Understanding the Labor Markets for Graduates of UNC System Institutions

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Introduction

The production and retention of an educated workforce is a key concern of state policymakers. In North Carolina, a commission of leaders in education, business, and government recently set a goal to increase the number of educated workers to 2 million by 2030 (myFutureNC, n.d.).[1] While progress toward this goal will require coordination across a range of sectors in the state, an important role rests with the system of public 4-year universities. The commission specified a 7 percentage point increase in the system-wide completion rate, from 73 percent in 2016 to 80 percent by 2030.

Ambitious policy goals centered on college completion may help to focus interest, effort, and resources on educational attainment. However, building the state's stock of educated labor requires a clearheaded look at another factor—migration. Students with bachelor's degrees, in particular, are more mobile and tend to move across state lines at higher rates (Wozniak, 2010). In- and out-migration of educated workers will play a role in how successful North Carolina is at achieving these goals. Further, the policy landscape within the state—such as the clarity and generosity of its financial aid programs and levels of direct appropriations to colleges—also stand to shape patterns of educational attainment and migration (e.g., Castleman & Long, 2016; Deming & Walters, 2017).

In this report we analyze the geographic destinations of college graduates from UNC System universities between 2010 and 2018. To do so, we use a newly constructed dataset based on publicly available, aggregated information from institutional LinkedIn pages (Conzelmann, Hemelt, Hershbein, Martin, Simon, & Stange, 2022). For each institution, we compute several descriptive statistics that characterize the spread and diversity of its graduates' destinations—within and across state borders. We then combine these measures with data on public funding (e.g., state appropriations) from the Integrated Postsecondary

1. Learn more about the commission, myFutureNC, here: myfuturenc.org.

Education Data System (IPEDS) to estimate the local rate of return on public investment in higher education in North Carolina, conceptualized as the number of graduates retained in state per increment (e.g., per $100,000) of state funding expended.

We document considerable variation across the 16 UNC System institutions in the extent to which their graduates leave the state or nearest metropolitan area, and the distance they tend to travel. While the flagship campus, UNC-Chapel Hill, retains just over 50 percent of its graduates in North Carolina, several other system schools—like UNC Greensboro—have North Carolina retention rates of 75 percent or higher. As a whole, the UNC System retains about two-thirds of its graduates in North Carolina, which places it in the top third (14th) of all states according to our data.

We use data from IPEDS in tandem with our novel data source on the destinations of graduates from UNC System institutions to approximate the local return on state investment in higher education. We find that regional public universities—such as UNC Wilmington and Appalachian State University—are efficient producers of college graduates who remain in North Carolina. Taken together, these analyses may aid policy leaders as they consider relevant local workforce needs, cross-sector collaborations, and student success in higher education.

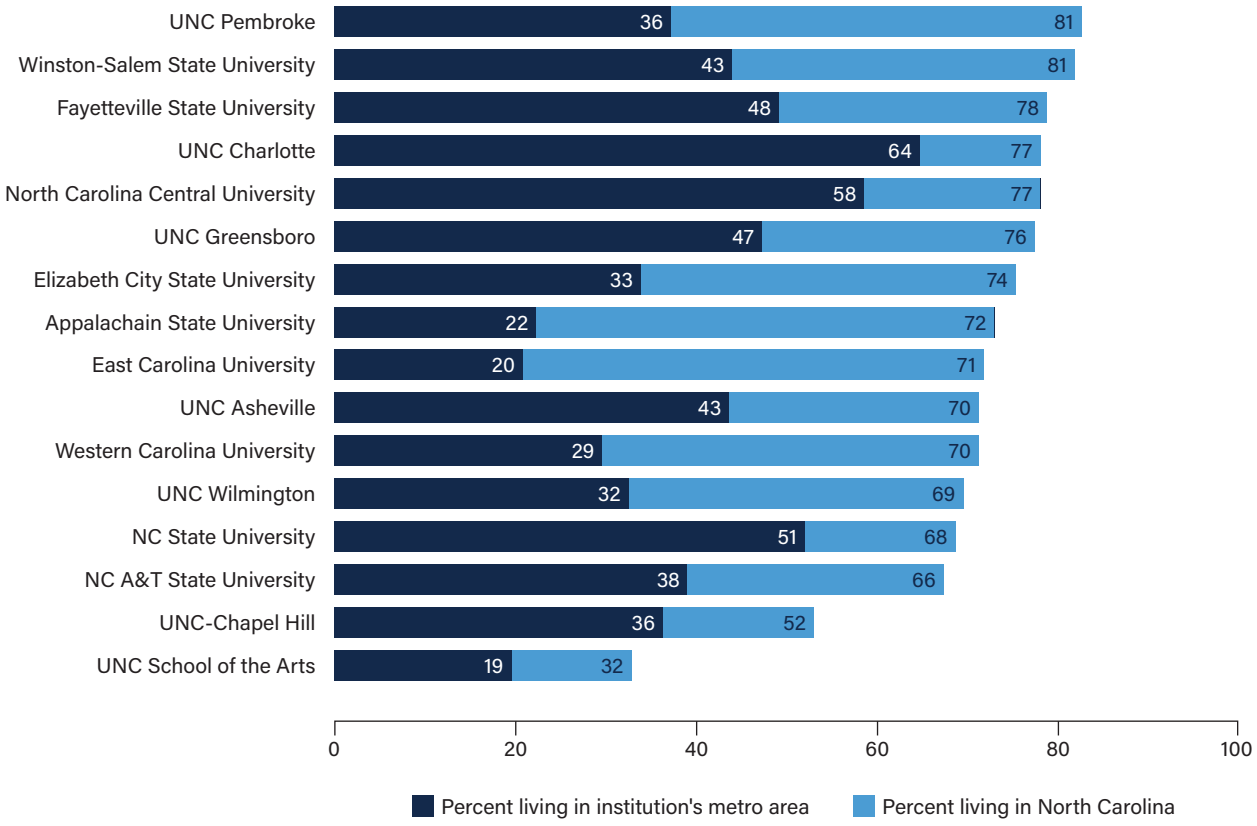
Basic Market Description of UNC System Schools: In-State Retention of Graduates

We begin with a simple characterization of the labor market for each institution's graduates. We use a dataset that was constructed to capture information on 2-year and 4-year degree recipients between 2010 and 2018 who attended any of the over 2,800 public and private institutions that participated in Title IV financial aid programs during these years (Conzelmann et al., 2022). These data map graduates' locations to 278 metro areas, which correspond to one or more of the U.S. Census Bureau's designations for local geographic areas.[2] One can think of the findings we present here as roughly representative of recent graduates of public 4-year institutions in North Carolina.

We first calculate the share of an institution's graduates residing in (a) the same metro area as the institution; and (b) the state. Figure 1 presents these results for UNC System schools.

2. These are Core-Based Statistical Areas (CBSAs), which are based on U.S. Census population counts; they include metropolitan statistical areas (urbanized areas with greater than 50,000 people) and micropolitan statistical areas (greater than 10,000 but less than 50,000 people). Our data use the 2013 delineation which contains 917 total CBSAs, excluding Puerto Rico.

Figure 1 Local and In-State Retention of UNC System Institutions' Graduates, 2010–2018



Notes: Data on graduates' destinations come from Conzelmann et al. (2022). Metro area roughly corresponds to a Core-Based Statistical Area (CBSA).

Takeaway #1: UNC System institutions vary in the extent to which their graduates leave the state; as a whole, 69 percent of system graduates remain in NC (top third of states).

We find ample variation across public 4-year institutions in North Carolina in the degree to which graduates tend to remain and work in state. For instance, while 81 percent of UNC Pembroke graduates do so, only half of UNC-Chapel Hill graduates stay in state. Of course, UNC System institutions operate in very different markets—for example, UNC-Chapel Hill competes in a national market, whereas other institutions in the system have a more regional focus.

The proximity of an institution to vibrant economic areas likely influences the share of students who remain nearby following graduation. For instance, both NC State and NC A&T State see roughly two-thirds of their graduates remain in in state; however, a relatively greater share of graduates from NC State remain in the Raleigh-Durham area (51 percent) compared to graduates from NC A&T State remaining in the Greensboro/Winston-Salem area (38 percent).

To give some sense of the most common destinations beyond the boundaries of The Tar Heel State, we compute shares residing in each of our non-NC geographies, and report the top 10 below, in Table 1.

Table 1 Top 10 Non-NC Destinations for UNC System Graduates

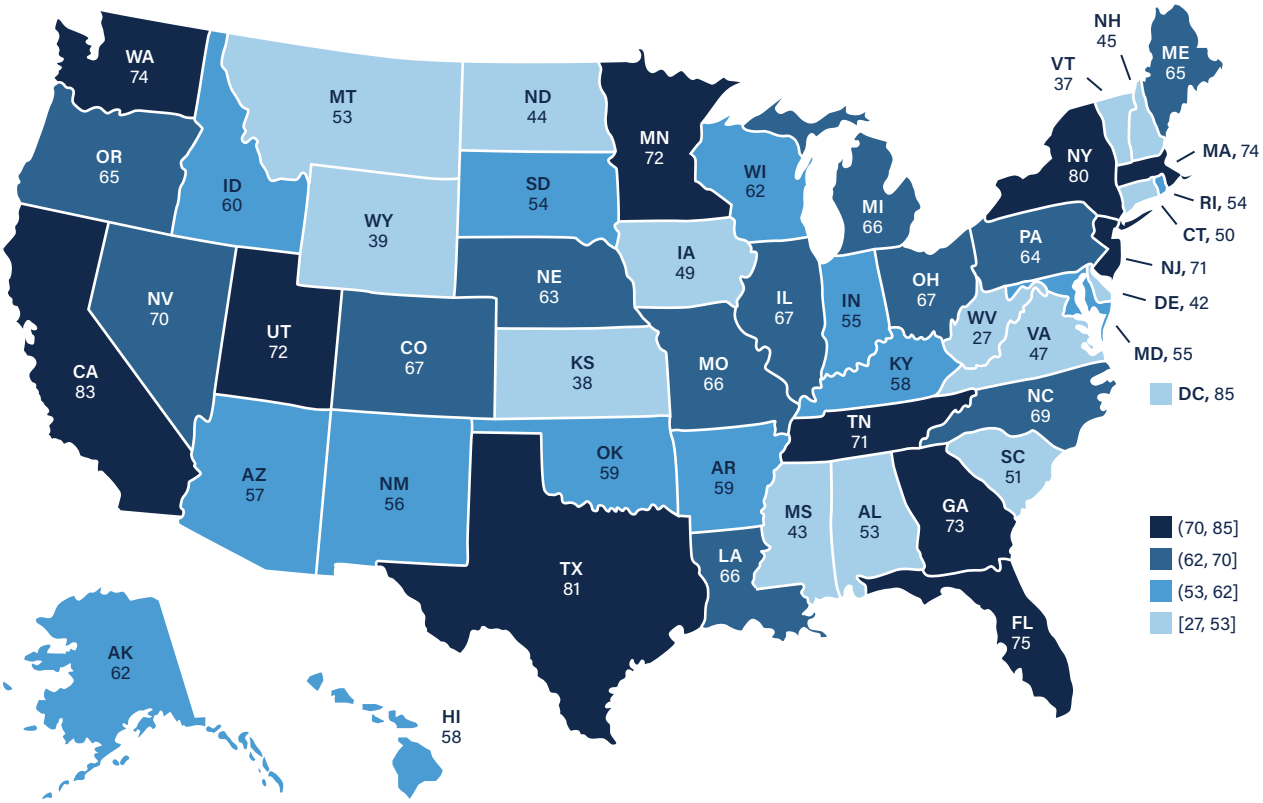
Rank	Destination Geography	Share
1	Washington D.C. Metro	0.218
2	Greater New York City Area	0.198
3	Greater Atlanta Area	0.132
4	San Francisco Bay	0.083
5	Los Angeles, California	0.054
6	Norfolk, Virginia	0.051
7	Greater Boston Area	0.048
8	Greater Denver Area	0.045
9	Greater Seattle Area	0.039
10	Greater Philadelphia Area	0.031

Notes: The denominator for each share is the total number of system-wide graduates who live outside of North Carolina. The numerator is the number of UNC System graduates residing in a given non-NC geography.

Among graduates not residing in NC, Table 1 shows that Washington, DC is a particularly common home. Unsurprisingly, vibrant areas in California, New York City, and Atlanta, GA are also common destinations—and collectively account for about 47 percent of UNC System graduates residing in non-NC geographies.

In Figure 2, we broaden our lens to compare North Carolina to the rest of the country in terms of the percentage of graduates from 4-year public institutions who remain in-state. North Carolina ranks 14th, in the top third of all states, with larger states like California and Texas leading the way nationally, retaining over 80 percent of their graduates.

Figure 2 In-State Retention of Graduates from 4-Year Public Institutions, 2010–2018



Note: Data on graduates' destinations come from Conzelmann et al. (2022).

Characterizing Graduates' Destinations: Distance and Diversity of Locations

The statistics in the prior section paint a high-level view of the movements of UNC System graduates. We deepen our understanding of the markets into which institutions' graduates flow by computing a measure that characterizes the diversity of locations occupied by an institution's graduates. That is, we calculate a version of the Herfindahl-Hirschman Index (HHI) to quantify each institution's geographic clustering of graduates across the United States.[3] The maximum value is 10,000, which implies that 100 percent of an institution's graduates live in one single sub-state/metro geography. Lower HHI values suggest that graduates are more dispersed across place.

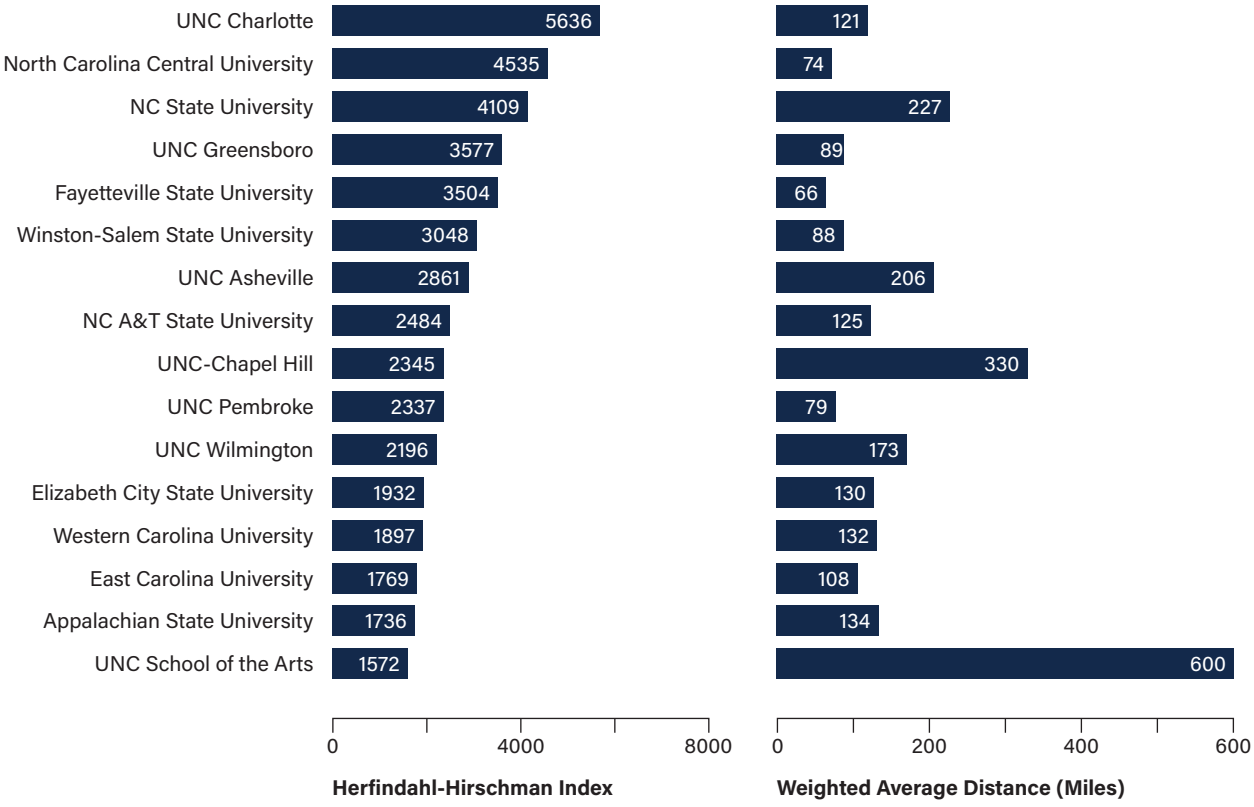
3. The HHI is a measure commonly used in the literature on market concentration. In our context, the HHI equals the sum of the squared percentages of an institution's graduates residing in each of the 278 possible geographies. The weighted average of the HHI for the full sample of UNC System institutions is 3,164. The median value is 2,484.

Takeaway #2: Institutions differ in the contours of the labor markets their graduates occupy. For example, NC Central and UNC Pembroke graduates both stay close to their respective institutions; however, NC Central graduates are much more geographically concentrated.

Because the HHI rewards a diversity of alumni locations without consideration to the physical proximity of those destinations to the institution, we also calculate the average distance traveled by graduates of each institution, weighted by the labor market shares (i.e., the proportion of an institution's graduates in each of the 278 geographies).

Figure 3 presents the HHI and average distance results by institution. We again find appreciable variation in both measures across UNC System institutions. Graduates of UNC Charlotte exhibit the most concentrated set of locations for work, whereas graduates of the UNC School of the Arts are much more dispersed—and the distance results in the right-hand panel suggest that those areas tend to be far away (e.g., New York, Los Angeles).

Figure 3 Herfindahl-Hirschman Index and Average Distance Traveled of Graduates, by UNC System Institution



Notes: Data on graduates' destinations come from Conzelmann et al. (2022). The Herfindahl-Hirschman Index (HHI) is calculated by summing the squared shares of graduates (multiplied by 100) living in each LinkedIn (LI) geography. A maximum of 10,000 implies 100 percent of the institution's graduates reside in one area, whereas lower values imply

greater dispersion across the country. Average distance is calculated by taking the crow-flies distance from each institution to the geographic center of each main LI geography multiplied by the share of graduates residing in that geography, then summed within institution.

Contrasting institutions in terms of these measures can shed light on the nature of their labor markets. For example, UNC-Chapel Hill and UNC Pembroke have very similar HHI values, implying that their graduates' locations are similarly diverse. However, the average distance traveled by UNC-Chapel Hill alumni is over four times as far as alumni of UNC Pembroke. Thus, these two institutions realize comparable levels of alumni geographic dispersion within markedly different geographic reaches. As another contrast, although graduates of North Carolina Central University and UNC Pembroke do not tend to venture far from their respective institutions, the HHI for North Carolina Central University is nearly double the HHI for UNC Pembroke—implying that graduates of North Carolina Central tend to be relatively more concentrated in fewer nearby geographic areas.

The Return on State Investment in Higher Education

We now turn to an analysis that explores the local return on state investment in higher education. States play a key role in funding public institutions to carry out their educational, research, and public service missions. In 2019, state governments collected more than $91 billion in tax revenue to fund public colleges (SHEEO, 2021). North Carolina allocated $4.3 billion for the fiscal year 2019. While it is clear that higher levels of educational attainment generate society-wide benefits in excess of their costs (Moretti, 2004), the social rate of return to such investment for a state also depends on mobility. Public institutions produce college graduates who leave for other states.

Takeaway #3: Regional public universities within the system are efficient producers of graduates who stay and work in North Carolina.

We combine our data on the geographic destinations of UNC System graduates with data from IPEDS on state appropriations and state grants to compute a proxy for the local return on such public investment. We conceptualize this "return" as the number of bachelor's degree graduates retained in-state per dollar (e.g., per $100,000) of state funding[4] expended on students at a given institution.[5] Figure 4 plots the results of this exercise.

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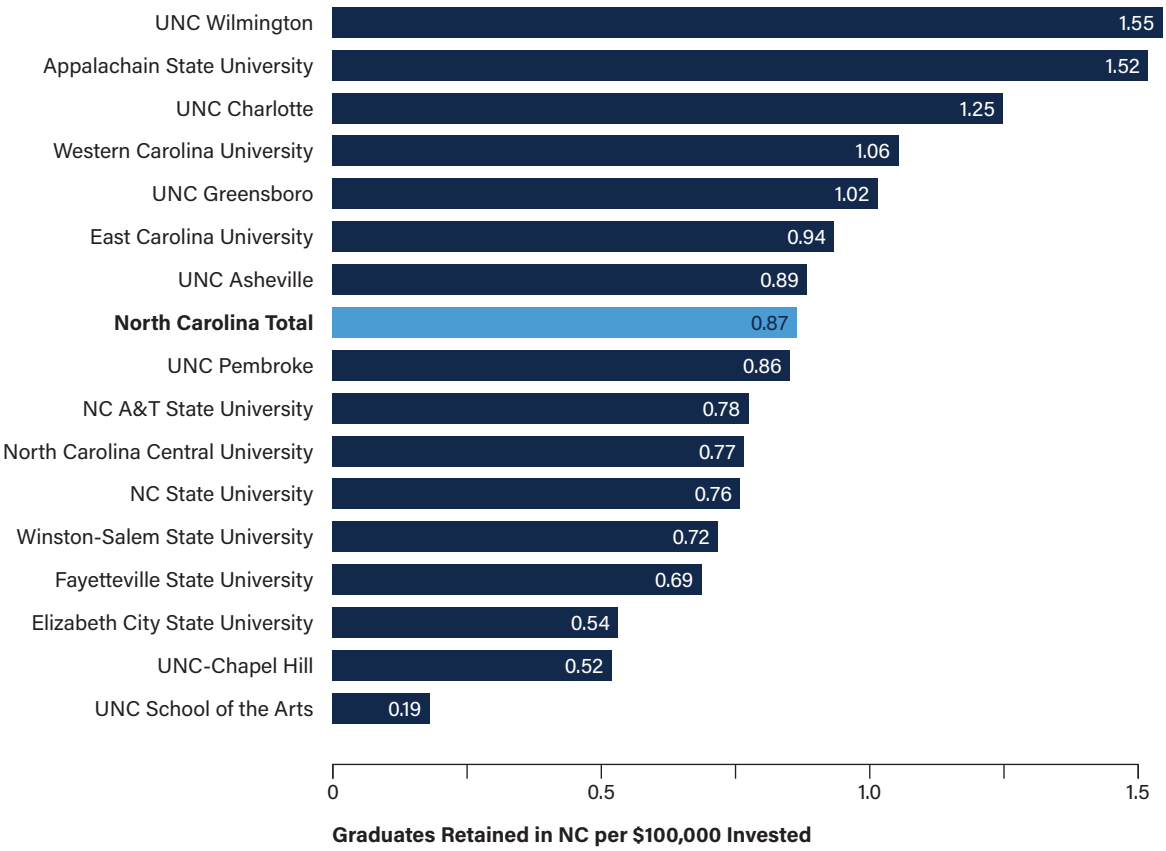
4. Our measure of "state funding" includes the following from IPEDS: (a) state appropriations, which are "amounts received by the institution through acts of a state legislative body, except grants and contracts and capital appropriations;" and (b) state grants, which "include expenditures for scholarships and fellowships that were funded by the state…"

5. We start with the 2009 and 2010 full-time, first-time (FTFT) freshman cohorts from IPEDS for each school, then estimate the number of cohort members enrolled in a given year between 2010 and 2018 using 1-year retention rates and 4-, 6-, and 8-year graduation rates. We then multiply the total state spending per FTE by the number of cohort members still enrolled each year and add across years to get the total state spending for the cohort. The final statistic divides the number of graduates remaining in North Carolina from the cohort by the total spending (in $100,000 increments).

Figure 4 Graduates Retained in North Carolina per $100,000 of State Expenditures, by Institution, 2010–2018



Notes: State expenditures include state appropriations and state grants from IPEDS. The term "graduates" refers to 4-year degree completers. Please see text for additional details on this metric.

We see substantial variation across system institutions in this metric. Of course, findings from the analyses above underscore that institutions within the system occupy different markets in terms of where their graduates go after college. For example, UNC-Chapel Hill competes in a national market whereas graduates of UNC Greensboro tend to remain quite local. Thus, we should expect lower values of the "local return" metric for institutions with high levels of out-of-state migration among their graduates.

Factors beyond out-migration rates also influence this metric. A second factor is completion rates. Consider two institutions that retain graduates in North Carolina at similar rates, UNC Wilmington and Western Carolina (both of which see about two-thirds of their graduates stay in state), but have quite different values in Figure 4. UNC Wilmington tops the figure, retaining about 1.55 graduates per $100,000 of state funding expended—whereas the value for Western Carolina is 1.06 retained graduates per $100,000 expended.

Differences in completion rates are a partial explanation for this contrast. For the cohorts that underlie our analysis, Table 2 shows that the 8-year completion rate at UNC Wilmington is about 15 percentage points higher than the analogous rate at Western Carolina (73 versus 58 percent, respectively). Thus, funds spent on students who do not complete college drive down Western Carolina's measure of graduates retained

per $100,000 of state expenditures. Patterns are similar regardless of whether we look at 8-year completion rates based on IPEDS data or 6-year completion rates based on student-level data from the UNC System.

Table 2 Completion Rates at UNC System Institutions, 2009 and 2010 Cohorts, by Data Source

Institution	8-Year Completion Rate (IPEDS)	6-Year Completion Rate (UNCSO)
UNC-Chapel Hill	91.3	90.5
NC State University	79.1	76.9
UNC Wilmington	72.9	71.5
Appalachian State University	72.9	71.3
UNC School of the Arts	66.9	66.6
East Carolina University	63.5	61.5
UNC Asheville	62.3	60.8
Western Carolina University	58.1	56.8
UNC Charlotte	57.8	54.9
UNC Greensboro	57.1	54.9
Winston-Salem State University	49.0	46.5
NC A&T State University	46.9	43.9
North Carolina Central University	44.2	42.2
Elizabeth City State University	39.4	37.8
UNC Pembroke	39.0	37.4
Fayetteville State University	34.4	31.8

Note: IPEDS completion cohorts contain first-time, full-time undergraduates.

The third and final component that influences the values in Figure 4 is state funding per FTE at each institution. Recent research underscores the importance of institutional resources for postsecondary educational attainment (e.g., Deming & Walters, 2017; Turner, 2018). In North Carolina, state funding to institutions is a function of enrollment projections (i.e., credits hours), cost differences by field of study, prices of key institutional inputs (e.g., personnel), tuition prices, and rates that relate instructional to other operating costs. In Table 3, we compute average state dollars per FTE (i.e., undergraduate and graduate) by institution[6] over our analysis period.

6. There is no way to parse state appropriation dollars to an institution into those spent on undergraduate versus graduate students.

Table 3 Average State Spending per Total FTE, by UNC System Campus

Institution	State spending per FTE (2010–2018)	Graduate Student % of FTE
UNC School of the Arts	$32,876	12.4
UNC-Chapel Hill	$22,804	28.9
NC State University	$16,980	20.7
Elizabeth City State University	$16,153	2.0
Winston-Salem State University	$14,015	6.4
UNC Asheville	$12,769	0.5
North Carolina Central University	$12,393	15.8
East Carolina University	$12,153	15.1
Fayetteville State University	$10,820	10.1
Western Carolina University	$10,765	13.2
UNC Greensboro	$10,670	14.2
UNC Pembroke	$10,643	9.0
NC A&T State University	$10,234	11.4
UNC Charlotte	$9,488	14.3
UNC Wilmington	$8,401	7.7
Appalachian State University	$8,316	8.4

Notes: The spending averages are expressed in nominal dollars. For each institution, the numerator is the sum of state appropriations and state grants (which include scholarships and fellowships funded by the state) from IPEDS. The denominator is the total number of FTE students (i.e., undergraduate and graduate); FTE = full-time equivalent.

Average state support per student varies substantially across UNC System schools for a variety of reasons. For example, some institutions support greater shares of graduate students.[7] Moreover, instructional costs differ markedly across fields of study (Hemelt et al., 2021, 2022), and institutions differ in the mix of fields they offer to students.

Given those realities, if we consider two institutions with similar completion rates and graduates who remain in NC at similar rates—such as UNC Greensboro and UNC Charlotte—the factor that generates differences in their values in Figure 4 is levels of state spending per FTE. Both institutions have 6-year

7. Table 1 in Hemelt et al. (2021) shows that institutions with a larger share of degrees that are graduate (which are also institutions with more research activity) have higher average instructional costs per student credit hour (SCH).

completion rates of about 55 percent and a bit over three-quarters of their graduates remain in NC. However, state spending per FTE at UNC Greensboro is about $1,180 higher than at UNC Charlotte, and thus the "local return" metric for UNC Greensboro is a little lower (1.02) than the metric for UNC Charlotte (1.25).

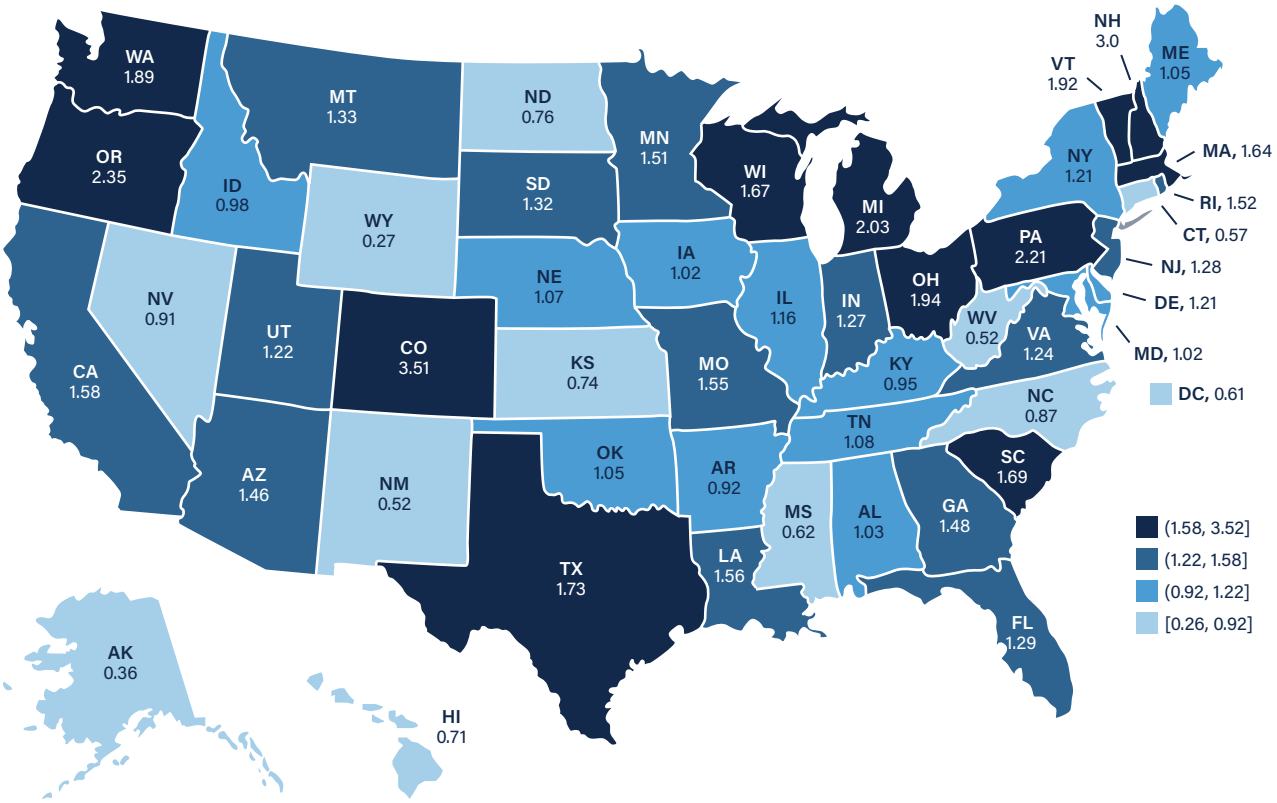
At a broad level, the results in Figure 4 provide policy leaders with a sense of the institutions that tend to efficiently produce graduates who stay and work in North Carolina. In addition, thinking through the components that lead to lower or higher values of the "local return" metric traces out a story for each institution—which may catalyze conversations concerning student success, institutional mission, and the broader landscape of state support for public higher education in North Carolina. For example, calls for additional federal support for regional public institutions are often anchored on arguments about local economic benefits (e.g., Maxim & Muro, 2021).

However, such a metric comes with important caveats. First, this metric is silent on the quality of the degrees/completions. Second, the metric makes no adjustments for the composition of the student body (e.g., average academic preparation, necessary supports, sociodemographic characteristics) or mix of degree programs at each institution. Third, this metric does not reflect spillover benefits to local areas from world-class universities (e.g., Valero & Van Reenen, 2019)—such as the ability to attract high-skill talent, employers, or the economic and social benefits that flow from medical advances, research, and innovation more broadly (e.g., Andrews, 2022).

As a final exercise, we aggregate the calculations in Figure 4 to the state level and compare North Carolina to the rest of the country. Figure 5 presents the results of this analysis. North Carolina ranks in the bottom quartile of states (41st), in terms of the average number of 4-year public college graduates retained in-state per dollar of state support.

Takeaway #4: Developing, evaluating, and then supporting initiatives that increase completion rates at UNC System institutions with low completion rates and high in-state retention rates for graduates is a sensible policy priority for state leaders.

Figure 5 Graduates Retained in State per $100,000 of State Expenditures, 2010–2018



Notes: State expenditures include state appropriations and state grants from IPEDS. The term "graduates" refers to 4-year degree completers. Please see text for additional details on this metric.

While no single factor explains the contrast between North Carolina's comparatively higher rate of in-state retention of its 4-year graduates and its relatively low ranking here, a few high-level points seem worthy of note. First, North Carolina is a low-tuition state—meaning that tuition prices have remained very affordable (relative to peer public institutions in other states) and the state (along with federal and other sources) has made up the difference in terms of costs necessary for institutions to realize their educational, research, and public service missions. To the extent that such support is insufficient to boost completion rates at system institutions, one might expect lower values of the "local return" metric.[8] Second, policy levers used by institutions in other states to generate additional resources are difficult or prohibited by law in North Carolina (e.g., increasing the share of out-of-state students). Finally, from our analysis, we see that many of the institutions with high rates of in-state retention among graduates also post low completion rates,

8. For example, based on financial reporting from SHEEO (shef.sheeo.org/state-profile/north-carolina), states such as MI, WA, OR, CA, and WI—all of which outperform NC on this metric—also have higher levels of education revenue per FTE (i.e., state appropriations plus net tuition dollars) available to support instruction.

resulting in low values of the "local return" metric. Thus, developing, studying, and then supporting initiatives that prove effective in boosting completion rates at such institutions ought to be a key focus of policy leaders in North Carolina.[9]

Conclusion and Takeaways

The production and retention of an educated workforce is critical for the prosperity and well-being of states and local communities. In this brief, we use a new dataset on the destinations of college graduates to characterize the labor markets for graduates of UNC System institutions. We then use additional data on completion rates and state funding per student to estimate local rates of return, from the vantage point of the state. Here, we recap four takeaways:

1. UNC System institutions vary in the extent to which their graduates leave the state; as a whole, about 69 percent of system graduates remain in NC (top third of states).

2. Institutions differ in the contours of the labor markets their graduates occupy. For example, NC Central and UNC Pembroke graduates both stay close to their respective institutions; however, NC Central graduates are much more geographically concentrated.

3. Regional public universities within the system are efficient producers of graduates who stay and work in North Carolina.

4. Developing, evaluating, and then supporting initiatives that increase completion rates at UNC System institutions with low completion rates and high in-state retention rates for graduates is a sensible policy priority for state leaders.

These analyses provide a deeper understanding of the labor markets for graduates from UNC System institutions, which may aid policy leaders as they consider local workforce needs, educational programming, student success initiatives, and future cross-sector collaborations.

9. This is one of the main aims of the Student Success Innovation Lab (SSIL)—an initiative that facilitates partnerships between institutional leaders and researchers to develop, field, and study promising postsecondary interventions aimed at boosting completion rates. For more information, please see: northcarolina.edu/impact/student-success/student-success-innovation-lab-ssil

References

Andrews, M. J. (2022). How Do Institutions of Higher Education Affect Local Invention? Evidence from the Establishment of U.S. Colleges. *American Economic Journal: Economic Policy*. doi.org/10.2139/ssrn.3072565

Castleman, B. L., & Long, B. T. (2016). Looking beyond Enrollment: The Causal Effect of Need-Based Grants on College Access, Persistence, and Graduation. *Journal of Labor Economics*, *34*(4), 1023–1073.

Conzelmann, J. G., Hemelt, S. W., Hershbein, B. J., Martin, S., Simon, S., & Stange, K. M. (2022). Grads on the Go: Measuring College-Specific Labor Markets for Graduates. IZA Discussion Paper No. 15323: docs.iza.org/dp15323.pdf

Deming, D., & Walters, C. (2017). *The Impact of Price Caps and Spending Cuts on U.S. Postsecondary Attainment* (No. w23736; p. w23736). National Bureau of Economic Research. doi.org/10.3386/w23736

Hemelt, S. W., Stange, K. M., Furquim, F., Simon, A., & Sawyer, J. E. (2021). Why Is Math Cheaper than English? Understanding Cost Differences in Higher Education. *Journal of Labor Economics*, *39*(2), 397–435. doi.org/10.1086/709535

Hemelt, S. W., Stange, K. M., Furquim, F., Simon, A., & Sawyer, J. E. (2022). Major Differences. *Education Next*. educationnext.org/major-differencecs-why-some-degrees-cost-colleges-more-than-others

Maxim, R., & Muro, M. (2021). Supporting distressed communities by strengthening regional public universities: A federal policy proposal. *Brookings Institution*, 36.

Moretti, E. (2004). Estimating the Social Return to Higher Education: Evidence from Longitudinal and Repeated Cross-Sectional Data. *Journal of Econometrics*, *121*(1–2), 175–212.

Turner, S. (2018). The Evolution of the High Tuition, High Aid Debate. *Change: The Magazine of Higher Learning*, *50*(3–4), 142–148. doi.org/10.1080/00091383.2018.1509652

Valero, A., & Van Reenen, J. (2019). The economic impact of universities: Evidence from across the globe. *Economics of Education Review*, *68*, 53–67. doi.org/10.1016/j.econedurev.2018.09.001

Wozniak, A. (2010). Are College Graduates More Responsive to Distant Labor Market Opportunities? *Journal of Human Resources*, *45*(4), 944–970.