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Perceived Reputational and Administrative Capacity Biases & the Role of Carnegie Classifications in Funding Review Processes

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ABSTRACT

Previous research on issues of social equity in funding distributions across institutions of higher education has pointed to reputation and administrative capacity biases in peer reviews of proposals, among other concerns. Further research is needed to identify what contributes to perceived biases and enables institutions to signal competitiveness to sponsors based on the principal-agent and resource dependency theories. For this study, a quantitative analysis was conducted on publicly available datasets to explore relationships among Carnegie Classification rankings, institutional control types, administrative capacities, and sponsored research and foundation funding levels. The study population included Carnegie Classifications of four-year institutions. Data sources included the Carnegie Classification 2018 Public Data Report, National Science Foundation's HERD FY2017 Survey, U.S. Department of Education's IPEDS 2016–2017 report, and the Council for Advancement and Support of Education's VSE FY2016–2017 report. Direct linear relationships were found between institutional rankings and administrative capacities and institutional funding levels. Further, funding source distributions differed by institutional control type. Increasing funding distributions to minority institutions and researchers will promote research development and improve social equity across funding mechanisms.

INTRODUCTION

Funding disparity is not a new struggle for today's institutions of higher education.

Forty-one percent of all federal research and development funding went to 20 academic research institutions prior to 1982; the remaining 59% was distributed among the remaining 570 institutions, according to a study conducted by the California Institute of Technology (McGarity, 1994). FY2016 data from the National Science Foundation's Higher Education Research and Development Survey (NSF HERD), showed that 71% of all national research and development expenditures are generated from research universities engaged in very high research activity — all other universities and colleges generated the remaining 29% (Gibbons, 2018). These findings demonstrate that funding disparities make it difficult for certain groups of institutions of higher education to obtain both federally sponsored research and philanthropic foundation funding. Studies have been carried out to gain information needed to develop models that may ensure more equity in funding competitions and improve distribution.

Previous research on social equity and the distribution of funding to institutions of higher education has found administrative capacity and reputation to be significant influences on peer reviews and panels during the funding review process (Collins & Gerber, 2008). Further research will identify the factors that contribute to perceived reputations and administrative capacities during these review processes. In this study, federal-, state-, and institutional-level reporting data were evaluated to identify social equity gaps in external funding distributions to institutions of higher education, and specifically how institutional reputation and administrative capacity correlate with funding decisions made by federal funding agencies and foundations. This information may be used by the research development profession to increase competitiveness among institutions — a strategy that is vital not only for

institutions, but also for communities, especially those that have historically and disproportionately lacked resources.

STUDY TERMINOLOGY

The terms used in this study were derived from the field of higher education and research development. *Social equity* is the third pillar of public administration and encompasses issues of complexity including fairness, justice, and equality. In this study, it encompassed the economic circumstances and positioning in U.S. institutions of higher education. *Classification ranking* within the Carnegie Classification of Institutions of Higher Education is considered the "dominant classification system" for higher education research and is one of the oldest consistently published rankings recognized in classifying university programs and reputations for doctorate-granting universities (Kosar & Scott, 2018). *Reputation* is the belief or opinion generally held about someone or something; in this case, it was used in reference to the institution of higher education. For the purposes of this study, reputation was tied to the institution's Carnegie Classification ranking. *Administrative capacity* references an institution's ability to carry out administrative responsibility necessitated by a sponsored program or project with adequate human infrastructure, organizational structure or processes, and resources for achieving outcomes. In this study, administrative capacity was the research capacity, or headcount, of research faculty, instructors, postdoctoral fellows, and other professional research staff (Carnegie, 2019; IPEDs). *Research and development expenditures* are expended sponsored research funds at an institution directly associated with secured and restricted sponsored funding. *Philanthropic sponsors* include organizations or individuals that make gifts, such as foundations and donors, to an institution of higher education to support research, programming, or institutional desires, causes, or needs. In this study, philanthropic sponsors were the foundation granting sponsors. *Control type* of an

institution is whether it is identified as either public or private.

THEORETICAL FRAMEWORK

An in-depth look at the social inequities of sponsored research and foundation funding mechanisms reveals a theoretical framework that focuses on the principal-agent and resource dependency theories. These thrive on ranking systems, historical funding patterns and sources, and administrative capacities that are feeding divisions into haves and the have-nots in higher education. The funding process followed by sponsored research agencies and foundations can be explained as a principal-agent relationship, as defined in public administration research where the principal is the funding sponsor and the agent is the institution of higher education. The principal looks to the performance of the institution to deliver desired outcomes as its agent, basing partnership decisions on national university rankings characterized by performance accountability. Institutions signal their credibility to funding agencies through their rankings (Morphew & Swanson, 2011). Institutions indicate their organizational commitment to sponsors by growing administrative capacity in the form of research faculty and professional research staff hires. Investment in formal offices and professional research services with direct functional roles in shaping research growth initiatives and negotiating and managing the exchange relationship's demands of sponsored research and foundation funding also indicate to sponsors an institution's commitment to research excellence. This is best explained by the resource dependency theory, which is based on the principle of engagement in transactions with external actors in order to acquire external resources such as research and foundation funding (Tolbert, 1985). Institutions' increased dependency on external relationships to secure funding has led to administrative differentiation in specialized administrative offices and positions – all signaling to sponsors the presence of adequate and competitive management structures to handle relationships. Public and private institutions have sufficient differences in funding management and support to

influence success in obtaining sponsored funding. Public institutions have historically relied on government funding to sustain research operations, while private institutions have had autonomy from government control and therefore have received less government funding, relying primarily on private funding from endowments, donors, and foundations.

Thus, there have been different expectations of public and private institutional administrative structures and exchange relationships. These differences distinguish dependency patterns according to the magnitude of dependency on specific sources of external funding, whether from sponsored research agencies or foundations (Tolbert, 1985). Ranking systems, historical funding patterns and sources, and administrative capacities among the haves and have nots in higher education are recognized and contribute to funding decisions and distributions. As a result, institutions affected by disparities in social equity with regard to funding decisions will typically have less capacity in terms of faculty resources, administrative infrastructure, and ability to recruit faculty and qualified professional research staff for research growth. Resource dependency theories of organizations, as reflected in funding patterns and sources, combined with capacities and the impacts of university rankings on external actors, suggests that funding sponsors are sensitive to shifts in rankings over time. This correlation led Bastedo and Bowman (2011) to an empirical study of the influence of *US News* rankings on future research funding by government, foundations, and industry. They found that published college rankings and shifts in peer assessment of reputation significantly affected financial resources.

As determined by theory, performance accountability is influenced by the evaluation of transaction costs for both grantors and grantees. Collins and Gerber (2008) demonstrated that transaction costs, including contract arrangements and negotiations, compliance reporting and monitoring, and administrative

support, influence perception of administrative capacity to fulfill sponsored project objectives for the principal, including requesting larger and more justified budgets to carry out projects regardless of social need. Social equity takes a back seat in the funding process due to need-response decisions that link efficacy with capacity and reputation. Social equity therefore suffers in competition-based funding models where applicants with greater capacity and performance rank more highly than do historically disadvantaged institutions.

Studies on the Influence of Rankings, Peer Reviews, & Funding Mechanisms

Higher education administrators have been found to correlate financial resources with college rankings — especially administrators at research universities. Resource dependency theories, combined with the impacts of university rankings on external actors, suggest that third-party resource providers are sensitive to shifts in rankings over time. This correlation led Bastedo and Bowman (2011) to an empirical study of the influence of *US News and World Report* rankings on future research and development giving by government, foundations, and industry, and whether alumni more readily donated to their alma mater. Predictions were tested using structural equation models. The researchers found that published college rankings had significant impacts on future giving by resource providers, independent of organizational change in quality and performance. The exception was the proportion of alumni who donated to their alma mater, yet the amount of giving was not impacted. Shifts in peer assessment of reputation, a by-product of college rankings, also showed significant effects on financial resources. Therefore, it is not a coincidence that higher education administrators are sensitive to college ranking systems since universities depend upon a continuous flow of external funding, especially sponsored funding and private giving.

Bastedo and Bowman (2011) included all universities that appeared in the 1998 *U.S. News and World Report* in their study. They extracted data on college rankings,

peer assessments, changes in institutional quality, and the reported proportion of alumni giving to institutions. They also extracted data from the Integrated Postsecondary Educational Data Set (IPEDS), the National Science Foundation's Survey of Research and Development Expenditures at Universities and Colleges (HERD), and the Council for Aid to Education's Voluntary Support of Education (VSE) survey. Significantly, they found that college rankings in 1998 were predictors of financial indicators in 2006, revealing the influence of rankings on social equity distributions among institutions and their ability to secure sponsored and private funds. Bastedo and Bowman (2011) also found evidence of the influence of reputational change – that is, institutions that ranked below the top tier received less research and development funding from federal and industry resources and lower alumni giving. Effects of reputation and funding disparity were strongest in the lowest tiers, Tier 4. Objective changes in institutional quality were positively associated with total alumni giving and foundation funding, and peer assessment ratings revealed positive impacts on industry research and development, total alumni donations, and total foundation funding. Overall, their findings showed the influences of college rankings on research and development funding, but little significance on foundation funding. Findings also indicated that rankings affected the proportion of alumni giving, but had little effect on the total amount of alumni donations. Bastedo and Bowman (2011) pointed to the need for a progressive look at the financial impacts of third-party evaluations on universities.

Bastedo and Bowman's study pointed to the likelihood that higher education rankings influence those most vulnerable to the status hierarchy created by these rankings, with this hierarchy of perceived value generating financial resources for research universities. They also showed that alumni are vulnerable to the perception of the value of their degree in the job market, thus affecting their likelihood *to* donate rather than *how much* they will

donate. Another stark finding is that faculty members who served on agency peer review committees were more likely to fund projects from highly ranked institutions (Bastedo & Bowman, 2011). Peer review committees involved in the sponsored funding review process are unique in their ability to assess research funding proposals from an expert level. Yet, the peer review process has been questioned for its potential biases. With funding becoming more competitive and funding success rates decreasing, public stakeholders that rely on funding have criticized systems that favor institutions that carry less risk and can guarantee results (Li & Agha, 2015). Prioritizing reputation, lower risk, and higher output have had greater impacts on the probability of funding that has movement in rankings (Bastedo & Bowman, 2011). This furthers the sponsored funding disparity between the *haves and the have nots* in higher education institutions. Rankings such as that offered by *U.S. News* have been shown to influence equitable distributions of external funding among institutions and their ability to secure sponsored and private funds in the future.

Previous studies of the peer review system's efficacy in predicting successful research outcomes have yielded mixed results. Li and Agha (2015) examined whether peer review committees could successfully predict the quality of proposed research funded by the National Institutes of Health (NIH). They concentrated their study on 137,215 research project (R01) grants funded by the NIH from 1980–2008. Funded grants were important to this study's analyses of funding and their direct effect on research productivity, focusing on the relationship between scores and outcomes of peer review. The authors measured applicant-level characteristics that included the researcher's publication and grant history, educational background, and institutional affiliation. Institutions were ranked by the number of NIH grants received over the study period of 1980–2008; applicants were measured according to whether they were from a top 5-, 10-, 20-, or 50- ranked institution. Using a Poisson regression of future

outcomes on peer-reviewed scores, including controls for the researcher's previous performance, the authors found that NIH peer-review evaluations were statistically related to grant quality. Additional controls were studied, including differences in citation and publication rates by disciplinary fields, applicant credentials of MD or Ph.D. and/or if they had both MD and Ph.D., grant proposal writing skills, and institutional quality, as well as the applicant's gender and ethnicity. The additional control factors still suggested that scores were better than randomly allocated and results remained stable (Li & Agha, 2015). Findings also showed that peer-review scores provided value by identifying hit publications and research with potential for commercialization. The authors also found that peer reviewers trended toward awarding funds to projects with potential for very high-impact publication, exhibiting the peer review panel's ability to discriminate among strong applications. Results also pointed to a steep relationship between scores and residual research outcomes, with the steepest results found among the highest-ranking proposals. The relationship between proposal scores and hit publications weakened among applications with lower competitive scoring. Li and Agha (2015) did not find evidence that the peer-review system added value beyond the factors of previous publications and qualifications when screening out low-citation papers. This study demonstrated the ways in which the peer-review system positively generates information about the quality of grant proposals tied to research outputs in funded applications but does not directly assess whether it rejects high-potential applications. It is important to consider the Matthew effect in the association between better scores and better outcomes, where credit and citations accrue to already established investigators because they are established, regardless of their quality of work. Li and Agha's (2015) study supports the peer-review system in accountability and outcomes related to the principal-agent theory of sponsored agencies, but also points to the widened gap in sponsored funding distribution as

supported by this system, contributing to disparities in funding opportunities among the *haves and the have-nots* of higher-education institutions.

Carnegie Classification of Higher Education Institutions

***History of Carnegie*.** Forecasting higher education's direction and its future demands is not a new issue in the field of U.S. higher education's administration and mainstream media. It has been approached analytically since the 1960s, starting with The Carnegie Foundation for the Advancement of Teaching. The Carnegie Foundation established the Carnegie Commission on Higher Education in 1967 to make recommendations on major issues faced by higher education. This information led to the Commission's development of a new classification scheme in 1970 to meet analytical needs (McCormick & Zhao, 2005). This classification scheme, known today as the Carnegie Classification of Higher Education Institutions, is described as the *dominant classification system* for higher education research and is one of the oldest consistently published rankings recognized in classifying university programs and *reputations for doctorate-granting universities* (Kosar & Scott, 2018). At the time of establishment, the classification system called attention to the institutional diversity in U.S. higher education in order to facilitate an increase in diverse offerings among institutions' various fields of study and workforce needs. It was meant as a framework to assist researchers in performing comparisons of programs and institutions within manageable categories. Ironically, since its inception, it has had a homogenizing influence, with institutions seeking to move up the scale to research-intensive recognition in pursuit of associated funding opportunities (McCormick & Zhao, 2005).

The Commission's original classification system created categories based upon empirical data representing the type and number of degrees awarded, federal research funding, and curricular specialization. It also included information about undergraduate college admissions' selectivity and preparation of future Ph.D.

recipients. Degree level and specialization emerged as the definitive organization criteria that grouped institutions by doctorate-granting universities, master's-level institutions, undergraduate liberal arts colleges, two-year colleges, and specialized institutions (McCormick & Zhao, 2005). The history of the Carnegie Classification is defined by both the creation of the research tool and the classification's design as reflected in the organization's specific research needs and interests during the process (McCormick, 2013). The system has evolved through both purpose of use and systematic changes to its current classification's algorithms, translating the contours and forecast of U.S. higher education direction and sustainability.

Updates of the Classification System. The viability of Carnegie has provided a consistent and adaptable classification system upon which to base comparisons of research activity across U.S. institutions of higher education. Updates to the system are crucial to adequately represent the changing landscape. The classification system is considered in decision-making processes based on perspectives on structure and function in the U.S. higher education system, and the allocation of scarce resources, and from political perspectives. Research into the flow of inputs and outputs in higher education, types of students served in different institutional categories, identification of social benefits from institutional types, along with finding the delicate balance in serving social needs and national priorities, have been derived through classifications of higher education (McCormick, 2013). The Carnegie Classification, originally published in 1973, has updated its methodology seven times since its inception, with updates occurring in 1976, 1987, 1994, 2000, 2005, 2015, and 2018. The updates have accounted for changes in the constellation of institutions, including impact of openings, closings, and mergers, and internal changes in institutions, including changes in offerings and activities. Changes also have been initiated after criticism that the traditional classification did not pay sufficient

attention to teaching, as research had been prioritized over teaching according to institutional type categories (McCormick, 2013). As Carnegie has periodically updated its methodology to accommodate the changing landscape of research and higher education, the most recent update to the basic classification system recognizes professional doctoral degrees, thus reflecting teaching and the contour of degree type conferral, further translating the forecast of growth and direction in U.S. higher education.

Social Practice and Value of a Classification System. Classification systems influence social construct, affecting not only perception and bias within public and private sectors, but *social equity performance* of public services and resources between defined categories of people, institutions, and communities. According to McCormick and Zhao (2005), the value of a classification system is tied to its intended use — classification is not only a way of seeing or of perception, but a *social practice* directing attention toward selected characteristics and away from others. Significant to this study of social equity performance in the distribution disparities among funding mechanisms and higher education is the focus on what contributes to biases present in the funding process. Reification can be a dangerous result of classification systems that define social constructs. For instance, even among the doctoral institutions, the top Carnegie Classification, there are stark differences among the institutional categories of R1, R2, and D/PU, their resources, and how they are perceived among peers and decision-makers. The R1 category, the top of all universities within the ranking system, encompasses the doctoral, very high research institutions. The R2 category, the next highest level, includes doctoral, high research activity institutions, and the D/PU, the lowest of the doctoral-level categories, are the doctoral, professional universities. Institutions included in the top two categories, R1 and R2, must award at least 20 research/scholarship doctorates and report at least $5 million in research expenditures with a cut-off value separating very

high research activity from high research activity, while the D/PU must award at least 30 professional practice doctorates across no less than two programs, with no reporting threshold for research expenditures (Carnegie, 2019). R1 institutions overshadow R2s and D/PUs, and R1s and R2s are perceived as the primary institutions where notable research takes place. McCormick and Zhao (2005) reiterated how the Carnegie Classification can result in reification of what is empirically real and natural, as well as how a dominant classification has the ability to influence public perceptions in a biased direction and limit consideration of other possibilities or perspectives of institutions and their value to U.S. higher education.

Fundamental Issues of the System. The Carnegie Classification system, although originally purposed for research analytic needs for the Carnegie Foundation for the Advancement of Teaching, has evolved over its lifetime into a general-purpose classification system used by a broad range of users and for various applications (McCormick & Zhao, 2005). Perception and bias are now invoked from the system's usage by higher education institutional personnel and administrations, state systems, foundations and other sponsored funders, membership organizations, and news magazines, as well as legislators, faculty, state boards, accreditors, and trustees (McCormick & Zhao, 2005). It is also an identifying factor used in published rankings among various sources for U.S. higher education institutions. McCormick and Zhao (2005) voiced concerns about the reliability of using the classification system in funding decisions, especially those directed by foundations. Foundations have been found to use this classification system as eligibility criteria in their grant programs, thus contributing to funding disparities and mobility of equity between institutional haves and have-nots. As McCormick and Zhao (2005) revealed the now broad uses of the system beyond its original purpose, the realization that a classification system, although empirically derived from positivist

data methods, cannot be perfectly neutral or objective. It will reflect decisions about the types of data that are important and meaningful and subject to interpretive uses beyond their original design.

Background on Reputation Biases in Funding Reviews

Reputation bias in peer reviews and panels is sometimes referred to as the "halo effect" due to agencies awarding funds based on the review panel's recommendations for funding when the peer reviewer ranks the proposal higher based on the researcher's or institution's past reputation rather than the merit of the proposal (McGarity, 1994). Some agencies also have been stifled by the "old boy network" or "old boyism" when their peer review panels allow members to serve extended terms and take care of their own in the review process (McGarity, 1994). Such reputation biases further divide the disadvantaged minority institutions from the large and stable institutions that rely on their established reputations for advantaged access to funding resources. Developing reputation as an institutional resource in the field of higher education has proven difficult since it cannot be easily purchased or improved. Social equity disparities are observed in organizations with positive reputations that find it relatively easy to maintain their status, while organizations with flat or less than positive reputations find it difficult to improve their reputations. Studies of institutional ranking systems such as *US News* have shown that an institution that changes ranking tiers may experience a positive impact on future peer assessments (Morphew & Swanson, 2011). Reputation perceptions or biases can contribute to the social equity performance issue in the distribution of funds and resources in higher education institutions and therefore demands attention from government agencies and foundation sponsors to ensure that funding processes improve equity in decision making.

Further blurring the concerns about reputation bias, institutional capacity also is seen as organizational performance — the varying dimensions of capacity encompass separate abilities to both

attract and absorb funding or resources. From the perspective of a funding agency or philanthropic sponsor, the ability of the institution to both absorb and manage funds with efficacy is critical to its decision process, as they perceive institutions that are smaller or with less rank as being less able to absorb the same or equal amounts of resources as those institutions that are larger or higher ranked (Honandle, 1981). Administrative capacity, also referred to as *administrative stock*, can be described as a fixed inventory of resources, including materials and human infrastructure, which are controlled and managed by an institution to achieve organizational potential (Honandle, 1981). This capacity is measured through data points identified in the Carnegie Classification system, with administrative capacity and perceived reputation considered during the funding review process.

RESEARCH DESIGN

Rankings have been found to directly affect research and development funding decisions by sponsors, including the government, industry, alumni, and foundations — further confirmation that financial contributions to higher education are tied to reputation (Morphew & Swanson, 2011). Among higher education organizations, rankings drive professional assessment of reputation. This is one of the most important factors in assessing organizational performance (Bastedo & Bowman, 2011). Carnegie doctoral research institutions are viewed as elite and top research universities, thus attracting sponsored investments due to perceived benefits of being associated with these successful institutions. Thus, to determine whether funding levels are, or are not, related to rank, the first research question [**RQ1**] asked in this study was: *Does an institution's Carnegie Classification ranking reflect its levels of sponsored research and foundation funding?*

Public and private universities have a historically long-standing tradition of relying on different sources of funding. As public institutions of higher education have operated under state supervision and control, private institutions have had more autonomy from

government control and have received less governmental financial support. Thus, historically, public institutions have typically relied heavily on sources of government support, including state appropriations, the Department of Education, and funding agencies for sponsored research, while private institutions have relied on tuition, endowments, gifts, and grants from private and philanthropic sources. Hence, there have been different expectations of public and private institutional administrative structures and interorganizational exchange relations, distinguishing dependency patterns according to the magnitude of dependency on external funding sources, whether from funding agencies or foundations (Tolbert, 1985). After examining institutional funding levels in light of an institution's Carnegie Classification, considering institutional control type (public or private) will highlight whether the *source* of external sponsored funding levels is correlated to the institution being public or private, leading to **RQ2**: *Does an institution's control type of public or private relate to the source(s) of external funding levels it secures as sponsored research or foundation funding?*

Social equity suffers under competition-based funding models due to the higher rank of institutions with greater administrative research capacity and performance reputation than found among disadvantaged minorities. Further, as shown by Collins and Gerber (2008), performance accountability is influenced by the evaluation of transaction costs for both sponsors and institutions, including contract arrangements and negotiations, compliance reporting and monitoring, and administrative support, all which reflect perceived administrative capacity dedicated to fulfilling proposed objectives. Thus, **RQ3**: *Does an institution's administrative capacity reflect its levels of research and foundation funding?*

METHODOLOGY

Population

To ensure inclusivity in data for diverse institutional types, the population in this study included Carnegie classifications of four-year institutions classified as Doctoral Universities, Master's Colleges and

Universities, Baccalaureate Colleges, and Special Focus Four-Year. This population includes the U.S. higher education institutions that have voluntarily reported to the National Science Foundation's Higher Education Research and Development Survey (NSF HERD) and the Council for Advancement and Support of Education's Voluntary Support of Education report. The resulting sample contained 603 institutions of higher education, of which 374 were public and 229 were private. Within this sample, 415 institutions of higher education reported their secured philanthropic foundation funding. Institutions included in the Carnegie Classifications data for the study population reported at least $150,000 in research expenditures during FY2016 and reported data to the NSF HERD, Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS), and Integrated Postsecondary Education Data Systems (IPEDs).

Data Sources

Data sources included the published National Science Foundation's Higher Education Research and Development Survey (NSF HERD) FY2016 data collected during the FY2017 survey cycle. This report was released in FY2018, as the report released each year includes data from two years prior. The NSF HERD is the primary government source of information on separately accounted-for research and development expenditures within higher education institutions in the United States, including outlying areas. The FY2017 survey cycle surveyed 915 institutions and successfully collected FY2016 data from 903 institutions between the months of November 2017 and June 2018 (Gibbons, 2018). Another data source was the Voluntary Support of Education FY2016 report (VSE, 2016) managed by the Council for Advancement and Support of Education. The data for this report are pulled from the VSE Survey and Data Miner, a web-based benchmarking service that provides access to more than 350 variables about charitable giving to educational institutions. Data

Miner affords access to 10 years of survey data from 1,000+ survey respondents. The Integrated Postsecondary Education Data Systems (IPEDs) report provides information from institutions of higher education on enrollment, degree conferral, and human resources infrastructure that contributed to administrative capacity data. The National Center for Education Statistics (NCES) is the primary federal entity for collecting and analyzing IPEDs data. Data reports from the Carnegie Classification (CC) of Institutions of Higher Education were a primary source for this study. These reports are based on publicly available data, including research expenditures, conferred eligible doctoral degrees, faculty composition, and research staffing. The CC data are collected through the National Center for Education Statistics (NCES) survey, Integrated Postsecondary Education Data Systems (IPED), the NSF HERD, and Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS).

Variables

Carnegie's basic classifications are ordinal, categorical data including the 33 categories or classifications identified by the Carnegie Classification of Institutions of Higher Education. Of the 33 classifications, 19 rank four-year U.S. higher education institutions. These 19 classification identifiers are further grouped into four categories, including doctoral universities, master's colleges and universities, baccalaureate colleges, and special focus four-year institutions for this study (see Table 1).

Variables in this study included the sample population's institutional Carnegie Classifications, administrative capacity, institutional control variable (public or private), total research expenditures, and their total foundation funding. Carnegie classification and administrative capacity are the independent variables, with Carnegie classification being a categorical, ordinal variable, and administrative capacity being a

continuous variable at the ratio level. An independence of observation is present, as institutions can only be ranked in one Carnegie Classification group, thus preventing overlap. Institutional control of public or private also serves as an independent variable, being a categorical, nominal variable for this study. Research expenditures and foundation funding serve as dependent variables, with both being continuous at the interval level.

Table 1
Condensed Carnegie Classification Groupings of Four-Year Institutions

Carnegie Group	**Basic Carnegie Classification**
Doctoral Universities	Very High Research Activity High Research Activity Professional Universities
Master's Colleges & Universities	Larger Programs Medium Programs Small Programs
Baccalaureate Colleges	Arts and Sciences Focus Diverse Fields Mixed Baccalaureate/Associate's Colleges Baccalaureate/Assoc's Colleges: Assoc's Dominant
Special Focus Four-Year	Faith – Related Institutions Medical Schools and Centers Other Health Professions Schools Engineering Schools Other Technology-Related Schools Business and Management Schools Arts, Music, and Design Schools Law Schools Other Special Focus Institutions

Statistical Methodology. A quantitative analysis was performed using IBM SPSS Version 27 to analyze data taken from publicly available NSF

HERD, IPEDs, VSE, and CC datasets to explore the relationship among Carnegie Classification rankings, institutional control types, administrative capacity, and funding levels for institutions of higher education.

DISCUSSION OF RESULTS

Research Question 1: Does an institution's Carnegie Classification ranking reflect its levels of sponsored research and foundation funding?

To test the hypotheses that (1) *research and development funding distribution is higher in Carnegie doctoral institutions compared to other four-year Carnegie Classifications,* and (2) *foundation funding distribution is higher in Carnegie doctoral institutions compared to other four-year school Carnegie Classifications*, a Kruskal-Wallis *H* Test was performed. The Kruskal-Wallis *H* Test was preferred over the one-way ANOVA due to the dependent variables of research expenditures and secured foundation funding not meeting assumptions of a normal distribution. The results of the test of homogeneity of variances indicated that variances among the four groups for research expenditures and foundation funding were significantly different for each, such that the assumption of the homogeneity of variances was not met. Outliers were removed at 2 standard deviations above the means, but doing so still did not provide a normal distribution of the dependent variable or homogeneity among variances. The non-parametric test was deemed the most accurate test to run in assessing the set of hypotheses. The results of the Kruskal-Wallis *H* non-parametric test showed significant differences in sponsored research funding levels based on Carnegie Classifications (Table 2. $X^2 = 253.14$, $df = 3$, $p < .01$). The results also showed significant differences in foundation funding levels based on Carnegie Classifications (Table 2. X2 = 116.15, df = 3, p < .01).

Table 2
Significant Differences in Funding Levels Based on Ranking

	All R&D Expenditures FY2016 (Thousands)	Foundation Funding FY2016 Total
Kruskal-Wallis H	253.14	116.15
df	3	3
Asymp. Sig	0.01	0.01

Note. Kruskal Wallis Test; Grouping Variable: Carnegie Classification four-year condensed groupings.

Significance in funding level differences based on the sums of ranks in Carnegie Classification groupings for four-year institutions were found to be relevant for funding mechanisms.

The results of the post hoc Tamhane's T2 test (see Table 3) showed a significantly greater difference in sponsored research funding between the Carnegie doctoral classification and each of the other 3 four-year Carnegie classifications of master's ($p < .01$), baccalaureate ($p < .01$), and special focus 4-year ($p < .01$). The Carnegie special focus 4-year classification also showed a significantly greater difference than master's ($p < .01$) and baccalaureate ($p < .01$).

Table 3
Mean Differences of Sponsored Research Levels Between Rankings

All R&D Expend FY2016 ($Thousands)		Mean Difference	Sig
Doctoral	Masters	183577.49	0.01
	Baccalaureate	187377.13	0.01
	Special Four-Year	103777.95	0.01
Masters	Doctoral	-183577.49	0.01
	Baccalaureate	3799.64	0.40
	Special Four-Year	-79799.54	0.01
Baccalaureate	Doctoral	-187377.13	0.01
	Masters	-3799.64	0.40
	Special Four-Year	-83599.18	0.01
Special Focus Four-Year	Doctoral	-103777.95	0.01
	Masters	79799.54	0.01
	Baccalaureate	83599.18	0.01

Note. Tamhane T2 Post-Hoc Test for multiple comparisons.

Similar to Table 3, the results of the post hoc Tamhane's T2 test (see Table 4) showed a significantly greater difference in foundation funding between the Carnegie doctoral classification and two of the four-year Carnegie classifications including master's ($p < .01$) and baccalaureate ($p < .01$). The Carnegie special focus 4-year classification also showed a significantly greater difference than master's ($p < .01$).

Table 4
Mean Differences of Foundation Funding Levels among Rankings

Foundation Funding Total FY2016		Mean Difference	Sig
Doctoral	Masters	25541996.00	0.01
	Baccalaureate	20725981.74	0.01
	Special Four-Year	8357986.88	0.72
Masters	Doctoral	-25541996.00	0.01
	Baccalaureate	-4816014.25	0.01
	Special Four-Year	-17184009.12	0.04
Baccalaureate	Doctoral	-20725981.74	0.01
	Masters	4816014.25	0.01
	Special Four-Year	-12367994.86	0.23
Special Focus Four-Year	Doctoral	-8357986.88	0.72
	Masters	17184009.12	0.04
	Baccalaureate	12367994.86	0.23

Note. Tamhane T2 Post-Hoc Test for multiple comparisons.

While sponsored research funding was significantly different between doctoral universities and each of the other 3 four-year classifications, foundation funding was similar except for the insignificant difference between doctoral universities and special four-year institutions. Unlike sponsored research funding, significant differences in foundation funding were found between baccalaureate institutions and master's institutions, with baccalaureate institutions having greater distributions of foundation funding. Special focus four-year institutions were a close second, with significant differences in both sponsored research and foundation funding distributions between special focus four-year and master's,

and a significant difference in sponsored research funding between special focus four-year and baccalaureate institutions.

The Carnegie doctoral classification showed the greatest sponsored research funding levels (Table 5: mean rank = 410.31), with the special focus 4-year as the second highest (Table 5: mean rank = 298.16). Mean rank reflects the amount of sponsored research funding levels present within each Carnegie grouping. The higher the level of funding in the mean rank, the more funding the Carnegie grouping receives in that array of institutions.

Table 5
Average Means of Carnegie Four-Year Institutions and Sponsored Research Levels

Carnegie Grouping	***N***	**Mean Rank**
Doctoral	296	410.31
Masters	162	178.14
Baccalaureate	80	155.18
Special Focus Four-Year	65	298.16
Total	**603**	

Note. SPSS Kruskal-Wallis *H* Test – Ranks; Mean Ranks = Research Expenditures 2016

Similar to Table 5, the Carnegie doctoral classification had the greatest foundation funding levels (Table 6: mean rank = 253.76), with the special focus 4-year institutions having the second highest (Table 6: mean rank = 205.23). Mean rank reflects foundation funding levels present within each Carnegie grouping. The higher the level of funding in the mean rank, the more funding the Carnegie grouping receives among its institutions.

Table 6
Average Means of Carnegie Four-Year Institutions and Foundation Funding Levels

Carnegie Grouping	*N*	Mean Rank
Doctoral	241	253.76
Masters	94	96.83
Baccalaureate	58	199.10
Special Focus Four-Year	22	205.23
Total	**415**	

Note. SPSS Kruskal-Wallis *H* Test – Ranks; Mean Ranks = Foundation Funding Levels 2016.

As expected, the doctoral classification reflected the highest average mean in both sponsored research and foundation funding levels, with special focus four-year institutions averaging as a close second. It is interesting that the baccalaureate institutions significantly outperformed master's institutions in their mean ranks for foundation funding levels, while both classifications ranked closely on sponsored research.

To test the third hypothesis that *foundation funding levels will increase as an institution's sponsored research funding increases*, a Spearman's *rho* was performed to examine the strength and direction of the linear relationship between the two continuous variables. The non-parametric Spearman's *rho* was preferred over the Pearson's *r* due to both variables not meeting the assumption of a normal distribution. The results of the Spearman's *rho* correlation showed a significant positive correlation between the two variables (Table 7: $\rho\rho = .698$, $p < .01$). Note that a Pearson's r was performed alongside the Spearman's rho, but the results were not similar enough to consider the Pearson's r results in the findings.

Table 7
Correlation between Foundation Funding and Sponsored Research Levels

		All R&D Expenditures FY2016 ($Thousands)	Foundation Funding FY2016
All R&D Expenditures FY2016 ($Thousands)	Correlation Coefficient	1.000	.698
	Sig. (2-tailed)		0.01

Notes. Correlation is significant at the 0.01 level (2-tailed); SPSS Spearman's rho Correlation.

A direct linear relationship was found between foundation funding levels and sponsored research funding levels. Results revealed that foundation funding increases as sponsored research funding increases at an institution. Figure 1 shows that data points tend to approximately follow a linear pattern.

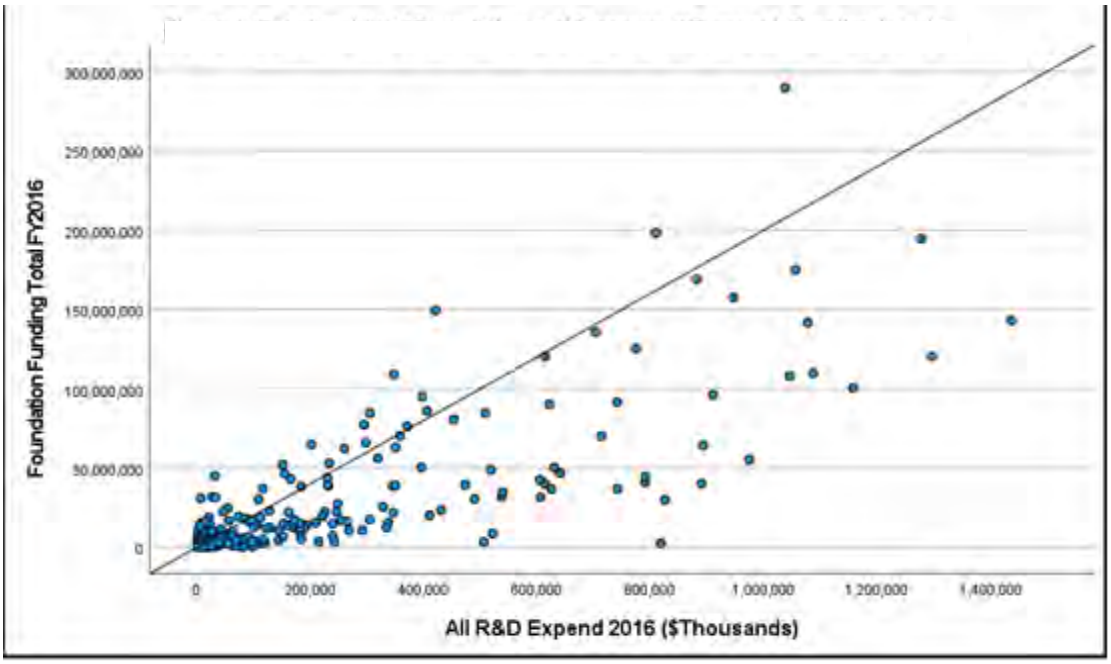

Figure 1
Relationship of Foundation and Sponsored Research Funding Levels

The Kruskal-Wallis *H* test results supported the hypotheses that both sponsored research funding and foundation funding distribution are higher in Carnegie doctoral institutions compared to other four-year school Carnegie classifications. Other significant findings included the following: special focus four-year schools are successful in securing both sponsored research and foundation funding, coming in a close second to doctoral institutions, and baccalaureate institutions outperformed the master's institutions in foundation funding. Thus, the null hypotheses were rejected. The third hypothesis was supported by the results of the Spearman's *rho*, finding that as foundation funding levels increased at an institution, the institution's research expenditures showed a similar increase in levels — thus, they are related, and the null hypothesis is rejected.

Research Question 2: Does an institution's control type of public or private relate to the source(s) of external funding levels it secures as sponsored research or foundation funding?

To test the hypothesis that *distributions of sponsored research funding and foundation funding will differ based on institutional control type of public or private, with public institutions receiving more sponsored research funding and private institutions receiving more philanthropic foundation funding*, a non-parametric Kruskal-Wallis *H* Test was performed. The Kruskal-Wallis *H* Test was preferred over the one-way ANOVA due to the dependent variables of research expenditures and secured foundation funding not meeting assumptions of a normal distribution. The results of the test of homogeneity of variances indicated that the variances for the four groups on research expenditures and on foundation funding were significantly different for each. Thus, the assumption of the homogeneity of variances was not met. Outliers were removed at 2 standard deviations above the means, but still did not provide a normal distribution for the dependent variable or homogeneity of variances. The non-parametric test was deemed the most accurate test to run in testing the set of hypotheses.

The results of the Kruskal-Wallis *H* non-parametric test showed

significant differences in sponsored research funding levels based on institutional control type (Table 8. $X^2 = 34.81$, df = 1, $p < .01$). The results also pointed to significant differences in foundation funding levels based on institutional control type (Table 8. $X^2 = 9.70$, df = 1, $p < .01$).

Table 8

Significant Differences in Funding Sources Based on Public and Private

	All R&D Expenditures FY2016 (Thousands)	**Foundation Funding FY2016 Total**
Kruskal-Wallis H	34.81	9.70
df	1	1
Asymp. Sig	0.01	0.01

Note. Kruskal Wallis Test; Grouping Variable: Institutional Control Type.

The Kruskal-Wallis *H* test results supported the hypotheses that distributions of sponsored research funding and foundation funding will differ based on institutional control type of public or private, with public institutions receiving more sponsored research funding and private institutions receiving more philanthropic foundation funding. Thus, the null hypothesis was rejected, and the resource dependency theory by institutional control type is supported in this study.

A direct linear relationship was found earlier between foundation funding levels and sponsored research funding levels (see Figure 1). Upon further examination, data reveal that the source of funding differs according to institutional control type. As reflected in Figure 2, public institutions in this study's sample received more sponsored research funding and private institutions received more foundation grant funds.

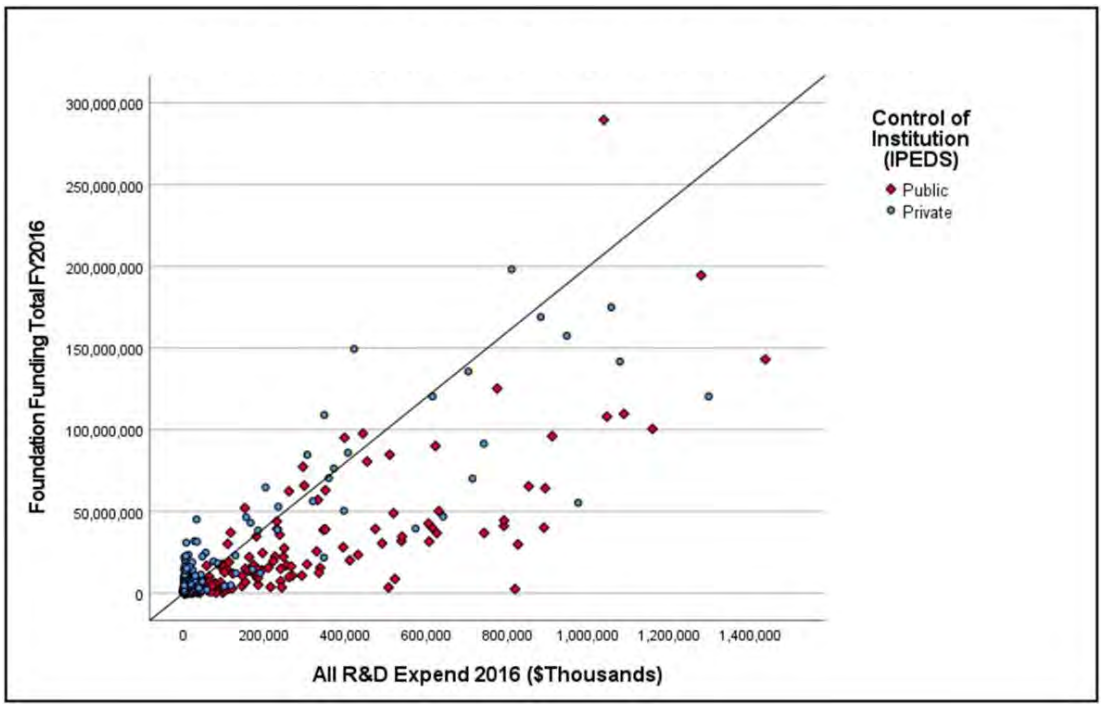

Figure 2
Relationship of Foundation and Sponsored Research Funding Levels

Research Question 3: Does an institution's administrative capacity reflect its levels of sponsored research and foundation funding?

To test the hypothesis that *sponsored research funding distribution will increase as institutional administrative capacities increase*, a Spearman's *rho* was performed to examine the strength and direction of the linear relationship between the continuous interval level variables. This test was preferred due to the fact that the continuous interval level variables were not meeting the assumption of a normal distribution. Interestingly, when the Pearson's *r* was performed alongside of the Spearman's *rho*, the results were similar — hence, the recommendation to report the Pearson's *r* correlation in the findings. The results of the Spearman's *rho* correlation showed a significant positive correlation between the two variables ($\rho\rho$ = .918, $p < .01$). The Pearson's *r* correlation also showed a significant positive correlation

between the two variables (Table 9:
$\rho\rho = .948$, $p < .01$).

Table 9
Correlation between Sponsored Research Funding and Administrative Capacity

		All R&D Expenditures FY2016 ($Thousands)	Administrative Capacity
All R&D Expenditures	Pearson Coefficient	1	.948
FY2016 ($Thousands)	Sig. (2-tailed)		0.01

Note: Correlation is significant at the 0.01 level (2-tailed); SPSS Pearson's r Correlation.

A significant linear relationship was found between the administrative capacity levels and sponsored research funding levels of institutions. As administrative capacity increased, sponsored research funding levels also increased (see Figure 3).

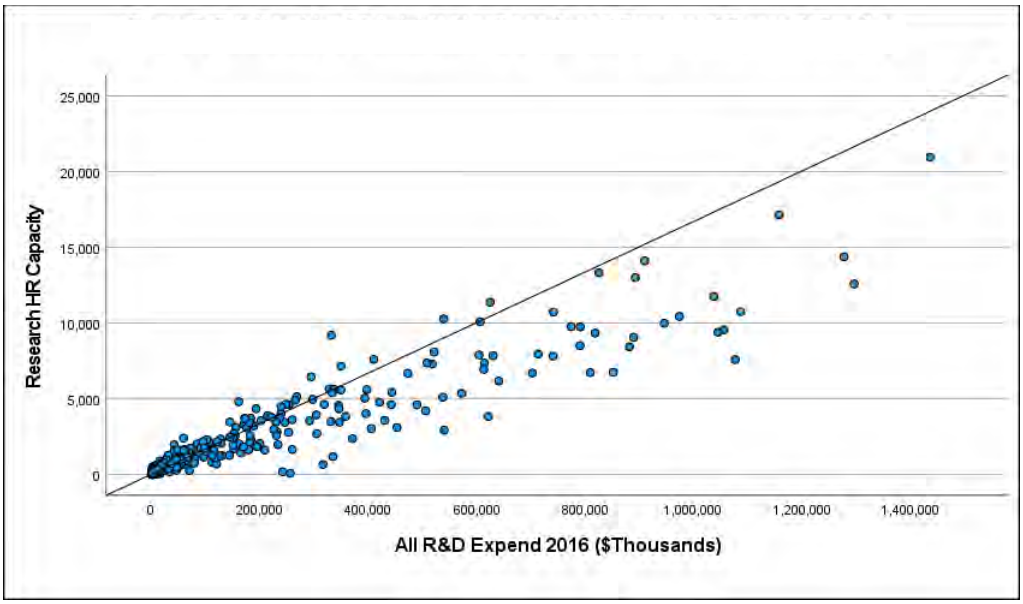

Figure 3
Relationship of Administrative Capacity and Sponsored Research Funding

To test the hypothesis that *foundation funding distribution will increase as institutional administrative capacities increase*, a Spearman's *rho*

was performed to examine the strength and direction of the linear relationship between the continuous interval-level variables. The Spearman's *rho* was preferred due to the fact that the continuous interval level variables were not meeting the assumption of a normal distribution. The results of the Spearman's *rho* correlation showed a significant positive correlation between the two variables ($\rho\rho$ = .700, $p < .01$). The Pearson's *r* correlation also showed a significant positive correlation between the two variables (Table 10: $\rho\rho = .736$, $p < .01$). *Interestingly, when the Pearson's *r* was performed alongside the Spearman's *rho*, the results were similar — hence, the recommendation to report the Pearson's *r* correlation in the findings.

Table 10
Correlation between Foundation Funding and Administrative Capacity

		Foundation Funding Total FY2016	**Administrative Capacity**
Foundation Funding Total FY2016	Pearson Coefficient	1	.736
	Sig. (2-tailed)		0.01

Notes. Correlation is significant at the 0.01 level (2-tailed); SPSS Pearson's *r* Correlation·

A significant linear relationship was found between administrative capacity levels and sponsored research funding levels of institutions. As administrative capacity increased, sponsored research funding levels also increased (see Figure 4).

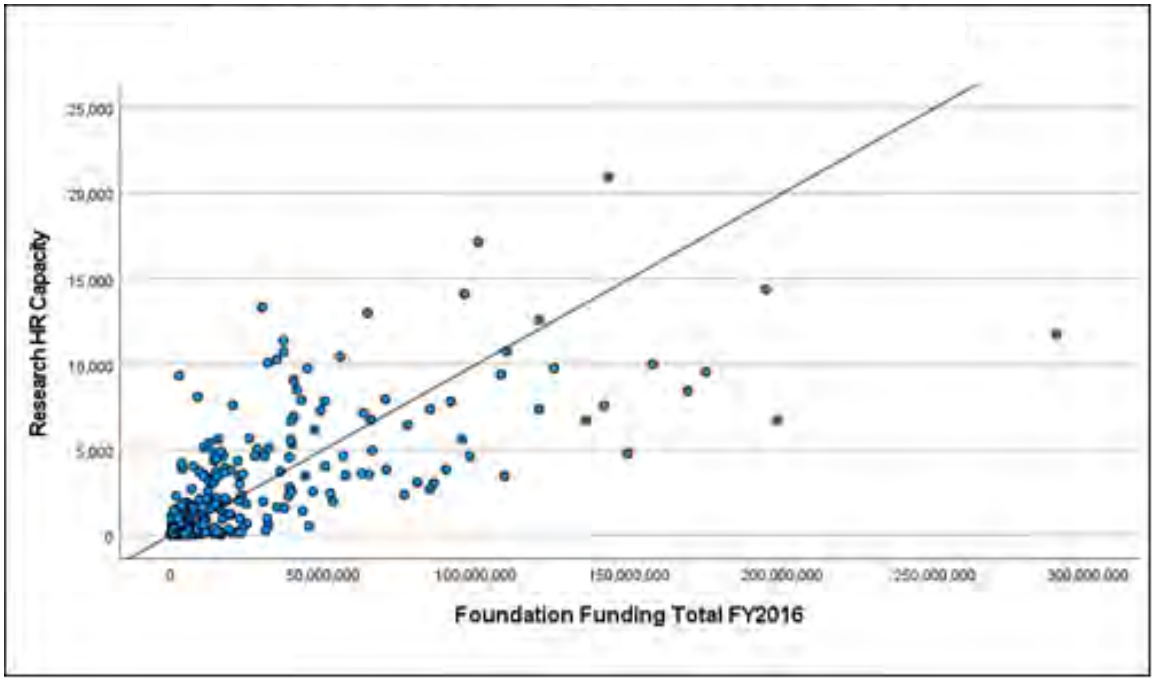

Figure 4
Relationship of Administrative Capacity and Foundation Funding

The Spearman's *rho*, further supported by similar findings from the Pearson's *r*, indicated across both hypotheses that as administrative capacity levels increased, both sponsored research funding and foundation funding levels increased. Administrative capacity and funding levels are found related; thus, the null hypotheses are rejected.

KEY FINDINGS AND DISCUSSION

An institution's Carnegie Classification ranking has a direct linear relationship with its level of sponsored research and foundation funding. As levels of funding are an indicator in the Carnegie Classification methodology, it is not surprising that the highest-ranking group, the doctoral universities, rank the highest in research and development funding compared to the other three four-year institution groups of master's, baccalaureate, and special focus four-year. Special focus four-year was a close second before master's and baccalaureate. Foundation funding levels varied slightly from the tendencies of sponsored research funding between the four-year Carnegie Classification groups in this study.

Yet, an interesting finding emerged: while foundation funding does increase with an institution's rank in the Carnegie Classification, with doctoral ranking first and special focus four-year second, baccalaureate was more highly ranked on foundation funding levels than universities in the master's group. The reason could be the presence of many prestigious, private baccalaureate institutions with low acceptance rates. These institutions produce alumni who go on to be much more successful than average and give back or show loyalty to the institution. While foundation funding levels in this study are based on foundation grant funding, not total giving which includes alumni and private gifting, these alumni go on to serve on influential foundation boards or provide connections to these boards through privilege. This opens the door to the receipt of select invitations to apply for prestigious funding from top foundations and a continued advantage in funding levels. Overall, this does support the finding that reputation as evidenced in higher classification ranks shows a relationship with higher levels of funding in both sponsored research and foundation funding.

Foundation funding levels do increase at an institution as sponsored research levels increase. This finding further supports the Matthew effect in that institutions with resources are more adept at securing additional resources. In addition, reputation is an indicator of funding competitiveness, as institutions that are successful in securing competitive funding are viewed as being less risky regarding transaction costs within the principal-agent model and bring further advantages as a partner. One point to consider is that institutions with access to more resources not only invest in more faculty infrastructure, but also may invest more in their professional staffing and administrative structure to adequately secure both sources of funding. Thus, the next key finding is based on resource dependency theory and institutional control type.

Distributions of sponsored research funding and foundation funding differ according to

institutional control type of public or private, with public institutions receiving more sponsored research funding and private institutions receiving more foundation funding. Differences in sponsored research funding and foundation funding were based on institution control type was public or private. This is supported by resource dependency theory — institutions signal their organizational commitment to sponsors by formalizing or growing administrative capacity in the form of faculty researchers, formal offices, and staffing that negotiate and manage sponsored research and foundation funding relationships. While this finding was expected based on theory and historical precedence, it is interesting to consider this in tandem with the previous key finding that foundation funding levels increase when sponsored research funding levels increase at an institution.

This also highlights the *wicked problem* of investment in focused faculty and professional staffing. Both contribute to capacity levels necessary for research growth within institutions. Does increased capacity lead to more funding or does more funding lead to the need to increase capacity? This question can be viewed with a focus on increasing the research capacity of faculty researchers and/or incorporating the administrative capacity levels of research development and foundation relations. Many institutions are limited or experience barriers in growing their faculty and administrative resources, especially R2's and below. They do not have the chance to strategically grow their numbers to secure more funding. Leadership and governing boards who are reluctant to staff critical areas to secure external sponsored funding increase the strain on existing faculty and staff. The strategy should be to plan for growth while climbing the ranking ladder.

Another consideration is that while private institutions effectively secure foundation funding, some of the most prestigious private institutions, such as Johns Hopkins, MIT, and CalTech, also are the most successful in securing sponsored

research funding. These outliers lead in both research *and* foundation funding levels – a fact associated with their performance and reputation as well as historical dependence and administrative structures built to secure and maintain sponsor relationships.

Again, are institutions with plentiful resources organizing their administrative structures to competitively secure more resources in funding sources? Will this contribute to a wider funding disparity gap in future years based on available resources and the economy?

As research administrative capacity levels increase, both sponsored research funding and foundation funding levels increase, and thus have a direct linear relationship. This finding is supported by both the principal-agent theory and resource dependency theories. The funding process followed by sponsored research agencies and foundations can be explained as a principal-agent relationship, with the principal being the sponsor and the agent being the institution of higher education. The sponsors look to institutions of higher education to deliver outcomes or products that they cannot deliver by or for themselves. The resource dependency theory is based on the principle that the institution of higher education has to engage in transactions with other actors and organizations in its environment to successfully acquire external resources — in this case, sponsored research and foundation funding. The increasing dependence of institutions on external relationships with funding agencies and foundations to secure funding has required organizations to both create specialized administrative offices and positions and to invest in significant training of faculty and specialized personnel in order to adequately and competitively secure and manage these relationships. Signaling of organizational commitment and capacity is weighed by the principals, or sponsors, when calculating transaction costs and performance accountability. Again, institutions with more resources can hire and train more faculty and personnel,

and thus the ability to more easily secure additional resources.

STUDY LIMITATIONS

Limitations included a smaller set of institutionally reported data on foundation funding levels compared to the number that reported their sponsored research funding levels in the dataset. While it is advantageous for an institution to report its research and development expenditures to the federal government, incentives are structured differently for reporting foundation funding. An institution also may not be a member of CASE — this could affect the reporting structure of private funding receipts. Another limitation or consideration is that when analyzing sponsored research and foundation funding, foundation funding expended under research activities can be counted both as a research expenditure and foundation funding between the NSF HERD and CASE VSE data. Also, the data reflecting the securing of sponsored research funding and levels of funding are captured in data on research expenditures within national higher education reporting systems. Foundation funding is reported by funds secured on the front end rather than when expended. Research expenditures reported to NSF HERD also may be internally and externally sourced, but the NSF HERD is the only dataset that provides a national report recognized by the federal government at this time. Another limitation is that organizations are re-classified in the Carnegie Classification of Institutions of Higher Education on an average of every 3 to 5 years. Thus, shifts in rankings may affect the data.

Limitations also included the inability to control for faculty teaching loads, which affect research productivity. It would be advantageous to be able to control for this factor, which directly affects time and effort to write research funding proposals and foundation funding applications, as well as time to carry out research, if funded. Teaching loads not only vary by type of institution, but also vary within the institution among departments, colleges, and schools.

RECOMMENDATIONS

Accountability and high impact outcomes are important to sponsored research and foundation funding as investments of taxpayer funds and private funds dedicated to fulfilling a mission. In addition, it is important to consider how the funding process can begin to make a more concentrated effort in narrowing the funding gap. The indirect cost, or facilities and administrative costs, of doing research are not fully covered by funding agencies, such that institutions must put forward resources to carry out research. With looming budget cuts due to current higher education market conditions and the effects of the global COVID-19 pandemic, we are witnessing cuts to research at institutions that do not fall within the R1, very high research activity institutions. This further magnifies resource disparities and social inequities in the higher education environment. Institutions affected by the funding disparity will cut research programs and student research experiences and will have to close their doors or merge into other systems. While closures and bankruptcies are based on declining enrollments and revenue streams, and not research and foundation funding streams, this concern clarifies the social equity gap in resources between large prestigious universities and small rural institutions. When an institution of higher education closes its doors, not only are the students and employees affected, but the communities served through engagement and economic vitality are impacted as well.

Sponsored research agencies at the federal level have worked to gear funding programs to states that have been less successful in securing awards from the federal government. Yet even with these programs in place, when funding is awarded, they reside with institutions receiving more resources from the state rather than those most in need of instrumentation, student workforce development, and resources for junior faculty to gain a competitive footing. Both types of higher education institutions are required for the state's economic growth.

While some of these federal funding programs have previously been under Congressional scrutiny for not showing true economic impact on and growth in states in which they have funded, new program structures need to continue to be explored. Mentoring programs may be established through which both higher- and lower-ranked institutions engage in resource-sharing according to proscribed levels, and immediate increases in administrative capacity and access to instrumentation, participants, and space to conduct research through partnerships.

Another recommendation involves administrative structures in higher education institutions that encourage foundation specialists to work closely with research development professionals on more effective strategies for raising external funds. Many foundation relations and corporate engagement officers are located in institutional advancement offices, which are typically separate from research and sponsored project offices in university settings.

Breaking down boundaries and cultivating collaborative relationships between these offices could foster positive cultural change in support of research growth in both restricted and non-restricted funding. It also may encourage the cultivation of stronger relationships with stakeholders, sponsors, and industry with the university (Devereux & Blackburn, 2018). Smaller and less research-intensive institutions tend to have fewer resources to dedicate to research development and foundation relations. Building capacity by partially integrating these offices may improve office productivity, specialization, and fiscal efficacy (Devereux & Blackburn, 2016). Arkansas State University bridged this gap starting in 2016 — the strategy quickly catalyzed efforts to apply for, secure, and manage externally sponsored funding, including both sponsored research and foundation grants (Devereux & Blackburn, 2018). Information on Arkansas State University's organizational model for integrating research development and foundation relations has been

presented and published by both the National Council of University Research Administrators (NCURA) and the Council for Advancement and Support of Education (CASE). Resources that support research and sponsored projects are crucial, and often scarce, for institutions with historically smaller sponsored funding levels. These institutions are in need of strategies that assist them in overcoming resource and funding disparities.

Another recommendation for more predominantly undergraduate institutions or less-research active universities, including R2 institutions, is intentional integration of research development into the organizational structure. This can involve intentional efforts to advance equity in administrative capacity by making a purposeful and deliberate attempt to increase an institution's competitiveness for externally sponsored funding. Related to the resource dependency theory, a university's responsiveness to the public accountability demands of societal responsiveness requires creative identification and use of resources and new management models to meet expected contributions to the public and its communities (Devereux, 2019). New models are restructuring research services to render them more effective in managing proposal submissions and encouraging staff to take on professional research development roles (including doctoral programs) designed to foster even more productive relationships with faculty researchers in developing competitive proposals, forming cross-disciplinary research teams for large proposals, and coordinating communications with funding agencies and stakeholders. These and like-minded strategies can catalyze institutional capacity to increase funding competitiveness.

FUTURE RESEARCH

Research that will further the reach and impact of this study's findings will include continuing explorations of university commitments and responses to plans to increase administrative capacities to engage in sponsored research and heighten foundation funding levels. A survey distributed to chief research and chief fundraising

officers of institutions who experienced a change in Carnegie Classification in the past two classification rounds (2018 and 2021) would be an important next step. This survey's findings would provide insight into administrative responses, investments, and commitments to capacity, as well as the ways in which perceived reputation changes have led to increases in research and private funds received by institutions since their change in rank. In parallel with this survey, a study of clearly defined research development service structures at newly reclassified institutions will provide a better understanding of intentional capacity-building in the interest of targeted research development initiatives.

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AUTHOR'S NOTE

This research was completed in part while previously employed at Arkansas State University. This manuscript's research was completed as a doctoral dissertation in public administration while at West Chester University

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