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Unintended Consequences

Examining the Effect of Part-Time Faculty Members on Associate's Degree Completion

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Employment of part-time faculty members by community colleges has become an increasingly common approach to reducing institutional costs, which may have unintended consequences for student outcomes. This study examines the relationship between part-time faculty members and the associate's degree completion of community college students. The authors use hierarchical generalized linear modeling to analyze student- and institution-level data from the California community college system to determine how student exposure to part-time faculty members affected the likelihood of earning an associate's degree. Findings indicate that students experienced a significant yet modest negative effect from exposure to part-time faculty members on the probability of completing an associate's degree.

Keywords: *associate's degrees; part-time faculty members; hierarchical generalized linear modeling; student outcomes; California*

Examining the effects of the part-time faculty on student outcomes in community colleges is critical given that these institutions educate almost 45% of the country's undergraduates (American Association of Community Colleges, 2006) and employ more part-time faculty members

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than any other type of institution of higher education. Across 1,052 associate's degree-granting institutions, 65.6% of faculty members were employed in part-time appointments in the fall of 2005, considerably higher than any other category within the Carnegie Classification of Higher Education Institutions (American Association of University Professors, 2006). Community colleges have also been the primary institutions of higher education to provide postsecondary education to underserved populations (Levin, 2001; Shaw & London, 2001; Shaw, Rhoads, & Valadez, 1999). The defining elements of community colleges, such as open access, low tuition, a multitude of services, and convenient locations, are especially pertinent to students with low socioeconomic status, to women with children, to minorities, and to those who are underemployed, who are academically unprepared, who are physically and mentally disabled, or who are adults looking for a second chance in education (Cohen & Braver, 2003; Dougherty, 1994; Phillippe, 2000). Investigating how these students can be successful in their academic pursuits is important for the student and the institution.

Recent research has begun to address the effects of exposure to instruction from part-time faculty members at both 4-year institutions and community colleges. Although part-time faculty members provide institutions some financial flexibility (Gappa, 1984; Schuster & Finkelstein, 2006), their increased use has raised concerns for constituents inside and outside of higher education. Part-time faculty members spend a greater proportion of their overall time teaching, but the initial evidence suggests that these appointees are less accessible to students, have less-frequent interactions with students, are more transient, bring less scholarly authority to their jobs, and are less integrated into the campus culture (Schuster, 2003; Umbach, 2007).

This article examines the relationship between the part-time faculty and student outcomes, focusing on associate's degree completion. Although the conferral of degrees is only one function of community colleges, the completion of an associate's degree often serves as a springboard to further education at 4-year institutions (Quigley & Bailey, 2003). By investing in additional years of education, students have the ability to obtain a more holistic education while simultaneously increasing their earning potential in the labor market (Kane & Rouse, 1999). Considering that higher education is seen as a flexible and convenient avenue for social mobility, particularly for disadvantaged individuals (Bowen, 1996), identifying facilitators of and barriers to completing an associate's degree has important implications.

This study draws from two conceptual frameworks—faculty-student interaction and social capital—to examine the effects of exposure to part-time

faculty on associate's degree completion. We use hierarchical generalized linear modeling (HGLM) to analyze student- and institution-level data from 107 community colleges across the state of California. This study seeks to determine whether increased exposure to instruction from part-time faculty members significantly affects the likelihood that community college students will complete an associate's degree.

Literature Review

We draw from several key areas of research to inform this study. We begin by discussing community colleges and their students. Second, given the reliance on part-time faculty members at community colleges, we provide an overview of part-time faculty members in the United States. We then examine studies addressing the effects of part-time faculty members on student outcomes. Although this research is limited and typically focuses on 4-year institutions, several key studies provide insight for our research, which adds an important dimension by focusing on community colleges. Finally, the review concludes with a critique of literature related to the associate's degree completion of community college students.

Community College Context

Community colleges maintain complex missions that include preparing students for degree programs, offering degree programs, preparing students to transfer to 4-year institutions, and providing a host of other educational and vocational opportunities (Cohen & Brawer, 2003). Characterized by low tuition, flexible scheduling, convenient locations, and comprehensive missions (Cohen & Brawer, 2003; Phillippe, 2000), community colleges offer students a possible vehicle for pursuing postsecondary education, particularly for first-generation students, single parents, economically and educationally disadvantaged students, and individuals with full-time employment (Choy, 2002; Cohen & Brawer, 2003; Grubb, Badway, & Bell, 2003). Community college faculty members have garnered some attention by scholars recently (Levin, Kater, & Wagoner, 2006; Townsend & Twombly, 2007; Twombly & Townsend, 2008; Wagoner, 2007), although Twombly and Townsend point out that this attention is relatively insignificant given the critical role these faculty members play. Important to this research is the uniqueness of part-time faculty members and their role with students.

Part-Time Faculty Members at Community Colleges

Fiscal constraints at the college and state levels create an increased demand for part-time faculty members (Gappa, 1984; Schuster & Finkelstein, 2006). Across public community colleges, nearly 67% of all faculty appointments made in 2003 were part-timers (American Association of University Professors, 2006). This is a dramatic increase from the late 1960s when just 27% of faculty members held part-time appointments (Cataldi, Fahimi, Bradburn, & Zimble, 2005; Schuster & Finkelstein, 2006).

As employment of part-time faculty members has increased at community colleges, researchers have examined more closely the characteristics associated with these individuals. Demographically speaking, part-time faculty members closely resemble their full-time colleagues (Eagan, 2007). In fact, educational attainment represents the only substantial difference between part-time and full-time faculty members, as a higher proportion of full-timers hold master's, professional, and doctoral degrees than do part-time faculty members (Eagan, 2007).

In addition to demographic differences, Levin (2007) noted differences in job satisfaction, showing that part-time instructors in the humanities and social sciences are less satisfied with their work environment than those in occupational and vocational areas. Levin added that compensation alone does not explain this difference. As community colleges adapt to economic globalization, the organizational context tends to be more favorable for part-time faculty members who offer specific expertise in career or technical fields than for part-time faculty members in academic fields (Levin, 2001, 2007; Levin et al., 2006). Levin (2007) asserted that liberal arts faculty members are hired not for their expertise but, rather, for their labor as substitutes for full-time instructors. In contrast, occupational and professional program faculty members are more often sought for their specialized knowledge. As we consider the role part-time faculty members play with students, it is important to consider this distinction. Part-time faculty members from the vocational and professional areas gain their professional identity outside of academia through nonacademic employment (Wagoner, 2007) and thus may be less invested in the overall institution.

Although the reliance of community colleges on part-time instructional labor has continued to rise, a recent analysis of part-time faculty members in California's community college system concluded that there is a lack of stability in the part-time faculty workforce. Yoshioka (2007) wrote the following:

To recap, economic uncertainty, little or no job security, low pay, inadequate health benefits, and minimal paid office hours all contribute to the shocking 20

to 25 percent annual turnover of part-time faculty. . . . Just stabilizing the part-time workforce would be a major achievement, yet administrators treat part-time faculty as an endlessly renewable resource. (p. 43)

Community college part-time faculty members face a challenging role as they attempt to meet the institution's growing demands for access to education and a trained workforce while at the same time working within an organization that may not adequately meet their needs.

Part-time Faculty Members and Student Outcomes

The part-time faculty represents a critical component of the success of community colleges, which must remain responsive to market and student demands. Part-time faculty members often teach larger, lower-level courses or specialized advanced courses at times that are often more convenient for part-time students. In addition to serving an important niche in relation to types and times of courses offered, part-time faculty members who bring real-world experiences and community connections to the classroom are helpful to community college students (Green, 2007).

The increased employment of part-time faculty members continues to draw criticisms from scholars who see part-timers as threats to the development of quality academic programs (Haeger, 1998). In discussions regarding the connection between student learning outcomes and the employment of part-time faculty members, scholars, including us, are diligent in noting that blame for any negative impact on outcomes does not rest solely on the part-time faculty member. At the same time, we need to be much more cognizant of how increased levels of part-time faculty instruction affect students and how institutions of higher education can address any negative consequences. Recent research (Ehrenberg & Zhang, 2004; Harrington & Schibik, 2004; Jaeger & Hinz, 2008; Jaeger, Thornton, & Eagan, 2007; Ronco & Cahill, 2004) has begun to examine this issue but has focused primarily on 4-year institutions. In addition, most of this research has looked at the institution as the unit of analysis rather than at an entire state system of higher education. Yet, in each of these studies, researchers have found some type of negative relationship between increased levels of part-time instruction and student academic success (e.g., persistence).

Fewer studies have focused on the relationship between student exposure to part-time faculty members and student outcomes at community colleges. One of the first research efforts was conducted by Burgess and Samuels (1999), who examined the impact of full-time versus part-time faculty

instruction on student performance and persistence in selected sequential courses. Drawing on analyses of data from a large, urban multicampus community college district, the results indicated that students whose first course was taught by a full-time instructor were better prepared for their second, subsequent course than were students whose first course was taught by a part-time instructor. Yet, because full-time instructors did not significantly outperform part-time instructors, and because the sample was limited to one college district, Burgess and Samuels provided only a starting point to examine the effects of part-time instruction on student outcomes.

More recently, Calcagno, Bailey, Jenkins, Kienzl, and Leinbach (in press) used data from the National Education Longitudinal Study of 1988 (NELS: 88) and the Integrated Postsecondary Education Data System (IPEDS) to examine the effect that institutional dependence on part-time faculty members has on the graduation rates of students at community colleges. The researchers found a significant and negative relationship between the level of part-time faculty employment and student degree completion (i.e., certificate, associate's degree, or bachelor's degree) or student success in transferring to a 4-year institution. Because of the broad definition of degree completion used by Calcagno et al., the results from this study did not provide evidence that specifically addressed the relationship between part-time faculty members and associate's degree completion rates at community colleges.

Also using IPEDS data, Jacoby (2006) examined whether graduation rates at public community colleges nationwide differed as institutions increased their use of part-time faculty members. Jacoby's study focused on institutional data, and, although his analyses included state-level controls, he did not account for student-level variables. Jacoby concluded that increased employment of part-time faculty members at community colleges negatively affected institutional associate's-degree completion rates. Although the focus on institutional factors provided insight into the effects of part-time faculty employment on community college graduation rates from a macroperspective, Jacoby's study did not advance the literature on how the exposure of individual students to part-time faculty members affects their likelihood of earning an associate's degree.

Associate's Degree Completion at Community Colleges

Students seeking associate's degrees represent just one category of students attending community colleges. Although comprising a distinct group, associate's-degree seeking students represent great diversity, as some

of these students enter community colleges with strong academic preparation (e.g., those entering science and technology fields), whereas others begin their coursework by registering for remedial classes (Cohen & Brawer, 2003). Those students needing significant remedial work will require more time and resources to complete their degree and often have low social and cultural capital.

Scholars increasingly have focused on factors affecting the likelihood that students will transfer from community colleges to 4-year institutions; however, many of the students entering community colleges have no intention of transferring and instead aspire to a subbaccalaureate credential or associate's degree (Grubb, 1996; Rendon & Nora, 1989). Despite this fact, no study has considered explicitly how exposure to part-time faculty members affects the likelihood that community college students will complete an associate's degree. However, a number of studies have examined other factors affecting associate's degree completion.

Dowd and Coury (2006) studied the effect of subsidized loans on the associate's degree attainment of community college students. They concluded that neither the receipt of financial aid (dichotomously coded) nor the actual amount of aid (continuously coded) had a significant effect on whether students earned an associate's degree within 5 years of initial enrollment in a community college. Students with higher community college grade point averages (GPAs) and those who identified themselves as being financially dependent on their parents had significantly higher odds of earning an associate's degree. Conversely, older students, single parents, and individuals who had either not declared a major or who had enrolled in vocational programs had significantly reduced odds of attaining an associate's degree. The study by Dowd and Coury added to the literature examining community college degree attainment, but their research is limited in terms of sample size, variables included in the analyses, and the types of analyses conducted. Although Dowd and Coury used appropriate weights for their sample, the actual analytic sample had just 694 students from the Beginning Postsecondary Students Longitudinal Survey covering the years 1990-1994. The authors did not include any experiential factors, such as interactions with faculty members, in their analyses. In addition, the single-level analyses did not account for the multilevel, clustered nature of the data that reflect the grouping of students within individual community colleges. By ignoring the clustering effect of students within institutions, the authors may have underestimated standard errors of the estimated parameters in their model, which may have resulted in Type I statistical errors (Wang & Fan, 1997).

In a qualitative study, Cejda and Rhodes (2004) examined how the connections Hispanic community college students had with faculty members affected their retention and program completion. They discovered that frequent and intentional interactions with faculty members inside and outside the classroom significantly contributed to the students' success in completing a subbaccalaureate credential, earning an associate's degree, or transferring to a 4-year institution. The faculty members in the study emphasized that becoming role models and mentors for these Hispanic students played an important role in encouraging and fostering their success in community colleges (Cejda & Rhodes, 2004).

Associate's degree completion within the state of California has its own set of unique challenges. For example, students who obtain an associate's degree at one of the California community colleges take two courses over the number transferable to a University of California institution (J. S. Levin, personal communication, September 7, 2008). Taking two additional courses, which would not transfer to a 4-year institution, to obtain an associate's degree may not be an economically feasible choice for the many low-income community college students. Obtaining an associate's degree versus obtaining 2 years of equivalency work is an important decision for community college students in California.

Our study addresses the limitations of prior research related to associate's degree completion across community colleges. By drawing on student- and institution-level data from California's community college system, and by utilizing advanced statistical analyses, our study aims to identify how student traits and behaviors interact with institutional contexts in relation to completing an associate's degree. Furthermore, this study specifically examines how exposure to part-time faculty members at the student level, as well as the proportion of part-time faculty members employed at the institutional level, affect associate's degree completion for community college students.

Conceptual Framework

Drawing on a conceptual model from previous work (Eagan & Jaeger, in press), this study assumes that students exposed to greater levels of instruction from part-time faculty members experience fewer meaningful interactions with those faculty members than they would with full-time instructors. As a consequence, students may become less integrated into the campus academic culture, an outcome supported by studies indicating the importance of

faculty-student interactions to student success (Cotten & Wilson, 2006; Endo & Harpel, 1982; Gaff & Gaff, 1981; Nora, Barlow, & Crisp, 2005; Pascarella & Terenzini, 1977, 2005). In addition, Baldwin and Chronister (2001) noted that students may view part-time faculty members as less stable or less secure. To the extent that this occurs—something that should be assessed in future research—students may be less likely to connect with these faculty members and see them as potential mentors or role models. Research has suggested that faculty-student interaction, particularly outside of the classroom, serves as a positive predictor of cognitive and affective development, academic achievement, and overall satisfaction with the college experience (Cotten & Wilson, 2006; Endo & Harpel, 1982; Milem & Berger, 1997).

It is plausible that students who have few interactions with part-time faculty members or who have few meaningful connections to these faculty members may become dissatisfied with their experience and thus more inclined to leave their college or university (Eagan & Jaeger, in press). Students who are more satisfied with their experience indicate that their instructors are more accessible and involved (Jaasma & Koper, 2002). A 2007 national report released by the Community College Survey of Student Engagement (CCSSE) analyzed 5 years of engagement data, revealing that the accessibility of faculty is critical. Almost half (47%) of the students responding to the CCSSE indicated they had never discussed course readings with a faculty member outside of class. In addition, as few as 8% reported they had often or very often worked with instructors on activities outside of class (Community College Survey of Student Engagement, 2006). McClenney (2007) added to the concern for the lack of student engagement by highlighting the differences between part-time and full-time students. She noted that part-time students are significantly less likely to work with other students on projects either inside or outside of class; to interact with instructors via e-mail or have conversations about grades, assignments, or career plans; and to make a class presentation. Thus, CCSSE data illustrate that the experience of part-time students appears to be systematically less engaging than the experience of full-time students.

Another perspective that informs this work is social capital and students' ability to generate and utilize social capital during their time at a community college (Jaeger & Eagan, 2008). Social capital corresponds to the production function of social connections (Coleman, 1988). By engaging in closed network systems, individual actors can tap into information channels and engender a sense of trust and reciprocity with others in the social network (Coleman, 1988). Developing relationships with and connections to other

actors within a social system enables individuals to generate social capital for themselves (Portes, 1998).

This study utilizes the idea of social capital to help understand how community college students may be disadvantaged by increased exposure to part-time faculty members. The disadvantaged backgrounds from which many community college students originate, as well as a tendency for these students to be less academically prepared than their peers in 4-year institutions, may place community college students at a deficit when considering their levels of both cultural and social capital. To counteract this potential deficit, community college students may need additional nurturing and guidance from mentors and faculty members.

Although social capital involves trust and reciprocity, information and knowledge, and norms and sanctions, we focus on how social capital facilitates networks of information and knowledge. This study builds on other research (Cejda & Rhodes, 2004; Stanton-Salazar & Dornbusch, 1995) that considers how students can generate social capital through their connections with institutional agents. Community college students can build social capital by connecting with various institutional agents including faculty members, advisors, and administrators. These relationships help students navigate the institution and make progress in their courses or toward degree completion. Yet, students who are unable to connect with these institutional agents or who are exposed to greater numbers of part-time faculty members who themselves are less integrated into the campus culture (Schuster, 2003) may be at a disadvantage. If part-time faculty members are less accessible to students (Umbach, 2007), their ability to help students successfully navigate the academic processes within a community college may be curtailed. Research (Cotten & Wilson, 2006; Milem & Berger, 1997) has demonstrated the importance of having an engaged and available faculty on campus, showing positive links between student–faculty interactions and student development while in college.

Method

Research Question

Drawing from social capital theory and previous research examining part-time faculty members, this study seeks to address the following research question: Controlling for background characteristics, does exposure to part-time faculty members in community colleges significantly affect students' likelihood of completing an associate's degree? It is hypothesized that as students'

exposure to part-time faculty members increases, their likelihood of completing the associate's degree decreases. A secondary research question asks the following question: Controlling for student-level characteristics, does the percentage of part-time faculty members employed by an institution significantly affect the average likelihood of associate's degree completion at community colleges?

Data and Sample

This study draws on student transcript, faculty employment, and institutional data from the California community college system. Utilizing two cohorts of first-time, credit-seeking students in 2000 and 2001, this study tracks the college-going behavior of California community college students over 5 years. The initial sample of students included more than 700,000 cases within each cohort, which translated into an initial overall sample of nearly 1.5 million students in 107 community colleges.

Because this study focuses on associate's degree completion, we reduced the sample to reflect those students whose initial aspirations as well as 1st-year course-taking behavior demonstrated a serious intention of completing an associate's degree. We delimited the sample to those students who initially indicated when they first enrolled in this system that they intended to complete an associate's degree and who had completed at least nine credit hours by the end of their 1st year of enrollment. Although scholars have suggested that initial aspirations provide a poor measure of actual intention and future behavior (Adelman, 2005; Cohen, 1991), we wanted to analyze a sample of students who had at least indicated an initial inclination toward an associate's degree rather than a sample that included all students, such as lifelong learners and individuals from 4-year institutions taking classes at their local community college. In addition, by further delimiting the sample to students who had completed at least nine units by the end of the 1st year, we attempted to eliminate individuals who may have used their time in the community college system as a single-term placeholder before moving into a 4-year institution. With these constraints imposed, the final analytic sample for this study included 178,985 students in 107 community colleges.

In addition to the student-level data provided by the California community college system office, we merged institutional data from IPEDS into our institution-level dataset. Variables we retrieved from IPEDS for each of the 107 California community colleges included the proportion of the faculty employed on a part-time basis, institutional size, and total revenues generated by each community college. Data from IPEDS provided a more complete picture of community colleges in the state of California.

Variables

In addition to the students' 1st-year and cumulative GPAs, the student dataset provided by the system office included variables related to students' background characteristics, enrollment traits, and course-taking behaviors. The dependent variable, associate's degree completion, represented a dichotomous variable reflecting whether or not a student completed an associate's degree within 5 years of initially enrolling in the system of community colleges. We included gender, ethnicity, age, and citizenship as demographic controls in the model. We created dummy variables for gender (male as the reference group), each race (White as the reference group), and citizenship (noncitizen as the reference group). We kept students' age as a continuous variable.

Variables relating to students' enrollment characteristics included controls for enrollment status (full-time student as the reference group), academic program, and financial aid. We controlled for students in vocational studies and those with undeclared majors, with students studying in traditional academic programs as the reference group. We had two variables related to financial aid. First, we controlled for whether students applied for and received aid. Second, we included the average amount of financial aid a student received across all terms of his or her enrollment at a particular community college.

We used student transcript data to create variables representing the extent of exposure students had to part-time faculty members. We defined part-time faculty members as those instructors hired at or below 98% of a full-time appointment. To examine possible differences between exposure to part-time faculty members in the students' 1st year of enrollment and overall exposure to part-time faculty members at community colleges over the 5-year period covered by the study, we created two separate yet related variables. We added the number of credits a student completed with part-time faculty members in the 1st year and divided that total by the number of credits the student completed during his or her 1st year. We used an identical procedure to create a variable for the overall exposure to part-time faculty members across all years in which a student enrolled at a community college. These quotients, representing students' exposure to part-time faculty members in the 1st year and overall, provided the percentage of credits students took with part-timers. We recoded these variables so that a one-unit increase corresponded to an increase of 10% in students' time with part-time faculty members.

In addition to student-level variables, we included several institutional variables in our analyses. We controlled separately for the proportion of instruction offered by part-time faculty members as well as the proportion of faculty

members employed in part-time appointments at each community college. We also included in our models the percentage of students identified as racial minorities, state and local revenues, institutional size as measured by the number of full-time equivalent students, and the urbanicity of the institution. For urbanicity, we used dummy variables for urban and rural campuses, with suburban campuses as the reference group.

Analyses

The multilevel, clustered design of the data necessitated the use of advanced statistical techniques (Raudenbush & Bryk, 2002). With this design and a dichotomous outcome variable, we utilized HGLM to understand the unique effects of student- and institution-level variables on students' likelihood of earning an associate's degree. HGLM enables analysts to distinguish between institutional and individual effects on the dependent variable. The use of single-level statistical techniques, such as logistic regression, for complex, multilevel data structures, may underestimate the standard errors of the estimated parameters in the model. Underestimated standard errors may lead to a Type I statistical error, which occurs when a researcher erroneously concludes that a parameter is statistically significant. (Raudenbush & Bryk, 2002).

Generally, to warrant the use of hierarchical linear modeling, the outcome variable must significantly vary across institutions (Raudenbush & Bryk, 2002). With continuous outcome variables, researchers can calculate the intraclass correlation (ICC) to determine whether the dependent variable varies significantly across groups. The heteroskedasticity of the variance of the dichotomous outcome variable in this study makes an ICC calculation non-instructive; instead, we relied on graphs of Empirical-Bayes (EB) residuals to determine whether the average associate's degree completion rates varied across institutions. Inspection of these graphs suggested that institutional graduation rates significantly differed; thus, we proceeded with the use of HGLM. Finally, in constructing our models, we centered all continuous variables around their grand mean.

Limitations

This study has at least three limitations. First, an important limitation to this study exists in the potential lack of consistency in data collection methods across the institutions in the sample. Despite the system office's efforts to standardize data collection methods, definitions and methods may

continue to vary slightly across institutions. Second, because we analyze secondary data, we are restricted by the variables and definitions available in the community college system and IPEDS datasets. For example, the system dataset did not provide information about students' prior academic performance because community colleges generally do not have any selection criteria in admitting students (Cohen & Brawer, 2003); thus, they rarely collect or report this information for students who enroll. Finally, the identification of the students included in the analytic sample has a certain level of subjectivity. The method used to identify the analytic sample may lead to a certain bias in the analyses by excluding some students who decided to pursue an associate's degree long after their initial enrollment in the community college system. Although we recognize this as a limitation, we believe that having an exclusion bias provides more realistic results than having an inclusion bias, which would occur had we included all of the students in the initial population.

Results

Descriptive Statistics

Table 1 presents descriptive statistics for the student and institution-level variables included in the analyses. Even after reducing our analytic sample to include students who completed at least nine credits in their first year and who initially indicated an intent to earn an associate's degree, just 19% of students in our sample actually earned the degree. Such a low percentage of associate's degree completers among a cohort of students who initially aspired to earn the degree underscores the importance of investigating the facilitators of and barriers to successfully completing an associate's degree.

On average, students earned 48% of their credit hours in courses taught by part-time faculty members during their 1st year of enrollment. This figure increased slightly to 49% when considering all years of enrollment. Disaggregating the sample by enrollment status showed that exposure to part-time faculty members was slightly higher for part-time students than it was for their full-time counterparts. Considering another variable related to academics, students had an average 1st-year GPA of 2.74. Students' GPAs tended to decline slightly with time, as their final cumulative GPAs averaged 2.45.

Women comprised 55% of the analytic sample, which resembled their representation (54%) in the larger population of California community college students. Asian American and Pacific Islander students accounted for 14% and 5% of the analytic sample, respectively. These percentages indicated a slight overrepresentation of Asian Americans and Pacific Islanders in the

Table 1
Descriptive Statistics for Variables in the Model

Variable	<i>M</i>	<i>SD</i>	Min.	Max.
Dependent variable (<i>n</i> = 178,985)				
Earned an associate's degree	0.19	0.39	0.00	1.00
Independent student-level variables (<i>n</i> = 178,985)				
Female	0.55	0.50	0.00	1.00
Asian	0.14	0.34	0.00	1.00
Black	0.07	0.25	0.00	1.00
Pacific Islander	0.05	0.22	0.00	1.00
Latino	0.25	0.43	0.00	1.00
Other race or ethnicity	0.07	0.15	0.00	1.00
White	0.41	0.49	0.00	1.00
Citizenship	0.79	0.41	0.00	1.00
Age	21.64	6.92	17.00	70.00
Received financial aid	0.44	0.48	0.00	1.00
Average financial aid per year (in US\$)	377.81	647.08	0.00	10,356.67
Enrolled part-time	0.63	0.48	0.00	1.00
Undeclared major	0.29	0.46	0.00	1.00
Vocational studies major	0.05	0.21	0.00	1.00
1st-year grade point average	2.74	0.76	0.00	4.00
1st-year percent exposure to part-time faculty members (×10)	4.80	0.14	0.00	10.00
Cumulative grade point average	2.45	0.75	0.00	4.00
Overall percentage exposure to part-time faculty members (×10)	4.90	0.23	0.00	10.00
Independent institution-level variables (<i>n</i> = 107)				
Percentage of faculty members in part-time appointments	0.65	0.09	0.08	0.86
Full-time equivalent (FTE) student enrollment (in 100s)	65.48	37.55	5.63	177.41
State revenues (in US\$1,000,000s)	23.20	16.45	1.14	87.06
Local revenues (in US\$1,000,000s)	18.09	12.57	1.04	74.04
Urban campus	0.44	0.50	0.00	1.00
Rural campus	0.25	0.44	0.00	1.00
Suburban campus	0.31	0.46	0.00	1.00
% of students identified as racial minorities (×10)	5.42	2.01	1.29	9.92

Note: Min. = Minimum; Max. = Maximum.

analytic sample; students in both groups combined constitute 13% of the entire community college population in California. White students constituted 41% of the sample, which was slightly less than the percentage of White students enrolled in the state's community college system (46%).

Comparatively, Latino and Black students made up 25% and 7% of the analytic sample, respectively. In the California community college system, Latino students represent 25.3% of the overall population, and Black students represent approximately 8% of the total student population.

The average age of students in the analytic sample was 21.6, which was significantly lower than the average age (28 years old) of students enrolled throughout the system. This statistic suggests that younger students may be more likely than older students to enroll in community colleges with an intent to pursue an associate's degree. Older individuals may have other goals in mind, such as vocational retraining or lifelong learning, when they first enroll. Less than half (44%) of the students in the sample applied for and received financial aid, and the average amount of financial aid received per year was just under US\$400. Nearly two thirds of students enrolled on a part-time basis. Approximately 29% of students in our sample did not declare a major, and 5% of the students majored in vocational studies programs. The balance of students studied a variety of fields, ranging from liberal arts and humanities to science and technology.

Among the institutional variables, part-timers constituted 65% of all faculty members across all the institutions in the system in 2002. The mean total state revenue for institutions was just more than US\$23 million but ranged widely across institutions from US\$1.14 million to US\$87.06 million. Similarly, local revenues averaged US\$18 million but ranged across institutions from US\$1.04 million to US\$74.04 million. About 44% of the campuses were located in urban areas, whereas 31% were in suburban locations and 25% were in rural areas.

HGLM Analyses

Table 2 presents the results from the HGLM analyses and details the log-odds, the odds ratios, and the delta-p statistics. Petersen's (1985) formula was used to calculate delta-p statistics, and we show these statistics only for those variables that were significant at $p < .05$. Table 2 shows the results for two models; however, the models differ only slightly. Model 1 includes 1st-year GPA and 1st-year percentage exposure to part-time faculty (i.e., the proportion of credits completed during the 1st year that were earned in classes taught by part-time faculty members.) In contrast, Model 2 includes total cumulative GPA and overall percentage of exposure to part-time faculty members across all years in which a student was enrolled. The control variables did not differ significantly between the two models, thus we only discuss the results of the control variables from Model 1.

Table 2
Hierarchical Generalized Linear Modeling (HGLM) Results

Variables	Model 1				Model 2			
	Log Odds	SE	Sig.	Delta-P	Log Odds	SE	Sig.	Delta-P
Student-level variables								
Female	0.36	0.02	***	6.2%	0.36	0.01	***	6.2%
Asian American	0.01	0.02		0.03	0.02			
Black	-0.08	0.03	**	-1.2%	-0.07	0.03	**	-1.1%
Pacific Islander	0.04	0.03		0.14	0.03***	2.2%		
Latino	-0.06	0.01	***	-0.9%	0.06	0.01	***	0.9%
Other	-0.12	0.06	*	-1.8%	-0.08	0.06		
Citizenship	0.03	0.01	**	0.5%	0.09	0.01	***	1.4%
Age	0.01	0.00	***	0.2%	0.01	0.00	***	0.2%
Financial aid status	-0.20	0.05	***	-2.9%	-0.15	0.05	***	-2.2%
Average financial aid per year	0.02	0.00	***	0.3%	0.02	0.00	***	0.3%
Undeclared major	-0.22	0.01	***	-3.2%	0.21	0.01	***	3.4%
Vocational studies major	-0.34	0.04	***	-4.7%	-0.33	0.04	***	-4.6%
Part-time student	-1.68	0.01	***	-14.8%	-1.46	0.01	***	-13.8%
1st-year grade point average	0.39	0.01	***	6.7%				
1st-year percent exposure to part-time faculty	-0.03	.00	***	-1.0%				
Total cumulative grade point average				0.81	0.01***	15.5%		
Total percent exposure to part-time faculty				-0.04	0.00***	-1.1%		
Institutional variables								
Intercept	-0.73	0.09	***		-1.06	0.10	***	
Percent of faculty in part-time appointments	-0.57	0.40		-0.52	0.44*	-6.8%		
State revenues	0.01	0.00	*	0.2%	0.01	0.00		
Local revenues	0.01	0.01		0.01	0.01			
Institutional size (FTE students)	-0.01	0.00	*	-0.2%	-0.01	0.00	*	-0.2%
Urban campus	0.05	0.11		0.05	0.11			
Rural campus	-0.01	0.13		-0.01	0.14			
% of students identified as racial minorities	-0.05	0.02	*	-0.8%	-0.05	0.03		
Model Statistics								
	Model 1				Model 2			
Level-2 variance	0.19				0.19			
Intercept reliability	0.94				0.94			
Chi-square	2694.96				2737.94			
			***				***	

Note: SE = standard error; FTE = full-time equivalent.

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

The key variable of interest in this study was the percentage of credits students completed with part-time instructors. Model 1 tested the significance of students' exposure to part-time faculty members during their 1st year of enrollment. The results suggest that an increase of 10% in the 1st-year proportion of credits earned in courses taught by part-time faculty members resulted in students becoming 1% less likely to earn an associate's degree. In Model 2, we included a measure of exposure to part-time faculty members across all years of enrollment, and the effect was quite similar. Although the log-odds coefficient in Model 2 associated with exposure to part-time faculty members had a slightly greater magnitude than the coefficient in Model 1, the delta-p statistic remained stable. Indeed, a 10% increase in the overall proportion of credits earned in courses taught by part-time faculty members reduced the students' likelihood of earning an associate's degree by 1%. This effect may seem quite small; however, considering that the average student earned approximately 50% of all of his or her credit hours in courses taught by part-time faculty members, the average student became 5% less likely to graduate with an associate's degree compared to his or her peers whose courses were taught by full-time faculty only. About 5,000 students, or just less than 3% of the analytic sample, had no exposure to part-time faculty members. In contrast, approximately 90,000 students earned between 40% and 60% of their credits in classes taught by part-timers. Similarly, more than 7,800 students (4.4% of the analytic sample) in this study earned all of their academic credits in courses taught by part-time faculty members, which translated into their being 10% less likely to earn an associate's degree than their peers who took courses taught only by full-time faculty members.

In contrast to exposure to part-time faculty members, 1st-year GPA had a significant and positive effect on students' likelihood to complete an associate's degree completion. For every one-unit increase in 1st-year GPA, students became about 7% more likely to earn an associate's degree. This trend held for Model 2 as well, although the effect of GPA became much more substantial when considering students' cumulative, rather than 1st-year GPA. For every one-unit increase in cumulative GPA, students became almost 16% more likely to earn an associate's degree.

Among the demographic characteristics, gender emerged as a significant variable in that women appeared to be 6% more likely to earn an associate's degree than their male peers. Several controls for race were significant, though the effect was marginal at best. Black and Latino students were approximately 1% less likely than their White counterparts to earn an associate's degree. Similarly, students classified as Other in terms of ethnicity were just 2% less likely to earn an associate's degree.

Financial aid seemed to have a significant and substantial effect on students' likelihood to earn an associate's degree. Students who received financial aid because of demonstrated financial need were about 3% less likely to earn an associate's degree than their peers who did not receive financial aid. Because of the poor quality of the parental and student income variables, we were unable to accurately control for students' socioeconomic status or actual financial need; therefore, the variable related to receipt of financial aid served in some ways as a proxy for socioeconomic status. The amount of financial aid that students received also had a significant albeit modest effect on associate's degree completion. For every US\$100 increase in average aid per year, students became less than 1% more likely to earn an associate's degree.

Several student entry characteristics emerged as significant predictors of associate's degree completion in the models. Part-time students were 15% less likely than their full-time counterparts to earn an associate's degree. Similarly, students with undeclared majors or those majoring in vocational studies were 3% and 5%, respectively, less likely to earn an associate's degree than students majoring in all other fields, such as science, mathematics, humanities, and liberal arts. Students were only assigned an undeclared status if they never declared a major during their enrollment or if they left before declaring a major.

In addition to the student-level variables, a few institution-level variables emerged as significant in both models. For simplicity purposes, we describe only the results from Model 1 because both models produced similar results in regard to institution-level predictors. Students attending community colleges that enrolled higher proportions of racial minority students were significantly less likely to earn an associate's degree. Specifically, a 10% increase in the proportion of minorities enrolled at a community college resulted in an average decrease of approximately 1% in a student's probability of earning an associate's degree. Similarly, institutional size had a statistically significant yet practically negligible negative effect on completion rates; indeed, the effect of a 100-student increase resulted in a 0.2% decrease in a student's likelihood of earning an associate's degree. State revenues had a significant positive effect on associate's degree completion, but the effect was negligible. The proportion of faculty members employed in part-time appointments had no significant effect on individuals' likelihood to earn an associate's degree, which is an important finding that we will discuss further in the next section. In other models (not shown), we included the proportion of instruction offered by part-time faculty members in lieu of the proportion of faculty members employed on a part-time basis. This variable did not emerge as significant and actually appeared to add error to our model.

Both models had a modest fit for the data. Table 2 includes the chi-square statistics for each model. Each model accounted for approximately 19% of the variance in degree completion rates across institutions. Level-one variance was heteroskedastic; therefore, HGLM cannot estimate explained variance for level one.

Discussion

This study sought to determine whether exposure to part-time faculty members affected students' likelihood of completing an associate's degree at a community college. Findings from the HGLM analyses suggest that exposure to part-time faculty members had a significant yet modest negative effect on completing an associate's degree. Although we recognize that degree completion represents a limited outcome variable for use with community colleges, the completion of an associate's degree often serves as a catalyst to advanced educational training at 4-year institutions (Quigley & Bailey, 2003). Yet, as students' exposure to part-time faculty members increased, their likelihood of completing an associate's degree significantly decreased. This effect remained stable across time as students advanced through their academic programs.

As previously noted, a 10% increase in overall exposure to part-time faculty members resulted in a 1% reduction in the students' likelihood of earning an associate's degree. Although this effect appears small, administrators and policymakers should consider that the average California community college student spends nearly 50% of his or her classroom time in courses with part-time instructors. According to estimates from our models, this level of exposure translates into the average student being at least 5% less likely to graduate with an associate's degree compared to his or her peers who only have full-time instructors in the classroom, holding constant all other variables in the model. In general, these findings are similar to the results of prior research on the negative effects of exposure to part-time faculty members on student retention and degree completion at 4-year institutions (Ehrenberg & Zhang, 2004; Harrington & Schibik, 2004; Jaeger & Hinz, 2008; Ronco & Cahill, 2004).

Although the effect of exposure to part-time faculty members was smaller compared to other variables in the model, community college administrators and policy makers actually have some control in addressing this issue. As prior research has demonstrated, a more available and fully engaged faculty positively contributes to a number of student outcomes, including transfer and associate's degree completion (Cejda & Rhodes, 2004). Inferring from prior

research (Eagan, 2007; Haeger, 1998; Umbach, 2007), the dissatisfaction of part-time faculty members with employment benefits, along with their lack of integration into the campus culture, may contribute to their inaccessibility and limited availability to students. With increased incentives, part-time faculty members may make a more concerted effort to be more available to students and work harder to engage students in the classroom.

By becoming more engaged with students, part-time faculty members have an opportunity to contribute to the development of community college students' social capital. As demonstrated by Milem and Berger (1997) and Cotten and Wilson (2006), connecting with faculty members inside and outside the classroom positively affects students in a number of ways. The negative correlation between exposure to part-time faculty members and associate's degree completion may indeed be related to the students' sense that they receive little support and guidance from part-time faculty members, who may lack the time and perhaps the necessary knowledge needed to assist their students in navigating the academic terrain at their respective institutions. At the same time, these students may need additional encouragement from the faculty to help them realize the potential benefits of completing their associate's degrees. Students arriving at the community colleges often need greater nurturing from the faculty, yet with high levels of exposure to part-time faculty members, they may not find the academic support necessary to work toward the completion of an associate's degree program.

In addition, this study suggests that it is important to consider how colleges might better meet the needs of part-time students. Part-time students in this study were approximately 15% less likely than their full-time peers to earn an associate's degree. Students attend college on a part-time basis for a variety of reasons, such as family commitments, work obligations, and general preferences (Cohen & Brawer, 2003). Because of their more limited time on campus, part-time students may experience greater challenges than full-time students in making connections to faculty members and peers. Because these connections may enhance students' social capital by providing additional information and support that help sustain progress toward an associate's degree, part-time students appear to have a substantial disadvantage compared to their full-time peers.

The authors of the 2007 national report released by the CCSSE noted that rethinking part-time faculty work will likely have the greatest effect on part-time students, because part-time faculty members are more likely to teach at night and on weekends when part-time students are more likely to take classes. This suggests that decisions regarding what courses part-time faculty members teach and when those courses are offered have important consequences.

Unfortunately, this study was unable to specifically examine factors that contribute to part-time students' reduced likelihood of completing an associate's degree. Additional research should examine how administrators might better reach out to part-time students and encourage their continued academic success.

One finding from this study was inconsistent with prior research. The results from this study suggest that neither the proportion of faculty members employed in part-time appointments at community colleges nor the proportion of instruction offered by part-time faculty members had a significant effect on associate's degree completion rates. Jacoby (2006) analyzed only institutional-level data and found that part-time faculty members negatively affected graduation rates at community colleges. By analyzing both student- and institution-level variables, this study appropriately separated multilevel variance and suggested that the reduced likelihood in graduation rates likely has more to do with individual student exposure to part-time faculty members than it does with the overall proportion of part-timers employed by a community college. Other institution-level results provide little practical insight for administrators and policymakers in community colleges.

In addition to highlighting the need to assist part-time students, this study suggests that campus administrators should provide additional encouragement and support to students who have not declared a major or who enroll in vocational studies programs. Undeclared and vocational studies majors were 3% and 5%, respectively, less likely to complete an associate's degree compared to their peers in other fields. In addition, it is likely that students who have not declared a major may also be attending on a part-time basis, which presents an even greater challenge to completing a degree.

Future Research

This study lays the foundation for future research that can be undertaken in a number of directions. First, future studies should consider sensitivity analyses to determine how the selection of the analytic sample affects the results of the regression analyses. This study relied on students' initial degree aspirations at the outset of their enrollment as well as on the students' 1st-year course-taking behavior to select cases for inclusion in the analyses. Rather than relying on degree aspirations to reduce the sample, future researchers might consider only eliminating individuals who enroll for lifelong learning purposes as well as students from 4-year institutions who enroll to take a course that is related to their baccalaureate degree.

Second, future research should include more controls for students' socioeconomic status, family obligations, and employment commitments. The initial dataset for this study included limited information on students' socioeconomic status, and the variables to which we had access had a substantial number of missing cases. Similarly, limited information related to students' family obligations and employment existed in the data. Given the diversity of the population of students who enroll in community colleges, it is important for future research to consider these additional nuances when predicting degree completion.

Third, including variables that provide a more comprehensive picture of the climate at individual institutions would enhance the analyses and potentially explain more variance in institutional completion rates. For this study, IPEDS data had limited information that could be included in the analyses. However, in future analyses, we intend to aggregate student-level predictors to generate a more complete picture of the institutional context in which students enroll. Some of these aggregated variables may include the percentage of students who transfer to 4-year institutions as well as the percentage of students who major in or graduate from programs devoted to vocational studies. Within this particular state system of community colleges, institutions vary significantly in their purposes; some institutions specialize in vocational studies whereas others are more committed to encouraging transfer to 4-year institutions and baccalaureate degree completion among students studying more traditional academic disciplines.

Future research might also consider using other advanced analyses. For example, students in the present study may have enrolled simultaneously in multiple community colleges. HGLM is limited in that it accounts for the effect of one institution at a time even though a student's likelihood of degree completion may be affected by multiple institutional contexts. Cross-classified hierarchical linear modeling would more accurately account for the varying contexts students experience when they simultaneously enroll at more than one community college. Finally, we have undertaken a new project to consider specific factors that lead to increased cost and production efficiencies in the California community colleges. Using an advanced econometric technique known as stochastic frontier analysis, we will estimate the extent to which California's community colleges can simultaneously improve both their efficiency at constraining costs while increasing their production of associate's degree earners, certificate holders, and transfer students.

Implications and Conclusion

As higher education enrollments continue to expand (Martinez, 2004), policy makers will look to public community colleges and 4-year institutions to accommodate the increased demand for postsecondary degrees. Following recent growth patterns, community colleges likely will accommodate the bulk of this expansion (Martinez, 2004). With more students entering community colleges across the United States, administrators and policy makers need to develop a better understanding of how students navigate the community college system, particularly those who have an interest in earning an associate's degree. In addition, as enrollments in community colleges increase, community colleges may continue their efforts to maintain economic efficiency by relying more heavily on part-time faculty members, which could have unintended consequences on student outcomes. Policy makers, faculty members, and administrators should consider various curricular decisions, such as what time of day and what courses part-time faculty members teach. Some of these decisions may be negotiable and have a significant effect on student outcomes, particularly for part-time students. Administrators and faculty members should also provide additional support to undeclared students, who often enroll on a part-time basis, because, according to this study, they have an increased chance of not achieving their aspirations for an associate's degree. Because the study results suggest that students with a clearer educational plan have a significantly increased likelihood of earning an associate's degree, administrators and faculty members need to offer special attention to undeclared students to help them identify a clearer academic path.

It is clear that part-time faculty members serve an important role across all institutions of higher education, and this research does not rest blame with the part-time faculty. It is financially and administratively impractical for community colleges to begin reducing the proportion of part-time faculty members they employ; thus, community college administrators and policy makers should consider how they can improve the environment in which these part-timers work. If administrators and full-time faculty members worked to increase the integration of part-time faculty members into campus and departmental cultures, and if attempts were made to address the concerns part-timers have about employment benefits, a greater sense of commitment and enthusiasm from part-time faculty members might be generated. Improving the work environment for part-time faculty members at community colleges has the potential to increase their sense of commitment, which may have

positive implications for a variety of student outcomes, including associate's degree completion.

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