The Value of College Teaching: An Enquiry

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Abstract: There is an uncomfortable feeling among faculty who are committed to education as they watch universities push towards greater research and substitute adjunct faculty for tenured track faculty. One justification used by administrators is that student evaluations of adjuncts is little different than for educators with greater experience, so no harm done. Something must be wrong? Experience certainly leads to greater effectiveness in teaching. The value of teaching is given short shrift. This paper attempts to rectify this by estimating a monetary measure to the value of teaching. It assumes that the increase in incomes due to a college education is due to three factors: One is teaching, second, that college is a screening mechanism sorting out the more capable students, and, third, that college students differ in their ability and efforts. It finds values for the latter two factors and uses the residual as an estimate of the value of teaching. With this estimate the paper considers whether recent trends towards the use of adjuncts and the push towards more research in higher education are economically efficient.

Introduction

There is a general consensus (Winston, 1994) that the quality of undergraduate education in the United States has deteriorated and is second rate. One cause may be due to the fact that colleges and universities are placing more emphasis on research productivity than undergraduate teaching. Another related cause may be due to the cost-savings pressure to substitute adjunct faculty for tenure-track faculty.

It is clear that faculty at higher education institutions have an incentive to allocate their time towards research and away from teaching. This is encouraged by current faculty compensation. On the national level faculty who allocate their time towards research and publishing and away from teaching receive higher salaries. Fairweather (1997) finds that teaching effort is either not related or negatively related to faculty compensation.

There is an increased reliance on adjunct faculty for teaching. In 1975 full-

time tenure-track faculty made up almost 57% of all faculty for all degree granting institutions in the US, while part-time faculty were just over 30%. In 2005 tenure track faculty fell to less than 32 % while part-time rose to 48%. (Trends in Faculty Status, 2005) To the degree that using part-time faculty results in less educational impact the quality of undergraduate education would have eroded.

The purpose of this article is to find the monetary value of teaching as it results in an increase in human capital. The purpose is not to produce a highly refined measure, but to get an estimate that is approximate, an order of magnitude, so some context can be given to the trade-off between teaching and research and between full time tenure-track faculty and part-time adjuncts.

Human Capital and Skill-Based Economic Impacts

The human capital approach recognizes that education is one of the main mechanisms for acquiring human capital. Many studies since Mincer's (1974) path breaking work have measured the positive association between educational attainment and earnings. Increased earnings are a premium for additional education. Becker's (1994) work provided the theoretical justification that education increases knowledge and skills that are assets in the production process, i.e., human capital. Thus, institutions of higher education are producers of human capital which result in an increase in productivity over a student's lifetime.

More recently investigations of the economic impact of institutions of higher education have included the output of human capital as a component. This has been referred to as the "skill-base" approach. The traditional approach focuses on various expenditures due to the existence of a university which expand a region's employment and economic base, the "economic base" approach. What is surprising is that the impact from the skill-base approach is many times larger than that from the traditional approach. See for example studies of the Economic and Social Impacts of Eastern Michigan University (2002), of the Economic Impact of the University of Massachusetts at Boston by Bluestone (1993) and of the University of Nebraska at Omaha by Corcoran ((2007). Although the skill-base approach is not without its critics, (Brown, 1997) there is no denying that a more highly educated worker contributes more to the economy.

This paper uses the idea from the skill-based approach by linking the increase in earnings as a result of the increase in human capital back to the value of attending college.

Screening

One of the major considerations in determining the value of attending college is that education is thought of as a screening or sorting mechanism. Attempts to measure this component have gone by the name "sheepskin effect". Clearly part of a faculty member's time is spent creating exams, grading and other activities which are plainly screening activities. Schooling screens out the less productive and students who graduate send a signal to prospective employers of their ability. Screening enhances productivity of businesses due to fact that they are able to allocate individuals according to their comparative advantage. Thus, there is value created in the screening process which

could result in an increase in earnings. This component is separate from increases in productivity due to increased effort and skills. The research in this area provides some strong support for the screening hypothesis. (See for example Park, 1999; Hungerford and Solon, 1987; and Jaeger and Page, 1996).

Student's Ability

Another consideration determining the value of attending college is the fact that students differ in their earning potential. One argument is that they already have skills. They may be innate or due to previous experience in the home or earlier schooling, or any number of factors. This ability differential will show up by different performance in the work place resulting in different earnings. Another argument is that students may differ in their earnings potential by putting forth greater effort relative to other students while going through the educational process. Both aspects will result in a range of earnings potential across students. And both are distinct from knowledge increase due to teaching faculty.

Calculating the Value of Teaching

In essence, I am positing that there are three inputs into the production of greater productivity which result greater earnings for college students. One is the increase in knowledge and skills due to teaching. The second is that the students are screened by the higher education process, signaling businesses of their comparative advantage. The third are the differences among students. By their differences in skills due to inherent abilities and efforts they will differ from other students in their earning potential. All three would result in increased earnings among college graduates. The attempt to capture the separate increase in value due each input is essentially trying to estimate the marginal product of these inputs towards earnings.

Conceptually, I start with an earnings function, by which the increase in earnings due to a college education is a function of three variables: acquired skills due to teaching faculty, the enhanced earnings due to education as a screening mechanism and the differential in skills and effort across student. The first task is to measure the increase in earnings to students as a result of having a college education. This was determined by taking the average increase in earnings of a college graduate over a high school graduate and weighting over a lifetime age earnings profile.[1] This average is given as $ 27,714 per year as estimated for graduates in 2007. The sum of this over a lifetime of working, which I took as between the ages of 25 and 65, is $ 1,108,560. Thus the average student who graduated from college in 2007 can be expected to earn $1.1 million more than the average high school graduate over his lifetime.

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1 The average earnings were taken from U.S. Census Bureau; 2006 Annual Social and Economic Supplement (March supplement) "Table PINC-03. Educational Attainment--People 25 Years Old and Over, by Total Money Earnings in 2007, Work Experience in 2007, Age, Race, Hispanic Origin and Sex;" published March 2008.

To find a weighting of how the average earnings varied over a persons life-cycle I used PINC-04. Educational Attainment--People 18 Years Old and Over, by Total Money Earnings in 2007, Age, Race, Hispanic Origin, and Sex also from the Census.

To be able to make statements about the value created in the present time period, I find the present value of that stream of earnings, the "educational premium". To calculate this I used a 3.0% discount factor which is the long-term Treasury bond rate[2]. This gives a present value of $642,210. This is the education premium earned by college graduates over high school graduates as a result of college teaching, screening and differences in students' abilities

The next step is separate the increase in earnings due to the three inputs. I first consider screening. Estimates of the amount measured by what is known as the "sheepskin effect" vary considerably for the average student.[3] The high side of the reasonable range of estimate appears to be 33% of the total educational premium (Fang, 2006). This figure will be used as the contribution due to screening.

Secondly, I considered the contribution due to different students' productivity. These differences should be positively correlated with differences in earnings. So I took the standard error of mean earnings across college graduates which is $419 (U.S. Census Bureau, March 2008, Table PINC-03). To err on the high side I use six standard deviations so as to include 97.5% of the average earnings differences. By this, the estimate of average earnings of the least productive college graduates is $2.514 less per year than the most productive. This figure is a little over 9% of the average earnings increase due to a college education.[4] This 9% is used as the contribution due to differences across students.

To arrive at an estimate of earnings due teaching I simply subtract the contributions from screening (33%) and the differences between students' productivity (9%). Thus, approximately 57% of the total increase in earnings as a result of a college education is due to teaching. This comes to over $370,000 for each student in present value terms.

With some robust assumptions the increased earnings value can be translated into a value for teaching faculty. First, I assume that this value is distributed equally over all classes, and that students take 120 credit hours to graduate this gives $3100 per credit hour.[5] Then assuming that the average class is worth three credit hours for each student and there is an average of 33 students per class. This gives an average value of teaching in each class of $305,000.[6] If the average teaching faculty has a four course load each semester, the value of teaching faculty is over $2.4 million per year. [7]

[2] This is the current rate of long term Treasury Bonds that is recommended by the Office of Management and Budget for 2007. Table of Past Years Discount Rates from Appendix C of OMB Circular No. A-94

[3] The measured amount also varies by field of study. See for example Ferrer and Riddel (2002).

[4] $2514/ $27714 = 0.091

[5] If a typical log format was applies to educational attainment over the years in college a greater weight would be placed on the courses taken earlier, e.g., the principles courses.

[6] Data on average class sizes and teaching loads are approximate and taken from my experience at the University of Nebraska at Omaha.

[7] It is interesting to extend the methodology to find the present value of the instructor's contribution over their teaching lifetime. It would include both the educational component and the screening component. Assuming a 35 year teaching timeline (30 to 65 years old), we net out the 9% that is the result of students marginal contribution, then discount the stream of value for teaching 800 student credit hours each year. The net present value comes to $86.6 million!

Discussion: Adjunct Faculty versus Tenure Track Faculty

Given that the average value of teaching in each class is $305,000, the cost of replacing tenure-track faculty with adjunct faculty can be evaluated. To replace a tenure-track faculty with an adjunct would result in savings for each class on the order of $9,000.[8] However one has to assume that the tenure track faculty are more effective teachers because of greater experience (See, for example, Petkova, 2008.[9]) At one end of the spectrum assumed that adjunct faculty, because of inexperience in the subject matter and inexperience in teaching can do no more than screening. In this case the full value of education is lost. The institution of higher education saves $9,000 but the private monetary loss to the student and society is $305,000. The social loss for each class would be $296,000. Clearly, from this viewpoint there is a misallocation of resources.[10]

However, the assumption of no educational impact from the adjunct faculty is extreme. One would expect adjunct faculty to contribute towards educational attainment. Let us, instead, consider, though, how much difference in teaching effectiveness would make sense for the substitution of adjuncts for tenure track faculty to be economically inefficient. As indicated, the savings to the university for using an adjunct instead of a tenure track faculty to teach a class is of the order of $9,000. This is less 3% of the total educational value created in one class. This means that there only has to be a differential of greater than 3% in teaching effectiveness for the universities decision to use adjunct faculty to result in a misallocation of resources.[11] In other words, it is economically inefficient to replace full time faculty with adjuncts if the teaching impact is reduced by more than 3%. One could argue about the details of effective adjunct faculty and possibly very poor teaching on the part of tenure-track faculty. The null hypothesis, though, given the evidence of experience curves in activities involving learning would be that much more than 3% is likely. Full time professional tenured track faculty would be more than 3% superior to adjunct faculty in relating an understanding of a subject matter. The burden of proof is on administrators to justify, that this is not so.

Discussion: Adjunct Faculty and Release Time for Research

What about the change in value when adjunct faculty is used to give release time to tenure track faculty for research. Whether the substitution is worth it or not depends upon the reduction in teaching effectiveness due to using adjunct faculty and, also, the value of the research which results. Let's say for discussion purposes that the adjunct is 20% less effective in imparting knowledge to the students

[8] This assumes an average full cost of full time faculty including salary and benefits per course is in the range of $11,500, while adjunct are paid $2,500.

[9] The paper is concerned primarily with entrepreneurial learning but suggest that the learning process occurs in "relatively unstructured or uncertain situations, in which individuals engage in creative or novel activities." Teaching would clearly fit this description.

[10] If the non-monetary private benefit to education and the external benefits: better health, less unemployment, less likely to be incarcerated, etc., are included the loss is much greater.

[11] The differential is even smaller when all social benefits to education are taken into account and thus replacing tenure track faculty with adjuncts even harder to justify

compared to tenure track faculty. And, that this results in a proportionate reduction in student's earnings over their working lifetime. Thus students in each class would experience a reduction in their earnings of over $60,000 for each class or over $120,000 for a one course release time each academic year. The adjuncts' total payment for two courses each year is $5000. Thus release time for research is economically justified, therefore, if it brings in over $125,000 of value for each year.

Given that these are ball park figures and that research in many cases may fall short, it is unlikely that problems of misallocation would be rectified. Universities, the decision makers, bear little of these costs. They fall on students" incomes and they, in turn, are unlikely to be aware of the tradeoff imposed on them.

Concluding Remarks

This paper has achieved its purpose. It has estimated an approximation of value added (earnings) due to faculty teaching. Many refinements can be undertaken, but the general range of the estimate seems reasonable.

The main conclusion is that, given the large value created by teaching it would be hard to justify on economics terms substituting adjunct faculty for full time tenure-track faculty unless adjunct faculty were at minimum not more than 3% less effective in imparting knowledge to students. The burden of proof is on the university administrators who by implication contend that it is less.

There is a further inference of this paper about the tradeoff between teaching and research. As a result of a moderate assumption about the more effective teaching on the part of tenure-track faculty, the increases in value for society of possibly $125,000 each year must be created to justify giving one course release time for research in which adjunct faculty is substituted for tenure track faculty. Difficult to know the value of research but at least the approach taken here gives focus to the tradeoff.

Finally, this brings us to considerations of needed areas of research. To add weight to the issues in this paper there needs to be a more concrete measure of teaching effectiveness with experience, say, years of teaching or number of classes taught. In effect a learning curve of teaching must be estimated. Also to clarify the tradeoff between teaching and research, estimates must be made about the value of research output.

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