

# PROJECT SUMMARY

## 2004 AIR RESEARCH GRANT PROPOSAL

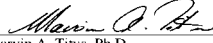
### EXAMINING THE PRIVATE BENEFIT OF GRADUATE EDUCATION: A TWO-STAGE APPROACH

Dataset of interest: Baccalaureate and Beyond 1993/2003

Grant amount requested: \$25,776

**Principal Investigator:**  
Marvin A. Titus, Ph.D.  
Assistant Professor  
North Carolina State University  
ACCE  
300M Poe Hall  
Raleigh, NC 27695-7801  
Phone: 919.515.6290 Fax: 919.515.6305  
E-mail: [marvin\\_titus@ncsu.edu](mailto:marvin_titus@ncsu.edu)

Authorized Institutional Representative:  
Matt Ronning  
Associate Vice Chancellor  
North Carolina State University  
Research Administration/SPARCS  
2230 Stinson Drive  
2 Leazar Hall  
Raleigh, NC 27695-7514  
Phone: 919.513.2148 Fax: 919.515.7721  
E-mail: [matt\\_ronning@ncsu.edu](mailto:matt_ronning@ncsu.edu)

  
Marvin A. Titus, Ph.D.  
Principal Investigator

  
Matt Ronning  
Authorized Institutional Representative  
John L. Chaffee  
Coordinator of Government Agreements  
Sponsored Programs &  
Regulatory Compliance

## 2004 AIR RESEARCH GRANT PROPOSAL

### EXAMINING THE PRIVATE BENEFIT OF GRADUATE EDUCATION: A TWO-STAGE APPROACH

Dataset of interest: Baccalaureate and Beyond 1993/2003

Grant amount requested: \$25,776

**Principal Investigator:**  
Marvin A. Titus, Ph.D.  
Assistant Professor  
North Carolina State University  
ACCE  
300M Poe Hall  
Raleigh, NC 27695-7801  
Phone: 919.515.6290 Fax: 919.515.6305  
E-mail: [marvin\\_titus@ncsu.edu](mailto:marvin_titus@ncsu.edu)

According to the National Center for Education Statistics (NCES), the number of individuals receiving graduate and first professional degrees has dramatically increased over the last decade. Between the years 1990 and 2000, the number of individuals earning master's degrees expanded by 46%, first professional degrees increased by 13%, and doctoral degrees increased by 17% (NCES, 2003). Over the same period, graduate tuition increased by 80% and the marginal return to a master's degree remained the same (NCES, 2003). Due to the growing importance of graduate school attendance, its private cost, and use as an institutional accountability indicator, graduate school attendance outcomes should be examined in detail.

Proposed is the first step in a line of inquiry designed to investigate the relationship between the private benefit of higher education, and the process of student access to college, persistence, degree completion, and graduate school attendance. Using a comprehensive theoretical model, employing a two-stage econometric approach, and utilizing restricted data from the final (2003) follow-up to the NCES-sponsored 1993 Bachelor's and Beyond (B&B:1993/2003) longitudinal survey, this project will examine the private marginal benefit of graduate study by degree type. This project is different from previous research in several ways. First, this study will examine the marginal private benefit of graduate education. Second, this research will draw from cultural, social, and human capital theories to help explain those benefits. Third, this study will address self-selection in graduate school, and the implications of controlling for this process. This study will make an effort to identify the predictors of graduate school attendance and its link to private benefits. This study will also enable campus leaders and higher education policy makers to identify the determinants of graduates' earnings, so as to provide a context for the use of earnings as an indicator of student outcomes and institutional accountability.

## TABLE OF CONTENTS

PROJECT SUMMARY

TABLE OF CONTENTS

PROJECT DESCRIPTION

A. STATEMENT OF PROBLEM.....	1
B. PROPOSAL OF WORK.....	4
Research Design.....	4
Data.....	4
Conceptual Model.....	5
Variables – first stage.....	6
Variables – second stage.....	8
Analysis.....	9
C. DISSEMINATION PLAN.....	10
D. DESCRIPTION OF POLICY RELEVANCE.....	11
E. DISCUSSION OF INNOVATIVE CONCEPTS OF PROJECT.....	12
F. DISCUSSION OF AUDIENCE TO WHOM THE PROJECT WILL BE IMPORTANT.....	13
REFERENCES CITED.....	14
BIOGRAPHICAL SKETCH.....	21
BUDGET AND BUDGET JUSTIFICATION.....	26
CURRENT AND PENDING SUPPORT.....	28
FACILITIES, EQUIPMENT AND OTHER RESOURCES.....	29
SPECIAL INFORMATION AND SUPPLEMENTARY DOCUMENTATION.....	30

## **PROJECT DESCRIPTION**

### **A. STATEMENT OF PROBLEM**

Over the past few years, substantial changes have occurred in post-baccalaureate degree education. According to the National Center for Education Statistics (NCES), between 1990 and 2000, the number of master's degree recipients expanded by 46%, first professional degree recipients rose by 13%, and doctoral degree recipients increased by 17% (NCES, 2003). Over the same period, graduate level tuition increased by 80%, while the observed difference in earnings derived from a master's compared to a bachelor's degree remained largely unchanged (NCES, 2003). Due to the growing importance of graduate school attendance, its private cost, observed benefit, and use as one of several institutional accountability indicators in higher education, graduate school attendance outcomes should be examined in detail using sound conceptual frameworks and sophisticated statistical techniques. Such research is needed to help explain the complex relationship between individual labor market outcomes and decisions with regard to enrolling and persisting in college (St. John, Kline, & Asker, 2001).

Perna (2003) has stated that more research is needed to examine the private marginal benefits of completing advanced degrees. Prior research on the private marginal benefits of an advanced degree is limited for at least two reasons. Firstly, this research has been constrained by a conceptual framework that relied on the human capital theory. This theory posits that individually earned income is largely a function of labor productivity, which is derived from individual investments in education and training (Becker, 1993). Drawing on concepts from the human capital theory, most conventional econometric models examine the private benefits of higher education by assuming that an individual maximizes his/her college-going behavior after comparing the lifetime monetary costs and benefits associated with completing a degree (e.g.,

Fuller, Manski & Wise, 1982; Manski & Wise, 1983; Schwartz, 1985). In conventional econometric models, preferences for and non-economic information about education do not play a role in individual higher education investment decisions (e.g., Mincer, 1974; Willis, 1986; Willis & Rosen, 1979). Manski (1993) and others (Paulsen & St. John; 2000; Perna, 2000; St. John & Asker, 2001) suggest that the explanatory power of econometric models for determining college attendance is improved when non-monetary concepts, such as values about education and access to college-related information, are included.

Second, prior research has been limited in that only one known investigation of the private marginal returns to advanced degrees [a study by Jaeger and Page (1996)] ignored variables associated with the probability of an individual's decision to attend graduate school. Studies of the private benefits of completing college, that do not take in account an individual's propensity to attend college, otherwise known as self-selection, may produce biased estimates (Heckman, 1979; Willis & Rosen, 1979). Although self-selection has been addressed extensively in economics (e.g., Amemiya, 1985; Garen, 1984; Heckman, 1979; Heckman & Sedlecek, 1985; Maddala, 1983; McMillen, 1995; Olsen, 1980; Willis & Rosen, 1979), it has been ignored in higher education literature, according to DesJardins (2002). DesJardins also contends that in order to achieve greater precision with respect to the impact of college on individuals, researchers need to address self-selection bias in studies of higher education.

There are essentially two types of selection bias. The first type of selection bias occurs when information on the dependent variable for a proportion of the respondents is missing. For example, if a study was conducted to estimate the influence of a college education on the income of minorities, the study may find that fewer minorities are employed and hence will have no income to report. Under these circumstances, using ordinary least square (OLS) regression

techniques to explore the relationship between income and education, may lead to biased estimates of the effect of education on minority income.

Another type of the selection bias occurs when information on the dependent variable is available for all respondents and those respondents are non-randomly distributed over categories of the independent variable of interest. For example, using a random sample of the population for which data on the income and educational level of individuals is known, a study may be able to explore the effect of an advanced college degree on income. Because the distribution of respondents over the categories of education is nonrandom, the use of OLS regression techniques to examine the association between income and educational level may result in bias estimates of the parameters reflecting college education. Bias estimates result because individuals who choose to attend graduate school may have different measured and unmeasured characteristics from individuals who choose not to attend graduate school. If these characteristics are related to income, the OLS regression coefficient estimates of the variables measuring different levels of education may also reflect the effect of these measured and unmeasured characteristics. This second type of selection bias is sometimes called heterogeneity bias. In an effort to identify heterogeneity bias, researchers can use a procedure that involves a two-stage process. In the first stage, a “selection” equation is utilized to determine the process of selection. In the second stage, a “substantive” equation is employed to determine the relationship between the dependent variable (e.g., income) and the primary independent variable (e.g., educational level). If correlation between the error terms of the two equations exists, the selection process should be taken into account before estimating the substantive equation (Heinrich, 1998). When estimating the outcome from the substantive equation, only some of the variables that are included in the selection equation are included in the substantive equation (Copas & Li, 1997).

## **B. PROPOSAL OF WORK**

### Research Design

This research will be unique in that it will take self-selection into account, and extend the conventional econometric model for examining the private return to a master's degree by including concepts from cultural and social capital theories. This study will use the final follow-up (2003) to the 1993 Bachelor's and Beyond (B&B:1993/2003) survey to address the following research questions:

1. Do variables, measuring cultural and social capital predict whether individuals attend graduate school? In other words, what variables reflecting cultural and social capital help to explain self-selection?
2. After taking into account self-selection, what is the private marginal return to an advanced degree, by degree type?

### Data

This study will use data from the third (2003) follow-up to the 1993 Bachelor's and Beyond (B&B:1993/2003) longitudinal survey, a restricted national database sponsored by National Center for Education Statistics (NCES). The B&B:1993/2003 survey will include data for individuals who received their bachelor's degree during the 1992-93 academic year. For the base year, data were collected as part of another NCES survey, the 1993 National Postsecondary Student Aid Survey (NPSAS:93). The second follow-up (1997) to the 1993 B&B (B&B:93/97) included data for 9,274 individuals, or 83% of the students in the base year sample, who responded to all three surveys (McCormick, Nuñez, Shah, & Choy, 1999). Because at least 70% of all graduate and professional students enroll in a post-baccalaureate program six or more years

after earning their bachelor's degree (Choy & Moskovitz, 1998), this study will use data from the final follow-up (2003) to the 1993 B&B (B&B:1993/2003).

### Conceptual Model

This study uses a comprehensive conceptual model that incorporates rationale from cultural, social, and human capital theories to examine the private benefits of graduate education. In an effort to further explain the factors that affect college enrollment decisions, higher education researchers (e.g., Perna, 2000, in press; Perna & Titus, in press-a,b) have utilized expanded econometric models that incorporate concepts from cultural and social capital theories. With underpinnings in sociology, cultural capital theories (Bourdieu, 1986; Bourdieu & Passeron, 1977) posit that class-based preferences, tastes, values or “habitus” are derived from parents and other individuals, while social capital theories (Coleman, 1988; Lin, 2001; Portes, 1988) hypothesize that social networks and institutions provide access to information. Using multilevel multinomial modeling techniques and nationally representative data, Perna and Titus (in press- a) demonstrate that measures of social capital help to further explain individual college-going decisions among high school graduates. Utilizing national panel data, Perna (in press) demonstrates that graduate school attendance is influenced by cultural and social capital, in addition to human capital.

Human capital theory (Becker, 1993) posits that individual earned income is largely a function of labor productivity, derived from individual investments in education and training. Drawing on concepts from human capital theory, most conventional econometric models examine the private benefits to higher education by assuming that an individual maximizes his/her college-going behavior after comparing the lifetime monetary costs and benefits



associated with completing college (e.g., Fuller, Manski & Wise, 1982; Manski & Wise, 1983; Schwartz, 1985). In conventional econometric models, preferences for and non-economic information about education do not play a role in individual higher education investment decisions (e.g., Mincer, 1974; Willis, 1986; Willis & Rosen, 1979). Manski (1993) and other researchers (Paulsen & St. John; 2000; Perna, 2000; St. John & Asker, 2001) suggest that the explanatory power of econometric models for determining college attendance is improved when such non-monetary concepts as values about education and access to college-related information are included. In addition to drawing from human capital theory, this study will use concepts from cultural and social theories to examine the private benefit of graduate school attendance.

#### Variables - First Stage

Because a two-stage econometric technique will be employed to address research questions, there will be two sets of dependent variables. In the first stage of the analyses, the dependent variable will measure the highest graduate degree program in which a bachelor's degree recipient enrolled or earned a degree by 2003. The dependent variable will be whether or not an individual enrolled or graduated from a graduate program (i.e., masters, doctoral first, professional) ten years after earning a bachelor's degree.

In the first stage of the analyses, the independent variables will include several measures of cultural and social capital. Based on the work of Perna (in press), measures of cultural capital will reflect an individual's preferences and tastes for graduate education. The two measures of cultural capital are: 1) parental educational attainment, and 2) whether the language that is most often spoken in the home is English (yes or no). Perna (in press) demonstrates that enrollment in

a master's program is positively related to parental educational attainment and whether English is most often spoken at home.

In this study, exploratory factor analysis will be used to construct several composite measures of the value that bachelor's degree recipients place on graduate education. Social capital will be measured by variables reflecting parental involvement in graduate education, and the extent to which social networks that promote graduate enrollment exist. Parental involvement will be measured by the total monetary contribution that individuals received from their parents for their undergraduate education. Similar to Perna's (in press) study, this research project will measure social networks by such characteristics of the bachelor's degree-granting institution as selectivity. Several studies (Dolan et al., 1985; Eide & Waehrer, 1998; Millet, 2003; Perna, in press; Schapiro et al., 1991; Wolf-Wendel et al., 2000) have shown that graduate school attendance is related to the institutional selectivity of the bachelor degree-granting institution. Selectivity will be measured by average SAT scores of the freshmen class at the bachelor's degree-granting institution.

Studies by Lang (1984) and Perna (in press) have shown that gender influences graduate school attendance. Research has also shown that there is relationship between graduate enrollment and race/ethnicity (e.g., King & Chepyator-Thomas, 1996; Lango, 1995; Monks, 2000). A series of dichotomous variables reflecting gender (male as the reference group) and a race/ethnicity (white as the reference group) will be utilized in this project.

In addition to demographic variables, financial resources may influence an individual's decision to enroll in graduate school (Ehrenberg, 1991; McCormick, Nuñez, Shah, & Choy, 1999). Research on the effects of debt on graduate school attendance, however, is mixed (Eide, Brewer, & Ehrenberg, 1998; Fox, 1992; Millett, 2003; Monks, 2001; Schapiro et al., 1991;

Weiler, 1994). In this study, accumulated debt and parents' income will be used as measures of financial resources.

Several studies have also demonstrated that graduate school attendance is influenced by undergraduate performance (Eide & Waehrer, 1998; Monks, 2000; Perna, in press, Sax, 2001; Schapiro et al., 1991; Temple & Polk, 1986). In this study, undergraduate grade point average will be used as a measure of undergraduate academic performance.

Following Perna's recommendation (in press), expected costs will be measured by variables which reflect the following: starting salaries for bachelor's degree recipients by major who are employed rather than those enrolled in graduate or first professional school; and time to bachelor's degree completion. Research by Perna (in press) suggests that the probability of enrolling in master's program (or first professional school) is negatively related to forgone income and the time to earn a bachelor's degree.

### Variables – Second Stage

In the second stage of the analyses, the dependent variable will be continuous and defined as the natural log of annual earnings. Based on human capital theory, the independent variables will reflect how the labor market rewards productive attributes like education and work experience (Mincer, 1974). The independent variables will include selection control factors (derived in the first stage of the analyses), areas of graduate study, labor market conditions, labor force experiences, and such control variables as gender and race/ethnicity.

In the second stage of the analysis, a series of dichotomous variables will reflect the area of graduate study (e.g., business education, biological sciences, physical sciences, etc.). The labor

market conditions will be reflected by the state unemployment rate. Variables reflecting labor force experiences will include work force experience, job tenure, and industry employed. Because prior research (e.g., Cooper & Cohn; 1997; Monks, 2000; Perna, 2003) on the returns to higher education also included gender, race/ethnicity and family income as predictors of earnings, this study will include those variables.

### Analysis

In the first stage of the analysis, “selection” or discrete choice models will incorporate measures of cultural and social capital to address the first research question. As suggested by Hilmer (2001), several measures of self-selection will be derived from discrete choice models via probit and logit analysis. The probit models will be used to derive measures of self-selection, as described above.

Utilizing the probit models, this study will identify the predictors of graduate school and first professional school attendance for each type of degree (i.e. masters, first professional, doctoral). Using these predictors, the residuals of the probit analysis will be used to construct a selection bias control factor, the Inverse Mills ratio (IMR) (Heckman, 1979). The IMR reflects the effects of unmeasured individual characteristics that are related to income. The IMR is also based on the assumption that the expected error for each observation follows a bivariate normal distribution. Because this assumption may not always hold (Greene, 1993), logit models will also be used to generate propensity scores (Rosenbaum, 2002). Used to reduce bias and increase precision, a propensity score is the logit-generated estimated probability of attending graduate school or earning a graduate degree conditional on individual predictor values. When using a

logit model to generate propensity scores, assumptions of normality in the distribution the expected error for each observation need not hold (Rosenbaum, 2002).

The second research question will be addressed in the second stage of the analysis. The “substantive” or Mincerian (Mincer, 1974) earnings equations with IMRs will be estimated via weighted least squares (WLS) regression and OLS regression models. According to Green (1993), OLS regression models with IMRs will produce error terms that are not the same for all observations and therefore result in bias parameter estimates. Consequently, the variance-covariance matrices of OLS regression models of the earnings equation will be adjusted to obtain consistent estimates of standard errors (Greene, 1993). Adjusted standard errors will be transformed to weights, which will be used in the WLS regression models.

The WLS regression models will include IMRs, derived from probit models in the first stage of the analysis. Because it will reflect the effect of all the unmeasured characteristics related to the graduate school attendance decision, the parameter estimate of the IMR coefficient will also reflect part of the effect of those characteristics which is related to income. The results of the Mincerian (Mincer, 1974) earnings equations estimated, via WLS regression techniques, will be compared to the results of Mincerian earnings equations estimated, via OLS regression techniques, with and without the logit-generated propensity score. STATA, a statistical software program, will be used to analyze the data.

### **C. DISSEMINATION PLAN**

The results of this research project will be presented at the 2005 national conferences of the Association for Institutional Research (AIR) and the Association for the Study of Higher Education (ASHE). The results of this study will also be discussed in manuscripts that will be

prepared for publication and submitted to such scholarly journals as *Research in Higher Education*, *The Review of Higher Education*, *The Journal of Higher Education*, *Economics of Education Review*, and *Sociology of Education Review*. The results of this research will be made available to institutional researchers, higher education policy analysts, college and university administrators, and faculty. It is expected that the results from this research project will appear in publication by the end of 2006.

#### **D. DESCRIPTION OF POLICY RELEVANCE**

St. John and colleagues (2001) contend that research is needed to inform national- and state-level policy debates on institutional accountability, which have become more employment outcomes-oriented and focused on the enhancement of human capital. Using the B&B:1993/2003, a comprehensive theoretical framework, and a two-stage econometric technique, this study will allow for the analysis of issues related to graduate school access, choice, and employment-related outcomes. Because institutions are increasingly being asked to provide accountability indicators reflecting graduate school outcomes, this research will inform campus leaders and higher education policy makers with regard to the predictors of the marginal private benefit of an advanced degree. St. John and colleagues argue there is a need to explain how tax revenues, via the earnings of individuals, are influenced by college student access, persistence, and outcomes. Given the increased use of graduate student employment-oriented outcomes as institutional accountability indicators, an extension of the argument by St. John and colleagues to identifying the link between graduate school attendance and graduate school outcomes, including earnings, is in order. Using a two-stage approach to examine the private

benefits of advanced degrees, this research will inform discussions around the issues of graduate school attendance and graduate school employment-related outcomes such as earnings.

## **E. DISCUSSION OF INNOVATIVE CONCEPTS OF PROJECT**

This project is different from previous research on the private benefits of graduate education in several ways. First, this study will examine the marginal private benefit of graduate education. Most studies of the private benefits of college focus on undergraduate enrollment and degrees.

Second, this research will draw from cultural, social, and human capital theories to help explain the private benefits of graduate education. Unlike previous research, which has only utilized human capital theory as a conceptual framework, this study will provide a comprehensive conceptual framework that is also drawn from cultural and social capital theories to examine the private benefit of advanced degrees.

Third, this study uses a two-stage approach to examine the private benefit of graduate school attendance. This approach will allow for an investigation of the association between the decision to attend graduate school and the private benefit of attending graduate school. In other words, this study will address self-selection into graduate school and the implications of controlling for the self-selection process on the results of research examining the private benefit of graduate school attendance. This study will also provide alternative ways of controlling for self-selection when examining the private returns to graduate school.

## **F. DISCUSSION OF AUDIENCE TO WHOM THE PROJECT WILL BE IMPORTANT**

The return to graduate education is important to higher education analysts, institutional researchers, and higher education policy makers. Analysts are interested examining the private returns to graduate education and comparing those returns to the private costs of graduate education. Given the increasing use of graduate student employment-related outcomes as institutional accountability indicators, institutional researchers are interested in the determinants of graduates' earnings so as to provide a context for the use of earnings as an indicator of student outcomes and institutional accountability. Higher education policy makers are also interested in issues around graduate school access and graduate student employment-related outcomes such as earnings.



## REFERENCES CITED

- Amemiya, T. (1985). *Advanced econometrics*. Cambridge: Harvard University Press.
- Becker, G.S. (1993). *Human capital: A theoretical and empirical analysis with special reference to education*. (3<sup>rd</sup> Edition). Chicago: University of Chicago Press.
- Bourdieu, P. (1986). The forms of capital. In J. G. Richardson (Ed.), *Handbook of theory and research for the sociology of education*. (pp. 241-258). New York: Greenwood Press.
- Bourdieu, P., & Passeron, J. C. (1977). *Reproduction in education, society, and culture*. Beverly Hills, CA: Sage Publications.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94(Supplement), 95-120.
- Cooper, S. T., and Cohn, E. (1997). Internal rates of return to college education in the United States by sex and race. *Journal of Education Finance* 23: 101–133.
- Copas, B. J. & Li, H. G. (1997). Inference from non-random samples (with discussion). *Journal of the Royal Statistical Society Series B*, 59, 55-95.
- Choy, S.P., & Moskowitz, R. (1998). *Graduate and first-professional students: National Postsecondary Student Aid Study (NCES 98-139)*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Christal, M. (1998). *State survey on performance measures: 1996-1997*. Denver: State Higher Education Executive Officers.
- DesJardins, S. L. (2002). Adding a timing light to the “Tool Box”. *Research in Higher Education*, 43(1), 83-114.
- Dolan, R. C., Jung, C. R., & Schmidt, R. M. (1985). Evaluating educational inputs in undergraduate education, *Review of Economics and Statistics*, 67(3), 514-520.

- Ehrenberg, R. G. (1991). Academic labor supply. In C. T. Clotfelter, R. G. Ehrenberg, M. Getz, & J. J. Siegfried (Eds.), *Economic challenges in higher education* (pp. 143-260). Chicago: University of Chicago Press.
- Eide, E., Brewer, D. J., & Ehrenberg, R. G. (1998). Does it pay to attend an elite private college? Evidence on the effects of undergraduate college quality on graduate school attendance. *Economics of Education Review*, 17(4), 371-376.
- Eide, E. & Waehrer, G. (1998). The role of the option value of college attendance in college major choice. *Economics of Education Review*, 17(1), 73-82.
- Fox, M. (1992). Student debt and enrollment in graduate and professional school. *Applied Economics*, 24, 669-677.
- Fuller, W. C., Manski, C. F., & Wise, D. A. (1982). New evidence on the economic determinants of postsecondary schooling choices. *Journal of Human Resources*, 17, 477-498.
- Garen, J. E. (1984). The returns to schooling: A selectivity bias approach with a continuous choice variable. *Econometrica*, 52, 1199-1217.
- Greene, W. H. (1981). Sample selection bias as a specification error. *Econometrica*, 47, 153-161.
- Heckman, J. J. (1976). The common structure of statistical models of truncation, sample selection and limited dependent variables and a simple estimator of such models. *Annals of Economic and Social Measurement*, 5, 475-92.
- Heckman, J. (1979). Sample selection bias as a specification error. *Econometrica*, 51, 507-513.
- Heckman, J. J. & Sedlecek, G. (1990). Self-selection and the distribution of hourly wages. *Journal of Labor Economics*, 8, S329-S363.

- Heckman, J., Ichimura, H., & Todd, P. (1997). Matching as an econometric evaluation estimator: Evidence from evaluating a job training programme. *Review of Economic Studies*, 64, 605-654.
- Heinrich, C. J. (1998). Returns to education and training for the highly disadvantaged: What does it take to make an impact? *Evaluation Review*, 22(5): 637-667.
- Hilmer, M.J. (2001). A comparison of alternative specifications of the college attendance equation with an extension to two-stage selectivity-correction models. *Economics of Education Review*, 20, 263-278.
- Jaeger, D.A. & Page, M.E. (1996). Degrees matter: New evidence on the sheepskin effects in the returns to education. *The Review of Economics and Statistics*, 78, 733-740.
- King, S. E., & Chepyator-Thomson, J. R. (1996). Factors affecting the enrollment and persistence of African-American doctoral students. *Physical Educator*, 53, 170-180.
- Lango, D. R. (1995). Mexican American female enrollment in graduate programs: A study of the characteristics that may predict success. *Hispanic Journal of Behavioral Sciences*, 17, 33-48.
- Lin, N. (2001). Building a network theory of social capital. In N. Lin & K. Cook, & R. S. Burt. (Eds.), *Social capital: Theory and research* (pp. 3-29). New York: Aldine De Gruyter.
- Maddala, G. S. (1983). *Limited-dependent and qualitative variables in econometrics*. Cambridge: Harvard University Press.
- Manski, C.F. (1993). Adolescent econometricians: How do youth infer the returns to schooling? In C.T. Clotfelter & M. Rothschild (Eds.), *Studies of supply and demand in higher education*. Chicago: University of Chicago Press.

- Manski, C. F., & Wise, D. A. (1983). *College choice in America*. Cambridge: Harvard University Press.
- McCormick, A.C., Nuñez, A.M., Shah, V., & Choy, S.P. (1999). *Life after college: A descriptive summary of 1992-93 bachelor's degree recipients in 1997*. Washington, DC: Office of Educational Research and Improvement (NCES 1999-155).
- McMillen, D. P. (1985). Selection bias in spatial econometric models. *Journal of Regional Science*, 35:417-436.
- Millet, C. M. (2003). How undergraduate loan debt affects application and enrollment in graduate or first professional school. *The Journal of Higher Education*, 74: 386-427
- Mincer, J. (1974). *Schooling, experience, and earnings*. Brookfield, VT: Ashgate Publishing Company.
- Monks, J. (2000). The returns to individual and college characteristics. *Economics of Education Review*, 19: 279–289.
- Monks, J. (2001). Loan burdens and educational outcomes. *Economics of Education Review*, 20, 545-550.
- National Center for Education Statistics. (2003). *The digest of education statistics 2002*. Washington, DC: U.S. Department of Education.
- Olsen, J. R. (1980). A least squares correction for selectivity bias. *Econometrica*, 48, 1815-1820.
- Paulsen, M. B., & St. John, E. P. (2002). Social class and college costs: Examining the financial nexus between college choice and persistence. *The Journal of Higher Education*, 73, 189-236.
- Perna, L.W. (2000). Differences in the decision to attend college among African Americans, Hispanics, and whites. *The Journal of Higher Education*, 71(2), 117-141.

- Perna, L. W. (2003). The private benefits of higher education: An examination of the earnings premium. *Research in Higher Education, 44*(4), 451-472.
- Perna, L.W. (in press) Understanding the decision to enroll in graduate school: Sex and racial/ethnic group differences. *The Journal of Higher Education*.
- Perna, L.W., & Titus, M.A. (2002, June). *Understanding the barriers to college access for low income students: The role of state context*. Paper presented at the 19th annual NASSGAP/NCHELP Financial Aid Research Conference, Denver, CO.
- Perna, L.W., & Titus, M.A. (in press-a). The relationship between parental involvement as social capital and college enrollment: An examination of racial/ethnic group differences. *The Journal of Higher Education*.
- Perna, L.W., & Titus, M.A. (in press-b). Understanding differences in the choice of college attended: The role of state public policies. *The Review of Higher Education*.
- Portes, A. (1998). Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology, 24*, 1-24.
- Rosenbaum, P. (2002). *Observational studies*. New York: Springer.
- Sax, L. J. (2001). Undergraduate science majors: Gender differences in who goes to graduate school. *Review of Higher Education, 24*(2), 153-172.
- Schapiro, M. O., O'Malley, M. P., & Litten, L. H. (1991). Progression to graduate school from the "elite" colleges and universities. *Economics of Education Review, 10*(3), 227-244.
- Schwartz, J. B. (1985). Student financial aid and the college enrollment decision: The effects of public and private grants and interest subsidies. *Economics of Education Review, 4*, 129-144.

- St. John, E. P., & Asker, E. H. (2001). The role of finances in student choice: A review of theory and research. In M. B. Paulsen & J. C. Smart (Eds.), *The finance of higher education: Theory, research, policy, and practice*. (pp. 419-438). New York: Agathon Press.
- St. John, E. P., Kline, K. A., & Asker, E. H. (2001). The call for public accountability: Rethinking the linkages to student outcomes. In D. E. Heller (Ed.), *The states and public higher education policy: Affordability, access, and accountability*. (pp. 219-242). Baltimore, Maryland: The John Hopkins University Press.
- St. John, E. P. & Paulsen, M. B. (1996). The nexus between college choice and persistence. *Research in Higher Education*, 37, 175-220.
- Temple, M., & Polk, K. (1986). A dynamic analysis of educational attainment. *Sociology of Education*, 59(2), 79-84.
- Titus, M. A. (2003a). *An examination of the influence of institutional context on student persistence at four-year colleges and universities: A multilevel approach*. Manuscript submitted for publication.
- Titus, M. A. (2003b). *No college student left behind: Understanding the influence of financial aspects of the state higher education policy context on college completion*. A paper accepted for presentation at the 2004 annual meeting of the American Educational Research Association, San Diego, CA.
- Titus, M. A. (2004). *Understanding the influence of the financial context of institutions on student persistence at four-year colleges and universities*. Manuscript submitted for publication.

- Weiler, W. C. (1994). Expectations, undergraduate debt and the decision to attend graduate school: A simultaneous model of student choice. *Economics of Education Review*, 13(1), 29-41.
- Willis, R. J. (1986): Wage determinants: A survey and reinterpretation of human capital earnings functions. In O. Ashenfelter & R. Layard (Eds.) *Handbook of labor economics*. New York: Elsevier Science Pub. Co.
- Willis, R. J. & Rosen, S. (1979). Education and self-selection. *Journal of Political Economy*, 87(5): part 2, S7-S36.
- Wolf-Wendel, L. E., Baker, B. D., & Morphew, C. C. (2000). Dollars and sense: Institutional resources and the baccalaureate origins of women doctorates. *Journal of Higher Education*, 71(2), 165-186.

## **BIOGRAPHICAL SKETCH**

I am an assistant professor of higher education in the Department of Adult and Community Education at North Carolina State University (NCSU). Prior to joining NCSU, I worked in various positions at the University System of Maryland (USM) Office. My most recent position at the USM Office was a coordinator of policy research and analysis. I also did consulting work for the National Center for Education Statistics (NCES) in Washington, DC and the Labor Department in the U.S. Virgin Islands. I have extensive experience analyzing data from such NCES datasets as the Bachelor's and Beyond (B&B) study, Beginning Postsecondary Students (BPS) study, Integrated Postsecondary Education Data System (IPEDS) survey, National Education Longitudinal (NELS) study, and the National Postsecondary Student Aid Study (NPSAS).

I earned my Ph.D. in higher education policy, planning, and administration from the University of Maryland. Prior to earning my doctorate, I earned a master's in economics from the University of Wisconsin –Milwaukee, after receiving a bachelor's in economics and history from York College of the City University of New York. In 2001, I received a grant from the Maryland Association for Institutional Research to complete my dissertation research. In 2003, I received the Outstanding Dissertation Award (co-winner) from the Department of Education Policy and Leadership at the University of Maryland. Using data from the BPS and multilevel modeling, my dissertation examined the influence of the institutional context on student persistence at four-year colleges and universities. My research interests include investigating the influence of economic and social factors on college access, persistence, and outcomes.

I have made numerous presentations of scholarly papers at national annual conferences of the American Educational Research Association (AERA), Association for the Study of Higher



Education (ASHE), and Association for Institutional Research (AIR). Together with Dr. Laura Perna at the University of Maryland, I have conducted research on college access. The results of that research are forthcoming in *The Journal of Higher Education* and *The Review of Higher Education*.

Recently, I submitted manuscripts, on college persistence, to scholarly journals. In the future, I plan to use multi-equation and multilevel modeling techniques (e.g., multilevel two-stage models, multilevel event-history models) to examine the influence of college choice and the persistence process on employment-related student outcomes.

## Brief Curriculum Vita

---

### ACADEMIC TRAINING

Ph.D. Education Policy, Planning & Administration	University of Maryland, College Park
M.A. Economics	University of Wisconsin at Milwaukee
B.A. Economics & History	York College of the City University of New York

### PROFESSIONAL EXPERIENCE

8/2003 – present	<b>Assistant Professor of Higher Education Department of Adult and Community College Education North Carolina State University, Raleigh, NC</b>
2000 – 6/ 2003	Coordinator of Policy Research & Analysis, Office of Administration & Finance
1991 - 2000	Policy and Planning Information Specialist, Office of Academic Affairs
1989 - 1991	Planning Analyst, Office of Policy and Planning University System of Maryland Office, Adelphi, MD
1987- 1989	Institutional Research Analyst Office of Institutional Planning and Research George Mason University, Fairfax, VA
1985 - 1987	Adjunct Lecturer, Economics University of the Virgin Islands, St. Thomas, U.S. Virgin Islands

### RESEARCH AND SCHOLARLY ACTIVITIES

#### Publications

*Journal Articles* (\* indicates refereed manuscript, +indicates invited manuscript)

\*Perna, L.W., & Titus, M. (in press) Understanding differences in the choice of college attended: The role of state public policies. *Review of Higher Education*.

\*Perna, L.W., & Titus, M. (in press) The relationship between parental involvement as social capital and college enrollment: An examination of racial/ethnic group differences. *Journal of Higher Education*

\*Perna, L., Steele, P., Woda, S., Hibbert, T., and Titus, M. (2003). An Exploration of the relationship between state public policies and college enrollment in the state of Maryland. Manuscript submitted for publication

Titus, M. (2003). Examining the influence of institutional context on persistence at four-year colleges and universities: A multilevel approach. Manuscript submitted for publication

Titus, M. A. (2004). Understanding the influence of the financial context of institutions on student persistence at four-year colleges and universities. Manuscript submitted for publication

**Selected conference presentations (\*indicates refereed, +indicates unrefereed)**

\*Titus, M.A. (2004, May/June). An examination of the short-term private benefit of master's degree: A two-stage approach. A paper accepted for presentation at the annual meeting of the Association for Institutional Research in Boston, MA.

\*Titus, M.A. (2004, April). No college student left behind: Understanding the state higher education policy context on college completion A paper accepted for presentation at the annual meeting of the American Educational Research Association, San Diego, CA

\*Titus, M.A. (2003, November). Understanding the influence of the financial context of institutions on college persistence student persistence at four year colleges and universities A paper presented at the annual conference of the Association for the Study of Higher Education Research, Portland, OR.

\*Perna, L., Steele, P., Woda, S., Hibbert, T., and Titus, M. (2003, May). An Exploration of the relationship between state public policies and college enrollment in the state of Maryland. A presented at the 20th annual NASSGAP/NCHELP Financial Aid Research Conference, Annapolis, MD.

\*Titus, M.A. (2003, April). An examination of the influence of institutional context on persistence at four-year colleges and universities: A multilevel approach. A paper accepted for presentation at the annual conference of the American Educational Research Association, Chicago, IL.

\*Perna, L.W. & Titus, M.A. (2002, November). Understanding the differences in the choice of college attended: The role of state context. A paper presented with Laura Perna at the ASHE Forum on Public Policy in Higher Education at the annual conference of the Association for the Study of Higher Education, Sacramento, CA.

+Titus, M.A. (2002, October). An analysis of college student persistence using empirical Bayes estimates and hierarchical generalized linear modeling. A presentation at the 16th Annual Conference of the Maryland Association for Institutional Research, Towson, MD

\*Perna, L.W. & Titus, M.A. (2002, June). Understanding the barriers to college access for students with low family income and low socioeconomic status: The role of state context. Paper presented at the 19th annual NASSGAP/NCHELP Financial Aid Research Conference, Denver, CO.

- \*Williford, L.E., Nadasen, D.D., & Titus, M.A. (2002, June). Employer follow-up surveys: A comparison of two multi-institutional university systems A paper presented with Denise Nadasen and Lynn Williford at the 42nd Annual Forum of the Association for Institutional Research, Toronto, Canada.
- \*Perna, L.W. & Titus, M.A. (2001, November). The role of social capital in understanding racial/ethnic group differences in the realization of educational plans. A paper presented with Laura Perna as part of a symposium entitled, "Parental Guidance Suggested: Family Involvement in College Preparation Programs," at the annual conference of the Association for the Study of Higher Education, Richmond, VA.
- \*Titus, M.A. (2000, May). The financing of success in higher education: Student aid expectations, and the persistence of first-time full-time freshmen. A paper presented at the 40th Annual Forum of the Association for Institutional Research, Cincinnati, OH.

### **FELLOWSHIPS AND AWARDS**

Outstanding Dissertation of the Year Award (co-winner), University of Maryland, Department of Education Policy and Leadership, 2003

Maryland Association for Institutional Research Dissertation Grant, 2002

ASHE Graduate Student Seminar on Higher Education Policy, Selected participant, November 2001.

Advanced Opportunity Program Fellowship, University of Wisconsin at Milwaukee, 1981-82.

Phi Alpha Theta International Honor in History, York College of the City University of New York, 1979.

Top History Major, York College of the City University of New York, 1979.

### **PROFESSIONAL ASSOCIATION MEMBERSHIPS**

American Educational Research Association  
 Association for Institutional Research  
 Association for the Study of Higher Education

## BUDGET AND BUDGET JUSTIFICATION

### Budget

---

#### Senior Personnel

PI Titus (2 months summer salary) 12,889

#### Other Personnel

Hourly Graduate Students (\$20/hr x 10 hrs/week x 28 weeks ) 5,600

#### Fringe Benefits

Faculty (23%) 2,964

Graduate Student hourly rate (8.45%) 473

#### Travel

To attend mandatory AIR conference 1,800

Conference attendance for dissemination of results 1,800

#### Other Direct Costs

Publication Costs/Documentation/Dissemination & Research Supplies 250

**Total Direct Costs (A through G) 25,776**

---

**Total Direct 25,776**

## **Budget Justification**

**Salaried Personnel.** Dr. Titus will serve as the Principal Investigator for the proposed research project. In this 1-year study, Dr. Titus will commit 2 months in Summer 2004 to this research project. Salary projections for the Principal Investigator shown in the proposed budget adhere to the salary schedule in the College of Education at North Carolina State University. Based on the current rate of pay of the Principal Investigator, the salary needed to compensate 2 months equals \$12,889. Fringe benefits and health insurance total \$2,964 for the Principal Investigator.

**Graduate Student Research Assistant.** One graduate student research assistant will be assigned to the project to facilitate the completion of the research project. The graduate student research assistant's salary is based on current annual salaries at North Carolina State University. Given the rate of pay and the number of months during the 1-year period the amount requested to cover the cost of one graduate student research assistant equals \$5,600. Fringe benefits and health insurance total \$473 for the graduate student hourly during the 1-year period.

**Travel.** Travel expenditures are requested in the amount of \$3,600 (estimated from prior experience) to cover the costs of presenting the findings of this study at two national conferences.

**Postage Costs/Supplies/Library Costs/Duplication Costs.** To accomplish the objectives of the study, the researcher will photocopy relevant library materials and other research-based information to gain additional perspectives and complete the proposed research study. Other research supplies (e.g., research reports, books, monographs, information resources, reprints, computer disks, etc.) will also be needed to complete and disseminate the proposed research study (\$250, estimated from prior experience).

## **CURRENT AND PENDING SUPPORT**

### **Current**

There is no current support for this or related projects.

### **Pending**

Marvin A. Titus is the Principal Investigator for a research proposal submitted to the College of Education at North Carolina State University in the amount of \$3,947 to conduct a quantitative study on the short-term private benefit of a master's degree by area of study using data from the B&B:93/97 survey.

## **FACILITIES, EQUIPMENT AND OTHER RESOURCES**

In addition to Dr. Titus' office computer, North Carolina State University (NCSU) will provide an additional stand-alone personal computer for analysis of the restricted use dataset. NCSU will also provide an additional copy of the latest version of SAS statistical software for initial data analysis as well as the latest version of STATA software for estimating two-stage models.



**SPECIAL INFORMATION AND SUPPLEMENTARY DOCUMENTATION**

Not applicable