TRYING TO KEEP UP WITH THE JONESES:
A STUDY OF PEER DIFFUSION
BY AMERICAN PUBLIC RESEARCH UNIVERSITIES

by

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B.A., Clark University, 1994

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Submitted to the Graduate Faculty of

Arts and Sciences in partial fulfillment

of the requirements for the degree of

Doctor of Philosophy

University of Pittsburgh

2007

UNIVERSITY OF PITTSBURGH

FACULTY OF ARTS AND SCIENCES

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April 4, 2007

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Political scientists examining the phenomenon of policy diffusion have routinely found that states within a similar geographical region tend to adopt similar policies over time. This result has been proven over a wide range of social policies and time periods. The theoretical logic behind the "contiguous state" explanation is twofold. First, states are in constant economic competition with each other for valuable resources such as industries and productive citizens, which in turn places pressure on state legislatures to emulate the public policies enacted by their adjacent neighbor so as not to lose the inter-state battle. Second, state governments and agencies lack the necessary resources (in terms of money, time, and information) to conduct a thorough investigation of potential policies to address their specific public issues. Thus they engage in a form of "satisficing" where instead of enacting the ideal policy solution, state policy-makers simply adopt familiar and convenient policies from their neighboring states. Unfortunately political scientists have only primarily applied this theory to the institution of state legislatures, raising the question about its generalizability to other public policy institutions. This dissertation tests this question by applying the theory to the institution of public research universities while concurrently exploring a novel alternative explanation for policy diffusion – peer pressure. Using an original data set of three highly salient higher education policies (establishing a technology transfer office, launching a capital campaign, and raising tuition) this dissertation finds that the actions of one's peers (universities that share similar levels of prestige) can have a greater influence than the actions of one's geographical neighbors in determining the eventual implementation of specific policies. This finding highlights the importance of professional reputation when creating policy networks that lead to institutional innovations.

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ACKNOWLEDGEMENTS

I want to take this opportunity to thank the people who have laughed, cried, and cheered me on throughout this adventure. Thank you to my dissertation committee: Guy Peters–for introducing me to the world of public policy and exuding calmness when I needed it the most; Carman–for giving me the best advice as we walked the streets of New Orleans; Susan Hansen-it was in your class that I realized I had made the right decision to come back to school; and Michael McLendon–for making me realize that a political scientist could study within the field of higher education and in doing so hopefully enrich both disciplines; George Krause–for being my unofficial committee member and forcing me to think about the research each and every day. Thank you to my colleagues in Institutional Advancement: Al and Allie–for your constant understanding as I tried to juggle both my professional and academic worlds; Dave – for drafting talent over position; Steve–for the many lunches when we discussed the more important subjects in life, fantasy baseball and movies. Thank you to my cohort: Kate–we may have started off on the wrong foot many years ago, but every step since then has led us to a long lasting friendship; Luis–your optimism and ability to overcome hurdles will always inspire me; Andrew, Kristen, and Zeke–whether in the classroom, in a living room, or on the soccer field, you have made these last five years so much more enjoyable. Thank you to my family: my parents–you have taught me that life is not about due dates or external expectations, but about personal experiences; my siblings–your accomplishments in life are what have set the standards for me to push myself that much harder; My in-laws–you have provided both an emotional and physical environment for me to flourish and have supported me in all my endeavors since the day we met; Lastly, and most importantly, thank you to my wife, Marcie and my son, Nate–you put everything in perspective; Sweetie – you have supported me when I've needed to be supported, you've challenged me when I've needed to be challenged, but most importantly you have loved me unconditionally. I love you.

1.0 CHAPTER ONE: INTRODUCTION

1.1 POLICY CHANGES IN PUBLIC HIGHER EDUCATION

Over the last twenty-five years, dramatic changes have occurred in American public higher education in regards to raising revenue. In that time public universities have gone from relying on state appropriations for the majority of their budget to relying on a more diverse stream of revenue sources (Kane and Orszag, 2003). Instead of simply depending on the state government as the primary source for funding, public universities have increasingly implemented one or more of three alternative policies to augment their income – raising tuition, seeking greater contributions from private sources, and producing more commercially viable research. These new policies have been criticized by public higher education advocates who say that the policies veer the institutions away from their traditional missions (Dennison, 2003). Instead of public universities representing the goals of equal access, egalitarianism, and the pursuit of general knowledge, the advocates claim that the universities are now transforming themselves into private enterprises where accumulating wealth is the primary objective. Yet many university administrators argue that they have been forced to adopt these new policies in an effort to replenish the income they have lost because of the steady decline in state appropriations (Bok, 2003). University presidents and senior university leaders have been quick to point out that over the last two decades state appropriations for higher education have dropped significantly as a share of state expenditures (Kane and Orszag, 2003). In other words, the enactment of the controversial policies is not evidence of a deliberate agenda to abandon responsibilities as a public institution, but simply a strategic response to a new fiscal environment.

Regardless of whether the substantial policy changes are due to the decline in state allocations or part of a larger institutional strategy, this scenario does create an interesting opportunity to broaden the research of policy diffusion because the innovations are occurring in a

state agency that has been traditionally ignored by political scientists. By using public universities as the unit of analysis, theories and variables customarily associated with diffusion research can be tested regarding their generalizability (Lowry 2001). Specifically this dissertation will use universities to test the "contiguous state" theory and a broader array of institutional level variables.

1.2 THE "CONTIGUOUS STATE" EXPLANATION TO POLICY CHANGE

It has been almost 50 years since Everett Rogers (1962) wrote his monumental book on the political phenomenon of policy diffusion. It is in this seminal piece of social science literature that the concept of diffusion is first comprehensively defined as a process by which policies (or "innovations") are communicated over time by individuals within a social system (1962, 5-6). Ideas are created, information is learned, uncertainty is addressed, and ultimately policies are adopted through this act of communication. Since Rogers' book, the research area of policy diffusion has made significant and noteworthy advances. Most notably in political science, Jack Walker (1969) and Virginia Gray (1972) applied Roger's theoretical construct to the American states and uncovered the importance of geography as a significant explanatory variable. More specifically, they found that contiguous states tended to adopt similar policies over time. Over the last three decades, this discovery has been investigated in greater detail by other political scientists and has been statistically confirmed to be essential in understanding the means by which states innovate. Some of the more prominent studies include the adoption of state lotteries (Berry and Berry 1990), abortion laws (Mooney and Lee 1995), welfare (Peterson and Rom 1990), and economic development (Gray 1994).

The theoretical logic behind the contiguous state explanation is twofold - one based on economics (Tiebout, 1956), the other based on social learning (Rogers 1962; Mintrom and Vergari 1998; Mooney 2001) The underlying economics theory is that neighboring states are continually in competition with each other over a wide gamut of "resources" such as industries, citizens, and federal appropriations. This competition motivates state legislatures to emulate the policies enacted by their adjacent neighbors for fear that if they don't, they will be on the losing

end of the inter-state battle (Tiebout, 1956; Berry and Berry 1990).[1] Walker (1969) notes this reality when he comments that "(the) process of competition…is an important phenomenon which determines in large part the pace and direction of social and political change in the American states" (p.890). The underlying social learning theory that helps explain the contiguous state phenomenon is that state governments lack the necessary resources (in terms of time, money, and information) to conduct a thorough investigation of potential policies to address their particular public issues. Thus they engage in a form of "satisficing" (Simon 1959) where instead of enacting the ideal policy solution, state legislators adopt only familiar and convenient policies, which typically come from neighboring states.

1.3 IS THE "CONTIGUOUS STATE" EXPLANATION GENERALIZABLE?

As the diffusion literature broadens into other policy domains, the overall research remains relatively shallow. This deficiency can be attributed to the fact that while different policies continue to be tested within the literature, state legislatures remain almost exclusively the only unit of analysis under question.[2] Other policy-making institutions have rarely been analyzed by political scientists in relation to policy diffusion. This narrow inquiry has stunted efforts to test the generalizability of the contiguous state theory.

While the vast majority of scholars have taken Walker and Gray's cue and studied the importance of regionalism as one of the main catalysts for the spread of innovations, the contiguous state explanation holds true only if both aforementioned theoretical underpinnings (regional competition and lack of information) accurately apply to the policy-making institution in question. What if similar institutions in a mutual area are in fact not in competition with each other for the same resources and revenue – would regionalism continue to play a significant role in explaining diffusion? What if the institutions in question are making policy decisions with more complete information? Again, would the contiguous state theory still apply? These

[1] Alternatively, states maybe a magnet for "undesirable" resources such as welfare recipients (Peterson and Rom 1990).

[2] One exception is the work of Volden and Shipan (2006), who examine the diffusion of innovations by local governments.

questions have never been approached in the diffusion literature because of the traditional focus on policies enacted by state governments. This is turn has impeded efforts to identify other methods by which innovations possibly spread beyond regionalism.

Yet substantial literature, particularly in the field of organizational theory, has raised sound theoretical arguments for policy change beyond the motive of geography. DiMaggio and Powell's conceptualization of *normative isomorphic change* and the importance of *professionalization* (1983) have proven that "organizational fields that include a large professionally trained labor force will be driven primarily by status competition" (153). In other words, some organizations homogenize due to peer pressure – a desire to remain competitive with those who share identical levels of prestige. Herein lays the underlying question of this dissertation: Can peer pressure be the primary incentive behind the policy adoptions of some public policy-making institutions?

1.4 INSTITUTIONAL ARRANGEMENTS

The secondary hole in the diffusion literature caused by the overwhelming attention to state legislatures is the lack of analysis on the internal dynamics (e.g., the rules, norms, and preferences) of the policy-making institution. Past studies have given only cursory recognition to the varying arrangements and design of the institutions implementing the policies. This deficiency can be attributed to the fact that variation within state governments is typically limited to legislative partisanship and professionalism (Berry and Berry 1990). This narrow exploration has led to a less than fully formed answer to why some states are more innovative than others.

However, substantial literature in other subfields of political science proves the importance of institutional design as the prime mechanism for generating particular policy outputs (Cox and McCubbins 1993; Shepsle and Weingast 1994; Sinclair 1994). Scholars have argued that the range of potential policies available to policy makers within an institution is endogenous, based heavily on the rules and values of that specific institution. Thus, innovations typically comply with the "logic of appropriateness" embedded within the organization (March and Olsen 1972). This paper also highlights the need to consider the significance of the institutional arrangements when analyzing the adoption of specific policies.

1.5 THE RESEARCH QUESTION AND ITS SIGNIFICANCE

The objective of this dissertation is to address the previously stated issues within the policy diffusion literature by constructing an original research project utilizing a unique unit of analysis for political science, American public research universities, and posing the question: **which factors have caused three controversial revenue generating policies to spread and become adopted by public universities throughout the country?** Are the determinants at the state level as some administrators have alleged or are the innovations due to institutional level variables (dependent on the decisions of university leaders) as critics have reputed? This question will be applied to the three salient higher education policies – raising tuition, increasing private fund-raising, and establishing a technology transfer office - collectively known as "privatization policies".

There are three reasons why universities provide additional analytical leverage beyond what is provided by state legislatures. First, there is some question as to whom public universities compete against for their valued resources. In some cases schools compete on a national scale, such as for faculty and federal grants. In other cases they compete at the state level, such as for students and state appropriations. This dynamic raises questions about the applicability of the contagious state theory and opens an opportunity to test alternatives. Second, universities have greater access to information about their competition thanks to highly publicized rankings and data. This valuable information generates a cognitive hierarchy for both university administrators and their external constituents (i.e., students, parents, desired faculty, and foundations). Consequently, it allows universities to expand their search for policy solutions beyond the confines that typically limit their state government counterparts. Lastly, there is wide variation in the institutional arrangements that oversee and govern American public research universities, which in turn allows greater opportunity to compare and contrast how these variations may affect policy output (Lowry 2001).

With that being said, the results of this dissertation question will make two significant contributions to the policy diffusion literature. First it will introduce a new construct of diffusion, "peer diffusion", where some institutions will innovate because of a desire to maintain their

place among institutions of similar caliber.[3] Peer diffusion is an appropriate model for institutions like public research universities, where regional competition is not as acute and information about their competition is more accessible as compared to state government. Thus universities are more apt to learn from their national peers who hold a similar level of prestige as opposed to their geographical neighbors.

In addition this dissertation project analyzes universities internal characteristics (namely their governance structure, mission, and wealth) to produce a more defined understanding of why there is innovation variance within a specific category of institutions. The intention is to prove that the institutional differences within the universities play a major role in influencing, and ultimately determining, which policies are adopted. Simply analyzing regional and state demographics presents an incomplete explanation to why some universities innovate at a greater rate than others.

In sum, this dissertation will attempt to push the diffusion literature forward by introducing a new conceptualization of how innovations spread, while also focusing its attention to the institutions adopting the policies.

1.6 METHODS OF INQUIRY AND FINDINGS

To answer these questions the standard methodological technique in policy diffusion studies, event history analysis, is employed (Berry and Berry, 1990). The statistically significant factors that affect the timing of when each university formally adopts each of the three policies – establishing a technology transfer office, initiating a comprehensive public capital campaign, and raising tuition - is determined. The tested variables are divided into three primary subgroups: institutional level (i.e., university governance structure, wealth, size, etc.), state level (legislative professionalism, partisanship, etc.), and diffusion (regional and peer). Following the standard procedures conducted in past diffusion studies, the regional diffusion variable is measured as the

[3] The term "peer diffusion" has been mentioned in past diffusion studies, particularly in relation to professional networks (Gray 1973; Mintrom and Vergari 1998). However for this dissertation the definition of "peer" is not simply similar actors in similar institutions, but similar actors in similar institutions of similar caliber. This research introduces the important concepts of status and prestige when determining peer groups. This distinction will be discussed in more detail within the dissertation.

proportion of universities that have adopted the policy in question prior to year *t* in the contiguous states to university$_i$. Similarly, the peer diffusion variable is measured as the proportion of universities that have adopted the policy in question prior to year *t* in the same peer group to university$_i$.

The results of the models clearly indicate that peer diffusion is a strong determinant in increasing the likelihood that a university will adopt a policy. In terms of both the establishment of a technology transfer office and the initiation of a comprehensive capital campaign, the effect of peer diffusion is significant. On the flip side, only in regards to raising tuition is regional diffusion found to be important. Additionally institutional level factors such as the presence of a medical school (for establishing a technology transfer office) and the university governance structure (for initiating a capital campaign and raising tuition) were found to be critical. However, the selected state-level variables had minimal effect in explaining the timing of the policy adoptions, raising a question about the true effect of state appropriations on university strategies.

In addition to the quantitative model, this dissertation will answer the research question through a series of elite interviews with university administrators and faculty. This supplement to the diffusion model follows the work of previous diffusion scholars who have uncovered through interviews the great importance of policy entrepreneurs in the eventual implementation of certain public policies (Kingdon, 1984; Baumgartner and Jones, 1993; Sabatier, 1999). The primary question is how influential are specific individuals in helping push an idea through an institutional bureaucracy. Past research has shown that dramatic events sometimes open a window of opportunity for new political and institutional actors (or "policy entrepreneurs"), who previously remained on the sidelines, to enter into the policy debate and "insist on rewriting the rules, and on changing the balance of power that will be reinforced by new institutional structures" (Sabatier, 1999, 101). The result is a change in the equilibrium of the policy domain and consequently a new set of policy options available to the institution. This proves to be the reality in the four cases examined (University of Washington, Pittsburgh, Alabama-Birmingham, and Louisville), where an individual is identified through the interviews as the primary advocate for the establishment of a technology transfer office.

1.7 OVERVIEW OF THE DISSERTATION

To properly prove the hypothesis and fully explain the research design and results, the chapters of this dissertation are divided in the following manner. The second chapter provides a more thorough examination of previous policy diffusion studies with an emphasis on those from the field of political science and several in the education field that have utilized universities in their research. The third chapter delves deeper into the theoretical underpinnings of the diffusion process, while also highlighting the reasons they may not logically apply to universities. Additionally, the theory of normative isomorphism is introduced with an explanation of why it can be logically applied to universities. The fourth chapter accomplishes two tasks. First it describes the privatization policies (tuition, private fundraising, and research commercialization) that are used to test my diffusion models. The historical evolution of the privatization policies is illustrated by highlighting specific pieces of education legislation that have helped define American public higher education, but now have been either altered or completely ignored. This chapter also explains in detail all variables used, including how they were constructed, the theoretical reasoning for their addition, and past scholarly works that support their statistical significance. The fifth, sixth, and seventh chapters will present the quantitative results of the different models that have been constructed. The eighth chapter presents the qualitative results of the elite interviews that were conducted with university administrators and decision makers to confirm the quantitative results. Finally, a general conclusion is drawn from the overall research and additional questions are raised regarding future scholarly work on this topic.

2.0 CHAPTER TWO: LITERATURE REVIEW

The objective of this chapter is threefold. First, it is to establish the definition of the diffusion process by using Rogers' seminal book, *Diffusion of Innovation* (1962). Rogers dissects each important step in the diffusion process providing a clear understanding of how innovations spread in a variety of social environments. The second goal of this chapter is to introduce in detail the early works of Walker (1969), Gray (1973), and Berry & Berry (1990), who collectively are recognized as the principle political scientists in the study of policy diffusion. Walker and Gray are credited for being two of the early scholars to apply Rogers' theoretical construct to the legislative policies of the American states and confirming both the regional and internal determinants models. Berry & Berry are acknowledged for introducing the methodological technique of event history analysis to policy diffusion research, which now is considered the standard tool for diffusion scholars. The last objective of this chapter is to highlight the most recent diffusion studies in both political science and higher education. These more current works have helped broaden the field and better explain this social and political phenomenon.

2.1 THE DEFINITION OF DIFFUSION

To properly begin a study in policy diffusion it is necessary to establish the definition of the process. It is to this objective that Rogers' book, *Diffusion of Innovation*, is properly viewed by most social scientists as the seminal work on the topic due to its main contribution - solidifying the definition of diffusion by breaking down its four components (or "elements"): innovation, communication, time, and social systems.

According to Rogers, the concept of "innovation" can be best understood as the first step in the process of diffusion since it is equivalent to an "idea, practice, or object that is perceived as new by an individual or other unit of adoption" (1962, 11). This does not mean the innovation is necessarily "new" as defined by the amount of time since its creation, but that it is simply perceived as that by the potential adopter. This is critical since many policies are not substantively original, but instead are typically old ideas that have either been slightly adjusted or applied to solve a new problem (Cyert and March, 1963).

After the innovation has been cognitively observed by the potential adopters, the next step in the diffusion process is "communication", where information pertaining to the innovation is shared and discussed amongst the participants. The participants are typically a combination of actors who have past experience implementing the innovation and actors who are considering implementing it for the first time. It is during this step of the process when questions are answered, concerns are alleviated, and ultimately an evaluation is conducted by those potential adopters. Yet a mandatory component to the communication step is the existence of venues (or "channels") where the participants can exchange their information, such as professional publications and conferences.

The third element in the diffusion of innovations is the unit of "time", which is often ignored by other types of policy research since they are typically only attempting to answer simple questions related to policy effects. However policy diffusion attempts to answer fundamental research questions about who are the policy leaders (entrepreneurs) versus followers (laggards), what is the rate of adoption, and when does an idea enter the cognitive mainstream of policy makers. None of these questions could be properly addressed without taking into consideration the variable of time.

The last element focuses on the importance of the "social system", the "interrelated units that are engaged in joint problem-solving to accomplish a common goal" (1962, 23). This is the formal group of participants who communicate amongst each other and generate new ideas to address their mutual issues. Typically the social system (or 'network') is based on a profession (such as doctors) or according to a location (such as citizens of a specific municipality). The critical criterion is an overarching problem that affects all members of the social system and helps bond them into this network of communication.

In sum, Rogers lays out the four fundamental components of the diffusion process (innovation, communication, time, and social system) and clearly identifies their characteristics, solidifying the definition of the social phenomenon and enabling future diffusion scholars to conduct more comprehensive research.

2.2 SEMINAL DIFFUSION STUDIES IN POLITICAL SCIENCE

One of the first political scientists to apply Rogers' more refined definition of the diffusion process upon the American states was Jack Walker (1969). Specifically, Walker raises the two fundamental questions that would become the basis for diffusion research within American politics - Why do some states innovate more rapidly? And how does innovation spread?

To answer the first question Walker tests 88 different public policies and focuses on whether state political and demographic factors determine which states ultimately adopt the policies. By constructing factor analysis scores for each state, Walker is able to uncover that variables such as wealth, education, and political ideology do have a strong correlation in determining which states implement specific policies. This discovery is followed by raising the underlying question of "time", and ascertaining how these demographic variables affect states' rate of innovation. Walker understands that to properly observe the phenomenon of diffusion, it is not enough to simply reveal the demographic factors, it is of equal importance to discern how these factors affect the length of time it takes some states to change. It is to this end that Walker constructs an "innovation score" for each state by observing the average number of years it takes for each state government to adopt legislation, concluding that some states do innovate at a quicker rate dependent on its particular demographic characteristics.

The conclusion about the importance of internal determinants, leads to the second fundamental question of how states innovate. Walker understands that a state legislator is under a difficult situation since he is asked "to choose among complex alternatives and constantly receiving much more information concerning his environment than he is able to digest and evaluate" (1969, 889). This information overload causes the legislator to limit his policy options to only those that are familiar and/or convenient. This is coupled with the economic fact that states are in competition with their regional neighbors for industries and citizens. It is in this

context that Walker forwards his regionalism hypothesis that states will most likely emulate their neighbors in enacting specific policies. To test this theory, Walker divides the states into regional groupings and finds that geography is a significant factor in the eventual adoption of public policies. Walker reveals a strong correlation between one state innovating and the other states within the grouping following suit soon there after.

Yet even with Walker's significant advances, Gray (1973) pushes the scholarly discussion further by challenging a few of Walker's conclusions, most notably that certain states can be broadly labeled as more innovative. Through a more focused experiment, Gray contends that the likelihood that a state will adopt a specific policy is much more sensitive to the type of policy in question and the timing of its emergence. Gray analyzes 12 policies across three main policy segments (education, welfare, and civil rights) that tap into the socio-economic divide within the country. Her findings confirm her hypothesis, revealing that when policies are disaggregated (as compared to Walker's composite "innovation score") the initial adopters vary depending on the type of policy that is being considered. Gray's research underlies the important fact that future diffusion studies must take into account the type of policy being analyzed in an effort to accurately conclude the reasoning for its rate of adoption by each individual state.

In addition to refining Walker's theories, Gray also introduces in her work the idea of a national interaction model where professionals learn about potential policies through the channel of "networks". Borrowing from Rogers' fourth element ("social system") to the diffusion process, Gray argues that state policy-makers become aware of possible public policy solutions through communication with their counterparts throughout the country. She generates a simple algebraic model that assumes that policy-makers of non-adopting states interact with policy-makers of adopting states through professional conferences, publications, and individual networks. As interaction grows, the number of non-adopters will decline as they communicate more with adopters. The result is traditional 'S' curve where an acceleration of innovation occurs in the middle, while limited activity occurs in the beginning and end of the diffusion process.

While Walker and Gray are rightfully viewed as the central figures of early diffusion work in American politics, their conclusions do have their limitations. In particular their models treat the internal and external determinants as bifurcated variables. In other words, their methodologies only allow a "single explanation" for policy adoption – either due to internal state factors or regional diffusion pressure. Subsequently it is impossible to determine what

interaction maybe occurring between the two separate models. Berry and Berry (1990) recognized this weakness and introduced the highly valuable method of event history analysis (EHA) to policy diffusion research. Put simply, EHA "is a pooled method that requires annual observations on independent variables for each state over a period of years (1994, 443). This methodological technique permits a scholar to observe both internal and external determinants in a single model and helps produce a much more comprehensive conclusion on the factors that affect policy diffusion. Berry and Berry validated their methodology by observing the influence of both internal and regional affects on the diffusion of state lotteries (1990) and state taxes (1992). Soon other political scientists were utilizing EHA and confirming the presence of state-to-state diffusion in other policy areas. The next section highlights some of the more recent works that have expanded on the ideas and methods forwarded by Walker, Gray, and Berry & Berry.

2.3 RECENT RESEARCH IN POLICY DIFFUSION

In as much as the introduction of the EHA technique pushed the diffusion literature forward over the last decade, other scholars have helped broaden the research by investigating other facets of this political phenomenon. One of these facets that has more recently been investigated is the importance of policy entrepreneurs and the role they play in actively promoting policies for adoption (Mintrom1997). Drawing from past research on the importance of policy entrepreneurs on agenda-setting (Kingdon 1984, Baumgartner and Jones 1993), diffusion scholars have found policy entrepreneurs to be highly consequential in the diffusion process since they help in identifying problems, uniting coalitions, and pushing specific policies onto the public agenda. Moreover, scholars have observed the critical importance of professional networks in assisting policy entrepreneurs in achieving their policy goals. Following the early works of Gray (1973), diffusion scholars have delve deeper into the role networks play in disseminating information and garnering broad support for passage of specific legislation. Specifically, Mintrom and Vergari (1998) identified policy entrepreneurs and surveyed their utilization of networks, revealing that the existence of one significantly increased the probability of their policy being enacted. It is in this context that the term, "peer" is used to describe the network of professionals

in the same occupational field (128). However there is no distinction between the caliber of the professionals or the institutions they serve, they are simply peers due to being in the same profession. This is the key difference between this dissertation and past diffusion studies that have used the concept of peers. For this research, the importance of how members in the same profession view each other in terms of their status and prestige plays a substantial role in determining the construction of their policy networks. It is assumed that policy-makers will be more likely to communicate with other policy-makers that share similar status. Conversely, policy-makers will be less likely to communicate with those of lesser stature within their occupational field.

Other important areas that have recently been investigated in the study of policy diffusion include the reinvention processes policies go through as they are slightly altered by the adopting state governments (Glick and Hays 1991). Traditionally, policies are assumed to be identical when being adopted by different states. However research has shown that policies may change substantially as they proceed through the diffusion process and are implemented. This phenomenon has profound implications on the affects of the policy including its results, costs, and affected citizenry. It has also been reveled that policies which are deemed successful in the eyes of politicians are much more likely to be emulated then those which are viewed as failures in accomplishing their main task (Volden 2006). This may seem logical, but this distinction between perceived success and failure had simply been assumed in past studies. Berry himself has pushed his work further by identifying, with the assistance of geographic information systems, the importance of size and location of specific populations in relation to the chances of policy adoption (Berry and Baybeck 2005).

Since this dissertation is examining the decision-making process within universities, it is important to include valuable scholarly works in the field of higher education related to policy innovation. One of these works is the analysis conducted by Hearn and Griswold (1994), who test the influence of states' postsecondary governance structure on the probability of states adopting a series of policy innovations in higher education (i.e., assessments of undergraduate students, pre-paid college tuition plans, required testing for teaching assistants, etc). The results show that governance structure does have a significant impact, specifically states with a more centralized structure tended to enact more stringent policies such as mandatory student assessments. Building on these results, McLendon, Heller, and Young (2005) expand the

analysis by including interstate diffusion pressures and by doing so bridge the higher education research with policy diffusion. Their results confirm the significant pressure of regionalism, finding strong diffusion effects when predicting policy adoption.

2.4 CONCLUSION

This chapter has briefly described some of the important scholarly studies of policy diffusion. It is a field of study that is still in its early stages for political science and education. Major strides have been made over the last few decades bringing greater clarity to the phenomenon and its determinants. This dissertation plans on expanding it even further by delving deeper into the process of diffusion at the institutional level. It should be noted that it is a process that has primarily been observed at the individual level (Rogers 1962) and at the state level (Walker 1967; Gray 1972; Berry and Berry 1990). This research raises the question about its relevance at the institutional level, specifically in regards to the policy-making decisions within universities. As discussed previously, do the theories constructed to explain innovation at the state level, apply appropriately to other public policy-making institutions at the institutional level. This is one of the primary contributions that this dissertation will provide to the diffusion literature.

3.0 CHAPTER THREE: THE THEORETICAL BACKGROUND

This dissertation addresses two identified shortcomings in the study of policy diffusion, both of which can be attributed to the narrow focus on state legislatures as the unit of analysis. The first shortfall is the question of applicability of the contiguous-state theory to all policy-making public institutions. The theory states that decision-makers will most likely seek public policy solutions by examining the policies already implemented by their regional neighbors based on two fundamental assumptions. The first assumption is that similar public institutions within a region are involved in an economic competition with each other for valuable resources such as industries, taxes, and productive citizens (Tiebout 1956). The second assumption of the contiguous-state theory is that policy makers lack important information and resources to comprehensively examine all of the potential solutions to their issues and thus, for convenience, will engage in a form of "satisficing" (Simon 1976) by considering only regional policies.

Based on these two critical assumptions, the end result of the contiguous-state theory is that regional institutions will homogenize over time as they adopt similar solutions to their public problems. The question that remains is whether these overarching assumptions are applicable to all public or quasi-public policy-making institutions. Is it true that all similar public institutions within a region compete with each other? Do all these institutions lack the vital information needed to engage in a more efficient and productive search for alternative ideas? If these two assumptions do not logically apply to a particular institution, will the contiguous state theory still make sense?

This dissertation focuses on a largely unstudied public policy-making institution, the university, as it relates to the diffusion of innovations. It is argued here that the contiguous-state explanation is not generalizable to this institution because neither of the two aforementioned assumptions holds true. First, universities are not engaged in a regional competition for resources (i.e. faculty, students, and private funding), but instead are involved in a national or intra-state

competition for these valuable assets. Second, universities possess valuable information about their competition through highly publicized annual rankings, which allows them to better maximize their policy options and reduce the need for satisficing.

An alternative to the contiguous-state explanation is the theory that universities innovate based on the actions taken by their "peers", schools that share similar levels of prestige and status. This hypothesis is drawn primarily from the interrelated theories of *professionalization* and *normative isomorphism* developed by DiMaggio and Powell (1983). The main idea of these two theories is that organizations with a professionally trained labor force from the same occupational field will be motivated to adopt the same policies as their competitors (peers) in an effort to ensure they provide the same benefits and services to their employees. This chapter explains in detail why the normative isomorphism theoretical construct is more applicable to universities than the contiguous state theory.

The second main part of this chapter addresses the lack of attention on the characteristics of the institution generating the policies. Minimal emphasis has previously been placed in understanding how the specific arrangements and norms within the institution in question help determine which policies eventually get adopted. Traditionally, the few institutional level variables tested by diffusion scholars have been legislative professionalism and partisanship. Again this limited analysis is due to the focus by political scientists on the institution of state legislatures, which lack substantial structural variance and transparency. Here the question is asked: can a more in-depth list of institutional determinants reveal a more substantive explanation for policy adoption?

The conclusion is that the utilization of universities as the unit of analysis allows for a more extensive examination on the affects of institutional factors in the policy making process. The wider variance in governance structure, missions, and rules within public universities creates a richer comparative study than state governments (Lowry 2001). The theoretical reasoning for shifting down from the state level to the institutional level is due to the conclusions drawn from normative and rational choice institutionalism, which assert that a fully specified model of policy outputs must include variables that tap into institutional rules or rule changes since they are typically the precursor toward policy outcomes (Peters, 1999).

The remainder of this chapter is divided into two primary subchapters. The first is a more thorough explanation behind peer diffusion by delving deeper into the assumptions behind the

contiguous-state theory (regional economic competition and lack of information) and illustrating how they are not generalizable to public universities. The second subchapter discusses the theoretical reasoning behind why a more thorough examination of the institutional rules and norms is needed. Lastly the conclusion provides an explanation on why one of the more renowned theories applied to universities, the garbage can theory (Cyert, March, and Winter 1964; Cohen, March, and Olsen 1972), is not pertinent to this research. Plus, it will summarize the theoretical logic behind my models.

3.1 THEORETICAL REASONING FOR PEER DIFFUSION

3.1.1 False Assumption #1: Regional Competition

As discussed, one of the main assumptions of the contiguous-state theory is that similar policy making institutions are in competition with their regional neighbors due to economic competitiveness for vital resources. This conclusion is drawn directly from the economic theory of Charles Tiebout (1956), who states that if different communities provide different levels of public goods and services, citizens will reveal their preferences by moving to the community that best fits their needs (or as it is more commonly known, "voting with their feet"). This in turn will generate competition amongst communities, who will react by adopting similar public policies so as to not lose citizens. As Tiebout notes, "the consumer-voter may be viewed as picking that community which best satisfies his preference pattern for public goods…the consumer-voter moves to that community whose local government best satisfies his set of preferences. The greater the number of communities and the greater the variance among them, the closer the consumer will come to fully realizing his preference position" (1956, 418). Naturally this theory can be applied to other valuable entities that do not want to be lost by communities such as industries and federal funding.

Policy diffusion scholars have applied the underpinnings of this economic theory to state politics and have routinely found it to be statistically significant in explaining innovations within regions. As discussed in the previous chapter, Walker was one of the first to recognize this correlation when he introduced his factor analysis scores and found that states within a certain

regional area tended to adopt similar policies over time (1969). For example he identified that when the state government of Massachusetts adopted a policy to increase elementary school spending, it increased the likelihood of the other New England states to enact the same policy shortly thereafter. A similar result arose with an array of public policies and different "clusters" of states. This finding was further validated by other notable policy diffusion scholars including Gray (1972), Berry & Berry (1990), and Mooney & Lee (1995). In all cases the underlying assumption was that regionalism mattered because contiguous state governments were in competition with each other for identical resources.

However not all public or quasi-public institutions are truly in competition with their regional neighbors for the same resources. In the case of public research universities, the competition for valuable resources (i.e. faculty, students, and government funding) is either at the national or intra-state level, not at the inter-state level. Academic departments do not simply rely on the local graduate programs to recruit junior faculty, nor do they seek to pry senior faculty members from only neighboring institutions. Instead national searches (sometimes even international) are conducted based on the candidate's record on research and teaching as the primary criteria (Bok 2003, 25). If, for example, the contiguous-state theory was applicable to universities, the political science department at the University of California at Los Angeles would conduct their faculty search by simply contacting the University of Arizona, Nevada, or Oregon for candidates. Instead, faculty searches are primarily conducted by interviewing only those candidates from institutions of similar or higher caliber (Bok, 2003).

The same can be said regarding the competition for research funding. The process is not conducted at the regional level; instead it is performed at the federal level. Researchers in the same discipline tend to apply for the same national grants and fellowships irregardless of where their home university maybe situated (Leslie and Slaughter, 1997). While maybe there are some funding opportunities that are restricted to a certain region, the monetary value of these grants pale in comparison to the national organizations and federal governmental departments who allocate hundreds of millions of dollars a year in support of academic research (Slaughter and Leslie 1997, 76-77).

Lastly, in regards to recruiting students, inter-state competition is relatively minimal compared to intra-state recruitment for most public universities. This is primarily because most public universities are legally bound to educate their local citizenry before opening their

admission doors to out-of-state students (Geiger, 2004). This results in the vast majority of public research universities filling their classes with students from their home state, while only a small percentage comes from other states.[4] This holds true even for the largest public research universities that describe themselves as "national universities" (Geiger 2004, 81). For example at the University of Pittsburgh, which is considered a national institution, less than one quarter of their undergraduate enrollment is from outside of Pennsylvania. In fact, none of the public research universities has a majority of its undergraduate enrollment hailing from outside of their home state (NCES). Taken all together, the assumption that institutions are in competition with their regional neighbors is not justified.

3.1.2 False Assumption #2: Incomplete Information

A second element to the contiguous state theory is that state governments will be more likely to look to their regional neighbors for policy solutions because they lack the comprehensive information needed to efficiently investigate the wider spectrum of potential solutions to their specific public policy problems. A search for appropriate solutions to complicated public policy problems necessitates an extensive amount of detailed information about both the array of policy options and the governments implementing them, and for most state legislators the act of collecting this information is too expensive in terms of both time and money. The result is a lack of cognitive understanding of their policy options. This political reality forces public officials to engage in a form of "satisficing" (Simon 1957), where they identify only solutions that are satisfactory to the majority and not necessarily solutions that maximize their situation. This limited search for solutions typically translates into only looking at neighboring states since they have similar demographics and connected political networks (Mintrom and Vergari 1998). This theoretical construct is derived from the research in behavioral economics conducted by Herbert Simon (1957).

Most economic models assume that individuals act rationally and make decisions with the primary objective of maximizing their preferences (North, 1990). As a result the "best"

[4] The competition for students on a national scale has recently heightened as more universities attempt to recruit highly accomplished high schools students with merit scholarships in an effort to improve their rankings. This recent policy should be tested in future diffusion studies.

policy to achieve this objective will be chosen in an effort to bring about the optimal outcome. However, Simon raises doubts to this assumption since in many scenarios individuals do not seek to optimize their situation, but instead make a choice that is simply acceptable to them, but few economists have taken the time to examine this phenomenon (1959). Simon notes that most economists simply, "assume that the economic actor is rational, and hence he makes strong predictions about human behavior without performing the hard work of observing people…which carries with it the implication that only the rational survive" (254).

However according to Simon's observations, rather than seeking the best solution to maximize their preferences, individuals select solutions that simply satisfy their goals. Simon identifies numerous situations where this is observed including problem solving and making financial decisions (1959).

The follow-up question is why do individuals not necessarily seek the option that maximizes their gains? For an individual to seek their ideal solution, they must be aware of its existence or willing to accept the costs searching for it. The reality is that most firms and individuals make decisions in an environment of uncertainty. They do not fully comprehend the impetus of their problem, the market they are engaged in, or the competition they are facing. Therefore they do not possess the pertinent information necessary to select the optimal choice. Compounding the problem are the economic constraints of costs (in terms of time, money, or reputation) that may be incurred while trying to identify the optimal solution. To engage in a lengthy search is an expensive proposition that most organizations are unwilling to accept. The end result is enacting solutions that are based on a perspective of "bounded rationality" and not full rationality as assumed by traditional economic theory (Cyert and March, 1963).

An argument can be made that universities make decisions in an environment of greater certainty than state governments primarily due to the assistance of highly publicized annual rankings, such as the *U.S. News and World Report*. University rankings act as a heuristic for university administrators, efficiently identifying their peer (and aspiration) institutions. This valuable information allows university administrators to evaluate with greater precision the potential policies that are more ideal for their specific institution. The assumption being that peer institutions are dealing with similar issues under similar constraints as compared to the issues of other universities that are either of lower or higher caliber. In essence, the rankings serve to simplify for decision-makers the complex process of determining which policies are best

for their institution (Ehrenberg 2002).[5] It should be noted that the argument is not that universities possess full information when making policy decisions. Universities, like all institutions, make choices based on incomplete information and uncertain outcomes. Instead the argument is simply they have more information than state governments, and thus do not need to engage in the act of satisficing to the same degree.[6]

A critic may raise the fact that this argument understates the dramatic changes that have occurred over the last couple of decades in terms of the methods and the amount of information state governments and agencies can accumulate. It can be argued that state agencies have a much greater ability to access information and learn about policy options than they did in the past due to the recent creation of rankings such as the *CQ State Fact Finder: Rankings Across America* and the *State Rankings Annual*, the increased level of professionalization within the field of government, and the expanded use of the internet. These mechanisms decrease the costs of accumulating information and reduce the need to satisfice as previously theorized, the end result being that state agencies possess the same level of information about their peer institutions as universities. This argument does have some merit; however the contiguous state theory remains the prominent theory with the diffusion literature, and thus an appropriate place to start this research. It is important to see how well the theory explains the diffusion of policy ideas within higher education. If the results are less than impressive, it opens the door for testing alternative diffusion explanations, such as effect of peer pressure.

With that being said, the contiguous-state theory possesses two underlying assumptions (regional economic competition and incomplete information) that do not completely apply to universities. On the contrary, universities are engaged in an economic competition at the national and intra-state levels. Moreover university administrators possess information through

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[5] Recently scholars have begun to investigate how much attention university administrators give to the annual rankings. Evidence has shown that while the rankings receive criticism from administrators for their inaccuracies and methodological mistakes, they nonetheless spend a tremendous amount of time analyzing them and utilizing them as a reference. Ehrenberg (2002) in particular reveals the extensive efforts some colleges engage in to improve their rankings, including focusing almost solely on the variables that are included in the U.S. News and World Report models.

[6] This conclusion is also supported by the anecdotal answers provided by the state legislator and university administrators interviewed for this dissertation (see Chapter 8). When asked to identify their competition in the field of higher education, the state legislator was not able to identify a specific cluster of states. He was unaware of the different policies other states were enacting or knew of any trends regarding Pennsylvania students enrolling in other states' institutions of higher education. However when the same question was presented to the university administrators, they were able to easily identify the cluster of schools considered their competition. Not incidentally theses schools happened to be in the same tier as them.

the annual rankings that works as a heuristic to engage in a more efficient search for appropriate policies. So if the contiguous-state theory is not particularly applicable then what can help explain innovations within universities? The next subchapter forwards the theory of normative isomorphism and professionalization to explain policy diffusion among universities.

3.1.3 Normative Isomorphism and Professionalization

While DiMaggio and Powell are not policy diffusion scholars, they too seek an answer to the question underlying policy diffusion studies - why do certain organizations homogenize? It is in this context that they forward their theory of isomorphic change. DiMaggio and Powell (1983) agree with the notion that competing organizations which encounter a similar set of economic and social conditions begin a process of homogenization (or "isomorphism") that result in a parallel movement toward identical innovations. As they state, "isomorphism is a constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions" (149). They further expand the argument by asserting that there are three different mechanisms through which institutional isomorphic change occurs, each with their own antecedents.

The first two isomorphic changes are coercive and mimeric isomorphism. Coercive changes occur when both formal and informal pressures are placed on an organization, primarily from the exogenous force of cultural expectations from society. This societal expectation typically comes in the form of government mandates. A classic example is the environmental controls placed on manufacturers and their factories. Whereas society has created an expectation regarding the condition of their environment, the government is responding through legislation and regulations. In the end all manufacturers homogenize because they are complying with the environmental restrictions placed upon them.

Mimeric isomorphism is caused by uncertainty as compared to coercion. In this case, organizations homogenize because they have limited knowledge of other alternatives, thus they simply look to each other for guidance. This form of isomorphism is strongly connected the idea of bounded rationality which is discussed above (Simon 1959). In both cases the underlying question is how do organizations behave when they lack vital information and are in an

environment of uncertainty? The general answer is that they copy each other regardless of whether that is the most rational decision in terms of maximizing their preferences.

The last mechanism DiMaggio and Powell identify, and the most important for this dissertation, is normative isomorphism. In this process of isomorphism organizations begin to innovate in a similar fashion because internalized norms within the institutions exert pressure on them to homogenize. Compared to coercive and mimeric isomorphism, normative isomorphism is more about endogenous decisions than exogenous forces. One of the critical components to the process of normative isomorphism is its antecedent – professionalization. Professionalization is defined by DiMaggio and Powell as the "collective struggle of members of an occupation to define the conditions and methods of their work, to control the production of producers, and to establish a cognitive base and legitimation for their occupational autonomy" (1983, 152). To put it another way, professionalization is the process where members of a specific occupational field insert authority over the definition and process of their occupation. This process of professionalization is accomplished by three particular means. The first is through the "hiring of individuals from firms within the same industry (and) through the recruitment of fast-track staff from a narrow range of training institutions" (152). The attention to where employees are being trained and educated is critical to the normative isomorphic process because is allows specific norms and values to be ingrained in each of the individuals as they go through the training process. As DiMaggio and Powell note, "such mechanisms create a poll of almost interchangeable individuals who…possess a similarity of orientation and disposition that may override variation in tradition and control that might otherwise shape organizational behavior (ibid).

The second means by which professionalization develops within an occupational field is through "common promotion practices" (ibid). In this scenario, individuals within an occupation uniformly understand the specific attainments that must be achieved for promotions within the field. These attainments are highly transferable across all organizations and institutions within the field since they are broadly recognized as the measurements by which every professional is judged. This also generates a clear hierarchy within the occupational field since the accomplishments of all the employees are understood and easily translated.

The last mechanism is a skill-level requirement for particular jobs. In essence, there is a filter to determine which individuals possess the necessary education and background to enter

into the occupational field. This mechanism is highly correlated with the second means by which professionalization is created since the skill-level requirement often dictates "the entry level and the career progression (of) the individuals" (ibid). Similar to the other mechanisms of the professionalization process, the requirements are clearly understood by all members of the occupation and by those who want to gain entry.

Taken together, these mechanisms define a broad range of different occupational fields including higher education. Based on the definitions provided by DiMaggio and Powell, universities are clearly "professionalized" since they accurately fulfill the requirements, particularly as it relates to faculty recruitment, hiring, and the tenure process. Faculty at major research universities tend to come from a relatively select and "narrow range of training institutions". It is not uncommon for academic departments, regardless of field, to be dominated by faculty from the traditional research university conferences such as the Ivy League and the Big-10. It is also the case that the tenure track process is run in a similar fashion regardless of university. Even though some universities may have slightly different requirements for proceeding through the promotional process, there is enough overlap that most professors can transfer from one institution to another with their promotional process still intact. Lastly, the expectations and assessments placed on all faculty is primarily done by peers and fellow academics, which internally establishes the "skills requirement" for success in the profession. Again, similar to the promotion expectation, the expected skill that each professor (or aspiring professor) is to possess is deeply engrained in the understanding of the members within the field. Collectively these distinct personnel practices leads to a highly restricted pool of professionals who share common ideas, goals, and policies.

DiMaggio and Powell note that once an occupational field has been professionalized the normative isomorphic pressure begins to build. Specifically," organizational fields that include a large professionally trained labor force will be driven primarily by status competition. Organizational prestige and resources are key elements in attracting professions. This process encourages homogenization as organizations seek to ensure that they can provide the same benefits and services as their competitors (1993, 1554)". Consequently, they share information only amongst each other and rarely to individuals/organizations that are considered to be outside their domain. The eventual result is a well "recognized hierarchy of status…that becomes a matrix for information flows and personnel movement across organizations (1983, 153)". In

other words professionalization generates peer groups, which become the main source of information amongst its members. This is the critical point in the theoretical reasoning for peer diffusion. Based on the description presented by DiMaggio and Powell, universities are ideal institutions to validate their theoretical claim. Hence this dissertation illustrates how the likelihood of policy adoption increases if the innovation has been implemented by a peer member.

3.2 THEORETICAL REASONING FOR INSTITUTIONAL RULES, NORMS, AND ARRANGEMENTS

One of the striking weaknesses in the policy diffusion literature is the lack of attention that scholars have given to the internal dynamics (e.g. the rules, norms, arrangements) within the specific institution adopting the innovations and ascertaining how they might affect which policies eventually become implemented. Minimal effort has been made to extensively investigate the institutional structure that decision makers have to abide by when considering their policy options. Walker himself warned of this need when he stated that his theoretical construct "directs our attention to the rules for decision employed by policy makers, rather than their formal group affiliation or their relative power or authority, and thus enables us to offer useful explanations of all policy decisions…(1969, 63)". As noted in the Chapter 2, the "internal determinants model" that has been popularly utilized in past diffusion studies, typically employs only variables that tap into the partisanship and professionalism of each state legislature.

One of the main arguments of this dissertation is that it is not enough to simply take into consideration a legislator's party affiliation and level of professionalism when trying to discern what institutional dynamics influence policy decisions. A more comprehensive investigation into the institutional rules and arrangements that help generate viable policy options is needed to bolster the literature. This sentiment should be heeded due to the fact that substantial research in the field of both normative and rational choice institutionalism has asserted that a fully specified model of policy outputs must include variables that tap into institutional rules or rule changes since they are typically the precursor toward policy outcomes. This is a particularly important proposition for this research since the debate surrounding the university policies being examined

(rising tuition, increasing private fundraising, and generating more commercially viable research) is whether their adoption is due to a change in values (normative institutionalism) or a reaction to a more competitive fiscal environment (rational choice institutionalism). The following subchapters provide more detail about these twp types of institutionalism.

3.2.1 Normative Institutionalism

Normative institutionalism is a response to the rational choice assumption that actors within an institution make calculated choices to maximize their perceived gains. The normative institutionalism argument is that actually, actors within an institution will feel restricted to some degree to make choices according to the norms and formal rules of the institutions (Cohen, March and Olsen, 1972). Put in another way, to fully comprehend the outputs of an institution, one must be aware of the "rules and routines that define appropriate actions in terms of relations between roles and situations" (March and Olsen, 1989, 21-22). It is these rules that define the institution, which in turn determines the behavior and ultimately the decisions of the policy makers. An institution is not defined by a tangible structure, but is defined by a relatively secure set of accepted practices, which creates an environment where individuals learn about what is expected of them. Once these "norms" are internalized, they bring legitimacy to the goals and direction of the institution, while simultaneously delegitimizing alternative ideas that could modify the direction. The result is that policy-makers within the institution are limited in considering only those options that are in accordance with the "logic of appropriateness" embedded within the institution (March and Olsen 1989). Administrators within the institution do not have an infinite list of policy options; instead it is a defined list of acceptable practices that fit within the parameters of appropriateness for the institution. This has been proven in a variety of institutions including the Senate (Mathews 1973), the House (Asher 1973), and public safety (McCubbins and Schwartz 1984). In each case the rules were found to be statistically significant in determining which policies eventually were enacted.

This concept has also been found to be relevant within a university structure based on the work of Cohen, March, and Olsen (1972). In this seminal scholarly study known as the "garbage can theory", universities are identified as "organized anarchies" due to the presence of three principle characteristics – fluid participation, unclear goals, and undefined processes. The result

is that universities typically have high turnover amongst its senior officials and faculty do not possess a clear understanding of the ultimate mission and role they play in the institution's achievement. Simply, ambiguity and uncertainty reign over the entire institution. This environment is particularly troublesome when institutional problems arise and solutions need to be identified, since most administrators are unsure how to address them. As a default, university administrators simply revert to policies that were utilized in the past since they already qualify within the parameters of the institution's logic of appropriateness.[7] This theory is connected to Simon's construct of satisficing. In both theories the overwhelming environment of uncertainty creates a limited examination of policy solutions.[8]

It is clearly important for policy diffusion scholars to uncover these norms when attempting to understand why some policies are adopted by specific institutions while other policies get ignored. This dissertation attempts to achieve this objective by including the institutional variables of the Carnegie classification and land grant mission in the quantitative models. Both of these variables are strong indicators of the academic priority to basic research. In addition the norms and rules are discussed within the context of the elite interviews with university administrators (see Chapter 8).

3.2.2 Rational Choice Institutionalism

Compared to normative institutionalism, rational choice institutionalism argues that examining the structure of the institution in question is critical when trying to comprehend policy adoption since the individuals within the institution will continue to act as rational actors, seeking the best outcome for themselves while at the same time, the structural arrangements of the institution will limit some of their options and greatly affect the potential outcome. As Douglas North notes,

[7] While Cohen, March, and Olson apply their theory also to universities, it should not be viewed so narrowly. The "garbage can theory" can be applied to a multitude of institutions that posses the attributes of an "organized anarchy".

[8] A skeptic may claim that this assertion by Cohen, March, and Olsen conflicts with the earlier claim that university administrators possess valuable information through the annual rankings, and thus make policy decisions in an environment of greater certainty. The rebuttal to this claim is that Cohen, March, and Olsen's theory is primarily concerned with the *internal* workings of a university – the working relationship and communication between administrators and faculty. On the other hand, the argument about the benefit of the annual rankings is primarily connected to the *external* workings of a university – how they perceive themselves in relation to their peer institutions. Thus both assertions about a university's environment can be valid.

"the formal and informal rules and the type and effectiveness of enforcement shape the whole character of the game" (1990, 4). It is this theoretical argument that is the main thrust behind the idea of "bounded rationality" (Peters 1999, 44). The options that an individual can consider are restricted and thus their ability to maximize their utilities must be done through the confines of the institution. A considerable amount of research has been conducted by political scientists to confirm this concept of bounded rationality, particularly in the subfield of legislative studies.

In legislative research, one of the overarching questions raised by scholars is what enforces individual legislators to remain relatively stable in their policy decisions? In other words, what are the factors that keep traditional legislative coalitions intact? This is a fundamental puzzle in legislative politics since theories of social choice assume that there are almost always alternative policies that could garner a majority of support from a new composite of legislators (Shepsle and Weingast, 1995). However, these alternative policies rarely get considered or have the opportunity to be discussed and the question is - why? One of the strongest indicators revealed in a number of studies are the rules that dictate the structure and procedures of the House. These rules constrain the individual legislators into conforming within the institution of the House; it in essence has bounded their individualistic rational behavior. This has been confirmed in relation to the agenda-setting capabilities of the House leadership (Shepsle and Weingast, 1994), political parties (Cox and McCubbins 1993), and legislative committees (Sinclair 1994). In sum, these cases expose how the legislative rules and procedures heavily determine which policies see the light of day and which never make it out onto the House floor. Thus it is vital for future diffusion research to thoroughly examine institutional design when attempting to understand policy adoption.

Many scholars in the education field (and a few in political science) have already ventured in this direction as it relates to the governance structure within public research universities. As mentioned earlier, American public universities are overseen by a variety of different structural arrangements. Some are governed with a heavy influence of state oversight, while others rely more heavily on internal administrative supervision. Researchers have tested this variation in governance structure and have found that the degree of state involvement does ultimately affect the type of higher education policy that eventually becomes implemented. Some of the more notable examples include tuition prices (Lowry 2001), resource allocations (Knott and Payne 2004), and performance assessments (McLendon, Heller, and Young 2005.

This dissertation continues in this scholarly direction and by focuses on capturing the differences in autonomy levels, missions, academic offerings, and wealth that are embedded within American higher education.

In sum, this research follows the lessons learned by both normative and rational choice institutionalism and includes independent variables that capture the norms, rules and structure of universities. This will provide a more complete understanding of the institutional-level determinants that potentially affect the type and timing of policy adoption.

3.3 CONCLUSION

This chapter has presented the theoretical reasoning behind a desire to expand the current policy diffusion literature be considering the influence of peer diffusion. DiMaggio and Powell's conceptualization of *normative isomorphic change* and the importance of *professionalization* (1983) have proven that "organizational fields that include a large professionally trained labor force will be driven primarily by status competition" (153). In other words, some organizations homogenize due to peer pressure – a desire to remain competitive with those who share identical levels of prestige. This is the underlying logic to why it makes theoretical sense to test the importance of peer influence. Additionally, past scholarship in both normative and rational-choice institutionalism, stresses the importance of testing institutional level determinants when trying to understand specific policy outputs.

Chapter 4 presents an explanation of the privatization movement, providing insight into the reasons why the particular policies were chosen for this study. In addition, the operationalization of the variables tested in the models is presented. In particular, an explanation of how each policy was constructed and how each is predicted to influence university decision-makers.

4.0 CHAPTER FOUR: VARIABLE OPERATIONALIZATION

This dissertation asks the question – how do higher education policies diffuse? Specifically, it looks at the determinants that influence university decision-makers to adopt policies that may alter their institutional mission. The hypothesis suggested here is that there are two critical factors that influence university policy diffusion: (1) The decisions of a university's peer institutions and (2) the university's distinct rules and arrangements. This chapter presents the three dependent variables used to represent the institutional innovation: raising tuition, increasing private fundraising, and establishing a technology transfer office. As noted earlier, innovations are ideas that are viewed as new to the prospective institution and will presumably alter its direction and eventual output (Rogers, 1962). Each of these variables is particularly well suited for study within the diffusion model because their adoption signifies a clear change in the behavior of a public university. This behavioral change is described by scholars as the "privatization" of public universities which will be described more fully in the following pages.

The adoption of the privatization policy by a university as indicated by the adoption of the three policies described above can be identified by using an extensive series of independent variables that have been categorized into three separate groupings – diffusion variables, institutional variables, and state variables. The diffusion variables are used in two separate models. The first model is the standard contiguous-state approach that has been developed and implemented by past diffusion scholars, where it is assumed that university administrators will be influenced by the policies implemented by their regional counterparts. In this model each university is simply grouped with those universities that are geographically adjacent to it and the diffusion is measured as the proportion of universities who have adopted the policy in question prior to year *t* in the contiguous states to university$_i$. Analogously, peer diffusion is constructed by clustering universities based on their average annual rankings and the diffusion is measured as the proportion of universities who have adopted the policy in question prior to year *t* in the same

peer group to university. This unconventional model supplements the standard diffusion perspective of regionalism as a source for policy learning.

The institutional variables attempt to capture the link between adopting specific policies and the diverse rules and arrangements of America's public research universities. Does it matter whether a university has a medical school? What is the affect does of the governance structure that oversees the university as far as the types of policies implemented within the institution? Does a land grant institution's historical focus on research still influence the decisions made by university administrators? These are the types of questions that the wide array of institutional variables attempt to answer in relation to policy choices. It is within this category of variables that the research presented here delves deeper into the workings at the institutional level than have been previously studied.

Lastly, state variables are determinants that tap into the political and population demographics of each state. Past diffusion research has methodically taken into consideration the variance in wealth and partisanship of the American states and has analyzed how these differences affect the types of policies adopted by state legislatures. While it is questionable that these variables influence university decisions, it would be negligent to exclude them because of their importance in the wider diffusion literature.

This chapter also provides greater detail about the variables described above and explains why each variable has been included in this study, how the variable was constructed, and a hypothesis on how each variable may (or may not) significantly affect a university's decision to implement one of the privatization policies presented. Finally, the chapter concludes with a brief specification of the units of analysis (American public research universities) detailing who and how they were selected.

4.1 THE PRIVATIZATION OF PUBLIC HIGHER EDUCATION

In its simplest and most common definition, privatization is the shift from public financing of a policy toward a heavier reliance on private sources. Instead of the cost of a policy being diffused amongst the general public, the shift places the financial burden more squarely on the individuals reaping the benefits from the policy itself. As Paul Peterson explains, "it is a policy that is

modified from one which allocates resources to individuals and groups in the population in reverse proportion to their contribution in taxes… to one which those who benefit from the policy pay for the full cost" (Peterson 1979, 294).[9] This shift is typically motivated by a desire on the part of political officials to reduce costs, increase accountability, and provide greater political flexibility (Peterson and Rom 1990). The general thinking is that individuals benefiting from a "privatized" policy will take greater ownership of it, thus reducing its costs to the public and limiting the political risk incurred by political leaders. The movement of privatization has been noted in numerous state policy domains ranging from welfare (Peterson, 1995) to medical care (Starr, 1980) to the arts (Hart, 1984).

More recently it has also been associated with public higher education, where a larger share of the operating costs has been accrued by the individuals directly linked to the institution. Instead of the majority of revenue coming from the general public via taxes, a growing share is coming from students, alumni, and corporations (Lyall and Sell, 2006). Most education advocates blame the reduction of state appropriations for this financial shift (Dennison, 2003). Other critics have focused on the internal decisions made by university administrators to become more entrepreneurial as a critical factor to the privatization movement (Bok, 2003). This dissertation examines both potential explanations.

4.1.1 Decline in State Appropriations

As previously noted, the share of state budgets directed toward higher education has dramatically declined over the last twenty years (see Figure 4.1).

[9] Although it should be noted that Peterson uses a different terminology when describing the policy shift Rather than describing it as a shift to privatization, Peterson describes it as a shift from a distributive policy to a developmental one. However the basic premise and result are the same.

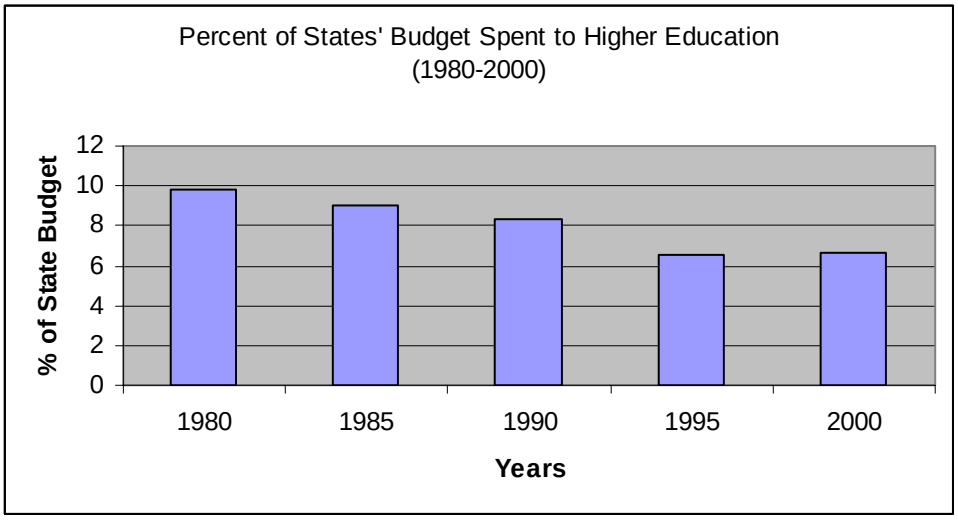

Figure 4.1: State's Budget to Higher Education (Source: NCES 2002)

This reduction in public support has been uniformly opposed by education scholars, administrators, and policy-makers, who have accused state legislators of absolving themselves from their responsibility of adequately supporting public institutions of higher education. Instead of viewing the value of higher education "to the long-term welfare of communities made up of informed citizens actively participating in the democratic process", legislators have begun treating it like "any other public utility (demanding) the most effective service at the most affordable price" (NEA, 2004). The expectation that higher education institutions must serve the public good is rooted in the historical relationship between public universities and state governments that was first established with the passage of the Morrill Act of 1862.

Prior to the creation of the Morrill Act, higher education institutions in America were primarily supported and administered by private citizens and religious sects. Both the federal and state governments played only small roles in the higher education system because of financial constraints and greater attention to elementary education. However both citizens and politicians grew concerned that the existing universities were not addressing the educational needs of the masses by providing curriculum in vocational subjects that were becoming critically important to America's expanding agricultural economy, such as agriculture and mechanics,. As a result Congress passed the Morrill Act of 1862 which legislated that each state was to be given

30,000 acres of public land for each senator and representative in Congress and the proceeds from the sale of the land were to be used to establish colleges "to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the states may respectively prescribe" (Heller, 2001, 134). The effects of the Morrill Act were immediate for it not only created research universities focused on subject matter essential to America's burgeoning economy, it also formally enacted the fiscal relationship between government and higher education. After the passage of the Morrill Act, it was accepted that government at both the federal and state level were to act as financial agents for the institutions – an agreement fortified over the past century and a half.

There are many in the field of education that believes that this agreement has been undermined with the curtailment in state appropriations. They believe that this in turn forced public universities to seek alternative revenue sources, such as larger financial contributions from students, alumni, and corporate-sponsored research. While these three providers have always played a role in financing institutions of higher education, their more profound role in recent times has raised these concerns.

4.1.2 Entering the Marketplace

There are other education scholars for whom the reduction in state appropriations does not fully explain the growing transformation into private enterprises. As former Harvard President, Derek Bok, states, "declining appropriations may have played a part, but something more is surely required to explain the rise of entrepreneurial activity on American campuses during the last twenty years (2003, 9). For many of these scholars, the other significant influence on privatization has been the institutional decisions by university administrators to more actively enter the private marketplace to generate more resources.

During the late 1970s and early1980s the United States, along with many other industrialized nations, saw their percentage of the global market decline due to significant competition from Asian countries within the Pacific Rim. One of the ways that American companies and politicians responded to this new and troublesome reality was by turning to research universities to find and help create the newest products to compete in the global market

(Slaughter and Leslie 1997). Fortunately businesses found the universities to be a welcoming partner because at the same time faculty and researchers were experiencing for the first time a decline in government appropriations and were actively seeking alternative funding sources.

Government, both at the state and federal level, was dealing with the burgeoning costs of entitlement programs that were consuming a growing percentage of their budgets (Geiger 2004). This adversely affected the government supported grants and fellowships that most scholars had relied on in the past to fund their research. The fiscal crunch made it appealing for many faculty members to partner with American corporations. Many departments soon found that a large segment of their faculty members were entrenched in the inter-workings of the corporate world. As an example, one university administrator noted, "biology was a basic science whose faculty were concerned primarily with performing research for the National Science Foundation and authoring papers for scholarly conferences…but by the mid 1980s, most full professors of molecular biology held equity positions in spinoff companies that sold products to large corporations" (Slaughter and Leslie 1997, 6). Naturally this transformation had monumental ripple affects throughout the university. Most notably it pushed research and faculty into the competitive world of the marketplace and inevitably reprioritized institutional goals to match the needs of industry. As a result many top scholars found themselves in the middle of high priced bidding wars between institutions. Salaries and benefits that were incomprehensible only a few years before were suddenly being offered.

This "arms race" mentality has only increased over the last twenty years and has spread into other facets of higher education including the recruitment of high achieving students (Goodchild et al., 1997) and wealthy donors (Geiger, 2004). Naturally this spending spree has caused significant financial strain on many universities and, according to some education experts, this is the real reason public universities have had to seek additional revenue sources from students, alumni, and corporations (Yeager et al., 2001)

Whether the privatization movement is due to a decline in state appropriations or alternatively due to entry into the private marketplace, the result is a growing shift in raising revenue from students, alumni, and corporations. This shift to privatization can be easily observed in the form of three increasingly popular policies – raising tuition, increasing private fundraising, and producing more commercially viable research through the establishment of a

technology transfer office (Dillion, 2005). The following sections discuss each policy and how each dependent variable was constructed.

4.1.3 DV #1: Establishing a Technology Transfer Office

Simply put, the establishment of a technology transfer office (TTO) indicates a willingness by a university to partner with industry. TTOs are administrative offices with a staff consisting of lawyers, entrepreneurs, academics, and other professionals familiar with the process of taking an original product to commercial market. A TTO has three primary responsibilities. (1) To solicit and evaluate academic research by faculty that may have practical commercial applications. (2) Once the potential product has been identified, the TTO assists the university researcher through the intricate process of the U.S. federal patent system (understanding the complexities of patent law are a major function of TTOs). (3) To assist university researchers in linking their patented product with a company that believes in its potential for profitability. These three responsibilities together serve to shepherd a research prototype from the academic research lab to the commercial marketplace (Geiger 2004).

While the majority of extensive research universities in the United States currently maintain a TTO, their establishment has only been a relatively recent phenomenon. Only a handful of universities had a TTO less than a quarter century ago. Instead, most universities relied upon their research compliance offices to oversee the scant number of patent applications (Geiger 2004: 217). In 1980, the U.S. Senate passed the Bayh–Dole Act, which provided universities with more expansive rights over the research they conducted using federal funds. This federal legislation was designed to rectify the perceived decline of American competitiveness in the global market through improved working-relations between institutions of higher education and private industry (Bok 2003: 140–141). For many university administrators, this legislation was seen as an opportunity to increase institutional revenue by partnering with private firms and profiting from academic research. Within ten years of the passage of the Bayh–Dole Act, 59 universities (both public and private combined) established TTOs, with another 53 through the 1990s (Geiger 2004: 217).

It is important to note that the adoption of TTOs is primarily under the decision–making control of university administrators, and not necessarily determined by state politicians or

business leaders (Carlsson and Fridh 2002: 205). Although some states did later enact policies to support the mission of TTOs, these government policies were enacted *after or concurrently* with the creation of TTOs. For example the Ben Franklin Partnership Program was established by the state of Pennsylvania to help spur economic growth through the public funding of technologically innovative firms. However the locations of the Franklin Centers were strategically placed near or on the campuses of research universities within Pennsylvania with the intention of bridging the gap between academic research and industry (Geiger 2004: 193).

The dependent variable is a dummy variable that equals 1 if a public research university has established a technology transfer office in a given year, 0 otherwise. The data comes from the Association of University Technology Managers (AUTM) (2003) licensing survey. This survey specifically asks each member to identify the year in which at least .5 of a full-time employee was assigned to support technology transfer activities. It should be noted that not all of the universities within the sample are members of AUTM, and therefore did not participate in the survey. However a questionnaire was sent to the non–members in order to confirm that their lack of membership to AUTM was due to the non–existence of a TTO within their university. This assumption was confirmed based on the responses to the questionnaire.

Table 4.2 presents descriptive summary statistical information concerning the hazard rate underlying the establishment of TTOs by public research universities. 93 institutions out of the 151 in the sample established a TTO during the full sample period (1978-2003).[10] The symmetry of the historical evolution of adoption patterns is striking. Specifically, almost half of these adoptions occur in the first 13 years of the sample period (1978–1990), while the remaining occurs in the latter 13 years (1991–2003). Naturally, the rate of adoptions declines as the end of the sample period is reached.

[10] The total number of PRUs who created a TTO by 2003 was 101. Although eight of the PRUs established their TTOs prior to 1978 (the beginning of the study was determined by data availability considerations), these institutions are not included in the hazard rate reported in Table 1 since I do not have sufficient data to predict these particular cases of TTO creation. Yet, I do incorporate this information in both the regional and peer diffusion independent variables that account for the proportion of *previous* TTO adoptions.

Table 4.1: Hazard rate for adoption of technology transfer office

YEAR	RISK SET	ADOPTIONS	HAZARD RATE
1978	151	0	0.000
1979	151	5	0.033
1980	146	2	0.014
1981	144	2	0.014
1982	142	1	0.007
1983	141	4	0.028
1984	137	3	0.022
1985	134	4	0.030
1986	130	2	0.015
1987	128	7	0.055
1988	121	5	0.041
1989	116	4	0.034
1990	112	7	0.063
1991	105	4	0.038
1992	101	6	0.059
1993	95	3	0.032
1994	92	6	0.065
1995	86	9	0.105
1996	77	5	0.065
1997	72	2	0.028
1998	70	2	0.029
1999	68	1	0.015
2000	67	5	0.075
2001	62	2	0.032
2002	60	2	0.033
2003	58	0	0.000

4.1.4 DV #2: Engaging in a Private Fundraising Campaign

In regards to private fundraising, the cost of maintaining a public university has been increasingly subsidized by the pockets of wealthy friends and graduates. In general alumni have increased their giving by over 20% from 1998-2003, which has translated into universities raising over $20 billion dollars per year (Chronicle of Higher Education, 2004). All types of universities, regardless of status or classification, have seen their fund raising enterprise increase over the last half decade as in Figure 4.3.

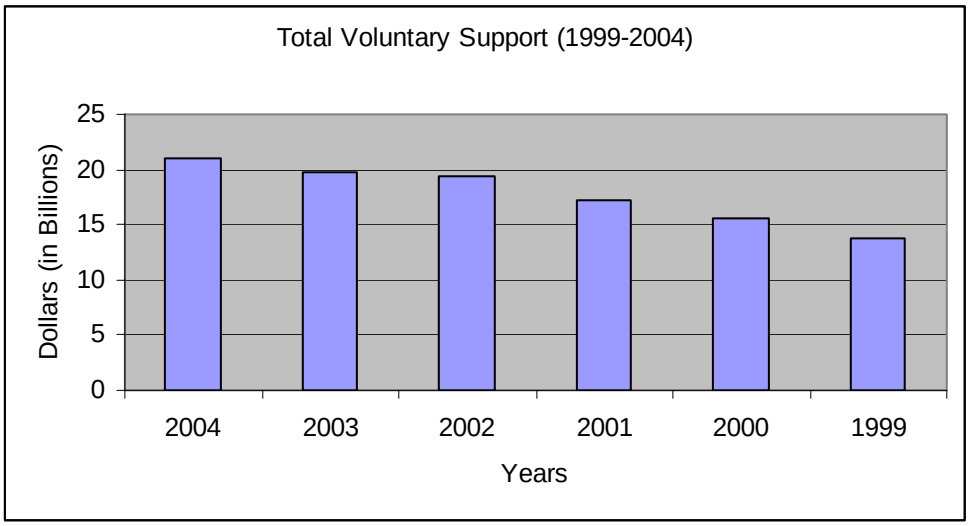

Figure 4.2: Total Voluntary Support (Source: Chronicle of Higher Education)

This prioritization of private fundraising can be observed through the change in the role and responsibilities of the university president. In a recent study conducted by the American Council on Education (2006), over 2,000 college presidents of public and private institutions were asked how their time was primarily used. The most common answer was fundraising, where nearly 40% of the presidents placed it among the top three of their responsibilities. This far outnumbered other presidential tasks such as building governing-board relations, overseeing personnel issues, or conducting strategic planning.

A president's success in fundraising and the priority of the activity has also had a significant affect on the rise of presidential salaries. Currently 112 schools compensate their

presidents with a package valued at more than a half-million dollars (Chronicle of Higher Education, 2006). These generous salaries are not necessarily due to only outstanding academic achievement or research, but also on the president's ability to raise money. "There's not necessarily a direct correlation between the reputation of the institutions and what the president gets, there are a lot of factors that go into the salaries (including)incentives for meeting fund-raising goals" (Semas 2006). Today's university presidents, states Kirp (2003, p. 263), are consumed with what he calls "the Sisyphean burdens of fund-raising and the placating of multiple constituencies." In many ways their central function has become raising money and they are judged on their ability to accomplish this task.

To capture the increased importance of private fundraising, a simple dummy variable has been created to represent whether a university engaged in a comprehensive public capital campaign from 1984-2004 (1 equals that they have initiated a campaign; 0 if they have not).[11] The amount of the campaign is not of importance, but it should be noted that over 60% of them have engaged in a fundraising campaign of $100 million dollars or more over the last ten years. The information was derived from a number of sources including the Chronicle of Higher Education, Chronicle of Philanthropy, and the fundraising consulting firm of Grezenbach, Glier, and Associates. Relying on multiple sources raises some concern for the overall results of this specific model, but the accuracy of the information has been confirmed by independent research.[12]

While the ideal construction of the fundraising variable would have been similar to the aforementioned "technology transfer" variable, listing the year in which the department was established at each institution, this was not feasible due to the fact that many universities had (and continue to have) separate fundraising foundations that are only quasi-affiliated with the host school. An example is the Kansas State Foundation, established in 1944, as a separate organization to assist in the fundraising for the university. The Foundation remains a separate entity from the university with its own board of trustees and operating budget. This is problematic for the diffusion study since this research is attempting to tap into the factors that have altered the decision-making within each university. It can not examine a policy that has

[11] A number of universities engaged in multiple capital campaigns during the period of examination (1984-2004). However for the EHA model, only the first one was counted.
[12] The start date (1984) was chosen solely due to limitations in collecting data prior to that time.

been adopted by a separate institution. Therefore the "engagement in a comprehensive public capital campaign" variable is used since regardless of the institution undertaking the task, the decision must meet with the approval of the senior administrators of each university within my sample.

Table 4.4 presents descriptive summary statistical information concerning the hazard rate underlying the establishment of a capital campaign by public research universities. Similar to the findings of the technology transfer variable, the decision to launch a capital campaign has been relatively "symmetrical" with 56 institutions having initiated a capital campaign prior to 1994, while 53 did so after.

Table 4.2: Hazard rate for initiating a comprehensice capital campaign

YEAR	RISK SET	ADOPTIONS	HAZARD RATE
1984	151	0	0.000
1985	151	2	0.013
1986	149	6	0.040
1987	143	7	0.049
1988	136	7	0.051
1989	129	5	0.039
1990	124	10	0.081
1991	114	4	0.035
1992	110	6	0.055
1993	104	9	0.087
1994	95	6	0.063
1995	89	8	0.090
1996	81	6	0.074
1997	75	11	0.147
1998	64	7	0.109
1999	57	4	0.070
2000	53	3	0.057
2001	50	6	0.120
2002	44	2	0.045
2003	42	1	0.024

4.1.5 DV #3: Tuition

There has been a meteoric rise in the price of tuition and a subsequent transfer of cost to students. In 1964-65 the average tuition price to attend a public 4-year institution was $243 ($1480.73 in current dollars), and over the next 20 years it only rose to $971 ($1765.37 in current dollars). Yet during the academic year of 2004-05, the cost for all public 4-year institutions increased to an average of $3,638 – more than double the amount charged in 1984 in current dollars (NCES 2004). To compound the issue, the percentage of total financial assistance in the form of loans (as compared to grants) from both state and federal sources has dramatically increased over the last ten years. In 1992-93, 38% of the average financial aid package for a 4-year public institution consisted of loans that were to be paid back by the student. However by 2003-04, the same financial aid package had nearly 47% of its support in the form of loans (ibid). In terms of dollars this difference translated into a student graduating with a debt of nearly $4,200 in 1992 as compared to over $5,800 in 2003. This extensive increase did not dissipate when factoring in family income. A student from a family classified as middle class still saw an increase in their loans over the past decade from 37% to over 44% (ibid).

According to education scholars this rise in tuition and drop in grant money has translated into a widening disparity between college attendances for white students versus racial minorities. In the last 20 years, white enrollment in higher education among the 25-29 year old population has risen from 47% to over 64%, an increase of nearly 27%. Yet during the same time period and among the same age group, the enrollment among black males has gone from 36% to 42%, an increase of only 14% (NCES 2004). Based on these statistics, and many others of a similar vein, education experts have drawn the conclusion that higher education, especially at the most elite institutions, has become inaccessible for the vast majority of students and families. The cost has simply become too much of an obstacle for the average family to afford. This runs counter to the accepted expectation that post secondary education should be attainable regardless of economic background, particularly within the public higher education system.

This grand expectation, like the financial relationship between state government and universities, is based primarily on historical legislation like the Serviceman's Readjustment Act of 1944 (better known as the GI Bill) and the Higher Education Act of 1965. Both of these pieces

of legislation were created with the egalitarian objective of increasing accessibility to a wider spectrum of the American population through the financial assistance of state and federal government. In both cases they succeeded in their mission and consequently helped shape and define public higher education in America (Heller 2001). Yet now with the rise in tuition and the reduction in aid the direct cost has been transferred to the individual student, and the egalitarian goal of accessibility has been accused of being forfeited, which leads to it being associated with the privatization movement.

Capturing the policy shift in relation to tuition is a difficult task since it can not be easily constructed as a dichotomous variable. It is unlike the previous two dependent variables where a single decision establishes a technology transfer office or launches a multi-million dollar campaign. Rather the increase in tuition prices is a gradual process that is more appropriate to be measured as a continuous variable. To use the event history model technique, the dependent variable must be bifurcated (Berry and Berry, 1990). Therefore the tuition variable has been constructed in the following manner: 1=two successive years that a university increased their tuition rate by more than 10%; 0=a university has not increased their tuition by more than 10% in successive years.[13] An example is the University of Michigan which is marked with a '1' in the year of 1988, meaning that it increased its tuition rate by double digits in both 1987 and 1988. While this is not an ideal construction of the dependent variable and may affect the results, it nonetheless reflects a significant plunge by a university into the tuition competition and its admittance into the privatization movement. The data comes from the National Center of Educational Statistics.

Table 4.5 presents descriptive summary statistical information concerning the hazard rate underlying the rise in tuition rate by public research universities. Compared to the previous two policies (technology transfer and private fundraising), there is no symmetry to the adoption of the tuition policy. Prior to 1994, 67 out of the 87 universities increased their tuition rate (by more than 10% in consecutive years). This predominance in the early period of the analysis raises questions about exogenous factors playing a major role in the eventual innovation.

[13] Some schools increased their tuition by more than 10% (in consecutive years) multiple times during the examination period. For the EHA model, only the first time was counted.

Table 4.3 Hazard rate for rising tuition rates

YEAR	RISK SET	ADOPTIONS	HAZARD RATE
1984	151	0	0.000
1985	151	0	0.000
1986	151	11	0.073
1987	140	9	0.064
1988	131	16	0.122
1989	115	4	0.035
1990	111	4	0.036
1991	107	7	0.065
1992	100	12	0.120
1993	88	4	0.045
1994	84	2	0.024
1995	82	3	0.037
1996	79	2	0.025
1997	77	1	0.013
1998	76	4	0.053
1999	72	2	0.028
2000	70	1	0.014
2001	69	0	0.000
2002	69	5	0.072
2003	64	0	0.000

In sum, a seismic shift has occurred on many college campuses over the past 20-25 years. A competition for revenue has forced university administrators to enact policies that shift the financial burden to its students, alumni, and corporations. The reasons for this competition are many, but according to critics continual cuts in state allocations and the effects of the marketplace are clearly major influences. It should also be noted that these dependent variables share two common fundamental characteristics with existing political science research analyzing the diffusion of policy innovations. First, they reflect a deviation from the embedded norm. Similar to policy innovations cited in the first chapter, such as children's health insurance

(Volden 2006), abortion restrictions (Mooney and Lee 1995), and welfare policies (Peterson and Rom 1989), these three variables depart from past institutional decisions. For example, the emphasis by technology transfer offices on profitability represents a significant departure from the traditional goals of the academy centered on non–commercial activities. So much so that is has caused considerable debate by faculty who view this development as potentially causing conflict of interests, reshaping missions, and being detrimental to the overall agenda of public higher education (Geiger 2004). Second, university administrators must *ex ante* weigh the costs and benefits of establishing a TTO analogous to what state politicians encounter, for example, when attempting to gauge the consequences of lottery, tax change, or casino adoptions (Berry and Berry 1990, 1992; Boehmke and Witmer 2004). In the case of technology transfer policy, balancing the tension between standard teaching and research functions within the university to service to a broader community is crucial (Carlsson and Fridh 2002: 230). Thus, the logic of TTO adoption by a PRU is rather similar to how state governments weigh either a revenue or social welfare enhancing policy innovation that is not costless.

The following section presents the universities used in the sample. This is followed by a description of the corresponding independent variables constructed for this dissertation, clustered into three categories: diffusion, institutional, and state level variables.

4.2 UNIT OF ANALYSIS

Selecting the appropriate unit of analysis for this study is critical. Naturally public universities should be the focus of the study since they are the institutions under question, but which of the state universities are the most logical to examine? I have chosen to focus strictly on public institutions classified by the *Carnegie Foundation* as either "extensive" or "intensive" doctoral research universities. The classifications are primarily based on three criteria - the amount of appropriations received by the federal government, the size of the graduate programs in terms of the number of doctoral degrees awarded, and priority to basic research.[14] The justification

[14] The exact definition of an Extensive Doctoral/Research University is that "these institutions offer a full range of baccalaureate programs, are committed to graduate education through the doctorate degree, and give high priority to

behind restricting the sample to only universities under these two classifications is due to one primary reason. The fundamental question behind peer diffusion is whether universities learn according to those who hold the same level of prestige throughout the country or conversely by their geographical neighbors as proven in past diffusion studies? The only way to properly answer this question is by testing universities that are known beyond their provincial territories. A policy can only be potentially learned by a national audience if the school where it is implemented is also known at the national level. Logically, a peer network can not be created if the members are not aware of each other's existence (Mintrom and Vergari, 1998). The schools which posses a more "national" reputation tend to be the institutions that receive the most federal funding, have the largest graduate programs, and who undertake the most promising research - in other words, the universities who are categorized as either extensive or intensive. With that being said, the total number of universities in the sample is 143 (see Appendix).[15]

4.3 INDEPENDENT VARIABLES: DIFFUSION

4.3.1 Peer Diffusion

As discussed in chapter 3, institutions like universities have a strong incentive to maintain their reputation by emulating those innovations adopted by their *peer* institutions. DiMaggio and Powell note this phenomenon when they state that "Organizational fields that include a large professionally trained labor force will be driven primarily by status competition. Organizational prestige and resources are key elements in attracting professions. This process encourages

research. They award 50 or more doctoral degrees each year. In addition, they receive annually at least $40 million or more in federal support" (www.carnegiefoundation.org/Classification). An Intensive Doctoral Research University is "

[15] There are 18 extensive or intensive universities that are not part of the sample. One is Rutgers University because they did not submit their results to the National Center for Education Statistics in an enough years to make the results valid. The other seventeen schools are universities that did not register a reputation score in the U.S. News annual rankings and thus could not be analyzed for the peer diffusion variable. The seventeen schools are the following: Alabama A&M, South Alabama, Arkansas-Little Rock, Louisiana-Lafayette, Maryland-Baltimore, Massachusetts-Boston, Central Michigan, Oakland, Jackson State, Nevada-Las Vegas, New Mexico Institute of Technology, East Carolina, South Carolina State, South Dakota State, East Tennessee, Texas A&M-Kingsville, and Texas-El Paso.

homogenization as organizations seek to ensure that they can provide the same benefits and services as their competitors (154)." Peer groups can thus provide a novel theoretical understanding as to how policy or institutional innovations diffuse within governmental settings. The assertion is that institutions, like universities, prefer to emulate those counterparts that are comparable to them in terms of status and prestige because of the competition for similar resources and employees. Hence this places considerable pressure on university administrators to adopt innovations already undertaken by other institutions of similar caliber.

In regards to constructing the peer diffusion variable, it is acknowledged that the definition of a "peer" can vary depending on the perspective of the individual within the institution. For example in universities a faculty member's perspective of their peers may only be based on their specific field of study, while a senior university administrator may consider their peer group based on a broader perspective of the entire university. These differences expose the reality that the term, peer, is vague and flexible depending on its usage.

With that being said, for this dissertation the peer diffusion variable is based on the perspective of the university administration since it is constructed by utilizing the U.S. News and World Report's Annual "America's Best Colleges" edition (1992–2003). Since 1992, U.S. News has published a college ranking based on a number of criteria including reputation score, which is a subjective question related to perceived prestige as viewed by university administrators. These rankings are very influential to university administrators strategic planning process insofar that it affects the external perception of their institution (Ehrenberg 2002: 149). I ranked my sample of universities based on the average annual reputation score received by each institution for the period of 1992–2003. Based on this average annual reputation score, each university was placed in a "peer group" with the ten universities ranked immediately higher and lower than itself in a given year (see appendix).

A skeptic might have two concerns with this construct. The first concern being that I am extrapolating the average annual reputation score to the years prior to 1992. In other words, for years prior to the availability of this ranking, I utilize the average reputation score culled from the 1992–2003 rankings to determine peer institutions for this earlier period when the data did not exist. However it should be noted that none of the public research universities in the sample had an average deviation of more than ten positions during the 1992—2003 annual period. This

suggests that these reputation scores are highly stable through time and that the measure will be robust to random, idiosyncratic fluctuations in the rankings.

The second concern a skeptic might claim is that a large overlap exists for institutions appearing in both diffusion variables since those that are geographically proximate (regional diffusion) tend to be comparable to in terms of status (peer diffusion). For example, many of the Big-10 universities are viewed equally in regards to reputation and they are located within neighboring states. However this conjecture is not supported by the data. Specifically, the correlation coefficient between the regional diffusion and peer diffusion variables is moderate (0.436). The peer diffusion variable is thus coded as the proportion of public research universities, which were either ten positions higher or ten positions lower than university$_i$ that had previously adopted the policy in question (i.e. establish a TTO, launch a capital campaign, or substantially increase tuition rates) prior to year *t*.[13]

In the end I expect that peer diffusion will have a significant effect on policy adoption. If a peer has implemented a privatization policy, this will in turn, positively increase the possibility for adoption by the other universities within the same peer group

4.3.2 Regional Diffusion Variable

The regional diffusion variable is calculated in two steps. First it follows the standard calculation done in previous diffusion studies, where the regional diffusion variable is measured as the proportion of public research universities in the contiguous states to university$_i$ who have adopted the policy in question prior to year *t*.[16] In addition the in-state brethren of univesity$_i$ are also included in the calculation since they constitute part of the regional diffusion effect on institutional innovation. For example it is assumed that University of Pittsburgh would be as influenced by the decisions made by administrators at Penn State (in-state neighbor) as they would by those at Ohio State (contiguous neighbor).[17] This has not been considered by past diffusion studies because the analysis has been conducted at the state level (i.e. state

[16] The reasoning for including proportion–based diffusion measures here is to mitigate any concerns about potential spurious results arising from variations involving geographic density across regions.

[17] A test was run controlling for in-state influence and the results did not alter the significance of the eventual findings.

legislatures), where there is no comparable in-state institutional neighbor. The inclusion of in–state institutions with out–of–state institutions should not have any bearing on the subsequent statistical analysis. The correlation between the augmented regional diffusion measure containing both in–state and out–of–state previous adoptions and a standard variable that only accounts for out–of–state previous adoptions is 0.969. Hence the regional diffusion variable is the proportion of public research universities within the region (both in–state and out–of–state) who adopted the policy in a prior year.

4.4 INDEPENDENT VARIABLES: INSTITUTIONAL

As noted in the introduction of this chapter, the factors tested in this study can be divided into three categories - institutional, state, and diffusion. In regards to the institutional variables, they are the determinants that tap into the variation of norms and arrangements within America's public universities. The United States enjoys a wide diversity of higher education institutions, particularly as it relates to size, wealth, governance structure, and mission. It is this diversity that makes it an ideal institution to investigate when attempting to uncover the importance of institutional-level features and arrangements on policy outputs. As Robert Lowry notes, one of the good reasons to analyze public universities is because "(they are) engaged in similar activities and the variation in institutional arrangements for governing public universities provide rich context that allows us to compare the effects of different instruments and combinations of instruments for political control" (2001, 846). This logic underlies the importance for including university variables when attempting to uncover why some schools privatize to a greater degree than others. The institutional-level variables that are tested are the following:

4.4.1 Governance Structure

Besides the theoretical logic discussed in Chapter 2, understanding the institutional structure and arrangements of a university is critical because of past studies, primarily in the field of

education, that have found it to be significant in determining the likelihood of certain policy adoption (Hearn and Griswold, 1994, Lowry, 2001, Nicholson-Crotty and Meier 2003, and McLendon, Heller, and Young, 2005). For this research variables that tap into both the governance arrangements with the board of trustees and the state government are included. University administrators typically have to deal with two levels of oversight, one coming from the institutional level board and the other coming from the state legislature. Since these are never two completely separate entities, including variables that capture both of their influence on the decision making process within universities is crucial. To this end, I have constructed four separate exogenous variables – two directly related to the arrangements of the board of trustees, and two related to the political oversight by state government.

The first variable captures the level of bureaucratic inertia that each university experiences due to the total number of years in a term that the majority of trustees serve on their board of trustees. The expectation is that trustee boards whose members possess lengthy terms will induce stagnation since new ideas that arise from board member turnover will be slow and gradual. The second variable is operationalized as the total number of board trustees with voting privileges. This can cause coordination problems and thus the expectation is that larger trustee boards will make it more difficult for the university leadership to facilitate major institutional change in a bold manner, which defines the privatization policies being examined. The third variable is the level of planning and budgetary restrictions placed on universities by state government (McGuiness 2006). The level of planning and budgetary restrictions is computed as an ordinal scale where universities with a low score (1 or 2 on the ordinal scale) are overseen by a governance system that simply holds advisory capabilities in regards to planning and budgetary decisions. In these cases the state board or agency has the authority to review budgets and operations, but can only offer recommendations to the universities within the system. While universities with a high score (3, 4, or 5 on the ordinal scale) are controlled by a strong state governance system that possesses authority over budgetary and/or programmatic affairs. In these cases, universities must have their budgets and/or programmatic plans approved by the state board before they can be implemented. The last governance structure variable is measured as the proportion of board trustees appointed by the state governor, the state legislator, or serving in an *ex officio* capacity. The assumption is that while some politicians may want universities to become more self-sufficient (and thus support the enactment of the privatization policies), the

added layer of government bureaucracy will nullify this possibility and simply make it more difficult for university administrators to enact the policies in question. The data source for these four variables comes from both the *State Postsecondary Education Structures Handbook* (McGuinness 1985–2004) and by–laws from each public research university analyzed in the sample.

4.4.2 Medical School

Every year the National Institute of Health (NIH) and the National Science Foundation (NSF) generate a ranking of the universities that receive the largest appropriations from their respected departments. The list of institutions rarely changes with the same schools routinely receiving the largest share of the federal grants. This raised the question of why there is such minimal variation in these annual rankings. In their analysis on the development and productivity of American research universities since World War II, Graham and Diamond (1997) were able to reveal that after controlling for size of the institutions, the critical variable that helps determine the level of federal appropriations for a university is the affiliation with a medical school. The existence of a medical school (particularly a highly rated one) has a tremendous impact in the amount of annual funding a university receives from the most prominent federal government sources such as the NIH and NSF. This important relationship can be primarily attributed to the fact that during the postwar era much of the promising research has been identified in the broader medical field.

This competitive advantage held by universities with medical schools could potentially play a factor as it relates to the adoption of the privatization policies since it is a major revenue stream that could affect whether other revenue producing policies are needed to be implemented. It could be argued that institutions with medical schools will be less likely to adopt a policy of higher tuition since they are not as desperate for added revenue due to the infusion of federal dollars. However the increased federal appropriations would spawn a need to establish a technology transfer office to take advantage of the research being conducted and the profits that it could generate. Additionally, a medical school is attractive to private donors for many of the same reasons it is attractive to government officials – promising research applicable to current issues. The variable is constructed as a simple binary dummy variable with 1

representing the existence of a medical school and 0 representing the non-existence of one. The data comes from the National Center of Educational Statistics.

4.4.3 Land Grant

As noted earlier, the Morrill Act of 1862 formally enacted the fiscal relationship between government and higher education, assigning both federal and state government the responsibility of being proper financial stewards. The Morrill Act's other significant implication was that it provided a clear mission to those universities established due to the legislation "to teach such branches of learning as are related to agriculture and the mechanic arts"(Heller, 2001, 134). More broadly, these universities (commonly known as "land grant" institutions) were seen as focal points for applied research benefiting local communities and the larger American society. The question currently is whether this mission is still relevant on many of these land grant campuses?

The assumption is that being a land grant school has very little relevance to the everyday decisions being made by administrators at these respected institutions. I doubt that the Morrill Act of 1862 heavily influences whether a policy of higher tuition is implemented or a large capital campaign is launched. These are decisions made based on current environments and attempting to address current financial issues. However I do suspect that the Morrill Act's early emphasis on research would place land grant schools in a better position to establish a TTO and the needed departments to make it successful. The variable is a dummy variable with 1 being a land grant institution versus 0 representing a non-land grant university.

4.4.4 Wealth

Naturally a university's wealth must be controlled for in this study. The logical data to utilize for this purpose is the size of each university's endowment. Unfortunately this is not as easy to obtain as one might think. The primary obstacle is that not all endowments are overseen by each individual institution. In some cases the entire university system controls the endowment and thus the value is based on the wealth of all of the institutions within the system. An ideal

example is the State University System of New York (SUNY). Accessing the total value of the endowment for the SUNY system is relatively easy, but it is nearly impossible to calculate how much of the value is directly associated with SUNY-Buffalo or SUNY-Stony Brook (and both institutions are in the sample). Thus an alternative measure is utilized to control for wealth, whether the institution is classified as either an "extensive" or "intensive" university by the Carnegie Foundation. As noted, the sample drew from only public research universities classified as either extensive or intensive, the distinction based primarily on the number of doctorates awarded annually and the amount of money received by the federal government. The expectation is that extensive universities will be more likely to establish a TTO and initiate a campaign since they have greater economic pressures to remain competitive in the intense field of research.

4.5 INDEPENDENT VARIABLES: STATE

In regards to the state variables, I applied the three standard diffusion variables used in past studies – state wealth, state partisanship and legislative professionalism. State wealth is measured as the average real state personal income (in 2000 constant dollars), and its data source is the *U.S. Bureau of Economic Analysis: State and Local Personal Income* 1978–2003. The assumption is that the aggregate state wealth will be positively related to the probability of public research universities adopting an innovation. Legislative Professionalism is measured as the estimated annual inflation–adjusted salary of a state legislator within each state (these data come from the *U.S. Bureau of the Census: Legislative Compensation – Regular Sessions:* 1978–2004). The expectation is that with a higher level of state legislative professionalism will result in a greater likelihood of adoption due to the fact that universities located in states with high levels of legislative professionalism will have legislators interested in seeing that these public institutions maintain pace with both regional and peer competitors. The state partisanship variable is constructed by coding +1 in each year a state is controlled by Republicans in both the governorship and state houses (lower and upper); +0.5 when a Republican occupies the

governorship, but there is divided government within the upper and lower state houses; 0 when there is pure divided government between the governorship and the state houses; -.05 when a Democrat holds the governorship while the house is divided; and -1 when the Democrats control both the governorship and state houses. The assumption is that states controlled by Republicans will be more likely to support the privatization policies since they encourage universities to become more self-sufficient and less reliant on state appropriations.

In addition the variable state appropriations were added to the model due to its critical importance to the current debate about the privatization movement. The assumption is that a decline in state appropriations will increase the probability of adopting all three privatization policies.

Lastly a linear trend variable is added which controls for any duration dependence that the model specification fails to capture. The logic underlying this linear trend variable is that with each additional passing year, the likelihood that a university implements a policy will increase.

4.6 METHODOLOGY

The methodology utilized for this dissertation will be a logistic regression variant of the event history analysis technique discussed in Chapter 2 (Berry and Berry, 1990). The main advantage to the event history analysis is that it captures the issues of time and units, both of which are critical to this study. By constructing a time series dataset and applying it to this pooled time-series cross-sectional (TSCS) method it will take into consideration the affect of time on each unit of analysis. Since this dissertation will be observing the behavior (or more specifically, the decision making process) of universities over an extended period of time, it is therefore vital to employ a technique that combines both components and generates a separate unit for each university by year.

Table 4.4: Summary of Hypothesis

	Technology Transfer Office	Capital Campaign	Tuition
Diffusion Variables			
Peer Diffusion	↑	↑	↑
Regional Diffusion	No correlation	No correlation	No correlation
Institutional Variables			
Length of Tenure for Trustees	↓	↓	↓
# of University Trustees	↓	↓	↓
% Politically Appointed Trustees	↑	↑	↑
State Regulation	↑	↑	↑
Medical School	↑	↑	↓
Land Grant	↑	↑	↓
Extensive	↑	↑	↓
State Variables			
Legislative Professionalism	No correlation	No correlation	No correlation
State Income	No correlation	No correlation	No correlation
State Partisanship	↑	↑	↑
State Appropriations	↓	↓	↓
Control Variable			
Log Linear	↑	↑	↑

5.0 CHAPTER FIVE: RESULTS FROM MODEL #1 - ADOPTION OF TECHNOLOGY TRANSFER OFFICE

The following three chapters will present the results of the individual models constructed to test the determinants in adopting the three selected privatization policies discussed in Chapter 4: the establishment of a technology transfer office, the increase in tuition rate, and the engagement in a comprehensive capital campaign. In each of these models the primary objective is to reveal the influences that alter the behavior of a university administration. As mentioned throughout this dissertation, the overarching assumption is that universities are primarily affected by the decisions and actions of their peers. Pressure to remain competitive with those institutions in which one shares a similar level of prestige and status cause university administrators and senior leaders to "innovate" by implementing policies that were previously inconceivable, but are now accepted by their brethren. In addition, drawing from the assumption that the institutional environment matters, it is theorized that institutional norms and structure will also affect the potential outcome of each university as to whether they adopt the policy in question. In sum the results presented in the following three chapters adequately address and answer the fundamental research question: **what are the determinants that motivate a university to innovate and adopt a specific institutional policy?**

While the dependent variable differs for each of the three models, the remaining components and operationalization are very similar. Following the past utilization of event history analysis in previous diffusion studies, I employ a logistic regression analysis in all three models. I cluster the units of analysis by university to address any potential issue caused by the lack of independence in adopting the privatization policy in question. In addition a probability coefficient is produced for each explanatory variable in an effort to capture the chances of the adoption occurring for each unit increase. The majority of independent variables utilized in each of the models are the same. They are grouped into the categories discussed in Chapter 4 –

university, state, and diffusion variables. In each chapter the statistical results of each variable will be discussed and analyzed. This chapter will specifically present the results related to the adoption of a technology transfer office. It will be followed by the analysis on private fund raising in Chapter 6, and tuition in Chapter 7.

5.1 RESULTS AND DISCUSSION: TECHNOLOGY TRANSFER OFFICE

Table 5.1 displays the results from the first model predicting the adoption of a technology transfer office by a public research university between the years of 1978–2003. The first column shows the coefficients of each variable. The second column displays the robust standard errors, followed by the probability in column three; all statistically significant coefficients are bolded.

Table 5.1: EHA Predicting TTO Adoptions

	Logit Coefficient	Standard Errors	Probability
Diffusion Variables			
Peer Diffusion	**2.210*** **	0.604	0.055
Regional Diffusion	-0.629	0.959	-0.012
University Variables			
Trustee Tenure Length	-0.064	0.056	-0.002
# of University Trustees	-0.015	0.017	-0.000
%Politically–Appointed Trustees	-0.041	0.026	-0.001
State Regulations	**0.165** **	0.094	0.005
Medical School	**0.778*** **	0.244	0.021
Land Grant	0.364	0.246	0.010
Extensive University	**1.332*** **	0.366	0.029
State Variables			
Legislative Salary	0.077E-04	0.074E-04	0.025E-05
State Income	-0.018	0.050	-0.000
State Partisanship	0.105	0.198	0.002
State Appropriations	0.354	0.742	0.003
Control Variables			
Linear Time Trend	0.663	0.341	0.015
Constant	-5.915	1.126	---------
Summary Statistics			
Pseudo R^2	0.128		
Number of Observations	2302		

* *p < 0.10* ** *p < 0.05* *** *p < 0.01*

5.1.1 Diffusion Variables

As noted above in Table 5.1, the evidence regarding how the policy of technology transfer diffuses amongst public research universities is unequivocal. The peer diffusion variable shows to be highly significant, indicating that a university is much more inclined to adopt a technology transfer office if their peer has established one in a previous year.[18] More specifically based on the probability computation, for every one university that establishes a technology transfer office there is a 5% increase in the likelihood that the other universities within the peer group will also adopt the policy. In stark contrast, the regional diffusion variable shows no sign of significance in affecting the outcome of the policy. The decisions (of the lack there of) by a university's regional neighbors has minimal affect on its resolution to establish an official technology transfer operation for itself.

These results strongly support my initial questioning of the contiguous theory being applied to public universities, particularly as it relates to the operation of technology transfer where the competition to discover and market the next "big thing" is at the national (possibly even international) level, not regional. The intense pressure university administrators are under to find highly lucrative products within the research conducted on their campus abolishes many of the provincial parameters they typically act within. This is not to say that the contiguous theory is obsolete. On the contrary the numerous diffusion studies that have recently been conducted confirm that many states continue to have a very provincial view of policy adoption. Instead the results of the model simply strengthen the argument that different public institutions have different networks by which they learn about potential policies and innovations. For state agencies it is too expensive politically and economically to engage in a substantive search for practical policy solutions, hence they take the easy and less risk adverse road of adopting primarily regional policies. Yet university administrators, who under similar limitations and

[18] It should be noted that in a separate study (Weinstein and Krause, N.d.) the peer diffusion variable was split into two peer groups – the institutions *above* the university in question and the institutions *below* the university in question. Understandably it could be theorized that universities would be more likely to copy the policies implemented by the universities in their "aspiration" group as compared to those trialing them in the rankings. However the results showed that there was no statistically significant difference between the two separate constructions of the peer variable and the single construction utilized for this dissertation.

concerns are able to venture beyond their region due to the significant reduction in transaction costs caused by the utilization of rankings as a heuristic. This would seem to be particularly true in regards to the establishment of a technology transfer office since one of its primary objectives is to increase revenue for the university, a statistic that has substantial influence in determining rankings and elevating status.

5.1.2 University Variables

Similar to the results of the diffusion variables, the university level variables revealed directionality and significance according to their hypotheses stated in Chapter 4. Specifically, the university variables that attempted to capture the level of state government supervision validated the expectations. It was predicted that additional government oversight would reduce the probability of adopting the privatization policy of technology transfer due to inertia caused by added governmental bureaucracy. Specifically the ordinal scale of state planning and budgetary regulations showed that as a state government moved up the scale (becoming less stringent in their oversight) the probability of a university adopting the innovation of technology transfer increased by over 16%. This was also proved to be true in regards to trustee involvement where both the number of overall trustees serving on a board and the length of their term negatively affected the chances for innovation. While the figure did not result in a statistically significant determinant, the appropriate directionality did confirm that with each added government assigned trustee, a university was less likely to implement the policy.

As it relates to the university variables that attempted to tap into the norms and missions of the institutions, their strong results also validated their expected importance. If a university was classified as an extensive institution, it translated into a substantial increase in likelihood that it would establish a technology transfer office, which makes logical sense since the definition of an extensive university is primarily based on the institution's commitment to basic research. It would be incongruous for a university whose primary mission is to advance basic academic research to not financially support one of the most promising and critical "tools" developed for professors over the last 25 years. Lastly, the possession of a medical school greatly affected the probability of a public research university establishing a technology transfer office. According to the results, the addition of a medical school increaes the probability of a

university adopting the technology transfer policy by over 77%. The underlying assumption is that a medical school provides additional research opportunities, many of them with significant financial promise, thus motivating universities who posses a medical school to take advantage of the current commercial interest in bio-medical research by establishing a technology transfer office and quickly producing marketable (and hopefully profitable) research.

5.1.3 State Variables

The last set of variables, state variables, were included in the model due to their substantial importance in past diffusion studies. As noted in Chapter 2, numerous research has found the level of professionalism of each state legislature (represented by the annual salary earned by the state legislators), the wealth of the state citizenry, and the partisanship within state government to hold significant influence in determining which policies ultimately get passed and which get nullified. However the results of the model do not reach the same conclusion. In all cases the variables did not reach significant levels in determining the chances of a university innovating from the establishment of a technology transfer office, confirming the expectations presented earlier. This is not too surprising since all of the policies being tested for this dissertation, but particularly the establishment of a technology transfer office, are primarily institutional policies that are generated and implemented by internal university administrators as compared to state policy-makers. As noted earlier in the dissertation, a proper policy diffusion study must examine policies that are within the control of the institution being studied so as not to be tainted by exogenous factors not taken into consideration by the models. This is not to say that state legislators can not have a meaningful impact on the likelihood that a higher education policy will be adopted, but as compared to the effect university administrators can have, it pales in comparison.

5.1.4 Control Variables

In addition to the variables grouped into the clusters mentioned above, I included one additional control variable critical to diffusion studies and technology transfer in particular. The variable is

simply a log linear trend that tests the impact of time, or more specifically each passing year that a university does not innovate. Logically this variable does prove to be important, validating the assumption that as time elapses, there is increased pressure for a university to establish a technology transfer office.

6.0 CHAPTER SIX: RESULTS FROM MODEL #2 - CAPITAL CAMPAIGN

This chapter focuses on the motivations behind the launching of a comprehensive capital campaign by a public research university. A similar format to the previous chapter is followed. I first present the statistical results of the logit regression, followed by an interpretation of the data, and then ending with a final summary of the key findings. As discussed in Chapter 4, the overall objective of this empirical model is to ascertain the reasons for a university to engage in a policy that is as expansive and costly as a capital campaign. It is not a simple decision to launch a campaign, it involves a significant amount of resources, the least of which a substantial portion of time on the part of a university President and other senior administrators. Who are the universities that are placing this pressure to act – those from contiguous states or those institutions whom hold a similar position in the annual rankings? And how much of a factor does the mission and governance structure of each school matter in determining the likelihood of engaging in this endeavor? This chapter helps answer these important questions as it relates to the monumental decision of initiating a capital campaign.

6.1 RESULTS AND DISCUSSION

Table 6.1 displays the results from the second model predicting the initiation of a comprehensive campaign by a public research university between the years of 1984–2003. The first column shows the coefficients of each variable; the second column displays the robust standard errors; followed by the probability measure in column three. All statistically significant coefficients are bolded.

Table 6.1: EHA Predicting Capital Campaign Adoption

	Logit Coefficient	Standard Errors	Probability
Diffusion Variables			
Peer Diffusion	**2.142*** **	0.607	0.089
Regional Diffusion	-0.244	1.064	-0.005
University Variables			
Trustee Tenure Length	-0.014	0.068	-0.004
# of University Trustees	-0.014	0.022	-0.001
%Politically–Appointed Trustees	-0.154	0.569	-0.007
State Regulation	0.250	0.188	0.010
Medical School	**0.434***	0.252	0.021
Land Grant	0.248	0.239	0.009
Extensive University	**0.850****	0.307	0.033
State Variables			
Legislative Salary	0.035E-04	0.01E-04	0.012E-05
State Income	-0.069	0.047	-0.002
State Partisanship	-0.026	0.173	-0.001
State Appropriations	-0.175	0.647	-0.002
Statistical Controls			
Linear Time Trend	0.349	0.282	0.013
Constant	-3.074	1.340	--------
Summary Statistics			
Pseudo R^2	.082		
Number of Observations	1791		

* *p < 0.10* ** *p < 0.05* *** *p < 0.01*

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6.1.1 Diffusion Variables

Similar to the results in the first model (see Chapter 5), a school's decision to launch a comprehensive campaign is highly influenced by the past actions of the universities who hold a similar place in the *U.S. News and World Report* annual rankings. If an institution has previously decided to engage in a campaign, the chances the others within their peer group will soon follow suit increases by almost 9%. In other words, when the University of Michigan (ranked #2) decides to launch a multi-million dollar campaign, it sends a clear message to its competitors of its strategy which dramatically increases the chances that UC Berkeley (#1), Virginia (#3), Wisconsin (#4), UCLA (#5) and the other institutions of similar status will imitate Michigan's actions and launch a campaign soon thereafter. In fact this is exactly what transpired when Michigan announced their campaign in 1983, UCLA soon followed by announcing one in 1984, UC Berkeley in 1985, Wisconsin in 1988, and Virginia in 1992. On the other end of the prestige spectrum a similar sequence of events occurred. When University of Rhode Island (#68) announced a campaign in 1992, University of Alabama (#69), University of Missouri-Rolla (#67), Louisiana State University (#66), and University of Cincinnati (#69) quickly followed the proclamation and launched individual campaigns all within three years of Rhode Island's initial decision. These examples in conjunction with the statistical results provides strong evidence that peer pressure is highly influential in affecting whether this specific policy ultimately gets accepted and implemented by a university.

In regards to the spread of innovation based on regional pressures, the results show no sign of significance. The lack of magnitude in the resulting coefficients provides strong evidence that a university will make decisions independent of the actions conducted by their geographical neighbors. Thus the administrators at the University of Michigan most likely decided to launch a campaign regardless of the decisions made by the administrators at Michigan State, Ohio State, Purdue, or any other of their regional neighbors. Instead their attention was focused on the actions of their true competition in Berkeley, Madison, and Charlottesville. This finding confirms the hypothesis stated earlier that the contiguous state theory did not make strong theoretical sense as it relates to the decision to initiate a capital campaign. This particular innovation is at the core a decision about raising critical funds for recruiting the top professors and students, providing the newest facilities, and being the most attractive to large federal

appropriations. All of these goals are evidence that the battle between universities is being waged at the national level, not at the regional. The rankings generated by publications such as the U.S. News and World Report simply provide the additional information regarding whom specifically each university is competing against in this nation-wide rivalry.

6.1.2 University Variables

Two of the university variables proved to be influential in determining the probability of a university adopting the policy of a capital campaign. The first is whether the institution in question is classified as an extensive university. An extensive university is three times more likely to launch a comprehensive campaign than an intensive institution. This result follows the initial hypothesis discussed in the previous chapter and makes theoretical sense since "extensive" universities have placed greater importance and focus on the endeavor of research as compared to their "intensive" counterparts. Research is an expensive enterprise and forces administrators and professors to constantly seek revenue streams to support it. In simple terms extensive universities need more money and thus are more likely to adopt a policy that directly addresses this issue. In addition being an extensive university and having research be an institutional priority makes the decision to engage in this costly endeavor more justifiable. University administrators can easily convince themselves and other institutional leaders that they are simply being loyal to the mission of the institution to support the operation of research. Following along the same line of logic, the other university level variable that proved to be important in determining the likelihood of launching a capital campaign was the existence of a medical school. Similar to the analysis discussed earlier, the existence of a medical school plays a major role in the mission and type of research being conducted within the university. A quick perusal of the top schools in National Science Foundation funding will reveal a predominance of universities with medical schools.

One surprising null result was the lack of importance of state appropriations received by the individual university. The assumption was that if state appropriations decreased from one year to the next, it would motivate universities to engage in a campaign to recoup the lost funding. Yet the results showed that it was a non factor, raising questions about the complaint often cited by university leadership that they are being forced into a comprehensive campaign

due to the dramatically falling assistance from state government. However a possible reason for this unusual result may be due to a simple principle-agent problem of imperfect communication. The message being sent by state government to universities to find and increase their own funding may take a longer period of time than the one year change that is being calculated in this model. In other words a longer trend of diminishing appropriations may have been occurring prior to the one year increase that supposedly generated the innovation. A future project should investigate more comprehensively the period of time prior to the announcement of a campaign before concluding this non-existent correlation.

6.1.3 State Variables

Interestingly none of the state variables proved to be significant in determining the probability of a university engaging in a comprehensive capital campaign. Neither the variables that attempted to tap into the economic and political disposition of the state citizenry, nor the variable that tried to capture the professionalism of the state government proved to be consequential in the final decision to launch a campaign. So the question can be raised as to why this surprising result?

One of the possible explanations for this unexpected outcome is that engaging in a campaign is not politically controversial. As compared to shifting institutional priorities away from teaching (which technology transfer has been accused of doing) or raising the cost of education, initiating a capital campaign is a relatively modest proposal that would not necessarily rile political protest from either the citizenry or government representatives. This lack controversy would help explain why the probability of initiating a capital campaign did not change based on the political leanings of the state or the level of professionalism of the state legislature. As a public policy it lacks the gravitas to attract significant government attention, and thus is implemented by universities according to their agenda.

Another possible explanation for the null results is that capital campaigns are such an accepted part of the greater higher education landscape that they are not truly an “innovation”. They are not a new idea that radically changes the perception and dynamic of the institution and thus is not considered an innovation as defined by previous diffusion literature. Campaigns have been a vital tool for private institutions for decades. Naturally state legislators and citizens are familiar with the practice and do need a substantial amount of information to draw an opinion on

the matter. This is quite different than the situation with the establishment of a technology transfer office, which can be easily assumed to be an innovation due its short history and unique purpose. Hence the policy of launching a capital campaign overcomes any political pressure or government inertia that normally influences the progress of adopting true university innovations.

6.2 CONCLUSION

The results of the model were as expected. The strong influence of peer pressure fits logically with the underlying hypothesis that universities want to generate greater revenue and when their competition adopts a policy that addresses that desire, they will quickly follow the actions of the initial adopter. This theory also helps explain why only university level variables revealed significance as compared to state level determinants. Engaging in a comprehensive campaign is a decision strictly made by university leaders and thus will diffuse according to their perception of the competition. However the lack of robustness in relation to the state variables does raise questions about the true innovativeness of campaigns. It could be argued that if a policy does not garner political attention, it is not truly altering the dynamic of the institution, a key component to the diffusion of innovation.

7.0 CHAPTER SEVEN: RESULTS FROM MODEL #3 - RAISING TUITION

This chapter will present the results and subsequent analysis of the diffusion of tuition rates amongst public research universities. It will follow a similar format to the previous chapters, documenting the computation of the logit regression followed by an interpretation of the statistical results of each explanatory variable. It should be reiterated that the confidence of these expected results are not as high as those in the previous models. As discussed in Chapter 4, constructing a dichotomous variable that would adequately capture the recent trend in tuition costs proved to be difficult. It is not as simple and clean as determining the year in which a particular office/department is established (i.e. technology transfer), nor when a publicly stated goal is issued (i.e. capital campaign). Instead the process by which a tuition price is determined by each university is more opaque; and thus the results of this model may need to be taken with some reservation. However the critical importance of tuition to a university's operation and its pertinence to the privatization movement makes it vitally important to analyze for this dissertation.

7.1 RESULTS AND DISCUSSION

Table 7.1 displays the results from the third model predicting the policy adoption of escalating tuition rates by a public research university between the years of 1984–2003. The first column shows the coefficients of each variable; the second column displays the robust standard errors; the third column is the probability computation. All statistically significant coefficients are bolded.

Table 7.1: EHA Predicting Raising Tuition Adoption

	Logit Coefficient	Standard Errors	Probability
Diffusion Variables			
Peer Diffusion	-2.336	1.143	-0.104
Regional Diffusion	**2.719*** **	0.831	0.119
University Variables			
Trustee Tenure Length	-0.107	0.070	-0.004
# University Trustees	-0.025	0.025	-0.001
% Politically–Appointed Trustees	**0.059** **	0.030	0.002
State Regulations	-0.118	0.197	-0.005
Medical School	-0.330	0.315	-0.012
Land Grant	-0.220	0.257	-0.009
Extensive University	-0.307	0.293	-0.017
State Variables			
Legislative Salary	0.093E-05	0.011E-03	0.023E-06
State Income	-0.029	0.064	-0.001
State Partisanship	**-0.465** **	0.176	-0.021
State Appropriations	-0.018	0.016	-0.001
Statistical Controls			
Linear Time Trend	0.192	0.456	0.001
Constant	-1.624	1.521	---------
Summary Statistics			
Pseudo R^2	.063		
Number of Observations	1618		

* *p < 0.10* ** *p < 0.05* *** *p < 0.01.*

7.1.1 Diffusion Variables

The results of the diffusion variables, region and peer, were the opposite of their expected outcome. Instead of peer pressure being the primary catalyst for rising tuition rates, it was regional pressure that seemed to cause universities to increase their tuition by double digits in consecutive years. The initial assumption was that universities, constantly under pressure to increase revenues, would increase tuition prices when given a window of opportunity that would not cause significant political or societal backlash. That "window" would most likely occur when other institutions of similar standing were also increasing tuition rates by substantial amounts. In essence universities were only waiting for the historical norm of access and egalitarianism to be weakened providing them a new environment upon which to implement their privatization policy of escalating tuition. However based on the results stated in table 7.1, peer diffusion did not increase the chances of tuition hikes. In fact the results were not only statistically insignificant, but the directionality was negative, raising a future question of whether peer pressure actually decreases the probability of a university adopting the tuition policy.

Yet the affects of regional pressure were strongly robust. According to the model, a university has an 11% greater chance of increasing their tuition for every one additional geographical neighbor who has done the same in the past. While my hypothesis is still viable regarding university administrators waiting for norms to shift, it is obvious that regional pressure, not peer, is the force that is opening the window of opportunity.

It should be noted that in Chapter 4, I did have some reservations about tuition being an outlier compared to the other dependent variables due to two primary reasons. First, of all the policies being tested in this dissertation, tuition could be the most susceptible to geographical pressures due to regional competition for prospective students. While out-of-state students do remain in the minority at almost all public research universities, these minority groups do tend to hail from states contiguous with the state of the chosen institution. Thus a competition does exist between geographical neighbors to remain as a viable choice among these prospective students. The second potential reason why regionalism is so significant is due to the political sensitivity of tuition as a public policy. As compared to technology transfer and capital campaigns, tuition prices affect a much broader constituency and thus viewed by many political leaders as a state issue. Politicians are fully aware that fighting for lower tuition rates is an argument that will

receive little backlash. It is a safe policy to support, and as a result will receive a tremendous amount of political attention. This political pressure in turn constrains university administrators in implementing their ideal agenda of increasing revenues through the escalation of tuition rates. It is only after other states have increased their prices would other state officials capitulate and "allow" their universities to follow suit.

On a related note, the significance of geographical pressure raises an interesting question of whether there are certain regions within the country where it is more influential than others. It could be hypothesized that universities which educate a substantial portion of their regional population will be less likely to increase tuition due to strong political pressure. It is only when other regional schools begin to increase their tuition rates does the tipping point shift and the policy of tuition spreads. Hence schools in the Midwest, West, and South will find regional pressure to be more influential than universities in the Northeast where a larger segment of the population is educated by private institutions. To test this hypothesis a dummy variable was created for the four regions; the results of the regression are displayed in Table 7.2.

Table 7.2: Geographical Influence on Tuition Increases

Geographical Region	Logit Coefficient	Robust Standard Errors
South	**0.685****	0.291
Northeast	-0.471	0.486
Midwest	**-1.091****	0.382
West	**0.5333***	0.325

* *p < 0.10* ** *p < 0.05* *** *p < 0.01.*

The results were exactly as expected, the only region that was not significantly influenced by geographical pressure were those schools in the Northeast. The reliance on private education and the subsequent reduction of political pressure translates into a null result for regional diffusion with the region of the Northeast. Yet regional pressure remains highly significant in all other areas within the country.

7.1.2 University Variables

In light of the significance for regional diffusion, it is not surprising that the only university level variable that proved to be important is the percentage of government appointed trustees. Obviously tuition is a policy that reaches beyond the parameters of each institution and is influenced heavily by the priorities at the state government level. Yet the surprising result is that as the number of politically appointed trustees increased, the more likely tuition prices increased. This is the exact opposite from what one would expect and differs from the conclusion drawn from Lowry (2001). The difference was not substantial, but nonetheless in a direction that deserves further attention.

7.1.3 State Variables

Interestingly the only state variable that proved to be significant was the partisanship measurement. However the results were the opposite of the hypothesis. Instead of confirming the assumption that a state controlled by Republicans would be more likely to adopt the privatization policies since it would assist universities in becoming more financially self sufficient, the results showed that a university in a state controlled by Democrats would be more likely to raise tuition. The negative direction of the coefficient shows that for every state government institution (governorship, upper house, or lower house) that is controlled by Republicans, there is approximately a 45% less chance that the tuition policy would be adopted. A possible explanation for this surprising result is that raising tuition is viewed by Republican policy-makers as less about government intervention and more about family expenses. Even though a rise in tuition would reduce the need for state appropriations, it would also negatively affect family budgets, an area that is deeply embedded in the Republican agenda.

7.2 CONCLUSION

The final results of this model were the most surprising of the three. The robustness of regional diffusion indicated that the policy of tuition is unlike the other two dependent variables examined in this dissertation. I believe the political sensitivity of the issue is the driving force behind the unexpected results. The importance of educational affordability pushes this policy outside of the parameters of university administration and more squarely under the auspices of state government. However it was very interesting to note that the affects of regional pressure were felt asymmetrically depending on the geographical region. This revelation deserves future attention since it better explains the reason behind the lack of peer pressure.

8.0 CHAPTER EIGHT: CASE STUDIES IN ESTABLISHING TECH TRANSFER OFFICES

The results presented in Chapter 5 show that peer diffusion is statistically significant in determining why a university establishes a TTO . In other words, one university's decision to initiate a technology transfer policy heavily influences other universities within their specific peer group to also adopt the policy. In addition, three other factors help explain some of the variance in establishing this policy, mainly the presence of a medical school, being classified as an extensive institution, and greater university autonomy from state government.

In order to supplement these statistical findings, a series of elite interviews were conducted with current and past university administrators and technology transfer employees at a select sample of universities. The primary objective of the interviews was to get the subjects perspective on the key influences (either at the local, institutional, state, or national level) that helped determine their university's decision to formally establish a TTO?[19]

In order to choose the universities to profile while controlling for selection bias, a simple most-different-systems design was implemented. As a result, four universities were identified that differed in the *expected* timing versus the *actual* timing of the establishment of their TTO. The expected timing was drawn primarily from the university's reputation score, assuming that a university with a higher score (hence more prestigious) would be more likely to establish a TTO at an earlier date, since a greater proportion of their peers would have already implemented one. Conversely a university with a low reputation score would be expected to innovate at a later stage since fewer of its peers would have already established a TTO. On the other hand, the actual timing was determined according to the specific year that the university established an office overseeing the responsibilities of technology transfer. Two of the selected institutions

[19] The definition of establishing a technology transfer office is "the year in which (an) institution assigned at least 0.5 professional full time employee in support of technology transfer activities" according to the questionnaire conducted by the Association of University Technology Managers (AUTM).

were expected to be true policy entrepreneurs based on their high reputation scores. However, only one was in actuality an entrepreneur (University of Washington), while the other was a laggard (University of Pittsburgh). The other two institutions were selected according to their low reputation rankings, and thus were both expected to be late innovators. While one of the institutions proved to be a laggard as expected (University of Louisville), the other university in this category had surprisingly established a technology transfer office at a relatively early date (University of Alabama at Birmingham) (see table 8.1).

Table 8.1: Expectation vs. Actual Timing of TTO Adoption

	Entrepreneur (Actual)	**Laggard (Actual)**
Entrepreneur (Expected)	University of Washington	University of Pittsburgh
Laggard (Expected)	University of Alabama-Birmingham	University of Louisville

Contact was made with a wide variety of individuals connected to these four universities and their technology transfer operations. Interviews were conducted with Deans, Provosts, Faculty, Directors of Technology Transfer Offices, Trustees, and in one case even the Chancellor of the University.[20] In the end, a tremendous amount of information was collected regarding the determinants that significantly influenced the formal decision to establish a TTO at each of the selected universities.

This chapter is divided into six sections. The first four sub-chapters give detailed profiles of the universities selected for the elite interviews along with the interview results, beginning with the University of Washington and followed by the University of Pittsburgh, University of Alabama-Birmingham, and University of Louisville. While the primary objective of these interviews was to uncover why each university chose to establish a TTO at the time they

[20] It should be noted that almost all of the senior administrators I interviewed wanted to speak "off the record". Many felt uncomfortable discussing the process by which they select particular policies and, more importantly, drawing comparisons of themselves to other institutions. For this reason I did not identify anyone by name.

did, the interview information also helps to begin answering some of the critical questions related to the phenomenon of punctuated equilibrium, a theory which is explained in the fifth sub-chapter. Finally this chapter concludes with a discussion of the prominent determinants that supported the empirical findings and identifies the influences that may not have been adequately specified in my quantitative models.

8.1 CASE STUDIES

8.1.1 Case Study #1: University of Washington

The University of Washington (UW) has a premier TTO.[21] Whether judged by the number of companies spawned (over 200 in the last 20 years), patents applied (178 in FY 2005), or innovations licensed (109 in FY 2005), it routinely ranks among the most successful operations in the country (Kwiram, 2005). Further evidence is noted in the annual report of the Association of University Technology Managers (AUTM), which ranks the University of Washington in the top 5 of U.S. universities in the number of licenses and options executed (ranked 5th), the number of licenses and options yielding income (ranked 5th), and the total number of start-ups established between 1996-2000 (ranked 4th) (2003). In sum the University of Washington competes with the very best research universities in the country, both public or private, in the field of technology transfer.

So why did the institutional leaders at the University of Washington decide to venture into the technology transfer arena in the first place? As can be seen in Figure 8.2, the University of Washington was one of the first schools to formally establish a TTO, even when compared to the other elite public research universities that formulate the University of Washington's peer group[22]. This observation raises the important question of what were the

[21] Technically the office of technology transfer at the University of Washington is comprised of two licensing departments, "Invention Licensing" and "Digital Ventures".

[22] The University of Washington's peer group consists of the following institutions (based on their average reputation score): UC-Berkeley, Michigan, Virginia, UCLA, Wisconsin, North Carolina, Georgia Tech, Texas, Illinois, Indiana, Penn State, UC-San Diego, William & Mary, Purdue, UC-Davis, Minnesota, Ohio State, Colorado, and Iowa.

significant factors that led to the University of Washington to the institutional innovation of formally adopting a policy of technology transfer.

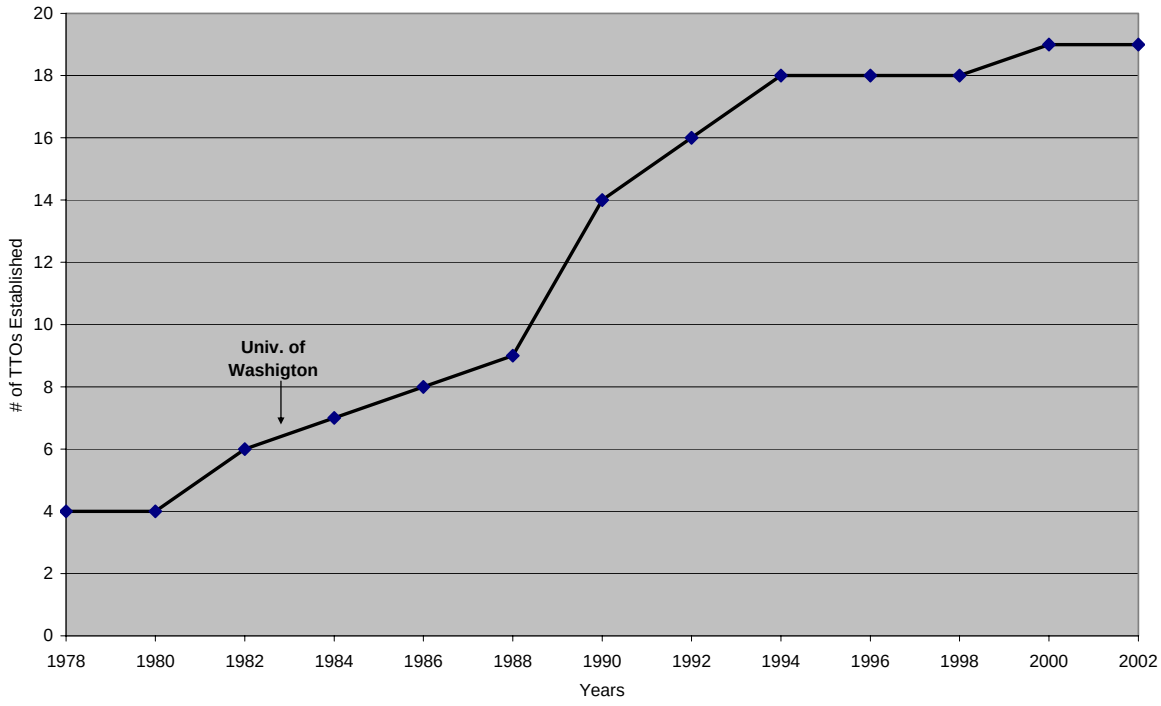


Figure 8.1: # of TTO Established by University of Washington's Peer Group

The following sections present the results of the interviews at the University of Washington which help to answer this question.

8.1.1.1 Local Economy and Leadership Three key determinants were routinely raised throughout the interviews with elite subjects from the University of Washington as vital to the progression and ultimate establishment of the university's TTO, the first is the local economy. While it is difficult in 2007 to think of Seattle as a depressed area, in the late 1970's it was a region struggling to diversify its declining economy beyond its two major employers: Boeing and the sea ports. Boeing in particular was struggling with a sagging airplane market that they

had saturated during the 1960s. As one newspaper columnist wrote,"(Seattle) battered by the misfortunes of the area's largest employer and by a national business slump coupled with inflation, the region entered the longest and deepest recession since the Great Depression" (Boswell and McConaghy, 1996). This dire situation forced civic leaders to seek alternative strategies for economic development and job creation. Since many of the political and business leaders of the region were also involved in some capacity with the University, it became a focal point for this objective.

In particular two University Regents and local businessmen, Tom Cable and Hunter Simpson, were key proponents in using the research that was being conducted on the University's campus to help spur company development for the Seattle area. As Regents of the University they were aware of the type of promising research that was being produced by the faculty, and as entrepreneurs were aware of the potential revenue it could generate if properly marketed. Mr. Cable and Mr. Hunter, along with other civic leaders (including Bill Gates Sr.), began to push the university administration to recognize the potential financial benefits of technology transfer and its growing importance to the sustainability of the region. Fortunately the administration listened and soon began to adequately support the establishment of a TTO through an increase in funding and recruitment of experienced administrators. Simply, the exogenous pressure of the failing local economy (a non-institutional issue) encouraged the university to adopt the institutional policy of technology transfer.

8.1.1.2 Peer Diffusion The second reason often cited in the interviews for the establishment of the TTO at the University of Washington can be loosely labeled as "peer influence". As discussed, pressure was placed upon the administration by civic and institutional leaders to utilize the research being created on campus to help generate revenue for both the university and the city. In an effort to accomplish this task the university administration sought to recruit experienced faculty and administrators familiar with this process of technology transfer. Naturally, they looked to other universities that had already entered into this new venture. In the mid-1970's very few schools had formally established a TTO and employed administrators who understood the ramifications of intellectual property. Therefore, the University of Washington looked to one of its peer institutions for guidance and in 1976, recruited Dr. Irving Shain, professor of Chemistry, from the University of Wisconsin to be its Provost and Vice President.

While at Wisconsin, Dr. Shain had worked closely with the Wisconsin Alumni Research Foundation (WARF), one of the first official university-related TTOs in the country. WARF was established in 1925 to manage the intellectual property around the discovery that would eventually eliminate the disease of rickets (Slaughter and Leslie, 1997). His familiarity with WARF was one of the critical reasons why senior leaders at the University of Washington recruited Dr. Shain to help lead their challenging research agenda. Once Dr. Shain arrived in Seattle, he quickly became involved in developing the operation from simply a research office to a full functioning patent office that assisted professors looking to enter the private marketplace.

Unfortunately, Dean Shain's tenure was short lived for he was soon recruited back to Madison to be their next President. However, during his time at the University of Washington he was credited for pushing the technology transfer operation out of its passive state and into a more comprehensive department that actively connected research being conducted on campus with private firms seeking profitable applications. Not surprisingly, within six years of Dr. Shain's arrival, the University of Washington established an official TTO and hired a senior staff administrator to oversee the department on a fulltime basis. In sum, peer diffusion (in the form of Dr. Shain) had a significant influence in the eventual development of the technology transfer office at the University of Washington since his past experiences with intellectual property at the University of Wisconsin (a peer institution) played a major role in his recruitment and hiring at Washington. In summary, it was not coincidental that Dr. Shain came from a peer university to the University of Washington. Instead, it is evidence of a deliberate and systematic search for an administrator from a school that had already established a technology transfer policy in order to venture into this new area and help maintain their position as an elite research university.

8.1.1.3 Medical School The last major influence routinely mentioned during the interviews was the importance of the medical school and the research being produced by its faculty. As mentioned above, the University of Washington was assembling a highly regarded and experienced administrative staff to run their new office of technology transfer. Another critical element needed for a successful operation was a steady stream of research that was attractive to local industries and entrepreneurs. This is turn would generate a demand that would allow the TTO to continue its momentum and gain popularity among the key administrators within the university who were still skeptical of this new (and expensive) venture. Fortunately during the

early 1980's, when the technology transfer office at the University of Washington was still in its infancy stage, the research areas of molecular biology and bio-technology were beginning to become extremely popular at the university as researchers were identifying broad and potentially lucrative applications. These areas were also very popular in the medical industry which made the medical school research particularly attractive for commercialization.

An early example of this type of research was the identification by university faculty of the area within a yeast gene where the process of producing proteins begins. This discovery allowed the researchers to create a bio-tech company that would produce human insulin, a highly applicable discovery in the medical industry. In universities without a medical school, this type of cutting-edge research was not being produced. Therefore, it was a substantial competitive advantage for the University of Washington to already have a highly reputable medical school that was filled with leading researchers who simply needed an education on how to bring their research from the lab to the marketplace.

8.1.1.4 Bayh—Dole Act While the three determinants cited above (peer pressure, medical school, and the local economy) were clearly instrumental in the establishment of the University's TTO, there are also noticeable absences from the list of influences. In all of the interviews it was cited that the Bayh-Dole Act was not a major factor in determining the establishment of the TTO at the University of Washington. In fact, very few faculty and administrators were aware of the legislation at the time of its enactment, let alone its potential ramifications. Naturally the administrators directly connected to office of research were aware of its implications and the guidelines it presented, but few individuals beyond that department were familiar with the Act. It became the responsibility of the administrators in the newly formed TTO to help educate the rest of the campus community of the Bayh-Dole Act and its potential benefits to the individual researcher and University of Washington as a whole. It can be concluded based on the limited knowledge of the Act that even though the TTO was officially established at the University of Washington at the same time as the Bayh-Dole Act was passed, it did not play a significant part in the deliberations about whether to establish an office. It was only *after* the policy was accepted did more faculty and administrators begin to comprehend the implications of the legislation.

In sum, the University of Washington was ahead of the competition because of a confluence of vital factors. First they were pressured to address the problem of boosting the regional economy in a way in which the university could also increase its revenues, mainly through technology transfer. Secondly, in order to achieve this goal, the pragmatic leadership of the University of Washington smartly recruited administrators from peer institutions with technology transfer experience from that could help the university to enter into a new venture that it (and most other universities) had previously not undertaken. Lastly, it already had the most critical resource, a strong medical school, which was generating commercially viable research and made the establishment of a TTO much easier for the university.

8.1.2 Case Study #2: University of Pittsburgh

In 2005 the University of Pittsburgh's (Pitt) TTO[23] ranked among the top-10 universities in the number of companies generated by faculty (AUTM, 2005). They outperformed such noteworthy universities as Cornell, University of Minnesota, and Harvard. In addition, the TTO ranked among the very best in the number of licenses it issued for its patents with a total of 53 in 2005 alone – again exceeding the outputs created by highly respected universities such as Penn State and Michigan (ibid). These accomplishments are particularly impressive when considering that the operation at the University of Pittsburgh has been in official existence for less than 15 years. As can be seen from Figure 8.3, the University of Pittsburgh lagged behind many of its peers in terms of its decision to formally establish a technology transfer office.[24] It was not until 1992 that a full-time employee was given the sole responsibility of overseeing the process of technology transfer (AUTM, 2003). At that time,14 of its peers had established an office, placing the University of Pittsburgh at the latter end of the 'S' curve.

[23] University of Pittsburgh's technology transfer office is officially called, Office of Technology Management (OTM)

[24] The University of Pittsburgh's peer group consists of the following institutions (based on their average reputation score): Colorado, Maryland, Arizona, Florida, Michigan State, UC-Irvine, Texas A&M, Kansas, Oregon, Georgia, UC-Santa Barbara, SUNY-Stony Brook, Virginia Tech, Iowa State, Arizona State, Missouri, Massachusetts, Miami (OH), and Tennessee.

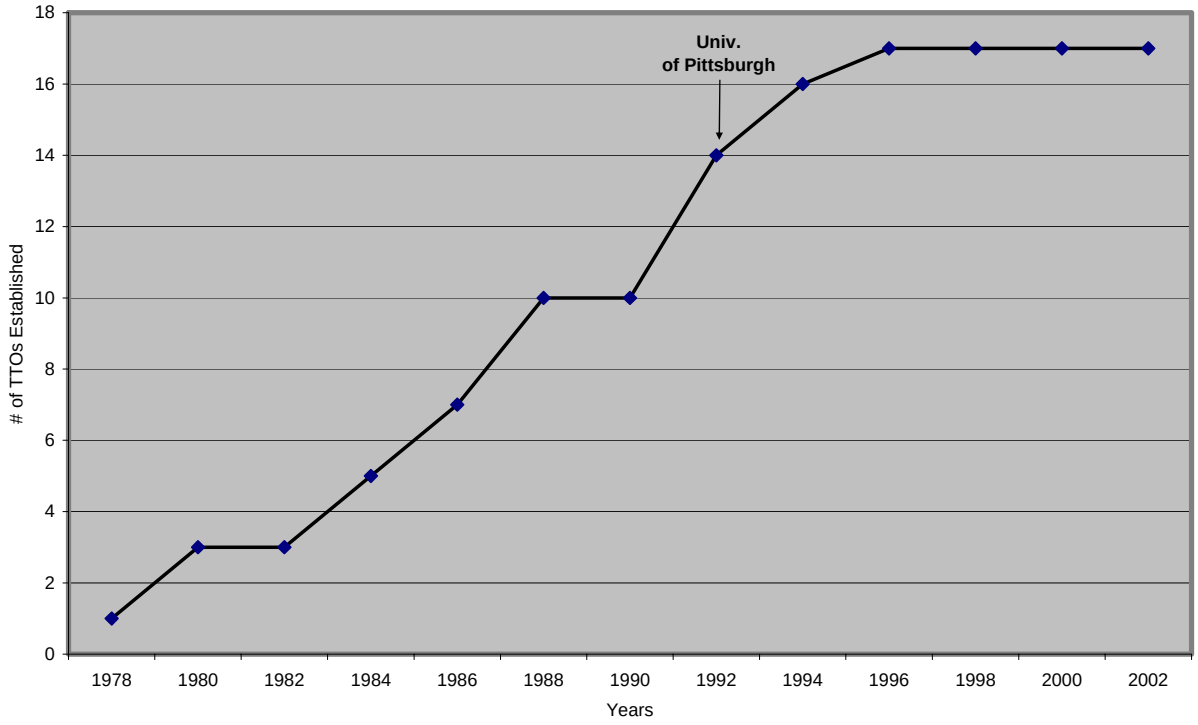


Figure 8.2: # of TTOs Established by University of Pittsburgh's Peer Group

The fact that so many of its peers had already established a TTO leads to the question of whether the determinants that influenced the administrators at the University of Pittsburgh were the same as those that encouraged the early adopters (i.e. University of Washington) or were the variables different? A difference in the influential factors may explain the late entry into the domain of technology transfer. In the answers provided by the interviewees at the University, only one major factor was uniformly cited as the influential factor for the establishing of a TTO - the research being conducted at the medical school. However, it can also be argued that the fundamental choice of the type of research that was chosen to be the primary output of the medical school is also evidence of peer pressure. Interestingly, it was a variable that was *missing* from the decision-making process that appears to be the reason why the University of Pittsburgh lagged so far behind its peers in terms of when they established a TTO – mainly the lack of strong local leadership.

8.1.2.1 Medical School All of the individuals interviewed identified Pitt's highly ranked medical school as the primary impetus for the establishment of their TTO. More specifically, they called out the fundamental shift in focus from clinical studies to more applied research as the main reason for the creation of a department to oversee technology transfer in a more established manner. For decades the University of Pittsburgh's medical school was internationally known and respected, primarily for the extensive clinical trails the school conducted, the most famous being the polio vaccine trials led by Dr. Jonas Salk. While this type of research kept the reputation of the school in good standing, it was not particularly lucrative from a revenue perspective as can be seen by the amount of federal research and development funding that the University received from 1980-1990, which totaled slightly more than $87 million (Graham and Diamond, 1997, 223). This amount placed the University of Pittsburgh only 23rd among Research I universities, lagging behind many other public universities in their peer group such as University of North Carolina, University of Illinois, and University of California at San Diego. The lack of federal financial support raised concern among the administration as they struggled to provide adequate facilities and retain promising faculty member and resulted in a comprehensive review and study of alternatives to address this growing issue – including the potential of changing the research agenda for the medical school.

Finally, in the mid-1990s, a decision was made to place greater emphasis on applied research that would garner more attention from the federal government. This change in focus was encapsulated in the recruitment and subsequent hiring of Dr. Art Levine as the new Dean of the Medical School. Prior to his arrival at the University of Pittsburgh., Dr. Levine had been a senior member of the National Institute of Health, which gave him tremendous insight on the type of research that would allure federal funding and could be a financial windfall for the medical school and the university as a whole. Dr. Levine's impact in terms of increased federal appropriations for the University of Pittsburgh was immediate as evidence by the fact that as early as 2002, the university moved into the top-10 in total NIH funding, placing it 8th among all universities with a total of $308 million. The increase in federal funding subsequently heightened the need for a professional staff that could effectively commercialize the new research. In the end, this change in the institutional goal of the medical school was the one of the

fundamental reasons for the formal establishment of an office of technology transfer at the University of Pittsburgh.[25]

8.1.2.2 Peer Diffusion One could argue that the shift in the medical school's focus and the hiring of Dr. Levine also highlights a more subtle form of "peer pressure" to create a TTO. Many of the university administrators had recognized that the University of Pittsburgh's low ranking in terms of overall federal funding was making it less competitive than its peer institutions. This is a less direct example of peer pressure as compared to the narrative told by the administrators at the University of Washington, who identified a specific faculty member (Dr. Shain) from a specific peer institution (University of Wisconsin) to be the primary catalyst in developing their operation. However, Dr. Levine, coming from a federal government agency, was still indirectly knowledgeable of the type of research being conducted at Pittsburgh's peer institutions and implemented this knowledge in helping build the TTO. While this may not fit the common model of a faculty member bringing his/her specific expertise from one peer institution to the next, but it can clearly be defined as an example of policies being adopted with the intention of remaining competitive, if not superior to other similar institutions.

8.1.2.3 Local Leadership Another fundamental difference between the University of Washington and the University of Pittsburgh was the role of local leadership at the institution. As discussed, the University of Washington benefited tremendously from the leadership of their trustees who understood both the needs of the local community and the dividends that could be provided by to both the city and university by the research being conducted by the faculty. Unfortunately for the University of Pittsburgh, there were no trustees or civic leaders that were cited as driving or assisting in the development of their TTO. In fact, at the University of Pittsburgh, the opposite was routinely noted as the local foundations were very late in supporting the offices at the major Pittsburgh universities.

This is particularly puzzling since the city and region of Pittsburgh was (and is) dealing with many of the same economic issues that the city of Seattle was attempting to address in the

[25] It should be noted that the University of Pittsburgh officially had a full time employee solely working on technology transfer responsibilities in 1992. However almost all of the senior administrators interviewed identified 1996-97 as the more accurate year of their entry into the field since that is when the shift in the medical school's priorities began to take root.

1970s – mainly the need for a diversified economy after years of relying too heavily on a narrow scope of industries. While city and institutional leaders in Seattle recognized the economic benefit that could be provided by intellectual property and drove the development of a department connecting the two entities, this story did not play out in Southwest Pennsylvania where the wealthy foundations, led by many of the city's most powerful individuals, did not recognize this same opportunity for an alternative revenue source.[26] It was not until the latter years of the 1990s that the local foundations began to better understand and recognize the possibilities for regional economic improvement through the spawning of companies by the local universities.

To summarize the interviews, the University of Pittsburgh was a laggard due to two primary factors. The first was that prior to the arrival of Dr. Levine, the research being produced within the medical school was not particularly attractive to outside funding sources, which in turn generated little need for a more comprehensive department overseeing intellectual property. The second factor was the short-sightedness of Pittsburgh's civic leadership, which did not realize the economic benefits that could be gained by supporting the commercialization of the research being conducted on the campuses of their local universities. Together, while these two forces ultimately led to a shift in mission and a subsequent adoption of a TTO, they also played into the delay of the creation of such an office as compared with the University of Pittsburgh's peer institutions. .

8.1.3 Case Study #3: The University of Alabama at Birmingham

The TTO at the University of Alabama at Birmingham (UAB) does not rank among the top intellectual property departments in such critical measures as the number of companies spawned or the number of licenses and options executed as compared to the aforementioned offices at the UW and Pitt.[27] This would be expected since UAB is traditionally viewed as an institution lagging behind many public universities in regards to critical attributes such as student test

[26] Ironically huge sums of "Pittsburgh money" were directed to technology transfer firms in other parts of the country . The most notable being Henry Hillman, one of the first investors in Kleiner Perkins Caufield and Byers (KPCB)of Silicon Valley, now one of the most prominent venture capital partnerships in the world (Kenny and Florida, 2000).

[27] The official name of UAB's office of technology transfer is "the UAB Research Foundation".

scores, doctorates awarded, and wealth (Lombardi et al., 2005). This is why it is surprising is that the UAB administration determined at a relatively early date to establish a TTO (1987) as can be seen by Figure 8.4 below.[28] This raises the question about what inspired the institutional leaders at UAB to enact the technology transfer policy before many of its peer institutions.

Three interrelated factors were commonly cited by the administrators contacted for an interview at UAB. The factors were (1) UAB's medical school (2) the NASA facility in nearby Huntsville and (3) Dr. Lawrence DeLucas, faculty member and former astronaut. It was Dr. Lucas who was routinely cited as the primary actor who connected the research being conducted at NASA with the facilities at the UAB medical school. This powerful triumvirate later would draw the attention of the Alabama state government when they chose the Birmingham area to be the focal point for the entire state's economic development plans.

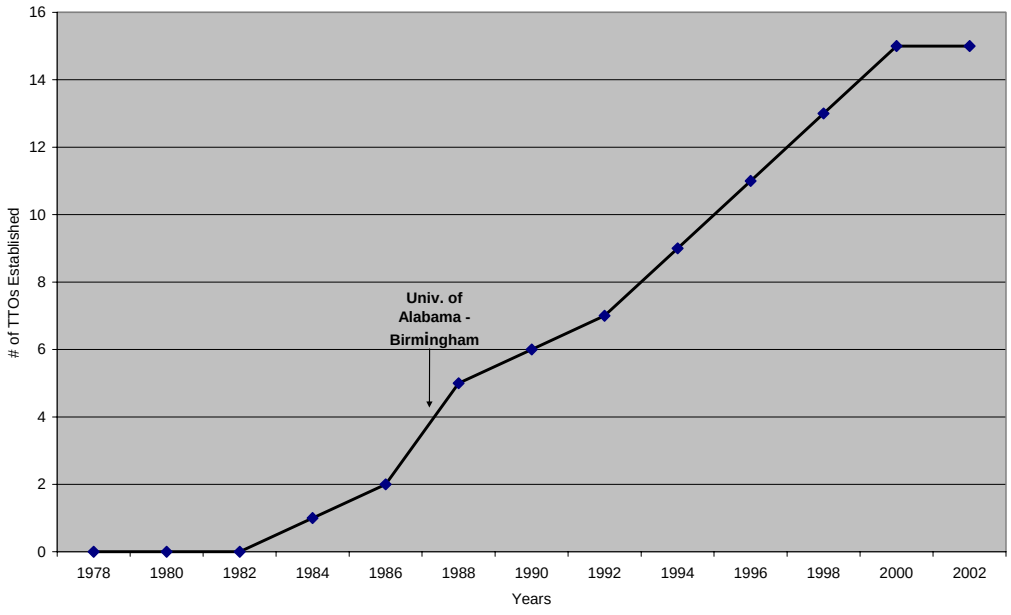


Figure 8.3: # of TTOs Established by UAB's Peer Group

[28] The University of Alabama at Birmingham's peer group consists of the following institutions (based on their average reputation score): George Mason, Temple, South Carolina, New Mexico, New Hampshire, Wisconsin-Milwaukee, Virginia Commonwealth, Louisiana State, Missouri-Rolla, Rhode Island, Alabama, Cincinnati, Texas Tech, IUPUI, Hawaii, Texas-Dallas, San Diego State, Wayne State, and West Virginia.

8.1.3.1 Medical School and Faculty Leadership The UAB medical school was broadly identified during the interviews as the main catalyst for the establishment of the TTO. Administrators cited the numerous companies sprouted from the medical school with assistance from the UAB's TTO. Yet similar to the narrative at Pitt, there was also an underlying story about the medical school that better explained the decision-making process behind the policy adoption. As previously noted at Pitt, the medical school was cited as the primary impetus behind the formal creation of their TTO. More accurately, it was the decision to shift attention to more applied research over basic clinical research within the medical school that ultimately spurred the development of the TTO. While it may appear on the surface that the medical school at UAB was a central determinant in the establishment of their TTO, in actuality it was the relationship that the medical school had with NASA and its facility in Huntsville that truly accelerated the administration's decision to enter into the academic domain of intellectual property.

As mentioned in the profile of the UW, the 1980's was a critical time in the development of bio-technology. Research in this burgeoning field was reaching new heights and receiving greater attention from the federal government and other non-university funding sources. A handful of fortunate universities were able to take advantage of these new funding opportunities with the assistance of their medical school, and UAB was no exception. However for UAB it was not simply the research being conducted within their medical school that was attractive to funding sources, it was also its collaboration with the researchers at NASA. This relationship, particularly in regards to bio-technology, was credited to former astronaut, UAB faculty member, and UAB graduate, Dr. Lawrence DeLucas, who was identified as the primary institutional leader in the eventual establishment of the TTO. Due to Dr. DeLucas appoints at both NASA and the UAB, he was very aware of the type of research being conducted at both facilities. He championed the efforts to have both institutions collaborate on more projects, particularly assignments from the federal government. So while the medical school and the NASA facility were instrumental in producing the type of research conducive to technology transfer, it was Dr. DeLucas who was the central figure in developing the operation. [29]

[29] Due to time constraints, an interview with Dr. DeLucas has not yet occurred. However future arrangements have been made for contact and thus a more complete explanation is forthcoming regarding the development of UAB's TTO.

8.1.4 Case Study #4: The University of Louisville

The TTO at the University of Louisville is still a relatively small operation as compared to the departments at other peer universities. In the last fiscal year the University of Louisville awarded only six licenses and option agreements (as compared to 54 by Pitt) and brought in a total of $2 million in revenue (as compared to almost $12 million at Pitt) (AUTM, 2006). This is not surprising since the University of Louisville, like the UAB, has not been historically known as a highly prestigious institution, which in turn has hindered its ability to attract leading researchers and solicit outside funding (Lombardi et al, 2005). However, unlike UAB, the administration of the University of Louisville did not deviate from expectation and did not act as a policy entrepreneur by establishing a TTO at an early stage in the evolution of intellectual property. On the contrary, Louisville, as expected, was a laggard, particularly as compared to its competitors as can seen in Figure 8.5.

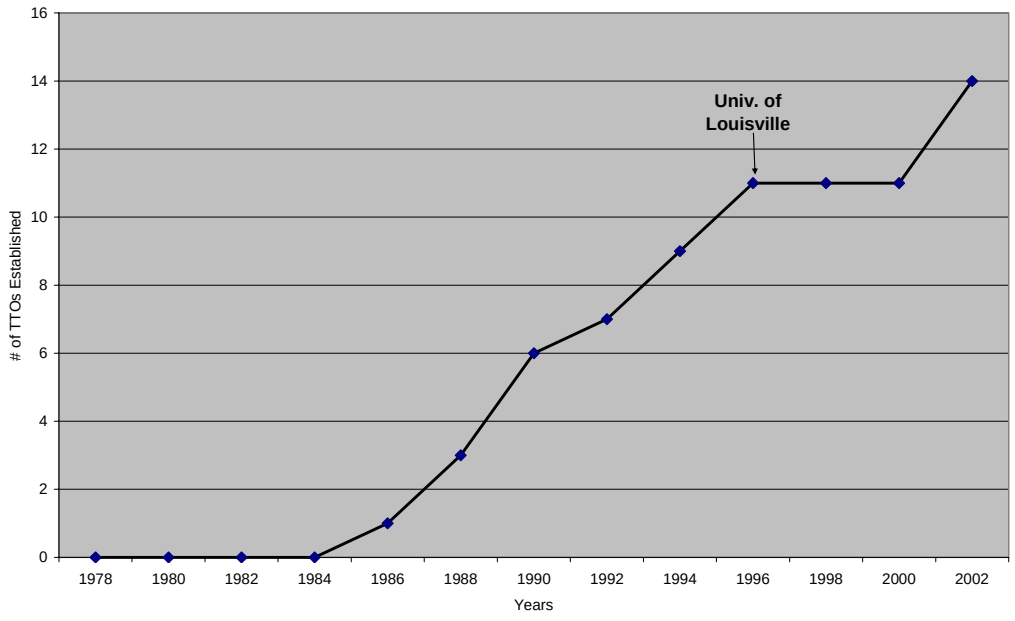


Figure 8.4: # of TTOs Established by University of Louisville's Peer Group

This begs the question - what were the variables that ultimately swayed the administration at Louisville to finally establish an office to oversee issues related to technology transfer? The answers provided through the interviews were twofold. The first was the creation of the Research Challenge Trust Fund by the Kentucky state government. The main objective of the program, more commonly known as the "Bucks for Brains", was to improve the economic development in the state by creating a matching-gift program where as the state government would match private donations designated toward university research. The second substantial factor in Louisville's decision was the fundamental shift in mission in the 1990s from being a regional institution with the primary responsibility of educating the local citizenry to the expansive goal of becoming a national research university. Additionally, it was mentioned that the critical factor that helps explain Louisville's late enactment of the policy is the fact that the university is not the sole overseer of the University Hospital. Instead it is a member of a partnership with three other healthcare entities, thus diluting the direct impact of the hospital on the university's research agenda.

8.1.4.1 State Economic Development In an attempt to improve the economic development within the state, in 1997 the Kentucky Senate passed a series of legislation that tried to accelerate the research capabilities of the universities within their higher education system. The primary goal was to help improve the state economy by strategically utilizing the public universities as economic engines for further growth and development. A key component to this reform was the state's creation of the Research Challenge Trust Fund, better known as the "Bucks for Brains" program, which matched state funds to private donations designated toward specified university research. From 1998-2005 Kentucky legislators invested $350 million in the Trust Fund, an amount equal almost one-third of the appropriations allocated to Louisville. As intended, the new revenue stream allowed Louisville to recruit faculty and researchers who previously they were unable to attract due to a lack of resources. The prime example often cited was Dr. Nancy Martin, a molecular biologist who currently serves as the Senior Vice President for Research. Dr. Martin had previously been at the University of Minnesota, one of the true pioneering institutions in the field of intellectual property. Similar to the story regarding Dr. Shain at UW, Louisville administrators cited Dr. Martin's expertise from Minnesota as one of the primary

reasons for her recruitment and her experience has been extremely beneficial in the development of their burgeoning operation.

Overall this acceleration in faculty recruitment has had an immediate impact on the activity generated from the TTO. In regards to patent applications Louisville has gone from one in 1997 (prior to the infusion of state money) to 61 in 2006; patents awarded has increased from 3 in 1997 to 9 in 2006; and patent reimbursement income has risen from zero dollars in 1997 to over $200,000 in 2006. In simple terms the state appropriations generated enough of an incentive for Louisville to accelerate their own private fundraising, which in turn attracted top researchers who became the catalyst for the establishment of their TTO. It should be noted that the "Bucks for Brains" program did not specifically state that Louisville (or any of the other state supported institutions) had to create a TTO. The decision to do so was still an act by the university administration at the institutional level though the Kentucky legislature provided great incentive.

8.1.4.2 Hospital While all of the other universities profiled identified their hospitals as one of the primary factors in the eventual establishment of their technology transfer offices, Louisville did not because surprisingly, the University Hospital is not solely controlled by the institution. Unlike the arrangements at the other three profiled institutions where they are the primary overseers of the research being conducted within the medical school, at Louisville the responsibility is shared by multiple medical entities. This unusual partnership was identified as one of the significant obstacles in pushing the university's overall research agenda. While the University Hospital has been beneficial in recruiting top faculty and has spawned potentially lucrative research, the additional institutions managing the hospital has caused bureaucratic coordination problems. This has translated into an impediment in dramatically developing the entire operation of intellectual property.

8.2 PUNCTUATED EQUILIBRIUM AND POLICY ENTREPRENEURS

Based on the information gleaned from the elite interviews, there were two commonalities between the four universities profiled in terms of the development of their TTOs. First was the

importance of an exogenous force that altered the traditional thinking of university administrators (i.e. the decline of the local or state economy, loss of federal appropriations, etc.). The second commonality was the critical role of specific actors in introducing and building the technology transfer department within the institutions (i.e. Hunter Simpson, Dr. Shain, Dr. Levine, etc.). This observation as to how important exogenous events and specific actors are on influencing change at an institution, taps into the study of punctuated equilibrium and the role of policy entrepreneurs (Baumgartner and Jones 1993). An additional argument can be made that UW and the UAB possessed true policy entrepreneurs (Hunter Simpson and Tom Cable) who acted as agenda-setters (Kingdon, 1984). While Pitt and Louisville simply possessed "institutional builders" (Marcussen and Peters, N.d.), who due to arriving on the scene at a later stage simply institutionalized the policy that had already been enacted.

The theory of punctuated equilibrium is rooted in the fundamental question of how does major policy change happen if incrementalism is the main pace of the policy process. Policy making is traditionally characterized as stabile and slow, which scholars have generally attributed to structural design (Kingdon, 1984; Cobb and Elder, 1983, Meier, 1985; Sabatier, 1987). The actors and organizations (or "subsystems") embedded in design of institutions rarely have the incentive to make drastic changes to the policy domain where they possess a monopolization. This fact, coupled with a political environment that generates significant obstacles for any opposition to become a major player in the decision making process, results in a steady pace of only slight adjustments to existing policies. However, as Baumgartner and Jones note, sudden bursts of change do occur in policymaking, a reality that is not well explained by the theory of incrementalism. Hence the scholars raise the question – what breaks the periods of stasis and can account for the drastic changes in policy direction?

One of the critical answers suggested is a shift in policy image or issue redefinition. This is typically accomplished by a major exogenous event that brings attention and pressure to a specific policy and the subsystem controlling it. This dramatic event opens a window of opportunity for new political and institutional actors (or "policy entrepreneurs"), who previously remained on the sidelines, to enter into the policy debate and "insist on rewriting the rules, and on changing the balance of power that will be reinforced by new institutional structures" (Sabatier, 1999, 101). The result is a change in the equilibrium of the policy domain and consequently a new set of policy options available to the institution.

The narratives provided by the interviews confirmed the accuracy of the punctuated equilibrium theory since in each case an event or force outside of the inner-workings of the universities punctured the traditional institutional thinking. At UW, the declining regional economy forced the university to rethink its role in the context of the Seattle economy. The university recognized that it needed to shift from a passive participant to being an active provider of jobs and resources. Pitt had its traditional perspective altered with the realization that stagnant federal appropriations were causing a competitive imbalance in recruiting top faculty and researchers. In both cases, a shock to the institutional system opened an opportunity for a new policy to be created and implemented.

Although the types of actors each university possessed was slightly different, the importance of specific actors at each university also became critical in the actual establishment of each TTO. Drawing from the work of Marcussen and Peters (N.d), the argument can be made that only the UW and UAB possessed true policy entrepreneurs ("innovators"), while the other two universities simply had "institutional builders". The key difference is that at UW (Tom Cable and Hunter Simpson) and UAB (Dr. DeLucas), the actors brought the policy idea of technology transfer to the administration, introducing them to a relatively new policy idea. Before their active involvement, the knowledge of technology licensing among the university administrators was rather limited. Therefore Mr. Cable, Mr. Simpson, and Dr. DeLucas follow the standard definition of a policy entrepreneur as "people who see to initiate dynamic policy change" (Mintrom, 1997, 739).

On the other hand, the important actors identified by Pitt (Dr. Levine) and Louisville (Dr. Martin) were administrators that were recruited to run the offices once the policy of technology transfer had already been accepted by the institution. Thus they played the role of being "institution-builders" since they were making institutional choices "once a direction for change has been pointed out" (Marcussen and Peters). This critical difference between the type of actors may be an additional factor that helps explain the timing of the policy adoption since both UW and UAB were early innovators, while both Pitt and Louisville were laggards compared to their peers.

8.3 CONCLUSION

The variables that proved to be statistically significant in the quantitative model (see Chapter 5) were verified during my interviews with key administrators at the selected universities. Without question, the most critical of the determinants proved to be the existence of a hospital. The three universities with a hospital (UW, Pitt, and UAB) all cited their medical school (and more specifically the research being conducted within it) as one of the primary catalysts for deciding to build a TTO. The financial opportunities that the hospitals provided were too enticing for the administrators to ignore at each school.

In addition the hypothesis that peer diffusion would also have a noticeable affect in the overall decision making process to establish a technology transfer office proved to be true. However, how peer pressure evolved for each institution was slightly different. For UW, peer diffusion came in the form of a new Dean from a peer institution (Dr. Shain from Wisconsin), who was able to apply his knowledge and expertise to his new home institution. Pitt felt the peer pressure because of their lack of federal funding and subsequent inability to compete for top faculty and students. Finally, UAB and Louisville were affected by their state governments' realization that economic development needed to be a higher priority. In all cases, a general cognition of where their institution stood in relation to other universities was a major force in the eventual implementation of the technology transfer policy.

However, it should be noted that the quantitative model did not take into account local issues, such as the economy. Based on the interview outcomes, local factors played a substantial role in the institutional decision making process. In the cases of the UW and Pitt, the difference in civic leadership had a substantial affect on the timing of the establishment of the TTO. While in the cases of Louisville and UAB, the intervention of their state governments to promote local economic development played a major role. In future research it would be important to construct a variable to try to capture the local conditions of each institution to improve the modeling.

9.0 CHAPTER NINE: CONCLUSION

9.1 SUMMARY OF FINDINGS

This dissertation answers the following question: which factors have caused three controversial revenue generating policies to spread and become adopted by public research universities? By conducting an event history analysis on three higher education policies (rising tuition, increasing private contributions, and establishing technology transfer offices), the research reveals that the initial hypothesis was correct in predicting that peer diffusion has a statistically significant effect on determining the timing of when universities establish a TTO and initiate a comprehensive capital campaign. Interestingly, the rising cost of tuition did not reinforce the hypothesis and could not be explained using a peer diffusion model. Within the peer diffusion model institutional level variables are found to be instrumental in increasing the probability of innovation in terms of establishing a TTO. The existence of a hospital has a major impact on the likelihood that a university will enact the policy of technology transfer as found by both the statistical models and the elite interviews. Moreover, the governance structure, specifically a larger number of trustees and a longer tenure length for each trustee, negatively impacts the opportunity for the university administration to establish an office. Conversely, none of the state level variables proves to have a substantial impact on TTO establishment. The probability of innovation in regards to technology transfer remains unaffected regardless of the level of professionalism amongst the state legislature, average state income, or change in higher education appropriations.

On the other hand, capital campaigns are affected by the decrease in state appropriations, proving that the claim that university administrators are being forced by the decisions of the state legislature to generate more private dollars may have validity. Not surprisingly, being an extensive university strongly increased the probability of initiating a campaign.

Another interesting result was that the rising of tuition was positively affected by the percentage of politically appointed trustees. The expectation was that government trustees would be reluctant to increase tuition prices due to voter backlash. Lastly, as noted it was the only dependent variable that did not follow a peer diffusion model. As discussed, this may be a result of how the variable was constructed or simply that it is a variable that is more susceptible to exogenous factors such as the regional economy.

Overall, this research highlights the very interesting process of peer diffusion that has not been previously tested by diffusion scholars. However, there remains one more critical question that must be asked before legitimizing the concept of peer diffusion – is this type of diffusion applicable to other institutions or has this dissertation simply revealed the unique process by which universities innovate? The next sub-chapter provides three criteria (all of which have been discussed in previous chapters) that an institution must possess for peer diffusion to be applicable: a professional workforce, a cognitive hierarchy (or recognized ranking) within the field, and a national competition for the same resources. If all three criteria are met, peer diffusion will have an impact on the spread of innovations and the model is applicable. The last sub-chapter will provide details on research that is currently being conducted in connection with this dissertation.

9.2 IS PEER DIFFUSION GENERALIZABLE?

This dissertation began by asking if the contiguous-state theory was generalizable to all public policy-making institutions. The results of this research clearly show that this is not the case since universities prove to innovate via a different process. Instead of regional diffusion, universities tend to adopt policies according to the decisions of their peer schools. The next question is whether the theory of peer diffusion is generalizable or if it is strictly a unique process applicable only to universities. Here the hypothesis is presented that if an institution meets the following three criteria, it too could potentially be influenced by peer pressure.

First, the institution must possess a workforce that is highly professionalized (DiMaggio and Powell, 1983). As discussed in Chapter 3, an occupational field with employees trained from the same type of institution, possessing the same level of education, and following the same

rules for promotions and recognition will tend to homogenize due to normative pressures. They will attempt to remain competitive by replicating the identical policies so as to retain the best talent within the occupational field, which directly leads to the second criteria.

The second criterion that must be met is a strong cognitive hierarchy of the employees and/or the institutions within the occupational field. This "ranking" has to exist for the aforementioned competition to retain and recruit the best talent. For a competition to exist, the same rules must apply to all "contestants" (which is the argument in the first criteria), but in addition a public understanding of who is "winning" the competition must also be in existence. It allows the contestants to know which institutions they aspire to work for in their field (simultaneously it sends a message to institutions about where they want to recruit contestants for their institution). Naturally for universities (and faculty within the universities) this is the information that annual rankings like the *U.S. News and World Report* provide.

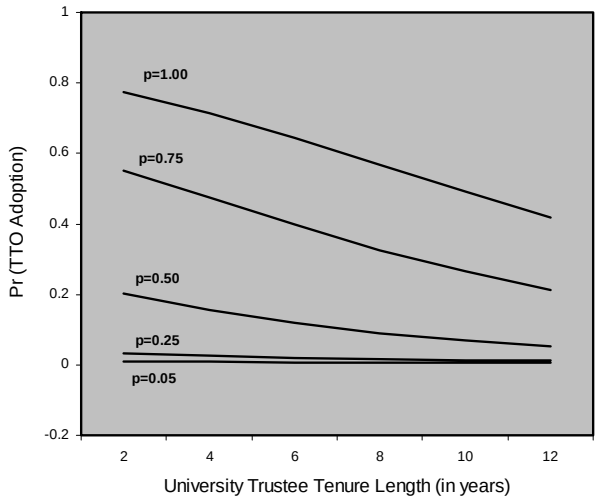
The last criterion that must be met for peer diffusion to be generally applicable to an institution is a competition amongst similar institutions for identical resources at the national level. There must be an incentive or reason that an institution to look beyond their regional parameters for alternative policies. As noted with universities, the national competition is for faculty and federal appropriations. The intense pressure for these valuable commodities motivates universities to innovate in a similar fashion as their national peers.

Based on the three aforementioned criteria, another type of institution where peer diffusion could be applicable is hospitals. Hospitals are an institution where the primary employees, doctors, are clearly in a professionalized occupational field. In addition, there is a known and accepted hierarchy of the best hospitals in the country, partly due to similar annual rankings by publications like the *U.S. News and World Report*. Lastly, hospitals compete against each other at the national level for the best doctors and research allocations. Hence it would not be surprising to find specific hospitals innovating based on decisions made by their peers. Other institutions that deserve future testing of the peer diffusion model may include economic development agencies and national charities.

9.3 CURRENT DIFFUSION RESEARCH

Currently research is being conducted that builds from the results presented in this dissertation. Weinstein and Krause (N.d) have begun to analyze the magnitude each institutional variable has on the peer diffusion process. This is a critical next step in the research since this dissertation does not examine the effect the explanatory variables have on the timing of adoption. Based on the results presented in Chapters 5-7, one can not measure the extent by which each variable influences each institution when they ultimately decide to innovate. This leaves an incomplete picture because it is important to know whether some variables affect early adopters differently than late adopters. By forwarding a theory of "transaction costs", where the institutional variables are viewed as obstacles toward innovation, interaction terms are constructed to test their potential constraint on the effects of peer diffusion. For example, as can be noted in Figure 9.1, the length of a university trustee's tenure length has a much greater effect on later adopters (p=0.75 and p=1.00) as compared to early adopters (p=0.05 and 0.25). In other words, the bureaucratic inertia hypothesized regarding long trustee tenure impacts universities who are late to adopt compared to their peers at a much greater rate than those universities that are the policy entrepreneurs of their peer group. Overall, this additional research continues to validate the importance of understanding the role peer pressure has on decision-making.

Figure 9.1 Effect of trustee length on establishing a TTO



APPENDIX A

LIST OF UNIVERSITIES IN SAMPLE

UNIVERSITY OF ALABAMA AT BIRMINGHAM	NORTHERN ILLINOIS UNIVERSITY
UNIVERSITY OF ALABAMA AT HUNTSVILLE	SOUTHERN ILLINOIS UNIVERSITY CARBONDALE
THE UNIVERSITY OF ALABAMA	BALL STATE UNIVERSITY
AUBURN UNIVERSITY MAIN CAMPUS	INDIANA UNIVERSITY-PURDUE UNIVERSITY-INDIANAPOLIS
UNIVERSITY OF ALASKA FAIRBANKS	INDIANA STATE UNIVERSITY
ARIZONA STATE UNIVERSITY AT THE TEMPE CAMPUS	INDIANA UNIVERSITY-BLOOMINGTON
UNIVERSITY OF ARIZONA	IOWA STATE UNIVERSITY
NORTHERN ARIZONA UNIVERSITY	UNIVERSITY OF IOWA
UNIVERSITY OF ARKANSAS MAIN CAMPUS	UNIVERSITY OF KANSAS MAIN CAMPUS
UNIVERSITY OF CALIFORNIA-BERKELEY	KANSAS STATE UNIVERSITY
UNIVERSITY OF CALIFORNIA-DAVIS	WICHITA STATE UNIVERSITY
UNIVERSITY OF CALIFORNIA-IRVINE	UNIVERSITY OF KENTUCKY
UNIVERSITY OF CALIFORNIA-LOS ANGELES	UNIVERSITY OF LOUISVILLE
UNIVERSITY OF CALIFORNIA-RIVERSIDE	LOUISIANA STATE UNIV & AG & MECH & HEBERT LAWS CTR
UNIVERSITY OF CALIFORNIA-SAN DIEGO	LOUISIANA TECH UNIVERSITY
UNIVERSITY OF CALIFORNIA-SANTA BARBARA	UNIVERSITY OF NEW ORLEANS
UNIVERSITY OF CALIFORNIA-SANTA CRUZ	UNIVERSITY OF MAINE
SAN DIEGO STATE UNIVERSITY	UNIVERSITY OF MARYLAND-BALTIMORE COUNTY
WAYNE STATE UNIVERSITY	UNIVERSITY OF MARYLAND-COLLEGE PARK
UNIVERSITY OF COLORADO AT DENVER	UNIVERSITY OF MASSACHUSETTS-LOWELL
UNIVERSITY OF COLORADO AT BOULDER	UNIVERSITY OF MASSACHUSETTS-AMHERST
COLORADO STATE UNIVERSITY	UNIVERSITY OF MICHIGAN-ANN ARBOR

UNIVERSITY OF NORTHERN COLORADO	MICHIGAN STATE UNIVERSITY
UNIVERSITY OF CONNECTICUT	MICHIGAN TECHNOLOGICAL UNIVERSITY
UNIVERSITY OF DELAWARE	WESTERN MICHIGAN UNIVERSITY
UNIVERSITY OF CENTRAL FLORIDA	UNIVERSITY OF MINNESOTA-TWIN CITIES
FLORIDA ATLANTIC UNIVERSITY-BOCA RATON	UNIVERSITY OF MISSISSIPPI MAIN CAMPUS
FLORIDA INTERNATIONAL UNIVERSITY	MISSISSIPPI STATE UNIVERSITY
FLORIDA STATE UNIVERSITY	UNIVERSITY OF SOUTHERN MISSISSIPPI
UNIVERSITY OF FLORIDA	UNIVERSITY OF MISSOURI-COLUMBIA
UNIVERSITY OF SOUTH FLORIDA	UNIVERSITY OF MISSOURI-KANSAS CITY
GEORGIA INSTITUTE OF TECHNOLOGY-MAIN CAMPUS	UNIVERSITY OF MISSOURI-ROLLA
GEORGIA STATE UNIVERSITY	UNIVERSITY OF MISSOURI-ST LOUIS
UNIVERSITY OF GEORGIA	MONTANA STATE UNIVERSITY-BOZEMAN
UNIVERSITY OF HAWAII AT MANOA	THE UNIVERSITY OF MONTANA-MISSOULA
IDAHO STATE UNIVERSITY	UNIVERSITY OF NEBRASKA AT LINCOLN
UNIVERSITY OF IDAHO	UNIVERSITY OF NEVADA-RENO
UNIVERSITY OF ILLINOIS AT CHICAGO	UNIVERSITY OF NEW HAMPSHIRE-MAIN CAMPUS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN	NEW JERSEY INSTITUTE OF TECHNOLOGY
ILLINOIS STATE UNIVERSITY	UNIVERSITY OF NEW MEXICO-MAIN CAMPUS
NEW MEXICO STATE UNIVERSITY-MAIN CAMPUS	TEXAS A & M UNIVERSITY
SUNY AT ALBANY	THE UNIVERSITY OF TEXAS AT ARLINGTON
SUNY AT BINGHAMTON	THE UNIVERSITY OF TEXAS AT AUSTIN
SUNY AT BUFFALO	THE UNIVERSITY OF TEXAS AT DALLAS
SUNY AT STONY BROOK	TEXAS SOUTHERN UNIVERSITY
UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL	TEXAS TECH UNIVERSITY
UNIVERSITY OF NORTH CAROLINA AT GREENSBORO	TEXAS WOMAN'S UNIVERSITY
NORTH CAROLINA STATE UNIVERSITY AT RALEIGH	UTAH STATE UNIVERSITY
UNIVERSITY OF NORTH DAKOTA-MAIN CAMPUS	UNIVERSITY OF UTAH
NORTH DAKOTA STATE UNIVERSITY-MAIN CAMPUS	UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLL
UNIVERSITY OF AKRON MAIN CAMPUS	COLLEGE OF WILLIAM AND MARY
BOWLING GREEN STATE UNIVERSITY-MAIN CAMPUS	GEORGE MASON UNIVERSITY
UNIVERSITY OF CINCINNATI-MAIN CAMPUS	OLD DOMINION UNIVERSITY
CLEVELAND STATE UNIVERSITY	VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIV

KENT STATE UNIVERSITY-MAIN CAMPUS	VIRGINIA COMMONWEALTH UNIVERSITY
MIAMI UNIVERSITY-OXFORD	UNIVERSITY OF VIRGINIA-MAIN CAMPUS
OHIO STATE UNIVERSITY-MAIN CAMPUS	WASHINGTON STATE UNIVERSITY
OHIO UNIVERSITY-MAIN CAMPUS	UNIVERSITY OF WASHINGTON-SEATTLE CAMPUS
UNIVERSITY OF TOLEDO	WEST VIRGINIA UNIVERSITY
WRIGHT STATE UNIVERSITY-MAIN CAMPUS	UNIVERSITY OF WISCONSIN-MADISON
OKLAHOMA STATE UNIVERSITY-MAIN CAMPUS	UNIVERSITY OF WISCONSIN-MILWAUKEE
UNIVERSITY OF OKLAHOMA NORMAN CAMPUS	UNIVERSITY OF WYOMING
OREGON STATE UNIVERSITY	PURDUE UNIVERSITY-MAIN CAMPUS
UNIVERSITY OF OREGON	
PORTLAND STATE UNIVERSITY	
INDIANA UNIVERSITY OF PENNSYLVANIA-MAIN CAMPUS	
PENNSYLVANIA STATE UNIVERSITY-MAIN CAMPUS	
UNIVERSITY OF PITTSBURGH-MAIN CAMPUS	
TEMPLE UNIVERSITY	
UNIVERSITY OF RHODE ISLAND	
CLEMSON UNIVERSITY	
UNIVERSITY OF SOUTH CAROLINA-COLUMBIA	
UNIVERSITY OF SOUTH DAKOTA	
UNIVERSITY OF MEMPHIS	
MIDDLE TENNESSEE STATE UNIVERSITY	
THE UNIVERSITY OF TENNESSEE	
TENNESSEE STATE UNIVERSITY	
TEXAS A & M UNIVERSITY-COMMERCE	
UNIVERSITY OF HOUSTON-UNIVERSITY PARK	
UNIVERSITY OF NORTH TEXAS	

APPENDIX B

LIST OF UNIVERSITIES IN SAMPLE SORTED BY AVERAGE RANKING

RANK	UNIVERSITY
1.08	UNIVERSITY OF CALIFORNIA-BERKELEY
1.92	UNIVERSITY OF MICHIGAN-ANN ARBOR
3.17	UNIVERSITY OF VIRGINIA-MAIN CAMPUS
3.5	UNIVERSITY OF WISCONSIN-MADISON
4	UNIVERSITY OF CALIFORNIA-LOS ANGELES
5.25	UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL
6.33	UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
6.92	THE UNIVERSITY OF TEXAS AT AUSTIN
9.33	UNIVERSITY OF WASHINGTON-SEATTLE CAMPUS
9.83	GEORGIA INSTITUTE OF TECHNOLOGY-MAIN CAMPUS
10.5	INDIANA UNIVERSITY-BLOOMINGTON
11.08	PENNSYLVANIA STATE UNIVERSITY-MAIN CAMPUS
11.33	UNIVERSITY OF MINNESOTA-TWIN CITIES
13.17	PURDUE UNIVERSITY-MAIN CAMPUS
13.92	COLLEGE OF WILLIAM AND MARY
14.5	OHIO STATE UNIVERSITY-MAIN CAMPUS
15.42	UNIVERSITY OF CALIFORNIA-DAVIS
15.42	UNIVERSITY OF CALIFORNIA-SAN DIEGO
16.83	UNIVERSITY OF IOWA
17.75	UNIVERSITY OF COLORADO AT BOULDER
19.08	UNIVERSITY OF MARYLAND-COLLEGE PARK
19.75	UNIVERSITY OF ARIZONA
21.25	UNIVERSITY OF FLORIDA

22.75	MICHIGAN STATE UNIVERSITY
23.08	UNIVERSITY OF CALIFORNIA-IRVINE
23.42	TEXAS A & M UNIVERSITY
27.42	UNIVERSITY OF KANSAS MAIN CAMPUS
27.58	UNIVERSITY OF PITTSBURGH-MAIN CAMPUS
28.08	UNIVERSITY OF OREGON
28.33	UNIVERSITY OF GEORGIA
28.83	UNIVERSITY OF CALIFORNIA-SANTA BARBARA
29.67	SUNY AT STONY BROOK
30.83	VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIV
30.92	IOWA STATE UNIVERSITY
33.17	ARIZONA STATE UNIVERSITY AT THE TEMPE CAMPUS
33.5	UNIVERSITY OF MISSOURI-COLUMBIA
34.83	UNIVERSITY OF MASSACHUSETTS-AMHERST
35.42	MIAMI UNIVERSITY-OXFORD
36.83	THE UNIVERSITY OF TENNESSEE
40	UNIVERSITY OF UTAH
40.08	SUNY AT BUFFALO
40.42	UNIVERSITY OF CALIFORNIA-SANTA CRUZ
40.42	UNIVERSITY OF NEBRASKA AT LINCOLN
41	NORTH CAROLINA STATE UNIVERSITY AT RALEIGH
42.08	UNIVERSITY OF CALIFORNIA-RIVERSIDE
42.17	UNIVERSITY OF DELAWARE
44.42	FLORIDA STATE UNIVERSITY
44.5	SUNY AT BINGHAMTON
44.83	AUBURN UNIVERSITY MAIN CAMPUS
45.42	UNIVERSITY OF CONNECTICUT
46.08	OHIO UNIVERSITY-MAIN CAMPUS
49.25	UNIVERSITY OF ILLINOIS AT CHICAGO
49.33	UNIVERSITY OF KENTUCKY
49.33	SUNY AT ALBANY
49.67	WASHINGTON STATE UNIVERSITY
50.42	UNIVERSITY OF OKLAHOMA NORMAN CAMPUS
52.92	OREGON STATE UNIVERSITY
53.58	UNIVERSITY OF VERMONT AND STATE AGRICULTURAL COLL
54.83	CLEMSON UNIVERSITY
55.42	KANSAS STATE UNIVERSITY

55.75	COLORADO STATE UNIVERSITY
59.83	GEORGE MASON UNIVERSITY
60	TEMPLE UNIVERSITY
60.17	UNIVERSITY OF SOUTH CAROLINA-COLUMBIA
61.33	UNIVERSITY OF NEW MEXICO-MAIN CAMPUS
62.5	UNIVERSITY OF NEW HAMPSHIRE-MAIN CAMPUS
64.75	UNIVERSITY OF WISCONSIN-MILWAUKEE
66.58	VIRGINIA COMMONWEALTH UNIVERSITY
67.25	LOUISIANA STATE UNIV & AG & MECH & HEBERT LAWS CTR
67.33	UNIVERSITY OF MISSOURI-ROLLA
68.08	UNIVERSITY OF ALABAMA AT BIRMINGHAM
68.08	UNIVERSITY OF RHODE ISLAND
69.25	THE UNIVERSITY OF ALABAMA
69.75	UNIVERSITY OF CINCINNATI-MAIN CAMPUS
71.17	TEXAS TECH UNIVERSITY
71.75	INDIANA UNIVERSITY-PURDUE UNIVERSITY-INDIANAPOLIS
73.42	UNIVERSITY OF HAWAII AT MANOA
74.83	THE UNIVERSITY OF TEXAS AT DALLAS
75.17	SAN DIEGO STATE UNIVERSITY
76.67	WAYNE STATE UNIVERSITY
78.08	WEST VIRGINIA UNIVERSITY
78.25	OKLAHOMA STATE UNIVERSITY-MAIN CAMPUS
78.33	UNIVERSITY OF HOUSTON-UNIVERSITY PARK
79.58	MICHIGAN TECHNOLOGICAL UNIVERSITY
80.58	UNIVERSITY OF COLORADO AT DENVER
80.75	NEW JERSEY INSTITUTE OF TECHNOLOGY
80.92	UTAH STATE UNIVERSITY
81.42	OLD DOMINION UNIVERSITY
82.08	SOUTHERN ILLINOIS UNIVERSITY CARBONDALE
82.42	UNIVERSITY OF MISSISSIPPI MAIN CAMPUS
83.42	GEORGIA STATE UNIVERSITY
83.42	UNIVERSITY OF IDAHO
85.5	UNIVERSITY OF MAINE
85.75	UNIVERSITY OF NORTH CAROLINA AT GREENSBORO
86.08	UNIVERSITY OF MARYLAND-BALTIMORE COUNTY
87.17	THE UNIVERSITY OF MONTANA-MISSOULA
87.17	KENT STATE UNIVERSITY-MAIN CAMPUS

87.17	UNIVERSITY OF WYOMING
87.42	UNIVERSITY OF ARKANSAS MAIN CAMPUS
88.5	UNIVERSITY OF LOUISVILLE
91.17	UNIVERSITY OF MISSOURI-KANSAS CITY
94.92	THE UNIVERSITY OF TEXAS AT ARLINGTON
97.58	BOWLING GREEN STATE UNIVERSITY-MAIN CAMPUS
100.17	BALL STATE UNIVERSITY
102.08	NEW MEXICO STATE UNIVERSITY-MAIN CAMPUS
102.33	UNIVERSITY OF SOUTH FLORIDA
103.25	PORTLAND STATE UNIVERSITY
105.58	MONTANA STATE UNIVERSITY-BOZEMAN
106.33	MISSISSIPPI STATE UNIVERSITY
106.33	UNIVERSITY OF NEVADA-RENO
106.58	UNIVERSITY OF NORTH DAKOTA-MAIN CAMPUS
107.25	ILLINOIS STATE UNIVERSITY
107.58	WESTERN MICHIGAN UNIVERSITY
107.75	INDIANA STATE UNIVERSITY
107.83	UNIVERSITY OF MISSOURI-ST LOUIS
108.25	NORTHERN ARIZONA UNIVERSITY
110.08	UNIVERSITY OF ALASKA FAIRBANKS
111.25	UNIVERSITY OF ALABAMA IN HUNTSVILLE
113.58	NORTHERN ILLINOIS UNIVERSITY
115.75	UNIVERSITY OF SOUTH DAKOTA
115.75	UNIVERSITY OF NORTH TEXAS
116.5	UNIVERSITY OF NEW ORLEANS
117.83	IDAHO STATE UNIVERSITY
118.42	TEXAS WOMAN'S UNIVERSITY
120.17	UNIVERSITY OF TOLEDO
120.17	UNIVERSITY OF MEMPHIS
121.17	NORTH DAKOTA STATE UNIVERSITY-MAIN CAMPUS
121.42	WICHITA STATE UNIVERSITY
121.42	UNIVERSITY OF MASSACHUSETTS-LOWELL
122.5	UNIVERSITY OF CENTRAL FLORIDA
126.92	LOUISIANA TECH UNIVERSITY
127.08	FLORIDA ATLANTIC UNIVERSITY-BOCA RATON
127.83	WRIGHT STATE UNIVERSITY-MAIN CAMPUS
129.33	FLORIDA INTERNATIONAL UNIVERSITY

130.08	TEXAS A & M UNIVERSITY-COMMERCE
130.83	INDIANA UNIVERSITY OF PENNSYLVANIA-MAIN CAMPUS
133	UNIVERSITY OF NORTHERN COLORADO
133	UNIVERSITY OF AKRON MAIN CAMPUS
134.83	CLEVELAND STATE UNIVERSITY
136.25	UNIVERSITY OF SOUTHERN MISSISSIPPI
138.75	TENNESSEE STATE UNIVERSITY
139.25	MIDDLE TENNESSEE STATE UNIVERSITY
139.83	TEXAS SOUTHERN UNIVERSITY

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