indirect funding.

As in all things in 2021, demographics of race and gender are critical factors in understanding the impact on various communities. Tax expenditure limiting laws could prove to be a revealing identification variable for trends in state quality of life metrics. Studies on Colorado's TABOR laws did not find a direct link between TABOR and reduced expenditure growth, but it explicitly points to the inclusion of individual contributor dollars, tuition and fees, in the operating budget (Eliason & Lutz, 2018). The main challenge would be obtaining each state's budget classification, source, and history to accurately assess the source and use of each dollar of Higher Education funding. Lastly, it is necessary to map the potential policy changes for college educated early childhood educators and assessing the causal mechanism as to why these educators are 97% female (Day & Newburger, 2002; Carnevale, Strohl, & Melton, 2011).

Policy Implications

This research strove to illuminate the impact of Colorado-specific tax policies on poverty mobility, specifically as it relates to the cost-benefit value of a college education. The General Fund share of the budget applied to Higher Education was 8.8% of the total budget in 2018, placing it in the top spending categories annually. Higher Education's inclusion in the "Big Six" spending categories indicates its priority for Coloradans. Most literature advocating for increased spending points to a beneficial correlation between increasing social contributions and reduced poverty levels (Caminada & Goudswaard, 2012). However, that relationship fails when taxation priorities obscure public policy priorities. The disconnect between tax revenue and public policy priorities has become commonplace in Colorado. The recent 2020 elections were a confounding example of voters advocating for more budget constraints while also supporting more public services. Coloradans passed both a decreased income tax and a new government-subsidized paid family leave program (Ballotpedia, 2020). Considering Colorado's propensity to limit taxation

but support taxpayer-funded programs, TABOR may have allowed for a decline in per capita investment in key categories of the spending, with the Higher Education category hit the hardest (Pena & Singleton, 2020).

Homeownership in Colorado is already financially unachievable for large portions of residents, with no market-based improvement probable with a rising cost of living and population. A cycle of debt and increasing poverty share among the rising graduate class will further bifurcate the economy into those who can and those who cannot afford homeownership. As discussed, this has expensive impacts in other areas of the economy. The larger metropolitan areas of the state already experience increased poverty and homelessness that strain public services and resources. Shifting the focus to preventative subsidies such as increased Higher Education category spending would serve as a viable mechanism for blunting these trends.

Further research is needed to provide transparency on the costs and benefits of a post-secondary education. The overall findings herein provide a roadmap for microeconomic extensions that could correlate the perceived versus realized value of a college education while factoring for previous socio-economic contributions. In a competitive job market, the share of firms filtering applicants by college degree attainment will increase while the costs to attain those degrees will continue to rise. If wage rates do not increase and dramatically, a large share of the college graduate labor market will continue to see increasing levels of poverty and debt. Without loan forgiveness, higher wages, or subsidized debt repayment models, it is too late to change the cost-benefit value for many graduates. It is time for public expenditure to regain its normative intentionality by proactively determining the public support funding for Higher Education. Following the intention of Colorado's Amendment 23, the funding for Higher Education should be removed from cyclical political influence and redefined with automatic

stabilizers. Adjustments for cost of living or means tested direct subsidies are two other mechanisms of normative funding that would reduce debt and poverty. If the goal is to make the promise of mobility true for the next generation, individuals must consider the funding process at the state level, and politicians must provide transparency and prioritization to the value of a college degree.

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¹ Carnevale also co-authored the report “What it is worth: The economic value of college” cited in this report.

² During the Roman republic and later imperium, newly elected or selected leaders would come into power on the promise of tax or debt cancellation as an indirect bribe. Later uses contributed to the hyperinflation that weakened the structural foundations of the empire.

³ This is from a conversation I had with the hiring manager and recruiter for my first job.

⁴ Enterprise funds (“Cash Funds”) are not unique to Higher Education and apply to various user-based fee systems.

⁵ ACS Summary File Data using the 5-year summary file units from each year, 2010-2018.

<https://www.census.gov/programs-surveys/acs/data/summary-file.2018.html>