Effects of Local R&D Funding on Community Colleges in the US

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Abstract

While much of the literature on education and local investment focuses on research universities, less is known about community colleges. This paper examines how local firm R&D investment affects nearby community colleges, using SBIR and STTR grants linked to IPEDS and College Scorecard data from 1996–2022. Higher local R&D funding is associated with lower net tuition revenue, lower in-district tuition, increased degrees and certificates, modest gains in student aid, and higher post-completion earnings, with no effects on faculty. Effects are concentrated in larger colleges, highlighting community colleges as key actors in local innovation systems.

Keywords: community colleges, research and development, human capital formation

JEL Classification: I28, O31, J24

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1 Introduction

Community colleges offer a valuable, though often overlooked, measure of local economic development. They educate nearly half of all undergraduates in the United States (Mountjoy, 2022) and play a vital role in local workforce training and regional growth. Investment in community colleges has the potential for substantial positive spillovers on local economies, yet most analyses of education and local investment focus on large universities or research-intensive regions. If community colleges do indeed serve as a key channel for local economic growth, it follows that understanding how firm activity, particularly local investments in research and development, affects the functioning and outcomes of these institutions is necessary. To study this connection empirically, I study how firm investment in research and development (RD), as measured by federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants, affects institutional outcomes at nearby community colleges. Using IPEDS and College Scorecard data, my results show that higher levels of local R&D funding are associated with increased degrees and certificates, modest gains in student aid, and higher graduate earnings several years after completion. Analyzing these effects across enrollment quintiles reveals that the largest community colleges experience the largest benefits, highlighting heterogeneity in capacity to leverage local R&D investments. Together, these findings position community colleges as active participants in local innovation systems and as channels through which public research investment can strengthen human capital formation and long-run labor market performance.

Community colleges frequently build partnerships with the private sector through SBIR/STTR grants, as evidenced in states such as Virginia (Central Virginia Partnership for Economic Development, 2025), Florida (Foundation, 2011; College, 2024), North Carolina (Supersonic, 2022), and California (District, 2025), as well as through nationwide program grant initiatives (Resnick and Duffy, 2022). These collaborations allow colleges to serve as workforce-development hubs, facilitate small business engagement with federal RD, and provide applied research opportunities for students.

However, recent uncertainty around SBIR/STTR program authorization, including a lapse in statutory authority, raises concerns about the stability of these partnerships (SSTI, 2025; Barna et al., 2025). Short-term extensions and delayed reauthorization threaten funding pipelines and disrupt long-term planning for community colleges, potentially limiting contract opportunities, constraining innovation-ecosystem infrastructure, and complicating curriculum design aligned with federally supported R&D. Understanding how R&D funding translates into institutional outcomes is therefore critical, both for designing effective policy and for ensuring that community colleges can continue to function as key nodes in regional innovation networks.

2 Literature Review

2.1 Access and Enrollment

Tuition and financial incentives are important determinants of community college enrollment. Denning (2017) estimate that a $1,000 decrease in tuition raises first-year enrollment by 5.1 percentage points, with an implied elasticity of -0.29. Lower tuition also facilitates student transfers from community colleges to four-year universities. Conversely, institutional characteristics such as large school size and higher proportions of part-time faculty or minority students can negatively influence persistence and attainment (Calcagno et al., 2008), while targeted financial incentives can improve short-term enrollment and credit accumulation (Barrow et al., 2014). Labor-market conditions also shape enrollment decisions: Schanzenbach et al. (2024) find that minimum wage increases reduce part-time enrollment but do not appear to affect overall degree completion, whereas Acton (2021) show that local employment shocks influence students' choice of fields of study.

2.2 Educational Outcomes and Labor-Market Returns

Community colleges contribute substantially to earnings and employment outcomes, though these benefits vary by program type and credential. Jepsen et al. (2014) document significant earnings gains from associate's degrees—roughly $2,400 per quarter for women and $1,500 for men—whereas certificates yield smaller returns. Even partial progress through a program can provide measurable benefits: Bahr (2019) report strong positive returns to completed credits in career and technical education (CTE) fields, particularly in non-credential-intensive sectors. Similarly, Jacobson et al. (2005) find that an academic year of community college for displaced workers raises long-term earnings by 9–13 percent. Studies of specific programs, such as nursing training lotteries, further demonstrate substantial earnings and employment gains (Grosz, 2020).

Yet not all effects are positive. Community college attendance can sometimes divert students from immediate four-year enrollment, with small negative impacts for those who would otherwise have pursued university study (Mountjoy, 2022). Doyle (2009) find that community college attendance reduces the hazard of completing a bachelor's degree, consistent with earlier evidence on diversion effects (Leigh and Gill, 2003). Part-time faculty employment is also negatively associated with student graduation rates (Yu et al., 2023). At the same time, programs designed to improve racial representation among instructors can reduce achievement gaps for underrepresented minority students (Fairlie et al., 2014).

2.3 Institutional Context and Career Choice

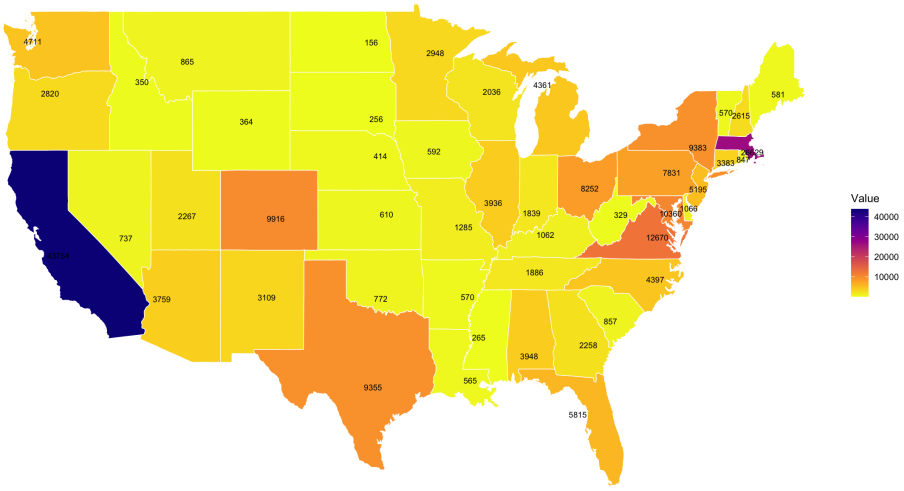
Community college students frequently attend multiple institutions over time, complicating the analysis of institutional effects. Calcagno et al. (2008) develop a framework to account for multi-institutional attendance, finding that institutional characteristics, including faculty composition and school size, systematically affect persistence, degree completion, and transfers. Performance-based incentives, meanwhile, can increase credit accumulation and enrollment continuity (Barrow et al., 2014). Financial aid policies, such as subsidized loans, appear less effective, and may even hinder persistence in some contexts (Dowd and Coury, 2006).

Students' program and major choices reflect both intrinsic preferences and labor-market signals. Baker et al. (2018) show that community college students often misestimate expected earnings and employment probabilities, yet they respond to labor-market outcomes when selecting programs. Acton (2021) further document shifts in enrollment between programs requiring similar skill sets in response to local employment shocks. These findings highlight the dual role of community colleges in offering both education and career signaling.

2.4 Community Colleges and Local Innovation Systems

A newer strand of research links community colleges to regional innovation ecosystems. Community colleges frequently collaborate with local firms and public RD initiatives, including federal SBIR and STTR programs, to align training with local labor-market needs (Resnick and Duffy, 2022; Central Virginia Partnership for Economic Development, 2025; Foundation, 2011; District, 2025; Supersonic, 2022; College, 2024). Federal policy uncertainty, such as lapses or delays in SBIR/STTR reauthorization, threatens these partnerships by creating unpredictable funding pipelines and disrupting curriculum development tailored to innovation-sector engagement (SSTI, 2025; Barna et al., 2025). Figure 1 illustrates the distribution of SBIR/STTR grants across the US, with California, Massachusetts, and Virginia, and Maryland as the top 4 states awarded funding.

Figure 1: Regional Distribution of SBIR/STTR Awards



Community colleges thus act as active nodes in local innovation networks, supporting workforce development, facilitating technology transfer, and amplifying the impacts of public RD investments. Research on funding effects shows that financial support, such as bond passage or targeted public investment, can increase public-sector enrollment at the expense of proprietary institutions, further emphasizing the role of policy in shaping local higher education markets (Cellini, 2009).

Overall, the literature underscores that community colleges are more than simply cost-effective educational alternatives, they are engines of human capital formation, labor-market alignment, and regional economic development. Understanding how local firm investment, particularly in R&D through SBIR/STTR programs, interacts with community colleges is therefore essential for evaluating the broader impact of public research funding on workforce development and regional growth.

3 Data

3.1 Integrated Postsecondary Education Data System

we use data from the Integrated Postsecondary Education Data System ("IPEDS"). IPEDS is a system of interrelated surveys conducted annually by the National Center for Education Statistics. These surveys collect annual institutional-level outcomes like tuitiion and fees, student finanical aid, and graduation rates. I collect from 1990 to 2022 to create an institution by year panel dataset. Institutions are identified at the city level, which allows me to match the location of the firm that accepts a SBIR grant to the city where community college is located.

Table 1: Summary Statistics for Community College Outcomes

Dependent Variable	n	Mean	SD	Min	Max	Unique UnitIDs	Years
Student Aid Institutional Grants	6733	104	133	0	1506	725	2013-2022
Student Loans	6733	124	180	0	3017	725	2013-2022
PT Certificate, Nonfirst	4467	0.0702	0.0849	0	0.81	712	2017-2023
PT Associates, Nonfirst	4467	0.195	0.0986	0	1	712	2017-2023
Net Tuition Revenue	9183	1635	1014	0	10915	736	2010-2023
PT Instructors	8055	206	190	0	1633	730	2012-2023
FT Instructors	8078	104	75.4	0	687	730	2012-2023

My name is Zachary Rodriguez and I'm an assistant professor in the Economics department at Union College. I joined Union College in 2022 where I teach ECO 101, a lower-level elective in development economics, and an upper-level seminar on causal inference and development policy. I received reappointment from Union College last year, and so I am currently on sabbatical. I believe that an unfunded fellowship through the NBER Fiscal and Economic Effects of Innovation and Productivity Policies group would help me address some of the gaps that I have noticed in my development courses when it come to domestic development policy. I have not seen much research on how the US grows its local vocational workforce. Trying to find materials to fill this gap has led me to community colleges and the effects that they have on local communities. Also noticing a lack of empirical work on the topic has encouraged me to begin organizing and analyzing data on community college outcomes through the Integrated Postsecondary Education Data System and College Scorecard datasets. I would love the opportunity to continue and discuss this research as described in my proposal, with the added benefit of getting feedback from the best economists in the world.

3.2 College Scorecard

I am able to use the College Scorecard dataset, which are institution-level data for 1996-97 through 2022-23 containing aggregate data for each institution. Includes information on institutional characteristics, enrollment, student aid, costs, and student outcomes. Most importantly for this study, the dataset collects earnings post graduation per institution. Earnings is reported by 6 and 10 years post graduation. The data on earnings is self-reported by institutions, so missingness does occur often within the sample. I am able to match this dataset to the the IPEDS dataset at the institutional level.

Table 2: Summary Statistics for Community College Outcomes

Dependent Variable	n	Mean	SD	Min	Max	Unique UnitIDs	Years
Med Earnings Post 6Y	9715	26156	5368	9400	106781	1577	1996-2023
Med Earnings Post 10Y	7316	31299	6231	10800	115318	1577	1996-2023

3.3 The Small Business Innovation Research Program

The Small Business Innovation Research (SBIR) Program stimulates technological innovation in the private sector by strengthening the role of small business concerns in meeting Federal research and development needs, increasing the commercial application of federally supported research results, and fostering and encouraging participation by socially and economically disadvantaged and women-owned small businesses.

An additional opportunity is available to foster partnerships between Community Colleges (CCs), which educate large numbers of underrepresented students, and the small business community. This pilot project is exploring a model to increase the numbers of Small Business/California Community Colleges (SB/CCC) partnerships applying for SBIR/STTR Phase II-CC supplemental funding. SBIR Phase II awardees within the corridor between Sacramento

and San Francisco are being identified. At the same time, local community college faculty and student teams are being recruited. This pilot is matching up to 20 SBIR Phase II companies with community college faculty-student teams, and supporting the submission of proposals for supplemental funding to support the research conducted by the faculty-student teams and the Small Business.

3.4 Small Business Technology Transfer (STTR) Program

The STTR program is a federal initiative that facilitates cooperative research and development (RD) between small businesses and non-profit U.S. research institutions, which can include community colleges. The goal is to encourage commercialization of innovative technological solutions. Key aspects related to community colleges: Mandatory Partnerships: Unlike its sister program, Small Business Innovation Research (SBIR), the STTR program requires a formal RD partnership, with a minimum of 40% of the work allocated to the partnering research institution (e.g., a community college) and 30% to the small busines

Table 3: Summary Statistics for SBIR/STTR Grants

Dependent Variable	n	Mean	SD	Min	Max	Years
SBIR Grants	151,465	399,026	597,001	0	55,800,000	1996-2023
STTR Grants	19,817	356,372	429,419	0	6,098,759	1996-2023
Phase I	117,192	135,057	113,663	0	3,418,440	1996-2023
Phase II	54,090	955,271	760,194	0	55,800,000	1996-2023
Department of Defense	82,539	399,795	646,355	0	55,800,000	1996-2023
Department of Energy	13,196	380,115	397,777	0	4,993,878	1996-2023
Department of Health and Human Services	39,694	517,990	658,568	0	8,175,546	1996-2023
National Aeronautics and Space Administration	14,490	270,866	308,378	0	4,999,968	1996-2023
National Science Foundation	12,089	263,730	235,835	0	1,715,999	1996-2023

4 Empirical Strategy

I estimate how the quasi-random award of R&D grants given through the SBIR and STTR programs in a year affects various institutional level outcomes for community colleges in the US. Specifically, I estimate the following equation:

$$Y_{icsy} = \beta_1 Awards_{cy} + \tau_i + \tau_c + \tau_y + \epsilon_{icy} \tag{1}$$

where Y_{icsy} denotes the outcome for institution i in city c, state s, and year y. $Awards_{cy}$ equals the number of SBIR/STTR grants awarded in a city c in a year y. The coefficient β_1 captures the average effect of grant awards in a city. Fixed effects for community colleges (τ_i), cities (τ_c), and years (τ_y) control for unobserved heterogeneity across multiple geographic and institutional levels. As before, standard errors are clustered at the city level to account for within-city correlation.

5 Results

In the following sections, I divide my analyses by first looking at the effects on community college outcomes by the number of SBIR/STTR awards in a given year, by either SBIR/STTR program type, early and later phases of the awards, and then by awarded agency.

5.1 SBIR/STTR Award Recipients

Table 5 reports estimates of the effects of federal R&D awards on community college outcomes. Each column corresponds to a separate fixed-effects regression including institution, year, and city fixed effects. Dependent variables capture measures of institutional finance, student credential attainment, and post-graduation earnings measured six and ten years after completion. Columns 1 and 2 are estimated conditional on colleges receiving institutional aid, defined as scholarships, fellowships, and tuition waivers funded from the college's own resources. Certificate and associate degree outcomes are restricted to non–first-year students. Results for first-year students can be found in the Appendix. There does not seem be any effect of R&D funding and the graduation of first-year community college students.

The first panel examines the combined effects of Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) awards. Combined awards are positively associated with student aid in form of institutional grants as a one-unit increase in awards corresponds to a 1.6 percent rise in students receiving aid through institutional grants. The association with part-time degree attainment is also positive but smaller, indicating a 0.36 percent increase. Effects on student loans and certificate completions are near zero, while the coefficients on post-graduation earnings are small and positive, with a 0.09 percent increase ten years after graduation. Overall, these results suggest that receiving any SBIR/STTR award modestly strengthens institutional resources and degree completion without increasing student borrowing or reducing earnings.

When I disaggregate awards across SBIR and STTR grants, the results reveal distinct patterns. SBIR awards, which primarily support applied R&D by small firms, show weakly positive effects on part-time certificate and degree attainment, approximately 0.7 and 0.4 percent increases, respectively. In contrast, STTR awards, which require formal partnerships between firms and research institutions, display a larger but more heterogeneous set of effects. The prior effect on student aid through institutional grants appears to concentrate among STTR funding, and is associated with higher 3.8 percent increase in aid. Also I find both certificate attainment and net tuition revenue decrease by about 1.8 and 1.6 percent, respectively. These patterns suggest that STTR-related collaborations may redirect resources toward research-oriented activities at the expense of short-term credential programs.

Finally, I disaggregate grant awards by research phase, which distinguishes between Phase I (early-stage feasibility) and Phase II (development and commercialization) awards. Phase I funding is associated with improvements in educational and labor market outcomes, as part-time degree attainment rises by 0.65 percent, and post-graduation earnings increase by 0.18 and 0.15 percent six and ten years after completion. In contrast, Phase II awards have more mixed effects. While student aid through institutional grants increase by 2.7 percent, graduate earnings six years after completion decline by 0.31 percent. These findings suggest that Phase I programs strengthen the partnerships that form between community colleges and firms involved in innovative R&D, whereas Phase II projects may shift focus toward firm-level commercialization with fewer direct benefits for students.

Overall, federal innovation awards—particularly early-stage SBIR/STTR and Phase I grants—appear modestly beneficial to community colleges. They increase finanical aid support for students through institutional aid and degree attainment while leaving student debt unchanged and slightly improving long-term earnings. More advanced or collaborative R&D programs (STTR and Phase II) exhibit smaller or negative effects on short-term student outcomes, consistent with a potential trade-off between institutional research engagement and instructional or workforce-oriented missions.

Overall, federal innovation awards appear modestly beneficial to community colleges, though effects vary by program type and project stage. SBIR funding and Phase I awards, which target early-stage, feasibility-oriented research, are associated with increases in institutional aid and degree attainment, as well as modest improvements in graduates' long-term earnings, without raising student borrowing. By contrast, STTR and Phase II awards, which emphasize collaborative or later-stage R&D and commercialization, show weaker or negative effects on short-term educational outcomes. These patterns suggest that while early-stage innovation engagement can complement colleges' instructional and workforce missions, more advanced or partnership-driven R&D activity may redirect institutional resources toward research-oriented objectives with fewer direct benefits for students.

Table 4: Effects of R&D Annual Awards on Community Colleges Outcomes

Dependent Variables:	log(CC Grants)	log(Student Loans)	log(PT Certificates)	log(PT Degrees)	log(Earnings Post 6Y)	log(Earnings Post 10Y)	log(Net Tuition Revenue)
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SBIR/STTR Awards	0.0162**	-0.0149	0.0027	0.0036*	0.0002	0.0009**	-0.0045
	(0.0066)	(0.0126)	(0.0032)	(0.0022)	(0.0005)	(0.0004)	(0.0028)
Observations	6,161	5,834	4,083	4,441	5,753	4,472	9,177
R^2	0.78015	0.92396	0.81222	0.68588	0.91782	0.94007	0.85408
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SBIR Awards	0.0106	-0.0130	0.0073*	0.0040*	0.0001	0.0003	-0.0019
	(0.0075)	(0.0101)	(0.0040)	(0.0024)	(0.0004)	(0.0004)	(0.0020)
STTR Awards	0.0384*	-0.0231	-0.0182**	0.0016	-0.0022	-0.0002	-0.0158*
	(0.0212)	(0.0259)	(0.0076)	(0.0046)	(0.0019)	(0.0016)	(0.0085)
Observations	6,161	5,834	4,083	4,441	6,360	4,949	9,177
R^2	0.78030	0.92397	0.81249	0.68589	0.91007	0.93766	0.85423
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Phase 1 Awards	0.0105	-0.0131	0.0045	0.0065***	0.0018**	0.0015**	-0.0045*
	(0.0075)	(0.0118)	(0.0044)	(0.0025)	(0.0007)	(0.0006)	(0.0025)
Phase 2 Awards	0.0269**	-0.0185	-0.0014	-0.0029	-0.0031***	-2.02×10^{-5}	-0.0043
	(0.0110)	(0.0150)	(0.0049)	(0.0049)	(0.0012)	(0.0006)	(0.0040)
Institution FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,161	5,834	4,083	4,441	5,753	4,472	9,177
R^2	0.78026	0.92397	0.81226	0.68613	0.91836	0.94012	0.85408

5.2 Awarded Agency

Table 5 reports the estimated effects of federal R&D awards—disaggregated by government agency—on community college outcomes. I look at the top 5 award agencies in the program: National Science Foundation (NSF), Department of Health and Human Services (HHS), National Aeronautics and Space Administration (NASA), Department of Energy (DoE), and the Department of Defense (DoD). Each column presents results from separate fixed-effects regressions that include institution, year, and city fixed effects. The dependent variables capture various measures of institutional finance, enrollment, and labor market performance.

Starting with NSF awards, the coefficients are generally small and imprecisely estimated. While the effects on institutional grants, student loans, and credential outcomes are close to zero, the estimates for post-graduation earnings are negative and statistically significant: a one-unit increase in NSF awards is associated with a 0.6 percent decline in average earnings six years after graduation and a 0.3 percent decline after ten years. These effects, though modest, suggest that NSF funding may not translate into immediate or broad-based student labor market gains.

HHS awards, in contrast, show the most consistently positive associations across outcomes. Community colleges receiving more HHS R&D awards experience a 3.3 percent increase in institutional grant revenue and a 1.7 percent rise in part-time certificate attainment, both significant at conventional levels. HHS funding also correlates with a small reduction in student loan volume (-2.1 percent), implying potential relief in student borrowing. For NASA awards, coefficients are generally small and statistically insignificant, indicating no systematic relationship between NASA-related R&D activity and the measured college outcomes.

Department of Energy (DoE) awards display a distinct pattern: while effects on grants, loans, and educational outputs are minimal, DoE funding corresponds to higher post-graduation earnings, approximately 0.3–0.4 percent increases six and ten years after graduation, respectively. This suggests that energy-sector R&D engagement may foster higher quality or better compensated skill formation. Finally, Department of Defense (DoD) awards have modestly positive effects on institutional grants and weakly negative effects on net tuition revenue, implying that

DoD funding may substitute for tuition-based income. The DoD coefficients on earnings outcomes are near zero.

Overall, the table indicates that the type of federal R&D award matters: HHS and DoE funding are most positively linked to student and institutional outcomes, while NSF and DoD funding have more limited or mixed effects. These patterns likely reflect differences in programmatic focus and the extent to which agency-funded R&D aligns with community college educational and workforce missions.

Table 5: Effects of R&D Annual Awards on Community Colleges Outcomes By Govt Agency

Dependent Variables:	log(CC Grants)	log(Student Loans)	log(PT Certificates)	log(PT Degrees)	log(Earnings Post 6Y)	log(Earnings Post 10Y)	log(Net Turition Revenue)
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
NSF awards	0.0295	-0.0410	0.0141	0.0126	-0.0057**	-0.0029*	-0.0034
	(0.0314)	(0.0373)	(0.0160)	(0.0093)	(0.0023)	(0.0015)	(0.0061)
HHS awards	0.0326***	-0.0207*	0.0171*	0.0032	-0.0010	4.02×10^{-5}	0.0017
	(0.0100)	(0.0118)	(0.0096)	(0.0042)	(0.0009)	(0.0010)	(0.0032)
NASA awards	-0.0353	0.0168	-0.0137	0.0022	0.0003	0.0020	0.0035
	(0.0319)	(0.0204)	(0.0234)	(0.0110)	(0.0013)	(0.0015)	(0.0074)
DoE awards	-0.0014	-0.0035	-0.0060	0.0046	0.0034**	0.0045*	-0.0053
	(0.0241)	(0.0230)	(0.0114)	(0.0069)	(0.0016)	(0.0024)	(0.0085)
DoD awards	0.0178*	-0.0121	0.0008	0.0037	0.0007	-8.19×10^{-6}	-0.0081**
	(0.0098)	(0.0124)	(0.0035)	(0.0035)	(0.0006)	(0.0005)	(0.0040)
Institution FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,161	5,834	4,083	4,441	6,360	4,949	9,177
R^2	0.78081	0.92414	0.81252	0.68599	0.91048	0.93792	0.85428

5.2.1 PT and FT Instructors

Given Yu et al. (2023) and their finding that part-time faculty employment is negatively associated with student graduation rates at public community colleges, I investigate whether or not local R&D funding has any effects on instructing staff hiring. Across all specifications, there appear to be no effects of R&D funding on full time or part time instructors at community colleges.

Table 6: Effect of Local R&D Funding on PT and FT Instructors

Dependent Variables:	log(staff_pt)	log(staff_ft)
Model:	(1)	(2)
SBIR/STTR awards	-9.1×10^{-5}	-0.0003
	(0.0016)	(0.0010)
Observations	7,975	8,066
R^2	0.91213	0.96539
Model:	(1)	(2)
SBIR Awards	0.0003	-0.0005
	(0.0019)	(0.0012)
STTR Awards	-0.0019	0.0007
	(0.0045)	(0.0029)
Observations	7,975	8,066
R^2	0.91213	0.96539
Model:	(1)	(2)
Phase 1 Awards	-0.0004	5.36×10^{-5}
	(0.0016)	(0.0013)
Phase 2 Awards	0.0004	-0.0010
	(0.0027)	(0.0018)
Observations	7,975	8,066
R^2	0.91213	0.96539
Model:	(1)	(2)
NSF Awards	0.0013	-0.0017
	(0.0050)	(0.0039)
HHS Awards	-0.0033	-0.0002
	(0.0044)	(0.0031)
NASA Awards	0.0076	0.0009
	(0.0058)	(0.0053)
DoE Awards	-0.0030	0.0017
	(0.0064)	(0.0051)
DoD Aawards	0.0013	-0.0005
	(0.0023)	(0.0012)
Observations	7,975	8,066
R^2	0.91216	0.96539
Institution FEs	Yes	Yes
Year FEs	Yes	Yes
City FEs	Yes	Yes

5.3 Enrollment Size

Table 7 presents the estimated effects of local R&D funding by the size of the community colleges, as measured through fall enrollment. Columns (1) show estimates for the full sample, while Columns (2)–(5) present results split by enrollment size quartiles, ranging from Q1 (smallest colleges) to Q4 (largest colleges).

Across the full sample, higher number of local awards are positively associated with institutional grants for student aid. When examining enrollment bins, the effect is strongest and statistically significant for the largest colleges, while smaller colleges show negligible effects. This suggests that larger institutions are better positioned to leverage local R&D activity into additional funding that can be made available to prospective students. Effects on student borrowing are mixed and generally modest. The second enrollment quartile shows a small positive effect, whereas the third quartile displays a negative relationship. These results indicate that local R&D funding has limited and heterogeneous effects on student debt across institutions.

Higher numbers of local grants are associated with small increases in part-time certificate and degree attainment,

particularly at larger colleges. For instance, the Q4 colleges show positive and significant effects for PT certificates and PT degrees. These patterns suggest that R&D investment may facilitate improved educational outputs, especially where institutional capacity allows colleges to capitalize on external research activity. Earnings six and ten years post-completion display small, mostly positive effects, with the largest colleges again showing the strongest gains for ten-year earnings. The effect of awards on net tuition revenue is slightly negative, reaching statistical significance for Q3 colleges. This pattern is consistent with the idea that external R&D funding may allow colleges to subsidize tuition or expand access, partially offsetting the need for tuition revenue.

Overall, the findings highlight community colleges as active participants in local innovation systems. While effects are small, the results consistently indicate that larger colleges benefit more from nearby R&D investment, translating into increased student aid through institutional grants, higher degree and certificate attainment, and slightly improved graduate earnings. These outcomes underscore the role of community colleges as channels through which public investment in research can strengthen human capital formation and support long-run regional economic development.

Table 7: Effect of Local R&D Funding on Community College Outcomes By Enrollment Size

Dependent Variable:	log(CC grants)				
Enrollment Size	Full sample	Q1: Small	Q2: Lower-mid	Q3: Upper-mid	Q4: Large
Model:	(1)	(2)	(3)	(4)	(5)
SBIR/STTR Awards	0.0162**	0.0022	-0.0056	0.0097	0.0328***
	(0.0066)	(0.0102)	(0.0148)	(0.0079)	(0.0094)
Observations	6,161	1,575	1,582	1,535	1,469
R^2	0.78015	0.81588	0.82372	0.84645	0.72825
Dependent Variable:	log(Student Loans)				
Model:	(1)	(2)	(3)	(4)	(5)
SBIR/STTR Awards	-0.0149	0.0154**	-0.0401**	-0.0138	-0.0099
	(0.0126)	(0.0059)	(0.0185)	(0.0089)	(0.0077)
Observations	5,834	1,241	1,460	1,527	1,606
R^2	0.92396	0.93880	0.92128	0.93502	0.94167
Dependent Variable:	log(PT Certificates				
Model:	(1)	(2)	(3)	(4)	(5)
SBIR/STTR Awards	0.0027	-0.0030	0.0043	-0.0018	0.0062*
	(0.0032)	(0.0069)	(0.0091)	(0.0061)	(0.0033)
Observations	4,083	814	1,033	1,109	1,127
R^2	0.81222	0.71887	0.79989	0.84935	0.87717
Dependent Variable:	log(PT Degrees)				
Model:	(1)	(2)	(3)	(4)	(5)
SBIR/STTR Awards	0.0036	0.0125	0.0097	-0.0005	0.0039**
	(0.0024)	(0.0116)	(0.0074)	(0.0043)	(0.0017)
Observations	4,441	951	1,132	1,173	1,185
R^2	0.68588	0.63049	0.72839	0.76718	0.80832
Dependent Variable:	log(Earnings Post 6Y				
Model:	(1)	(2)	(3)	(4)	(5)
SBIR/STTR Awards	0.0002	-0.0012	0.0009	-0.0002	0.0001
	(0.0005)	(0.0037)	(0.0015)	(0.0018)	(0.0005)
Observations	5,753	583	1,622	1,850	1,698
R^2	0.91782	0.92850	0.92711	0.93975	0.93607
Dependent Variable:	log(Earnings Post 10YR				
Model:	(1)	(2)	(3)	(4)	(5)
SBIR/STTR Awards	0.0009*	-0.0002	0.0007	-0.0003	0.0013***
	(0.0005)	(0.0028)	(0.0023)	(0.0014)	(0.0005)
Observations	4,472	446	1,236	1,398	1,392
R^2	0.94007	0.93910	0.94461	0.94993	0.95452
Dependent Variable:	log(Net Tuition Revenue)				
Model:	(1)	(2)	(3)	(4)	(5)
SBIR/STTR Awards	-0.0045	-0.0053	-0.0139*	-0.0047	-0.0007
	(0.0029)	(0.0045)	(0.0084)	(0.0092)	(0.0014)
Observations	9,177	2,155	2,334	2,346	2,342
R^2	0.85408	0.83147	0.84556	0.88566	0.95295
Institution FEs	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes
City FEs	Yes	Yes	Yes	Yes	Yes

6 Conclusion

My analysis shows that higher local R&D funding, as measured by SBIR and STTR program grants, is associated with lower net tuition revenue, increased degrees and certificates, modest gains in student aid, and higher graduate earnings, with no effects on faculty employment. Policy implications include promoting stronger integration of community colleges into regional innovation systems through deliberate R&D partnership incentives, ensuring colleges can leverage federal and local research investments for workforce development. Such integration can help colleges align curricula with emerging industry needs, foster applied research opportunities for students, and strengthen local innovation ecosystems. It also encourages long-term collaboration between firms and colleges, creating sustainable pathways for student skill development and regional economic growth.

Another implication is to prioritize designing R&D and grant programs for local labor-market alignment, so that increases in firm-level innovation funding translate directly into improved educational outcomes and long-term earnings for students. Programs can target sectors with strong regional employment demand, ensuring that students gain skills that are immediately valuable in the local economy. This alignment also helps maximize the social returns on public research investments by linking innovation funding directly to workforce development and community prosperity. Together, these policies highlight the potential for community colleges to act as active nodes in regional innovation networks, translating public and private investment in research into tangible benefits for students, employers, and local economies.

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