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Institutional Determinants of Labor Market Outcomes for Community College Students in North Carolina

A CAPSEE Working Paper

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Abstract

The extent to which community college students experience labor market success depends on both the attributes of the individual students and the characteristics of the community colleges they attend. In this paper, we examine the impact of community college characteristics on the earnings of first-time college students who enrolled in the North Carolina Community College System in 2002–03. We estimate multilevel models that incorporate variables representing institutional features of community colleges along with individual characteristics obtained from student-level administrative college transcripts data, Unemployment Insurance wage data, and enrollment and graduation data from the National Student Clearinghouse across 830,000 community college students between 2001 and 2010. We find that a number of characteristics of community colleges enhance earnings independently of the attributes of individuals. In particular, students attending community colleges in service areas with higher unemployment rates receive lower earnings, and students from colleges that serve a single county and (especially women) in colleges with larger enrollments earn more.

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1. Introduction

The labor market benefits of community college participation have received considerable academic and policy attention in recent years. This interest reflects in large part the increasingly prominent role that community colleges are playing within the system of higher education in the current time of rapid changes in the nature of work and labor markets (Cohen & Brawer, 2008; Levin, 2001; Milliron & De Los Santos, 2004; O'Banion, 1997). Community colleges enroll about 50 percent of all first-time college students in the United States, and it is expected that by 2015 community college enrollments will account for 43 percent of all enrollments in higher education (Cohen & Brawer, 2008). In North Carolina, one in nine residents are enrolled in a community college (North Carolina Community College System, 2012), and they represent 48 percent of all enrollments in higher education in the state (The Completion Arch, 2012).

Going forward, the changing nature of the North Carolina labor force and labor market will continue to put its community colleges in the forefront of workforce development. Since the 1990s, North Carolina has seen a 273 percent rise in its foreign-born population, which represents the greatest increase in the United States. This includes a 394 percent growth in the Hispanic/Latino population (Ralls, 2008, 2014), which is likely to translate into a significant surge in the demand for community college training, as it is projected that Hispanic students will represent one third of all high school enrollments in North Carolina by 2018 (Marks, 2007). Furthermore, middle-skill jobs, which require more than a high school diploma but not a four-year degree, make up the largest part of North Carolina's labor market, representing about 50 percent of jobs. Yet in 2009, only 43 percent of the labor force had appropriate training for middle-skill jobs (National Skills Coalition, 2014). Given the significance of community colleges for individuals, organizations, and society, understanding better how they affect student outcomes is a pressing area of research generally, and for North Carolina in particular.

Studies of the labor market outcomes of participation in community colleges have generally found that most awards (e.g., certificates, diplomas, and associate degrees) yield positive returns, though these outcomes differ by type of award and across subgroups within the population (see Belfield & Bailey, 2011, for a review of the published evidence on this subject). Much of the research on this topic has emphasized the variety of pathways taken by students at community colleges and has sought to explain these on the basis of the motivations and characteristics of the students themselves.

A relatively neglected area of research on the labor market effects of community college participation is the role of institutional factors associated with the colleges and the labor markets into which they send students. A key issue in studies of education is how the contexts within which instruction takes place affect both human capital acquisition and students' ability to convert skills and credentials into labor market success. This topic is also important for policy purposes, as some of the features of school contexts are amenable to public and private interventions. For those institutional features that are beyond the control of community colleges,

crucial policy concerns center around matters of institutional accountability and rankings. For example, is it fair to penalize community colleges for factors that affect their ratings but are beyond their control? And, if not, how can accountability systems attempt to control for those factors when calculating or reporting ratings? Most studies of how institutional factors affect community college effectiveness have concentrated on outcomes such as the attainment of particular awards or transfer rates to four-year colleges (e.g., Calcagno, Bailey, Jenkins, Kienzl, & Leinbach, 2008; Clotfelter, Ladd, Muschkin, & Vigdor, 2013). Only a few studies (e.g., Mobley, 2001, 2002) have examined explicitly the impacts of community college characteristics on labor market outcomes such as earnings.

In this paper, we address this gap in the literature by examining how institutional factors influence the labor market returns to college. Our sample consists of students in North Carolina who began their postsecondary studies at a community college in the 2000s. We conceptualize institutional factors in terms of characteristics of the labor market and areas served by the community college, as well as features of the colleges themselves, such as their size, financial resources, demographic characteristics, and instructional portfolios. We estimate multilevel models that explain students' medium-term earnings on the basis of these institutional characteristics while controlling for a large number of student characteristics.

We first discuss previous studies that have examined the labor market returns to community college attendance. We then describe our data and variables, as well as our analytic model. We next summarize our results, both quantitatively and in more depth by examining community colleges whose students received unusually high or low earnings. We finally discuss some of the implications of our results.

2. Labor Market Returns to Community College Participation

The literature on the economic returns to community college participation is extensive. Belfield and Bailey (2011) summarized this literature by concluding that an additional year of schooling raises yearly earnings between 5 and 10 percent on average. Much of this research has explored differences in earnings between various subgroups within the population. A large body of work has focused on differentiated labor market returns based on gender. Kane and Rouse (1995) and Leigh and Gill (1997) reported that an associate degree provides earnings increases of around 25 percent for men and 30 percent for women. Jepsen, Troske, and Coomes (2014) also analyzed returns for other credentials besides associate degrees and found that diplomas[1] have quarterly earnings returns of nearly $2,400 for women and $1,500 for men, compared with much smaller returns for certificates.

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[1] As defined by the Kentucky Community and Technical College System, diplomas require between 36 and 68 credits, although most require at least 50 credits.

Not all research, though, is focused only on students who have earned credentials. Kane and Rouse (1995), like many other researchers, looked at the effects of some college (no degree) and found that, even when controlling for family background and ability, the average person who attended a two-year college, even without completing an associate degree, earned about 10 percent more than the average person without any college education. Further, they estimated that economic returns at a two-year or four-year college were roughly 4–6 percent for every 30 completed credits (two semesters). Jacobson, LaLonde, and Sullivan (2005a, 2005b) looked at the labor market returns to community colleges for displaced workers and found that an additional year of community college increased long-term earnings by approximately 9 percent for men and 13 percent for women.

Belfield, Liu, and Trimble (2014), using the same data we analyze here, found that associate and bachelor's degrees yielded very strong returns, though returns to certificates and diplomas were weak. Moreover, they showed that even small accumulations of credits had labor market value; the returns to health sector credentials in particular were extremely high. In addition, returns were much higher for female students than for male students.

Most studies of the economic returns to community college participation have treated community colleges as homogeneous institutions, ignoring that they often differ in important ways. Bryk and Raudenbush (1988, p. 469) argued that the difficulties in past research "served as indicators of a fundamental mismatch between the relatively complex, multilevel reality we have sought to study and the comparatively simplistic, single-level statistical models used to study that reality." Similarly, Mobley (2002) points out:

> Another weakness in the literature on school-to-work transitions of community college students is methodological in nature. Studies that address the role of community colleges in facilitating students' entry into the labor market tend to conduct analyses at the individual (the student) level. These single-level models rarely consider the contributions to student outcomes from other levels (for example, classroom, school, and even state-level variables). (p. 3)

The paucity of studies utilizing both community college and student characteristics could be due in part to the difficulty of obtaining reliable wage data at the student level. Nevertheless, given the diversity of possible community college–level attributes and the possible consequences for student outcomes, multilevel modeling becomes an important theoretical and methodological tool for advancing our understanding of how community colleges affect labor market outcomes.

Several studies have recently estimated multilevel models that seek to explain the effectiveness of community colleges, and we draw on these in guiding our choice of institutional variables. Titus (2004, 2006) identified institutional characteristics of four-year colleges that appear to influence student persistence, including whether the college is residential, enrollment, revenue, and patterns of budget expenditure. He concluded that persistence is higher at more selective, residential, and larger institutions (Titus, 2004). In a subsequent paper, he found that

higher expenditure per full-time equivalent (FTE) student is associated with greater persistence (Titus, 2006). Graduation rates were also higher at community colleges in which a larger share of revenue came from tuition (Titus, 2006). Kuh et al. (1991), and later Sjoberg (1999), examined how college differences in Carnegie classification, size, wealth, complexity, location, and quality affected student persistence (attrition). Jenkins (2007) used transcript-level data for Florida community college students and measured how institutional characteristics affected graduation, transfer, and persistence. He found the most important college-level attribute was how closely aligned programs and services were with activities that supported student success.

A study by Calcagno et al. (2008) represents one of the most robust efforts at multilevel analysis modeling the efficacy of community college features. Their model predicted student probabilities of completing a certificate or degree or transferring to a baccalaureate institution based on four categories of community college characteristics: (1) general institutional features (e.g., enrollment, proportion of part-time faculty, and certificate-to-degree ratio); (2) institutional-level compositional characteristics (e.g., proportion of minority students); (3) financial indicators (e.g., Pell grants, loans, tuition, and instructional spending); and (4) geographical location (urban, rural, or suburban). They found that a student's probability of graduating or transferring was lower in larger institutions and in community colleges with a greater proportion of part-time faculty and minority students. Another study by Clotfelter et al. (2013) measured the success of each college in the North Carolina Community College System (NCCCS) along two dimensions: attainment of an applied diploma or degree, and completion of the coursework required to transfer to a four-year college or university. Their research showed that individual characteristics explained most of the variation in outcomes, and that once student characteristics were controlled for, it was hard to distinguish between community colleges except between the extreme high and low performers (Clotfelter et al., 2013).

Mobley (2001, 2002) used hierarchical linear modeling to investigate whether the structure of a community college makes a difference in how well a young adult is able to transition from school to work and whether the characteristics of a community college affect certain types of students differently. The institutional-level characteristics she examined included enrollments, percentage of full-time faculty, transfer rate, and availability of career counseling. She found that, consistent with previous research, enrollment size was positively correlated to higher wages. She theorized that larger schools may be more able to invest in new program development, and that larger schools, located in more urban areas, may increase possible job opportunities, but she did not have data to test this. She also found that a race/ethnicity gap existed in wages but that institutional characteristics did not account for this gap.

3. Data

North Carolina Community College System

The NCCCS, like the community college systems in other states, plays a significant role in the education system in North Carolina. It represents the third largest state community college system nationally, with 58 colleges statewide; California, with 117 colleges, and Texas, with 64, are first and second respectively (although Texas has five different systems that together account for the 64 colleges). Every resident of North Carolina lives within 30 miles of a community college, and 840,000 students, or one in nine residents, were enrolled in their local community college in 2010–11 (NCCCS, 2012b). The colleges offer a collective total of more than 1,000 curriculum programs classified under more than 250 curriculum titles (NCCCS, 2008b).[2] Programs are offered at the certificate, diploma, and associate degree levels (NCCCS, 2008b), and nationally the NCCCS ranks fifth in the number of technical and vocational degrees completed each year (Fahy, 2005). Furthermore, the NCCCS provides one of the largest workforce continuing education programs, with over 1,400 training categories for employers to choose from.

Individual-Level Data

Our individual-level data are comprised of all first-time-in-college students in designated curriculum programs leading to awards who began in the NCCCS in the academic years 2001–02 through 2009–10. These data thus exclude continuing education and non-credit-seeking students, as well as credit-seeking students enrolled in customized programs created for a specific business or industry. The dataset contains information on individual students and student transcript information, including the highest award attained by each student at any institution within the designated time period. The college transcript data were merged with student-level data from the National Student Clearinghouse (NSC), which tracks students as they transfer to other Title IV– eligible colleges. This was important, as more than one third of all community college students transfer to other Title IV–eligible colleges (Hossler et al., 2012).

The combined student dataset was then merged with North Carolina Department of Commerce Unemployment Insurance (UI) records using social security numbers. The UI data include earnings collected on a quarterly basis from UI-covered employers and include total earnings from all jobs, as well as Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) information for each job (there is no information on hours of work or occupation). Our primary focus here is on the 2002–03 NCCCS entry cohort, for which we have nine years of NCCCS and NSC transcript data; we also have earnings data for the period from the first quarter of 1996 (i.e., before any of the students in our sample enrolled in college) to the first quarter of 2012. All earnings are adjusted for inflation and expressed in 2010

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[2] Figures based on Classification of Instructional Programs (CIP 2000) coding.

dollars based on the quarterly Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W). This dataset yields over 5 million quarters of earnings data across 830,000 students. The dependent variable for our analysis is (the log of) 2011 quarterly earnings (and we include in the analysis only those individuals reporting 2011 earnings).[3] We estimate all analyses separately by gender.

Institutional-Level Data

We collected institutional information for each of the 58 North Carolina community colleges. We classified the institutional-level data into six categories, which we describe in this section. Measures of these community college characteristics and their descriptive statistics are presented in Table 1. Correlations of these community college characteristics are presented in Table 2, separately for men and women.

General institutional characteristics. The variables in this category describe in general terms the institutional composition of the community college. The first is (the log of) student enrollment in 2002–03 (NCCCS, 2003a). Most studies that assess the impact of institutional-level variables on educational outcomes include this measure of organization size, though previous findings about its direction and significance are mixed. Kuo (1999) found a positive relationship between size and outcomes and argued that economies of scale allow larger institutions to offer more programs and degrees than smaller institutions, resulting in better outcomes. Mobley (2001, p. 19) also found a positive relationship between wages in the labor market and institutional size, and also concluded that economies of scale allow larger institutions to invest in and develop occupational training programs that prepare students for available work and higher paying occupations. By contrast, other studies have found a negative relationship between enrollment and measures of community college efficacy (e.g., Calcagno et al., 2008; Huffman & Schneiderman, 1997). Still other studies have found no correlation between enrollment and student outcomes (e.g., Antley, 1999; Clotfelter, 2013). To date, two studies by Mobley (2001, 2002) represent the only multilevel studies using wages as a dependent variable, and as mentioned above, she found a positive relationship between wages and institution size. We also expect to find a positive relationship between wages and enrollment. We hypothesize that larger institutions (1) are able to invest in and develop occupational training programs that prepare students for available work and higher paying occupations, (2) offer students more resources to assist in their transition to the labor market, and (3) are located in areas with greater job opportunities.

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[3]As reported by Belfield et al. (2014), UI coverage is reasonably high in these data: 775,000 of the 830,000 persons (91 percent) had at least one UI wage record during the period from 1996–2012. Individuals with no wage record between 1996 and 2012 are excluded from our analysis. The UI data do not include all workers; they exclude independent contractors, military personnel, some federal personnel, and those working in the informal sector (e.g., casual laborers). Analysis of Bureau of Labor Statistics data suggests that approximately 10 percent of civilians are not included in the UI data, primarily because they are independent contractors (see Stevens, 2007). Moreover, in most states, including North Carolina, state UI datasets do not include workers who moved out of state.

Table 1: Community College Variables Used in the Analysis

Variable Name (abbreviation)	Mean	Min	Max
General institutional characteristics			
Student enrollment in 2002–03 (logenroll)	13,981.14	1,813	57,217
Proportion of full-time faculty (facftoverall)	0.31	0.13	0.56
Student body composition characteristics			
Proportion of students applying for financial aid (c_applyfin)	0.44	0.24	0.70
Proportion of students entering to finish high school (c_intent_hs)	0.19	0.02	0.49
Number of students enrolled part-time (c_size)	1,730.33	227	7,874
Community college service area characteristics			
UNC campus in service area (uncinarea)	0.10	0	1
Single-county service area (singlecounty)	0.52	0	1
Labor market characteristics of community college service area			
Rural or urban service area (urbanperc)	0.48	0	0.99
Service area unemployment rate, 2008–2010 (urscale2010)	2.16	1	3
Institutional labor market focus			
Proportion of FTE enrollments in continuing education offerings (ceratio)	0.68	0.53	0.81
Proportion of "applied" offerings in curriculum programs (appratio)	0.58	0.40	0.77
Rate of student transfer, 2002–03 cohort (transfer0203)	0.34	0.22	0.61
Proportion of instructional budget allocated to continuing education (percCEbudget)	0.28	0.12	0.64
Student readiness for labor market opportunities			
First-time student licensure pass rate, 2002–2012 (licpass0212)	0.84	0.68	0.92
Proportion of students enrolled in customized industry programs (custprop)	0.05	0.01	0.21

Table 2: Correlations Between Community College Variables, by Gender

	log_qtr_ earnings	log enroll	facft overall	c_ applyfin	c_ intent_hs	c_ size	unc inarea	single county	urban perc	urscale 2010	ce ratio	app ratio	transfer 0203	perc CEbudget	licpass 0212	cust prop
	Male ($n = 147{,}309$)															
log_qtr_earnings	1	0.0554	-0.0377	-0.0276	-0.0731	0.0433	-0.0135	0.0382	0.0573	-0.0179	-0.0007	-0.0091	-0.0286	-0.019	0.0354	-0.0364
logenroll	0.0544	1	-0.1694	-0.6777	-0.5423	0.9103	0.089	0.2014	0.8418	-0.4182	-0.2669	-0.3756	-0.198	-0.3784	0.7677	-0.5079
facftoverall	-0.0229	-0.1969	1	0.2612	0.1136	-0.0038	-0.0128	0.1122	-0.2217	0.0944	-0.2276	0.1796	0.1916	-0.081	-0.0517	0.1198
c_applyfin	-0.0305	-0.6764	0.301	1	0.1194	-0.6191	-0.1488	-0.0541	-0.648	0.5511	0.3032	0.3317	0.0028	0.4111	-0.4918	0.3284
c_intent_hs	-0.0521	-0.4792	0.1286	0.0715	1	-0.4798	0.1314	-0.303	-0.5997	0.102	0.0819	0.3195	0.3379	0.1475	-0.3748	0.5057
c_size	0.0435	0.9054	-0.0173	-0.6137	-0.4281	1	0.1058	0.3214	0.7751	-0.3166	-0.4204	-0.2709	-0.1826	-0.4027	0.6784	-0.4741
uncinarea	-0.0247	0.1031	0.0407	-0.1452	0.0929	0.1532	1	-0.0602	0.0592	-0.2229	0.1368	-0.1475	-0.2314	0.167	0.2027	0.0113
singlecounty	0.0107	0.1608	0.0703	-0.0558	-0.2725	0.2828	-0.0011	1	0.2708	-0.0123	-0.1764	0.0173	0.1099	-0.1174	0.1065	-0.1125
urbanperc	0.0444	0.8327	-0.2422	-0.6475	-0.5472	0.7759	0.0848	0.257	1	-0.3615	-0.3659	-0.3653	-0.2443	-0.4246	0.6597	-0.5033
urscale2010	-0.0191	-0.4015	0.1191	0.5497	0.0654	-0.3155	-0.2026	0.0148	-0.3354	1	0.0592	0.1867	-0.0965	0.1621	-0.4458	0.2036
ceratio	-0.0149	-0.2854	-0.2428	0.3041	0.0373	-0.4431	0.0808	-0.1181	-0.3799	0.1006	1	-0.0114	0.0362	0.5548	-0.1522	0.2967
appratio	-0.0055	-0.3878	0.1686	0.3784	0.275	-0.2848	-0.1561	-0.0242	-0.3568	0.2264	-0.0018	1	0.225	0.269	-0.3639	0.2906
transfer0203	-0.0023	-0.1824	0.1062	-0.0313	0.3091	-0.1763	-0.2178	0.1256	-0.2228	-0.118	0.0557	0.1836	1	-0.0664	-0.1224	0.157
percCEbudget	-0.0251	-0.3663	-0.0694	0.4386	0.0554	-0.3828	0.1315	-0.0633	-0.3946	0.2078	0.5355	0.2795	-0.0701	1	-0.3238	0.0833
licpass0212	0.0381	0.7467	-0.0278	-0.4631	-0.3137	0.6627	0.1831	0.0849	0.646	-0.4107	-0.2082	-0.3695	-0.1148	-0.3503	1	-0.4891
custprop	-0.0363	-0.5202	0.1486	0.3503	0.4613	-0.4791	-0.0448	-0.1175	-0.5006	0.251	0.2733	0.2687	0.0958	0.0627	-0.4954	1
	Female ($n = 238{,}914$)															

Studies are also mixed on the effect of our second general institutional measure, the proportion of full-time faculty (NCCCS, 2002, 2003b, 2004, 2005, 2006, 2007, 2008a, 2009, 2010, 2011, 2012a). Some researchers maintain that a lower proportion of full-time faculty members does not lead to lower student outcomes (Ehrenberg & Zhang, 2005), but the majority of research indicates that increases in part-time faculty negatively affect student outcomes. Jacoby (2006) found a significant negative effect on graduation rates as the proportion of part-time faculty increased. Some have argued that part-time faculty are less certain about their place in the institution, are often viewed as less prepared to teach, are less committed to the institution, and are less available to students; these are among the factors that are likely to lead to lower student outcomes (Benjamin, 2002; Cottingham, Newman, & Sims, 1981; Eagan & Jaeger, 2009; Goble, Rosenbaum, & Stephan, 2008; Griffith & Connor, 1994; McGuire, 1993). On the other hand, the study by Mobley (2001) is the only attempt to examine the association between the part-time to full-time faculty ratio and wages and found no statistically significant relationship, and this is consistent with our expectations.

Student body composition characteristics. These variables are specific to the composition of the student body of the community college, and we obtained them by aggregating individual-level data on students within each college. The first variable, the proportion of students who applied for financial aid, is based on the assumption that those applying for financial aid will be lower income students. At the individual level, research has shown that higher income students tend to have more educational success (Toutkoushian & Smart, 2001). This suggests that a community college with a higher proportion of students applying for financial aid will be associated with lower outcomes overall. Other research has shown that student motivation strongly correlates with higher student outcomes (e.g., Church, Elliott, & Gable, 2001; Pintrich & Schunk, 1996), and if one assumes that students who have a greater financial stake in their education (i.e., by applying for financial aid) will be more motivated to achieve labor market success, then it is likely there will be a positive relationship between financial aid and wages.

The second variable, the proportion of students who entered community college to finish high school by obtaining a GED, indicates the overall proportion of students in each community college who entered the college without completing high school but intended to earn their high school equivalence certificate, at a minimum. The consensus of most literature is that high-performing high school students will have better education outcomes (e.g., Lee, 2012). Several studies have also shown that higher student outcomes are positively related to institutional selectivity (Marcus, 1989; Saupe, Smith, & Xin, 1999; Sjoberg, 1999). Thus, we would expect to find lower wages and outcomes in community colleges that have higher proportions of students entering the college without having completed high school.

Third, we expect that the proportion of part-time students in the community college will have a negative impact on labor market outcomes. Nora's (2002, 2003, 2006) engagement model for student persistence in higher education suggests that a higher proportion of part-time students would negatively affect the social and academic engagement of students, which would lead to lower student outcomes. More specifically, we would expect part-time students to have fewer

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formal and informal interactions with faculty and to be less involved in learning communities and social/academic experiences that create a sense of purpose and allegiance to the institution and to higher education. Calcagno et al. (2008) found a positive relationship between the proportion of full-time students in the community college and positive student outcomes, supporting the theoretical assertion that lower levels of engagement among part-time students may lead to lower student outcomes. Other factors may also put part-time students at a disadvantage; for example, part-time students may be more likely to have competing priorities for time and resources.

Community college service area characteristics.[4] These variables are specific to the geographical area served by the community college. The first is whether there is a University of North Carolina (UNC) four-year college campus in the community college service area.[5] We presume that community colleges that share a service area with a UNC campus will have a greater proportion of students intending to transfer to that campus and so are likely to have stronger and clearer pathways and agreements for transferring to that specific four-year college; this ought to lead to higher wages. On the other hand, a greater institutional focus on the needs of transfer students might result in lower wages, as these community colleges may be disproportionately preparing students to transfer rather than to enter the labor market.

Second, the geographical area that the community college is expected to serve varies in size and number of counties. Some community college service areas span multiple counties, and some community colleges are asked to serve only one county.[6,7] Our measure is whether the community college's service area is a single county. We hypothesize that community colleges that serve a single county may be better able to focus their efforts on preparing their students for the job opportunities that are available in the geographical area, which is likely to result in students getting better jobs and higher wages.

Labor market characteristics of the community college service area. These variables are specific to the labor market in the community college service area. The first is whether the service area is urban or rural.[8] Although community colleges in urban service areas may have students with higher wages because they have greater job opportunities, urban areas are also likely to be associated with more job applicants, which might depress wages.

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[4] The North Carolina State Board of Community Colleges designates a unique service area for each community college. We assigned all labor market variables to community colleges based on these service area designations. Most service areas use counties as lines of demarcation, though some serve multiple counties. We combined and averaged the labor market values for community colleges that span multiple counties.

[5] We manually created and coded this variable by identifying UNC campuses and then matching them to community college service areas.

[6] Single-county designation does not seem to be strongly related to population density (.1202) or institutional size (-.0274), and there is great variance is the size of North Carolina counties (ranging from 221 square miles to 1,562 square miles; average = 538 square miles).

[7] Community college service areas are decided by the NCCCS governing board, which takes into account "the past and present patterns of providing services, including existing agreements between colleges" (North Carolina State Board of Community Colleges, 2004).

[8] We use the urban/rural definitions set forth by the North Carolina Rural Economic Development Center in their rural data bank (see http://www.ncruralcenter.org).

Second, we measure the average unemployment rate in the service area during the period from 2008 to 2010.[9] Labor market characteristics, including unemployment rates, have generally not been included in previous multilevel models. Nevertheless, this seems to be an essential variable to consider, given the strong theoretical relationship between overall wages in a specific area and the strength and stability of the local labor market, as measured by number of jobs and job opportunities.

Institutional labor market focus. These variables measure the extent to which the community college's offerings are focused on providing students with skills that match the job opportunities in the local labor market. We first use two institution-level measures of offerings to students: the proportion of FTE enrollments in continuing education offerings[10] and the proportion of "applied" offerings in the curriculum programs at the community college.[11] Together, these variables demonstrate the opportunities students have to receive training and credentials that will prepare them for opportunities in their local labor market.

We also include a measure of the rate of student transfers to four-year colleges (NCCCS, 2003b). While the transfer rate has often been studied as an indicator of the efficacy of community colleges,[12] others have used it as a proxy for the vocational emphasis of the community college. Mobley (2001), for example, assumes that community colleges with a higher proportion of transfer students will allocate more resources to those students and fewer resources to labor market–focused programs.

Finally, we use an indicator of the proportion of the instructional budget that is allocated to continuing education in 2002–03 (Briggs, 2002) in order to reflect the community college's labor market focus from a fiscal and resource standpoint (cf., Calcagno et al., 2008; Clotfelter et al., 2013). We use this measure because the NCCCS's funding model is based heavily on enrollment (the correlation between student enrollment and total budget is almost .94 in these data), so a pure expenditure or budget variable is too collinear with enrollment. We assume that community colleges that have a higher proportion of their institutional budget earmarked for continuing education students (who are excluded from our dataset) will be associated with lower wages for individuals in our dataset, which consists of curriculum students.

Student readiness for labor market opportunities. We use two variables to measure the extent that students are prepared for labor market opportunities. The first is first-time

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[9] Given the drastic increase in unemployment beginning in 2008 and the subsequent partial recovery by 2010, we decided to calculate the average unemployment during the period so as to provide a more accurate depiction of how unemployment rate might affect workers' labor market opportunities during this period. We then created an ordinal variable that represented colleges 2 percent or greater below the state average, within 2 percent in either direction, and greater than 2 percent above the state average.

[10] We calculated this using the FTE of continuing education enrollments divided by the overall FTE enrollment.

[11] We calculated this by dividing the number of applied curriculum course offerings by the overall number of curriculum course offerings in each community college. Applied courses are identified within the community college system as non-general education courses. These courses are curriculum courses assigned to terminal degrees, diplomas, or certificates not associated with a transfer program.

[12] NCCCS uses student transfer rate as an annual performance measure (NCCCS, 2013).

licensure pass rate (NCCCS, 2002, 2003b, 2004, 2005, 2006, 2007, 2008a, 2009, 2010, 2011, 2012a),[13] or the rate at which students in all industry licensure programs offered at the community college (e.g., Certified Public Accountant, Certified Nursing Assistant) pass their licensure exam on the first attempt. We assume that community colleges with higher first-time licensure pass rates are doing a better job of preparing students for entering the labor market. Second, we measure the proportion of students enrolled in customized, industry-specific programs (NCCCS, 2003a).[14] We expect that community colleges with higher percentages of students in customized programs are working more closely with industry to prepare their students for relevant opportunities available in the labor market. Thus, we use this variable as a proxy for an institution's relationship with industry as well as its ability to create relevant programs for students that prepare them for openings in the labor market.

4. Analysis

Our point of departure for our analysis of the determinants of earnings is the basic Mincerian model, which is represented by Equation 1. This model has been shown by past research to be relatively robust in accounting for earnings differences among individuals (see Belfield et al., 2014). Because we are using 2011 earnings, it seems reasonable to assume that our independent variables (which are all measured prior to 2011) precede earnings both temporally and causally.

$$Y_i = \alpha + \beta X_i + e_i \tag{1}$$

In Equation 1, Y_i represents the (log) earnings of individual i, X_i represents the individual-level predictors of earnings used in Belfield et al. (2014) (college education—e.g., awards or credits; a vector of prior college characteristics; a vector of pre-college personal and ability-related characteristics; and work experience), and e_i represents the error term for individual i.

We add to this individual-level model random intercepts associated with each community college (j), as shown in Equation 2:

$$Y_{ij} = \alpha + \beta X_{ij} + u_j + e_{ij} \tag{2}$$

In this model, u_j signifies the average level of earnings that students in that college obtained after controlling for their individual characteristics.[15] This is a simple multilevel model, in which earnings are assumed to be a function of both individual-level variables ("level 1"

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[13] We calculated the average first-time licensure pass rate from 2002 to 2012 using data from the NCCCS's annual *Critical Success Factors* reports for those years.

[14] We calculated the percentage of students in customized training programs using data from the NCCCS's 2003 annual statistical report.

[15] We use the values of these random intercepts to select the community colleges with the two highest and two lowest average earnings for more intensive discussion later in the paper.

characteristics) and the average earnings of the community college that they attended ("level 2" characteristics). We estimate this multilevel model using the "xtmixed" procedure in Stata.

Finally, we estimate a model that adds the institutional variables described above (Z_j), which is represented by Equation 3. The vector of coefficients ß* indicates the effects of these institutional variables on the earnings obtained by students in that community college (j).

$$Y_{ij} = \alpha + ßX_{ij} + ß*Z_j + u_j + e_{ij} \qquad (3)$$

5. Results

The results from our estimation of the multilevel model represented by Equation 3 are presented in Table 3. We estimated this model separately for men and women.

We do not present results for the individual-level variables, as these are generally consistent with those reported by Belfield et al. (2014) in their analyses of these data. Like Belfield et al. (2014), we also find that while women earned less than men overall, women obtained greater wage returns to associate and bachelor's degrees than men. In addition, students who earned a diploma or higher had higher wages than those who obtained no award, regardless of gender. The individual-level results from our study also indicate the presence of earnings gaps by race/ethnicity, with White students earning more than their racial/ethnic minority counterparts.

Our estimation of the model represented by Equation 2 indicates that, after controlling for the individual-level variables, about 1 percent of the variation in earnings for men, and about 0.7 percent of the variation in earnings for women, can be explained by differences between the community colleges. Our measured institutional variables (Equation 3) explain 52 percent of the total variation in earnings between community colleges for men and 60 percent of the total variation in earnings between community colleges for women.[16] Thus, compared with students' individual attributes, which explain about 20 percent of the variation in earnings for men and about 17 percent for women (Belfield et al., 2014), the institutional characteristics of the 58 NCCCS community colleges explain relatively little of the variation in individual wages. Nevertheless, our measured institutional variables are fairly successful in accounting for the variation in wages that we can attribute to the community colleges.[17]

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[16] The variation in individual wages explained by differences between community colleges is $.102^2 = .01$ for men and $.082^2 = .0067$ for women (Equation 2). The variation in wages accounted for by the random intercept when the measured institutional variables are in the model is $.069^2 = .0048$ for men and $.052^2 = .0027$ for women (Equation 3). The amount of variance in individual wages between community colleges that can be explained by our measured institutional variables is thus $(.01 - .0048) / .01 = .52$ for men and $(.0067 - .0027) / .0067 = .597$ for women.

[17] We should keep in mind that the assumption of the multilevel model is that there are no unobserved factors at the individual level that affect the choice of what community college to attend; what we observe as an "effect" of a community college could actually be something about the sorting of students into that school that is not picked up by the individual-level variables.

Table 3: Institutional Marginal Effects From Random Effects With Inclusion of Student-Level Characteristics

Variable	Female		Male	
	Coefficient	*SE*	Coefficient	*SE*
General institutional characteristics				
Student enrollment in 2002–03 (log)	0.142***	0.037	0.068	0.050
Proportion of full-time faculty	0.033	0.113	-0.027	0.152
Student body composition characteristics				
Proportion of students applying for financial aid	0.120	0.115	0.223	0.154
Proportion of students entering to finish high school	-0.225*	0.110	-0.240	0.148
Proportion of students enrolled part-time	0.000	0.000	0.000	0.000
Community college service area characteristics				
UNC campus in service area	-0.029	0.028	-0.060	0.037
Single-county service area	0.035*	0.016	0.093***	0.022
Labor market characteristics of community college service area				
Rural or urban service area	-0.083	0.061	-0.133	0.082
Service area unemployment rate, 2008–2010	-0.033*	0.017	-0.059**	0.022
Institutional labor market focus				
Proportion of FTE enrollments in continuing education offerings	-0.462*	0.198	-0.411	0.267
Proportion of "applied" offerings in curriculum programs	0.292**	0.114	0.230	0.153
Rate of student transfer, 2002–03 cohort	0.087	0.125	-0.650***	0.168
Proportion of instructional budget allocated to continuing education	-0.029	0.099	-0.068	0.135
Student readiness for labor market opportunities				
First-time student licensure pass rate, 2002–2012	-0.006	0.258	-0.358	0.350
Proportion of students enrolled in customized industry programs	-0.154	0.257	-0.101	0.345
Constant	6.355***	0.324	7.736***	0.44
SD of random intercept—student level variables only	0.082		0.102	
SD of random intercept—institutional and student variables	0.052		0.069	
Intraclass correlation coefficient (LR Test)	318.86***		305.93***	

Note. Dependent variable is log earnings. Model includes student-level variables that are not displayed. Student-level variables include college education (e.g., awards or credits), a vector of prior college characteristics, a vector of pre-college personal and ability-related characteristics, and work experience.

*p < .05. **p < .01. ***p < .001.

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Turning to our results for specific community college characteristics, we find a number of institutional variables are positively related to earnings: (log) enrollment size is positively associated with earnings, but only for women (this relationship is also positive for men but not statistically significant); both men and women whose community colleges have single-county service areas earn more; and women who attend community colleges that have a greater ratio of applied to academic offerings earn more (the association for men is also positive but not statistically significant).

Other institutional characteristics are negatively related to earnings: women who attend community colleges that have higher proportions of entering students who have not completed high school earn less (the association is also negative for men but not statistically significant); both male and female students who attend community colleges that are in service areas with higher unemployment rates earn less; women who attend community colleges that have a higher proportion of continuing education courses earn less (the association for men is also negative but not statistically significant); and men in community colleges that have a high rate of student transfers to four-year colleges earn less (the association for women is positive but not statistically significant).

Community Colleges With High- Versus Low-Earning Students: A Closer Look

The results of our multilevel models identify a number of features of community colleges that are associated with earnings regardless of the characteristics of students themselves. We now take a more in-depth look at the two community colleges that are associated with the highest earnings and the two that are associated with the lowest earnings, after controlling for student attributes, in order to understand better what differentiates community colleges with regard to their ability to provide their students with high wages. We selected these two pairs of colleges from the results of the multilevel model that included the individual-level variables as well as a random intercept for each college (i.e., Equation 2 above). The values of these random intercepts indicate the relative earnings associated with students in each college *after* controlling for the individual-level attributes.

High-performing community colleges. Both of the community colleges with the highest earnings (High-Performing Community College #1 and #2, hereafter HPCC1 and HPCC2) share a number of characteristics. Both reside in urban areas that have North Carolina's densest populations, have multiple campuses, and serve single-county areas with some of the lowest unemployment rates in the state. Both represent some of the largest community colleges in the system and have a relatively small proportion of enrolled students taking remedial courses or courses to complete a high school equivalency; this suggests that these schools are able focus more of their resources on increasing student skills to match labor market opportunities rather than on remedial education. Students enrolled at HPCC1 have access to over 250 programs of study that lead to degrees, diplomas, or certificates, and those at HPCC2 can choose from over 180 programs of study that lead to degrees, diplomas, or certificates.

In addition, both colleges have stable leadership. The president of HPCC1 has been leading the institution for over two decades, and HPPC2 has had the same president for over a decade; further, both colleges have had only had a small number of presidents in their 50-year histories. Their stable leadership has enabled these colleges to build close ties and trust with the communities and businesses in their service areas. Moreover, the vision statements of both colleges underscore their high aspirations, as both publicly aspire to be national leaders in workforce development by providing world-class programs and services.

In addition to these organizational and demographic commonalities, the two high-earning colleges share several distinctive characteristics. HPCC1's close ties to its community are evidenced by sizable donations to its foundation and programs made by businesses within its service area. Its close working relationship with industry is also evident in its corporate learning center, which is tasked with identifying and understanding the specific employee learning and development needs of businesses, organizations, and partners in the college's service area. Similarly, HPCC2's partnerships are structured in ways that leverage its relationships with businesses and agencies to help students find work. For example, in partnership with the state of North Carolina, HPCC2 provides training and certification in professional skills such as the most popular computer programs used in today's business offices, as well as other skills needed to run a successful office as jointly identified by the college and the agency. HPCC2 has also partnered with a local four-year university and created state-of-the-art training facilities that mirror a bio-manufacturing plant, with technologically advanced classrooms and industrial-grade equipment laboratories. Courses are taught by industry experts and focus on teaching bio-manufacturing skill sets identified by the industry.

Larger enrollments translate directly to higher operating budgets, and HPCC1 achieves some flexibility in order to fund programs and projects beyond the bare operating essentials. For example, HPCC1 built and maintains an innovative, free online tool that allows local residents and students to explore the employment prospects in a variety of career fields available in the college's service area. This tool provides local employment statistics in real time to help students decide on appropriate skills and the corresponding education they might want to pursue based on opportunities available in the local labor market. HPCC1 also has multiple centers across its campuses intended to support students while they are enrolled by providing information and guidance, assistance with goal clarification, answers to questions, tutorial assistance, and advising and counseling. Furthermore, HPCC1 has centers focused on helping students begin their careers by teaching them how to conduct job searches, create resumes, and hone their interview skills.

HPCC2 also offers significant "wrap-around" services to ensure that students are entering the labor market as prepared as possible. A hallmark of this effort is HPCC2's learning center, which offers free tutorial support services to all registered students in their courses of study. Furthermore, HPCC2 has a career center that offers career exploration labs, open resume-writing labs, one-on-one resume review sessions, job search assistance, mock interviewing, online career

resources, job opening lists, job fairs, and networking opportunities. HPCC2 even offers a course that covers topics that will help students make the transition from college to a career.

Finally, both HPCC1 and HPCC2 have a center specifically devoted to veterans that provides them with support services, including individual and group counseling and advising, assistance with choosing programs of study, and help identifying employment opportunities specific to veterans and their spouses.

Low-performing community colleges. Both of the low-earning community colleges (Low-Performing Community College #1 and #2, hereafter LPCC1 and LPCC2) also share a number of characteristics. Both colleges reside in North Carolina's most rural counties, and each has a service area that includes three counties with some of the highest unemployment rates in the state. LPCC1 is a small, rural community college with two campuses; LPCC2 is a small, rural community college with one campus and two satellite centers offering continuing education courses. In addition, both schools are some of the smallest community colleges in the system, at almost one eighth the size of the high-performing colleges.

Both colleges have comparatively fewer resources for students and a significantly higher percentage of students who need to complete a high school equivalency or who are enrolled in remedial courses. Their comparatively high remediation rates suggest that these colleges must focus more of their resources on remedial education and devote fewer funds proportionally to increasing student skills to match labor market opportunities. It is thus not surprising that students at LPCC1 and LPCC2 have much more limited opportunities, with only a small number of programs of study to choose from: LPCC1 offers students only 28 programs of study, and LPCC2 offers its students 35 programs of study. LPCC1 also has a high proportion of its students taking some or all of their coursework online, with over 75 percent of curriculum students taking at least one course online. According to the NCCCS website, LPCC2 dedicates almost half of its overall budget to continuing education, compared with about 28 percent for the average community college in North Carolina.

Student support services are also less robust at these two colleges. LPCC1 has no centralized advising function but instead assigns each entering student to a faculty advisor who is expected to assist students with academic advising, and each program of study also has a faculty advisor who is expected to guide students. Counseling and guidance services are outsourced by LPCC1 to a community services organization that is located off campus, and LPCC1 only has a small career center with computers and job guide labs for resumes, interviews, and other job-related topics. Similarly, personal, career, transfer, and academic counseling at LPCC2 are all centralized in a counseling center, with no specific center dedicated to special needs or veteran students. LPCC2 does not have a specific center or staff focused on careers and job placements. The responsibility for career and job placement is located in the counseling center.

Finally, LPCC1 and LPCC2 lack stable leadership and ambitious vision statements—two key organizational traits characteristic of the high-performing colleges. LPCC1's current president has a tenure of about five years, and took over from a president who was accused of

large financial "inconsistencies" while in office. In addition, LPCC1 has no public or published vision statement, and its mission statement is unquestionably regional, as it aims to "enrich the communities it serves." LPCC2's vision statement is also locally focused and specifically names the three counties it serves in its service area.

6. Discussion and Conclusion

Our results suggest that institutional factors do matter for the success of community college students, though there is much more variation within community colleges produced by individual attributes than there is between colleges (see also Clotfelter et al., 2013). Still, our measured institutional variables explain about half of the variation for men, and about 60 percent of the variation for women, that is due to differences between community colleges.

A number of our findings are consistent with our expectations and prior research on the labor market outcomes of community college attendance. For instance, students of colleges with larger enrollments earn more. Among other benefits conferred by their economies of scale, larger institutions are able to provide greater resources and more programs and degrees than smaller institutions, resulting in better labor market outcomes (see also Kuo, 1999; Mobley, 2001).

That women who attend community colleges with higher proportions of non–high school completers earn less is consistent with the argument that these colleges are likely to have lower performing students, who are likely to obtain lower wages (Marcus, 1989; Saupe, et al., 1999; Sjoberg, 1999). Because our model controls for individual characteristics, this finding suggests a contextual effect, perhaps produced by the impact of peers.

Several of our findings suggest that a college's curricular emphases and course offerings affect student earnings. Our finding that men who attend community colleges with higher transfer rates earn less suggests that these institutions have a greater focus on the needs of transfer students and thus allocate more resources to them and less to vocational programs and students, thereby lowering students' ability to find higher paying jobs (see also Dougherty, 1991; Mobley, 2001). Moreover, the more academic nature of transfer curricula suggests that workers who enroll in transfer programs will be less prepared with the technical skills usually required for jobs paying higher wages.[18] In contrast, we found that women in community colleges with a higher ratio of applied courses (versus academic courses) in their curriculum programs earn higher wages. We also found that women who attend community colleges with a higher proportion of continuing education courses earn less. In interpreting this finding, we should remember that our sample of students consists only of those participating in curricular offerings,

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[18] We assume that our measure of whether a student obtained a four-year award picked up the effect of transferring to a four-year college. It might also be the case that transfer students were out of school for less time and thus did not have as much labor market experience by 2011, but this should be captured in the measure of work experience included in our model.

not those in continuing education courses. Thus, the curricular students in these data are likely to be disadvantaged in their instruction in those colleges that devote a higher percentage of their resources to continuing education courses.

We found that both men and women whose community colleges serve a single county earn more, which may be due to their ability to gear their instructional efforts and workforce development toward opportunities that are available in the single county. For example, HPCC1 works directly with a workforce development agency that is focused solely on the single county served, presumably allowing the college a greater ability to gear offerings to local opportunities. Conversely, LPCC1 needs to work with three different county entities in coordinating job opportunities, and interfaces with workforce development boards that are tasked with serving many counties, presumably requiring the college to accommodate more stakeholders. Similarly, our finding that students in community colleges with a greater ratio of applied to academic offerings earn more is consistent with the reasoning that students in such schools have more opportunities to receive training and credentials that will qualify them for opportunities available in their local labor market.

Finally, we found that labor market demand affects student wages, as those attending community colleges in service areas with higher unemployment rates receive lower earnings. This is consistent with our expectation that higher unemployment rates reflect fewer job opportunities for students in the service area, resulting in lower paying jobs.

A somewhat surprising result is that students who attend community colleges in more densely populated areas earn less, though this negative effect is not statistically significant. This result is to some extent inconsistent with our description of the high-performing colleges, which tended to be in urban areas, while the low-performing schools were in rural areas. One possible explanation for this might be that while there may be more job opportunities in more densely populated areas, there may also be more job seekers and thus more competition for these jobs.

Our findings have a number of implications for our understanding of the labor market returns to education as well as for educational policy. In particular, our results underscore the importance of social contexts for explaining student achievement and success, a prominent theme in sociological studies of education and social inequality. Efforts to improve educational outcomes should thus focus on enhancing characteristics of these contexts directly, in addition to encouraging and motivating individual students to take particular courses or to follow certain educational pathways.

For policy, an important insight from our results is that some of the community college traits we have discussed are beyond the control of individual community colleges and are not amenable to public policy interventions. Examples of these include characteristics of the geographical service area, such as the density of population or the unemployment rate. These kinds of institutional characteristics are contextual factors that a community college must deal with as best it can, and are not open to direct manipulation by public policies or business decisions. The fact that these characteristics are beyond the control of community colleges but

still impact student employment placement and labor market returns implies that a state or federal rating or ranking system that judges community colleges based on their labor market outcomes will systematically disadvantage colleges that already have geographic and structural disadvantages that are not under their control. This in turn raises some important questions, such as whether states or the federal government should adjust for these geographic and structural factors when constructing their ratings and rankings and, if it is feasible to do so, how they should go about doing it.

Other institutional features are within the control of the community college, however. Examples of such characteristics include the stability of their leadership; their vision and strategy; and the proportion of their budget allocated to various instructional activities, such as applied or continuing education courses. These institutional features could be improved by more effective management practices, and would benefit from research on the effectiveness of various ways of organizing community colleges. Studies of how the characteristics of community colleges influence their students' labor market returns are likely to grow in importance as these educational institutions come to occupy an increasingly prominent role in placing students in rapidly changing labor markets.

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