

MATRICULATION IN U.S. ECONOMICS PH.D. PROGRAMS: HOW MANY ACCEPTED AMERICANS DO NOT ENROLL?

T. Aldrich Finegan, Wendy A. Stock, and John J. Siegfried*

Every economics Ph.D. program in America admits students who do not enroll. Most students who reject specific economics Ph.D. programs enroll in others. Yet some admitted students do not enroll in *any* economics Ph.D. program. We call them nonmatriculants (nonmats, for short).¹ How many make this choice, and why? Do they differ from those choosing to pursue a Ph.D.?

Nonmats represent a loss of unknown numbers to the economics profession, which is growing more slowly than other social sciences (John J. Siegfried and Wendy A. Stock, 2005). The loss of North Americans may also affect the field distribution of new doctorates. Moreover, unless over-booking is sufficient to enroll the targeted number of students, when financial aid is offered to nonmats, less funding may be available for other economics students who would have enrolled. On the other hand, if declining to enroll in a Ph.D. program in economics avoids dropping out a year or two later, non-matriculation may save considerable opportunity costs.

We know a little about nonmats from the American Economic Association's annual Universal Academic Questionnaire (UAQ). The 54 Ph.D. programs that responded to it in 2004-2005 received 14,079 applications to their doctoral programs and made 3,030 offers of admission, 1,015 of which were accepted; yet only 859 students, or an average of 16 per program, actually enrolled (Charles E. Scott and John J. Siegfried, 2005, 524). Unfortunately, we do not know how many of the 3,030 offers of admission were multiple admissions of the

same individual, nor how many admitted applicants failed to enroll in any Ph.D. program or what happened to them.

Using a sample of Ph.D. programs and students admitted to them, we estimate the number of nonmats to economics Ph.D. programs, explore the factors related to their decision not to matriculate, and compare them to those who enroll. We asked nonmats why they decided against studying to be an economist, and what they did instead. For example, how important were expectations that it takes too long to earn a Ph.D., that economics is "too theoretical," or that financial aid is insufficient? Are students who are interested in policy more likely to follow alternative career paths, as some economists speculate (David Colander, 1998; Ronald G. Ehrenberg, 1999)?²

Our analysis is limited to U.S. and Canadian applicants because international students face very different alternative educational and occupational opportunities. The matriculation decisions of North Americans have special relevance to the U.S. labor market for new Ph.D. economists and to economics education in this country. Between 1973 and 2002, the number of new Ph.D.s awarded to U.S. citizens fell by one half (Siegfried and Stock, 2005). While degrees awarded to foreign students rose sharply over the same period, their applications declined in the wake of September 11, 2001 (Heath Brown and Maria Doulis, 2005). Only one-half of international Ph.D. graduates take their first job in the U.S. Thus, the supply of new Ph.D.s to U.S. employers declines as the mix of graduates shifts towards internationals, even if total new Ph.D.s remains unchanged. Finally, as the share of degrees awarded to Americans declines, so does the share of new graduates with an interest in fields like economic history, law and economics, public economics, and health, education and welfare (Siegfried and Stock, 2005).

I. Survey and Data Description

Our analysis draws on several data sources. First, we obtained mailing and financial aid information for all North American applicants offered admission to 26 U.S. economics Ph.D. programs in Fall 2003.³ These programs offered 597 admissions to 364 different individuals, 162 of whom enrolled in one of them in Fall 2003, leaving 202 who did not.

Second, in December 2003, we mailed a survey questionnaire to 265 students who had declined admission to at least one of our sample Ph.D. programs. These "declinees" consist of 201 of the 202 students who did not enroll in one of our 26 sample programs, and 64 students who had declined admission to at least one of the programs, but had enrolled in another of them. The survey asked about economics education background, interest stimulators, career aspirations, and recent educational and labor-market activities. For those who did not enroll in *any* economics Ph.D. program (whether in our sample or not), we asked why they made that decision.

We received 155 usable replies, yielding a response rate of 58 percent.⁴ Among the 113 respondents who did not enroll in one of our sample programs, 73 reported having enrolled in an economics Ph.D. program (outside our sample) in Fall 2003, while 40 said they had not enrolled at all. Because 13 of these 40 told us that they had deferred enrollment or planned to apply for admission again, in Fall 2004 we conducted Internet searches for all 40 individuals, finding that 10 of them had, in fact, enrolled in an economics Ph.D. program. Subtracting the delayed enrollees from the original set of 40 non-enrollees leaves 30 probable Fall 2003 nonmats who, to our knowledge, had not enrolled in *any* economics Ph.D. program by Fall 2004.

Finally, we gathered from participating programs application file information for the 30 nonmats, including demographic information (sex, date of birth, country of citizenship),

educational background (major and minor fields of study, GPAs, names of schools for previously earned degrees), scores from the Graduate Record Examination (GRE), information about the financial aid package(s) offered to these students, and their field(s) of interest within economics. We gathered similar information on 196 U.S. and Canadian Ph.D. students who enrolled in one of the 26 programs in Fall 2002.

Thus, we have two types of information for a set of 30 nonmats to economics Ph.D. programs—program-provided information from the individuals' application files, and survey information regarding their sources of interest in economics, career aspirations, and reasons for not matriculating. We have comparison information for the former from enrollees in the same programs in Fall 2002, and comparison information for the latter from survey respondents who enrolled in an American economics Ph.D. program in Fall 2003.

II. Characteristics of Nonmatriculants and Enrollees

Table 1 compares demographic characteristics, educational background, and fields of special interest of nonmats with Fall 2002 enrollees in Ph.D. programs. The two groups are remarkably similar. The only significant differences are that nonmats are: (1) more likely than enrollees to hold a prior graduate degree; (2) less likely than enrollees to have an undergraduate degree from a public university that does not offer a Ph.D. in economics; and (3) less likely than enrollees to have been offered financial aid. While lack of financial aid is a common reason cited by nonmatriculants for deciding not to enroll, offers of aid may indicate student ability known to applicants and observable to admissions committees, but not available for this analysis.

Table 2 compares the importance of various factors in stimulating each group's interest in seeking a Ph.D. in economics and in the types of jobs that attracted them *when they applied for admission*.⁵ To gauge the importance of various motivational factors, we asked respondents,

"What facets of your previous studies in economics stimulated your interest in seeking a Ph.D. in economics? Indicate the importance of each using the categories: negative, none, small positive, moderate positive, large positive." The table reports the fraction of each group reporting either a moderate positive or large positive role for *theory, mathematical modeling, economic data, economic institutions, public policy issues, and economic research*. The only significant difference is that a larger fraction of enrollees reported a positive role for economic research.

Nonmats and enrollees appear to have had different long run job goals at application time. Larger fractions of enrollees than nonmats reported having been interested in teaching and doing research in university economics departments or schools of business, while smaller fractions of enrollees said they were interested in conducting research for a corporation or financial institution or in working as consultants than did nonmats. Of course, despite our instructions to the contrary, some responses by nonmats may have been influenced by what they were actually doing when they were surveyed.

III. Why Don't Nonmats Seek Economics Ph.D.s, and What Do They Do Instead?

Of the 30 likely nonmats we found, only 15 said they had decided unequivocally not to seek an economics Ph.D. (the others said they had deferred entry, intended to apply again, or needed more time to decide). Accordingly, only these 15 were asked how much weight (none, little, some, or heavy) each of eight possible considerations had played in their decision.

The sole reason given "some" or "heavy" weight by a clear majority (9) was "expected to receive too little financial aid." Better aid packages are likely to improve matriculation rates, but perhaps less so for stronger vis-à-vis weaker prospects (see below). Also mentioned for deciding against a career in economics was how long it takes to earn a degree (6 of 15) and expecting to

earn larger lifetime earnings elsewhere (4 of 15). Only one was put off by the use of math and theory in economics.⁶

When asked what they had been doing since October 2003, ten of the fifteen reported enrollment in other graduate or professional programs—four in public policy, and three in finance Ph.D. programs. Seven of the ten had applied to at least *six* economics Ph.D. programs; five had received "full ride" offers from at least one of them, and three from more than one. Only one of the ten who enrolled in an alternative program cited too little aid as heavily influencing their decision not to become an economist; five said it played no role at all. Perhaps we lose relatively more of our better prospects because they conclude, on second thought, that a different profession offers a better match with their interests, talents, and goals.⁷

IV. Implications

Only a small fraction of offers of admission to economics Ph.D. programs go to nonmats as we define them, but estimating that fraction is not easy. We identified 30 likely nonmats among the respondents to our survey, but the correct number is surely smaller. Since many university web sites do not post the names of entering students, our internet search for Fall 2003 nonmats who had enrolled in Fall 2004, of whom we found ten, could not have identified them all. Were the actual delayed enrollee count a more plausible 15, the nonmat count would fall to 25.

We must also take into account the nonmats who did not return our survey. If the same fraction of respondents and non-respondents did not matriculate, and if 25 is our best estimate of nonmats, then the total estimate would be 44 nonmats.⁸ Dividing 44 by 364, the total number of students offered admission to our sample of 26 programs, yields an overall nonmatriculation rate of 12 percent in 2003-04.⁹ A nonmatriculation rate this small is good news for the economics

profession: there are few numerical losses after admission. The challenge, it appears, is to interest more of our top undergraduate majors in applying to Ph.D. programs.

We have no data on the nonmatriculation rate for U.S. students in earlier decades, hence no way of knowing whether it has changed. The surge in applications from well-qualified foreign students during the 1980s and 1990s may have led to some decrease in matriculation by Americans if fewer of them received offers of financial aid.¹⁰ But unless our estimate of 12 percent in 2003-04 is much too low, the nonmatriculation rate, which must be greater than zero, cannot have risen much. That implies that the *matriculation* rate cannot have fallen much relative to the 50 percent drop in the output of new Ph.D.s going to Americans that occurred over this period. Thus, the main source of that decline must lie earlier in the recruitment process.

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Table 1 - Application File Characteristics of Economics Ph.D. Nonmatriculants and Enrollees
(U.S. and Canadian Citizens Only)

	<i>Fall 2002</i>	<i>Fall 2003</i>
	<i>Enrollees</i>	<i>Non-matriculants</i>
Number of Observations ^a	196	30
Male	0.68	0.70
Median age at time of entry into program	23.9	23.8
Median years since undergraduate degree	0.75	1.75
Hold undergraduate degree in economics	0.69	0.63
Hold undergraduate degree in math	0.04	0.07
Hold undergraduate degree in economics/math	0.10	0.11
Hold prior graduate degree	0.17 ^{db}	0.30
Type of undergraduate institution attended		
U.S. economics Ph.D.-granting	0.59	0.69
U.S. top-50 liberal arts	0.12	0.17
Other U.S. public	0.14 ^{>}	0.00
Other U.S. private	0.07	0.10
Foreign	0.09	0.03
GRE analytical score ^c	735	720
GRE verbal score	608	628
GRE quantitative score	756	768
Financial aid offered		
No work requirement	0.46 ^{>}	0.20
Work requirement	0.34 ^{>}	0.13
No aid	0.20 ^{<}	0.67
Field of interest specified on application		
Theory	0.31	0.33
Other	0.42	0.43
None specified	0.27	0.20

Source: Authors' surveys of graduate programs, graduate students, and nonmatriculants in economics. Sample is limited to U.S. and Canadian citizens.

^a Number of observations varies by row because some demographic and background information was not available for all nonmatriculants. Reported N is the maximum, which never exceeds the actual by more than two, with the exception of GRE analytical score (see below).

^b < (>) indicates that the mean of the variable is significantly lower (higher) for the enrollees than for the nonmatriculants at the 0.05 significance level (two-tailed tests).

^c The analytical portion of the GRE changed substantially in October 2002 and scores before and after that time are not comparable. We report only the GRE analytical score for nonmatriculants who took the exam prior to October 2002 (N = 18).

Table 2 - Survey Characteristics of Economics Ph.D. Nonmatriculants and Enrollees
(U.S. and Canadian Citizens Only)

	<i>Fall 2003 Enrollees^a</i>	<i>Fall 2003 Non-matriculants</i>
Number of Observations ^b	125	30
Interest in Ph.D. study was stimulated by ^c		
Theory	0.73	0.68
Mathematical modeling	0.49	0.57
Economic data	0.47	0.57
Economic institutions	0.46	0.35
Public policy issues	0.72	0.76
Economic research	0.84 ^{>e}	0.57
Long-run job interest in ^d		
Teaching and research in university economics department	0.72 ^{>}	0.40
Teaching and research in school of business	0.18 ^{>}	0.07
Teaching and research in school of public policy or government	0.16	0.17
Teaching in four-year liberal arts college	0.28	0.20
Teaching in two-year college	0.01	0.00
Research for corporation or financial institution	0.11 ^{<}	0.23
Research for government, international organization, or think tank	0.44	0.43
Consulting	0.15 ^{<}	0.37

Source: Authors' surveys of graduate programs, graduate students, and nonmatriculants in economics. Sample is limited to U.S. and Canadian citizens.

^a The Fall 2003 enrollees sample includes only those enrollees who returned a survey form. It also includes ten individuals who were admitted for Fall 2003, but actually enrolled in 2004.

^b Number of observations varies by row because some information was not available for all of the survey respondents. Reported N is the maximum, which never exceeds the actual N by more than two.

^c Reports mean of variable equal to 1 if respondent reported a moderate or large positive role, in response to survey question: "What facets of your previous studies in economics stimulated your interest in seeking a Ph.D. in economics? Indicate the importance of each using the categories: negative, none, small positive, moderate positive, large positive."

^d Reports mean of a variable equal to 1 if respondent reported "much" interest in job, in response to the question: "Here is a partial list of jobs that new Ph.D.s in economics take. At the time that you applied for admission to doctoral studies in economics (not now), how much interest did you have in each as a long run goal? Use the categories: none, a little, some, much."

^e < (>) indicates that the mean of the variable is significantly lower (higher) for the enrollees than for the nonmatriculants at the 0.05 significance level (one-tailed tests).

Endnotes

* Finegan: Department of Economics, Vanderbilt University, Nashville, TN 37235; Stock: Department of Agricultural Economics and Economics, Montana State University, Bozeman, MT 59717; Siegfried: Department of Economics, Vanderbilt University and American Economic Association, 2014 Broadway, Nashville, TN 37203. Pat Fisher, Roberto Penaloza, Jason Jimmerson, Chase Cook, and Katie Genadek provided research assistance. Financial support came from the Ford Foundation. Opinions, conclusions, or recommendations in this paper are those of the authors and do not necessarily reflect the views of the American Economic Association or Ford Foundation. Malcolm Getz, W. Lee Hansen, Ronald Ehrenberg, Daniel Hamermesh, Maresi Nerad, and Barbara Wolfe advised on the design of the study. Andrew Daughety, Daniel Hamermesh, and Lee Hansen provided helpful comments on an earlier draft. Of course, we owe the greatest thanks to the program representatives and nonmatriculants who returned our survey questionnaires.

¹ We distinguish between nonmats – students who are offered admission but choose not to accept the offer, and "no-shows" – students who are offered admission, who accept the offer, but who then do not show up to the program.

² For over three decades, the number of U.S. citizens earning a Ph.D. in economics has been declining by over one percent per annum. One possible reason is that graduate programs in public policy, government, and urban affairs—along with business and law—may have been luring away potential graduate students in economics who are put off by the abstract and mathematical nature of doctoral studies in economics. From 1971-72 to 2001-02, Ph.D.s awarded annually rose from zero to 119 in Public Policy Analysis and from 3 to 37 in Urban Affairs, but fell from 758 to 625 in Political Science and Government. Over the same period, new doctorates in Business and Finance grew by about 300 per annum and new MBAs by about

90,000, while the annual output of new lawyers rose by about 17,000. (Source: U.S. Dept. of Education, National Center for Education Statistics, various reports.)

³ The programs are participants in an on-going study of attrition and matriculation in 27 U.S. economics Ph.D. programs. The programs are drawn from all quality tiers; but larger, higher-ranked universities are over-represented. For further information on the characteristics and selection of these programs, see Wendy A. Stock, T. Aldrich Finegan, and John J. Siegfried (2006). Because of data problems, one of the 27 programs in the project is excluded from this study.

⁴ Of the 155 declinee respondents, 113 were from non-enrollees to our sample programs and 42 were from enrollees, yielding response rates of 56 and 66 percent, respectively.

⁵ The 125 Fall 2003 enrollees reported in the first column of Table 2 are comprised of 73 survey respondents who reported enrolling at a Ph.D. program *outside* our sample set of programs, plus 42 responding enrollees *within* our sample set, plus 10 respondents who *deferred* enrollment until Fall 2004.

⁶ The other listed factors weighted "some" or "heavy" by the number of students in parentheses were a larger risk of not finishing the degree (3), too large a sacrifice of other goals to pursue an academic career (3), and insufficient interest in teaching (1).

⁷ Of the five nonmats who had decided against a Ph.D. in economics and who were not enrolled in other graduate programs, one was completing an M.A. in economics and planning to become a C.F.A., one was working full-time and planning to attend law school, one was doing economic research for a not-for-profit organization, one was working as a financial analyst, and one was working full-time in an unreported occupation.

⁸ $44 = [25 + ((25/113) * 88)]$. There were 113 respondents and 88 non-respondents among the non-enrollees to our sample programs.

⁹ The true nonmatriculation rate for all U.S. economics programs could be larger or smaller than 12 percent if sample selection bias led to under- or over-representation of nonmats among survey respondents, or if the true rate for our sample of programs differed from what a census of all programs revealed.

¹⁰ We thank William J. Collins for this observation.