An Analysis of Issues with Academic Tenure in the 21st Century: Towards a New Consensus Model

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Introduction

Over the last twenty years, there has been a sharp decrease in the percentage of college faculty holding continuous tenure, at liberal arts colleges and at other institutions of higher learning. Financial constraints, the increased specialization of college and university faculty, and the absence of any legal mandatory retirement age have cast a significant pall over the prevalence of tenure. With higher education evolving and transforming, economics and efficiency will likely lead to a more diverse set of employment practices for faculty. The most successful institutions will succeed in matching institutional purpose with course and curricular offerings and with corresponding types of faculty appointments. There will not be a standard model of faculty employment, rather different ones that will be tailored to an institution’s overall objectives. A continuation of this work will involve a modeling of the utility-maximizing faculty model or combination of faculty appointments for an institution. In this regard, one might argue that the existence of tenure at liberal arts colleges might be more important than its preservation at other institutions. In other words, a significant number of tenured positions may be a necessary condition for academic excellence in the liberal arts.
I. Historical Note

Two early incidents of administrative abuse directed against the political views of faculty members, at Stanford and at Columbia, are frequently cited as significant impetus for faculty advocacy of continuous tenure. In 1900 at Stanford University, sociology Professor E. A. Ross was removed by university co-founder Jane Stanford who objected strenuously to Ross’ criticism of excessive Chinese immigration as exploited workers. Other Stanford faculty resigned in sympathy with Ross. In 1917, Charles Beard, in protest of Columbia University’s interference with faculty teaching, scholarship, and public utterance, resigned from the university. Earlier in the month the trustees and administration had terminated the appointments of two faculty and issued warnings relating to the need to refrain from criticism of United States involvement in World War I.¹

The American Association of University Professors (AAUP) has argued, since its founding in 1915, that tenure is “necessary to protect academic freedom. Tenure, briefly stated, is an arrangement whereby faculty members, after successful completion of a period of probationary service, can be dismissed only for adequate cause or other possible circumstances and only after a hearing before a faculty committee.”² Many schools of higher education pledge adherence to the AAUP’s 1940 Statement of Principles on Academic Freedom and Tenure.³ It emerged from a series of meetings during the late 1930s between the AAUP and the Association of American Colleges (currently the Association of American Colleges and Universities (AAC&U)).


The 1940 statement speaks to two principal arguments for academic tenure. The first concerns preservation of academic freedom in research and teaching but not without any restraint on the part of the faculty member. Faculty are cautioned to refrain from teaching “controversial matter which has no relation to their subject.” Also, faculty are reminded that their work is subject to the judgment of the public so they should respect other opinions. The second argument advocates that faculty receive “a sufficient degree of economic security to make the profession attractive to men and women of ability.”

According to Caitlin Rosenthal, fewer than 50 percent of sampled universities had a formal tenure policy in 1935, while nearly 100 percent did by the 1970s. As colleges and universities increasingly accepted tenure as a standard faculty benefit, the rationale of administrators, she argues, steadily shifted in this direction: providing the economic security referred to in the 1940 Principles. This economic benefit, a form of compensating wage differential, became standard in the highly competitive academic job market of the 1960s, when relative shortages of qualified faculty existed.

II. Academic Tenure in the Contemporary United States

Since 1990, Federal legislation prevents colleges and universities from having any mandatory retirement age for faculty. With longer life expectancy, faculty, like the general population, tend to be healthier and more active, wishing to extend income-earning years. Increased health care costs, coupled with a reduction in retirement health-care provisions, have contributed to faculty wishing to maintain full-time working status even after age 65, when they become Medicare-eligible. Finally, the sharp decline in equity values during the recent recession, particularly in 2008, significantly reduced both household net worth and the value of different pension-like accounts, such as TIAA-CREF.

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With faculty typically receiving annual salary increases, there is an increase in instruction costs and the average age of faculty from this postponing of retirement. It is possible that this same result would occur with the absence of tenure. However, with annual contracts that are renewable there is a lower threshold in non-renewal, due to reduced competence, than there would be with tenured faculty. When tenure was instituted, a clearly expected, mandatory retirement age existed, muting competency issues with older faculty. Now, tenure co-exists with the absence of any mandatory retirement age, increasing the costs of tenure for a college and increasing the risks and costs of maintaining faculty whose competence could be waning.

In the past twenty years, there has been increased specialization of graduate education. Research questions in most disciplines have become increasingly focused and limited, encouraging graduate students, who know that their future success will be influenced by their scholarly output, to concentrate with greater detail and focus on narrower specialties. Also, academic accreditation agencies are quite concerned with the match of course content and faculty expertise. As courses become narrower, faculty must be more deeply trained. However, these faculty are then frequently less able to offer a wide range of courses.

The result is that today’s Ph.D.’s are less able to teach a range of courses within their discipline. In prior years, a strong liberal arts college could expect to hire an individual who could effectively offer courses in the modern history of Austria, Germany, and, perhaps, even Russia. Finding such breadth today in a new Ph.D. in history would be most unlikely. In making a tenure appointment, an institution must be relatively confident that the very specific expertise that the individual brings will contribute to courses that will be needed for the professional life of the individual hired, perhaps for forty years.

At all institutions there has been an increase in interdisciplinary work. Does the existence of tenure slow or facilitate this process? Faculty who are tenured with a limited disciplinary knowledge may not easily adapt to interdisciplinary work. On the other hand, tenured faculty can afford the time
and the risk of retooling toward interdisciplinary work. The recession of 2007 has greatly challenged state and federal funding of higher education. With funding reductions, salary increases for faculty at public institutions have been very low. Moreover, retirees who had tenure are increasingly being replaced with non-tenure track contingent faculty, reducing the percentage of courses offered by tenured and tenure-track faculty. The same phenomenon is occurring, with perhaps less severity, at private institutions. In a 1999 Journal of Economic Perspectives article, Michael McPherson and Morton Schapiro specifically mentioned the end of mandatory retirement and the cost pressures within higher education. These have become even more relevant since 2007.

For whatever set of reasons, the percentage of full-time instructional faculty with tenure has declined precipitously from 61.86 percent in 1980-81 to 38.95 percent in 2011. In 2011 only private baccalaureate colleges had a faculty that was more than 50 percent tenured. These institutions are, of course, are our private liberal arts colleges. These and other data are found in appendix to this paper in a table entitled “Percentage of Full-Time Instructional Faculty with Tenure (1980-2011).”

III. Implications for the Decline in Academic Tenure

One central question is whether tenure is still needed to protect academic freedom. With far greater protection of civil liberties today, one could argue that freedom of expression is well protected at both the state and the federal level. Neither the administration nor the trustees of an institution of higher learning can easily dismiss an individual for the tenor of his or her research. Most institutions now have faculty review processes that are used to assess faculty performance and appeal processes for any faculty dismissals. One could argue that the existence of tenure is likely to have minimal impact on research agendas of most permanent faculty; many would take exception, feeling the argument is both

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naïve and optimistic. However, Mark Taylor, in *Crisis on Campus*, argues that the contention that tenure is needed to guarantee academic freedom is without substance. He states “But on the basis of my experience, this argument is completely without merit—in forty years of teaching, I cannot think of a single person who was more willing to express his or her views after tenure than before.”6 Another argument suggests that tenure provides a deterrent to any action aimed at reducing academic freedom, as the existence of anti-trust laws provides a deterrent to uncompetitive business mergers.

It is possible that the existence of tenure leads to a stronger pool of candidates and a greater research productivity. If an academic job opening is tenure-track, it is likely to attract a stronger set of candidates, particularly ones with real research potential. Tenure or job security is a positive compensating differential for any employee. Earning tenure, however, will require successful research performance, and, increasingly so, the evidence suggests.

Another argument is that faculty with tenure are more likely to seek the strongest candidates, not worrying that those candidates will push them aside. H. Lorne Carmichael reminds us that with academic openings, it is departmental members or colleagues who do the hiring.7 To ensure that the best is hired these department members must have their own job security. He contrasts this to a professional sports team, where the owners do the hiring. Older “stars” are regularly replaced by younger players.

Would academic departments be stronger if the administration hired all new academicians as management hires all new members of the professional sports team? If a history department is looking to hire a 19th century specialist in Colonial Africa, other members of the history department will be best

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able to assess candidates. However, teaching and service potential could be analyzed just as well by members of the administration.

Law firms and medical firms are able to recruit newer associates annually. Senior partners, without having formally received tenure, have incentives to seek the best from the applicant pool. But senior partners, in law or medicine, share in the revenues generated by new colleagues. In academic departments, there is a halo effect when junior colleagues publish excellent work, but there may also be negative comparison for senior faculty.

The existence of tenure contributes to a bond between the individual and the institution. With the individual having the assurance that the institution has made a life-long commitment to employment, the faculty member will be likely to respond positively. Teaching, research, and college or university service can be considered complementary and will be at a higher level. Moreover, the individual faculty member will have less incentive to look for employment elsewhere. This scenario may be supportive of the existence of tenure at the liberal arts college.

If teaching and research are substitute activities, and if tenure is linked to success with research and publication, then teaching quality could suffer as the rational economic actor devotes time to professional activity at the expense of teaching. In 2006, the Executive Council of the Modern Language Association (MLA) investigated claims that publication expectations for tenure have been increasing. They found that “Over 62 percent of all departments report that publication has increased in importance in tenure decisions over the last 10 years. The percentage of departments ranking scholarship of primary importance (over teaching) has more than doubled... from 35.4 percent to 75.4 percent.” It is likely that time devoted to highly specialized research activity comes at the expense of teaching and time with students.

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8 Cathy Trower, "What is Current Policy?" in Richard P. Chait (editor), The Questions of Tenure, 38.
Could tenure lead an individual to accept more leisure, not fearing the professional consequences, leading to a diminution in the quality and quantity of teaching, research, and college service? The empirical evidence reviewed by McPherson and Schapiro is mixed on the question of research productivity with respect to length of service. Were research productivity to decline with age and experience, then tenure would be less defensible. They cite a study showing that research productivity by scientists tends to fall with age and another showing the same for economists. These studies tend to concentrate on quantity of articles, not necessarily on quality. It is not impossible to envision a senior tenured scholar interested in writing a single seminal article without worry that she is not producing several articles per year.

An argument can be made that tenure allows faculty to participate more fully and more honestly in institutional governance. As McPherson and Schapiro write, tenure can be seen as “as a set of constraints on the discretion of managers (the ‘administration’) over various aspects of the academic enterprise... to influence the distribution of authority between administration and faculty.” A faculty member with particularly contrary and vocal views could be viewed, whether fairly or unfairly, as a liability. A less than fully tolerant administration could be tempted to remove a dissident faculty member. That would likely reduce significantly countervailing views and discussion within a faculty.

Work by Richard Chait suggests that the argument above is valid. Based on his study of colleges with and without tenured faculty, he concludes: “Among the sites studied, faculty at institutions without tenure generally exercised less power and influence than faculty on campuses with tenure.” He also states, “On balance, colleges with tenure exhibited more properties of shared governance, and the faculties there had more sway than colleagues at institutions with contracts.” However, Chait does


10 Ibid 92.
caution that tenure may have “signaled rather than created these conditions.” A variety of other institutional factors, such as financial stability, size, age, and location, may be conducive both to the institution of tenure and the higher degree of faculty involvement in governance. It would be possible for an institution without tenure to have a faculty intensively involved in governance.

Also, tenure provides protection for faculty to offer professional judgments on student work, other faculty performance, and public research with greater independence. Tenure can also provide protection from administrative pressures that derive from development or fundraising objectives. During the process of earning tenure, faculty can endure significant stress. The Collaborative on Academic Careers in Higher Education (COACHE) has attempted to measure job satisfaction for pre-tenure faculty, with data from over 15,000 pre-tenure individuals from more than 200 U.S. four-year institutions. The study found that junior faculty, with respect to tenure, “are most interested in clarity of standards, process, and criteria; in transparency, consistency, and equity; and in reasonable expectations for achieving it.” Given that there are fewer tenure-track openings per prospective faculty member, departments and institutions can raise expectations for granting tenure, without significant fear of faculty shortages. Many institutions are, in fact, expecting greater publishing success for tenure. Coupling rising expectations with a diminution of resources to support professional activity, there is clearly increased pressure on pre-tenured faculty. This increased pressure can result in a diversion of time from teaching, losses of time from family and personal activities, and increased anxiety.

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11 Richard Chait, “Does Faculty Governance Differ at Colleges with Tenure and Colleges without Tenure?” in Richard P. Chait (editor), The Questions of Tenure, 72.

12Cathy Ann Trower, Success on the Tenure Track: Five Keys to Faculty Job Satisfaction, Johns Hopkins University Press, Baltimore 2012, 2.
Increasingly, liberal arts colleges and universities more known for undergraduate teaching are using “market power” to expect greater research productivity for tenure. In some cases, pre-tenure faculty are expected to teach four courses per semester and annually produce published work. Evidence exists to show that this pressure and concern can disproportionately affect female faculty and those of color. Non-majority faculty (women and people of color) maybe devote more effort than male counterparts to service, a contribution less rewarded in the tenure process. Also, as Chait points out, these faculty members are being assessed disproportionately by white male counterparts whose experiences differ.\(^\text{13}\)

The pressures felt today are not consistent with the original AAUP’s call for tenure. The two pronged purpose of tenure was to relieve pressure (from attacks on academic freedom) and improve the quality of life for university faculty. Notwithstanding the pressures associated with it, Chait concludes, “The vast majority of faculty remains committed to the concept of academic tenure..., and the lion’s share of prospective faculty prefer a tenure-track appointment.”\(^\text{14}\)

\section*{IV. Alternatives to Academic Tenure}

Four general types of faculty arrangement can be identified with contemporary undergraduate education in traditional academic institutions. These are tenure, multi-year renewable contracts, combined faculty and administrative position, and per-course hirings.

\textbf{Tenure or Tenure Track}: With a positive tenure decision, the faculty member has a form of life-time employment, one now without mandatory retirement age. Exceptions involve moral turpitude,


\(^{14}\) Ibid 25.
incompetence that might be documented with post-tenure reviews, or the elimination of an entire academic department. Examples of abridgements of employment are rare.

Tenure-track appointments would tend to be the most appealing for an institution under the following circumstances:

A. The specific field of appointment is one of durable interest (e.g., analytical geometry) or the hire is expected to exhibit flexibility.

B. The institution has a strong teaching mission with a significant time commitment expected from faculty with students. The faculty member devotes more time to students; the institution guarantees employment. Very much a liberal arts setting.

C. Faculty are expected to assume significant roles in governance. Faculty may need protection from donors or other interest groups in certain institutions. The AAC&U in 2006 issued a statement on Academic Freedom and Educational Responsibility which linked academic freedom to curricular design and protecting faculty from groups who might try to reduce a growing emphasis on diversity within the 21st century curriculum.\textsuperscript{15} Also, conducive to tenure in a liberal arts setting.

D. Faculty assume a significant role in the hiring process.

E. Tenured faculty may well have both the expertise and the willingness to engage undergraduate students in quality research, that might not be publishable in top-twenty field journals. Again, a liberal arts setting.

\textbf{Multi-year Renewable} in terms of salary and benefits. To be attractive to those under multi-year renewable contracts, those faculty should receive roughly a compensation commensurate to that

\textsuperscript{15} Susan Albertine, “Toward the Next Century of Leadership: A Future Faculty Model,” Peer Review, 15.3 (Summer 2013).
of tenure-track and tenured faculty. These positions should carry faculty benefits such as mentoring, professional development funding, and other resources needed for effective teaching. Contracts can be for a year or for multiple years, with renewals associated with satisfactory performance.

Many institutions will employ non-tenure-eligible faculty to teach basic, introductory courses in foreign language or in first-year writing. The institution may prefer that these individuals specialize in teaching and working directly with students, with the demands of research and professional activity minimized. In these cases, the professional expectations will differ from those associated with a tenure-track position.

Institutions may use temporary, full-time faculty to investigate the desirability of a particular area of study before committing to a tenure-track position. For instance, a liberal arts college may be debating adding a corporate-finance sequence. Existing faculty may be skeptical of such a business-like course, and the course demand from current students may be unclear. Having a two or three-year visitor could be a prudent course of action, prior to making the commitment to a tenure-track position.

Institutions have used non-tenureable appointments purposefully, in place of making tenure-track commitments. Frequently, the impetus for this course of action is the presumption of increased flexibility for the institution and enhanced incentive for the faculty member. These premises are ones that tend to be associated with arguments against tenure: non-flexibility and lack of incentives.

Frequently, since these positions offer less employment security than a tenureable position, there will be a salary premium for the faculty member. Both James Madison University (JMU) and Central Arkansas University (CAU) have experimented with appointments of this nature. In both cases, presidents, without significant consultation, opted to hire a limited number of faculty without tenure and with an accompanying salary premium. In each case, the experiments were not well received by faculty, nor were they highly successful and enduring.
At the Franklin W. Olin College of Engineering, the faculty has always been in non-tenure positions. Initial and subsequent contracts are for six years. A Reappointment and Promotions committee provides peer review, assisting the Provost and President with recommendations to the Olin Board of Trustees. By all accounts, the Olin model provides appropriate employment security for a faculty that expresses high job satisfaction and low turnover. Undoubtedly the relatively small size of the faculty (approximately forty full-time), the faculty’s cohesion and acceptance of the institution’s overall mission, the relatively strong financial stance of the institution, and the relative homogeneity of a STEM-centered faculty may contribute to the success of this model.

Blended Faculty and Administrative: Some institutions have treated blended faculty and administrative positions as non-tenurable. Examples include hiring a mathematics and science instructional laboratory director who will also teach the equivalent of a quarter-teaching load. In such a case, a non-tenurable position with a lengthened contract could be desirable. Traditional tenure expectations never included three-quarters administration, in addition to teaching and to publication. If the individual excelled in the important administrative/teaching function and with the in-class courses, but was not publishing, a dilemma concerning tenure would present itself.

This blended position may become more prevalent as faculty members are individuals of practice, for instance an accountant who has both teaching and professional responsibilities, or individuals who provide important student academic services that are growing in prevalence, such as writing center directors or information technology experts. Such individuals, while pursuing professional activity to be current in their work, need to be assessed principally on their teaching and on their administrative service. Yet, an alternative arrangement of this nature could create a tiered faculty.

16 Conversation with Vincent Manno, Provost and Dean of Faculty at the F.W. Olin College of Engineering, February 2014.
Per Course Instruction: The per-course faculty member represents a form of hiring that is particularly transitory. These faculty members are often called “adjunct” or “contingent.” In 2014, they numbered more than one million people or fifty percent of all higher education faculty. Most typically, there are no benefits associated with this per course hiring.

There are serious drawbacks to quality undergraduate education with per-course adjuncts. If these individuals are cobbling together several courses over different campuses, they have reduced time to plan courses, to provide quality feedback, or to meet with students. Even the most professional, well trained, and dedicated of these individuals will be operating under serious constraint. Also, there is an exploitation of sorts with compensation at low hourly rates and without benefits. If the typical adjunct meets for fourteen weeks with three hours per week, and three hours of preparation and correction per hour of class time, the individual devotes 168 hours to a course. At a $2700 per course average, this represents approximately $16.00 per hour. Many adjuncts will spend far more than 168 hours per course.

V. Assessment of Alternative Faculty Models from different perspectives

From a student perspective, we can assume that high quality undergraduate teaching is paramount. Ingredients of high quality teaching include the interest and expertise of the faculty member, the quality of the assignments given the students, and the time spent working individually with students. A tenured or tenure-track faculty member may bring the greatest expertise, but in some circumstances may not give assignments that require much effort on the student’s part. Full-time non-tenure track faculty, perhaps teaching introductory language courses or composition, may be superb in their willingness to challenge students and spend time with students without the concurrent demands

17 “The Just-in-Time Professor,” Staff Report of the House Committee on Education and the Workforce (Democratic Staff), January 2014, 1.

18 Ibid 5.
of producing original professional work and publications. From most perspectives, the per-course travelling adjunct is not likely to be the most effective teacher, given that adjuncts clearly have reduced faculty development opportunities, resources, and most importantly, time with students.

However, a recent study at Northwestern University has found that students may learn more from adjunct faculty than from tenure-track professors. The authors of the study found that students tracked from 2001 to 2008 were more likely to enroll in a subsequent course in the subject and earn a better grade when the first course was taught by an adjunct. According to Scott Jaschik, writing for Inside Higher Ed, these “results provide evidence that the rise of full-time designated teachers at U.S. colleges and universities may be less of a cause for alarm than some people think, and indeed, may actually be educationally beneficial. Perhaps the growing practice of hiring a combination of research-intensive tenure track faculty members and teaching-intensive lecturers may be an efficient and educationally positive solution to a research university’s multi-tasking problem.” The underlying presumption is that adjunct faculty, without tenure, will be motivated annually to teach well, not encumbered with time demands of professional activity.

Both the cohort of current faculty and of potential faculty (i.e., current graduate students) can have varying views on the relative importance of tenure. Asked a simplistic question such as, if everything else were equal (e.g., location, salary and benefits, teaching/research division), would you wish to have a tenured position, the answer is clearly “yes”; there is more job security without any other diminution. Rarely, however, would an individual in real life face such a choice. In actuality, there are varying attributes to different faculty positions. Cathy Trower explored the sensitivity of faculty and potential faculty to a range of attributes including tenure, mix of research and teaching, location, length of a non-tenure contract, and the probability of receiving tenure, if tenure track. Secondary factors

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included salary, benefits, sabbaticals, release time, and other forms of faculty development. Her overall conclusion was not unambiguous. Trower wrote: “The type of appointment, whether on or off the tenure track, was important to doctoral candidates and new faculty alike, but views on this varied greatly, making it difficult to generalize. For some, unable to imagine academic life without it, tenure was crucial in the job choice process. For others, tenure was far less important than were other factors, such as location, the mix of teaching and research, and the quality of the department.”

Different faculty profiles can be associated with different preferred arrangements. A faculty member at a liberal arts institution who will disproportionately teach courses, spend time with students, and be involved in faculty governance may well prefer the security and the protection of tenure. That individual, even if professionally active, is not as likely to have a strong professional research profile that is the “currency” of moving between institutions. In other words, that individual should be rewarded or protected for her/his choice to assume a more teaching-intensive position. In contrast, a leading professional whose works leave her/him in a position to move easily across institutions is likely to prefer an arrangement with reduced in-class teaching and perhaps, higher salary, being less concerned with the job security provided by tenure. In this analysis, the research-intensive individual is less inclined to seek tenure, while the teaching-intensive individual is seeking tenure. The economic benefit of tenure (i.e., job security) seems to trump the research benefit (i.e., academic freedom) in the academic world of the 21st century.

For current graduate students, tenure can provide a mixed incentive. In a world where there are far more graduate students interested in teaching than teaching openings, tenure can be viewed as a further constraint, reducing the probability of any one individual being hired. In such cases, the rational

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20 Cathy Trower, “Can Colleges Competitively Recruit Faculty without the Prospect of Tenure,” 188.
individual, particularly one with concerns about the strength of her or his own qualifications, might wish to see more non-tenure track openings.

As with individuals, institutions will have different objective functions that will include elements such as faculty research profiles, teaching quality, and cost considerations. In essence, they will seek a blend of faculty that maximizes their overall institutional satisfaction.

VII. Conclusions: Lining up of employment scheme with institutional mission

With higher education evolving and transforming, economics and efficiency will likely lead to a more diverse set of employment practices for those having faculty roles. Many reasoned groups and individuals are talking about a new faculty model as a way of addressing the simplistic, unnecessary, and toxic presumption that faculty can only be “senior tenured faculty over 70 years of age” or “one course adjuncts barely paid the legal minimum wage.” Rather than a “new faculty model” with this type of dichotomy, it is likely that institutions will develop varying blends of faculty categories. The most successful institutions will succeed in matching institutional purpose with course and curricular offerings and with corresponding types of faculty appointments. In other words, there will not be a standard model of faculty employment, rather one tailored to each institution’s overall objectives. Subsequent research will investigate how an institution might devise and develop the faculty model optimal for their mission, aspirations, and academic assets.

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Choosing an Optimal Blend of Faculty Types: A Preliminary Model of College Hiring Decisions

Research Proposal by: Shyam Gouri Suresh and Clark G. Ross, Department of Economics

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Colleges face various constraints and tradeoffs when they make decisions regarding the numbers and types of faculty members to be hired each year. Their decisions can affect the quality of teaching at the college, the research output of the college, and the financial standing of the college all of which in turn can have implications for student satisfaction and college reputation. The optimal blend of faculty types for any given college would therefore depend on its particular objectives and constraints. We will assume that faculty can be in one of three categories: tenure track; more permanent full-time, non-tenurable; and per course adjunct. Of interest will be if the optimal percentage of faculty who should be tenured will be higher in the liberal arts colleges, as speculated in the paper by Ross. [An Analysis of Issues with Academic Tenure in the 21st Century: Towards a new consensus model”]

In this section, we construct a preliminary economic model that captures various important elements of a college’s hiring decisions. We aim to calibrate and solve this model in subsequent work. In our model, each year a college can choose to hire among the three categories of faculty mentioned above. Each institution can have a differing composition of faculty among the categories. In addition, we assume that a college can choose the level of tuition to charge students. The college’s primary objective while making these hiring and tuition decisions is to enhance the wellbeing of its students and to bolster its own institutional reputation. We recognize that a college has to make numerous other
recurring decisions every year but we restrict our attention to the ones mentioned above for the sake of clarity and focus in the model.

We assume that student wellbeing depends on the cost of attending the college, the student-teacher ratio of the college, the quality of instruction received, the reputation of the college, and their placement success upon graduation. The quality of instruction is also endogenous in our model and is assumed to be a function of the student-teacher ratio, the total time spent on teaching related activities by faculty, and the research output of the faculty. Similarly, the placement success of a college is also endogenous in our model and is determined by the quality of instruction at the college and the reputation of the college. The reputation of a college in turn depends on the college’s placement success, the research output of faculty, the grants received by the college, the endowment of the college, and the college’s own prior reputation. The research output of the college is assumed to be a function of the time spent by faculty on research related activities and the quantity of grants received which in turn depends on the college’s reputation and its research output in the previous year. The time spent on teaching-related activities and the time spent on research-related activities are dependent on the number of tenured, tenure-track, full-time non-tenured, and visiting faculty members, with each having a different expectation of time devoted to teaching and to research.

As the description above suggests, we construct an inherently dynamic model with various sources of recursion and ‘inertia’ (e.g., a college’s reputation depends partly on its own prior reputation) built-in to help us capture the actual considerations faced by colleges while making hiring decisions. Consequently, the primary constraint for the college each year is also dynamic in nature. The endowment a college will have the next year depends on its prior endowment (compounded by the annual return on the endowment), the tuition collected that year, the grants received, the additional
money raised, and the wages paid to faculty as well as other annual costs. We assume that the additional money a college raises depends on the historical wellbeing of its students and the current reputation of the college.

Like most economic models, our model makes numerous simplifying assumptions. We would like to point out one important limitation – we assume that an individual college’s decision with regard to the faculty blend it chooses does not affect market-wide wages or the research and teaching related attributes of the different types of faculty members. In the language of economics, we assume that each college, by itself, is a ‘price-taker’ and we only undertake a partial equilibrium analysis. In future work, we plan to build a more complete model that incorporates the decision making process of current and prospective faculty members in addition to the college’s decision making process. This more complete model would also explicitly consider the interaction effects of the two sets of decision-makers in a general equilibrium setting.

Despite its limitations, we believe our model presents a realistic framework for analyzing a college’s decision making process. Although we have not yet fully analyzed our model, we predict that the optimal blend of faculty types will vary across colleges based on their attributes and the weights ascribed to all the considerations in the various mathematical functions described in the model.
The Preliminary Model:

We use value function notation to depict the dynamic programming problem faced by the college:

\[ V(E_t, R_t, L_t, T_t, K_t, F_t, O_t) = \max_{N_K, N_F, N_V} U(S, R_{t+1}) + \beta V(E_{t+1}, R_{t+1}, L_{t+1}, T_{t+1}, K_{t+1}, F_{t+1}, O_{t+1}) \]

subject to:

\[ E_{t+1} = (1 + r)E_t + C + G + M - w_T T_{t+1} - w_K K_{t+1} - w_F F_{t+1} - w_V N_V - A \]

(3) \[ T_{t+1} = T_t - \delta_T T_t + \rho K_t \]

(4) \[ K_{t+1} = K_t - \delta_K K_t - \rho K_t + N_K \]

(5) \[ F_{t+1} = F_t - \delta_F F_t + N_F \]

(6) \[ S = f \left( C, \frac{B}{T_{t+1} + K_{t+1} + F_{t+1} + N_V}, Q, R_{t+1}, P \right) \]

(7) \[ Q = g \left( \frac{B}{T_{t+1} + K_{t+1} + F_{t+1} + N_V}, H_L, O_L \right) \]

(8) \[ P = h(Q, R_t) \]

(9) \[ R_{t+1} = m(P, O_{t+1}, G, E_{t+1}, R_t) \]

(10) \[ O_{t+1} = n(H_R, G) \]

(11) \[ G = p(O_t, R_t) \]

(12) \[ H_R = q(T_{t+1}, K_{t+1}, F_{t+1}, N_V) \]

(13) \[ H_L = s(T_{t+1}, K_{t+1}, F_{t+1}, N_V) \]

(14) \[ M = u(L_t, R_t) \]

(15) \[ L_{t+1} = v(L_t, S) \]

Equation (1) depicts the value function, \( V \), for the college’s decision process which depends on seven state variables measured at the start of a given time period denoted by \( t \). The state variables are:
$E$ (endowment, measured at the start of the year), $R$ (reputation, measured at the start of the year), $L$ (the long-term historical satisfaction/wellbeing of alums), $T$ (number of tenured faculty, measured at the start of the year prior to promotions and separations), $K$ (number of tenure track faculty, measured at the start of the year, prior to promotions, new hires, and separations), $F$ (number of full-time nontenured faculty, measured at the start of the year, prior to new hires and separations), and $O$ (research output of previous academic year measured at the start of the new year). The value function is the maximized outcome of the current period utility function (denoted by $U$) which depends on $S$ (student satisfaction over the academic year) and $R$ (reputation as measured at the end of the year) and the discounted value function of the next period. The choice variables available to the college in this model are $N_K$ (the number of tenure track faculty hired that year), $N_F$ (the number of full-time non-tenured faculty hired that year), $N_V$ (the number of visiting faculty hired that year) and $C$ (the costs imposed on students that year). The value function problem is subject to numerous constraints and dynamic equations described below.

Equation (2) depicts the evolution of the college’s endowment. The endowment of the college at the start of the next year depends on the compounded returns from its current endowment ($r$ denotes the rate of return achieved for the investments constituting the endowment), $C$ (the costs imposed on students during the academic year), $G$ (the grants received by the college during the academic year), $M$ (the money raised by the college during the academic year), the wages paid to all the faculty members ($w_T$ is the wage rate for tenured faculty, $T_{t+1}$ is the number of tenured faculty in that academic year, $w_K$ is the wage rate for tenure-track faculty and $K_{t+1}$ is the number of tenure track faculty during that academic year, $w_F$ is the wage rate for full-time non-tenured faculty and $F_{t+1}$ is the number of such faculty during that academic year, $w_v$ is the wage rate for visiting faculty and $N_V$ is the number of visiting faculty that year) and $A$ (the other administrative costs for the year).
Equations (3), (4), and (5) depict how the numbers of tenured, tenure-track, and full-time non-tenured faculty change in that academic year. $\delta_T$ indicates the separation rate of tenured faculty (this includes retirements as well as other separations), $\delta_K$ indicates the separation rate of tenure-track faculty, $\delta_F$ indicates the separation rate of full-time non-tenured faculty, and $\rho$ indicates the promotion rate of tenure-track faculty. Recall that $N_K$ and $N_F$ indicate the number of tenure-track and non-tenured full-time faculty hired that academic year.

Equation (6) depicts student wellbeing ($S$) as a function ($f$) of the student-teacher ratio ($B$ is the size of the student body), the quality of instruction that year ($Q$), the reputation the college develops by the end of the academic year ($R_{t+1}$), and the placement success for that academic year ($P$).

In Equation (7) the quality of instruction is defined as a function ($g$) of the student-teacher ratio, the total hours spent by faculty on instruction related activities ($H_i$), and the research output of the faculty at the start of the current year ($O_t$).

Equation (8) shows that the placement success of a college as a function ($h$) of the quality of instruction that year and the reputation of the college at the start of the current year.

Equation (9) shows that the reputation the college attains by the end of the year is a function ($m$) of its placement success, the research output over the year, grants received over the year ($G$), the endowment at the end of the year, and the college’s own prior reputation.

Equation (10) suggests that the research output for a college over the year is a function ($n$) of the total hours spent by faculty on research related activities ($H_r$), and grants received that year.

Equation (11), on the other hand, suggests that the grants received in an academic year are a function ($p$) of the research output and reputation of the college at the start of the year.

Equations (12) and (13) show that hours spent on research and the hours spent on instruction are functions ($q$ and $s$, respectively) of the numbers of tenured, tenure-track, full-time non-tenured, and visiting faculty.
Equation (14) shows that the money raised by a college is a function ($v$) of the long-term historical satisfaction/wellbeing of alums and the reputation of the college at the start of the year. Finally, Equation (15) shows that the long-term historical satisfaction of the alums of a college is a function ($v$) of its prior value and the wellbeing of its latest cohort of students.

**Further notes on questionable assumptions**

We have assumed that $A$ (annual administrative costs), $B$ (the size of the student body), $\delta_r, \delta_t, \delta_f$, $\delta_r$ (the separation rates for full-time non-tenured, tenure-track, and tenured professors) and $\rho$ (the promotion rate of tenure-track professors) are exogenous. In practice these could be at least partially endogenous in the sense that a college could change the values of these variables/parameters in order to maximize its objective. We have also ignored any service or administrative services conducted by faculty members. Finally, we have not incorporated $A$ into any of the functions. Perhaps increasing administrative expenses (actually, $A$ includes all non-faculty related expenses) could result in increased reputation, student wellbeing, etc.
<table>
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<tr>
<th>Type of Institution</th>
<th>1990-91</th>
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<th>2001</th>
<th>2011</th>
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<td><strong>Public (4 year and above)</strong></td>
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<tr>
<td>Number of Full-time Instructional Faculty</td>
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<tr>
<td><strong>Private, not-for-profit (4 year and above)</strong></td>
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