Opportunistic Financial Reporting in Higher Education

Trent Stanton Henke

Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
In
Business, Accounting and Information Systems

John J. Maher, Chair
T. Bowe Hansen
E. Scott Johnson
Brooke D. Beyer
John C. Easterwood

April 13, 2017
Blacksburg, Virginia

Keywords: Opportunistic Financial Reporting, Earnings Management, Higher Education, University Prestige

Opportunistic Financial Reporting in Higher Education

Trent Stanton Henke

ABSTRACT

Annual university rankings produced by mainstream sources, such as U.S. News and World Report, are very popular and viewed as important by a variety of university stakeholders. Consequently, universities expend a great deal of effort in an attempt to ensure they appear in the best possible light. One major component of these ranking systems is the Carnegie Classification of Institutions of Higher Education, which is partly based on the research expenditures reported by the university. This system provides incentives for administrators at institutions of higher education to make strategic accounting choices, with respect to the classification of research expenditures, to improve the prestige of the university. I first measure the amount of accounting discretion within a university's classification of research expenditures and then test whether discretionary research expenditures impact the prestige of a university. Results indicate that discretionary research expenditures are positively associated with university prestige. Specifically, universities within my sample that have positive discretionary research expenditures have an increased probability of subsequently being classified as a Doctoral University with moderate to high research activity by 5% and 7% respectively. In addition, universities within my sample that had positive discretionary research expenditures experienced increases in their ranking of federal funding received relative to other universities by an average of 20.4 positions. These results are consistent with the concept that universities can make certain discretionary accounting choices which can help improve the prestige of the institution with the goal of obtaining additional sources of funding.

Opportunistic Financial Reporting in Higher Education

Trent Stanton Henke

GENERAL AUDIENCE ABSTRACT

Annual university rankings produced by mainstream sources, such as U.S. News and World Report, are very popular and viewed as important by a variety of university stakeholders. Consequently, universities expend a great deal of effort in an attempt to ensure they appear in the best possible light. One major component of these ranking systems is the Carnegie Classification of Institutions of Higher Education, which is partly based on the research expenditures reported by the university. This system provides incentives for administrators at institutions of higher education to make strategic accounting choices, with respect to the reporting of research expenditures, to improve the prestige of the university. I first measure the amount of accounting choice (i.e. accounting discretion) within a university's report of research expenditures and then test whether accounting discretion impacts the prestige of a university. Results indicate that accounting discretion is positively associated with university prestige. I also find a positive association between university accounting discretion and subsequent increases in federal funding received relative to other universities. These results are consistent with the concept that universities can make certain accounting choices which can help improve the prestige of the institution with the goal of obtaining additional sources of funding.

DEDICATION

To my wife Candace for being my foundation and keeping me on track. Without you, this would not have been possible. Thank you for supporting me, helping me, and loving me throughout this crazy adventure. I love you!

To my children Blake, Melaiya, and Garrett for being willing to try new things and for providing the fun breaks along the way. You can do hard things and I hope you will pursue your future dreams. I love you!

ACKNOWLEDGEMENTS

I first want to thank my Savior Jesus Christ whose grace and mercy has sustained me in difficult times and given me the strength to keep moving forward. I am eternally grateful for His sacrifice and for all the blessings He has bestowed upon me.

I also want to give a special thanks to my wife Candace. It seems from Day 1 I felt like I was in over my head starting a PhD program and she has always been there to keep me grounded and moving forward. I am grateful for all she did to keep our house running, getting the kids to school on time, dealing with homework in the evenings, paying the bills, walking Moxie, and all while feeling like a single parent. I am very grateful for the love and support and constant encouragement that she has provided. I am also grateful for my children, Blake, Melaiya, and Garret who have been so willing to go on an adventure. They have grown so much over the past four years and I'm looking forward to starting a new adventure with them soon.

I also want to thank my mom Jennifer Fisher for encouraging me and teaching me to go after my dreams. She has always provided a listening ear when I've needed one. I also want to thank my dad and step-mom, Marvin and Jan Henke, for supporting me and encouraging me. I am thankful for you staying connected with my children through this process and helping them feel loved. I also want to thank my mother-in-law Lee Ann Garrett for her encouragement and support. I know she has also been a great support to my wife Candace throughout this process which I am very grateful for. I also want to thank the rest of my family members that have supported me and encouraged me throughout my time in the PhD program.

I am very grateful for the guidance of my dissertation committee, John J. Maher, T. Bowe Hansen, E. Scott Johnson, Brooke D. Beyer, and John C. Easterwood. Your comments and suggestions have been very helpful in moving me forward from a research question to my final

dissertation. Thank you for being willing to let me pursue a topic that I know is not in your primary research areas and for helping me to better understand the questions I should be asking.

I am also thankful for my fellow cohort, Tripp Petzel, Gillian Lei, and Jamie Zhou. I don't think I could have made it through this process without having fellow classmates to lean on. I also want to thank the other PhD students who are always enjoyable to be around and help make our program even better: Dr. Eric Negangard, Dr. Kathy Enget, Dr. Joanna Garcia, Dr. Gabe Saucedo, Dr. Alan Stancill, Dr. Nicole Wright, Dr. Joe Rakestraw, Dr. Brandon Ater, Dr. Christine Gimbar, Dr. John Lauck, Dr. Mark Sheldon, Ian Twardus, Jenny Parlier, Jen Glenn, Rebecca Wetmiller Martin, Jennifer Williams, Adam DuPon, Chris Sherman, and Kevin Hale.

I am thankful for the support, patience, and time of Phyllis Neece, Arnita Perfater, and Darian Runion. You all do so much to keep the PhD students on track and I am especially grateful for the help in navigating graduate school policies and for all the classroom support.

I am indebted for the financial assistance I received from the Accounting and Information Systems Department in the Pamplin College of Business at Virginia Tech. My scholarship assistance included the ACIS Alumni Scholarship, ACIS Faculty Scholarship, Floyd A. Beams Scholarship, John E Peterson, Jr. & Mary Jane C. Peterson Ph.D. Fellowship, Pauline L. Corn Scholarship, Bruce Prouty Scholarship, and finally the Virginia Society of CPAs Virginia Tech Doctoral Scholarship.

I also want to thank seminar participants from Virginia Tech, Texas State University, and Murray State University for their helpful comments and suggestions at improving this dissertation.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Annual university rankings published by mainstream sources, such as U.S. News and World Report[1], are very popular and often carry a great deal of weight with the public by succinctly summarizing the overall value and quality of a university. Consequently, these rankings are often treated with a good deal of respect and consideration by various university stakeholders including potential students and donors. There are overall rankings of all universities along with many sub-groups comprised of assorted categories. Some rankings focus on the "Best National Universities" or the "Best Value College" while others might focus on the next tier of "A-Plus Schools for B Students." An important component utilized by most of these rankings systems is the university classification determined by the Carnegie Classification of Institutions of Higher Education (CCIHE). Historically, CCIHE has employed the level of research expenditures reported by a university as one of their principal criteria in determining classification (Carnegie 2001). The purpose of this paper is to empirically explore whether administrators of institutions of higher education make strategic accounting choices with regards to the classification of their research expenditures in an effort to enhance their rankings and correspondingly improve the prestige of the institution.

Universities are unique in that they can be either for-profit, nonprofit, or governmental in nature. Agency theory, as applied to nonprofit and governmental institutions, predicts that managers have incentives to improve institutional prestige (see Newhouse 1970, and Weingast 1984). Because universities compete in a multi-product environment, prestige becomes a

[1] Other highly influential ranking are produced by The Wall Street Journal, Money Magazine, and Forbes as well as many others.

function of instruction, research, and other activities (Cohn et al. 1989; Johnes and Johnes 2009; and Leslie et al. 2012). Evidence shows that university administrators seeking to maximize prestige will value research over other types of activities (see Leslie et al. 2012; and Ehrenberg et al. 2007). Administrators can use research expenditures to impact university prestige in two ways. They can actually fund research activities or classify expenditures from other activities as research related. These methods are similar to those methods discussed in the corporate setting as "real earnings management" or "classification shifting." A key difference from the corporate setting is that administrators are actually looking to increase the expenditure rather than reduce it or shift it down the income statement. The nature of research expenditures in the university setting make "real earnings management" difficult to achieve in a given year. On the other hand, as long as an administrator has discretion in the classification of expenditures, classification shifting is a more feasible strategy. Therefore, I predict that administrators will use discretion in the classification of their expenditures in an effort to improve the prestige of the institution.

The classification of an expenditure is often determined by the revenue source of the funds used for the expenditure. For instance, a federal research grant must be used for a specific research project and thus the expense classification of research is determined by the revenue source. However, absent any specific restrictions, administrators have discretion when determining the classification of expenditures. Some areas of possible discretion include the cost of laboratory equipment, faculty and administrative salaries, and the cost of graduate programs. Expensive laboratory equipment is most likely being used for both classroom instruction and research purposes and could be classified as either. Faculty provide both instruction, research, and service and administrative functions support all these areas well. Salaries therefore could be classified in all of these areas. Finally, stipends for graduate student who both teach and perform

research could be classified as either instruction or research. Therefore, I model a university's research expenditures as a function of revenue source and use the residual as a measurement of discretionary research expenditures. Drawing upon the literature within the area of higher education, I model university prestige and test whether there is an association between prestige and discretionary research expenditures. In addition, theory predicts that the goal in achieving and maintaining high institutional prestige is to secure additional sources of university funding. I model a university's level of federal funding and test whether there is an association between discretionary research expenditures and subsequent changes in the level of federal funds received relative to other universities.

The results of this study are consistent with the idea that universities have discretion in classifying research expenditures and that discretionary research expenditures are positively associated with subsequent university classification. Specifically, for universities within my sample, the average partial effect of having positive discretionary research expenditures increases their probability of being subsequently classified with a Carnegie classification of "Doctoral University: Moderate Research Activity" by 5% and as a "Doctoral University: Highest Research Activity" by 7%. In addition, universities within my sample that had positive discretionary research expenditures subsequently improved their ranking, relative to other recipients of federal funds, by an average of 20.4 positions. These results are consistent with the concept that universities can make certain discretionary accounting choices that can help improve the prestige of the institution, with the goal of obtaining additional sources of funding.

This research contributes to the literature by being the first study to measure accounting discretion at institutions of higher education. This study is also the first to show that administrators at universities can use accounting information to improve the prestige of the

university. These results also help inform the literature within higher education on the determinants of university prestige and should help inform entities that use reported research expenditures when preparing university classifications and rankings.

The remainder of this paper is organized as follows. Chapter 2 provides a review of the relevant literature and develops hypotheses. Chapter 3 describes the methodology used with a brief history of the nature of financial reporting for universities. Chapter 4 describes the data sources and the sample selection process. Chapter 5 presents the detailed results. Chapter 6 presents supplemental analyses. Finally, Chapter 7 provides concluding remarks, the contribution and possible limitations of this research, followed by references, figures, tables, and appendices.

CHAPTER TWO

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Agency Theory

Agency theory was formally discussed by Jensen and Meckling (1976) who define a firm as a nexus of contracts and address the nature of agency costs that arise as a result of the separation of ownership and control. Managers have access to inside information that is not generally available to the owner/investors of the firm and such information asymmetry creates a demand for financial information and an opportunity for opportunistic financial disclosure by management. Jensen and Meckling (1976) define various mechanisms used to monitor and control the behavior of the manager and reduce the amount of information asymmetry that exists within the firm. On this premise, Beyer et al. (2010) define two primary roles for accounting information, valuation and stewardship, which allows for investors and creditors to evaluate the return of potential investments and to monitor the use of their capital once committed. However, Jensen and Meckling (1976) are careful to state that it is not cost effective to perfectly monitor the manager and thus agency costs will always be positive. Because perfect monitoring is not optimal and some level of information asymmetry exists, managers are provided with an opportunity to make strategic accounting choices.

Agency theory has long been used in the context of for-profit firms and it is generally assumed that managers in this setting are seeking to maximize their profits. Evidence from academic research generally supports this assumption and indicates that management in the corporate sector make strategic accounting choices to meet certain benchmarks. Burgstahler and Dichev (1997) state that "studies of earnings management typically consider a specific incentive for earnings management (e.g., incentives related to executive bonus plans) and then test whether

earnings have been managed assuming a particular earnings management method (e.g., management of accruals)." In their review paper, Habib and Hansen (2008) document abundant evidence of earnings management within the corporate sector surrounding three key benchmarks: the earnings level benchmark (loss avoidance), earnings changes benchmark (earnings improvement benchmark), and the analyst forecast benchmark.

On the other hand, it is less clear how agency theory applies to nonprofit firms and government entities (Eldenburg et al. 2004). Fama and Jensen (1983) argue that nonprofit entities encounter similar agency costs despite their lack of residual claimants to net cash flows. These agency costs arise because managers do not bear a major share of the wealth effects of their decisions. The demand for financial information arises because potential donors want to know that their contributions will be used in meaningful and efficient ways, and creditors want to be able to assess credit risk and return (see Parsons 2003). Hofmann and McSwain (2013) argue that, similar to the corporate sector, information asymmetry also exists within nonprofit and government entities because it is likely that managers in this sector possess more information about the organization's financial condition and mission-related program service opportunities than potential donors. Kitching (2009) goes further to say that information asymmetry is greater within nonprofit and government entities than for the corporate sector because there are, in effect, two principals: the donor and the beneficiary of the organization's product and services. Greater complications arise in this scenario because donor and beneficiary preferences may differ. In all likelihood, the donor has little knowledge of the technical details in meeting the needs and preferences of the beneficiary.

While it seems that agency costs do arise in nonprofit firms and government entities, it is unclear what managers are seeking to maximize in this setting. If not seeking for profits,

managers must have some other objective function that may not be obvious (see Brickley and Van Horn 2002 and Eldenburg et al. 2004). Academic studies have attempted to identify the objectives of managers in the nonprofit setting. Leone and Van Horn (2005) establish a model where nonprofit organizations may experience pressure to show near zero income. They argue that large positive earnings could cause regulators to question a nonprofit's tax-exempt status and cause donors to be less likely to make a charitable donation because of large profits. On the flip side, they argue that nonprofit managers do not want to show losses because of debt costs and high manager turnover. Leone and Van Horn (2005) find evidence from nonprofit hospitals to support their model in that nonprofit managers manage earnings both toward zero and to avoid losses. Similarly, Omer & Yetman (2003) find a statistically abnormal amount of nonprofit entities with taxable income near zero. They interpret this finding as nonprofit entities managing their taxable income and find that those having a paid CPA preparer are more likely to have taxable earnings near zero. Vermeer et al. (2014) attempt to compare earnings management within the corporate sector to the nonprofit sector. They identify defined benefit pension plans as an area of common accounting practice between for-profit and nonprofit entities. They find that nonprofit managers are more aggressive than for-profit managers with discretionary accounting choices regarding pension obligations.

With regards to governmental entities, Kido et al. (2012) argue that incumbent governors have incentives to "window dress" the financial position of the state before an election. They find that state governments exhibit patterns of opportunistic financial reporting during gubernatorial elections. They focus on two types of discretionary expenditures, compensated absences and pension expense, and find that these items are lower in years leading into an election. Felix (2015) investigates municipalities' use of inter-fund transfers to manage the

general fund and finds that municipalities have a tendency to manage the general fund toward zero. In particular, he finds that the tendency to manage toward zero did not differ between positive and negative pre-managed fund balance, suggesting the incentive to report neither surplus nor deficit which is similar to the arguments made by Leone and Van Horn (2005) for nonprofit entities.

2.2 Incentives in Higher Education

Institutions of higher education are somewhat unique in that they can either be for-profit, nonprofit, or government. However, it is unlikely that administrators at institutions of higher education have the same incentive structure as managers in the typical nonprofit or governmental setting. In addition, evidence of common incentives within higher education is lacking in the academic literature. Newhouse (1970), in his theoretical development of a nonprofit institution, predicts that a manager of a nonprofit institution will value and seek to maximize institutional prestige. He argues that managers of nonprofits are concerned about the quality and quantity of services provided to a beneficiary and are dependent on the generosity of donors to increase both quality and quantity of provided services. Prestige then becomes an important factor in attracting and retaining donors to the nonprofit institution. While these ideas can also apply to governments, Weingast (1984) adapts traditional agency theory to the congressional-bureaucratic setting. He argues that bureaucracies have incentives to be self-promoting and always increasing in size. Institutional prestige plays an important role in the popularity of the bureaucracy which helps to ensure continued and increased funding from congressional oversight. In addition to continued funding, Weingast (1984) further argues that popular bureaucracies that are perceived as fulfilling their congressional mandate often enjoy less scrutiny from congressional oversight and more freedom in implementing pet policies. It is reasonable to assume then that

administrators of universities, whether nonprofit or governmental, have incentives to improve the prestige of the institution. Leslie et al. (2012) argues that administrators at universities seeking to maximize prestige will prioritize research over other activities. Ehrenberg et al. (2007) provide some evidence to support this argument. They find that, not only are the costs of research increasing over time, but that they are increasingly being funded by internal university funds. In addition, they show that those universities whose own expenditures on research are growing most rapidly have had greater increases in student faculty ratios and higher tuition increases. To further support this idea, discussions with university administrators at various levels ranging from the departmental level to the university controller's office has revealed that administrators are very aware of the amount of research expenditures being reported. It is also common for departments to have a "target" percentage of research expenditures to total expenditures and it's not uncommon for administrators to turn to those areas with a lot of functional overlap to "justify" some additional research expenditures to meet their benchmark.

Universities are not alone in their focus on research as an indication of prestige. CCIHE's classification of universities relies heavily on the institutions' volume of external research funding (Carnegie 2001). CCIHE was first developed in 1971 in an effort to support research in higher education by identifying homogenous groups of institutions (Carnegie 2001). Despite the Carnegie Foundation's insistence that this is not a ranking system, it has become an indication of prestige and is used by numerous bodies, such as governmental entities, to determine institutional funding based on classification. Similarly, U.S. News & World Report's annual ranking of national universities not only relies on the Carnegie classification but also places heavy weights on faculty salaries and the institutions' expenditures per student, both of

which include research expenditures.[2] Thus, research expenditures should be increasing with university prestige.

Administrators at universities could use research expenditures to impact prestige in two ways. They can fund actual research activities or classify expenditures for other activities as research. Bowen's (1980) revenue theory of costs states that universities will spend all the money they raise and that they can never raise enough to satisfy their spending desire. This implies that all activities the university engages in are most likely under-funded and that in making actual expenditures towards research activities would reduce funding from other desired activities. This method is similar to real earnings management discussed within the corporate sector (see Baber et al. 1991; Dechow and Sloan 1991; Bushee 1998) and is most likely difficult to accomplish in a given year in the university setting. The second method of classifying expenditures from other activities as research is similar to a classification shifting earnings management strategy (see McVay 2006). This method is most likely much easier to accomplish in a given year, assuming that an administrator has discretion in the classification of expenditures. In addition, Morphew and Baker (2004) show evidence that universities that moved from Research University II status to Research University I status emulated the cost structure of those universities that maintained Research University I classification during the same time period. Therefore, universities may use strategic accounting choices with regards to the classification of their cost structure in emulating top ranked universities. This leads to my first hypothesis stated in alternative form:

H1: Discretionary research expenditures are positively associated with the prestige of the university.

[2] U.S. News & World Report. 2016. "How U.S. News Calculated the 2017 Best Colleges Rankings" http://www.usnews.com/education/best-colleges/articles/how-us-news-calculated-the-rankings accessed 9/14/2016.

Bowen's (1980) revenue theory of costs indicates that the goal of prestige maximization is to procure additional sources of funds. A major source of research funds come through federal research grants which are disproportionately awarded to institutions with the highest Carnegie classification. For instance, $27.7 billion or 41.3% of federal funding for Higher Education Research and Development was received by 30 universities out of 895 total reporting institutions.[3] Of these 30 institutions, 29 were classified within the highest Carnegie classification with the one exception being classified as a "Special Focus Four-Year: Medical Schools and Centers." However, federal funding is not the only source of potential funds for prestigious research universities. State appropriations provide another major source of funds to a university and can often be determined based on the prestige of the institution. The University of Houston provides an example of this expectation. The University of Houston was upgraded to the highest Carnegie Classification in 2011. As stated in their press release to acknowledge the advancement in classification, the university "reported receiving more than $100 million in research grants last year" with a goal of $200 million by the year 2021.[4] Furthermore, as a result of the new classification, the University of Houston anticipated receiving a share of the Texas National Research University Fund,[5] a fund available only to those Texas universities classified as a "Tier One" institution. The potential for new sources of funding provides the incentive for administrators to make opportunistic accounting choices with regards to research expenditures and leads to my next hypothesis stated in alternative format.

H2: Discretionary research expenditures are positively associated with the level of research funding received by the university in the following year(s).

[3] Statistics reported by the National Science Foundation InfoBriefs NSF 16-302 https://www.nsf.gov/statistics/2016/nsf16302/ accessed on 9/16/2016.

[4] "Carnegie Foundation gives University of Houston its highest classification for research success, elevating UH to Tier One status" by Richard Bonnin, http://www.uh.edu/news-events/stories/2011articles/Jan2011/011811CarnegieTierOne.php accessed on 9/16/2016.

[5] The Texas National Research University Fund (NRUF) was originally passed as proposition 4 in November 2009 and later codified as Texas Education Code (TEC) 62.146(b).

CHAPTER THREE

METHODOLOGY

3.1 Discretionary Research Expenditures

An important component of my research design requires measurement of the amount of discretion that administrators have in the classification of research expenditures. Consequently, this requires a brief review in the nature of financial reporting for universities. Public universities follow accounting standards set by the Governmental Accounting Standards Board (GASB) whereas, private universities follow accounting standards set by the Financial Accounting Standards Board (FASB). Objectives for financial reporting espoused by both boards are similar but are not identical. FASB's primary focus is on providing information that is useful to resource providers in making rational decisions about the allocation of resources to nonprofit organizations.[6] GASB also endorses decision usefulness but states that "accountability is the cornerstone of all financial reporting in government."[7] I do not discuss all the differences between GASB and FASB. However, comparisons between standards with respect to higher education have been discussed by Fischer (1997), Engstrom and Esmond-Kiger (1997), Goldstein and Menditto (2005), and Fischer et al. (2010).

Despite the existence of two boards, GASB and FASB, and the potential for differences in standards, decision usefulness and accountability in the context of financial reporting within higher education leads to an emphasis on the allocation or use of provided resources. The presentation and classification of operating expenditures by public and private universities is similar. Both FASB and GASB allow for the recognition and presentation of expenses by functional or natural classification. In defining expense classification for public universities,

[6] See FASB Statement of Financial Accounting Concepts No. 4 paragraph 35.
[7] See GASB Codification Appendix B – GASB Concepts Statement 1.

GASB statement 34 states that universities "should establish a policy that defines operating expenses that is appropriate to the nature of the activity being reported." For private universities, FASB states that "a statement of activities shall provide information about expenses reported by their functional classification," where functional classification is defined as "a method of grouping expenses according to the purpose for which costs are incurred."[8] In applying the above standards, most universities follow the classification definitions provided by the National Association of College and University Business Officers (NACUBO) which include Instruction, Research, and Service.[9]

The determination of the purpose of an expenditure is often determined by the provider of the resources used for the expenditure. Provided revenues often come with certain restrictions on how that revenue may be spent. Consequently, revenue providers are increasingly concerned about how funds are expended (Leslie et al. 2012). For instance, a federal granting agency has a strong interest in ensuring that the revenues it sends to universities are spent on the type of research it seeks to promote. In addition, state governments seeking to provide subsidies to reduce costs to tuition payers have a strong interest in ensuring that subsidies are expended for instructional purposes. Therefore, it is common for the functional classification of an expenditure to be determined based on the revenue source of the funds used for the expenditure. Figure 1 provides an example Statement of Revenues, Expenses, and Changes in Net Position (income statement) for a large U.S. public university which shows how revenues are reported by source and expenditures classified by function. However, the GASB and FASB standards, along with the NACUBO definitions, leave room for administrators to make opportunistic accounting

[8] See FASB Codification 958-720-45-2.
[9] See NACUBO Advisory Report 2010-1 Appendix B for further expenditure classification definitions (www.nacubo.org).

choices when reporting expenditures. Some areas of possible discretion include the cost of laboratory equipment, faculty and administrative salaries, and the cost of graduate programs. Expensive laboratory equipment is most likely being used for both classroom instruction and research purposes and could be classified as either. Faculty provide both instruction, research, and service and administrative functions support all these areas well. Salaries therefore could be classified in all of these areas. Finally, stipends for graduate student who both teach and perform research could be classified as either instruction or research.

Based on the above discussion, I model university research expenditures as a function of revenue source to control for restricted funds common to specific revenues sources. Based on resource provider restrictions, universities should only be able to exercise discretion when expending unrestricted funds. The residual from this model should then represent the discretionary portion of research expenditures that are not determined by restrictions of revenue source.[10] Modeling expenditures by revenue source follows the same basic methodology developed by Leslie et al. (2012) who explore the relationships between functional expenses and the revenues received by the university. For purposes of this study I focus just on research expenditures. In addition to controlling for revenue source, I also control for institutional characteristics that affect the level of research expenditures of a university. My data, described in more detail in the next section, consists of panel data and it is likely that the error terms for the same institution over time are correlated with each other. For example, private institutions may

[10] This methodology is similar to that developed in the earnings management literature where researchers model a firm's use of accruals and then define the residual as the discretionary accrual or abnormal accrual. These residuals are then used as independent variables in new regressions to test their impact on such items as meeting certain earnings benchmarks or audit outcomes (see Healy & Wahlen 1999; and Dechow et al. 2010). A key difference is that accruals will eventually reverse in the accounting cycle whereas this study focuses on the classification of expenditures which do not reverse. I assume that total expenditures are unchanged as universities will spend all revenues received in a given period and I am interested in whether the classification of expenditures impacts university prestige.

rely more on tuition revenue than public institutions who receive state appropriations. Similarly, there may be unobserved time specific factors that affect all institutions in the same period such as the level of federal research funds available in a given year to be spread among the various universities. To help correct for this, I include both university and time fixed effects in my model. Leslie et al. (2012) observe that the revenue-expenditure relationship changes over time so I add an interaction term between each revenue category and year variable to control for any potential time trend. Thus, my model for estimating discretionary research expenditures is shown in Equation 1 as follows:

$$ResExp_{it} = \alpha_0 + \alpha_1 Tuit_{it} + \alpha_2 Appr_{it} + \alpha_3 Grnts_{it} + \alpha_4 Gifts_{it} + \alpha_5 Aux_{it} + \alpha_6 Oth_{it} + \alpha_7 Hosp_{it} + \alpha_8 DrSch_{it} + \alpha_9 \%DrDeg_{it} + u_{it} \quad (1)$$

where $ResExp_{it}$ is the research expenditures for university *i* in year *t*. $Tuit_{it}$ is revenue from all tuition and fees assessed against students for university *i* in year *t*. $Appr_{it}$ is revenue received through acts of a federal, state, or local legislative body, except by grants and contracts, for university *i* in year *t*. $Grnts_{it}$ is revenues from federal, state, and local government agencies that are for specific research projects or other types of programs for university i in year *t*. $Gifts_{it}$ is revenues from private gifts for university *i* in year *t*. Aux_{it} is revenues generated by auxiliary enterprises for university *i* in year *t*. Oth_{it} is all other revenues not included in previous listed sources for university *i* in year *t*. $Hosp_{it}$ is an indicator variable if a hospital is associated with university *i* in year *t*. $DrSch_{it}$ is an indicator variable if university *i* is a doctoral granting institution in year *t*. $\%DrDeg_{it}$ is the proportion of doctoral degrees awarded to total degrees awarded by university *i* in year *t*. All variables except indicator variables are scaled by student FTE. The error term u_{it} should represent the portion of the research expenditure that is not

dictated by the revenue source or institutional characteristics of the university. In other words, u_{it} is the discretionary portion of total research expenditures for university *i* in year *t*.

3.2 University Prestige

To test my first hypothesis I examine the impact that discretionary research expenditures, calculated as the residual from Equation 1, have on the prestige of the institution. The method of how to measure and model institutional prestige has been widely discussed in the higher education academic literature (see Morphew & Baker 2004; Rindova et al. 2005; Volkwein & Sweitzer 2006; Cyrenne & Grant 2009; and Boyd, Bergh, & Ketchen 2010). Based on this literature, I utilize a model of institutional prestige built on the conceptual model developed by Volkwein and Sweitzer (2006) and depicted in Figure 2. As shown in Figure 2, an institution's structural characteristics affect the way it deploys its resources and recruits faculty and students. Faculty activities and resources not only affect current students but also future students by influencing institutional attractiveness. Spending on student recruitment and selectivity positively influences the relative attractiveness of the institution for both prospective students and prospective faculty recruits. Higher quality faculty and students lead to higher quality outcomes which further enhances the reputation of the institution. This model implicitly assumes that additional resources can be used to improve future resources, outcomes, and ultimately the prestige of the institution. Equation 2 below incorporates the conceptual model in Figure 2 by modeling an institution's prestige as a function of an institution's structural characteristics, faculty and student resources, and faculty and student outcomes.

$$Prestige_{it} = \beta_0 + \beta_1 u_{it-1} + \beta_2 Size_{it-1} + \beta_3 S/F_{it-1} + \beta_4 Sal_{it-1} + \beta_5 \%FT_{it-1} + \beta_6 SAT_{it-1} + \beta_7 Res_{it-1} + \beta_8 Grad_{it-1} + \beta_9 End_{it-1} + \beta_{10} Hosp_{it-1} + \beta_{11} Pvt_{it-1} + \varepsilon_{it} \quad (2)$$

The dependent variable $Prestige_{it}$ represents the prestige of university *i* in year *t*. The variable of interest is u_{it-1} and is the discretionary research expenditure (residual from Equation 1 above) for university *i* in year *t-1*. A positive coefficient would support H1 and provide evidence that administrators' use of discretionary research expenditures is associated with subsequently higher university rankings. The remaining independent variables are control variables suggested by the literature that represent structural characteristics, faculty and student resources, and faculty and student outcomes (see Volkwein and Sweitzer 2006).

Variables that control for structural characteristics include *Size*, *Hosp*, and *Pvt;* where *Size* represents the student full-time equivalent enrollment of university *i* in year *t-1*, *Hosp* is an indicator variable if university *i* has a hospital in year *t-1*, and *Pvt* is an indicator variable if university *i* is a private institution in year *t-1*. Student enrollment is a better indication of university size than total assets because reported assets for some universities is greatly distorted based on the age of the university and whether or not those assets were acquired because of a land grant status. Larger student full-time equivalent enrollments likely have a positive impact on the prestige of a university. The presence of a hospital should be an indication of greater prestige because of the expectation for a greater amount of research that a hospital brings to the institution. Similarly, a private institution is expected to have a higher prestige than a public institution because they can be more selective in their student recruitment and often have more resources available for faculty.

Variables from the literature that control for student and faculty resources are *S/F*, *Sal*, *%FT*, and *SAT*; where *S/F* is the student to faculty ratio for university *i* in year *t-1*, *Sal* is the average faculty salary for university *i* in year *t-1*, *%FT* is the percentage of full-time faculty at university *i* in year *t-1*, and *SAT* is the median entering student *SAT* score for university *i* in year *t-1*. The student faculty ratio is used to proxy for instructional quality and the amount of access that students have with their professors. Lower student faculty ratio should be associated with higher university prestige. Faculty salaries and the percentage of full-time faculty are used to control for resources available to recruit high quality faculty members and both should have a positive association with university prestige. SAT scores represents the selectivity of admissions and controls for the quality of students attending the university and should be positively related with university prestige.

Variables that control for student and faculty outcomes are *Res*, *Grad*, and *End*; where *Res* represents the faculty research output for university *i* in year *t-1*, *Grad* is the student graduation rate for university *i* in year *t-1*, and *End* is the endowment income for university *i* in year *t-1*. Research is used to proxy for faculty scholarly productivity and is expected to be positively related to university prestige. The graduation rate is an indicator of student academic success and should also be positively associated with university prestige. Endowment income is used as a proxy for alumni attainment and should be positively associated with university prestige. Ideally, my model would incorporate alumni donation rates but I am unable to include this due to data limitations as discussed in the next section. However, larger endowments should be a result of greater alumni donations rate and correspondingly larger endowments should receive higher investment income than smaller endowments, ceteris paribus.

3.3 University Funding

H2 predicts that discretionary research expenditures will have a positive effect on the future funding received by the university. General sources of funding available to a university include state appropriations (for public universities), tuition and other payments from students, contract and grant revenue, donations, and auxiliary sales. While university prestige may directly or indirectly impact all of these sources, it's likely that the most direct impact will be with regards to contract and grant revenue. Competition for contract and grant revenue has become more intense in recent years with federal funding of higher education research and development failing to outpace inflation for the third straight year as reported in Nov. 2015. The National Science Foundation reported the longest multiyear decline in federal funding for research and development of 11% from 2011 to 2014.[11] Therefore, it is necessary to take into consideration the amount of funding available in a given year. For instance, federal research grants are budgeted for a specific amount at the federal level and subsequently awarded to universities in increments based on the grant applications received by the awarding federal agency. H2 predicts that discretionary research expenditures should lead to additional funding sources which is subject to how much funding is available relative to the amounts received by other institutions. Therefore, Equation 3 tests H2 by modeling a university's level of federal funding relative to other recipients of federal funds.

$$FedRank_{it} = \beta_0 + \beta_1 u_{it-1} + \beta_2 Size_{it-1} + \beta_3 S/F_{it-1} + \beta_4 Sal_{it-1} + \beta_5 \%FT_{it-1} + \beta_6 SAT_{it-1} + \beta_7 Res_{it-1} + \beta_8 Grad_{it-1} + \beta_9 End_{it-1} + \beta_{10} Hosp_{it-1} + \beta_{11} Pvt_{it-1} + \varepsilon_{it} \quad (3)$$

[11] Statistics reported by the National Science Foundation InfoBriefs NSF 16-302 https://www.nsf.gov/statistics/2016/nsf16302/ accessed on 9/16/2016.

The dependent variable *FedRank* is the rank level of federal funds received and expended by university *i* in year *t*. The variable of interest again is u_{it-1} which represents the discretionary research expenditures of university *i* in time *t-1*. The remaining independent variables are the same as those used in Equation 2 and control for university prestige as more prestigious universities should be receiving larger portions of available federal research grants. Definitions for all variables used in Equations 1, 2, and 3 can be found in Appendix B.

CHAPTER FOUR

DATA AND SAMPLE SELECTION

4.1 Measuring University Prestige

I use the Carnegie classification of higher education institutions as my measurement of university prestige. The Carnegie classification method was first developed in 1971 with subsequent publications with minor updates in 1973, 1976, 1987, 1994 (see Carnegie 2001). Throughout this period, top research institutions were classified as Research University 1 or RU1 with the next tier of university being Research University 2 or RU2 and then moving to lower tier institutions (Doctoral University, Masters University, etc.). In an effort to overcome user misinterpretation of the classification system, Carnegie implemented a two-phase plan that led to major changes in classification with the first phase appearing in the 2000 edition and additional changes occurring in phase two in the 2005 edition. These changes resulted in what originally were four categories of doctoral granting institutions (RU1, RU2, DU1, and DU2) to three categories (Research Universities – Very high research activity; Research Universities – High research activity; and Doctoral/Research Universities). Following the phase-one and phase-two changes in the 2000 and 2005 editions, the classification has been updated in 2010 and 2015. The 2015 edition brought additional changes by expanding the classification system to include various categories for small associate's colleges and "Special Focus" two-year colleges.[12] Although the Carnegie classification was not created as a ranking system, it is based on variables linked to normative models of prestige and stature (e.g., federal research dollars, selectivity, and number of doctorates awarded, etc.) For my study, I convert the Carnegie classification to an

[12] Beginning with the 2015 update, the Carnegie Classification, while keeping its original name, is now maintained by the Center for Postsecondary Research at the Indiana University School of Education. http://carnegieclassifications.iu.edu

ordinal scale where the highest research activity classification has a value of 8 down to the lowest classification of an associate's college of 1. Appendix A contains a history and definitions of the Carnegie Classification system along with the Carnegie Classification Editions 2000, 2005, 2010, and 2015. Appendix A also indicates how each Carnegie edition maps to my prestige measurement.

4.2 Sample Selection Process

I begin my sample by selecting all U.S. universities that have a prestige rank of at least 2 in the Carnegie 2015 edition, meaning that in 2015 the university is at least a "Special Focus Four-Year" institution. Once selected, I obtain previous Carnegie rankings for each university back to the 2000 edition. While earlier editions of the Carnegie Classification are available, I do not include them in my sample because of the classification changes described earlier that occurred beginning in the 2000 edition. I merged these institutions with financial and institutional data from the Integrated Postsecondary Education Data System (IPEDS) maintained by the National Center for Education Statistics (NCES). NCES conducts annual surveys and gathers information from every college, university, and technical/vocational institution that are eligible to participate in federal student financial aid programs as required by the Higher Education Act of 1965.[13] At the time of data gathering for this study, the IPEDS database included years up to 2013.

The IPEDS data includes all the financial variables required for Equation 1 and all but two of the variables used for Equations 2 and 3. Two final variable needed for Equations 2 and 3 are the faculty research output and the university federal rank based the amount of federal research dollars received and expended. Research output is measured by the annual publication

[13] For more information about IPEDS and NCES, see their website at http://nces.ed.gov

counts of a university which were obtained from the Thomson Reuters InCites database. The InCites database uses data from seven indices of the Thomson Reuters Web of Science Core Collection for its publication counts. These seven indices represent more than 12,000 journals, 12,000 annual conferences, and 53,000 scholarly books. In addition, these indices represent all published areas of the sciences, social sciences, and humanities.[14] University rankings based on the amount of federal funds received are obtained from the Higher Education Research and Development (HERD) survey. The HERD survey is produced annually by the National Center for Science and Engineering Statistics (NCSES) which is a department of the National Science Foundation (NSF). Appendix B contains detailed definitions and sources for all variables used in this study.

For a university to be included in my sample I required that institutions have tuition revenues and research expenditures in a given year. However, there were no limitations on the institution to report other specific sources of revenue and missing values are assumed to be zero. For example, grants and contracts revenue comprises federal grant revenues, state grant revenues, and local grant revenues. A single institution may report a value for both federal and state grant revenues but not for local grant revenues (i.e. they did not receive any local grants). Therefore, I allow for missing revenue values to be equal to zero when calculating total "Grants & Contracts" revenue. The same methodology applies to the remaining revenues sources except for tuition revenue. Universities were also required to have values for all variables used in Equation 2 with some minor adjustments for a few variables as described below.

[14] Thomson Reuters. 2015. Web of Science Core Collection Content http://ipscience-help.thomsonreuters.com/inCites2Live/indicatorsGroup/aboutHandbook/content/woscore.html accessed on 9/23/2016

In the collection of faculty data, IPEDS does not require institutions to report faculty counts each year, only every other year is required, but some institutions voluntarily report faculty counts every year while others do not. Faculty counts should not dramatically change from year to year and to reduce the removal of observations due to missing data, I interpolate missing years for faculty counts for those institutions who only report every other year. To obtain a single SAT score for each institution, I calculate the midpoint between the reported SAT 25th and 75th percentile scores in the IPEDS database. SAT-ACT concordance tables were used to convert composite ACT scores into SAT scores for those institutions that did not report SAT scores in the IPEDS database.[15] Finally, institutions are allowed to have years with zero publications as long as they are included in the Thomson Reuters InCites database. I excluded institutions that could not be found in the InCites database.

My sample selection process is depicted in Table 1 Panel A and my final sample consists of 413 unique universities with 4,732 university years. Of these, 339 unique universities with 2,586 university years were included in the HERD survey. Panel B of Table 1 shows the breakout of university prestige ranking by year.

4.3 Descriptive Statistics

Table 2 Panel A contains descriptive statistics for *ResExp* and its component of *Disc ResExp (u)*. Panel B reports descriptive statistics for the remaining independent variables used in Equation 1. The sample mean of *ResExp* is $5,357.048 per student FTE or $73.9 million and is comparable to prior research (see Volkwein and Sweitzer 2006; Leslie et al. 2012).

[15] The College Board is a not-for-profit institution that administers the SAT exam. The College Board also produces SAT-ACT concordance tables based on the scores of students who have taken both exams within a certain time frame. Historical concordance tables can be obtained from the College Board website (accessed 9/27/2016): https://research.collegeboard.org/programs/sat/data/concordance.

Table 2 Panel C shows the descriptive statistics for the remaining variables used in Equations 2 and 3. The average *Prestige* ranking for my sample is 5.8 indicating that the majority of my sample universities are classified as "Master's Colleges & Universities: Larger Programs" or better. About 28% of my sample universities are private institutions and 10.6% have a hospital associated with the university. The descriptive statistics for variables used in Equation 2 are also similar to prior research (see Volkwein and Sweitzer 2006). To limit the effect of any outliers, all variables are winsorized at the 1st and 99th percentiles.

Tables 3 and 4 provide pairwise Pearson correlation coefficients for variables used in Equations 1 and 2. As expected and consistent with prior studies (Leslie et al. 2012), most of the variables in Equation 1 are significantly and highly positively correlated with each other, with the exception of *Appr*. The largest correlation is that of *ResExp* and *Grnts* at 0.965 which is reasonable given that most grants and contracts received by a university are for research purposes. Most of the revenue sources are positively correlated with research expenditures. This provides some initial support that administrators have discretion to expend unrestricted funds for research purposes, otherwise research expenditures should not necessarily be correlated with auxiliary sales revenue for instance. Most of the variables in Equation 2 are positively correlated with each other and especially with *Prestige*. This is expected since these variables should have a positive impact on university prestige, with the exception of *S/F* which should be negatively correlated indicating that smaller student/faculty ratios is associated with higher university prestige.

4.4 Discretionary Research Expenditures

In order to estimate *Disc ResExp (u)*, I estimate Equation 1 as an OLS regression with fixed effects for both year and university and standard errors are clustered at the university level.

The results of this regression are shown in Table 5. For comparability to prior research, Column 1 of Table 5 presents Equation 1 without the time trend for each revenue source. Column 2 presents the full model of Equation 1 including the time trends for each revenue source. These results are consistent both in magnitude and significance with those reported by Leslie et al. (2012). My discretionary research expenditures are the residuals from the regression presented in Column 2 of Table 5. As noted above, the variables used in Equation 1 are almost all significantly positively correlated with each other which presents a concern that multicollinearity may be an issue within the regression estimates. The effects of multicollinearity include inflating each variable's standard error which impacts the significance of the effect. However, multicollinearity should not affect the residuals of the regression and the purpose of this paper is not to evaluate the effects of revenue sources on research expenditures but to predict discretionary research expenditures as the residual. In addition to estimating *Disc ResExp (u)*, I also calculate *Nondis ResExp* by taking the difference between *ResExp* and *Disc ResExp (u)*. Descriptive statistics for *Disc ResExp (u)* and correlations for *Disc ResExp (u)* and *Nondis ResExp* are included in Tables 2 and 4 respectively.

CHAPTER FIVE

RESULTS

5.1 Test of H1

To empirically test whether discretionary research expenditures affect university prestige, I estimate Equation 2 as an ordered logistic regression. Year fixed effects are included and standard errors are clustered by university. The number of observations is less for Equation 2 because the independent variables are for time *t-1* and thus the first year that an institution enters my sample period is lost. I begin by estimating Equation 2 without including research expenditures as shown in Table 6 column 1. The results in column 1 are all in the predicted direction, with the exception of *SAT*, and are comparable to results reported by Volkwein and Sweitzer (2006). The results for *SAT* are surprising because the direction of the coefficient is opposite from what is expected and is highly significant at the 1% level in the opposite direction. Further investigation of my sample reveals that the average SAT score for institutions with prestige of 2 are significantly higher than the average SAT score for other prestige rankings. Prestige ranking 2 includes institutions classified as "Special Focus Four-Year" institutions with various specialties including medical schools, engineering schools, and law schools. It is not surprising that these types of institutions that attract a specific type of student for a specific field have higher average SAT scores than larger general type institutions that attract all types of students with a wider range of SAT scores. I estimated Equation 2 for only those institutions with a prestige rank > 2 (see supplemental analysis section 6.4) and *SAT* had a coefficient in the expected direction for two of the three models but was not significant in any of the models as shown in Table 11 Panel B.

In Table 6 column 2, I add *ResExp* to evaluate the effect that total research expenditures have on university prestige. The coefficient of *ResExp* is positive and significant at the 10% level. In column 3, I break out research expenditures into *Disc ResExp (u)* and *Nondis ResExp*. The magnitude of the effect of *Disc ResExp (u)* is eight times that of *Nondis ResExp* and is more than double the effect of *ResExp* in column 2 and is more highly significant at the 1% level. This indicates that discretionary research expenditures increases the probability of a university subsequently receiving a higher prestige rank. These results support H1 that discretionary research expenditures have a positive effect on university prestige.

To further analyze the effects that discretionary research expenditures have on university prestige, I create an indicator variable, *PosU*, which is equal to 1 if *Disc ResExp (u)* is greater than zero. For discretionary research expenditures to be positive, the regression model in Table 5 must be underestimating the level of research expenditures of a university as predicted by revenue source. I assume that these universities are using discretion to classify the expenditure of unrestricted funds as research expenditures. Table 7 Panel A presents the ordered logit regression of Equation 2 using *PosU* rather than *Disc ResExp (u)*. Column 1 reports the results using *PosU* and the remaining control variables while column 2 includes *ResExp* to control for the level of spending by the university in time *t-1*. The coefficient for *PosU* is significant at the 1% level in both columns and indicates that being a positive discretionary research expenditure university in time *t-1* increases the probability of receiving higher *Prestige* rankings in time *t*. Table 7 Panel B reports the marginal effect of *PosU* for each level of *Prestige*. The marginal effect of *PosU* in time *t-1* in both columns 1 and 2 reduces the probability of a university having *Prestige* equal to 2, 3, and 4 in time *t* and increases the probability of a university having *Prestige* equal to 6, 7, and 8 in time *t*. Specifically, looking in column 2, the marginal effect of

being a positive discretionary research expenditure university increase the probability of receiving a *Prestige* rank of 6, 7, and 8 by 4.9%, 4.5%, and 6.7% respectively, all significant at the 1% level.

5.2 Test of H2

In order to empirically test whether discretionary research expenditures have an effect on the amount of funding received by a university, I estimate Equation 3 as an OLS regression. Year fixed effects are included and standard errors are clustered at the university level. Equation 3 incorporates the rank level of federal funds received and expended as the dependent variable as reported by the HERD survey. The university receiving and expending the highest amount of federal funds in a given year is ranked #1 while the university receiving the lowest amount in a given year is ranked approximately #630.[16] The predicted directions in Equation 3 are opposite those from Equation 2 because lower ranks indicate higher amounts of federal funding. Column 1 in Table 8 reports the breakout effects of research expenditures by using *Disc ResExp (u)* and *Nondis ResExp*. The coefficients for both *Disc ResExp (u)* and *Nondis ResExp* are negative and significant at the 5% and 1% levels respectively. This implies that both *Disc ResExp (u)* and *Nondis ResExp* have an impact on subsequent federal funding and there is no statistical difference in the magnitudes of the coefficients making it difficult to determine if one is more impactful than the other. To further explore the effects of discretionary research expenditures on subsequent federal funding I substitute *PosU* in the model. Columns 2 and 3 in Table 8 show the regressions results of incorporating *PosU* into the model. The coefficient of *PosU* in column 2 is negative and significant at the 1% level. The magnitude of the coefficient implies that a university with positive discretionary research expenditures in time *t-1* subsequently improves its

[16] The actual number of universities ranked in a given year is dependent on the number of universities reporting and the amount received.

ranking relative to other universities by 25.9 positions. Column 3 controls for the level of research spending of a university by including *ResExp* in the model and the coefficient on *PosU* remains significant at the 1% level with little reduction in magnitude at 20.4 positions[17]. These results are consistent with the interpretation that universities with positive discretionary research expenditures receive a larger portion of the available federal funds relative to other universities in a given year. Overall, this evidence supports H2 which predicts that discretionary research expenditures will subsequently lead to additional sources of university funds.

[17] Results are qualitatively similar when including university fixed effect in the model, however *PosU* is no longer significant. For 90% of the universities in my sample, *PosU* is either 1 or 0 for the entire sample period causing *PosU* to be highly correlated with university fixed effects.

CHAPTER SIX

SUPPLEMENTAL ANALYSIS

6.1 Supplemental Analysis

Overall, the main results support both H1 and H2, however, there are some limitations in both the data used and the tests performed in the main analysis. First, the descriptive statistics in Table 2 show that many of the financial variables used in Equation 1 are skewed even after scaling by student FTE and winsorizing at the 1st and 99th percentiles. This implies that some of the main results are driven by those observations with the highest research expenditures. Second, the Carnegie classification schedule that is used to proxy for university prestige are not consistent throughout the whole sample period and changes occur only in years 2005 and 2010. This limits the ability of the model used to detect the true impact that discretionary research expenditures have on university prestige. Finally, the ordering of the variable Prestige may not actually reflect the true prestige of the university. For instance, many of the special focus institutions (Prestige = 2) may be more similar to doctoral institutions (Prestige = 6, 7, or 8) and any movement of an institution from special focus to doctoral would exaggerate the main results. The following supplemental analyses are provided to help alleviate these concerns.

6.2 Log Transformation

I performed a log transformation by taking the natural log of all the financial variables used in Equation 1 except for *Oth*. Other is a revenue category that includes all the other university revenues that are not included in the other revenue categories. One of the items included in *Oth* is endowment gains and losses which is the only revenue source reported in IPEDS that has negative numbers. Because of the financial crisis that occurred in the middle of my sample period, many universities experience losses in their endowment investments. As a

result, a lot of observations are lost when performing a log transformation on *Oth*. To limit the loss of these observations I exclude the variable *Oth* from Equation 1. Table 9 Panel A shows that the log transformation helped to reduce the skewed distribution of these financial variables. Table 9 Panel B shows the results of an OLS regression of Equation 1 using the log transformed variables with the exception of *Oth*. University and year fixed effects are included and standard errors are clustered by university. Similar to Table 5, column 1 excludes the year interaction terms with each of the revenue sources while column 2 includes them. Coefficient signs and significance in Table 9 are generally similar to those in Table 5. Once again, the purpose of this paper is not to determine the association between revenue source and research expenditures but to obtain the discretionary portion of research expenditures not dictated by revenue source. The discretionary portion of research expenditures, or *Disc lnResExp (u)*, is the residual from the model shown in column 2. I also calculate *Nondis lnResExp* as the difference between *lnResExp* and *Disc lnResExp (u)*.

Table 9 Panel C shows the results of an ordered logit regression of Equation 2 using *lnResExp, Disc lnResExp (u)*, and *Nondis lnResExp*. Year fixed effects are included and standard errors are clustered by university. Column 1 shows the impact of *lnResExp* on *Prestige* whereas column 2 shows the breakout of *Disc ResExp (u)* and *Nondis lnResExp*. Similar to the results in Table 6, the coefficient for *Disc lnResExp (u)* in column 2 is positive and significant at the 1% level while *Nondis lnResExp* is not significant. Column 3 substitutes *lnPosU* which is an indicator variable equal to 1 if *Disc lnResExp (u)* is positive and is zero otherwise; however, the coefficient for *lnPosU* is not significant. Overall, these results are consistent with the main results and support H1 implying that discretionary research expenditures in time *t-1* have a positive impact on university prestige in time *t*.

Table 9 Panel D presents the results of an OLS regression of Equation 3 using *Disc lnResExp (u)*, *Nondis lnResExp*, and *lnPosU*. Year fixed effects are included and standard errors are clustered by university. Column 1 shows the breakout of research expenditures by including both *Disc lnResExp (u)* and *Nondis lnResExp* in the model. The coefficients for *Disc lnResExp (u)* and *Nondis lnResExp* are both negative and significant at the 1% level. This is similar to the results shown in Table 8 and implies that both *Disc lnResExp (u)* and *Nondis lnResExp* have an impact on subsequent federal funding and there is no statistical difference in the magnitude of each coefficient. This makes it difficult to determine if one is more impactful than the other on subsequent university funding. Column 2 incorporates *lnPosU* into the model which shows a coefficient that is negative and significant at the 10% level. Interpreting the coefficient implies that a university that has positive discretionary research expenditures in time *t-1* has an average increase in the rank level of federal funding in time *t* by 10 positions relative to other universities. These results are similar to those reported in the main analysis and support H2.

6.3 Carnegie Classification Changes

As discussed in section 4.1, changes to the Carnegie classification that occurred during my sample period occurred in years 2005 and 2010. The classification system from 2000 to 2005 is not exactly the same as the classification system that was used post 2005. Because of how Prestige is calculated (see Appendix A), the changes in Prestige that occur in 2005 may be the result of the expansion of categories rather than the results of spending on research expenditures. However, the classifications used pre- and post- the change in 2010 are much more similar and should not impact any changes in Prestige during this time. Therefore, in an attempt to control for the classifications used during this time, I drop observations from before 2005 and focus on the change in 2010. Further, because the Carnegie classification system

became more standardized during this period, it is reasonable to assume that university administrators anticipated the 2010 change. If administrators are making discretionary accounting choices with research expenditures, they may only attempt to do this in those years leading up to the change. Therefore, I create another indicator variable, *RankYr*, that is equal to 1 if the year is 2008 or 2009 and is zero otherwise. If discretionary research expenditures are more impactful in these years leading up to a change then the coefficient of an interaction term between discretionary research expenditures and *RankYr* should be positive.

Table 10 Panel A presents the result of an ordered logit regression of Equation 2 using only those observations beginning in 2005. Year fixed effects are included and standard errors are clustered by university. Column 1 incorporates the original *Disc ResExp (u)* as calculated in the main analysis whereas column 2 incorporates *Disc lnResExp (u)* which is the residual from the log transformation model used in section 6.2. In each column I interact discretionary research expenditures with the *RankYr* indicator variable. The main effects of *Disc ResExp (u)* and *Disc lnResExp (u)* are both positive and significant at the 1% level and are consistent with the results reported in Table 6 and Table 9 respectively. Coefficient on the interaction of (u) and *RankYr* is significantly negative in column 1, opposite from predicted, but is positive and not significant in column 2. These results imply that the discretionary research expenditures are not necessarily more meaningful in these years or that those preparing the Carnegie classification are able to see through the discretionary accounting choice. The overall effect of discretionary research expenditures, the sum of the main effect and the interaction, remains positive and significant in both columns 1 and 2 as shown in Table 10 Panel B.

6.4 Special Focus Institutions

In order to address the possibility that special focus institutions are driving the results in the main analysis I exclude all institutions all institutions with *Prestige* equal to 2. I estimate each equation using only those institutions with Prestige greater than 2. In addition, it's reasonable to assume that master's universities (Prestige = 3, 4, and 5) treat research expenditures differently than doctoral universities (Prestige = 6, 7, and 8). Therefore, I also estimate each equation for just master's universities and just doctoral universities. Table 11 presents the results of this process using the original financial variables for Equation 1 from the main analysis whereas Table 12 presents the results of this process using the log transformed financial variables in Equation 1. Table 11 Panel A and Table 12 Panel A present the results of Equation 1 for each group of universities described above. Discretionary research expenditures used in subsequent equations for each group are the residual from the respective regression of Equation 1 for that group.

Table 11 Panel B presents the ordered logit regression results of Equation 2 for each group of universities. Column 1 is for all universities excluding special focus institutions, column 2 incorporates just master's universities, and column 3 uses only doctoral universities. The coefficient for *Disc ResExp (u)* in column 1 is positive and significant at the 5% level while the coefficient for *Nondis ResExp* is not significant. This is consistent with the results in the main analysis. However, neither coefficient is significant in column 2 while both are significant in column 3. These results generally support H1 but implies that research expenditures are more important for doctoral university prestige than for master's universities. Table 11 Panel C presents the OLS regression results of Equation 3. Once again, the results in Column 1 are consistent with the main analysis but is not supported in both columns 2 and 3. The coefficient

for *PosU* is negative and significant at the 1% level in column 1 but is not significant in columns 2 and 3. These results do not support H2.

Table 12 Panel B presents the ordered logit regression results of Equation 2 for each group of universities when discretionary research expenditures were calculated using log transformed financial variables. Similar to Table 11, the coefficient for *Disc lnResExp (u)* is positive and significant at the 1% level while the coefficient for *Nondis lnResExp* is not significant. However, neither coefficient is significant in column 2 while both are significant in column 3. This is further evidence to support H1 with the caveat that research expenditures are more important for doctoral universities than for master's universities. Table 12 Panel C reports the OLS regressions results of Equation 3. The coefficient for *lnPosU* is not significant in any of the columns and these results do not support H2.

CHAPTER SEVEN

CONCLUSION

7.1 Conclusion

Annual university rankings have become popular over time with rankings published by U.S. News and World Report, Forbes, The Wall Street Journal, and Money Magazine among others. Many of these ranking systems are partly based on the level of expenditures that support research endeavors by the university. This practice provides incentive for university administrators to overstate research expenditures in an effort to improve the prestige of the institution. The results of this study are consistent with the interpretation that administrators are concerned with institutional prestige and that they make discretionary accounting choices to improve the prestige of the institution. Specifically, my results indicate that for universities in my sample, the average partial effects of having positive discretionary research expenditures increase the probability of being categorized as a doctoral university with moderate to high research activity by 5% to 7% respectively. In addition, I find that universities with positive discretionary research expenditures subsequently increase their level of federal funding relative to other universities by an average of 20.4 positions. These results lead to additional questions for future research about whether discretionary accounting choices within higher education have credit market implications or impact audit outcomes.

The results in this study are limited by an imperfect classification system which limits the ability to distinguish the impact that discretionary accounting choices have on the movement from one classification category to another. Changes in the classification system over time make it difficult to determine if university changes are due to the new classification definition or because of some effort put forth by the university. In addition, the measurement of discretionary

accounting choice is imperfect and these results do not distinguish between changes in classifying research expenditures and actual changes in spending towards research activities.

This study contributes to the literature by exploring the incentives for opportunistic financial reporting in higher education which is an area that has been ignored in the academic literature. This is also the first study to show that administrators have incentive to manage the prestige of the university. These results also show that when modeling university prestige, researchers should be careful to control not only for the level of research expenditures of a university but for the amount of accounting discretion available to administrators when classifying such expenditures. This study should also be of interest to third party users of financial information when preparing university classifications and rankings.

REFERENCES

Baber, W., P. Fairchild, and J. Haggard. 1991. The effect of concern about reported income on discretionary spending decisions: The case of research and development. *The Accounting Review* 66 (4): 818-829.

Beyer, A., D. A. Cohen, T. Z. Lys, and B. R. Walther. 2010. The financial reporting environment: Review of the recent literature. *Journal of Accounting and Economics* 50 (2): 296-343.

Bowen, H. R. 1980. *The costs of higher education: How much do colleges and universities spend per student and how much should they spend?* San Francisco, CA: Jossey-Bass.

Boyd, B. K., D. D. Bergh, and D. J. Ketchen. 2010. Reconsidering the reputation—performance relationship: A resource-based view. *Journal of Management* 36 (3): 588-609.

Brickley, J. A., R. L. Van Horn. 2002. Managerial incentives in nonprofit organizations: Evidence from hospitals. *Journal of Law and Economics* 45 (1): 227-249.

Burgstahler, D., and I. Dichev. 1997. Earnings management to avoid earnings decreases and losses. *Journal of Accounting and Economics* 24 (1): 99-126.

Bushee, B. 1998. The influence of institutional investors on myopic R&D investment behavior. *The Accounting Review* 73 (3): 305-333.

Carnegie Classification of Institutions of Higher Education, The. n.d. *About Carnegie Classification*. Retrieved (September 24, 2016) from http://carnegieclassifications.iu.edu/.

Carnegie Foundation for the Advancement of Teaching. 2001. *The Carnegie classification of institutions of higher education / with a foreword by Lee S. Shulman*. Menlo Park, CA: Carnegie Publications.

Cohn, E., S. L. Rhine, and M. C. Santos. 1989. Institutions of higher education as multi-product firms: Economies of scale and scope. *The review of economics and statistics* 71 (2): 284-290.

Cyrenne, P., and H. Grant. 2009. University decision making and prestige: An empirical study. *Economics of Education Review* 28 (2): 237-248.

Dechow, P., and R. Sloan. 1991. Executive incentives and the horizon problem: An empirical investigation. *Journal of Accounting and Economics* 14 (1): 51-89.

Dechow, P., W. Ge, and C. Schrand. 2010. Understanding earnings quality: A review of the proxies, their determinants and their consequences. *Journal of Accounting and Economics* 50 (2): 344-401.

Ehrenberg, R. G., M. J. Rizzo, and G. H. Jakubson. 2007. Who bears the growing cost of science at universities? In P. Stephan and R. G. Ehrenberg (Eds.), *Science and the University* (pp. 19-35) Madison, WI: University of Wisconsin Press.

Eldenburg, L., B. E. Hermalin, M. S. Weisbach, and M. Wosinkska. 2004. Governance, performance objectives and organizational form: evidence from hospitals. *Journal of Corporate Finance* 10 (4): 527-548.

Engstrom, J. H., and C. Esmond-Kiger. 1997. Different formats, same user needs: a comparison of the FASB and GASB college and university financial reporting models. *Accounting Horizons* 11 (3): 16-34.

Fama, E. F., and M. C. Jensen. 1983. Agency problems and residual claims. *The Journal of law & Economics* 26 (2): 327-349.

Felix, R. 2015. The Use of Inter-Fund Transfers to Manage the "Bottom Line" in the Municipal Context. *Journal of Governmental & Nonprofit Accounting* 4 (1): 17-31.

Fischer, M. 1997. Two accounting standard setters. *Journal of Public Budgeting, Accounting and Financial Management* 9 (2): 251-284.

Fischer, M., T. P. Gordon, and M. A. Kraut. 2010. Meeting user information needs: The impact of major changes in FASB and GASB standards on financial reporting by colleges and universities. *Journal of Accounting and Public Policy* 29 (4): 374-399.

Goldstein, L. and S. Menditto. 2005. GASB and FASB. *NACUBO Business Officer* 38 (7): 21-26.

Habib, A., and J. C. Hansen. 2008. Target shooting: Review of earnings management around earnings benchmarks. *Journal of Accounting Literature* 27: 25-70.

Healy, P. M., and J. M. Wahlen. 1999. A review of the earnings management literature and its implications for standard setting. *Accounting Horizons* 13 (4): 365-383.

Hofmann, M. A., and D. McSwain. 2013. Financial disclosure management in the nonprofit sector: A framework for past and future research. *Journal of Accounting Literature* 32 (1): 61-87.

Jensen, M. C., and W. H. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3 (4): 305-360.

Johnes, G., and J. Johnes. 2009. Higher education institutions' costs and efficiency: Taking the decomposition a further step. *Economics of Education Review* 28 (1): 107-113.

Kido, N., R. Petacchi, and J. Weber. 2012. The influence of elections on the accounting choices of governmental entities. *Journal of Accounting Research* 50 (2): 443-476.

Kitching, K. 2009. Audit value and charitable organizations. *Journal of Accounting and Public Policy* 28 (6): 510-524.

Leone, A. J., and R. L. Van Horn. 2005. How do nonprofit hospitals manage earnings? *Journal of Health Economics* 24 (4): 815-837.

Leslie, L. L., S. Slaughter, B. J. Taylor, and L. Zhang. 2012. How do revenue variations affect expenditures within US research universities? *Research in Higher Education* 53 (6): 614-639.

McVay, S. E. 2006. Earnings management using classification shifting: An examination of core earnings and special items. *The Accounting Review* 81 (3): 501-531.

Morphew, C. C., and B. D. Baker. 2004. The cost of prestige: Do new research I universities incur higher administrative costs? *The Review of Higher Education* 27 (3): 365-384.

Newhouse, J. P. 1970. Toward a theory of nonprofit institutions: An economic model of a hospital. *The American Economic Review* 60 (1): 64-74.

Omer, T. C., and R. J. Yetman. 2003. Near zero taxable income reporting by nonprofit organizations. *Journal of the American Taxation Association* 25 (2): 19-34.

Parsons, L. M. 2003. Is accounting information from nonprofit organizations useful to donors? A review of charitable giving and value-relevance. *Journal of Accounting Literature* 22: 104-129.

Rindova, V. P., I. O. Williamson, A. P. Petkova, and J. M. Sever. 2005. Being good or being known: An empirical examination of the dimensions, antecedents, and consequences of organizational reputation. *Academy of Management Journal* 48 (6): 1033-1049.

Vermeer, T. E., C. T. Edmonds, and S. C. Asthana. 2014. Organizational Form and Accounting Choice: Are Nonprofit or For-Profit Managers More Aggressive? *The Accounting Review* 89 (5): 1867-1893.

Volkwein, J. F., and K. V. Sweitzer. 2006. Institutional prestige and reputation among research universities and liberal arts colleges. *Research in Higher Education* 47 (2): 129-148.

Weingast, B. R. 1984. The congressional-bureaucratic system: A principal agent perspective (with applications to the SEC). *Public Choice* 44 (1): 147-191.

TABLES AND FIGURES

Figure 1 – Example Statement of Revenues, Expenses, and Changes in Net Position from a large U.S. Public University

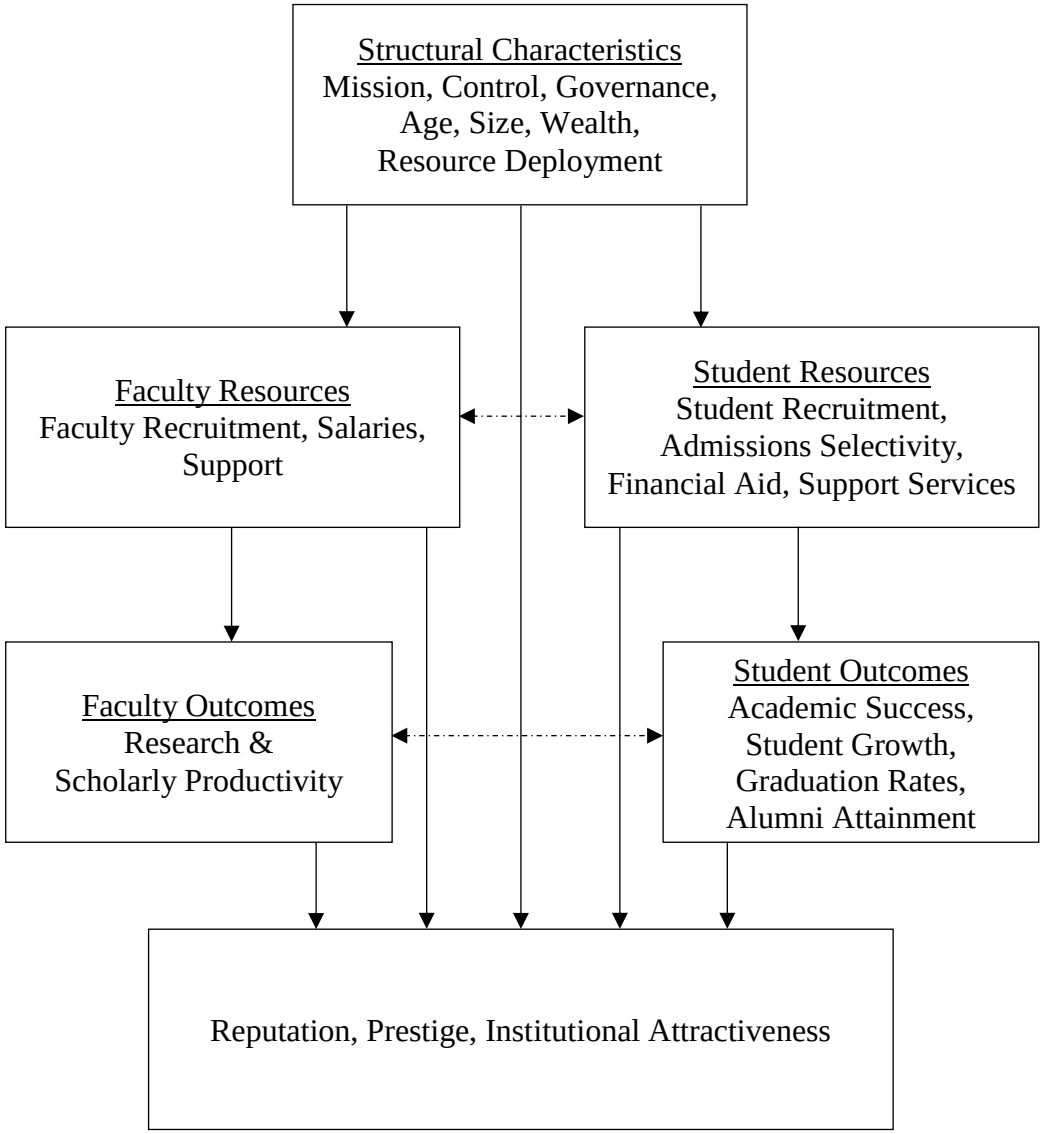
STATEMENT OF REVENUES, EXPENSES, AND CHANGES IN NET POSITION

For the year ended June 30, 2015 with comparative financial information for the year ended June 30, 2014

(all dollars in thousands)

	2015		2014	
	University	Component Units	University	Component Units
OPERATING REVENUES				
Student tuition and fees, net *(Note 1)*	$ 411,207	$ -	$ 383,566	$ -
Gifts and contributions	-	58,598	-	51,692
Federal appropriations	17,439	-	15,123	-
Federal grants and contracts	210,332	-	222,708	-
Federal ARRA grants and contracts	1,467	-	3,399	-
State grants and contracts	14,214	-	12,670	-
Local grants and contracts *(Note 3)*	14,349	-	13,977	-
Nongovernmental grants and contracts	37,661	-	35,871	-
Sales and services of educational activities	17,345	-	16,279	-
Auxiliary enterprise revenue, net *(Note 1)*	234,640	45,682	223,228	44,827
Other operating revenues	6,368	60,584	10,640	60,535
Total operating revenues	965,022	164,864	937,461	157,054
OPERATING EXPENSES				
Instruction	318,725	4,920	298,752	2,920
Research	304,657	10,838	308,297	9,946
Public service	101,403	4,634	102,743	4,610
Academic support	80,852	16,219	79,381	14,746
Student services	14,628	-	14,852	-
Institutional support	56,917	40,795	58,143	39,339
Operation and maintenance of plant	77,482	13,008	79,567	12,294
Student financial assistance	13,474	25,036	12,242	25,110
Auxiliary enterprises	196,212	36,060	181,532	37,613
Depreciation and amortization *(Note 9)*	95,163	10,122	91,629	10,468
Other operating expenses	60	17,864	90	12,510
Total operating expenses	1,259,573	179,496	1,227,228	169,556
OPERATING LOSS	(294,551)	(14,632)	(289,767)	(12,502)
NON-OPERATING REVENUES (EXPENSES)				
State appropriations *(Note 21)*	242,831	-	243,593	-
Gifts	60,259	-	60,489	-
Non-operating grants and contracts	2,027	-	2,615	-
Federal student financial aid (Pell)	17,218	-	16,830	-
Investment income, net	3,271	18,858	12,858	11,411
Net gain on investments	-	11,979	-	98,796
Other non-operating revenue *(Note 30)*	8,856	-	684	-
Interest expense on debt related to capital assets	(18,424)	(9,815)	(18,605)	(9,751)
Net non-operating revenues (expenses)	316,038	21,022	318,464	100,456
INCOME BEFORE OTHER REVENUES, EXPENSES, GAINS, OR LOSSES	21,487	6,390	28,697	87,954
Change in valuation of split interest agreements	-	(3,761)	-	3,297
Capital grants and gifts *(Note 10)*	52,761	10,611	75,927	11,796
Loss on disposal of capital assets	(967)	(1)	(1,581)	(10)
Additions to permanent endowments	-	29,330	-	17,610
Other expenses	-	(1,092)	-	(1,147)
Total other revenues, expenses, gains, and losses	51,794	35,087	74,346	31,546
INCREASE IN NET POSITION	73,281	41,477	103,043	119,500
Net position—beginning of year *(Note 1)*	1,143,398	1,034,798	1,433,123	915,298
Net position—end of year	$ 1,216,679	$ 1,076,275	$ 1,536,166	$ 1,034,798

Figure 2 - Institutional Prestige & Reputation



Volkwein and Sweitzer (2006)

Table 1 – Sample Composition

Panel A – Sample Selection Process

	Unique Institutions	Institution Years
Institutions with Prestige Rank > = 2 (Carnegie 2015 Edition)	2,147	
Merge with IPEDS database 2000-2013	1,911	25,036
Less: Missing Tuition Revenue	(11)	(249)
Less: Missing Research Expenditures	(934)	(13,054)
Less Equation 2 Control Variables:		
Missing Publication Data	(528)	(5,976)
Missing SAT Scores	(52)	(1,495)
Missing Graduation Rate	(2)	(42)
Missing Faculty Count	-	(3)
Final Sample	384	4,217
Included in HERD Survey (2005-2013)	339	2,586

Panel B – Institutional Prestige Rank by Year

Academic Year	Institution Prestige Rank								Grand Total
	0	2	3	4	5	6	7	8	
2002		30		8	119		56	113	326
2003		32		8	125		56	116	337
2004		33		9	131		57	116	346
2005		35	11	27	97	40	44	93	347
2006		33	11	27	99	40	44	93	347
2007		36	12	27	99	41	44	93	352
2008	1	37	11	29	100	40	44	93	355
2009	1	39	10	31	100	38	44	93	356
2010		40	13	23	107	44	32	103	362
2011		40	14	22	108	45	31	103	363
2012		41	14	22	107	45	30	103	362
2013		44	14	21	107	46	29	103	364
Grand Total	2	440	110	254	1,299	379	511	1,222	4,217

Table 2 – Descriptive Statistics						
	N	**Mean**	**Std. Dev.**	**P25**	**Median**	**P75**
Panel A – Research Expenditures						
ResExp	4,217	5,357.048	9,807.009	188.295	1,098.234	6,468.687
Disc ResExp (u)	4,217	-0.000	4,573.334	-2,282.501	-1,414.949	822.850
Panel B - Equation 1 Variables						
Tuit	4,217	15,245.439	12,121.021	6,593.596	9,033.607	23,651.631
Appr	4,217	6,075.261	5,134.747	278.916	5,809.794	8,908.709
Grnts	4,217	8,087.414	10,769.231	2,195.431	3,954.235	9,114.517
Gifts	4,217	3,780.661	8,122.054	117.918	610.237	2,781.238
Aux	4,217	4,349.252	3,202.162	2,064.929	3,624.825	5,702.404
Oth	4,217	11,813.674	36,806.119	203.680	753.649	4,385.016
Hosp	4,217	0.106	0.308	0.000	0.000	0.000
DrSch	4,217	0.501	0.500	0.000	1.000	1.000
%DrDeg	4,217	0.023	0.033	0.000	0.010	0.038
Panel C - Equations 2 and 3 Variables						
Prestige	4,217	5.775	1.921	5.000	6.000	8.000
Size	4,217	13,805.338	12,142.977	5,424.391	9,724.233	18,980.000
S/F	4,217	16.271	5.712	12.179	16.783	20.365
Sal	4,217	90,453.711	25,989.220	72,476.063	85,226.758	102,470.883
%FT	4,217	0.891	0.075	0.844	0.909	0.950
SAT	4,217	1,108.784	149.719	995.000	1,080.500	1,190.000
Res	4,217	0.793	0.868	0.175	0.415	1.228
Grad	4,217	0.578	0.195	0.429	0.557	0.716
End	4,217	4,444.190	18,160.533	53.173	238.840	1,265.686
Pvt	4,217	0.279	0.448	0.000	0.000	1.000
FedRank	2,586	282.389	200.345	92.000	268.500	442.000

Table Notes:
This table presents descriptive statistics for all variables used in this study. Panel A focuses on research expenditures and its component of discretionary research expenditures which is calculated as the residual from Equation 1, see Table 5. Panel B reports the remaining variables used in Equation 1. Panel C reports variables used in Equations 2 and 3. All variables are winsorized at the 1st and 99th percentiles. Detailed variable definitions are in Appendix B.

Table 3 – Pearson Correlations (Equation 1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) ResExp	--								
(2) Tuit	0.410***	--							
(3) Appr	-0.013	-0.624***	--						
(4) Grnts	0.965***	0.317***	0.073***	--					
(5) Gifts	0.716***	0.673***	-0.397***	0.634***	--				
(6) Aux	0.413***	0.609***	-0.176***	0.360***	0.570***	--			
(7) Oth	0.659***	0.420***	-0.178***	0.632***	0.673***	0.406***	--		
(8) Hosp	0.359***	0.120***	0.194***	0.394***	0.145***	0.188***	0.398***	--	
(9) DrSch	0.462***	0.263***	0.114***	0.440***	0.238***	0.225***	0.255***	0.320***	--
(10) %DrDeg	0.777***	0.391***	-0.004	0.739***	0.608***	0.435***	0.594***	0.298***	0.625***

This table reports the pairwise Pearson correlation coefficients for variables used in Equation 1. All variables are defined in Appendix B.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4 – Pearson Correlations (Equation 2)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Prestige	--							
(2) Disc ResExp (u)	0.513***	--						
(3) NonDis ResExp	0.358***	0.761***	--					
(4) Size	0.574***	0.155**	0.110***	--				
(5) S/F	-0.330***	-0.554***	-0.505***	-0.035**	--			
(6) Sal	0.352***	0.336***	0.266***	0.299***	-0.183***	--		
(7) %FT	0.217***	0.257***	0.283***	0.130***	-0.249***	0.095***	--	
(8) SAT	0.354***	0.641***	0.471***	0.163***	-0.679***	0.483***	0.304***	--
(9) Res	0.636***	0.686***	0.586***	0.369***	-0.507***	0.553***	0.319***	0.659***
(10) Grad	0.338***	0.535***	0.362***	0.173***	-0.608***	0.487***	0.287***	0.879***
(11) End	0.132***	0.460***	0.391***	-0.047***	-0.358***	0.235***	0.160***	0.445***
(12) Hosp	0.360***	0.282***	0.254***	0.317***	-0.393***	0.142***	0.156***	0.243***
(13) Pvt	0.042***	0.392***	0.195***	-0.259***	-0.563***	0.317***	-0.072***	0.589***

	(09)	(10)	(11)	(12)
(10) Grad	0.584***	--		
(11) End	0.343***	0.373***	--	
(12) Hosp	0.326***	0.222***	0.093***	--
(13) Pvt	0.224***	0.585***	0.340***	0.042***

This table reports the pairwise Pearson correlation coefficients for variables used in Equation 2. All variables are defined in Appendix B.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5 – Discretionary Research Expenditures

	(1) ResExp	(2) ResExp
Tuit	0.0727***	0.0379
	(0.0242)	(0.0375)
Tuit x Year		0.0005
		(0.0020)
Appr	0.1271**	0.1736***
	(0.0515)	(0.0585)
Appr x Year		-0.0024
		(0.0027)
Grnts	0.5502***	0.4496***
	(0.0921)	(0.0626)
Grnts x Year		0.0106**
		(0.0042)
Gifts	0.0350**	0.0852**
	(0.0169)	(0.0412)
Gifts x Year		-0.0067
		(0.0045)
Aux	-0.0205	-0.0470
	(0.0472)	(0.0554)
Aux x Year		0.0074*
		(0.0042)
Oth	-0.0004	0.0053
	(0.0031)	(0.0084)
Oth x Year		-0.0008
		(0.0007)
Hosp	-510.2623***	-322.2411*
	(171.2738)	(188.8352)
DrSch	-793.2001	-597.8874
	(529.4420)	(373.2785)
%DrDeg	-3,327.8668	-8,945.0757
	(7621.0660)	(8165.0805)
Constant	-510.2815	32.4550
	(599.1162)	(738.2504)
Univ FE	Yes	Yes
Year FE	Yes	Yes
Observations	4,217	4,217
Adjusted R^2	0.3980	0.4383

Table Notes:

This table presents the OLS regression estimate of Equation 1:

$$ResExp_{it} = \alpha_0 + \alpha_1 Tuit_{it} + \alpha_2 Appr_{it} + \alpha_3 Grnts_{it} + \alpha_4 Gifts_{it} + \alpha_5 Aux_{it} + \alpha_6 Oth_{it} + \alpha_7 Hosp_{it} + \alpha_8 DrSch_{it} + \alpha_9 \%DrDeg_{it} + u_{it}$$

Year interaction terms are excluded from column 1 but are included in column 2. University and Year indicator variables are included but coefficient estimates are suppressed. All variables are defined in Appendix B. Standard errors, in parentheses, are clustered by university. All p-values are based on two-tailed t tests.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6 – University Prestige

	Prediction	(1) Prestige	(2) Prestige	(3) Prestige
ResExp	+		0.0003*	
			(0.0002)	
Disc ResExp (u)	+			0.0008***
				(0.0002)
Nondis ResExp	+			0.0000
				(0.0002)
Size	+	0.0002***	0.0002***	0.0001***
		(0.0000)	(0.0000)	(0.0000)
S/F	-	-0.0878***	-0.0231	-0.1156***
		(0.0374)	(0.0467)	(0.0427)
Sal	+	0.0000	0.0000	0.0000**
		(0.0000)	(0.0000)	(0.0000)
%FT	+	0.6405	-0.6393	0.2251
		(1.4360)	(1.5801)	(1.4240)
SAT	+	-0.0063	-0.0070	-0.0093
		(0.0022)	(0.0021)	(0.0020)
Res	+	3.4847***	2.3751**	2.1187**
		(0.8375)	(1.1555)	(1.1144)
Grad	+	1.1919	2.0011**	2.1893**
		(0.9445)	(0.9260)	(0.9744)
End	+	0.0000	-0.0000	-0.0000
		(0.0000)	(0.0000)	(0.0000)
Hosp	+	1.2132***	0.7370*	1.4963**
		(0.4519)	(0.4830)	(0.7784)
Pvt	+	0.4485	0.6459**	-0.5940
		(0.3610)	(0.3550)	(0.4069)
Year FE		Yes	Yes	Yes
Observations		3,814	3,814	3,814
Pseudo R^2		0.3612	0.3820	0.4170

Table Notes:

This table presents the ordered logit regression estimate of Equation 2:

$$Prestige_{it} = \beta_0 + \beta_1 u_{it-1} + \beta_2 Size_{it-1} + \beta_3 S/F_{it-1} + \beta_4 Sal_{it-1} + \beta_5 \%FT_{it-1} + \beta_6 SAT_{it-1} + \beta_7 Res_{it-1} + \beta_8 Grad_{it-1} + \beta_9 End_{it-1} + \beta_{10} Hosp_{it-1} + \beta_{11} Pvt_{it-1} + \varepsilon_{it}$$

Column 1 presents the effects of the control variables. Column 2 introduces research expenditures into the model. Column 3 presents a breakout of research expenditures into the discretionary portion and the nondiscretionary portion. Year indicator variables are included but coefficient estimates are suppressed. Estimates for each constant level for Prestige are also suppressed. All variables are defined in Appendix B. Standard errors, in parentheses, are clustered by university. P-values are based on one-tailed t tests for directional predictions.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7 – University Prestige

Panel A – Positive Discretionary Research Expenditures

	Prediction	(1) Prestige	(2) Prestige
PosU (=1 if u > 0)	+	2.2279***	1.7698***
		(0.4985)	(0.5244)
ResExp	+		0.0002
			(0.0002)
Size	+	0.0002***	0.0002***
		(0.0000)	(0.0000)
S/F	-	-0.0816**	-0.0407
		(0.0360)	(0.0433)
Sal	+	0.0000*	0.0000*
		(0.0000)	(0.0000)
%FT	+	0.2848	-0.4329
		(1.3886)	(1.4895)
SAT	+	-0.0071	-0.0074
		(0.0021)	(0.0020)
Res	+	2.5885***	1.9971**
		(0.8876)	(1.1080)
Grad	+	1.7159**	2.1616***
		(0.9095)	(0.8962)
End	+	0.0000	-0.0000
		(0.0000)	(0.0000)
Hosp	+	1.4811***	1.1027**
		(0.5780)	(0.6296)
Pvt	+	0.1275	0.3271
		(0.3641)	(0.3643)
Year FE		Yes	Yes
Observations		3,814	3,814
Pseudo R^2		0.3841	0.3947

Table 7 – University Prestige

Panel B – Marginal Effect of PosU

	(1) dy/dx(PosU)	(2) dy/dx(PosU)
Prestige		
= 2	-0.1607***	-0.1263***
= 3	-0.0295***	-0.0234***
= 4	-0.0487***	-0.0378***
= 5	0.0328	0.0261*
= 6	0.0606***	0.0489***
= 7	0.0511***	0.0451***
= 8	0.0944***	0.0674***

Table Notes:

Panel A presents the ordered logit regression estimate of Equation 2:

$$Prestige_{it} = \beta_0 + \beta_1 u_{it-1} + \beta_2 Size_{it-1} + \beta_3 S/F_{it-1} + \beta_4 Sal_{it-1} + \beta_5 \%FT_{it-1} + \beta_6 SAT_{it-1} + \beta_7 Res_{it-1} + \beta_8 Grad_{it-1} + \beta_9 End_{it-1} + \beta_{10} Hosp_{it-1} + \beta_{11} Pvt_{it-1} + \varepsilon_{it}$$

The independent variable *u* is an indicator variable equal to 1 if the university has positive discretionary research expenditures in time *t-1*. Column 2 adds total research expenditures to control for the research spending by the university in time *t-1*. Year indicator variables are included but coefficient estimates are suppressed. Estimates for each constant level for Prestige are also suppressed. All variables are defined in Appendix B. Standard errors, in parentheses, are clustered by university. P-values are based on one-tailed t tests for directional predictions.

Panel B presents the marginal effects of a university being a positive discretionary research expenditure university in time *t-1* for each level of Prestige in time *t*.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8 – Federal Research and Development Funds

	Prediction	(1) FedRank	(2) FedRank	(3) FedRank
Disc ResExp (u)	-	-0.0025**		
		(0.0013)		
Nondis ResExp	-	-0.0019***		
		(0.0007)		
PosU (=1 if u > 0)	-		-25.8824***	-20.4136***
			(5.8517)	(5.5764)
ResExp	-			-0.0029***
				(0.0010)
Size	-	-0.0087***	-0.0087***	-0.0086***
		(0.0007)	(0.0007)	(0.0007)
S/F	+	6.4756***	6.9791***	6.0834***
		(1.1551)	(1.1317)	(1.1868)
Sal	-	0.0001	0.0002	0.0001
		(0.0001)	(0.0002)	(0.0001)
%FT	-	-151.8109***	-177.9843***	-153.8122***
		(49.5208)	(49.2495)	(49.3412)
SAT	-	-0.0605*	-0.0722**	-0.0522
		(0.0418)	(0.0420)	(0.0418)
Res	-	-52.5549***	-58.6111***	-49.3868***
		(7.1098)	(6.8214)	(7.2831)
Grad	-	-6.6194	1.9405	2.6051
		(36.0373)	(36.0181)	(35.7298)
End	-	0.0001	0.0001	0.0002
		(0.0000)	(0.0000)	(0.0000)
Hosp	-	-13.6091***	-14.4241***	-13.0737***
		(3.8652)	(4.1027)	(3.8952)
Pvt	-	6.1686	0.1686	4.4978
		(20.9317)	(20.6373)	(19.9748)
Constant		569.8451***	591.3015***	570.5222***
		(66.0833)	(66.2040)	(64.5552)
Year FE		Yes	Yes	Yes
Observations		2,556	2,556	2,556
Adjusted R^2		0.0637	0.0608	0.0627

Table Notes:

This table presents the OLS regression results of Equation 4:

$$FedRank_{it} = \beta_0 + \beta_1 u_{it-1} + \beta_2 Size_{it-1} + \beta_3 S/F_{it-1} + \beta_4 Sal_{it-1} + \beta_5 \%FT_{it-1} + \beta_6 SAT_{it-1} + \beta_7 Res_{it-1} + \beta_8 Grad_{it-1} + \beta_9 End_{it-1} + \beta_{10} Hosp_{it-1} + \beta_{11} Pvt_{it-1} + \varepsilon_{it}$$

Column 1 reports the effects of discretionary and nondiscretionary research expenditures in time *t-1* on the rank level of federal funding in time *t*. Column 2 substitutes an indicator variable equal to 1 if a university has positive discretionary research expenditures in time *t-1*. Column 3 also uses an indicator variable equal to 1 if a university has positive discretionary research expenditures and controls for the level of research spending by a university in time *t-1*. Year indicator variables are included but coefficient estimates are suppressed. All variables are defined in Appendix B. Standard errors, in parentheses, are clustered at the university level. P-values are based on one-tailed t tests for directional predictions, two-tailed otherwise.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9 – Log Transformation

Panel A – Descriptive Statistics

	N	Mean	Std. Dev.	P25	Median	P75
lnResExp	4,217	6.876	2.221	5.243	7.002	8.775
Disc lnResExp (u)	4,217	0.000	1.731	-1.205	0.278	1.510
lnTuit	4,217	9.354	0.721	8.794	9.109	10.071
lnAppr	4,217	6.844	3.619	5.634	8.667	9.095
lnGrnts	4,217	8.407	1.063	7.695	8.283	9.118
lnGifts	4,217	6.046	2.756	4.778	6.415	7.931
lnAux	4,217	8.081	0.860	7.633	8.196	8.649

Table 9 – Log Transformation		
Panel B – Discretionary Research Expenditures Log Model		
	(1)	(2)
	lnResExp	lnResExp
lnTuit	0.4083***	0.3215**
	(0.1281)	(0.1481)
lnTuit x Year		0.0337***
		(0.0104)
lnAppr	0.0184	0.0178
	(0.0118)	(0.0170)
lnAppr x Year		0.0007
		(0.0013)
lnGrnts	0.3710***	0.4504***
	(0.0800)	(0.0803)
lnGrnts x Year		-0.0044
		(0.0032)
lnGifts	0.0232	0.0427*
	(0.0155)	(0.0239)
lnGifts x Year		-0.0018
		(0.0020)
lnAux	0.1309*	0.1811*
	(0.0777)	(0.0948)
lnAux x Year		-0.0067
		(0.0064)
Hosp	-0.0042	0.0120
	(0.0342)	(0.0324)
DrSch	-0.1334	-0.1138
	(0.1014)	(0.1021)
%DrDeg	-1.0627	-0.5943
	(1.0333)	(1.0533)
Constant	-1.2431	-2.2812
	(1.5050)	(1.5983)
Univ FE	Yes	Yes
Year FE	Yes	Yes
Observations	4,217	4,217
Adjusted R^2	0.0605	0.0778

Table 9 – Log Transformation				
Panel C – University Prestige Log Model				
	Prediction	(1) Prestige	(2) Prestige	(3) Prestige
lnResExp	+	0.3418***		0.2703***
		(0.0976)		(0.0927)
Disc lnResExp (u)	+		0.3551***	
			(0.0910)	
Nondis lnResExp	+		0.1601	
			(0.4741)	
lnPosU (=1 if u > 0)	+			0.3961
				(0.3581)
Size	+	0.0001***	0.0001***	0.0001***
		(0.0000)	(0.0000)	(0.0000)
S/F	-	-0.0419	-0.0505*	-0.0426
		(0.0347)	(0.0382)	(0.0345)
Sal	+	0.0000	0.0000	0.0000
		(0.0000)	(0.0000)	(0.0000)
%FT	+	-1.3199	-1.2321	-1.4029
		(1.3795)	(1.3976)	(1.3676)
SAT	+	-0.0068***	-0.0068***	-0.0066***
		(0.0021)	(0.0021)	(0.0022)
Res	+	2.8801***	2.9242***	2.8081***
		(0.8721)	(0.9145)	(0.8876)
Grad	+	1.8756**	1.9516**	1.9315**
		(0.9248)	(0.9278)	(0.9157)
End	+	0.0000	0.0000	0.0000
		(0.0000)	(0.0000)	(0.0000)
Hosp	+	1.2428***	1.2741***	1.2466***
		(0.4376)	(0.4526)	(0.4363)
Pvt	+	0.3789	0.4096	0.3873
		(0.3621)	(0.3654)	(0.3591)
Year FE		Yes	Yes	Yes
Observations		3,814	3,814	3,814
Pseudo R^2		0.3720	0.3721	0.3728

Table 9 – Log Transformation			
Panel D – Federal R&D Funds Log Model			
	Prediction	(1) FedRank	(2) FedRank
Disc lnResExp (u)	-	-39.4807***	
		(9.1718)	
NonDis lnResExp	-	-59.5782***	
		(15.1145)	
lnResExp	-		-40.4955***
			(8.8385)
lnPosU (=1 if u > 0)	-		-10.0279*
			(7.0819)
Size	-	-0.0073***	-0.0072***
		(0.0008)	(0.0007)
S/F	+	3.6471***	4.0862***
		(1.4236)	(1.2661)
Sal	-	0.0002*	0.0001
		(0.0001)	(0.0001)
%FT	-	-46.0352	-54.7807
		(46.4780)	(49.7009)
SAT	-	-0.0364	-0.0383
		(0.0389)	(0.0391)
Res	-	-37.1903***	-39.5056***
		(8.2890)	(8.4649)
Grad	-	20.8720	14.3306
		(32.7539)	(32.1226)
End	-	0.0001***	0.0001***
		(0.0000)	(0.0000)
Hosp	-	-8.7626***	-9.3562***
		(3.1881)	(3.1325)
Pvt	-	19.4655	12.4991
		(15.9198)	(16.2068)
Constant		842.7603***	727.5834***
		(127.3454)	(70.9453)
Year FE		Yes	Yes
Observations		2,556	2,556
Adjusted R^2		0.0890	0.0865

Table Notes:

Panel A shows descriptive statistics for the log transformation of variables used in Equation 1. Discretionary Research Expenditures represent the residuals from Panel B Column 2.

Panel B reports the OLS regression estimates of Equation 1. Year interaction terms are excluded from column 1 but are included in column 2. University and year indicator variables are included but coefficient estimates are suppressed.

Panel C reports the ordered logistic regression estimates for Equation 2. Column 1 reports results using total lnResExp as an independent variable. Column 2 breaks lnResExp into the discretionary portion and the nondiscretionary portion. Column 3 substitutes an indicator variable equal to 1 if

discretionary research expenditures are positive, 0 otherwise. Year indicator variables are included but coefficient estimates are suppressed. Estimates for each constant level of Prestige are also suppressed.

Panel D reports the OLS regression estimates of Equation 4. Column 1 presents a breakout of lnResExp in the discretionary portion and the nondiscretionary portion. Column 2 substitutes an indicator variable equal to 1 if discretionary lnResExp is positive, and is 0 otherwise. Year indicator variables are included but coefficient estimates are suppressed.

All variable definitions can be found in Appendix B. All standard errors, in parentheses, have been clustered at the university level. All p-values are based on one-tailed t tests for directional predictions, two-tailed otherwise

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10 – Carnegie Classification Change

Panel A – University Prestige 2010 Change

	Prediction	(1) Prestige	(2) Prestige
Disc ResExp (u)	+	0.0008***	
		(0.0003)	
Disc lnResExp (u)	+		0.3551***
			(0.1010)
RankYr	+/-	-0.8167***	-0.2417*
		(0.1690)	(0.1462)
(u) x RankYr	+	-0.0001***	0.0146
		(0.0000)	(0.0301)
NonDis ResExp	+	0.0001	
		(0.0002)	
NonDis lnResExp	+		0.2135
			(0.5060)
Size	+	0.0001***	0.0001***
		(0.0000)	(0.0000)
S/F	-	-0.1221***	-0.0512
		(0.0490)	(0.0414)
Sal	+	0.0000**	0.0000
		(0.0000)	(0.0000)
%FT	+	0.4164	-1.0891
		(1.5368)	(1.4718)
SAT	+	-0.0090***	-0.0066***
		(0.0020)	(0.0022)
Res	+	2.3818**	3.1097***
		(1.1585)	(0.9421)
Grad	+	2.1156**	1.8584**
		(1.0140)	(0.9753)
End	+	-0.0000**	0.0000
		(0.0000)	(0.0000)
Hosp	+	1.2875*	1.1533***
		(0.8450)	(0.4910)
Pvt	+	-0.6971*	0.3570
		(0.4659)	(0.3859)
Year FE		Yes	Yes
Observations		3,153	3,153
Pseudo R^2		0.4258	0.3781

Table 10 – Carnegie Classification Change		
Panel B – Test of Discretionary Research Expenditures		
u + (u x RankYr)	0.0007	0.3697
Test: u + (u x RankYr) = 0		
χ^2	5.89	13.61
Prob > χ^2	0.0152	0.0002

Table Notes:
Panel A reports the ordered logit regression results for Equation 2 for observations beginning in the year 2005 to the end of the sample period. RankYr is an indicator variable equal to 1 if the year is 2007 or 2008 and 0 otherwise. Column 1 presents the results using the research expenditures as defined in Appendix B. Column 2 presents results using the log transformation of research expenditures. Year indicator variables are included but coefficient estimates are suppressed. Estimates of each constant level of Prestige are also suppressed. All other variables are defined in Appendix B. Standard errors, in parentheses, are clustered at the university level. All p-values are based on one-tailed t tests for directional predictions, two-tailed otherwise.
Panel B reports the test results of the sum of coefficients for discretionary research expenditures and the interaction of discretionary research expenditures and RankYr.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 11 – Exclude Special Focus Institutions			
Panel A – Discretionary Research Expenditures			
	(1)	(2)	(3)
	ResExp	ResExp	ResExp
	(Prestige > 2)	*(2 < Prestige <6)*	*(Prestige > 5)*
Tuit	0.0453	0.0413	0.0969
	(0.0394)	(0.0481)	(0.0640)
Tuit x Year	0.0005	0.0053	-0.0017
	(0.0021)	(0.0034)	(0.0031)
Appr	0.1840***	0.1022*	0.1703***
	(0.0695)	(0.0543)	(0.0593)
Appr x Year	-0.0025	-0.0049	-0.0057*
	(0.0029)	(0.0043)	(0.0029)
Grnts	0.4586***	0.2784**	0.4522***
	(0.0597)	(0.1296)	(0.0669)
Grnts x Year	0.0110**	0.0501**	0.0057*
	(0.0052)	(0.0192)	(0.0032)
Gifts	0.0959*	0.1609	0.0674
	(0.0564)	(0.1262)	(0.0499)
Gifts x Year	-0.0082	-0.0208	-0.0044
	(0.0063)	(0.0142)	(0.0054)
Aux	-0.0452	-0.0525	-0.1002
	(0.0635)	(0.1198)	(0.0767)
Aux x Year	0.0086	0.0067	0.0147**
	(0.0054)	(0.0071)	(0.0061)
Oth	0.0051	0.1095*	0.0028
	(0.0084)	(0.0642)	(0.0086)
Oth x Year	-0.0007	-0.0094*	-0.0004
	(0.0007)	(0.0054)	(0.0006)
Hosp	-331.7610*	-23.2437	-489.5216**
	(193.3491)	(364.8298)	(192.1201)
DrSch	-598.8398		
	(381.4560)		
%DrDeg	-9,783.4967	-33,165.6935	-3,112.2459
	(7,906.8400)	(24,075.1950)	(4,870.1422)
Constant	42.6859	-1,692.6595**	1,203.2938
	(803.6963)	(738.6768)	(1,225.3500)
Year FE	Yes	Yes	Yes
Univ FE	Yes	Yes	Yes
Observations	3,775	1,663	2,112
Adjusted R^2	0.4507	0.5052	0.4270

Table 11 – Exclude Special Focus Institutions

Panel B – University Prestige

	Prediction	(1) Prestige *(Prestige > 2)*	(2) Prestige *(2 < Prestige < 6)*	(3) Prestige *(Prestige > 5)*
Disc ResExp (u)	+	0.0005**	0.0000	0.0003**
		(0.0003)	(0.0001)	(0.0001)
Nondis ResExp	+	-0.0000	-0.0000	0.0003***
		(0.0002)	(0.0000)	(0.0001)
Size	+	0.0002***	0.0007***	0.0002***
		(0.0000)	(0.0001)	(0.0000)
S/F	-	-0.2230***	-0.2516***	-0.0463
		(0.0545)	(0.0627)	(0.0597)
Sal	+	0.0000***	0.0000**	-0.0000*
		(0.0000)	(0.0000)	(0.0000)
%FT	+	4.6705***	-0.5505	4.5018**
		(1.5486)	(2.7388)	(2.5838)
SAT	+	-0.0023	0.0003	0.0018
		(0.0022)	(0.0030)	(0.0035)
Res	+	2.2419**	-0.4152	3.1377***
		(1.2434)	(0.3723)	(0.8170)
Grad	+	-0.4096	-2.2534	1.5320
		(1.0935)	(1.8154)	(2.1964)
End	+	0.0000	-0.0002***	0.0000**
		(0.0000)	(0.0001)	(0.0000)
Hosp	+	0.6975	-2.1513**	0.6059*
		(0.6121)	(1.1546)	(0.4499)
Pvt	+	0.0221	1.2573**	0.0009
		(0.4261)	(0.5713)	(0.7655)
Year FE		Yes	Yes	Yes
Observations		3,419	1,489	1,930
Pseudo R^2		0.4786	0.2980	0.6634

Table 11 – Exclude Special Focus Institutions

Panel C – Federal R&D Funds

	Prediction	(1) FedRank *(Prestige > 2)*	(2) FedRank *(2 < Prestige < 6)*	(3) FedRank *(Prestige > 5)*
PosU (=1 if u > 0)	-	-17.3391***	6.6375	-1.4735
		(5.8986)	(9.3888)	(2.3863)
ResExp	-	-0.0037***	-0.0027***	-0.0035***
		(0.0011)	(0.0012)	(0.0007)
Size	-	-0.0057***	-0.0156***	-0.0020***
		(0.0018)	(0.0015)	(0.0007)
S/F	+	1.8789***	9.0339***	0.3453
		(0.7026)	(2.7544)	(0.3379)
Sal	-	-0.0001	-0.0006*	0.0000
		(0.0001)	(0.0004)	(0.0001)
%FT	-	-153.8798***	-312.4570***	-59.7896**
		(50.5789)	(95.2546)	(29.6929)
SAT	-	-0.1709***	-0.0891	-0.1298***
		(0.0486)	(0.0796)	(0.0379)
Res	-	-26.3046**	-36.7332*	-11.0242**
		(11.7131)	(28.0289)	(5.2751)
Grad	-	-50.0929	75.5494	-69.6280*
		(46.2938)	(60.7861)	(45.6614)
End	-	0.0000**	-0.0004	0.0000**
		(0.0000)	(0.0004)	(0.0000)
Hosp	-	-14.8315***	-48.1108***	-8.5447***
		(4.2663)	(17.2803)	(2.1239)
Pvt	-	8.2810	-16.6881	98.5796***
		(25.5666)	(40.7595)	(22.0565)
Constant		761.0092***	788.3043***	464.6306***
		(68.7187)	(124.7787)	(47.4713)
Year FE		Yes	Yes	Yes
Observations		2,347	845	1,502
Adjusted R^2		0.0412	0.1319	0.0092

Table Notes:

This table presents the results of all equations excluding special focus institutions. Column 1 includes all institutions with Prestige >2. Column 2 includes only Master's Universities with 2<Prestige<6. Column 3 includes only Doctoral Universities with Prestige>5.

Panel A presents the OLS regression estimates of Equation 1. The residual from each column represents the discretionary research expenditures for the respective group.

Panel B presents the ordered logit regression estimates of Equation 2. Estimates for each constant level of Prestige have been suppressed.

Panel C presents the OLS regression estimates of Equation 3.

University and Year fixed effects included when indicated but coefficient estimates have been suppressed. All standard errors, in parentheses, are clustered by university. All p-values are based on one-tailed t tests for directional predictions, two-tailed otherwise.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12 – Log Transformation Exclude Special Focus Institutions			
Panel A – Discretionary Research Expenditures Log Model			
	(1)	(2)	(3)
	lnResExp	lnResExp	lnResExp
	(Prestige > 2)	*(2 < Prestige < 6)*	*(Prestige > 5)*
lnTuit	0.3882**	0.4658*	0.1443
	(0.1543)	(0.2627)	(0.1520)
lnTuit x Year	0.0257**	0.0298	0.0120
	(0.0107)	(0.0203)	(0.0093)
lnAppr	0.0237	0.0023	0.0173
	(0.0170)	(0.0553)	(0.0166)
lnAppr x Year	-0.0004	0.0003	-0.0002
	(0.0014)	(0.0053)	(0.0012)
lnGrnts	0.4828***	0.4598***	0.6012***
	(0.0951)	(0.1763)	(0.0933)
lnGrnts x Year	-0.0064*	-0.0135	-0.0118***
	(0.0038)	(0.0139)	(0.0040)
lnGifts	0.0321	0.0598	0.0179
	(0.0246)	(0.0404)	(0.0247)
lnGifts x Year	-0.0009	-0.0041	0.0019
	(0.0021)	(0.0038)	(0.0015)
lnAux	0.1187	0.2615	-0.0179
	(0.0910)	(0.1773)	(0.0389)
lnAux x Year	-0.0078	-0.0188	0.0030
	(0.0068)	(0.0118)	(0.0053)
Hosp	0.0038	0.2197	-0.0218
	(0.0320)	(0.2490)	(0.0225)
DrSch	-0.1348		
	(0.1060)		
%DrDeg	-1.1890	-1.0629	-1.5542
	(1.0897)	(4.1005)	(0.9628)
Constant	-2.2259	-4.8177**	1.4534
	(1.5763)	(2.4323)	(1.8289)
Year FE	Yes	Yes	Yes
Univ FE	Yes	Yes	Yes
Observations	3,775	1,663	2,112
Adjusted R^2	0.0834	0.0639	0.2031

Table 12 – Log Transformation Exclude Special Focus Institutions				
Panel B – University Prestige Log Model				
	Prediction	(1) Prestige *(Prestige > 2)*	(2) Prestige *(2 < Prestige < 6)*	(3) Prestige *(Prestige > 5)*
Disc lnResExp (u)	+	0.5050***	0.0866	0.5185**
		(0.1252)	(0.1413)	(0.2935)
Nondis lnResExp	+	-0.5513	-0.7297	2.6187***
		(0.5145)	(0.7600)	(1.0583)
Size	+	0.0002***	0.0006***	0.0002***
		(0.0000)	(0.0001)	(0.0001)
S/F	-	-0.1814***	-0.2790***	0.0093
		(0.0431)	(0.0701)	(0.0584)
Sal	+	0.0000**	0.0000**	-0.0000**
		(0.0000)	(0.0000)	(0.0000)
%FT	+	3.3462***	-0.3476	2.1026
		(1.4395)	(2.6644)	(2.8332)
SAT	+	-0.0012	-0.0002	0.0034
		(0.0023)	(0.0029)	(0.0030)
Res	+	2.4553**	-0.4197*	2.6639***
		(1.0830)	(0.3087)	(0.9200)
Grad	+	0.2161	-1.8369	1.7831
		(1.1111)	(1.8001)	(2.1111)
End	+	0.0000***	-0.0002***	0.0000***
		(0.0000)	(0.0001)	(0.0000)
Hosp	+	0.3702	-1.9418**	0.5752
		(0.4057)	(1.1150)	(0.4547)
Pvt	+	1.0437***	1.6724***	-0.0036
		(0.3813)	(0.6930)	(0.7774)
Year FE		Yes	Yes	Yes
Observations		3,419	1,489	1,930
Pseudo R^2		0.4699	0.3013	0.6667

Table 12 – Log Transformation Exclude Special Focus Institutions

Panel C – Federal R&D Funds Log Model

	Prediction	(1) FedRank *(Prestige > 2)*	(2) FedRank *(2 < Prestige < 6)*	(3) FedRank *(Prestige > 5)*
lnPosU (=1 if u > 0)	-	-4.7233	-10.2332	-5.4954
		(9.4382)	(11.6198)	(6.6531)
lnResExp	-	-46.4627***	-32.5856***	-51.1016***
		(9.1530)	(10.7343)	(10.2615)
Size	-	-0.0046***	-0.0153***	-0.0020***
		(0.0015)	(0.0014)	(0.0008)
S/F	+	1.2151**	6.9385***	0.0710
		(0.6323)	(2.7647)	(0.3113)
Sal	-	-0.0000	-0.0005*	0.0001
		(0.0001)	(0.0004)	(0.0001)
%FT	-	-66.7999*	-196.5515**	-10.0192
		(50.1927)	(97.7484)	(33.0341)
SAT	-	-0.1386***	-0.0561	-0.1198***
		(0.0494)	(0.0767)	(0.0433)
Res	-	-22.1829***	-28.3850	-8.2725**
		(9.4786)	(22.6358)	(3.8680)
Grad	-	-23.2705	63.3110	-38.7866
		(39.9178)	(59.2765)	(37.5612)
End	-	0.0000***	-0.0005	0.0000***
		(0.0000)	(0.0005)	(0.0000)
Hosp	-	-12.0259***	-41.7305***	-7.5349***
		(3.7892)	(12.6617)	(2.0653)
Pvt	-	21.7796	3.6424	70.6449***
		(21.4969)	(36.4174)	(17.1922)
Constant		913.3504***	868.0966***	790.8272***
		(61.9865)	(123.0192)	(58.3499)
Year FE		Yes	Yes	Yes
Observations		2,347	845	1,502
Adjusted R^2		0.0588	0.1260	0.0674

Table Notes:

This table presents the results of all equations excluding special focus institutions. Column 1 includes all institutions with Prestige >2. Column 2 includes only Master's Universities with 2<Prestige<6. Column 3 includes only Doctoral Universities with Prestige>5. All financial variables used for Equation 1 are based on the log transformation of the variable.

Panel A presents the OLS regression estimates of Equation 1. The residual from each column represents the discretionary research expenditures for the respective group.

Panel B presents the ordered logit regression estimates of Equation 2. Estimates for each constant level of Prestige have been suppressed.

Panel C presents the OLS regression estimates of Equation 3.

University and Year fixed effects included when indicated but coefficient estimates have been suppressed. All standard errors, in parentheses, are clustered by university. All p-values are based on one-tailed t tests for directional predictions, two-tailed otherwise.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX A
THE CARENEGIE CLASSIFICATION OF INSTITUTIONS OF HIGHER EDUCATION

(CCIHE)

The following history and definitions are taken from The Carnegie Classification of Institutions of Higher Education (n.d.).

History of the Carnegie Basic Classification

The Basic Classification is an update of the traditional classification framework developed by the Carnegie Commission on Higher Education in 1970 to support its research program. The Basic Classification was published for use in 1973, and subsequently updated in 1976, 1987, 1994, 2000, 2005, 2010, and 2015. The 2005 edition involved some significant changes from the previous releases by dividing Associate's colleges into subcategories and using a multi-measure research index to classify doctorate-granting institutions. The 2010 update retained the same classification structure as the 2005 edition. In the 2015 update, the Associate's Categories were substantially redefined and the categories of the Research Doctoral Universities changed (but not the calculation methodology).

Note: The "shorthand" labels for the Doctoral Universities and Master's Colleges and Universities were restored in the 2015 update to numeric sequences (R1, R2, R3, and M1, M2, M3) to denote that each one is based on differences in quantitative levels. For doctoral universities, the levels are based on a research activity index and for master's colleges and universities it is based on number of degrees conferred.

Definitions

Doctoral Universities

Institutions were included in these categories if they awarded at least 20 research/scholarship doctorates in 2013-14. Professional practice doctoral degrees (J.D., M.D., Pharm.D., Aud.D., DNP, etc.) were not counted for the purpose of this criterion. These categories were limited to institutions that were not identified as Tribal Colleges or Special Focus Institutions.

Doctoral universities were assigned to one of three categories based on a measure of research activity. The research activity scale includes the following correlates of research activity: research & development (R&D) expenditures in science and engineering; R&D expenditures in non-S&E fields; S&E research staff (postdoctoral appointees and other non-faculty research staff with doctorates); doctoral conferrals in humanities fields, in social science fields, in STEM (science, technology, engineering, and mathematics) fields, and in other fields (e.g. business, education, public policy, social work). These data were statistically combined using principle components analysis to create two indices of research activity reflecting the total variation across these measures (based on the first principle component in each analysis).

One index represents the aggregate level of research activity, and the other captures per-capita research activity using the expenditure and staffing measures divided by the number of

full-time faculty within the assistant, associate, and full professor ranks. The values on each index were then used to locate each institution on a two-dimensional graph. We calculated each institution's distance from a common reference point, and then used the results to assign institutions to one of three groups based on their distance from the reference point. Thus the aggregate and per-capita indices were considered equally, such that institutions that were very high on either index were assigned to the "highest research activity" group, while institutions that were high on at least one (but very high on neither) were assigned to the "higher research activity" group. Remaining institutions and those not represented in the National Science Foundation data collections were assigned to the "moderate research activity" category. Before conducting the analysis, raw data were converted to rank scores to reduce the influence of outliers and to improve discrimination at the lower end of the distributions where many institutions were clustered.

Master's Colleges and Universities

Institutions were included in these categories if they awarded at least 50 master's degrees in 2013-14, but fewer than 20 research doctorates (as defined above). Some institutions with smaller master's programs were also included (see below). These categories were limited to institutions that were not identified as Tribal Colleges or Special Focus Institutions.

Master's program size was based on the number of master's degrees awarded in 2013-14. Those awarding at least 200 degrees were included among larger programs; those awarding 100–199 were included among medium programs; and those awarding 50–99 were included among smaller programs. The smaller programs group also includes institutions that awarded fewer than 50 master's degrees if (a) their Enrollment Profile classification is Exclusively Graduate/Professional or (b) their Enrollment Profile classification is Majority Graduate/Professional and they awarded more graduate/professional degrees than undergraduate degrees.

Baccalaureate Colleges

Institutions were included in these categories if bachelor's degrees accounted for at least 50 percent of all degrees awarded and they awarded fewer than 50 master's degrees (2013-14 degree conferrals). In addition, these categories were limited to institutions that were not identified as Tribal Colleges or as Special Focus Institutions.

Institutions in which at least half of bachelor's degree majors in arts and sciences fields were included in the "Arts & Sciences" group, while the remaining institutions were included in the "Diverse Fields" group.

Baccalaureate/Associates Colleges

Includes four-year colleges (by virtue of having at least one baccalaureate degree program) that conferred more than 50 percent of degrees at the associate's level (excluding special focus institutions, Tribal Colleges, and institutions that have sufficient master's or doctoral degrees to fall into those categories). These institutions are divided into two subcategories: Mixed Baccalaureate/Associate's Colleges are those that conferred more than 10% of degrees at the baccalaureate level or higher (fewer than 90% associate's degrees);

Associate's Dominant institutions are those that conferred fewer than 10% of degrees at the baccalaureate level or higher (at least 90% associate's degrees).

Associate's Colleges

For institutions that conferred associate's degrees as the highest degree level offering, the 2015 update employed a new classification methodology. First, the institutions were separated according to whether their total awards (associate's degrees and certificates), were primarily in one or a few disciplinary fields. These fields were identified according to the first four digits of the CIP** code. Any institution offering at least 75% of awards in just one field other than "Liberal Arts & Sciences, General Studies or Humanities", or those offering 70-74% in one field but having awards in no more than 2 other fields, or those offering 60-69% in one field but having awards in no more than 1 other field, were classified into one of four Special Focus groups noted below. Two-year institutions not designated as special focus were classified according to the combination of two factors, each divided into three groups (3x3=9 categories total): program mix and student mix.

**CIP refers to the Classification of Instructional Programs taxonomy maintained by the National Center for Education Statistics.

Special Focus Institutions

The special-focus designation was based on the concentration of degrees in a single field or set of related fields, at both the undergraduate and graduate levels. Institutions were determined to have a special focus with concentrations of at least 75 percent of undergraduate and graduate degrees. In some cases the percentage criterion was relaxed if an institution identified a special focus on the College Board's Annual Survey of Colleges, or if an institution's only recognized accreditation was from an accrediting body related to the special focus categories.

Tribal Colleges

Tribal colleges are defined as members of the American Indian Higher Education Consortium, as identified in the IPEDS Institutional Characteristics data.

Carnegie Classification and Prestige Variable Mapping

Categories shaded and bold represent those institutions selected for this study as described in Section V. Data and Sample Selection.

Carnegie Basic Classification 2015 Edition		Prestige Value
0	(Not classified)	0
1	Associate's Colleges: High Transfer-High Traditional	1
2	Associate's Colleges: High Transfer-Mixed Traditional/Nontraditional	1
3	Associate's Colleges: High Transfer-High Nontraditional	1
4	Associate's Colleges: Mixed Transfer/Vocational & Technical-High Traditional	1
5	Associate's Colleges: Mixed Transfer/Vocational & Technical-Mixed Traditional/Nontraditional	1
6	Associate's Colleges: Mixed Transfer/Vocational & Technical-High Nontraditional	1
7	Associate's Colleges: High Vocational & Technical-High Traditional	1
8	Associate's Colleges: High Vocational & Technical-Mixed Traditional/Nontraditional	1
9	Associate's Colleges: High Vocational & Technical-High Nontraditional	1
10	Special Focus Two-Year: Health Professions	1
11	Special Focus Two-Year: Technical Professions	1
12	Special Focus Two-Year: Arts & Design	1
13	Special Focus Two-Year: Other Fields	1
14	Baccalaureate/Associate's Colleges: Associate's Dominant	1
15	**Doctoral Universities: Highest Research Activity**	**8**
16	**Doctoral Universities: Higher Research Activity**	**7**
17	**Doctoral Universities: Moderate Research Activity**	**6**
18	**Master's Colleges & Universities: Larger Programs**	**5**
19	**Master's Colleges & Universities: Medium Programs**	**4**
20	**Master's Colleges & Universities: Small Programs**	**3**
21	**Baccalaureate Colleges: Arts & Sciences Focus**	**2**
22	**Baccalaureate Colleges: Diverse Fields**	**2**
23	**Baccalaureate/Associate's Colleges: Mixed Baccalaureate/Associate's**	**2**
24	**Special Focus Four-Year: Faith-Related Institutions**	**2**
25	**Special Focus Four-Year: Medical Schools & Centers**	**2**
26	**Special Focus Four-Year: Other Health Professions Schools**	**2**
27	**Special Focus Four-Year: Engineering Schools**	**2**
28	**Special Focus Four-Year: Other Technology-Related Schools**	**2**
29	**Special Focus Four-Year: Business & Management Schools**	**2**
30	**Special Focus Four-Year: Arts, Music & Design Schools**	**2**
31	**Special Focus Four-Year: Law Schools**	**2**
32	**Special Focus Four-Year: Other Special Focus Institutions**	**2**
33	Tribal Colleges	1

Carnegie Basic Classification 2005 & 2010 Editions		Prestige Value
-3	Not classified, not in classification universe	0
1	Assoc/Pub-R-S: Associate's--Public Rural-serving Small	1
2	Assoc/Pub-R-M: Associate's--Public Rural-serving Medium	1
3	Assoc/Pub-R-L: Associate's--Public Rural-serving Large	1
4	Assoc/Pub-S-SC: Associate's--Public Suburban-serving Single Campus	1
5	Assoc/Pub-S-MC: Associate's--Public Suburban-serving Multicampus	1
6	Assoc/Pub-U-SC: Associate's--Public Urban-serving Single Campus	1
7	Assoc/Pub-U-MC: Associate's--Public Urban-serving Multicampus	1
8	Assoc/Pub-Spec: Associate's--Public Special Use	1
9	Assoc/PrivNFP: Associate's--Private Not-for-profit	1
10	Assoc/PrivFP: Associate's--Private For-profit	1
11	Assoc/Pub2in4: Associate's--Public 2-year colleges under 4-year universities	1
12	Assoc/Pub4: Associate's--Public 4-year Primarily Associate's	1
13	Assoc/PrivNFP4: Associate's--Private Not-for-profit 4-year Primarily Associate's	1
14	Assoc/PrivFP4: Associate's--Private For-profit 4-year Primarily Associate's	1
15	RU/VH: Research Universities (very high research activity)	8
16	RU/H: Research Universities (high research activity)	7
17	DRU: Doctoral/Research Universities	6
18	Master's L: Master's Colleges and Universities (larger programs)	5
19	Master's M: Master's Colleges and Universities (medium programs)	4
20	Master's S: Master's Colleges and Universities (smaller programs)	3
21	Bac/A&S: Baccalaureate Colleges--Arts & Sciences	2
22	Bac/Diverse: Baccalaureate Colleges--Diverse Fields	2
23	Bac/Assoc: Baccalaureate/Associate's Colleges	2
24	Spec/Faith: Special Focus Institutions--Theological seminaries, Bible colleges, and other faith-related institutions	2
25	Spec/Med: Special Focus Institutions--Medical schools and medical centers	2
26	Spec/Health: Special Focus Institutions--Other health professions schools	2
27	Spec/Engg: Special Focus Institutions--Schools of engineering	2
28	Spec/Tech: Special Focus Institutions--Other technology-related schools	2
29	Spec/Bus: Special Focus Institutions--Schools of business and management	2
30	Spec/Arts: Special Focus Institutions--Schools of art, music, and design	2
31	Spec/Law: Special Focus Institutions--Schools of law	2
32	Spec/Other: Special Focus Institutions--Other special-focus institutions	2
33	Tribal: Tribal Colleges	1

Carnegie Basic Classification 2000 Edition		Prestige Value
-3	Not classified, not in classification universe	0
40	Associate's Colleges	1
15	Doctoral/Research Universities—Extensive	8
16	Doctoral/Research Universities—Intensive	7
21	Master's Colleges and Universities I	5
22	Master's Colleges and Universities II	4
31	Baccalaureate Colleges—Liberal Arts	2
32	Baccalaureate Colleges—General	2
33	Baccalaureate/Associate's Colleges	2
51	Specialized Institutions—Theological seminaries and other specialized faith-related institutions	2
52	Specialized Institutions—Medical schools and medical centers	2
53	Specialized Institutions—Other separate health profession schools	2
54	Specialized Institutions—Schools of engineering and technology	2
55	Specialized Institutions—Schools of business and management	2
56	Specialized Institutions—Schools of art, music, and design	2
57	Specialized Institutions—Schools of law	2
58	Specialized Institutions—Teachers colleges	2
59	Specialized Institutions—Other specialized institutions	2
60	Tribal colleges and universities	1

APPENDIX B

VARIABLE DEFINITIONS

Variable	Description	Source
Equation 1 Variables		
ResExp	Expenditures associated with activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution scaled by student FTE enrollment.	IPEDS
Tuit	Revenues from all tuition and fees assessed against students for educational purposes scaled by student FTE enrollment	IPEDS
Appr	Revenues received by the institution through acts of a federal, state, or local legislative body, except by grants and contracts, scaled by student FTE enrollment.	IPEDS
Grnts	Revenues from federal, state, and local government agencies that are for specific research projects or other types of programs scaled by student FTE enrollment.	IPEDS
Gifts	Revenues from private gifts, including contributions from affiliated organizations, scaled by student FTE enrollment.	IPEDS
Aux	Revenues (net of discounts and allowances such as scholarships) generated by auxiliary enterprises that exist to furnish a service to students, faculty, or staff, and that charge a fee that is directly related to the cost of the service scaled by student FTE enrollment.	IPEDS
Oth	Revenues not included in previously listed sources, namely, tuition and fees, grants and contracts, and sales and services of auxiliary enterprises scaled by student FTE enrollment.	IPEDS
Hosp	Indicator variable = 1 if the university has a hospital, 0 otherwise.	IPEDS
DrSch	An indicator variable equal to 1 if *Prestige* is 6, 7, or 8 and is zero otherwise.	Calculated
%DrDeg	The proportion of doctoral degrees award to total degrees awarded.	IPEDS
Remaining Equations 2 and 3 Variables		
Prestige	Ranking based on the Carnegie Classification of the institution. See Appendix A for classification to ranking map.	CCIHE
Disc ResExp (u)	The discretionary portion of an institution's research expenditures. Calculated as the residual from regressing an institution's research expenditures onto various sources of revenue. See Equation 1.	Calculated
PosU	An indicator variable equal to 1 if *Disc ResExp (u)* > 0 and is zero otherwise.	Calculated

Nondis ResExp	The nondiscretionary portion of an institution's research expenditures. Calculated as research expenditures minus u (Eq 1).	Calculated
Size	Student full-time equivalent (FTE) enrollment. Enrollments are derived from the enrollment by race/ethnicity section of the fall enrollment survey. The full-time equivalent of an institution's part-time enrollment is estimated by multiplying part-time enrollment by factors that vary by control and level of institution and level of student; the estimated full-time equivalent of part-time enrollment is then added to the full-time enrollment of the institution. This formula is used by the U.S. Department of Education to produce the full-time equivalent enrollment data published annually in the Digest of Education Statistics.	IPEDS
S/F	Student FTE enrollment divided by Faculty FTE. Faculty FTE is total full-time faculty plus part-time faculty where part-time faculty are counted as ¼ FTE (Volkwein & Sweitzer 2006).	IPEDS
Sal	Instruction salaries and wages divided by Faculty FTE.	IPEDS
%FT	Number of full-time faculty divided by Faculty FTE	IPEDS
SAT	The midpoint between the reported 25th percentile and 75th percentile SAT scores. Also includes converted ACT scores (midpoint between reported 25th percentile and 75th percentile ACT scores) for institutions not reporting SAT scores. ACT scores were converted using College Board SAT-ACT concordance tables.	IPEDS
Res	Annual Thomson Reuters Web of Science documents divided by Faculty FTE. Web of Science documents represent more than 12,000 journals, 12,000 annual conferences, and 53,000 scholarly books from published areas of the sciences, social sciences, and humanities.	Thomson Reuters InCites
Grad	Percent of students graduating within 150% of normal time.	IPEDS
End	Endowment investment income scaled by student FTE enrollment.	IPEDS
Pvt	Indicator variable = 1 if the university is a private institution, 0 otherwise.	IPEDS
FedRank	The annual rank level of federal revenues received and expended for research and development with the highest reported amount of funding received being ranked 1 to the lowest reported amount of funding received being ranked 630. Federal research and development funding is reported as part of the annual Higher Education Research and Development (HERD) Survey.	National Science Foundation
RankYr	An indicator variable equal to 1 for years 2008 and 2009 and is zero otherwise.	Calculated