

# **A Differentiated Model of Doctoral Training in Economics**

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### **Abstract**

This paper describes a new Ph.D. program that trains only labor, health and public economists that was developed in response to calls from the COGEE for greater differentiation in Ph.D. programming. The decisions regarding curricular content and structure are explained as well as the two curricular innovations that implemented these decisions—a doctoral core designed specifically for applied microeconomists and an innovative sequence of courses to train students in applied research methods, data manipulation and communication. This differentiated Ph.D. program is integrated with a professionally-oriented M.A. in Applied Economics, and the paper explains how these two programs are effectively combined.

## **A Differentiated Model of Doctoral Training in Economics**

### **Introduction**

In 1991 the Commission on Graduate Economic Education (COGEE) concluded that a single approach to doctoral education dominated the training of economists in the U.S. even though the Ph.D.s went on to pursue a variety of career paths in academia, government and business (Krueger, 1991, 1053). This “traditional” model, which continues to dominate graduate programming, emphasizes theory and techniques over application and mathematical formalism over historical and institutional context. The COGEE established two generalizations that help to explain the widespread use of the traditional model: 1) faculty who taught in graduate programs and their students both believed that the focus of the traditional curriculum was appropriate and 2) the Ph.D. afforded new economists faster placement and higher starting salaries than recently trained graduates in other social sciences. The COGEE reported other evidence, however, that suggested important weaknesses in the traditional curriculum: 3) alumni of graduate economics programs reported significant gaps between what they were taught and what they needed in their careers and 4) employers found that many new Ph.D.s were inadequately prepared to conduct and communicate about applied research. In addition, evidence had begun to mount by 1990 that domestic demand for new doctoral economists had reached a long-run plateau and that interest in graduate economics training among U.S. undergraduates was declining. In light of these troubling signs the COGEE expressed surprise and concern that the doctoral curriculum in economics had not become more differentiated so that it could better serve a diverse student audience (Krueger, 1991, 1053).

This paper describes a different approach to doctoral training that addresses many of the concerns that the COGEE and others have raised regarding the traditional curriculum. The

differentiated model of doctoral training described here is not a proposal; it was designed and actually implemented at UNC Greensboro in 2004 and differs from the standard model in three key respects. First, it is intended to train only applied microeconomists in the fields of public, labor and health economics. Second, it is integrated with and supported by a terminal, professionally-oriented M.A. program in Applied Economics. Third, the program's core course sequence is explicitly designed to emphasize the applications of theory and econometrics that are most relevant for labor, public and health economists. Each of these innovations would be problematic or even inappropriate if embedded within a traditional Ph.D. program that offered a diverse set of specializations. Taken together, however, they represent an alternative approach to doctoral education that can be used to train applied economists in other narrowly-focused areas of specialization for careers outside research-oriented departments of economics.

Differentiated doctoral programs in economics will become attractive alternatives to the traditional model only if prospective students, academic advisors and employers accept their relative strengths and weaknesses. We discuss these strengths and weaknesses in the conclusion of the paper and their implications for the quality and viability of differentiated doctoral programming. We lead up to that assessment by first reviewing what we have learned about graduate education in economics from and since the COGEE report. We then describe how the three curricular innovations that are emphasized here—a narrow focus, a specialized core and integration with a terminal, professional masters' program—have been combined in the differentiated doctoral program in applied microeconomics at UNC Greensboro.

### **What We Have Learned From and Since the COGEE**

In its 1991 report the COGEE documented and gave voice to concerns within the economics profession regarding the direction, content and structure of doctoral education. Since

this groundwork was laid, a variety of researchers have extended, amplified and updated the COGEE's analysis on a regular basis. We briefly review that literature in this section to highlight developments in graduate education in economics over the past sixteen years that provide context and motivation for the curricular innovations that are described later. The discussion focuses on three broad themes that have resonated since the COGEE report: the strengths and weaknesses of the standard doctoral curriculum in economics; the profession's resistance to changing this traditional model; and the impact that the adherence to the curriculum has had on the number, composition and career profiles of Ph.D. economists who are being trained in the U.S. These three developments, when viewed together, indicate a continuing need for the development of differentiated doctoral programs in economics.

#### *The Strength and Weaknesses of the Standard Model*

The overwhelming majority of graduates from doctoral programs in economics follow one of five career paths:

- a) researcher/teacher in a department of economics with a graduate teaching mission.
- b) teacher/researcher in a department of economics with an undergraduate teaching mission.
- c) researcher/teacher in professional graduate school of public policy, education, health or business.
- d) researcher/policy analyst in government or in a non-academic research organization.
- e) researcher/practitioner employed by a business enterprise.

The concern of the COGEE that we focus on here is its conclusions that the standard doctoral curriculum in economics is designed primarily to prepare students for the first career path and provides less effective training, as a result, for the other four.<sup>1</sup> The seriousness of this problem is underscored by the fact that four out of every ten new Ph.D.s economists work outside of

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<sup>1</sup> Colander and Klamer (1987) and Coats (1992) argued forcefully that the training provided by the doctoral curriculum had become inappropriate even for the basic research path.

academia—a share that has not changed in the sixteen years since the COGEE report.<sup>2</sup>

The COGEE based its conclusions and recommendations on several types of evidence regarding curricular focus and emphasis that were assembled and reported by Hansen (1991). First of all, he asked faculty serving in graduate programs and their students to rate the importance that was given to seven specific areas of knowledge and six different skill sets within their doctoral programs; he also asked respondents to rate the importance that each knowledge area and skill set should have been given.<sup>3</sup> Both groups reported that the knowledge profile of the curriculum was appropriate—theory was and should have been more important than econometrics, empirical technique or policy applications while the least emphasis was correctly placed on knowledge of institutions, history and the economics literature. The faculty and students also had a common view of the appropriate mix of skills—the greatest emphasis should have been given to analytics, critical judgment and creativity; less emphasis on the ability to apply abstract concepts to real-world issues; and the least on mathematical, computational and communication skills. Both groups agreed, however, that too much emphasis was actually placed on mathematical and computational skills and too little on critical judgment and creativity. Hansen's survey established that the faculty and students most intimately connected to graduate education shared a common view of the doctoral curriculum in economics, and one that was generally positive.

Hansen (1991, 1068-75, 1083-5) also surveyed alumni of Ph.D. programs in economics (the 1977-78 class) to elicit their views concerning the focus and effectiveness of the doctoral

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<sup>2</sup> Hansen (1991, 1060) reported that 57.5% and 54.5 % of economics Ph.D. students planned to pursue academic careers in 1977 and 1987 respectively; Stock and Siegfried (2004, 275) estimated that 58.8% of the 2001-02 cohort of Ph.D. graduates actually did so.

<sup>3</sup> The knowledge areas specified by Hansen (1991, 1068) were economic theory, econometrics, institutions and history, economic literature, economic application and policy issues, and empirical economics. The skill areas (see Hansen, 1991, 1070) were critical judgment, analytics, applications, mathematics, computation, communication and creativity.

curriculum. The survey indicated that there had been little change in the basic focus of doctoral training in the years leading up to the COGEE report as the alumni reported that the programs they had attended a decade earlier provided virtually the same mix of knowledge and skills that were reported by current Ph.D. students. The older Ph.D.s reported, however, that the knowledge and skill sets that were important in their postgraduate careers turned out to be different from those that were emphasized in graduate school. In particular, theory, econometrics, mathematics and computational skills were considerably less important in their careers than they had been in their doctoral programs. Knowledge of policy applications, empirical techniques and communication skills, on the other hand, proved to be much more important. Ph.D.s with academic careers in both graduate and undergraduate departments of economics voiced these impressions, but the mismatch in knowledge and skills was judged to be particularly severe by Ph.D.s who worked outside of academia.

Employers of new Ph.D.s also gave mixed reviews to the knowledge and skill sets that were provided by the traditional doctoral curriculum (Hansen 1991, 1082-3). Both non-academic employers and chairs of graduate and undergraduate departments of economics rated Ph.D. knowledge of economic theory and econometrics high, their command of history and institutions low; and their understanding of policy, application and economic literature somewhere between these extremes.<sup>4</sup> All employer groups also rated the mathematical, analytic and computational skills of the new Ph.D.s the highest, followed closely by their critical judgment. On the other hand, all employers, except liberal arts colleges, gave their lowest rating to the application skills of the new graduates which actually ranked below their ability to communicate and to be creative. In fact, non-academic employers and department chairs at top-tier graduate programs

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<sup>4</sup> Because of low survey response rates from non-academic employers, Hansen (1991, 1083-4) supplemented their survey responses with face-to-face interviews with a smaller sample.

joined in ranking the application skills of new graduates as actually being “less than adequate”. The non-academic employers revealed even broader dissatisfaction with the doctoral curriculum in face-to-face interviews. They generally acknowledged that new Ph.D.s were well-trained in theory, econometrics, mathematics and analytics, but they “urged” that doctoral programs do better jobs preparing students to conduct and communicate about empirical research and providing them with knowledge about real-world applications and data (Hansen, 1991, 1085).

Hansen’s evidence established that graduate faculty, current and past graduate students, and employers of all types held similar views of the strengths and weaknesses of doctoral training in economics. These responses reinforce the generalization Hansen that drew from information he collected from descriptive brochures, course syllabi and comprehensive examinations—doctoral programs in economics were strikingly similar in structure across all departments (Hansen, 1991, 1061-3). This singular approach emphasizes technique over professional knowledge and skills because “graduate programs concentrate their efforts almost exclusively on preparing Ph.D.s for academic, research-oriented jobs” (Hansen, 1991, 1085), Colander (1998, 605) stated the case differently—in his view the traditional doctoral curriculum emphasizes the formal, deductivist tradition of theoretical economics at the expense of the general, inductivist approach that is important in applied work.

This backdrop frames two recommendations made by the COGEE that we focus on throughout this paper. First, the report encouraged departments to differentiate their doctoral programs by providing training that was appropriate for the career paths most frequently pursued by their own graduates (Krueger, 1991, 1051-3). Second, the COGEE identified the core as the logical focal point for curricular innovation and improvement. More specifically, the COGEE suggested that departments take collective responsibility for core courses, emphasize more

application of theory within the core, and connect the core more effectively to field courses (Krueger, 1991, 1043-6). Both recommendations play a central role in the design of the differentiated doctoral program described below.

### *Continued Adherence to the Standard Model*

Nearly a decade after the COGEE report, Colander (1998) characterized the profession's response as "The Sounds of Silence". He was not alone. Siegfried and Stock (1999, 133) found it "peculiar" that there was so little evidence of program differentiation eight years after the COGEE report and Krueger (1999, 156), who chaired the commission, remained "puzzled" by the lack of innovation. Coats (1992, 344), in contrast, had predicted resistance to the implementation of the COGEE's recommendations because the faculty and students most directly involved in doctoral programs were generally satisfied with the traditional curriculum, while dissatisfaction with the approach was concentrated among alumni and employers. Coats (1992, 348) also placed the resistance to change in a broader historical context by noting that Bowen (1953) had some four decades earlier raised concerns about graduate education in economics similar to those raised by the COGEE; Coats took this as evidence that a "narrowly technocratic species of professionalism" had dominated the economics profession and shaped graduate education since at least World War II. On the other hand, Siegfried and Stock (1999, 133) speculated that graduate programs were reluctant to innovate COGEE's recommendations because differentiation represented a poor competitive strategy given the uncertainty and information problems prospective graduate students faced when evaluating their postgraduate career options.

Whatever the cause for the reluctance to change, the traditional doctoral curriculum in economics continues to be widely employed well after the COGEE's report called for greater

program differentiation. Colander (1998, 604) found that some departments outside the elite tier of graduate schools had refocused their doctoral programs on specific, “niche” specializations or on training undergraduate teachers, but he emphasized that many of these were responses to idiosyncratic university-based initiatives and not to the COGEE report.<sup>5</sup> Some five years later Colander (2005) also reported that the research conducted by doctoral students in elite programs was more empirical and relied on more diverse theory than had been the case in the late 1980s. But the change in research focus was not, in his judgment, due to curricular innovation. Instead: “the pedagogical institutional structure has not kept pace with the changing research technologies. My critique of economics now is not about economics, but about pedagogy—specifically the structure of the core in graduate education” (Colander, 2005, 197).

Hansen and Stock (2004) found additional evidence of the profession’s slow response to the concerns raised by COGEE in their replication of Hansen’s (1991) survey of doctoral alumni. In the later study, as in the original, the respondents were asked to compare the importance of the knowledge areas and skills that were emphasized in their Ph.D. programs to those that were required in their careers. This time, however, members of two cohorts were surveyed—those from both the 1996-1997 and 2001-2002 graduating classes. The survey revealed little change in the doctoral curriculum in the decade after the COGEE report. More than 50 percent of both cohorts reported that their programs had placed “too little” emphasis on the application of theory to the real world, and one-third reported that “too little” emphasis had been placed on using theory in empirical applications. The skill gap between doctoral training and professional requirements was also unchanged from 1991—mathematics and computation were more important in graduate school than on the jobs, while the reverse was true for application and

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<sup>5</sup> Colander (1998, 604) discussed seminars on teaching, area studies programs and programs in alternative approaches to economics as examples of program innovation. Krueger (1999, 156) also acknowledged the existence of some narrowly focused “niche” programs.

communications. Moreover, the disparity between the knowledge and skills taught and those subsequently used was, once again, larger for respondents in non-academic professions.<sup>6</sup> In light of these results Stock and Hansen concluded in 2004, as the COGEE had thirteen years earlier, that greater emphasis on applications of economic theory, empirical research and communication skills had to be built into the graduate economics curriculum if it were to better serve the professional aspirations of a diverse student body.

### *The Effects of Adherence to Standard Curriculum*

Between 1977 and 2001 around 700 new, domestically-trained Ph.D. economists entered the U.S. labor market each year; over the same period the number of these new Ph.D.s who were U.S. citizens declined from 550 to around 350 (Siegfried and Stock, 2004, 273-4).<sup>7</sup> To place these trends into perspective note that the number of Ph.D.s awarded to U.S. citizens in all science fields doubled over this period, and more than doubled in other social sciences (Siegfried and Stock, 2006, 1). In stark contrast, the number of U.S. citizens who will begin careers each year as doctoral economists will soon fall to levels not seen since the Eisenhower administration (Siegfried and Stock, 2006, 1).

These trends in the number and composition of new Ph.D. economists were already established at the time of the COGEE report, and several observers predicted that they would continue unless the COGEE's recommendations were taken seriously. Hansen (1991, 1085) and Coats (1992, 348), for example, expressed concern that the demand for new Ph.D.s economists would remain flat in the U.S. so long as the gap existed between the knowledge and skill sets emphasized in doctoral programs and those required for professional careers outside of research-

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<sup>6</sup> Stock and Hansen (2004, 269) reported that slightly more than one-third of the graduates were in non-academic professions in both survey years.

<sup>7</sup> The modest increase in the average annual production of Ph.D. economists in the U.S. over these same three decades was completely attributable to students who accepted employment abroad after graduation—for example, from 119 in 1977 to 244 in 2001 (Siegfried and Stock, 2004, 273).

oriented economics departments<sup>8</sup> They argued that the mismatch increases the on-the-job training costs employers face when hiring economists as applied researchers and policy analysts and, therefore, provides incentives to replace Ph.D. economists with graduates from professional schools of business, public policy and health who are better prepared for these roles.

Other observers expected a continuation in the decline in the number of U.S.-trained undergraduates who completed the Ph.D. in economics—although the forecasts were based on different views of how the trend was connected to the traditional curriculum.<sup>9</sup> Kaspar (1991) examined the interest in graduate education among economics majors at elite liberal arts colleges and concluded that many undergraduates who became interested in economics as a method of examining applied, real-world issues decided not to pursue graduate training in the field because it had become too abstract and technical. Colander (1998, 604), on the other hand, argued that U.S. undergraduates with strong empirical interests and talents are being disproportionately excluded from doctoral programs because admission committees favor mathematical aptitude and training. Hansen (1991, 1081-3) conjectured that the declining number of U.S. undergraduates earning Ph.D.s results from higher attrition after matriculation due to poor preparation. But Finegan, Stock and Siegfried recently found no difference in matriculation behavior, attrition or time-to-degree between U.S. citizens and international students.<sup>10</sup> They conclude, in fact, “that the main source of that decline [in Ph.D.s earned by U.S. citizens] must

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<sup>8</sup> Hansen (1991, 1085) makes the point based on interviews with non-academic employers while Coats (1992, 348) focuses on differences in the focus of graduate training in economics departments and professional schools of business, public policy and health.

<sup>9</sup> The number of U.S. citizens receiving Ph.D.s in economics each year is predicted to fall below 300 by 2009 (Siegfried and Stock, 2006, 1). The decline (from around 550 in the early 1970s) is particularly striking given that the number of undergraduate majors in economics has increased (although sporadically) by 25% over the same period—from 16,674 in 1977 to 24,402 (1987), 17,896 (1996) and 20,377 (2001), (U.S. Department of Education, 2007, Table 43)

<sup>10</sup> See Finegan, Stock and Siegfried (2006) on matriculation; Stock, Finegan and Siegfried (2006) for attrition and Stock and Siegfried (2006) on time-to-degree.

lie earlier in the recruitment process” (Finegan, Stock and Siegfried, 2006, 457).

Doctoral programs in economics in the U.S. have succeeded over the past several decades in training outstanding basic research scientists who make significant contributions to economic theory, econometrics and cutting-edge application of these tools in a variety of fields. In pursuing this mission they have attracted a pool of talent that is increasingly international in composition and who in increasing numbers seek and find postgraduate employment opportunities abroad. Over the same period the numbers of new Ph.D. economists who are absorbed into the domestic labor market each year has remained virtually flat while the production of Ph.D.s from professional schools of business, education, public policy and health has been increasing. If increasing numbers of applied social scientists are to be trained in economics departments, some modifications need to be made to the doctoral curriculum in economics.

### **A Differentiated Ph.D. Curriculum**

Three factors shaped the focus and structure of the differentiated doctoral program in economics as it was developed and implemented at UNC Greensboro between 2002 and 2004. First, the COGEE report provided context and an underlying rationale by calling for the development of doctoral programs that better served specific professional audiences. Second, the Ph.D. was brand new and not a modification of an existing program; as a result, all features of the curriculum, and especially the doctoral core, could be designed from the ground up. Finally, a set of curricular components that was appropriate for the new doctoral program was already being offered at UNC Greensboro in its innovative, professionally-oriented masters’ program in Applied Economics. Taken together these three factors created the opportunity to

build an innovative, narrowly-focused and differentiated Ph.D. program and in this section we describe how it differs from the traditional Ph.D. in economics.

*Narrowly Focused Training.*

The first, and easiest, decision concerning the new doctoral program at UNC Greensboro was the choice of specialized fields that would be offered to students. A key input into any Ph.D. program, and especially a new one, are the faculty who mentor students as they define and develop quality research agendas. The economics department at UNC Greensboro had decided in the mid-1990s to recruit and retain faculty who specialized in empirical microeconomic research in health, labor and public economics. The idea was to assemble a strong core of research faculty who could collectively produce research comparable in quantity and quality to faculty at departments of economics with Ph.D. programs.<sup>11</sup> The research strength of the faculty was already concentrated in empirical labor, health and public economics when the new doctoral was first proposed and so only those only those fields were offered in the new doctoral program.

The COGEE report provides persuasive evidence that the traditional doctoral curriculum in economics is not appropriate for a program with such a narrow focus. Many, if not most, Ph.D.s who specialize in applied microeconomics seek and find attractive career alternatives outside departments of economics—in government agencies, in professional schools of health, education or public policy, or in private research organizations. We have seen above that employers in these sectors express dissatisfaction with the knowledge and skill sets that are emphasized in the traditional economics curriculum and are particularly concerned about the quality of training it provides in applied economic research and real-world policy analysis.

Taking this evidence into account, the economics faculty at UNC Greensboro determined that a

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<sup>11</sup> At the time the differentiated doctoral program was proposed the department of economics at UNC Greensboro was ranked 178th in the world in research according to Kalaitzidakis, Mamuneas and Stengos (2003) with a particularly strong record of funded research in health and labor.

program that offers specialized training in applied microeconomics needed to incorporate significant curricular features that differentiated it from the traditional doctoral curriculum.

*Integration with a Professionally-oriented M.A. Program.*

One source of curricular innovation for the new Ph.D. program was the professionally-oriented M.A. program in Applied Economics that had been operating at UNC Greensboro since 1997.<sup>12</sup> Because the Applied M.A. program was itself shaped by the COGEE report, its complementarities with the new Ph.D. program are not coincidental. Up until the early 1990s the masters' program at UNC Greensboro was a high-quality, traditionally-structured terminal program comprised of a core, elective field course requirements and an independent thesis. By 1994 alumni from this program who did not pursue doctoral training were voicing concerns similar to those identified in the COGEE report—they left the program with excellent technical skills and knowledge but were not adequately prepared for the applied research responsibilities that were important in their postgraduate careers. In response to these observations the M.A. program was redesigned to place greater emphasis on application, professional writing, data management and computational skills—just as the COGEE had recommended for doctoral programs. The curricular mechanism was a four-course sequence in applied research methods: a course in which students learn how theory and econometrics are used in applied microeconomic analysis; a seminar in which students write a substantial, independent literature review; a course in which students learn to compile, manage and manipulate very large and complex datasets; and

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<sup>12</sup> See Y and Z (2007) for a detailed description of the M.A. Applied Economics program at UNC Greensboro and a discussion of its origins. Briefly, its lock-step curriculum combines a core of theory and econometrics in the first semester, courses that emphasize the application of research tools in the second semester, and seminars on advanced data management skills and independent research in the third semester. Overlaying this basic structure are three broader principles: that applications would be integrated into courses wherever useful and practical; that every econometric course (six in all) would have a weekly laboratory component; and that each student would be required to complete a major writing requirement and substantial independent data project.

a seminar in which each student completes a substantial, independent research project. By the time the new doctoral program was first considered, the Applied M.A. program was a proven success as alumni and their employers reported that the curriculum provided high-quality and marketable training in applied research.<sup>13</sup>

Ph.D. economists who supervised graduates from the Applied M.A. program provided feedback that had a particularly important impact on the formulation of the new Ph.D. curriculum. These individuals recognized the quality of the training that was being provided in the applied research methods component of the masters' program, but they also volunteered that similar training would have been a valuable component of their own doctoral training. Based largely on these observations, the applied research methods sequence was incorporated as a curricular requirement in the new Ph.D. program. When asked to review the proposed doctoral program, non-academic employers of Ph.D. economists were particularly impressed with this curricular component:<sup>14</sup>

“The strength of the proposal is the practitioner-oriented emphasis...we look for accomplished students who are well-trained in applied econometric tools and methods. Because the proposed program will emphasize these skills, it will address an important market segment.”

The applied-practitioner orientation of your proposed program makes a lot of sense...Mastering theory or econometric technique is vital, but does not suffice by itself. What is required is sustained exposure to the interplay between observation, broadly defined, and economic reasoning.... Your program strikes me as much more like what many of them will be called upon to do after graduation.”

Students in the doctoral program complete the twelve credit hour research methods sequence within their first three semesters. As a result, they receive training in the entire skill set

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<sup>13</sup> Before designing the Applied M.A. program a survey was given to alumni of the traditional M.A. program that was similar in structure to the one reported by Hansen (1991). The information gathered in this survey was important to its ultimate success.

<sup>14</sup> During the proposal process the design of the new program was reviewed not only by academics but also by representatives from federal government agencies, private research organizations and business.

that is required to perform high-quality, applied economic analysis before they enroll in field courses or undertake dissertation research. The applied research methods sequence, although originally developed for an M.A. program, represents an innovation that specifically addresses key weaknesses that the COGEE identified in the traditional doctoral curriculum.

### *An Innovative and Specialized Doctoral Core*

Most of the specific curricular recommendations made by the COGEE involved changes to the doctoral core. It recommended, in particular, that the core become an integrated departmental “public good” that was connected to field courses by the incorporation of more applications of economic theory and econometrics.(Krueger, 1991, 1043-46). Colander (1998, 606) proposed a more radical modification—that doctoral programs offer separate core sequences to students who specialize in formal theory and those who pursue careers as applied researchers or undergraduate teachers. Regardless of the merits of these specific suggestions, these proposals make clear that the doctoral core should be a focal point for meaningful curricular innovation within graduate economics education.

Against this backdrop the economics faculty at UNC Greensboro designed a three-stage doctoral core that is specifically designed for applied microeconomists.<sup>15</sup> In the first stage the student satisfies a prerequisite—the completion of a masters-level core that includes courses in microeconomic theory, macroeconomic theory and applied and theoretical econometrics. “Masters-level” refers here to calculus-based treatments of theory and econometrics that emphasize application rather than formal proofs and which rely on texts such as Nicholson (microeconomics), Romer (macroeconomics) and Greene (econometrics). Students who enter the

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<sup>15</sup> To implement a multi-stage core sequence students must be required to follow a lockstep curriculum until they enroll in specialized field courses. This innovation makes sense, therefore, only in a program that supports closely related fields of specialization.

differentiated Ph.D. program with bachelor's degrees are required to take the one semester core sequence offered in the Applied M.A. program before beginning their doctoral coursework; this requirement is waived for students who have earned comparable masters' degrees from other institutions.

The second stage of the doctoral core in the differentiated program is similar in structure, rigor and emphasis to core sequences in traditional doctoral programs. It differs from the familiar model, however, in that students take only one course each in microeconomic theory, econometric theory and mathematical economics (including mathematical statistics). Within this one semester sequence students are given a rigorous exposition of the theory of the consumer, firm and markets and the foundations of parametric and non-parametric estimation and inference. One reason that this material can be covered in one semester is that the students have already been exposed to many fundamental concepts in their M.A. core courses. A second reason, of course, is the absence of additional advanced coursework in macroeconomic theory. As a result, the second stage of the doctoral core in the differentiated program is briefer and more selective in focus than the core in a traditionally-structured doctoral program.

The third stage of the doctoral core represents the second important curricular innovation in the differentiated program. After completing the second stage, students take a sequence of four required, half-semester courses in both applied theory and applied econometrics. Each of these courses is designed to treat specific topics that are usually examined separately in both core and field courses within the traditional curriculum—such as information and intertemporal economics, game theory and public goods. The four topics covered in the applied econometrics sequence are limited dependent variables, panel data and duration models, treatment effects and sampling methods. Within the differentiated program the formal

presentation of each topic is combined in the half-semester two credit hour courses with the applications that are most relevant to health, labor and public economists. As a result, application is balanced with formalism and students enter specialized field courses with a clear understanding of how formal theory and econometrics are actually used.

### **The Quality and Viability of a Differentiated Ph.D. Program**

The doctoral program in applied microeconomics at UNC Greensboro is differentiated from the traditional doctoral curriculum by a three-stage doctoral core that is specially designed for applied microeconomists and an innovative four-course sequence that trains students in applied research methods, data management and communication. Both innovations represent significant curricular responses to weaknesses that the COGEE and others have identified in the training that applied research economists receive within the traditional doctoral model of education. Nonetheless, questions will and should remain about the overall quality of training that students will receive in such a program and whether they will be viable.

The quality issue will ultimately be resolved, of course, by the program's track record in placing students and their postgraduate successes. But these outcomes will be determined, in part, by the impact of tradeoffs that have already been built into the differentiated curriculum. The program has been designed to offer training in applied microeconomic theory and specialized field courses that is comparable to the training students receive at the best doctoral programs and training in applied microeconometrics and research methods that is even better. To accomplish these goals students in the differentiated program students receive formal, rigorous training in a relatively narrower range of microeconomic theory and none in

macroeconomic theory.<sup>16</sup> Some will argue that these tradeoffs cannot improve the overall quality of doctoral training even for applied microeconomists, but one of the important lessons of this paper is that explicit tradeoffs like these have to be made to build a differentiated doctoral programs such as the one described here.

Assuming that the curriculum will provide outstanding training, program viability will primarily be determined by success in attracting and retaining outstanding faculty and outstanding students. It turns out thus far that the presence of a differentiated doctoral program has, if anything, provided an advantage in faculty recruitment. There is the obvious impact, of course, of research synergies that are created when building a narrowly-focused research core, but it turns out that outstanding applied microeconomists are also attracted to a program in which the doctoral core clearly supports their areas of specialization and in which they have an opportunity to teach applied theory and econometrics in addition to standard field courses.

A differentiated doctoral program faces much greater challenges recruiting students. Hansen (1991, 1081-1083) makes the point that prospective Ph.D. students face considerable uncertainty concerning their choice of career paths within economics and may not fully understand the different knowledge and skills that will be required in the different areas. Matriculation into a differentiated, specialized program like the one described here would seem to foreclose the flexibility that students naturally value in this situation, but it turns out that the presence of a high-quality, terminal M.A. degree program provides a set of alternative career paths that some students prefer to the career options available in a larger doctoral program. The curricular structure of the two programs at UNC Greensboro provides prospective students with three excellent options after entering the differentiated Ph.D.: 1) to complete the combined

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<sup>16</sup> Students do take a masters' level macroeconomics course and receive doctoral-level training in intertemporal modeling in one of the applied economic theory modules.

M.A./Ph.D. program, 2) to transfer into the three-semester, terminal applied M.A. program after either the first or second semester; or 3) to use the terminal master's program to prepare for a doctoral program that better suits their interests and abilities.<sup>17</sup> The recruiting strategy, therefore, has been to attract outstanding students—and there are many--who have yet to decide whether to pursue a Ph.D. or earn a professionally-oriented, applied masters' degree. Thus far, two-thirds of the Ph.D. students have entered the program through this mechanism.

Besides providing advantages in student recruitment, the integration of the Applied M.A. and Ph.D. program at UNC Greensboro has helped to resolve at least some of the problems that arise in a small-scale graduate program.<sup>18</sup> There is a strong presumption that a department of economics cannot simultaneously maintain a high-quality masters alongside a Ph.D. program. A second important message of this paper is that this conventional wisdom can be turned on its head for the case of a professionally-oriented masters' program and a differentiated, specialized doctoral program. If they are carefully structured and well-integrated programs like these can support and strengthen each other, rather than compete.

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<sup>17</sup> The seamless transition between the two programs also provides the faculty with precise information about the ability and temperament of a student to pursue the doctoral degree. This is used at UNC Greensboro in both recruiting into the doctoral program and advising students out of the program.

<sup>18</sup> These efficiencies include sharing the required research methods course sequence, using doctoral students as graduate assistants in M.A. coursework, and sharing the fixed costs of program administration.

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