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Opportunism vs. Excellence in Academia: Quality Accreditation of Collegiate Business Schools

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ABSTRACT

This study extends the literature on the (in)effectiveness of quality accreditation by examining how standards adopted by an accrediting or research agency, such as the Association to Advance Collegiate Schools of Business International (AACSB), can be manipulated by academic units, such as collegiate schools of business. We present a hierarchical differential game between a collegiate business school and its accrediting agency to advance the hypothesis that strategic or opportunistic behavior occurs where heterogeneity in academic achievement exists, as represented by an uneven distribution of academic achievement resulting either from the presence of both unproductive and highly productive faculty or periods of high academic productivity followed by other periods of low academic productivity. Statistical explorations utilizing data from senior management faculty affiliated with both the highest-ranking and lowest-ranking colleges and universities in the U.S. are suggestive of the presence of incentives facing some U.S. business schools to behave strategically or opportunistically in terms of quality accreditation.

KEYWORDS

Quality Accreditation, Academic Productivity, Incentives in Academia

INTRODUCTION

Since the seminal work by Nelson (1970 and 1974), it has generally been understood that a consumer's ability to make pre-purchase judgments about the attributes of a good or service is a function of its characteristics. Within this typology, experience goods are those whose attributes can be understood, at least at relatively low cost, only after purchase. In many ways, higher education fits this category of goods and services.[1] As such, accrediting and research agencies potentially play an important role in helping potential consumers (i.e., students, and sometimes their parents) navigate the process of selection and purchase. Accreditation of educational units is, however, costly, and competition (and potential competition) among accrediting agencies can lead to moral hazard problems in higher education.[2] In some cases of quality accreditation, these issues call into question the ability of

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[1] Although he does not explicitly use a goods and services typology framework, see Winston (1999) for more on the experience goods nature of higher education.
[2] See Heriot, Franklin and Austin (2009) and Trifts (2012) for more on the costs of accreditation in the business school context. See Lowry and Willmott (2009) for more on agency competition in higher education accreditation.

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accreditation agencies to fulfill their missions.[3]

Globalization, which has elevated the importance of education over the past few decades, has (potentially) exacerbated the problems listed above. Many countries now realize the need to be competitive with regards to higher education and have established systems of incentives to improve their universities (Besancenot, Faria and Huynh, 2014). Much of the accreditation or monitoring of colleges and universities is done by governmental agencies and as expected, the process is plagued by government failure. Additionally, the strategic use of resources by colleges and universities in order to manipulate the evaluation process has become a problem (Besancenot, Faria and Vranceanu, 2009; Pelegrini and França, 2020). Evaluation of tertiary education has also experienced problems related to subjective bias (Sahel, 2011). Even where apparently objective measures are taken into account, such as bibliometric indicators, there are methodological problems (Glänzel and Moed, 2002; Hirsch, 2005), limitations of their utilization (Moed, Burger, Frankfort and Van Raan, 1985; Spinak, 1998; Abbott, Cyranoski, Jones, Maher, Schiermeier and Van Noorden, 2010; Durieux and Gevenois, 2010; Moed and Halevi, 2015), lack of standardization (Kaur, Radicchi and Menczer, 2013) and mismatch of classification (Moravcsik, 1986). In Brazil, for example, there is ample evidence of government evaluation failures and opportunistic behavior by institutions (e.g., Faria, 2004 and 2005; Faria, Araujo and Shikida, 2007; Issler and Pillar, 2002; Issler and Ferreira, 2004; Novaes, 2008; Da Silva, 2009; Guimarães, 2011; Haddad, Mena-Chalco and Sidone, 2017).

This study extends the literature on the (in)effectiveness of quality accreditation by examining how standards adopted by an accrediting or research agency, such as the Association to Advance Collegiate Schools of Business International (AACSB), can be manipulated by academic units, such as collegiate schools of business. The agency's standards are designed to enhance faculty research productivity, while the objective of the agency is academic excellence. However, some academic units may face incentives to behave strategically by maximizing favor from the agency without concomitantly raising average faculty productivity. We present a hierarchical differential game between a collegiate business school, the follower, and its accrediting agency (i.e., AACSB), the leader. This game advances the hypothesis that strategic or opportunistic behavior occurs where heterogeneity in academic achievement exists, as represented by an uneven distribution of academic achievement resulting either from the presence of both unproductive and highly productive faculty or periods of high academic productivity followed by other periods of low academic productivity.

Anecdotal evidence related to corruption indexes and tuition differentials between AACSB accredited business schools and business schools lacking such designation is suggestive of the presence of incentives facing some non-U.S. collegiate schools of business to behave strategically or opportunistically vis-à-vis AACSB accreditation. Additionally, statistical explorations utilizing data from senior management faculty affiliated with both the highest-ranking and lowest-ranking colleges and universities in the U.S. are suggestive of the presence of similar incentives facing some U.S. business schools to behave strategically or opportunistically in terms of quality accreditation.

Before presenting the specifics of our hierarchical differential game, or delving into some of the empirical explorations, we first provide a review of recent literature on the (in)effectiveness of quality accreditation in the collegiate business school context. That review is followed by a discussion of the game-theoretic approach to quality accreditation, after which the main body of the study concludes with empirical analyses of the game's main hypothesis.

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[3] Xiao (2010) asserts that the ineffectiveness of a quality accreditation can be attributed to the inability of the accreditation status to provide consumers with information they do not already possess from inferences about a firm's reputation. See Francisco, Noland and Sinclair (2008), Lowry and Willmott (2009) and Everard, Edmonds and St. Pierre (2013) for explanations (e.g., the creation of non-academic faculty designations, peer-to-peer accreditation review, and mission-driven accreditation standards) of the ineffectiveness of quality accreditation in the business school context.

PRIOR LITERATURE: A REVIEW

Even a cursory consideration of the expected benefits of academic accreditation yields a relatively long list, from higher tuition rates paid by university students to higher salaries paid to university faculty. Our review of the literature on these expected benefits follows other aspect of our study by focusing on business school accreditation. In that regard, a seminal study by Hedrick, Henson, Krieg and Wassell (2010) examines differences between the salaries of business faculty in AACSB-accredited business schools and those affiliated with institutions that do not hold AACSB accreditation. They report that faculty in AACSB-accredited business schools are paid more than their counterparts in un-accredited business schools. As an indirect source of compensation, faculty in accredited business schools also teach less than their peers in non-accredited business schools. Each of these differences exists between faculty who are otherwise similar, and are not simply due to nonrandom selection of faculty into accredited and non-accredited institutions (Hedrick et al., 2010). The first of these two perhaps unsurprising results is further supported by Bell and Joyce (2011).

Pecuniary returns to AACSB accreditation also apply to business school leadership. Achieving business school accreditation boosts the upward mobility of business school deans, associate deans and department chairs. A study by Faria, Gropper, Mixon and Santoyo (2019) on the salaries paid to deans of AACSB-accredited U.S. business schools reveals a mean salary of just under $275,000 from a sample wherein about 43 percent of deans are employed by relatively small regional colleges and universities. Econometric evidence suggests that the national university (vs. regional university) salary premium across accredited business schools is about $85,000 per year, *ceteris paribus* (Faria et al., 2019). Thus, upward mobility through accreditation success represents a substantial financial incentive for U.S. business school deans.[4]

Despite what appear to be obvious benefits of academic accreditation in this case, a body of relatively recent literature provides evidence of the ineffectiveness of AACSB accreditation in producing results that are beneficial to business students. For example, results from content analysis presented by Bieker (2014) indicate that the learning outcomes of students enrolled at AACSB accredited schools do not exceed those of non-accredited schools. Relatedly, Miller and Nouri (2015) examine the relationship between obtaining accounting accreditation from AACSB and CPA exam pass rates. The study uses data over a 13-year period from 19 schools that received initial accounting accreditation during that time frame. Specifically, the authors compare overall CPA exam scores, and scores for individual sections of the CPA exam, for the years preceding the year of initial accounting accreditation to respective scores for the years following the year of initial accreditation. The study reports that obtaining accounting accreditation has no effect on CPA exam pass rates (Miller and Nouri, 2015).[5]

Results from these two studies are well aligned with findings reported by Elliott and Soo (2013), who use a worldwide panel dataset from business colleges and schools to investigate the relationships between tuition, applications and enrollment choices made by applicants to MBA programs. Their results suggest that neither alumni ratings of program quality, nor program accreditation, impacts student application choices. In fact, with the exception of *U.S. News & World Report*'s ranking of U.S. MBA programs, published rankings of MBA programs tend to be negatively associated with the number of applications received.[6] The findings discussed by Elliott and Soo mirror those from a study

[4] Interestingly, Faria and Mixon (2020) report that this upward mobility is often hampered by U.S. business schools that operate as an internal labor market.

[5] This result is disputed in a more recent study by Nagle, Menk and Rau (2018).

[6] Hutchins and Olbrecht (2009) report that AACSB graduates are less likely to apply to graduate programs, and having done so, less likely to be accepted.

of historically black colleges and universities (HBCUs) by Doh, Prince, McLain and Credle (2018). These researchers point out that the general decline in business school enrollment, combined with the heavy reliance by HBCUs on tuition revenue, have made enrollment an increasingly important determinant of the survival of these institutions. Unfortunately, data indicate that AACSB accreditation does not lead to greater enrollment growth at HBCU business schools (Doh et al., 2018).

The ineffectiveness of AACSB accreditation pointed out in the literature discussed above also extends beyond the human capital investment stage. For example, Bastin and Kalist (2013) examine whether there is a wage premium from attending an AACSB accredited business school (compared to a non-accredited business school). Using data from the *Baccalaureate and Beyond Longitudinal Study*, which provides an exhaustive set of covariates, wage equations estimated therein fail to indicate any wage premium associated with graduating from an AACSB accredited business college, at least upon entry into the workforce (Bastin and Kalist, 2013). This result is consistent with that in the aforementioned study by Bieker (2014) indicating that graduates of AACSB accredited schools do not experience greater career success than graduates of non-accredited business schools.

In their study of business school accreditation, Jalbert, Jalbert and Furumo (2011) indicate that, although business schools devote substantial resources to earn and maintain accreditation, a paucity of academic research on the extent to which accredited schools outperform non-accredited schools in market driven situations exists. In filling this gap in the literature, the study examines the extent to which the CEOs of large U.S. companies who graduated from accredited business schools manage their firms differently, and perhaps earn higher profits, than CEOs who do not hold an academic credential from an accredited business school. Although a substantial portion of U.S.-based CEOs earned a degree from an AACSB accredited business school, the empirical results presented by Jalbert et al. (2011) suggest large companies in the U.S. that are managed by graduates from AACSB accredited schools do not outperform those managed by other CEOs.

The types of findings reported by the studies above extend to issues related to international migration and economic growth. For example, Lien (2006) considers a developing country-based university that allocates finite education resources to the delivery of two types of knowledge – global and local. In doing so, the study asserts that the optimal resource allocation (i.e., that which maximizes social welfare) differs from that under international accreditation of global education. In fact, Lien's (2006) approach shows that by imposing a minimum resource allocation to global knowledge instruction, international accreditation may exacerbate the brain drain problem facing the developing country. The results articulated in Lien (2006) are supported in Marconi (2013), which investigates the study abroad choices made by business school students in The Netherlands. Based on analysis of 2,970 study abroad applications (between 2004 and 2009) that include more than 150 partner institutions, Marconi (2013) finds, unlike the results for U.S.-based students seeking an MBA degree reported in the contemporaneous study by Elliott and Soo (2013), that international rankings and business school accreditations (e.g., AACSB) are important for exchange students with high academic achievement, even after taking university fixed-effects into account.

Any number of conceptual arguments can be made to explain the apparent failure of business school accreditation to achieve the mission of AACSB. In this regard, Everard et al. (2013) point to the change in the early 1990s to the mission-driven approach, wherein a school's accreditation was intended to stem from its adherence to a specific mission rather than to a uniform standard.[7] Analysis by Everard et al. (2013) of all accredited U.S. business schools suggests that program quality prior to the early 1990s exceeded that after this period. As they conclude, this result calls into question the ability of third parties to differentiate between high quality business programs and those that do not

[7] Even with this change, accredited business schools continued to face research expectations in order to maintain good standing with AACSB.

meet the same standards.[8]

The study by Everard et al. (2013) extends an earlier contribution to the literature by Lowry and Willmott (2009) which examines peer-administered accreditation in business education. They argue that the AACSB's change to a "mission-linked architecture" was motivated primarily by expansionist, rather than pedagogical, considerations. The history recounted in Lowry and Willmott (2009) links the change to the inability of many business schools in the U.S. to meet AACSB's previous standards, and to the emergence of a rival accreditation agency (Association of Collegiate Business Schools and Programs) formed to target this market. While the peer-reviewed mission-driven approach was good for AACSB growth, Lowry and Willmott (2009) argue that it was restrictive and unhealthy for business education.

Lastly, a recent study by Klasik and Hutt (2019) uses quantitative measures (e.g., graduation and default rates) to benchmark an institution's performance. More specifically, the study employs historical data on accreditation actions to compare the performance of a hypothetical quantitative evaluation system to contemporary accreditation standards in identifying low-performing schools. Klasik and Hutt (2019) find that schools facing accreditation sanctions are, on average, also low performing when evaluated by various quantitative measures. However, when the quantitative measures are applied to schools in good standing vis-à-vis accreditation, a substantial portion of the higher education sector would be categorized as low performers.

A HIERARCHICAL DIFFERENTIAL GAME

Consider a Stackelberg differential game with two players – an academic unit (i.e., a representative college or school within a university structure) and an accreditation or research agency.[9] The agency is the leader and the academic unit is the follower. The agency ranks the academic units, R, according to their research achievements, measured by average faculty productivity, $p \equiv P/F$, where P is research output measured by the number of publications in peer-reviewed journals, or citations to those peer-reviewed publications, and F is the size of the department's faculty. This classification criteria yields the ranking dynamics,

$$\dot{R} = a\left(\frac{P}{F}\right) - \delta R, \tag{1}$$

wherein the initial value of $R(0)$ is given. The academic unit increases its ranking position when its average research productivity exceeds a research threshold established by the agency.

In what follows we present and study two cases. The first case describes the behavior of excellence in academia, in which the academic unit plays honestly and follows the incentives of the agency (i.e., it makes efforts to raise the average research productivity of its faculty). In the alternative case, the academic unit acts strategically in the sense that it manipulates the system in an effort to maximize benefits and avoid the costs of excellence. One strategy available to the academic unit is to present for review by the agency only the scholarly credentials of its most productive faculty, while hiding those of the remaining, relatively unproductive faculty.

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[8] These results, and this conclusion, are supported by the content analysis, meant to examine whether AACSB accreditation leads to quality improvement in business schools whose missions are primarily teaching, reported in Bieker (2014). Given the lack of generally accepted metrics for evaluating quality discussed by Everard et al. (2013), there is no empirical evidence to determine whether AACSB accreditation enhances or retards quality improvement for institutions whose missions are primarily teaching (Bieker, 2014).

[9] A good example of the former is a college or school of business, such as the Ross School of Business at the University of Michigan. The leading international accreditation agency for colleges and schools of business is the Association to Advance Colleges and Schools of Business International (AACSB). The National Science Foundation (NSF) and the Carnegie Classification (CC) are good examples of a research agency.

ACADEMIC EXCELLENCE

The academic unit's payoff is affected by its own average productivity, p, that yields a benefit and has a cost to be implemented that is assumed to be quadratic. The academic unit also benefits from the agency's income provision, Y, which is associated with its ranking position R. The academic unit's objective function is,

$$\underset{p}{Max} \int_0^{\infty} [bp - 0.5\beta p^2 + RY] e^{-rt} dt, \tag{2}$$

where r is the academic unit's rate of time preference. The academic unit's problem is to solve (2) subject to (1). It is important to stress the fact that what characterizes the academic unit's excellence is its control variable (i.e., research productivity), p, which accounts for every member of its faculty. For simplicity, F is set equal to unity (i.e., F = 1).

The academic unit's Hamiltonian is,

$$H = [bp - 0.5\beta p^2 + RY] + \lambda[ap - \delta R]. \tag{3}$$

Maximizing the Hamiltonian with respect to the control variable yields,

$$\frac{\partial H}{\partial p} = 0 \Longrightarrow \lambda = [\beta p - b] a^{-1}. \tag{4}$$

The adjoint equation is,

$$\dot{\lambda} - r\lambda = -\frac{\partial H}{\partial R} \Longrightarrow \dot{\lambda} = (r + \delta)\lambda - Y, \tag{5}$$

plus the usual transversality condition. Differentiating (4) with respect to time and substituting into (5) yields the differential equation describing the dynamic behavior of the average productivity of a principled academic unit,

$$\dot{p} = \left(\frac{\beta p - b}{\beta}\right)(r + \delta) - \frac{a}{\beta} Y. \tag{6}$$

Equation (6) is taken by the agency alongside (1) as an additional dynamic constraint. The agency's payoff is positively affected by the term, RY. However, due to budget constraints imposed by the political process underlying research policies, we assume that the agency faces quadratic costs with regards to the income, Y, it distributes to academia. The agency's objective function is,

$$\underset{Y}{Max} \int_0^{\infty} [RY - 0.5cY^2] e^{-\rho t} dt, \tag{7}$$

where ρ is the agency's rate of time preference.

The agency's Hamiltonian is,

$$J = [RY - 0.5cY^2] + \mu_1[ap - \delta R] + \mu_2 \left[\left(\frac{\beta p - b}{\beta}\right)(r + \delta) - \frac{a}{\beta} Y\right]. \tag{8}$$

Maximizing the Hamiltonian with respect to the control variable yields,

$$\frac{\partial J}{\partial Y} = 0 \Longrightarrow R = cY + a\beta^{-1}\mu_2. \tag{9}$$

The adjoint equations are,

$$\dot{\mu}_1 - r\mu_1 = -\frac{\partial J}{\partial R} \Longrightarrow \dot{\mu}_1 = (\rho + \sigma)\mu_1 - Y, \tag{10}$$

and

$$\dot{\mu}_2 - \rho\mu_2 = -\frac{\partial J}{\partial p} \Longrightarrow \dot{\mu}_2 = [\rho - (r + \delta)\mu_2 - a\mu_1, \tag{11}$$

wherein the usual transversality conditions apply.

In the steady-state, $\dot{R} = \dot{p} = \dot{\mu}_1 = \dot{\mu}_2 = 0$. From (9) through (11) in the steady state we have,

$$R = Y\left[c + \frac{a^2}{\beta(\rho+\delta)[\rho-(r+\delta)]}\right], \tag{12}$$

while from (1) and (6) in the steady-state we have, respectively,

$$R = \left(\frac{a}{\delta}\right)p, \tag{13}$$

and

$$Y = \left(\frac{\beta p - b}{a}\right)(r + \delta). \tag{14}$$

Solving the system in (12) through (14) for p yields the equilibrium average productivity of a principled academic unit, p^*,

$$p^* = \frac{\delta b}{a^2}(r + \delta)(c + \Psi)\left[\frac{\delta\beta}{a^2}(r + \delta)(c + \Psi) - 1\right]^{-1}, \tag{15}$$

where, $\Psi \equiv a^2/\beta(\rho + \delta)[\rho - (r + \delta)]$. We assume that the agency's impatience is very high, $\rho \gg (r + \delta)$, so that $\Psi > 0$ *and* $(r + \delta)(c + \Psi) > a^2/\delta\beta$ for $p^* > 0$. Notice that substituting p^* in (15) into (13) and (14) yields equilibrium values of $R^*$and Y^*.

ACADEMIC OPPORTUNISM

What characterizes opportunism in the academic opportunism case is that the academic unit's control variable is the total research output, P, over the reviewed period, which it accounts for only members of its faculty who were productive during the period (i.e., the academic unit does not take into consideration its whole faculty, as it hides the scholarly credentials of its unproductive ones). Therefore, the variable faculty, F, is ignored in the dynamic optimization problem.

The academic unit's problem is,

$$\underset{P}{Max} \int_0^{\infty} \left[b\frac{P}{F} - 0.5\beta\left(\frac{P}{F}\right)^2 + RY \right] e^{-rt} dt, \qquad \text{s.t. } (1). \tag{16}$$

The academic unit's Hamiltonian is,

$$H = \left[b\left(\frac{P}{F}\right) - 0.5\beta\left(\frac{P}{F}\right)^2 + RY \right] + \lambda\left[a\left(\frac{P}{F}\right) - \delta R \right]. \tag{17}$$

Maximizing the Hamiltonian with respect to the control variable yields,

$$\frac{\partial H}{\partial P} = 0 \Longrightarrow \lambda = \left[\beta\frac{P}{F} - b \right] a^{-1}. \tag{18}$$

The adjoint equation is,

$$\dot{\lambda} - r\lambda = -\frac{\partial H}{\partial R} \Longrightarrow \dot{\lambda} = (r+\delta)\lambda - Y, \tag{19}$$

plus the usual transversality condition. Differentiating (18) with respect to time (assuming F is constant) and substituting into (19) yields the differential equation describing the dynamic behavior of the average productivity of an opportunistic academic unit,

$$\dot{P} = \frac{F}{\beta}\left(\frac{\beta p}{F} - b\right)(r+\delta) - \frac{a}{\beta}FY. \tag{20}$$

Equations (20) and (1) are taken as dynamic constraints by the agency, which maximizes,

$$\underset{Y}{Max} \int_0^{\infty} [RY - 0.5cY^2] e^{-\rho t} dt. \tag{21}$$

The agency's Hamiltonian is,

$$J = [RY - 0.5cY^2] + \mu_1\left[a\frac{P}{F} - \delta R \right] + \mu_2\frac{F}{B}\left[\left(\frac{\beta p}{F} - b\right)(r+\delta) - aY \right]. \tag{22}$$

Maximizing the Hamiltonian with respect to the control variable, Y, yields,

$$\frac{\partial J}{\partial Y} = 0 \Longrightarrow R = cY + aF\beta^{-1}\mu_2. \tag{23}$$

The adjoint equations are,

$$\dot{\mu}_1 - r\mu_1 = -\frac{\partial J}{\partial R} \Longrightarrow \dot{\mu}_1 = (\rho+\sigma)\mu_1 - Y, \tag{24}$$

and

$$\dot{\mu}_2 - \rho\mu_2 = -\frac{\partial J}{\partial p} \Longrightarrow \dot{\mu}_2 = [\rho - F(r+\delta)\mu_2 - a\mu_1, \tag{25}$$

wherein the usual transversality conditions apply. Note that in (25) the agency reviews only the average productivity of the academic unit, p, and not its total output, P.

In the steady-state, $\dot{R} = \dot{p} = \dot{\mu}_1 = \dot{\mu}_2 = 0$. From (23) through (25) in the steady state we have,

$$R = Y\left[\frac{a^2}{\beta(\rho+\delta)[\rho - F(r+\delta)]}\right], \tag{26}$$

while from (1) and (20) in the steady-state we have, respectively,

$$R = \frac{aP}{SF}, \tag{27}$$

and

$$Y = a^{-1}\left(\frac{\beta P}{F} - b\right)(r+\delta). \tag{28}$$

Solving the system in (26) through (28) for P, yields the equilibrium total research output of an opportunist academic unit, denoted by $\bar{P}$,

$$\bar{P} = F\frac{\delta b}{a^2}(r+\delta)(c+\Omega)\left[\frac{\delta\beta}{a^2}(r+\delta)(c+\Omega) - 1\right]^{-1}, \tag{29}$$

where $\Omega = \frac{a^2}{\beta(\rho+\delta)[\rho - F(r+\delta)]}$.

As in the previous case we assume that the agency's impatience is so high that $\rho > F(r+\delta)$, thus $\Omega > 0$ *and* $(r+\delta)(c+\Omega) > a^2/\delta\beta$ for $\bar{P} > 0$. Notice that substituting $\bar{P}$ in (29) into (27) and (28) yields the equilibrium values of academic unit's ranking, $\bar{R}$, and income from the agency, $\bar{Y}$, for an opportunistic academic unit.

COMPARING ACADEMIC EXCELLENCE TO ACADEMIC OPPORTUNISM

The comparison of a principled academic unit (i.e., one that pursues excellence following the incentives set by the agency) to an opportunistic academic unit (i.e., one that manipulates the system) is made by comparing their respective optimal average productivities. The optimal average productivity of the principled academic unit, p^*, is given by (15), and the optimal average productivity of the opportunistic academic unit, $\bar{P}/F$, is obtained from (29),

$$\frac{\bar{P}}{F} = \frac{\delta b}{a^2}(r+\delta)(c+\Omega)\left[\frac{\delta\beta}{a^2}(r+\delta)(c+\Omega) - 1\right]^2. \tag{30}$$

Recall that the optimality conditions of the principled academic unit are consistent with $F^* = 1$.

The comparison between the equilibria yields the main result of the model. Academic units with average productivity below that of the principled academic unit have an incentive to be opportunistic. In other words, only productive academic units follow the agency's incentives and try to raise the overall average productivity of faculty, while unproductive academic units manipulate the system (i.e., $p^* > \bar{P}/F$, is the criteria to distinguish productive from opportunistic departments, or academic excellence from academic opportunism). It is straightforward to show that $p^* > \bar{P}/F$. By (13) and (29) it follows that $\Omega > \Psi$, and therefore $F > F^* = 1$. This condition yields the hypothesis of this paper. It

asserts that academic units with largely unproductive faculty tend to manipulate the system, reporting the output of only a share of its faculty (i.e., its productive faculty) to the agency.

ADDITIONAL THOUGHTS ON THE IMPLICATIONS OF THE HIERARCHICAL DIFFERENTIAL GAME

The result derived by our Stackelberg game, namely that academic units with average productivity below that of the principled academic unit have an incentive to be opportunistic, could be obtained by a myriad of available models. For example, there is a very large theoretical literature in political economy describing how information asymmetries regarding the competence of politicians can create incentives for them to behave opportunistically in order to maximize their re-election chances and the probability of extracting rents (e.g., Mueller, 1989; Drazen, 2000; Persson and Tabellini, 2000). Our model, however, describes clearly how the manipulation of the system is executed in a very simple form. That is, academic opportunism ignores the size of faculty, F, and takes into account only total research output, P, while honest academic units set $F = 1$ and control for average productivity, $p = P/F$. The results are crisp and independent of any probability distribution which is inherent in models with informational asymmetries. Ockham's razor indicates that if one has to select between models that issue the same results, it is preferable to pick the simpler model, as is our case.

Given the certain level of corruption implied therein, the hypothesis stemming from the strictly-defined main result of the hierarchical differential game described in the previous section is, if applied to business school accreditation in the U.S. or similar countries, open to some degree of criticism. Such criticism would be much less appropriate if the result of the game – that academic units with largely unproductive faculty report only a share of its faculties' academic credentials to the agency – were applied to other countries whose universities are home to business schools that seek AACSB's stamp of approval. To further explain, the organization referred to as Transparency International annually scores countries on the basis of a corruption perception index (CPI), where scores closest to 0 denote "highly corrupt" countries and those closest to 100 indicate "very clean" countries. Among the countries whose business schools have sought and attained AACSB accreditation include Venezuela, which resides at the 98th-percentile in terms of corruption. Other countries at or above the 60th-percentile in terms of corruption according to Transparency International include Nigeria (83rd-percentile), Lebanon (83rd-percentile), Russia (72nd-percentile), Mexico (69th-percentile), Pakistan (69th-percentile), Egypt (65th-percentile), Philippines (64th-percentile), and Boznia and Herzegovina (62nd-percentile). A recent study by Nassereddine (2018) examines data on tuition and accreditation status, extending back to 1960, from business schools in Lebanon. Results from both parametric and nonparametric procedures to analyze these data indicate that accredited business schools in Lebanon charge tuition rates that are three times the average tuition of non-accredited business schools. This difference clearly provides an incentive for business schools in Lebanon, which resides at the 83rd-percentile of corruption, to act opportunistically vis-à-vis AACSB. To the extent that similar tuition differentials exist at the other countries listed above, even the strict conclusions expressed by our hierarchical differential game apply to the accreditation of business schools around the globe.

In terms of U.S.-based business schools, uniformity in the expectations faced by accredited business schools to produce academic scholarship will lead to behaviors by managers of business school with largely unproductive faculty to disproportionately promote the academic achievements of the most productive faculty. This might occur through a variety of channels, such as prominent display of academic journal and scholarly book publications, in-person meetings (e.g., fancy dinners, cocktail gatherings), the use of affinity publications (e.g., magazines) and academic presentations. As such, examination of the academic credentials of business school professors across a variety of business schools in the U.S. may yield insights as to the likelihood and prevalence of such behavior. This is the focus of the next section of the study.

EMPIRICAL ANALYSIS

In order to explore some of the implications of the hierarchical differential game presented above, data were collected on the scholarly productivity of management faculty in the U.S.[10] As such, our study extends the literature investigating the determinants and outcomes of the research endeavors of management faculty (e.g., Williamson and Cable, 2003; Gómez-Mejia, Treviño and Mixon, 2009; Ryazanova and McNamara, 2016; Nielsen, 2017; Seibert, Kacmar, Kraimer, Downes and Noble, 2017; Becker, Kernan, Clark and Klein, 2018; Treviño, Gómez-Mejia, Balkin and Mixon, 2018).[11] Our data collection process focused on the scholarly productivity of both associate and full professors of management across each of two sub-samples. One such sub-sample is drawn from institutions that are ranked among the top 100 national colleges and universities by *U.S. News & World Report*, and whose business schools hold AACSB accreditation. The second such sub-sample is similarly drawn from a comparable number of institutions receiving the lowest rankings by this source. The list of institutions comprising each sub-sample is provided in the Appendix.

Scholarly productivity in this case is measured by the number of Google Scholar citations garnered by the academic research produced by associate and full professors of management who are employed by the institutions listed in the Appendix. In all, 1,039 observations are collected from the highest-ranking institutions, and 368 observations come from the sub-sample containing the lowest-ranking institutions. Summary statistics from each sub-sample are presented in Table 1. As indicated there, the mean number of citations across faculty at the highest-ranking institutions is, at 8,285 citations, about four times greater than that of 2,065 citations across faculty at the lowest-ranking institutions.[12] Based on the data, only those management professors at the lowest-ranking institutions who reside 1.8 standard deviations above the mean citations for that group have garnered the average number of citations of the management professors at the highest-ranking institutions. Given that throughout the modern history of the AACSB the agency has maintained a fidelity to academic research across its accreditation umbrella, these distributional considerations point to a strong incentive for opportunistic behavior by business schools with largely unproductive faculty.

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[10] At the center of a business school is its management department (faculty). Thus, management faculty are chosen as the point of analysis.

[11] Williamson and Cable (2003) examine the predictors of early career research productivity for 152 management professors over the first six years of their career, finding that early career research productivity is a function of dissertation advisor research productivity, pre-appointment research productivity, and the research output of a faculty member's academic origin and academic placement. Studies by Gómez-Mejia et al. (2009) and Treviño et al. (2018) examine the correlates, including research productivity, of securing a named professorship in management, with the latter study indicating the presence of gender discrimination in the process. Ryazanova and McNamara (2016) report that both organizational environment and individual behavior influence the research performance of U.S. business school faculties, with collaboration behavior being the most important driver of research outcomes. Nielsen (2017) investigates the extent to which a gender gap exists in the citation rates of management researchers, finding a marginal difference in citation impact in favor of women management scholars, who are also more likely than men to author articles in journals ranked among the top 10 percent in their fields. Seibert et al. (2017) examine the effects that coauthoring and working in multiple research fields have on the number of publications in each of three journal quality tiers for 119 management professors during an eight-year period. Among their findings is that distributing coauthoring activity evenly across a greater number of coauthors is positively related to the number of publications in the highest-quality journals for the focal researcher. Lastly, Becker et al. (2018) find that commitment to the academy was positively related to intrinsic motivation in management faculty to engage in research and, through this effect, resulted in more challenging research goals, increased commitment to those goals, more hours spent on research, and greater research productivity.

[12] The difference in median citations, again favoring management faculty in the highest-ranking institutions, is of a similar magnitude.

Table 1. Summary Statistics – Citations

Category	*n*	Mean	Median	CoV	Skewness	Kurtosis
Highest-Ranking Institutions	*1,039*	*8,285*	*3,573*	*152.2*	*3.46*	*15.9*
Lowest-Ranking Institutions	*368*	*2,065*	*781*	*178.2*	*3.75*	*16.5*

Note: CoV = Coefficient of Variation.

The distributions of citations across the two groups of management faculty are, according to the reported measures of skewness (see Table 1), both highly positively skewed, thus exhibiting long right tails. More specifically, 72 percent of the faculty who are affiliated with the highest-ranking institutions possess a citations count that is less than the mean of 8,285 for this sub-sample. Additionally, 75 percent of faculty who are affiliated with the lowest-ranking institutions possess a citations count that is less than the mean of 2,065 for the sub-sample. Going further, only about 14 percent of faculty at the lowest-ranking institutions possess the median number of citations possessed by faculty at the highest-ranking institutions, while only about five percent possess at least 8,285 citations, which is the mean for the highest-ranking institutions.[13] These distributional considerations further point to a strong incentive for opportunistic behavior by business schools with largely unproductive faculty.

Some of the comparisons above allude to an examination of differences in total citations across management faculty in each class along the joint distribution. Additional details about the joint distribution of citations are provided in Table 2. As indicated there, fully 60 percent of management faculty employed by the highest-ranking institutions meet or exceed the median of 2,389 citations. On the other hand, only 21.7 percent of management faculty who are affiliated with the lowest-ranking institutions meet or exceed this degree of scholarly productivity.

Table 2. Differences in Citations along Joint Distribution

		Joint Distribution	
Level (%)	**Citations**	**% Lowest-Ranking Institutions ≥**	**% Highest-Ranking Institutions ≥**
0	*2*	*100.0*	*100.0*
1	*43*	*96.5*	*99.8*
5	*168*	*84.0*	*98.8*
10	*336*	*72.3*	*96.4*
25	*881*	*46.5*	*85.2*
50	*2,389*	*21.7*	*60.0*
75	*7,152*	*5.7*	*31.8*
90	*18,008*	*1.4*	*12.9*
95	*28,045*	*0.0*	*6.8*
99	*55,959*	*0.0*	*1.4*

The differences in citations along the joint distribution shown in Table 2 appear to indicate that the distribution of citations across management faculty at the highest-ranking institutions dominates that for the lowest-ranking institutions. In that regard, Figure 1 provides two cumulative probability distributions – one for the Google Scholar citations garnered by the academic research of management faculty at the highest-ranking institutions and another for the Google Scholar citations garnered by the academic research of management faculty at the lowest-ranking institutions. Note that the former series lies strictly to the right of the latter, thus representing a case of first-order stochastic dominance (Quirk and Saposnik, 1962; Hadar and Russell, 1969; Bawa, 1975). This indicates

[13] The kurtosis values reported in Table 1 indicate the presence of a number of outliers in each distribution. These are represented by exceptional performers in each case.

that at all levels of cumulative probability the Google scholar citations of a typical management professor at a highest-ranking institution exceeds that of a typical management professor at a lowest-ranking institution. This consideration reflects the incentive for deans of business schools with largely unproductive faculty to overplay the academic achievements of those faculties in the extreme right tail of the local distribution of citations.

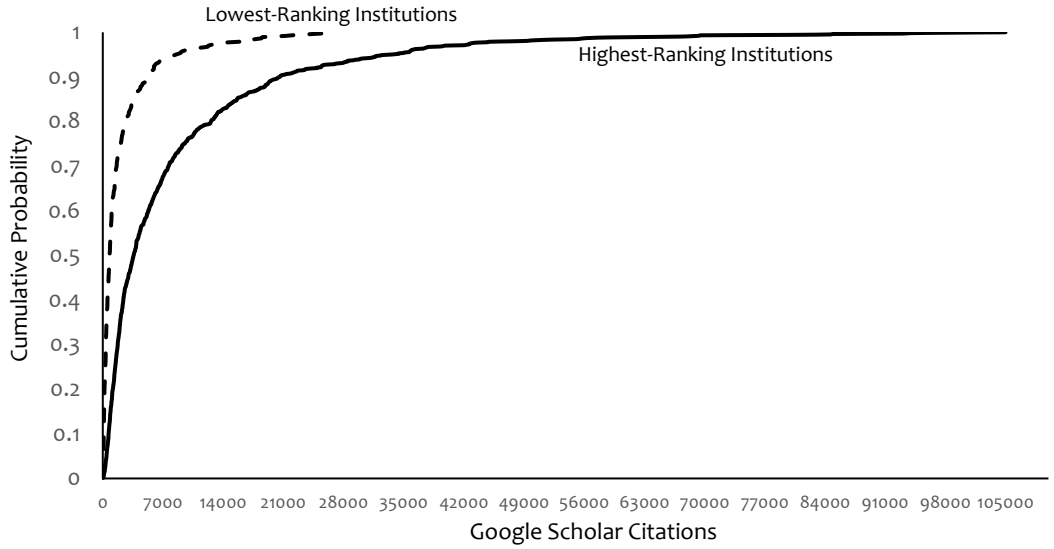

Figure 1. Cumulative Probability Distributions

Our final empirical examination involves econometric estimation of a citations equation controlling for a number of basic demographic and institutional covariates that one would expect to explain citations. In this case, the logarithm of citations garnered by a given management professor, *i*, is expressed as a function of the gender and rank of that professor. The former is included as $Female_i$, which is a dummy variable equal to 1 if professor *i* is female, and 0 otherwise. The latter is included as $Full_i$, which is a dummy variable equal to 1 if professor *i* is a full professor, and 0 otherwise. While the latter of these, $Full_i$, is expected to be positively related to the logarithm of citations garnered by professor *i*, expressed here as $\log Cites_i$, no relationship is indicated *a priori* for the former, $Female_i$.

Next, three institutional characteristics are held constant in the citations equation, namely $Named_i$, $Private_i$, and Ivy_i. The first of these, $Named_i$, is a dummy variable equal to 1 if professor *i* is affiliated with a named school of business, and 0 otherwise. Given that named business schools typically enjoy relatively large endowments, faculty affiliated with them typically have access to a larger financial pool to support their research endeavors. As a result, $Named_i$ should be positively related to $\log Cites_i$. The second variable in this sequence is $Private_i$, which is a dummy variable equal to 1 if professor *i* is affiliated with a private college or university, and 0 otherwise. Although private institutions may typically possess relatively large private endowments, they are also generally much smaller in terms of enrollment than their public counterparts. Thus, no *a priori* is offered in this case. Lastly, Ivy_i is a dummy variable equal to 1 if professor *i* is affiliated with a business school in an Ivy League institution, and 0 otherwise. This variable captures many of the stars of profession, which are represented by some of the extreme outliers in the joint distribution of citations discussed above. As such, Ivy_i should retain a positively-signed coefficient estimate.

To capture the asymmetry in academic productivity across management professors in our sample, an asymmetry that hampers the ability of an agency such as the AACSB to effectively judge the efficacy of a business school's academic program, the variable *Highest-Ranking*$_i$ is included in the regression specification. This covariate is represented by a dummy variable equal to 1 if professor *i* is affiliated with a business school attached to one of the highest-ranking colleges and universities (see the Appendix), and 0 otherwise. After accounting for other factors that impact log*Cites*$_i$, the coefficient estimate associated with this variable should provide further indication as to the magnitude of the differences in average productivity of management faculty across the spectrum of AACSB-accredited business schools.

Table 3. Variable Descriptions and Summary Statistics

		Highest-Ranking Institutions		Lowest-Ranking Institutions	
Variables	**Description**	**Mean**	**SD**	**Mean**	**SD**
Cites$_i$	*Total Google Scholar citations garnered by each professor, i.*	*8,285*	*12,611*	*2,065*	*3,680*
Female$_i$	*Dummy variable equal to 1 if professor i is female, and 0 otherwise.*	*0.256*	*0.437*	*0.288*	*0.453*
Full$_i$	*Dummy variable equal to 1 if professor i is a full professor, and 0 otherwise.*	*0.617*	*0.486*	*0.543*	*0.499*
Named$_i$	*Dummy variable equal to 1 if professor i holds a named professorship, and 0 otherwise.*	*0.428*	*0.495*	*0.144*	*0.352*
Private$_i$	*Dummy variable equal to 1 if professor i is affiliated with a private institution, and 0 otherwise.*	*0.478*	*0.500*	*0.027*	*0.163*
Ivy$_i$	*Dummy variable equal to 1 if professor i is affiliated with an Ivy League institution, and 0 otherwise.*	*0.121*	*0.327*	*0.000*	*0.000*

Summary statistics (and variable descriptions) for the variables in the econometric specification are presented (by category of institution) in Table 3. As indicated there, women represent 25.6 to 28.8 percent of senior management faculties in AACSB-accredited business schools at national universities in the U.S. The wider range of 54.3 to 61.7 percent of these senior management faculty hold the higher rank of full professor. Interestingly, the very wide range of 14.4 to 42.8 percent of these senior management faculty in the U.S. are affiliated with a named school of business, while anywhere from 2.7 to 47.8 percent of these senior management faculty are employed by a private college or university. Of course, in all cases these variations stem from our categorization of AACSB-accredited business schools using the highest- and lowest-ranking binary option. Lastly, about 12.1 percent of senior management faculty employed by the highest-ranking colleges and universities are affiliated with an Ivy League institution.

Results from estimation of the citations equation by OLS are presented in the second column of Table 4. The specification is jointly significant and produces a relatively high adjusted R^2. With the exception of that for *Female*, each the coefficient estimates is statistically significant. The results indicate that the Google Scholar citations count accruing to the typical full professor of management at an AACSB-accredited business school exceeds that of the typical similarly situated associate professor of management by about 220 percent. Additionally, the citation counts of management faculty affiliated with named business schools exceed those of their counterparts elsewhere by about 130 percent. Both of the results confirm, at least from a directional perspective, expectations.

Table 4. Summary of Econometric Results

	OLS	Quantile Regression		
	Estimates	**Estimates**	**95% Confidence Limits**	
Constant	*5.862*** (71.53)*	*117**	*44*	*218*
Female	*0.047 (0.70)*	*72*	*−344*	*280*
Full	*1.157*** (17.22)*	*2,243**	*1,701*	*2,617*
Named	*0.817*** (11.64)*	*4,430**	*3,446*	*5,429*
Private	*−0.281*** (−3.65)*	*−393**	*−954*	*−102*
Ivy	*0.392*** (3.61)*	*760**	*212*	*2,776*
Highest-Ranking	*1.345*** (14.98)*	*1,489**	*1,238*	*1,893*
nobs	*1,407*	*1,407*		
***F*-statistic**	*216.4****		*Test of Highest-Ranking*	
R^2	*0.481*		*Wald*	*146.5****
adj. R^2	*0.479*		*Likelihood Ratio*	*87.9****

Notes: Numbers in parentheses above are robust t-ratios (White, 1980). The Wald and Likelihood Ratio tests statistics follow a χ^2 with 1 degree of freedom. ***(**) denote the 0.01(0.05) level of significance.

Next, although Ivy League-affiliated senior management faculties possess citations portfolios that exceed those of other management faculties by about 50 percent, affiliation with a private college or university is generally associated with fewer citations garnered. More specifically, senior management faculties at private universities produce about 25 percent fewer citations that their counterparts in public institutions.[14] Lastly, senior management faculty who are affiliated with AACSB-accredited business schools at the highest-ranking colleges and universities possess a citations count that is about 280 percent larger, *ceteris paribus*, than that of their counterparts across lowest-ranking institutions. This result is suggestive of our prior assertion that the AACSB's accreditation practices vis-à-vis scholarly endeavors incentivizes the disproportionate promotion of the academic achievements of exceptional scholars in largely unproductive business schools.

The remaining results in Table 4 relate to a quantile regression approach that better-suited to data exhibiting extreme values in estimating the citations equation (Koenker and Hallock, 2001; Koenker, 2005). The results from this approach, which replaces log*Cites* with *Cites*, confirm those from OLS estimation. As pointed in Table 4, only in the case of *Female* do the 95% confidence limits include the value of 0. This indicates that each of the other coefficient estimates is significant at the 0.05 level, including *Highest-Ranking*. In this case, Wald and likelihood ratio χ^2 statistics from an individual test of the significance of *Highest-Ranking* indicates, with 99 percent confidence, that the citations count premium of 1,489 Google Scholar citations associated with a highest-ranking affiliation is statistically

[14] The correlation coefficient for the association between Ivy and Highest-Ranking is, at only 0.187, perhaps not as large as expected. Separate OLS regressions wherein each is omitted but not the other produce results similar to those reported in Table 4. Thus, multicollinearity does not unduly impact the estimates.

significant. As stated previously, this result is suggestive of the incentive of business schools at lower-ranking colleges and universities to behave opportunistically vis-à-vis the AACSB accreditation process.

CONCLUSIONS

This study investigates the (in)effectiveness of quality accreditation by examining how the quality accreditation process in academia can be manipulated by academic units, such as collegiate schools of business. We present a hierarchical differential game between a collegiate business school, the follower, and its accrediting agency (i.e., AACSB), the leader. Within the construct of the formal approach, the accrediting agency's standards are designed to enhance faculty research productivity, while the objective of the agency is academic excellence. The game also characterizes some academic units as facing incentives to behave strategically by maximizing favor from the agency without concomitantly raising average faculty productivity. This leads to a main feature of the game, that strategic or opportunistic behavior occurs where heterogeneity in academic achievement exists, as represented by an uneven distribution of academic achievement resulting either from the presence of both unproductive and highly productive faculty or periods of high academic productivity followed by other periods of low academic productivity.

In the empirical explorations that follow the presentation of our game-theoretic approach, scholarly productivity is measured by the number of Google Scholar citations garnered by the academic research produced by associate and full professors of management at collegiate schools of business in the U.S. We find that the mean number of citations across faculty at the highest-ranking institutions is about four times greater than that across faculty at the lowest-ranking institutions, and that only those management professors at the lowest-ranking institutions who reside in the right tail of that group's citations distribution have garnered the same number of citations as the typical management professor at the highest-ranking institutions. Given that throughout the modern history of the AACSB the agency has maintained a fidelity to academic research across its accreditation umbrella, we assert that these distributional considerations point to a strong incentive for opportunistic behavior by business schools with largely unproductive faculty. These distributional characteristics, and the accompanying assertion, are also supported by information gleaned from analysis of the joint probability distribution of citations, the two cumulative probability distributions of citations, and from OLS and quantile regression estimates of the correlates of management faculty citations across collegiate schools of business in the U.S.

Given that this study focuses solely on management faculty, future research might examine faculty in other business disciplines, such as accounting, finance, and marketing. Until then, we would caution against generalizing our results to other academic fields, particularly those outside of business. Finally, future research might also explore whether the ability to pay open access fees in journal publishing creates disparities between outcomes across institutions by wealth. If open access publishing leads to greater citations over time, this may be an issue that should be addressed in empirical testing.

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APPENDIX

LISTS OF COLLEGES AND UNIVERSITIES INCLUDED IN THE SUB-SAMPLES

Highest-Ranking Institutions	Lowest-Ranking Institutions
American University	*Arkansas State University*
Auburn University	*Boise State University*
Baylor University	*Clark Atlanta University*
Binghamton University	*Cleveland State University*
Boston College	*East Tennessee State University*
Boston University	*Eastern Michigan University*
Brigham Young University	*Georgia Southern University*
Carnegie Mellon University	*Idaho State University*
Case Western Reserve University	*Indiana State University*
Clemson University	*Indiana University of Pennsylvania*
College of William & Mary	*Jackson State University*
Columbia University	*Kennesaw State University*
Cornell University	*Lamar University*
Dartmouth College	*Louisiana Tech University*
Duke University	*Marshall University*
Elon University	*Middle Tennessee State University*
Emory University	*Mississippi College*
Florida State University	*Missouri State University*
Fordham University	*Morgan State University*
George Washington University	*North Dakota State University*
Georgetown University	*Northern Illinois University*
Georgia Institute of Technology	*Northern Kentucky University*
Gonzaga University	*Oakland University*
Harvard University	*Portland State University*
Indiana University	*Stephen F. Austin State University*
Johns Hopkins University	*Tennessee State University*
Lehigh University	*Texas A&M University – Commerce*
Loyola Marymount University	*Texas A&M University – Kingsville*
Marquette University	*Texas State University*
Michigan State University	*Texas Wesleyan University*
New York University	*University of Arkansas – Little Rock*
North Carolina State University	*University of Central Arkansas*
Northeastern University	*University of Colorado – Colorado Springs*
Ohio State University	*University of Hawai'i – Hilo*
Pennsylvania State University	*University of Louisiana – Lafayette*
Pepperdine University	*University of Maryland – Eastern Shore*
Purdue University	*University of Michigan – Flint*
Rensselaer Polytechnic Institute	*University of Nebraska – Omaha*
Rutgers University	*University of New Orleans*
Santa Clara University	*University of Northern Colorado*
Southern Methodist University	*University of South Alabama*

Syracuse University
Texas A&M University
Texas Christian University
Tulane University
University at Buffalo
University of Arizona
University of California – Berkeley
University of California – Irvine
University of California – Riverside
University of Connecticut
University of Delaware
University of Denver
University of Florida
University of Georgia
University of Iowa
University of Maryland
University of Massachusetts
University of Miami
University of Michigan
University of North Carolina
University of Notre Dame
University of Pennsylvania
University of San Diego
University of Southern California
University of Texas
University of Virginia
University of Washington
University of Wisconsin
Villanova University
Virginia Polytechnic Institute & State University
Washington University – St. Louis
Worcester Polytechnic Institute
University of Southern Mississippi
University of Tennessee – Chattanooga
University of Texas – Arlington
University of Texas – El Paso
University of Texas – Rio Grande Valley
University of Texas – San Antonio
University of Texas – Tyler
University of Toledo
University of West Georgia
University of Wisconsin – Milwaukee
Valdosta State University
Washburn University
Western Kentucky University
Wichita State University
Wright State University