



University of Kentucky
UKnowledge

MPA/MPP Capstone Projects

Martin School of Public Policy and
Administration

2014

Postsecondary Instruction: Changes in the Academic Workforce and State Appropriations for Community Colleges

R. Ryan Kendrick
University of Kentucky

Follow this and additional works at: https://uknowledge.uky.edu/mpampp_etds

 Part of the [Education Policy Commons](#), [Policy Design, Analysis, and Evaluation Commons](#), and the [Public Administration Commons](#)

[Right click to open a feedback form in a new tab to let us know how this document benefits you.](#)

Recommended Citation

Kendrick, R. Ryan, "Postsecondary Instruction: Changes in the Academic Workforce and State Appropriations for Community Colleges" (2014). *MPA/MPP Capstone Projects*. 11.
https://uknowledge.uky.edu/mpampp_etds/11

This Graduate Capstone Project is brought to you for free and open access by the Martin School of Public Policy and Administration at UKnowledge. It has been accepted for inclusion in MPA/MPP Capstone Projects by an authorized administrator of UKnowledge. For more information, please contact UKnowledge@lsv.uky.edu.

**Postsecondary Instruction: Changes in the Academic Workforce and State Appropriations
for Community Colleges**

R. Ryan Kendrick

April 17, 2014

Executive Summary

Over the last 30 years continued decline in state appropriations for public institutions has been accompanied by an increase in the use of part-time instruction. Community colleges have been particularly susceptible to both of these problems. Two-year institutions have less freedom than their larger counterparts to raise tuition rates and part time instructors constitute a larger percentage of their workforce. Less revenue has resulted in fewer resources to devote to instruction and student support. Part-time time instruction, on the whole, results in lower student retention and graduation rates.

This analysis intended to establish a connection between cuts to state appropriations and increases in part-time labor at community colleges in the post-Great Recession time period. Data was gathered for the years 2010, 2011, and 2012 on employment, finances, and enrollment for 464 institutions. Two analyses were conducted to better understand how these factors influenced the ratio of part-time to full-time faculty. A fixed-effects model was used to understand how changes in these variables influenced the ratio within institutions. A between-effects model was used to estimate the differences between institutions. Neither model showed state appropriations as being a statistically significant influence upon the part-time to full-time ratio. The fixed-effects model indicated increases in tuition, local appropriations, and private grant or contract revenues could increase the ratio of part-time to full-time faculty. The between-effects model included state and urbanization-level variables. There were many significant state level effects, but of the variables previously tested in the fixed-effects model, only investments in instruction were found significant.

Policy suggestions can be drawn from this study despite the lack of a connection between state appropriations and the part-time to full-time instructor ratio. The significance of instruction expenditures in the second model highlights the importance of investment in an academic labor force. Substantial state-level effects provide opportunities for administrators and legislators to seek out best practices and policies from more successful states. Finally, increases in reliance on local appropriations and private grants may indicate mission creep and distraction from the importance of investing in instruction.

Introduction

Over the last decade a massive change in the management of academic personnel has taken place on American campuses. Many faculty have seen tenure, unions, and contract protections eroded, if not entirely revoked, by their institutions. Colleges and universities have come to rely much more on part-time instructors known as adjunct professors. At the same time, state funds for higher education have been eroding nationwide. This has created ever tighter budgets for education administrators.

The connection between the continued decrease of state-appropriations for higher education and the increased use of the replacement adjunct is a relevant topic for policy makers and academic institutions. From a policy point of view, budget makers should be concerned with how cuts in funding affect both the current academic workforce and the academic labor market in their state. For administrators, it would be incredibly useful to understand how budget cuts will change the shape of their workforce and the nature of future hiring.

When discussing adjunct professors and their role in academia, it is important to distinguish between legitimate and judicious use of part-time labor and the complete replacement of full time positions with part time help. Recent studies have shown that the use of some adjuncts – especially older, professionally experienced instructors in career or profession-based academic disciplines – has significant benefits for students.¹ Other studies have raised concerns over the use of adjuncts as replacement labor, and the rise in the use of adjunct labor has created a dearth of full-time academic positions.

¹ Bettinger, Eric and Bridget Terry Long. *Do College Instructors Matter? The Effects of Adjuncts and Graduate Assistants on Students' Interests and Success*. NBER Working paper No. 10370. March 2004. <http://www.nber.org/papers/w10370>

This paper will specifically address these problems at the nation's community colleges. The primary reason for this focus is that community colleges usually employ a higher percentage of part-time instructors. Community colleges are also usually focused on instruction, rather than research, and funded by tuition and public appropriations. Finally, community colleges have felt the brunt of state appropriation cuts as they have few supplementary income-producing endeavors and fewer endowments when compared with four-year institutions.

Background: Part-Time Faculty

The continued increase in the use of part-time faculty in higher education has been a trend for the last several decades. The percentage of full-time faculty members in the academic workforce has dropped due to replacement by these lower-wage workers. Faculty advocates, industry organizations, and academic researchers have produced a large body of literature on the nature of the changing workforce, effects part-time labor has on academic outcomes, and the budgetary constraints that could necessitate this practice.

The literature on the growth in the part-time workforce makes the distinction between regular and contingent faculty – the latter comprising 75.5 percent of the academic workforce as of 2009.² The broader category of contingent faculty includes non-tenure track full-time instructors, graduate students as instructors, and adjunct professors. The narrower category of adjunct professor has become 50 percent of the overall academic workforce.³ Many writers prefer to refer to these workers as 'part-time faculty' because 'adjunct' is considered inaccurate. As the Coalition on the Academic Workforce (CAW) writes in their 2013 *Annual Report on the Economic Status of the Profession*, "...their work is central, rather than peripheral, to the higher

² Coalition on the Academic Workforce. *A Portrait of Part-Time Faculty Members*. June 2012., p. 1.

³ Kezar, Adrianna. *Changing Faculty Workforce Models*. TIAA-CREF Institute. 2013., p.5.

education enterprise.”⁴ This is especially true with community colleges where, as Adrianna Kezar writes in *Changing Faculty Workforce Models* (2013), “In community colleges, part-timers now average 70 percent of the workforce, although roughly 11 percent of community colleges have 80 percent or more part-time faculty.”⁵

The nature of adjunct faculty has changed as their numbers have increased. Before the major shift in the workforce, the adjunct professor was just that – a supplementary instructor. The standard adjunct was an instructor serving in a part-time status in professional- and industry-focused programs, or part-time instructors with other full-time work. Recent studies on the composition of the part-time academic workforce have shown that this has changed. The House Committee on Education and the Workforce Democratic Staff 2014 report on a November 2013 e-forum, *The Just-In-Time Professor*, details a majority of their respondents as impoverished, harried, and desperate for full-time employment. As the report describes, adjunct professors work, “...with no job security from one semester to the next, working at a piece rate with few or no benefits across multiple workplaces, and far too often struggling to make ends meet.”⁶ The CAW, from their survey data, detail in the 2012 *A Portrait of Part-Time Faculty Members*, “80% of respondents had been teaching part-time for over three years, and over 50% had been doing the same for more than six years. Over 75% of the respondents were actively seeking full-time employment.”⁷ The accomplished professional or part-time worker with a career elsewhere has now become a minority among adjunct professors. These new adjuncts report working between several institutions, earning near-poverty wages, and finding few options for full-time employment in academia.

⁴ Coalition on the Academic Workforce. *The Annual Report on the Economic Status of the Profession*. 2013., p. 7.

⁵ Kezar, p.5.

⁶ House Committee on Education and the Workforce Democratic Staff. *The Just-In-Time Professor*. January 2014., p. 1.

⁷ CAW 2012, p.2.

Understanding the change in the nature of the average adjunct is important to grasping how this new workforce affects educational outputs. Richard Moser writes in his commentary, *Overuse and Abuse of Adjunct Faculty Members Threaten Core Academic Values*, "...the overuse of adjuncts and their lowly status and compensation institutionalize disincentives to quality education."⁸ Moser's observation illustrates the primary problem with the temporary professor. Limited investment in instruction has resulted in limited returns. The Council for Higher Education Accreditation, a non-profit advisory group for college accreditation organizations, comments on other problems affecting instructional quality in their 2013 report, *An Examination of Changing Faculty*:

Last minute hiring decisions and a lack of time to prepare for providing instruction. A lack of access to orientation, mentoring, and professional development opportunities, including on-campus programming and funding to attend conferences and seminars off-campus. Exclusion from curriculum design and decision making. A lack of access to office space, instructional resources, and staff support.⁹

Adjunct professors must cope with low compensation, harried schedules, few resources, a lack of basic academic resources, separation from a career path, and exclusion from the collegiate community. The difficulties and lack of support these instructors face could negatively affect their performance in the classroom. A lack of instructional resources and investment in instructional labor leads to negative effects on student outcomes.

Literature Review

Part-time Faculty and Student Outcomes

Community college success is measured by persistence and completion. While grade point average, course load, and test scores have been used to predict student success, institutions

⁸ Moser, Richard. "Overuse and Abuse of Adjunct Faculty Members Threaten Core Academic Values." *The Chronicle of Higher Education*. January 2014. <https://chronicle.com/article/OveruseAbuse-of-Adjuncts/143951/>

⁹ Council for Higher Education Accreditation. *An Examination of the Changing Faculty: Ensuring Institutional Quality and Achieving Desired Student Learning Outcomes*. 2013., p.6.

have been evaluated by educational outcomes such as retention and graduation. For community colleges, there is also the measure of transfer. Recent studies have shown the presence of part-time faculty to have a negative influence on all three of these measures.

Retention is a measure of student persistence. It is usually presented as either the percentage of students who have continued from fall to spring of the same academic year or from fall of one academic year to fall of the next academic year. Retention is directly related to graduation, but also gives some idea of when students face the most difficulty in their academic careers. This can help institutions make important changes to first-year experience programs or other drives to target at-risk students. The rate of retention has become much more important as institutions strive to improve graduation rates and as tuition has become a more substantial part of revenues. A student not retained is both a drop in the graduation rate and a loss of future tuition. Part-time instructors have been the subjects of a large number of studies related to retention. Harrington and Schibik (2004) conducted a study, with the student as the unit of analysis, which showed that exposure to part-time faculty reduced the likelihood students would continue to the next semester.¹⁰ Another student-level study conducted by Jaeger and Hinz re-confirmed this assertion.¹¹ Both of these analyses were single-institution studies and referred solely to fall to spring retention. Another single-institution study published in 2004 by Ronco and Cahill found that higher levels of interaction between students and part-time faculty resulted in lower likelihood of retention into the second year (fall to fall retention).¹²

¹⁰ Harrington, C, & Schibik, T. "Caveat emptor: Is there a relationship between part-time faculty utilization and student learning outcomes and retention?" AIR professional file no. 91. Tallahassee, FL: Association of Institutional Research. 2004.

¹¹ Jaeger, A. J., & Hinz, D. "The effects of part-time faculty on first year freshman retention: A predictive model using logistic regression. *Journal of College Student Retention*, 10(3). 2008. pp. 33-53.

¹² Ronco, S. L. & Cahill, J. "Does it matter who's in the classroom? Effect of instructor type on student retention, achievement, and satisfaction". Paper Presented at the 44th Annual Forum of the Association for Institutional Research, Boston. June 2004.

Graduation rates are a measure of the percentage of students enrolled in a particular year who graduate in four, five, or more years. This rate has become a very important measure of institutional effectiveness as more emphasis is being placed on the outcomes of higher education. Policy makers and the public are starting to become more critical of institutions that use large amounts of public resources without guiding students to successful completion of college. Ehrenberg and Zhang (2004) found a negative relationship between the proportion of part-time faculty members and the graduation rate at the institutional level.¹³ Calcagno et al. found the same connection after controlling for aggregate student characteristics.¹⁴ These authors found a direct relationship between an increase in the percentage of part-time instructors and a decrease in the graduation rate. Finally, Jacoby (2006) found this trend at community colleges as well.¹⁵ This study found the same connection between the percentage of part-time faculty and graduation rates in institutional-level data.

Transfer rate is the percentage of community college students that leave each year to enroll in four-year institutions. This rate is a simple measure of the percentage of students who attend at the two-year school level and then move to a four-year college. It does not include any measures of student success or persistence once at the four-year level. The mission of most community colleges has expanded to include a variety of goals, but transfer to four-year institutions is still a major focus. Eagan and Jaeger found in a 2009 study that exposure to part-time faculty decreases the likelihood of transfer to a four-year institution. This study accounted

¹³ Ehrenberg, R. G., & Zhang, L. "Do tenured and tenure track faculty matter?" (NBER working paper no. W10695). Cambridge, MA: National Bureau of Economic Research. 2004.

¹⁴ Calcagno, J. C, Crosta, P., Bailey, T., & Jenkins, D. "Stepping stones to a degree: The impact of enrollment pathways and milestones on community college student outcomes." *Research in Higher Education*, 48(1). 2007. pp. 775-802.

¹⁵ Jacoby, D. "Effects of part-time faculty employment on community college graduation rates." *Journal of Higher Education*, 77(6). 2006. pp. 1081-1103.

for both social and human capital factors. The authors found students who had part-time instructors were “significantly less likely to transfer.”¹⁶

Accreditation Concerns

Accreditation bodies provide higher-education institutions with a guarantee of quality, a degree of oversight, and a body of policy suggestions for difficult issues. Regional accreditation bodies are the most prominent general accrediting bodies and provide oversight for the largest number of colleges in the US. With the increased use of part-time faculty and the negative effects associated with their use, many have looked to accreditation bodies for guidance. Most regional accreditation bodies include language in their regulations regarding the teaching workforce, but enforcement has been varied on this issue. The New England and Southern associations, as well as the Middle States and North Central commissions have put forth suggestions regarding part-time faculty.¹⁷ Most notably, the Southern Association, that suggests use of part-time faculty should be “judicious”, has denied accreditation and placed institutions on warning for overuse of part-time faculty. The Southern Association states that institutions should have “adequate faculty to support the mission of the institution.”¹⁸ This is the type of ambiguity that allows institutions a considerable amount of leeway in fulfilling their academic missions, but does not create an exact, enforceable requirement for the proper use of part-time faculty. Considering this, it can be expected that only the most egregious violations of the spirit of these requirements will result in accreditation problems for U.S. colleges and universities.

¹⁶ Eagan, M. Kevin and Audrey J Jaeger. “Effects of Exposure to Part-Time Faculty on Community College Transfer”. *Research in Higher Education*. 2009., p. 168.

¹⁷ Henry, Earl. “Looking the Other Way? Accreditation Standards and Part-Time Faculty.” American Association of University Professors. <http://www.aaup.org/report/looking-other-way-accreditation-standards-and-part-time-faculty>.

¹⁸ Southern Association of Schools and Colleges, Commission on Colleges, Resource Manual for Principles of Accreditation: Foundations for Quality Enhancement, 2005, www.sacscoc.org/pdf/handbooks/Exhibit%2031.Resource%20Manual.pdf., p. 16.

State Funding

The continued decrease in state appropriations for higher education has been the most substantial change in funding for public institutions in the United States. “State supported” institutions can now be called “state assisted” in light of the large cuts in state funding. The year 2011 marked a 30-year low-point for funding when considering inflation and the simultaneous increase in enrolments.¹⁹ As of 2010 the average state appropriation dollar per full-time equivalent student was down 19% from the peak year 1987.²⁰ Even before the most recent economic downturn, 2008 appropriations per full-time equivalent, after accounting for inflation, were less than 20 years earlier.²¹ While state appropriations have decreased, tuition has continued to increase much faster than inflation. Despite the drop in state appropriations, the net of tuition and state appropriations per full-time equivalent has not changed on average for four-year institutions.²² Tuition increases have thus been used to fill in the gaps left by state government cuts.

Community colleges have had more difficulty dealing with state appropriation cuts than four-year institutions. Due to larger increases in enrollment and lower increases in tuition, community colleges have seen much lower funding per full-time equivalent student.²³ Other public institutions relied on other revenues such as research, income from endowments, and other income in lieu of state funding. Community colleges often do not have these types of funds and suffer greatly from state appropriation cuts. With missions focused on accessibility and

¹⁹ CAW 2012, *supra* no. 2.

²⁰ State Higher Education Executive Officers. State Higher Education Finance: FY 2010. Boulder: SHEEO. 2011, fig. 3.

²¹ Ehrenberg, Ronald G. “American Higher Education in Transition”. *Journal of Economic Perspectives*. Vol 26. No 1. Winter 2012 pp. 193-216., p. 195.

²² *Ibid.*

²³ Desrochers, Donna M. and Rita J. Kirshstein. “College Spending in a Turbulent Decade: Findings from the Delta Cost Project.” Delta Data. 2000-2010. 2010.

affordability, community colleges have not made a corresponding increase in tuition to cover the gap in funding. Instead they have seen a continued decrease in funding per full-time student.

There is the question of whether cuts in state appropriations have resulted in cuts in investment in instruction at the four-year institution. Even though tuition increases have shifted the burden of higher education funding from the state to students, changing demands inside institutions have resulted in diversion of this funding away from instruction. Ehrenberg posits that, ‘reallocations of funds away from instruction have been a major factor driving the shift away from full-time tenure and tenure-track faculty.’²⁴ Even though the overall net revenue has not decreased for four-year institutions, it is possible that the decrease in state appropriations has affected how these schools have chosen to spend their money. These institutions have diverted resources from instruction into research, hospitals, facilities, and other more lucrative endeavors in order to weather further cuts to state funding. The decrease in state funding has continued to decrease resources available to instruction at community colleges. The Delta Cost Project – an analysis of revenues and expenses across higher education – reports that, as a whole, community colleges have been the only type of institutions to report a decrease in all types of institutional spending.²⁵

Research Design

This analysis will examine the connection between state budget cuts, investments in instruction, and how community colleges have chosen to spend their dwindling revenues. The ratio of part-time to full-time faculty is a representation of how these community colleges have spent this money. As Jacoby writes, “...the decision to employ part-time faculty is part of a

²⁴ Ehrenberg, 2012., p. 204.

²⁵ Desrochers and Kirshstein, 2010., p. 5.

larger set of decisions about how to provide instructional resources.”²⁶ The question is then whether the hiring of full-time faculty at community colleges is more influenced by limitations in resources or choices in how these resources are spent. The choice of part-time, inferior instruction due to state budget cuts is regrettable. The choice to employ part-time workers to divert funding to other areas of institutional spending is questionable. To invest more in administrative personnel while instruction suffers is certainly not in fitting with the mission of any college or university. This will try to find a direct relationship between cuts in state appropriations and increases in the ratio of part-time to full time faculty.

This study is an attempt to understand how state appropriations affect the part-time to full-time ratio for public community colleges. To explain how state appropriations for higher education influence the part-time to full-time faculty ratio for public four-year and community colleges, this paper will analyze differences over time and differences between institutions. These years were chosen as to understand the hiring trends and state appropriations changes after the period called the Great Recession. The analysis hypothesizes that decreases in state education appropriations will increase the ratio of part-time to full-time faculty. This will take into account a number of funding sources, spending on instruction, enrollment, and the location of the institution.

Data

Institutional data are obtained from the National Center for Education Statistics database IPEDS - Integrated Postsecondary Education Data System. This system contains the most complete data on part-time/full-time faculty ratio and will be the sole source of data for this analysis. The data is for the years 2010, 2011, and 2012 in order to study the post-Great Recession academic workforce. Out of 1052 total community colleges nationwide, 464

²⁶ Jacoby, 2006., p. 1091.

institutions have complete data available for all three years for a total of 1392 observations. Institutions are excluded due to missing employment data (583 institutions), enrollment data (2 institutions), or financial data (2 institutions). One institution is excluded due to the complete lack of full-time faculty as per the data. This prohibits the computation of the part-time/full-time ratio. The remaining institutions have complete data for employment, enrollment, and finance for all three years. The employment data includes full-time and part-time numbers for instructional staff. Financial information, produced to GASB accounting standards, is available for all expenditures and revenues important for the analysis. All dollar amounts are in thousands of 2010 dollars. Also included are the categorical data for state and the Carnegie classification for urbanization.

Variables

The dependent variable, 'ratio', was calculated by determining the fall ratio of part-time to full time faculty from the employment data obtained from IPEDS. This ratio will vary by year and institution in a way that the other variables included will explain.

The financial variables being examined are all thousands of dollars per full time equivalent (FTE) student. This includes revenues from tuition, state appropriations, local appropriations, and both government and private grants or contracts. State appropriations is the primary variable of interest. The other categories are included to account for the influence of other sources of revenues. Investment return and miscellaneous revenues were excluded due to their small amounts and irrelevance to instruction. Increases in all types of revenue should have a negative relationship with the part-time to full-time ratio.

The sole expenditure category included is instruction. This figure captures all funds devoted to classroom instruction, including salaries, benefits, and other operating costs. This

accounts for how much of the appropriations received make their way into the classroom. This figure is the only type of expenditure with a direct effect upon the part-time to full-time faculty ratio. Investments in instruction should decrease the part-time to full-time ratio.

Included with the financial data is the full-time equivalent enrollment for the fall semester, for the years in question, in thousands of students. The enrollment data matches the semester and year of the employment data. Different enrollment sizes should not make a difference in the ratio, but large changes in enrollment should make changes in the ratio as well. Large enrollment spikes should be matched by an increase in the ratio of part-time to full-time faculty. A decrease in enrollment should decrease part-time faculty as well.

The final, categorical variables are the state in which the institution is located and the Carnegie classification for urbanization. These will be used in the between-effects model to understand how location might affect this part-time to full-time ratio. Urbanization should have an effect as more urban locales should have a larger academic workforce. This would indicate a larger pool of academic labor and would result in a higher ratio of part-time to full time instructors. Some state-level effects should be noticeable due to differences in legal requirements, college system rules, and differences in the culture of the academic labor force between states.

**Table 1:
Explanatory Variables**

Variables	Reason	Measurement	Predicted Relationship
Revenue: State Appropriations per FTE (1000)	Primary Variable of Interest	Thousands of Dollars	Fixed-effects: Negative Between-effects: Negative
Revenue: Tuition per FTE (1000)	Substantial Source of Revenue	Thousands of Dollars	Fixed-effects: Negative Between-effects: Negative
Revenue: Local Appropriations per FTE (1000)	Substantial Source of Revenue	Thousands of Dollars	Fixed-effects: Negative Between-effects: Negative
Revenue: Government Gifts/Grants/Contracts per FTE (1000)	Substantial Source of Revenue	Thousands of Dollars	Fixed-effects: Negative Between-effects: Negative
Revenue: Private Gifts/Grants/Contracts per FTE (1000)	Substantial Source of Revenue	Thousands of Dollars	Fixed-effects: Negative Between-effects: Negative
Expenditures: Instruction per FTE (1000)	Spending on Instruction	Thousands of Dollars	Fixed-effects: Negative Between-effects: Negative
FTE Fall Enrollment (1000)	Enrollment influences faculty hiring	Thousands of Students	Fixed-effects: Positive Between-effects: None
State	Between-effects Only	42 states represented	Between-effects: Varies
Urbanization	Between-effects Only	12 categories	Between-effects: Positive

Summary Statistics

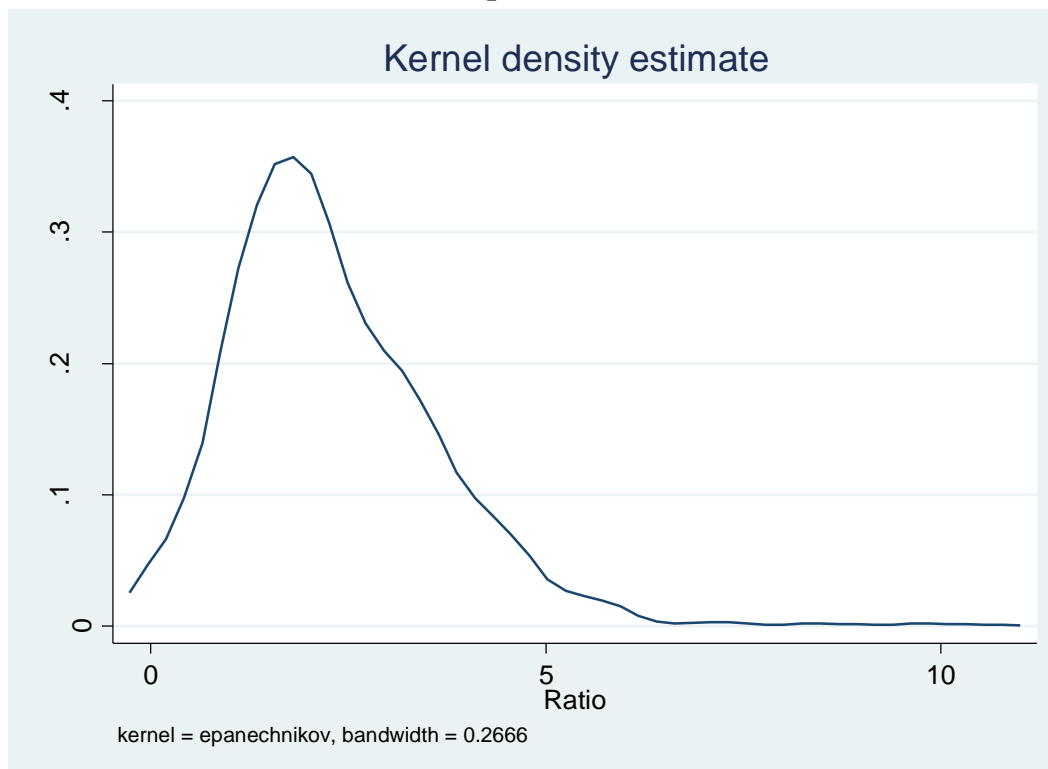
The dependent variable, ratio, was created by dividing the number of part-time faculty by full-time faculty. The following table contains summary statistics on this ratio:

**Table 2:
Dependent Variable Summary Statistics**

	Observations	Mean	Median	St. Dev.	Minimum	Maximum
Ratio	1392	2.3216	2.08	1.3345	0	10.7321

These institutions have on average around 2.32 part-time instructors employed per full-time instructor. There are 15 observations (5 institutions) which have no part-time instructors. The difference in the median and mean show this is right skewed data. Figure 1 shows a kernel density estimate of the variable ratio produced in STATA.

**Figure 1:
Graph of Ratio**



The distribution of ratio is not normal, right skewed, and single peaked. A few observations go to values of 10 or more skewing the data to the right. This graph is smoothed at a bandwidth of 0.2666 to best show the shape of the data.

Table 3 contains the summary statistics for the explanatory variables. All dollar values are in thousands of 2010 dollars per full time equivalent student. Fall enrollment is listed in thousands of students. These statistics are unavailable for the categorical variables and a simple count is provided in Appendix A.

**Table 3:
Summary Statistics**

Variables	Observations	Mean	Standard Dev.	Minimum	Maximum
State Appropriations	1392	3.229	1.6841	0	12.8336
Tuition	1392	1.965	1.1922	0.004	8.9211
Local Appropriations	1392	1.428	2.4896	0	35.6098
Government Grants	1392	3.682	1.7317	0.7771	25.7897
Private Grants	1392	0.137	0.2907	-0.0855	7.03
Instruction	1392	4.806	1.6393	1.754	17.9075
Fall Enrollment	1392	5.193	4.8460	0.071	58.682

Government grants and contracts have the highest mean and thus, on average, are the largest source of income for these community colleges. State appropriations are slightly less, and like government grants, do not vary as much from institution to institution as shown by the standard deviation. Tuition, local appropriations, and private grants are all lesser sources. Tuition does not vary greatly between institutions. This fits with the access-based mission of most community colleges. The much higher standard deviation and maximum shows that local appropriations can be a much larger source of funds for some institutions. Fall enrollment also varies considerably as the standard deviation is quite high. Investments in instruction do not vary greatly, but the mean surpasses that of any individual revenue type. This shows that tuition alone cannot provide funding for instruction.

Statistical Model: Fixed-Effects

The first statistical analysis is performed to better understand how changes within institutions, between years, changed the ratio of part-time to full-time faculty. This multiple regression is a fixed-effect model and is used to measure changes over time in the panel data.

This will determine if changes in revenues, enrollment, and instructional expenditures affect the dependent variable ‘ratio’. The variables for state and urbanization are omitted from this model as they do not change over time. Fixed-effect models cannot contain time-invariant factors as they are already accounted for. The model is as follows:

Equation (1):

$$(y_{it} - \bar{y}_i + \bar{\bar{y}}) = \alpha + (\mathbf{x}_{it} - \bar{\mathbf{x}}_i + \bar{\bar{\mathbf{x}}})\beta + (\epsilon_{it} - \bar{\epsilon}_i + \bar{\bar{\nu}}) + \bar{\bar{\epsilon}}$$

The variables in this model are regressed by taking the specific observation, subtracting the mean of all observations for this institution, and then adding the mean of the means of the variable.

This is how time-invariant factors are removed from the model. Any institution-based effect is removed in order to analyze the differences over time. The constant remains the same – represented by alpha in the model. The error term is similarly ignores fixed-effects.

Findings

Holding institution effects constant and measuring the average changes over time results in the following regression statistics:

**Table 4:
Fixed-Effects Regression Statistics for y = Ratio**

n = 1392	Coefficient	Std. Err.	t	P> t
State Appropriations	0.0527	0.0369	1.43	0.153
Instruction	-0.0536	0.0390	-1.37	0.17
Tuition	0.125	0.0559	2.23	0.026
Local Appropriations	0.0975	0.0465	2.1	0.036
Gov’t Grants/Contracts	-0.0341	0.0278	-1.22	0.221
Private Grants/Contracts	0.2017	0.0639	3.16	0.002
FTE Fall Enrollment	0.0123	0.0104	1.19	0.236

In these results the p-values show that changes within institutions in state appropriations, investment in instruction, government grants, and enrollment have no statistically significant effect upon the ratio. Increases in tuition, local appropriations, or private grants are statistically significant and increase the ratio of part-time to full-time faculty. The R squared for this model, both fixed effects and for the model as a whole, is 0.02. This means the model explains only 2% of the variance in the ratio. Despite this lack of fit the coefficients of the statistically significant variables stand.

Second Model: Between-effects

Between-effects models are regressions on the institution averages for each variable. This model is represented by the following:

Equation (2):

$$\bar{y}_i = \alpha + \bar{\mathbf{x}}_i\beta + \nu_i + \bar{\epsilon}_i$$

In this model the mean of observations for each institution are used to determine the variables.

The intercept remains the same in this model as well. The error term here is the fixed error effect plus the mean of the errors per institution. This model allows for the inclusion of state and urbanization to determine how location might influence the ratio.

Findings

The following table details the results of the between-effects regression for continuous variables:

**Table 5:
Between-Effects Regression Statistics**

n = 1392	Coefficient	Std. Err.	t	P> t
State Appropriations	-0.0552	0.0401	-1.38	0.17
Instruction	-0.2532	0.0512	-4.95	0.000
Tuition	-0.0661	0.0666	-0.099	0.322
Local Appropriations	0.0544	0.0315	1.73	0.085
Gov't Grants/Contracts	-0.0621	0.0346	-1.79	0.074
Private Grants/Contracts	0.2874	0.2433	1.18	0.238
FTE Fall Enrollment	-0.0118	0.0131	-0.9	0.37

These results are net of state and urbanization level effects. The p-values show only instruction is statistically significant at a 95% confidence interval. Increased investment in instruction has a negative effect upon the part-time to full-time ratio. Local appropriations and government grants are statistically significant at a 90% confidence interval. Larger local appropriations result in more part-time faculty. Increased government grants or contracts result in less part-time faculty. The categorical variables contained in this analysis vary greatly in their significance. The R squared for this model as a whole, is 0.52. This means the model explains 52% of the variance in the ratio – a much better fit than the previous model. There are no significant increments of urbanization. A number of state-level effects are statistically significant. The following table lists these:

**Table 6:
Between-Effects Regression Statistics – Statistically Significant State Effects**

	Coefficient	Std. Err.	t	P> t
Alaska	3.5656	1.0658	3.35	0.001
Connecticut	2.2935	0.4434	5.17	<0.001
Maryland	2.1597	0.3213	6.72	<0.001
Oregon	2.0671	0.4209	4.91	<0.001
Virginia	1.9533	0.2814	6.94	<0.001
Massachusetts	1.9041	0.3412	5.58	<0.001
Michigan	1.8936	0.3646	5.19	<0.001
New Jersey	1.8924	0.3351	5.65	<0.001
Pennsylvania	1.8800	0.3994	4.71	<0.001
Ohio	1.6163	0.3193	5.06	<0.001
Colorado	1.4441	0.4487	3.22	0.001
Louisiana	-0.9359	0.3620	-2.59	0.010

Alabama is the index state at a coefficient of zero. All other states, of the 43 represented in the data, do not have a statistically significant state-level effect. The regression statistics for all states are available in Appendix B.

Analysis

The fixed-effects model shows how changes within institutions during the three-year period affected the part-time to full-time ratio. Institutions that experienced changes in tuition, local appropriations, or private grants also saw corresponding changes to the ratio of part-time to full-time faculty. For every thousand-dollar per FTE increase in tuition the fixed-effects model predicts a 0.125 increase in the ratio. For every thousand-dollar per FTE increase in local

appropriations or private grants there is a 0.097 or 0.201 increase in the ratio, respectively. These findings run contrary to the effects predicted. It was expected that any change in funding would be negatively related to the ratio. Increases in these types of funding actually increase the ratio. An explanation for this could be that these types of revenues could be seen as less reliable and thus would not encourage full-time hiring.

The between-effects model shows how differences between institutions influence the part-time to full-time ratio. Instruction expenditures are the only continuous variable that is statistically significant. It is the only variable, besides one state-effect, to have a negative relationship with the ratio. For every thousand dollars per FTE in instruction expenditures the ratio decreased by 0.25, net of enrollment, revenue, and state-level effects. The relationship of enrollment to tuition and instruction expenses is a concern. Tuition revenues and instructional expenditures are correlated at 0.38, but instructional expenditures affect the ratio, not tuition revenue. If revenues are not dedicated to instructional expenditures there is no effect.

State and urbanization-level effects are included in the between-effects model. There are no statistically significant urbanization increments. Local increase in academic workforce would be matched by local demand for educated workers. Urbanization alone did not indicate an excess or lack of academic labor in the market. A number of states have significant state-level effects. This is the most interesting result of the analysis as state-effects have a large influence on the ratio. Of the twelve states listed above, eleven have a positive state-level coefficient, and thus have increased part-time to full-time ratios even accounting for all other factors included in the model. Louisiana alone has a significant negative state-level effect. Net of all other factors, Louisiana institutions are less likely to employ part-time faculty. State level effects cannot be precisely explained without further research. There are myriad reasons that a particular state

could be less or more likely to use part-time academic labor. State legal requirements, college system rules, and the cultural differences between state academic and professional organizations could be a factor. State-level effects could also indicate the presence of inexpensive academic labor that was not indicated by urbanization.

Limitations

The primary limitation of this analysis is the lack of full data for all community colleges in the US. The large number of institutions excluded for the lack of essential data is regrettable. A more robust study would allow more definitive statements to be made about community colleges as a whole. If and when this data is available – it would be a good opportunity for further study. This study is also limited in the scope of time. Data from 2010, 2011, and 2012 were the only post-Great Recession years available. Data for the year 2013 have not been released. A more robust study could be conducted by obtaining data for as many years as possible. Though the intention of the study was to examine this period specifically – it is possible that a better understanding of how funding and other factors affect the part-time to full-time ratio could be gained by expanding this window. The availability of data is a concern.

The possible influence of the dependent variable on the independent variable instruction could be a problem. Budgeting drives how these institutions conduct hiring. How resources are budgeted to instruction would determine whether an institution could hire full or part-time instructors. Instruction and the ratio are only correlated at -0.23. Meanwhile, the ratio and enrollment are correlated at 0.15. This would be expected to be higher if the instructional demand created by enrollment drove the ratio substantially enough to strongly influence instructional expenditures.

Conclusion and Recommendations

This research was undertaken in order to increase understanding of how state appropriations influence the hiring of adjuncts. It was intended to be a tool to help legislators and administrators understand how cuts in funding could be a detriment to the quality of education and the health of an academic workforce. From the analyses, it has been determined that changes in state funding and differences in this funding between institutions are not a significant influence upon the ratio of part-time to full-time academic workers.

The fixed-effects model found that changes in a few types of revenues have a positive relationship with a change in this ratio. One concern with the receipt of local appropriations and private grants or contracts is a concern with mission creep. If local appropriations or private contracts are tied to endeavors that are not related to instruction, this could divert attention away from investing in the classroom. This is possibly how these types of funding result in a higher part-time to full-time ratio.

The most important conclusion to be drawn from these analyses is the effect of instructional expenditures as revealed in the between-effects model. The amount of investment in instruction, net of all other factors, was the only statistically significant financial measure in this model. Regardless of revenue source, institutions that invest more in instruction have less part-time labor and more full-time employees. This obvious connection should drive spending in community colleges if the quality of instruction is made a priority.

Future Study

Future study is recommended for a more complete dataset, and for more years of data. This could result in a more accurate understanding of how changes in revenues effect the part-

time to full-time ratio. Study is also recommended to better understand how spending in other categories effects spending in instruction, and how these differences influence educational outcomes. Finally, the state-level effects in this study could be the most interesting area for further study. A quantitative study of the reasons for such substantial differences in state-level effects could lead to a better understanding of how states could encourage a healthy, professional academic workforce.

Sources

- Bettinger, Eric and Bridget Terry Long. Do College Instructors Matter? The Effects of Adjuncts and Graduate Assistants on Students' Interests and Success. NBER Working paper No. 10370. March 2004. <http://www.nber.org/papers/w10370>
- Calcagno, J. C, Crosta, P., Bailey, T., & Jenkins, D. "Stepping stones to a degree: The impact of enrollment pathways and milestones on community college student outcomes." *Research in Higher Education*, 48(1). 2007. pp. 775-802.
- Coalition on the Academic Workforce. A Portrait of Part-Time Faculty Members. June 2012.
- Council for Higher Education Accreditation. An Examination of the Changing Faculty: Ensuring Institutional Quality and Achieving Desired Student Learning Outcomes. 2013.
- Desrochers, Donna M. and Rita J. Kirshstein. "College Spending in a Turbulent Decade: Findings from the Delta Cost Project." *Delta Data*. 2000-2010. 2010.
- Eagan, M. Kevin and Audrey J Jaeger. "Effects of Exposure to Part-Time Faculty on Community College Transfer". *Research in Higher Education*. 2009.
- Ehrenberg, Ronald G. "American Higher Education in Transition". *Journal of Economic Perspectives*. Vol 26. No 1. Winter 2012 pp. 193-216.
- Ehrenberg, R. G., & Zhang, L. "Do tenured and tenure track faculty matter?" (NBER working paper no. W10695). Cambridge, MA: National Bureau of Economic Research. 2004.
- Harrington, C, & Schibik, T. "Caveat emptor: Is there a relationship between part-time faculty utilization and student learning outcomes and retention?" AIR professional file no. 91. Tallahassee, FL: Association of Institutional Research. 2004.
- Henry, Earl. "Looking the Other Way? Accreditation Standards and Part-Time Faculty." *American Association of University Professors*.
<http://www.aaup.org/report/looking-other-way-accreditation-standards-and-part-time-faculty>.
- House Committee on Education and the Workforce Democratic Staff. The Just-In-Time Professor. January 2014.
<http://www.mpsanet.org/Portals/0/1.24.14-AdjunctEforumReport.pdf>
- Jacoby, D. "Effects of part-time faculty employment on community college graduation rates." *Journal of Higher Education*, 77(6). 2006. pp. 1081-1103.

- Jaeger, A. J., & Hinz, D. "The effects of part-time faculty on first year freshman retention: A predictive model using logistic regression. *Journal of College Student Retention*, 10(3). 2008. pp. 33-53.
- Kezar, Adrianna. *Changing Faculty Workforce Models*. TIAA-CREF Institute. 2013. Coalition on the Academic Workforce. *The Annual Report on the Economic Status of the Profession*. 2013.
- Moser, Richard. "Overuse and Abuse of Adjunct Faculty Members Threaten Core Academic Values." *The Chronicle of Higher Education*. January 2014. <https://chronicle.com/article/OveruseAbuse-of-Adjuncts/143951/>
- Ronco, S. L. & Cahill, J. "Does it matter who's in the classroom? Effect of instructor type on student retention, achievement, and satisfaction". Paper Presented at the 44th Annual Forum of the Association for Institutional Research, Boston. June 2004.
- Southern Association of Schools and Colleges, Commission on Colleges, *Resource Manual for Principles of Accreditation: Foundations for Quality Enhancement*, 2005, www.sacscoc.org/pdf/handbooks/Exhibit%2031.Resource%20Manual.pdf.
- State Higher Education Executive Officers. *State Higher Education Finance: FY 2010*. Boulder: SHEEO. 2011.

Appendix A: States and Urbanization

States

State	Com. Colleges
Alaska	1
Connecticut	6
Maryland	16
Oregon	7
Virginia	23
Massachusetts	12
Michigan	10
New Jersey	15
Pennsylvania	8
Ohio	15
Colorado	6
Indiana	1
Delaware	3
Nebraska	4
Florida	6
New Mexico	8
Arizona	2
Montana	3
New York	16
Iowa	5
North Carolina	10
Missouri	7
Nevada	1
Tennessee	9
Washington	18
West Virginia	4
Oklahoma	4
Alabama	25
Wisconsin	7
California	83
Texas	36
Kentucky	16
South Carolina	6
Arkansas	9

Idaho	1
Minnesota	31
Maine	2
North Dakota	2
Georgia	8
Kansas	7
Mississippi	2
Louisiana	9

Urbanization

Urbanization	Count
City: Large	195
City: Midsize	129
City: Small	198
Suburb: Large	222
Suburb: Midsize	42
Suburb: Small	21
Town: Fringe	21
Town: Distant	117
Town: Remote	153
Rural: Fringe	240
Rural: Distant	39
Rural: Remote	15

Appendix B: Between-effects Regression Output for States

State	Coefficient	Std. Error	t	P> t
Alaska	3.5656	1.0658	3.35	0.001
Connecticut	2.2935	0.4434	5.17	<0.001
Maryland	2.1597	0.3213	6.72	<0.001
Oregon	2.0671	0.4209	4.91	<0.001
Virginia	1.9533	0.2814	6.94	<0.001
Massachusetts	1.9041	0.3412	5.58	<0.001
Michigan	1.8936	0.3646	5.19	<0.001
New Jersey	1.8924	0.3351	5.65	<0.001
Pennsylvania	1.8800	0.3994	4.71	<0.001
Ohio	1.6163	0.3193	5.06	<0.001
Colorado	1.4441	0.4487	3.22	0.001
Indiana	1.1989	0.9731	1.23	0.219
Delaware	1.0147	0.5909	1.72	0.087
Nebraska	0.7956	0.5272	1.51	0.132
Florida	0.7300	0.4280	1.71	0.089
New Mexico	0.7245	0.3869	1.87	0.062
Arizona	0.7105	0.7085	1.00	0.317
Montana	0.6740	0.5799	1.16	0.246
New York	0.6018	0.3183	1.89	0.059
Iowa	0.5766	0.4661	1.24	0.217
North Carolina	0.5635	0.3573	1.58	0.116
Missouri	0.5558	0.4076	1.36	0.174
Nevada	0.3500	0.9390	0.37	0.710
Tennessee	0.2958	0.3627	0.82	0.415
Washington	0.2906	0.3078	0.94	0.346
West Virginia	0.2246	0.4969	0.45	0.652
Oklahoma	0.1238	0.5054	0.24	0.807
Alabama	0.0000	0.0000		
Wisconsin	-0.0023	0.4806	0.00	0.996
California	-0.0308	0.2459	-0.13	0.900
Texas	-0.0604	0.2594	-0.23	0.816
Kentucky	-0.0799	0.3061	-0.26	0.794
South Carolina	-0.1882	0.4329	-0.43	0.664
Arkansas	-0.1966	0.3614	-0.54	0.587
Idaho	-0.2346	1.0191	-0.23	0.818
Minnesota	-0.2642	0.2714	-0.97	0.331
Maine	-0.2745	0.7721	-0.36	0.722
North Dakota	-0.2777	0.7037	-0.39	0.693
Georgia	-0.2947	0.3830	-0.77	0.442
Kansas	-0.5111	0.4204	-1.22	0.225
Mississippi	-0.6231	0.6960	-0.90	0.371
Louisiana	-0.9359	0.3620	-2.59	0.010