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**Involving Undergraduates in Research to Encourage Them to
Undertake PhD Study in Economics**

by

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I. Introduction

The number of PhDs granted in economics annually by American universities has fluctuated between 900 and 1100 since the early 1970s (Ehrenberg 2004, figure 1). However, increasingly these PhD degrees are granted to temporary residents of the United States; while temporary residents earned less than 20% of the PhDs in economics in 1970 by 2002 they earned over 55% (Ehrenberg 2004, figure 2). The declining interest of American students in pursuing PhD study in economics is due to a number of factors, including much better earnings opportunities in related fields, such as law and business, and the declining attractiveness of academic careers in economics that has been caused by the declining shares of faculty positions in economics departments that are full-time tenured and tenure-track ones. For example, a survey of economics department chairs undertaken by the Cornell Higher Education Research Institute (CHERI) in 2003 found that nationwide the percentage of economics department faculty members at surveyed institutions in full-time tenured and tenure-track positions fell from about 75% in 1982-83 to about 58% in 2002-2003 (Ehrenberg 2004, table 1).

Recent evidence suggests that the growing use of part-time and full-time non tenure-track faculty nationwide adversely influences American college students' graduation rates (Ehrenberg and Zhang forthcoming). I have become concerned that the increased usage of non tenure-track faculty members also likely adversely influences the propensity of undergraduate students to go on for PhDs in economics for two reasons.

First, many students enter college with the expressed intent of becoming doctors or lawyers, getting an MBA, or going on for advanced degrees in the sciences or humanities. However, with the exception perhaps of the small number of high school

students who have taken advanced placement classes in economics, very few entering freshman have any idea what PhDs in economics do.¹ The son of two secondary school health education teachers, when I entered college, my ambition was to become a high school mathematics teacher. But one young faculty member turned me on to economics; I wanted to be just like him and that was my motivation for going on for a PhD. Many colleagues have similarly told me of a key professor who motivated them to want to become a professor. Role models are important and if the faculty members teaching principles of economics classes are not involved in research and are not in tenured or tenure-track positions, they will be less likely to serve as role models and to motivate and encourage their students to go on for PhD study.²

Second, most top graduate programs in economics now require four semesters of calculus and linear algebra, as well as real analysis. Only by getting to undergraduate students early in their college careers can faculty members explain how students need to structure their undergraduate studies if they are to have any hope of pursuing PhD study in economics. Part-time and full-time non tenure-track faculty members are unlikely to see this as part of their responsibilities.

II. Encouraging Students to Consider PhD Study in Economics

During the first twenty-five years that I spent at Cornell University I chaired the PhD committees of over 35 graduate students, but very few undergraduate students from my college went on for PhDs in economics.³ I decided about five years ago that if I cared about the flow of future PhDs in economics it was important for me to produce future PhD students, as well as PhDs, and that involving undergraduate students in research early in their academic careers was the best way to try to accomplish this.

One strategy that I pursue is to recruit undergraduate research assistants prior to their arrival at Cornell. I read through the folders of the students who have accepted offers of admissions to my college (approximately 160) and search for students with strong mathematics, statistics or economics backgrounds – this usually means students who have taken calculus and/or either advanced placement economics or advanced placement statistics in high school.⁴ I write several of these students prior to their arriving at Cornell and offer them positions as research assistants at CHERI. Given the large fraction of our students who must take out loans or work as part of their financial aid packages, the take-up rate on these offers is high.⁵

The current generation of entering first-year students is so computer literate that they rapidly learn how to use spread sheet and statistical software programs, such as EXCEL, Stat/Transfer, and STATA. I heuristically explain the econometric models we are using to them and even if they have not had classes in statistics, they quickly understand the research that I am conducting. Within a short-time, we are working together on empirical research projects. These students also mention our work to their friends and I often link-up with other bright students through these referrals.

Typically the type of research I do with my undergraduate students is not as sophisticated as the research I do with my graduate students or postdoctoral fellow. However, the research is of sufficiently high quality that since 2000 I have published six papers that had at least one undergraduate coauthor and I have supervised the preparation of another two published papers in which undergraduates were the only authors (Crosta and Packman, forthcoming; Ehrenberg, Ehrenberg, Smith and Zhang, 2004; Ehrenberg, Klaff, Kezsbom and Nagowski, 2004; Ehrenberg and Smith, 2003; Ehrenberg and Smith,

2004; Klaff and Ehrenberg, 2003; Kotlyraenko and Ehrenberg, 2000; and Nagowski, forthcoming). Seven different undergraduate students were associated with these papers.

One of these students, who came to Cornell wanting to be a lawyer, is now a second-year PhD student in economics at MIT and another would be lawyer is a first-year PhD student in the economics of education program at Columbia Teachers College. A third student is applying to economics PhD programs this year. A number of papers are in progress with other undergraduates and I anticipate at least two more applications to PhD programs will come from my group within the next two years, including one from an underrepresented minority student.

My students' decisions to pursue PhD study is due partially to the enjoyment that they see I have working with them, partially to the fun that they have doing the research, and more generally from their learning what the life of an academic economist is like. To be honest, I emphasize to them the uncertain nature of the academic job market and discuss the types of positions for PhD economists that are available outside of academia. They know, for example, about former PhD students of mine who have been employed at the Rand Corporation, the Urban Institute, Mathematica Policy Research, the Center for Naval Analysis, the World Bank, the OECD, the Congressional Budget Office, the Bureau of Labor Statistics, Merrill Lynch, the Federal Trade Commission and Merck Pharmaceuticals. I also encourage them to have an experience as a junior economist in a nonacademic setting before they apply to graduate school, so that they can see first hand what nonacademic PhD economists do. The three I mentioned above spent time, respectively, at the Center on Budget and Policy Priorities, Mathematica, and the Brookings Institution, during or after their undergraduate studies.

III. Involving More Undergraduate Students in Research

Once I began worrying about attracting more students into PhD study, it was a natural extension to think more broadly about how to involve more undergraduate students in research. After all, if what is unique about research universities is the extent to which the faculty is involved in research, shouldn't our students, who bear some of the costs of the research, also derive some of the benefits in terms of being exposed to the research process?⁶ So I decided to require group econometric research papers in my two undergraduate classes – a sophomore level labor economics class (with an enrollment of about 35 to 40) and a junior/senior level class on the economics of the university (with an enrollment of about 65). The papers are group projects (students may work in groups of up to 4 – on average they tend to work in groups of 2) to allow me time to meet with each group multiple times during the semester to check on their progress and to help guide their work.

I provide each class with a list of suggested research topics. Given that my current research interest is the economics of higher education, the topics relate to that area. Table 1 provides examples of some of the topics that I share with students in the labor economics class (in parentheses I indicate to what section of the course each topic corresponds). I emphasize to the students that they are not restricted to these topics and that they can discuss other topics with me (and many do), but that these are topics for which I know data is readily available.

Student responses to these projects have been overwhelmingly positive. The projects allow them to make use of statistical methods that they have learned to confront “real world” issues. They allow them to test economic theories and to understand better,

the *ceteris paribus* nature of the predictions of these theories. The projects give them experience in conducting empirical research and, for some; this experience leads them to consider future study in economics, or careers as economists. Many of these students will not have the mathematical background necessary to go directly on for economics PhD; however, some pursue degrees in public policy and others go on to PhD programs in other applied social science fields. Given the nature of my college, a number of the students go on to law school, but some of these students now think about careers as law professors, in which they can blend legal and economic analyses.

IV. Concluding Remarks

Involving undergraduate students in research, both within and outside of the classroom, is a very time-consuming activity. However, the benefits I receive from doing this have been enormous. In addition to these students having helped to pad my vita and to my sense of the importance of helping to contribute to the pool of potential PhD students in economics and engaging undergraduates in the major activity of a research university, I have gotten to know many undergraduate students much better than I would have if I were not engaged in these activities. Many of the relationships that I have established with these students will be very long-lasting in nature and I will follow their careers and personal lives with great interest and pride.

My goal in writing this essay is to encourage senior economists in academia to emulate my behavior. In particular, economists at major research universities, many of which attract our nation's best undergraduate students, should realize that they have an obligation to the profession to enhance the flow of undergraduate students into PhD study, as well as to train those students who show up in their PhD program

Table 1

**EXAMPLES OF UNDERGRADUATE EMPIRICAL RESEARCH PROJECTS
(Section of the labor economics class to which the project relates)**

1. Each year average faculty salary data is published in *Academe* for male and female faculty, at each rank, by institution. The ratio of female to male salaries varies widely across institutions, as does the ratio of female to male faculty members. What factors other than differences in gender discrimination across institutions are responsible for these differences? (Gender, Race and Ethnicity in the Labor Market)
2. There are many ways to measure the research productivity of faculty- two are the number of citations to an individual's published work and the number of his or her publications. Human capital theory predicts that the productivity of an individual should vary over the life cycle. What do the life cycle productivity profiles actually look like for Cornell economists? Why should Cornell economists' research productivity vary across individuals at a point in time? (Human Capital Theory)
3. In the *Yeshiva* decision, the Supreme Court effectively barred collective bargaining for tenured and tenure-track faculty members at private colleges and universities. However, state laws permit faculty at public institutions to bargain in a number of states. What determines whether faculty members at a public institution are covered by a bargaining contract and do unionized faculty members

- at public higher education institutions earn more than their otherwise comparable nonunion faculty colleagues? (Unions and the labor market)
4. Faculty/student ratios vary widely across colleges and universities in the United States. According to the theory of labor demand, when faculty salaries are high, one should expect to observe, *ceteris paribus*, lower faculty/student ratios. However, those institutions with the highest faculty salaries also tend to have the highest faculty/student ratios. Does this observation mean that the theory of labor demand is irrelevant or incorrect for nonprofit and public institutions? (Labor demand)
 5. Average faculty salary levels vary widely across academic institutions, even if one confines one's self to universities that produce PhD degrees. Every decade or so, the National Research Council (NRC) conducts a study that subjectively rates the quality of PhD programs in different fields. As part of the NRC's 1995 study, information on objective measures of faculty research productivity was also collected. How should average faculty salaries vary with average faculty research productivity? What other variables might be associated with differences in faculty salaries across institutions? (Pay and productivity, Labor mobility)

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¹ The College Board reports that of the 1,101,802 high school students that took AP exams in 2004, 41,265 took the macroeconomics exam, 27,674 took the microeconomics exam and 17,398 took both exams (see http://www.collegeboard.com/student/testing/ap/exgrd_sum/2004.html). In contrast, the biology exam was taken by 111,104 students, the chemistry exam by 71,070 students, the two calculus exams by over 276,000 students, the statistics exam by 65,878 students, the U.S. History exam by 262,906 students and the English Literature and Composition exam by 239, 493 students.

² The CHERI survey indicated that over 80% of principles of economics students at liberal arts colleges in 2002-2003 were taught by tenured or tenure-track faculty, so the problem I am describing is not as pressing for these colleges (see www.ilr.cornell.edu/cheri for details of the survey). Whether faculty involvement in

research is important in generating future PhDs at these institutions has been addressed by Lemke, Barzev, Filipova and Suleva (2004).

³ But those that did were superb –for example Alan Krueger (Princeton), David Bloom (Harvard) and Phil Levine (Wellesley)

⁴ All the students admitted to ILR-Cornell are interested in careers in law, human resources, collective bargaining, union organization and administration, or applied social sciences. Thus, it is easy for me to quickly go through the application files and pick out the few top students who may prove to be interested in economics. Economists teaching in liberal arts colleges would need to focus their attention on applicants who express interest in mathematics or social science. Economists at large universities would need to establish good relationships with admissions staff at their institutions, explain to the admissions officers the types of students that they are looking for, and ask them to make referrals of student names to them.

⁵ Of course one needs money to pay the students and I am deeply indebted to the Andrew W. Mellon Foundation and the Atlantic Philanthropies (USA) Inc. for providing the funding to CHERI that makes this possible. The sums of money involved here are not large and Cornell University’s experience is that alumni are very willing to contribute funds to enhance undergraduates’ research experiences. I encourage economics departments to raise funds for this purpose.

⁶ Ehrenberg, Rizzo and Jakubson (forthcoming) present evidence that undergraduate students bear part of the cost of increased faculty research in the forms of increased student/faculty ratios, increased exposure to non tenure-track faculty and somewhat increased tuition payments.