THE STATE OF TEXAS HISPANIC-SERVING INSTITUTIONS: A QUANTITATIVE LOOK AT DIFFERENCES IN STATE FUNDING, INSTITUTIONAL EXPENDITURES, AND CAPITAL SPACE

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Dedication

Dedicated to Ana Milena Torres,

for her relentless belief in love and dedication to its depths,

and to Josias Molina,

for his tireless pursuit of progress and dedication to its details.

To both of these fearless souls, my parents, who in 1985 left their homes and their families in Colombia to seek out the American dream, with nothing but an understanding of the risk that they were taking;

A risk taken for the dream of a better life for them and their future family.

Thank you for instilling in me the diligence to face the depths and the details necessary to see this path through.

This work is a payoff from that risk taken and a piece of that dream fulfilled.

Un sueño cumplido.

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Abstract

Background: Capital space is a critical element for institutions of higher education that historically has been responsive to institutional growth (Chapman, 2006) and significantly costly (Kaiser, 2018; Ness & Tandberg, 2013). While typically an overlooked facet in higher education (Strange & Banning, 2015), growth in capital space is instrumental in meeting both institutional needs and strategic enrollment state goals in Texas (Texas Higher Education Coordinating Board, 2016, 2018b). Also important to the state is increasing the collegiate success of its large and growing Latinx population, of which the majority are enrolled at institutions federally designated as Hispanic-Serving Institutions (HSIs) (Hispanic Association of Colleges and Universities, 2019). However, despite HSIs being vulnerable to state funding influence (Núñez, Crisp, & Elizondo, 2016) and accounting for more than half of the state's public four-year institutions (THECB, 2018a), Texas does not mention HSIs within their strategies nor funding model. **Purpose/Research:** The guiding questions for this study are *whether Texas is providing equitable state financial support to its public four-year HSIs when compared to its public four-year non-HSIs* and *if state financial support reflects state-legitimized institutional expenditures and measures differently because of HSI designation.* Guided by institutional isomorphism and resource dependence frames, the study also investigates the possibility of HSI designation influencing the relationship of state funding to institutional expenditures and metrics within the state-legitimized higher education context.

Methods: The analysis used publicly-available institutional data for Texas public four-year institutions (n=36) for fiscal year 2017. It explored the effect of HSI

designation on mean differences across legitimized institutional expenditures and measures, capital expenditures, and capital measures using one-way multivariate analyses of variance. The study also considered the effect of accountability groups alongside HSI designation on variances across the same outcome variable categories using two-way multivariate analyses of variance. Analyses using moderated hierarchical multiple regression examined the influence of HSI designation on the associations between specific state appropriations and institutional expenditures, legitimized measures, and capital growth-related outcomes. **Findings:** Findings revealed that appropriations, expenditures, and measures were not statistically dissimilar between Texas HSIs and non-HSIs. Instead, state-sanctioned accountability groups were indicative of institutional differences, specifically on tenured/tenure-track faculty numbers and predicted total square footage needs. HSI designation was also found to have a nonsignificant effect on any differences in the predictive relationships of state appropriation on institutional expenditures or measures. Nonetheless, state appropriations were found to be positively correlated with institutional operating and capital expenditures. **Conclusion:** This research highlights the significant role that institutional capital space can have on institutional funding, growth, and capability. It also studies the place of HSIs within state strategies and funding systems that do not explicitly recognize them. As a leading state in HSI representation that is focused on capital space, Texas is fertile grounds for gaining a better understanding of the interaction between these under-resourced institutions and state appropriations. Finally, it reinforces the important call for state governments to begin playing a bigger role in supporting public institutions of higher education designated as Hispanic-serving.

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Introduction

The physical space of a college campus is meant to provide a place for students to live, learn and grow (Guckert & King, 2004). Along with providing the educational setting, the built environment also provides the institution with a voice. It acts as a visual representation of what it believes in, what type of institution it recognizes itself as, and what its mission stands for (Strange & Banning, 2015; Troyer, 2005). To be thoughtful towards the institution's built environment means to consider the function that the institutional environment is meant to provide. From this perspective, the built environment is more than just walls on buildings. The buildings themselves become important elements in providing purpose to the environment and creating a sense of place at the institution (Chapman, 2006). This idea of the important role that physical space plays in an institution's capability to serve its educational mission and purpose is well-documented (Lucas, 2006; Kenney, Dumont, & Kenney, 2005; Snedden, 1920; Turner, 1984). This is particularly true in the role it plays for higher education enrollment trends.

Historical Importance of the Physical Campus

Historically, spending on the physical assets of an institution became a legitimized pattern to be able to serve and recruit. Needing the space to serve was a response to the college enrollment booms documented over the years, specifically for World War II veterans in the 1940s and the baby boomers of the 1960s (Kaiser, 2018). These enrollment growths spurred college infrastructure to change from few campus buildings into the sprawling edifice of buildings that today house the complex higher education missions of teaching, research, and service (Strange & Banning, 2015). The

most recent surge began in the mid-1990s, and with it came competitive recruitment efforts that then further drove determined efforts to invest in institutional facilities (Chapman, 2006). In the business of higher education, the need to remain modern and recruit is a pressure that drives the continual addition of new assets to the existing campus (Lynn, 2015). Increase in institutional space capacity is still viewed as a necessity for meeting student and faculty needs (Texas Higher Education Coordinating Board, 2016, 2018b), as well as a principal cause of significant campus change (Dalton, Hajrasouliha, & Riggs, 2018). Investing in the physical campus matters, as the appearance and quality of a college campus has also been found to be relevant in faculty, staff, and student recruitment and retention efforts (Brown & Burnette, 2014; Chapman, 2006; Hajrasouliha, 2017; Hajrasouliha & Ewing, 2016; Kaiser, 2018). For these and other reasons, institutions consider the details of what they build and invest high amounts of money into their facilities (Guckert & King, 2004). They also spend to meet their constituents' demands of quality higher education facilities and to remain competitive within the higher education environment (Guckert & King, 2004). These factors have legitimized the spending and growth of campus capital assets as a necessity to be an able institution of higher education. Furthermore, with today's higher education construction boom, such costs for facilities have become an obligation to simply keep up with the rest of the institutional field (Strange & Banning, 2015). These stipulations make building and maintaining a college campus an important, but costly, endeavor.

Investing in Campus Capital

Among the many ways that institutions invest in the pursuit of educational success, the role of the physical campus has been the most overlooked (Strange &

Banning, 2015), while also being one of the costliest (Tandberg & Ness, 2011; Ness & Tandberg, 2013). These capital expenses are necessary for the institutions to remain up to date and operational (Kaiser, 2018), and they have been projected to be of importance for a long time (Snedden, 1920). Without spending on their physical campus, outside of enrollment, recruitment, or competitive reasons, there is no physical institution. The spaces for teaching and conducting research would not exist. This means that institutional capital assets act as the backbone of an institution's purpose (Manns, 2004). *Capital assets* are the term commonly used to refer to an institution's physical environment, which includes the land, buildings, building improvements, acquired property and facilities needed for institutional operations (National Center for Educational Statistics, 2019). The expenditures related to acquiring and/or constructing capital assets are referred to as *capital outlay* (*capital expenditures* is used interchangeably with capital outlay in this study) (THECB, 2018c). The available funding provided to institutions by government bodies for the purchase, construction, and/or repairs of capital assets are referred to as *capital appropriations* (Texas Fiscal Division Management, 2019). Capital appropriations help public institutions of higher education cover their capital outlay as they build and maintain capital assets.

Public institutions largely rely on government funding to operate, with the costs related to structural assets and new construction as another item on a long list of anticipated appropriations. This financial government-institution relationship affects many enrolled college students as more than 75% of the nation's undergraduate students are enrolled in public institutions (Schak, Bentley, Nichols, & Del Pilar, 2019). Furthermore, with capital expenditures being a set expense on state and institutional

budgets, little research exists that examines how state funding for capital assets relates with other higher educational expenses (Delaney & Doyle, 2014; Ness & Tandberg, 2013). The messiness of governmental funding for public institutions of higher education typically involves appropriations and expenditures that affect one another. As the landscape of higher education grows in institutional numbers and diversity, the relationship between institutions and their institutional environment also begins to vary, especially in their response to funding incentives. This area of research becomes murkier when considering the varied systems of institutional funding that changes from state to state, and the diversification of students and federally-recognized institutional types. This diversification of institutional types is a symptom of the increasingly diverse college student body.

The State of Hispanic-Serving Institutions

Universities today are experiencing a major shift in racial demographics. Of the 4,658 degree-granting universities eligible to process federal student aid, 1,905 have a student population that is less than 50% White (Douglas & Shockley, 2017). This major demographic shift in college student background is prompting the rapidly growing number of Minority-Serving Institutions (MSIs), specifically Hispanic-Serving Institutions (HSIs) (Garcia, 2019). MSIs are institutions recognized for enrolling and serving large numbers of minority students, either due to historical institutional mission or enrollment numbers (Congressional Research Service, 2018; Gasman, Baez, & Turner, 2008). HSIs are federally recognized for enrolling large concentrations of Latinx[1] college

[1] The term “Latinx” is a non-gender binary reference to Latina/o individuals/group (Salinas & Lozano, 2019).

students, and, as a group, they house most of the nation's Latinx college students (Hispanic Association of Colleges and Universities, 2019b, 2019d). Latinx students are of critical importance because out of all ethnic groups, they have the lowest rates of college completion while also being the largest minority group in the United States (Kiyama, Museus, & Vega, 2015). Latinx students are also the driving variable for HSI designation eligibility. By association, this places the strain of tackling the Latinx success issue mainly on HSIs. It also brings to question the involvement of state support to the growing number of HSIs, especially when they are some of the most resource-limited institutions in higher education (Hurtado & Ruiz Alvarado, 2015).

As of late, state funding in higher education has gradually shifted towards tracking accountability, with 35 states providing some higher educational funding based on performance metrics such as student graduation rates and degrees conferred (Fain, 2017; Hester & Ishitani, 2016). At the federal level, attempts at coupling appropriations with performance-based metrics have also been made, with a particular aim at funding for MSIs (Kreighbaum, 2017, 2019). Recognizing the already existing needs of these institutions, recent federal amendments are pushing for a permanent and annual $255 million of federal funding for MSIs (St. Amour, 2019). These developments in higher education funding highlight two issues related to this study: the disconnect between state and federal authorities on funding institutions of higher education and the disadvantaged place of MSIs in that divide. Garcia (2019) argues against this mistreatment of MSIs, specifically HSIs, and the institutional benchmarking against universal accountability measures and funding incentives that do not consider institutional-type, designation, or

student body makeup. These funding mechanisms also fail to consider the costly and necessary capital expenditures these institutions must also engage in.

The literature around funding towards capital expenditures at HSIs is limited, but the federal government makes an effort at targeting the funding. Federal appropriations for HSIs in FY 2020 mention a $40 million authorized amount for capacity building, specifically for HSIs that are agricultural colleges and universities (HACU, 2019d). Such investments by the federal government show its continual heavy involvement in public higher education. The federal government invests nearly $100 billion annually to assist with issues around institutional capacity and serving disadvantaged students (Mumper, Gladieux, King, & Corrigan, 2011). Yet, even though the federal government has continually increased the amount of federal appropriations for HSIs, the amount has not kept pace with the growing number of HSIs that has more than doubled since 2005 to a total of 539 institutions (HACU, 2019b). Furthermore, HSIs must apply to receive a piece of federal funds available to HSIs, which increased to $123.2 million for FY 2018, but without guarantee that they will receive funding (HACU, 2018b, 2019e). For these reasons, HACU (2019d) has specifically called for a federal capital financing program to help fund HSI capital needs to accommodate growing enrollments. With the federal government struggling to agree on guaranteeing limited funding for all MSIs, state governments are the next in line to recognize and assist their most needy public institutions. Historically, the relationship between state governments and public higher education has always been more involved than with the federal government (Mumper et al., 2011), especially when related to specialized funding like capital appropriations

(Manns, 2004; McGuinness, 2005). This places states in a principal role of assisting these disadvantaged institutions.

Texas Context

The situation surrounding limited appropriation pools from an already-invested federal government amid an increasing number of HSIs calls to question how state governments are responding. In the wake of public higher education experiencing an increase in student diversity, it is also facing decreasing state public funding, especially for the institutions serving more minority students (Santiago, 2012; Schak et al., 2019). Texas is an exemplar state where many of these issues surrounding appropriation support, capital space, Latinx students, and HSIs are convening. Texas is a leading state in HSI representation, being home to the second most number HSIs of any state in the country with 94 designated institutions (*Excelencia* in Education, 2018). Texas also suffers from having the second lowest Latinx completion rates out of the top five states with highest Latinx student enrollment (*Excelencia* in Education, 2019). The Latinx enrollment is expected to increase within the state, as Texas is also home to the second largest Latinx primary school student population in the country (Gandara & Contreras, 2009). These measures place Texas in a prime position to advocate for and set the standard on HSI success.

Statement of Problem

Within the HSI-rich state of Texas, Latinx students are the majority enrolled at public four-year institutions, yet only account for 32.5% of four-year degree completions (Texas Association of Chicanos in Higher Education, 2019). With more than half of Texas public four-year institutions being designated HSIs (THECB, 2018a), this rate is

alarming in terms of the state's higher education success. Currently, the completion rate for Latinx college students in Texas, 56%, is almost on par with the national completion rate at 57% (*Excelencia* in Education, 2019). The completion gap between Texas Latinx college students and White students is also a sizeable 12% difference, with Latinx lagging behind (*Excelencia* in Education, 2019). On the state funding side, only three HSIs are included in the state's top ten list of public four-year institutions receiving state-funded revenue per full-time student, while the bottom three are also HSIs (THECB, 2018a). With an ever-growing Latinx population, these statistics place Texas on a perilous path full of questions on how or what the state is planning to address these issues.

Similar to the rest of the nation's higher education systems, Texas responded to the postwar enrollment booms through rapid capital expansion (Cardozier, 2001). Enrollment swells had their effect on the funding system in Texas as well. The Texas state funding model has built in metrics that consider aspects of institutional space. Due to the state's constitutional writing, this funding system favors certain four-year institutions over others, inclusive of its capital appropriations. Nonetheless, Texas public four-year institutions plan on spending $4.4 billion in facility renovations for the fiscal year (FY) period of 2018 through 2022 (THECB, 2018b). Moreover, instead of having a typical student performance-based focus for public four-year institutions, the Texas state funding system concentrates on enrollment, institutional expenditures, and the production volume of research and credit hours taught (Perna, Finney, & Callan, 2014; THECB, 2000, 2015). These selected institutional benchmarks have been legitimized by the state's strategic goals for its public higher education. With at least 1.4 million students enrolled

in its public institutions of higher education (Legislative Budget Board, 2019), Texas's goals[2] involve funding and having the institutional capacity to educate its large and growing state population.

Purpose

Even though state appropriations, capital, and operating expenditures are a necessity for institutional maintenance and growth, research remains limited on the effect that designation has on state funding, specifically with HSIs in states such as Texas. With its high number of HSIs and capital-acknowledging funding system, this study will attempt to illuminate possible deficiencies that may exist for HSIs in a state with a large Latinx population. Finding any deficiencies is critical because of the majority role the Latinx population in Texas will have in the future. The study aims at exploring this possibility based on the HSI designation. It seeks to understand any impact and influence that being designated an HSI may have on state appropriation amounts, institutional expenditures and measures, capital expenditures, and capital space size, as the state's higher education planning has legitimized all of these elements. Institutional expenditures in this study refer to capital expenditures and total operating expenditures. Institutional operating expenditures consist of four use-of-state-funds categories: (1) instruction, research, and academic support, (2) student services and scholarship, (3)

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[2] Texas is in the middle of its *60x30TX Higher Education Plan,* which was preceded by the *Closing the Gaps by 2015* (*CTG*) Plan (THECB, 2015). Adopted in October 2000, *CTG* was a 15-year initiative focused on increasing enrollment numbers and institutional rankings. By doing so, the plan hoped to increase the number of college-educated Texans and creating a more legitimate public higher education system at the national level. The *60x30TX* plan continues these same efforts, with a stated emphasis on its Latinx population (THECB, 2015). Surprisingly, the state's strategic plans and funding system lacks any discussion on HSIs.

institutional support and operations and maintenance, and (4) other. The fourth operating expense reported, “other”, is not included due to it being the sum of miscellaneous activities not related to basic institutional services (THECB, 2018c) or this study.

Institutional measures include reported semester credit hours (SCHs), tenured/tenure-track (T/TT) faculty numbers, and predicted net-assignable square footage (NASF) in total, office, and teaching space amounts. State appropriations include state appropriations without research grants or capital funds included, operations support funds from Instruction and Operations (I&O) Support, E&G space support funds from Infrastructure Support, and capital-specific debt-retirement appropriations from Infrastructure Support. For ease of variable categorization, expenditures and measures directly related to capital assets are categorized separately from non-capital expenditures and measures in the methodology and categorization.

Research Questions

Given the already limited federal support for institutions housing most of the nation’s Latinx students, and because the majority of HSIs are four-year institutions at 54% (HACU, 2019b), only public four-year institutions are included in this study. Furthermore, the state of Texas does not provide capital appropriations for its two-year colleges (LBB, 2019). The main questions guiding this investigation are **whether Texas is providing equitable state financial support to its public four-year HSIs when compared to its public four-year non-HSIs** and **if state financial support reflects state-legitimized institutional expenditures and measures differently because of HSI designation.** The specific research questions to be addressed are:

1. *Are there significant differences in all state appropriation types, legitimized institutional expenditures and measures, and capital expenditures and measures between public four-year HSIs and non-HSIs in Texas?*
2. *Does HSI designation influence the relationships between formula-funded state appropriations and total operating expenditures, reported semester credit hours, and tenured/tenure-track faculty numbers?*
3. *Does HSI designation influence the relationships between E&G space support funding and capital outlay, predicted net-assignable square footage for total, office, and teaching spaces?*

As discussed, the physical campus space has historically been legitimized as an important, but costly, piece of an institution, especially since the college enrollment booms. With the enrollment growth came higher expenses and a heightened need for funding support. Public funding of institutions has always been a complicated and layered process in which MSIs have typically been dealt with less favorable fiscal support than their non-MSI peer institutions. Additionally, MSIs, specifically HSIs, serve the neediest students, but historically suffer from having less resources. This in turn affects the institution's ability to spend on serving and building, of which both are important for the state of Texas and its higher education goals. The following literature review will introduce concepts important to this study, inclusive of the guiding theoretical lenses, the development of HSIs, the Texas funding models and strategic higher education plans, and capital space considerations.

Chapter II

Review of Literature

Various topics need to be covered to understand the context of the issue investigated in this study. This literature review explains the complex and disadvantaged position Texas public four-year HSIs find themselves in. Any public institution, regardless of designation, has institutional expenditures, inclusive of capital assets, that rely on steady government funding. Without government backing, public institutions cannot fully take on their educational purpose, and without capital assets, an institution has no physical home from which to function from and serve its students. In Texas, institutional purpose is extended and legitimized from the state's higher education strategic plans: *Closing the Gaps by 2015* (*CTG*) and *60x30TX*. Since 2000, Texas has focused the efforts of its higher education system to prioritize increasing the college enrollment of its state population, increasing the degree and research production of its public institutions, and increasing the legitimacy of its institutions via research and teaching excellence (THECB, 2000, 2015). Outside of the necessary space to meet enrollment increase demands and resources needed to carry out these goals, the state's funding model involves assessing capital capacity. In Texas, state appropriations fund legitimized expenditures which beget projected space needs that then affect appropriations. This generalized loop casts doubt on the assumption that all of the state's public institutions are being supported equitably, especially when considering the state's clear attention on its Latinx population.

Currently, the students in largest need of postsecondary assistance, given the predicted population growth and poor performance markers both nationally and in Texas,

are Latinx. Latinx students are also the sole driving force behind HSI institutional designation, based on current federal requirements. This literature review covers the current state of Latinx college students, the background of HSIs to understand the situational context of these institutions as it relates to federal funding, Texas's higher education strategic plans, and the details of Texas's state funding processes. The aspects of institutional expenditures are considered throughout, as related to their role in Texas's state funding model. The two theoretical lenses guiding this premise are Institutional Theory and Resource Dependence Theory (RDT). These theories have commonly been coupled in higher education research (Cai & Mehari, 2015), with institutional theory specifically used in trying to understand HSI organizational identities (Garcia, 2017). Together, these theories help formulate an understanding of HSI fiscal behaviors from a legitimacy standpoint, and within the organizational context of the Texas public higher education environment.

Institutional theory is rooted in sociological foundations (DiMaggio & Powell, 1991; Selznick, 1957) and has been used as a lens to try and understand individual and group behaviors (Cai & Mehari, 2015). Neo-institutionalism, originating as a derivative from institutional theory in the 1970s, shifts focus from the specifics of intra and inter-organizational behavior to understanding organization-environment relational behavior (Cai & Mehari, 2015; Selznick, 1996). Even though the use of institutional theory in higher education has included both branches to better understand institutional behavior from internal and external vantages (Huisman, Norgård, Rasmussen, & Stensaker, 2002; Morphew & Huisman, 2002; Oplatka & Hemsley-Brown, 2010), neo-institutionalism

best fits this study's aim of understanding HSIs with regard to environmental actors and pressures.

Neo-Institutionalism

Neo-institutionalism shifted more attention towards an organization's behavior within its organizational field, such as a university within the field of higher education, and the norms created by the organizational field that fuel conforming behaviors (Cai & Mehari, 2015; DiMaggio & Powell, 1983; Selznick, 1996). Conforming behavior can consist of following rules, norms, and values that peer organizations adapt to (Scott, 2005). The organizational field is a major concept in neo-institutionalism, as it deals with a specific sector within a community of common organizations (Meyer & Scott, 1992). As educational organizations, universities function within the organizational field of higher education alongside other higher educational organizations. The context of higher education does have institutional type differences that drive divisions between educational organizations. These divisions stem from organizational differences that exist, such as the ways four-year institutions function versus two-year institutions. Institutional types can also include public versus private, but this distinction matters less when seeing either type as purely a four-year institution with the same purpose of providing a bachelor's degree. Financially, public versus private will have differences, but as four-years, their organizational mechanisms will be more similar than that of two-year institutions. Typical characteristics of four-year institutions are those most common within the specific context of four-year higher education than they are across the broad post-secondary spectrum. This theoretical lens has proven successful in higher education research as it helps to better understand typical characteristics of higher education

institutions (Cai & Mehari, 2015). Typical characterization refers to behaviors that are viewed as the norm for institutions of higher education to act in. It has also provided a way to understand the established context of higher education, and how it can influence the educational organizations within it.

The settings that organizations exist in tend to have very well-established contexts, such as practices, procedures, and policies that influence the behavior of its member organizations (Meyer & Rowan, 1977). An example within four-year higher education is the broadly accepted pursuit of improving specifically set success outcomes, such as six-year graduation rates, and recognizable credentials via accreditation. Within an organizational environment, such as in higher education for this study, the institutionalized expectations are rational for any like-minded organization (Meyer & Rowan, 1977). This means that what is accepted from most (if not all) higher education organizations is deemed logical for any other higher education institution to follow. Institutions of higher education must provide a college education to its student stakeholders, for example. That is the purpose of a college or university, and any other college or university will understand and stick to this rationalized expectation through set practices and policies.

Meyer and Rowan (1977) define these established expectations as *myths*, and state that within highly institutionalized settings, actions taken by member organizations must uphold these myths. In upholding the myths through behaviors, institutions engage in work to maintain these set expectations. Lawrence and Suddaby (2006) identify this type of work as *embedding and routinizing*, which means that institutions will embed normalized actions into the organization's practices. For instances like state

appropriations, this means driving organizational practice to reflect funding model expectations. In Texas, for example, part of the state-funded Infrastructure Support stems from predicted square footage dedicated to research spaces, which then stems from the amount of spending the institution does on research. Spending more on research thus increases the amount of space the state predicts the institution needs for research, which results in more Infrastructure Support for the institution. As varied as institutions of higher education may be, funding models that recognize specific spending behaviors can lead to diverse institutions taking parallel actions to reap the financial benefits at hand. Through similar actions, the concept of *institutional isomorphism* develops within the organizational field.

Institutional isomorphism. In pursuing rationalized standards that are recognized by both the institutional environment and its involved institutional members, the identity of institutions of higher education is thus based on mimicking how other institutions respond to normalized external pressures (Dowling & Pfeffer, 1975; Selznick, 1996). Within organizational fields, this mimicking behavior results in *institutional isomorphism*, which is a dynamic that explains why organizations of the same field begin to similarly conform to established institutional norms (DiMaggio & Powell, 1983). DiMaggio and Powell (1983) use Hawley's (1968) description of homogenization amongst organizations to define *isomorphism* as a process that compels organizations to resemble one another due to experiencing the same environmental circumstances. In higher education, examples of systematic environmental pressures include improving student success outcomes or the production of new research. What an institution of higher education is expected to do then becomes the norm for most to follow. This conformity

that occurs in organizations is enabled through three isomorphic mechanisms: *coercive*, *mimetic*, and *normative* (DiMaggio & Powell, 1983).

Coercive, mimetic, and normative isomorphisms. Each of the three isomorphic processes can help explain isomorphism within the same organizational field. *Coercive isomorphism* occurs from external expectations set by other entities that the organizational field may be dependent on, such as state governments; *mimetic isomorphism* is caused by uncertainty in path or goals, leading organizations to imitate the perceived best practices or solutions of other organizations; and *normative isomorphism* deals with standards brought about by professionalization, or the collective norms from members of the same occupation (DiMaggio & Powell, 1983). These three processes have been used to explain behaviors in public sector organizations (Frumkin & Galaskiewicz, 2004), and more specifically, within the organizational culture of higher education (Cai & Mehari, 2015; Huisman et al., 2002; Levinson, 1989; Morphew & Huisman, 2002; Oplatka & Hemsley-Brown, 2010). Levinson (1989) explained that public institutions of higher education encounter each isomorphic mechanism by following governmental requirements for conditional funding (coercive), adopting innovations in curriculum or programming from elite universities (mimetic), and hiring professionals from non-academic fields for administration roles (normative). Texas public four-year institutions experience institutional isomorphism, specifically coercive isomorphism, through the state funding model. This occurs by the model providing more funding for specific types of academic programs offered, such as STEM over liberal arts, additional funding for higher amounts of T/TT faculty teaching, and additional funding

for more space measured via institutional expenditures (LBB, 2016a, 2019; THECB, 2005).

With coercive isomorphism in play through the state funding model, mimetic isomorphism comes into question. Texas public four-year institutions are being financially rewarded for certain metrics set by the state government, without consideration for institutional designation diversity within the public four-year ranks. For HSIs within the public four-year field, this means following behaviors that are noted in the state funding model and acted upon by non-HSI public four-year institutions. Garcia (2017) utilized institutional theory to understand how HSIs, as educational organizations, mimic other institutions of higher education by pursuing improved legitimized success outcomes that are not unique to HSIs. HSIs accordingly conform to the institutionalized norms followed by other organizations in the field. Coercive and mimetic isomorphisms present institutions of higher education with the difficult task of maintaining an individual organizational identity within their field (Marshall, 2011). Instead, organizations like public institutions of higher education more commonly adjust to institutional pressures, given the government's strong external role (Frumkin & Galaskiewicz, 2004). In this sense, institutional isomorphism sets the context that expects certain institutional behaviors. If the state of Texas is setting the context with its higher education strategic goals and funding model, institutions will morph to reflect the expectations regardless of designation differences. In doing so, per neo-institutionalist thought, these organizations focus on legitimization through the mimicked practices of the peer organizations deemed successful by the external pressures (Selznick, 1996).

Legitimacy as a resource. Legitimacy is a key consideration in neo-institutionalism (Cai & Mehari, 2015; DiMaggio & Powell, 1991; Frumkin & Galaskiewicz, 2004; Selznick, 1996) that organizations attain by means of isomorphism (Pedersen & Dobbin, 2006). As many organizations respond to similar external circumstances in collective ways that are justified as rational, the practices become the collective norm for that organizational field (DiMaggio & Powell, 1983, 1991; Meyer & Rowan, 1977). Through the creation of collective meaning to the environmental pressures, organizations homogenize under the best responsive practices, leading to a place of legitimacy for any organization that follows suit (Pedersen & Dobbin, 2006). Therefore, organizational legitimacy exists when the values of an organization's activities align with the behavioral norms of the environment it belongs to (Dowling & Pfeffer, 1975). This congruent relationship is visible in higher education when institutions increase research output, improve graduation rates, or hire star faculty. For example, if higher education perceives star faculty hires as a rational mean to improving the education being offered and research being produced, then institutions will strive to hire more star faculty. As they hire more star faculty, their legitimacy under higher educational norms increases, leading to other institutions doing the same. This type of behavior fuels isomorphism in higher education, even though institutions of higher education exist in a competitive organizational environment (Oplatka & Hemsley-Brown, 2010). As organizational fields become older and more established, the diversity in organizational practices and aims begins to steer towards homogenization (DiMaggio & Powell, 1983). Scott (2005) also recognizes this inexorable process, stating that within

organizational fields with the most organizational diversity, institutional forces work the strongest.

As organizations that are *institutions*, per aforementioned definitions, public universities are also responsive to societal pressures. The external forces that push organizations towards homogenization in their pursuit of legitimacy are *institutional* because they involve social perception. In aligning organizational behavior with acceptable social norms, organizations like institutions of higher education gather social legitimacy. For HSIs, this means that the pursuit of legitimacy within higher education, a highly recognized field, means following procedures recognized by external standards (Meyer & Rowan, 1977) without regard to their institutional identity (Garcia, 2017). This places HSIs in a complicated position within their organizational field. By not conforming to set expectations or behaviors, their organizational legitimacy is threatened, and ultimately, their survival within their organizational context is threatened as well (DiMaggio & Powell, 1991). Legitimacy becomes an attainable resource for organizations and, as Selznick (1996) describes, the force propelling organizations towards isomorphism for the sake of attaining success. For this reason, it is important for organizations to include the accepted norms in their institutional behavior to avoid illegitimacy (Meyer & Rowan, 1977). As a resource, legitimacy stands as a measure for an institution of higher education's capabilities and success, but also becomes a necessity for their ability to survive and thrive. In the case of Texas and its state funding model, legitimacy is tied to strategies highlighted within the state's higher education plans and the affiliated spending on these aspects.

Legitimized factors within Closing the Gaps by 2015 higher education plan. Texas's ambitious public higher education goals that are relevant to this study began with the aims of *CTG* in 2000. *CTG* aimed at explicitly closing the gaps in student enrollment, degree completions, institutional rankings, and research funding by 2015 (THECB, 2016). It sought to do this by increasing college enrollment overall, increasing the number of degrees awarded, raising the rankings of its public institutions, and attracting more federal research dollars (Perna et al., 2014). *CTG* set the standards that became legitimized pursuits for Texas' public institutions of higher education and was foundational for the current *60x30TX* state higher education plan. It categorized each of its goals as *participation, success, excellence,* and *research* (THECB, 2000; 2016). The language used in the strategic plan is important to consider because it demonstrates what the state's higher education system was legitimizing as expectations. Improving *participation* via enrollment increases is an intricate element in Texas higher education because it touches on various facets of the state's funding model. In order to increase enrollment, institutions must possess the space and the faculty to serve the growing student numbers. The more student numbers an institution has, the more SCHs it possibly produces. Texas takes into account both the amount of SCHs taught and the number of faculty to calculate specific appropriation amounts as well as to predict needed institutional space. These aspects are covered in more detail in the Texas funding model portion of the literature review.

The *success* goal, identified via degree completions, is not directly related to the state's funding model, but does relate to the importance of HSIs. *CTG* mentions the critical state of graduation gaps in Texas across racial groups, especially for Latinx

students compared to White students (THECB, 2000). The plan argues for improved Latinx enrollment and graduation rates due to the predicted continual growth of Latinx Texans, meaning that a college-educated state population in the future will most likely be majority Latinx. *CTG* emphasizes enrollment increases to have graduate numbers that reflect the Texas population, yet this has not been met for the Latinx population (Schak et al., 2019). Despite not meeting this strategic target for Latinx students, the state reported an increasing Latinx enrollment each year from the onset of *CTG* in 2000 (THECB, 2016). Interestingly, regardless of these state trends, the strategic plan fails to mention HSIs or make any note of institutions where most Latinx students are concentrated (THECB, 2000).

The *excellence* and *research* gaps stated in *CTG* are focused on improving the prestige of Texas higher education at the national level. While *excellence* calls for institutions to invest in their strengths, such as premier academic programs already in place, the *research* initiative seeks for institutions to acquire more federal research funding and increase research expenditures (THECB, 2000). These two concepts are closely related, with institutional excellence usually being founded on rankings, which are typically based on the production of research and quality of faculty (Pusser & Marginson, 2013). In their analysis of national and global university ranking systems, Pusser and Marginson (2013) found that little variance exists across different ranking systems, with existing academic reputation, institutional resources, prestige of faculty, and faculty research productivity strongly influencing them all. This creates a cycle of reinforced ideas as to what or who is classified as *prestigious* or *legitimate*. The institutions already highly ranked find their strengths in the characteristics regarded as

necessary to be highly ranked, setting the precedent for other institutions to follow. In fact, Pusser and Marginson (2013) explain that institutional reputation from rankings publicly legitimizes the measures taken for such rankings, cause the unequal distribution of resources for capital development, create a source of institutional power that causes institutional isomorphism, and strongly influence state agendas and policies. Furthermore, to the detriment of HSIs, ranking systems do not measure institutional mission differences (Pusser & Marginson, 2013). All of these factors appear in the *CTG* and emphasize the nexus of legitimized ideas presented by this study.

Texas outlined a strategic plan via the *CTG* that was meant to strengthen the state's higher education system. *CTG* legitimized measures that benefited institutions that are already highly capable in the areas of institutional resources, capital development, faculty quality, student enrollment and teaching, institutional spending, and research expenditures. *CTG* set the state expectations for Texas higher education as a whole that are still visible today. The proceeding *60x30TX* higher education plan is only in its fifth year, identifying the *CTG* as its foundation to further build upon (THECB 2015, 2016). Even though the goals for the new plan are different, the importance of the Latinx population continues alongside the lack of acknowledgment for the state's HSIs.

Legitimized factors within the 60x30TX higher education plan. The *60x30TX Higher Education Plan* focuses on the overarching goal of having at least 60% of Texans between the ages of 25 and 34 obtain a certificate or college degree by 2030 (THECB, 2015). The plan also includes goals dealing with increases in overall postsecondary degree and certificate completions, increasing identified marketable skills in Texas college graduates, and lowering undergraduate student loan debt to not exceed 60% of

first-year wages for Texas college graduates (THECB, 2015). Differing from *CTG*, the *60x30TX* plan focuses more on student persistence, completion, and job capabilities. It alludes to the importance of continuing the goals and shortcomings of the *CTG*, stating the importance of continual pursuit of excellence in teaching and research. These two elements, as described in the previous section, are supported by faculty, student enrollment, and institutional expenditures, which require both federal and state support. State appropriations were only mentioned in *CTG* to discuss the amount of research and development expenditures at public institutions in Texas (THECB 2016). Meanwhile, in the current *60x30TX* plan, financing higher education via balanced appropriations is listed as a strategy for making college more affordable for students (THECB, 2015), without specifics on the balanced approach.

Like *CTG*, *60x30TX* continues to emphasize the importance of the state's Latinx population in ensuring the overall success of the state's public postsecondary institutions. The contradiction present within both plans is the continual lack of HSI mention. Balanced state appropriations are mentioned as a necessity for a more affordable college education, but not for institutions to improve on the measures of success listed as goals in *CTG*. Neither plan lists specifics for state funding, make no mentions of institutional capital factors, nor recognize the resource differences across institutions. Meanwhile, underneath the desired strategies for Texas higher education and its funding model, capital factors and institutional resources play a significant role. With an expectation on increasing enrollments that lead to more degree completions, institutions need the capital assets and financial resource capabilities to do so; with the goal of increasing and sustaining institutional rankings and research output, research space and funding is

needed; and with the recognized numbers of Latinx students, HSIs need to be recognized and strategized for. In the postsecondary environment created by both higher education plans, Texas public four-year institutions are presented with the state's expectations by means of legitimized measures further strengthened by the state's funding model. Within this environment, Texas public postsecondary institutions are left to vie amongst one another for both state finances and institutional legitimacy as a resource.

Resource Dependence

The current state of American higher education places HSIs at a complicated crossroads, involving calls for more open enrollment for diverse students in the face of shrinking resources (Núñez, Hurtado, & Galdeano, 2015). Resource constraints are one of the principal external pressures affecting today's HSIs (Núñez et al., 2015). Even with HSI-specific funding from the federal government, budget cuts in the last few years have caused underfunding for these institutions to persist (Kouyoumdjian, Guzmán, Garcia, & Talavera-Bustillos, 2017). This patten proves to be problematic because HSIs are typically highly dependent on government funding (Hurtado & Ruiz Alvarado, 2015; Ortega, Frye, Nellum, Kamimura, Vidal-Rodríguez 2015). In the growing HSI landscape, it has become critical to understand the economic context of HSIs, specifically at the state and local level (Núñez et al., 2015). Since HSIs are typically comprised of the most poorly resourced institutions with large populations of disadvantaged students (Cuellar, 2015), they are in a place to behave in ways that yield the most resources possible. Yet, the behavior of public institutions of higher education has long been an area of much scrutiny because of the various political, administrative, and economical parties involved (Fowles, 2014).

RDT considers the influence external environmental forces have on the actions and behaviors of organizations (Pfeffer & Salancik, 2003). The concept of being resource dependent is characterized as a reliance on outer resources for the organization to function properly (Scott, 1995). Similar to the discussion on institutional isomorphism, Pfeffer and Salancik (2003) describe an organization as an instrument working within reason to achieve a set goal or set of goals. Organizations are thus seen as inherently rational in the way they work. For institutions of higher education, the rational goal is to serve and educate their students. This rationalized goal causes issues, though, when the institutions of higher education are generalized as working towards this goal regardless of the variety of institutional types that exist. Tolbert (1985) states that in the context of a shared characterization, certain practices and policies become institutionalized as the accepted norm for achieving stated goals. The issue with viewing a set of organizations under the context of a shared characteristic is that it ignores the diversity that exists across institution types, student bodies, and funding amounts. Instead, institutions conform to what is validated by their institutional context and the external actors in charge of the resources. When an organization does not conform to what is seen as rational and common across other similar organizations, its legitimacy, ability to obtain outside resources, and public support are threatened (Tolbert, 1985). This means that the behavior of an HSI will adhere to the norms put in place prior to the existence of HSIs.

The behavior of an institution can best be understood by understanding the context it is in and the external entities that affect them (Hillman, Withers, & Collins, 2009). One of the main sources of dependence to an outside actor for public institutions of higher education is the need for monetary resources, like state appropriations from a

state government. This circumstance rings particularly true for HSIs, since about three-quarters of HSIs are public institutions (Núñez, Crisp, & Elizondo, 2016), and already have limited institutional resources (Núñez & Elizondo, 2012). Public institutions of higher education are organizations that have routinely relied heavily on state governmental support (Tolbert, 1985). When considering common institutionalized norms, such as the importance of having T/TT faculty for extra funding in Texas (LBB, 2016a), institutions will work towards meeting government-set benchmarks that measure expected success regardless of their institutional designation or history. Within the understanding of resource dependence, HSIs will behave in ways to meet these set goals, even if this contradicts the type of institution the HSI was to begin with. This means that if an HSI understands that more spending on research means more funded capital space from the current state funding model, it will engage in research-spending behavior even if it is not an emerging or leading research institution.

Within the context of higher education, public institutions have had a chronicled relationship with state funding that is reactive to state budgets (White & Musser, 1978). HSIs are especially vulnerable to the outer influence of policies on state resource appropriations (Núñez et al., 2016). To add to the problem, HSIs have been found to generally receive lower amounts of funding when compared to other types of institutions (Cuellar, 2015; De los Santos & De los Santos, 2003; Hurtado & Ruiz Alvarado, 2015; Ortega et al., 2015). This places HSIs in a difficult position to fend for resources to begin with. HSIs must compete with non-HSIs for resource allocations even though HSIs are designated as serving an already disadvantaged student population (Garcia, 2019; Gasman et al., 2008) and low-income students (Cuellar, 2015; Garcia, 2016).

Given these complicating conditions, HSIs are found within a conflicting context between their institutional identity and legitimized state-based institutional expectations. While institutional leadership tries to steer the institution towards goals deemed suitable to obtain more funding, they are responding to set external state measures that ignore existing resource disadvantages. Due to resource dependence on state funding, HSIs are thus not focused on becoming better HSIs, but are instead focused on meeting pre-HSI set benchmarks and keeping up with legitimized institutional norms. This fostered drift in institutional identity can ultimately change the institutions at its core. Institutional expenditure patterns have been found to be explanatory gauges for an institution's goals and mission focus (Morphew & Baker, 2004). Titus (2006) also found that certain institutional behaviors towards expense patterns and sources of revenue, which were influenced by the institution's financial standing, predicted student success.

When applied to HSIs, resource dependence for legitimacy illuminates an issue between institutional identity and set funding allocation. It encourages steps towards institutional isomorphism. Texas HSIs are generally included in the context of public four-year institutions, vying for state resources within a context that does not explicitly acknowledge their designation. Their susceptibility to external factors and cited limited resources make resource dependence on legitimacy, attained through legitimized expenditures and measures, another appropriate lens for trying to understand the stance of HSIs in Texas. Various studies have previously used RDT to better study and understand HSIs (Garcia, 2015; Ortega et al., 2015; Rodríguez & Galdeano, 2015). Pfeffer and Salancik (2003) state the need for applying RDT towards changes in policy and driving new policy making. Initiatives that do so can not only help states like Texas better

support their HSIs, but can also help the large Latinx student populations enrolled at HSIs.

Latinx Students

Latinx students are the fastest growing minority group in higher education today (Garcia, 2017), accounting for 19% of all undergraduate students, which is second only to White students at 56% (*Excelencia* in Education, 2019). Yet, while the growth of the Latinx population is surpassing the growth of White non-Hispanics in the United States, the Latinx population growth is not synonymous with college degree attainment (*Excelencia* in Education, 2019; Gross, Torres, & Zerquera, 2012). In fact, Latinx students hold the lowest college graduation rates when compared to all other racial groups in the United States (Gross et al., 2013; Kiyama et al., 2015), even though degrees conferred for Latinx students have steadily increased. Latinx students made up 12.8% of bachelor's degrees conferred in 2015-2016, seeing an increase of 5.3% from 10 years prior (U.S. Department of Education, 2017).

Like other underrepresented student groups, Latinx students bring their own sets of needs that institutions may or may not meet. Issues with belongingness and congruence with their institution of higher education are factors that Latinx students struggle with, starting as early as during their high school to college transition (Tello & Lonn, 2017). Other issues Latinx students have experienced in higher education settings include a lack of physical cultural representations (González, 2003), lack of institutional research and understanding on how to serve Latinx students (Franco & Hernández, 2018), and lack of campus climate conducive to fostering a sense of belongingness (Museus, 2014). The literature on the importance of understanding and measuring campus climate

as it relates to minority student success, including Latinx students, is abundant (Cerezo, 2014; Franco & Hernández, 2018; Gloria, Castellanos, & Orozco, 2005; González, 2003; Kiyama et al., 2015; Kuh, Kinzie, Schuh, & Whitt, 2011; Museus, Ravello, & Vega, 2012; Museus, 2014; Tello & Lonn, 2017). The question then shifts to what the campus climate at HSIs should be like, or what direction the institution should take for better serving this underserved population. These disconnects are further fueled when Latinx students attend state institutions faced with limited state resources as a principal concern (De Los Santos & De Los Santos, 2003).

The issue of Latinx student success is relevant here due to the role Latinx students play in HSI designation and their importance in Texas higher education goals. If Latinx students are the metric for identifying HSIs, this means that HSIs are where the Latinx educational issues are concentrated. This does not mean, though, that Latinx students are confined to singular institutional types. HSIs are a varied group. On top of the limited research on how HSIs can intentionally adapt to better serve Latinx students (Garcia, 2019), more research is also needed on what HSI institutional identity currently looks like.

The Current Dilemma of HSI Identity

The growing number of Latinx students is evident from the corresponding surge in the number of institutions becoming federally designated as HSIs (*Excelencia* in Education, 2018; HACU, 2019d). Yet, while HSIs are enrolling the growing numbers of Latinx students, we do not know the common direction HSIs are trying to head in as an institutional type. Researchers are also unsure of how HSIs are evaluating their use of funding and institutional direction to affect the success of their Latinx students (Ortega et

al., 2015). From this sensed lack of direction and understanding, the designated identity of HSIs as a group of institutions of higher education intended to serve Latinx students is also at risk. What is currently identified as an HSI includes a vast assortment of institutional types with varying missions and serving histories (Garcia, 2018; Gasman et al., 2008; Núñez et al., 2016). The main reason behind this is because historically, the majority of HSIs began as Predominantly White Institutions (PWIs) that experienced a growth in Latinx student populations over time (Hurtado & Ruiz Alvarado, 2015). Garcia (2017) uses the term *transitional identity* to describe this situational process for HSIs, stating that most HSIs are in a provisional phase figuring out what they are becoming. Other researchers have even suggested federal granting geared towards establishing a standard HSI identity (Hurtado & Ruiz Alvarado, 2015).

HSI advocacy is predominantly focused at the federal level. Collections of data important to HSI research are scattered across the U.S. Department of Education, individual institutions, and non-profit organizations like *Excelencia* in Education and HACU. This aspect, coupled with the relatively new and still-developing identity of HSIs within the higher education landscape, causes the direction of new HSI research be less strategically aligned. HSIs are still a topic in flux and in need of further research. Moreover, institutions designated as Hispanic-serving are known for being of assorted institutional missions and types, without subcategorization that takes other institutional characteristics into account. This current dilemma for these Latinx student-rich institutions is better understood when looking at the history and growth of the designation itself.

Establishment and Growth of the HSI Designation

The 1992 Reauthorization of the Higher Education Act (HEA) officially recognized HSIs as institutions of higher education serving large populations of Latinx students (Gasman et al., 2008). Initially under Title III, HSIs were granted their own section after the 1998 Reauthorization of the HEA under Title V, "Developing Institutions" (Office of the Legislative Counsel, 2019). Under Title V, an HSI was federally defined as an accredited, degree-granting institution where Latinx full-time students made up at least 25% of the total undergraduate enrollment (Gasman et al., 2008; Office of the Legislative Council, 2019). This is the same core definition still recognized today, fueling the current uncertainty in the literature on what "Hispanic-serving" means outside of student body makeup (Franco & Hernández, 2018; Garcia, 2019; Gasman et al., 2008; Núñez et al., 2015).

This simple definition has also allowed for various types of institutions to become HSIs, regardless of their previous institutional identities. From 2010 to 2016, there was a 58% increase in the number of federally designated HSIs (Franco & Hernández, 2018), and the growth has continued by an average of 30 new institutions per year since 2009 (HACU, 2019c). The types of institutions being designated as HSIs have also grown in their variety. As of 2017, HSIs include 222 public two-year institutions, 146 private four-year institutions, 133 public four-year institutions, and 22 private two-year institutions (HACU, 2019b). Along with the quick growth of HSI numbers still ongoing today (*Excelencia* in Education, 2019), the designation has also centralized the majority of Latinx college students. HSIs only account for 17% of all institutions of higher education (*Excelencia* in Education, 2018), but enroll 66% of all Latinx undergraduate students

(HACU, 2019b). Nonetheless, the designation does not mean that only Latinx students are being served. HSIs are quickly becoming institutions with diverse institutional backgrounds serving an even more diverse student body.

HSI Diversity and Disadvantage

As MSIs, HSIs are very diverse institutions outside of the Latinx population metric (Santiago, 2006). HSIs serve more than 20% of all African American students, 17% of American Indian students, and 37% of Asian Americans students (HACU, 2019a), making them institutional vanguards in serving the quickly diversifying American college student bodies. In fact, HSIs are serving more African American and Native American students than Historically Black Colleges and Universities (HBCUs) or Tribal Colleges and Universities (TCUs) (Garcia, Núñez, & Sansone, 2019). Furthermore, as institutions of higher education serving such diverse populations of minority students, HSIs are also in a place to be the institutions primarily serving historically disadvantaged groups. Compared to non-HSIs, HSIs typically serve more low-income students (Garcia, 2017; Malcom-Piqueux & Lee, 2011; Núñez et al., 2016) as well as less academically prepared students (Núñez & Bowers, 2011). The reasons behind the greater number of disadvantaged students enrolled at HSIs is because HSIs are institutions that are more likely to be less-selective (Garcia et al., 2019) and have open-access admissions when compared to non-HSIs (Gasman et al., 2008; Núñez et al., 2016). Mounting these aspects together places HSIs at a clear distinction from non-HSIs that is not acknowledged by the designation alone. These institutions are starting from a disadvantaged point which in turn affects their student success outcomes. When compared to non-HSIs, HSIs have shown mixed impact to minority students, with such

positives as providing an increased sense of belongingness (Garcia & Dwyer, 2018; Hurtado & Ruiz Alvarado, 2015), but not correlating with better graduation rates (Garcia, 2017), nor intentionally pursuing initiatives to improve Latinx student success outcomes (Santiago, 2012).

The variability of student ethnicities within HSIs points to another issue within higher education research on Latinx topics: the generalization of Hispanic people under the single umbrella Latinx term. As diverse as the students and institutions under the HSI designation are, so too are the ethnicities and cultures that identify as Latinx. Moreover, the diversity in Latinx student nationalities and ethnicities within college student bodies can change based on regions of the country. The state of Texas, for example, has a large Mexican-American population due to the proximity of the state to Mexico. These blanketed overgeneralizations place HSIs in a position where insufficiencies affect all of their diverse students, including their large and diverse Latinx subpopulations.

Institutions with limited resources. On top of the previously mentioned disadvantages of HSIs, they are also institutions that are typically under-resourced (Hurtado & Ruiz Alvarado, 2015; Ortega et al., 2015). Institutions that have limited resources tend to struggle meeting normalized standards of student success (Garcia, 2017). Having limited resources at HSIs has been found to be correlated with their lower student completion measures when compared to non-HSIs (Rodríguez & Galdeano, 2015). Additionally, having limited resources has also been shown to hinder institutions' abilities to pay competitive salaries that retain and recruit faculty (Gasman et al., 2008).These type of disadvantages matter when access to resources is tied to measures, like degree completions and T/TT faculty numbers, that legitimize an institution.

Furthering the issue is the cyclical nature of resources in that context. In order to meet the measures expected out of an institution and needed for access to more resources, an institution must have the resources to spend on meeting said expectations.

HSIs have historically also had low educational expenditures (Benitez, 1998). This is problematic when institutional expenditures are tied to the institution's capabilities in supporting measures for success. Núñez, and Elizondo (2012), for example, found that HSI institutional expenditures had a positive relationship with higher Latinx graduation rates, a typical measure of institutional legitimacy and success. This highlights the importance of institutional expenditures, which HSIs tend to be more limited on. Nonetheless, calls have been made to the federal government to intervene with better support for these institutions (Garcia, 2019), specifically as it relates to government funding (HACU, 2019a, 2019d). Since HSIs are federally created concepts (Santiago, 2006), funding for the designation begins at the federal level. Federally, fiscal support for HSIs is, and has always been, limited, turning the attention towards state-level funding. States such as Texas are in a position to engage HSIs with more adequate funding that goes beyond the current federally-led scenario in order to properly serve their student populations (Espinosa, Turk, & Taylor, 2017).

Texas HSIs

Texas is one of the leading states in the country when it comes to both HSI and Latinx student representation. Texas is home to the second highest number of HSIs in the country with 94 institutions (*Excelencia* in Education, 2018, 2019). Of these 94 HSIs, 21 are public four-year institutions, out of the state's 37 total public four-year institutions (THECB, 2018a). This number reflects the Latinx population in Texas, which alongside

California, has the nation's largest Latinx populations (Malcom-Piqueux & Lee, 2011). In fact, Latinx made up 65% of the state's population growth in the 2010 census (THECB, 2015). The population growth is also evident at the collegiate level. Of all undergraduate students in the state of Texas, 39.2% are Latinx (HACU, 2018a). This percentage is expected to increase, as Texas is home to the second largest Latinx primary school student population in the country (Gandara & Contreras, 2009). These measures place Texas in a prime position to advocate for and set the standard on both Latinx and HSI success. The state's strategic plans for higher education heavily recognizes the importance of Texas's Latinx student success (THECB 2000, 2015), but lack any discussion of the HSI role in the process, inclusive of state funding for these institutions. Currently, funding for HSIs continues to predominantly come from the federal government.

HSI Federal Funding

The criticism of adding HSIs to Title III in 1992 came from HBCU leaders because of the limited federal funding pool that HSIs were now sharing with HBCUs, lessening HBCU federal support (Gasman et al., 2008). This financial constraint continued once Title V was established due to the rapid growth of HSIs. As aforementioned, to be federally recognized as an HSI, the institution must have a Latinx student population of at least 25%. To then qualify for Title V federal grants, HSIs must also prove that at least 50% of their enrolled Latinx students are receiving need-based assistance under Title IV (Gasman et al., 2008; Office of the Legislative Council, 2019). The unintended consequence of having few requirements for becoming HSI-designated is that the number of applicants quickly increases for an already limited funding pool. For

some institutions, the designation then became simply a means to an end. Carter and Patterson (2019) found that at the organization level, becoming an HSI was at times a priority solely for the chance to obtain more funding.

If and after an institution attains HSI designation, the institution must then apply and compete for federal funding. This is a stark contrast to other MSIs, specifically HBCUs and TCUs, which receive federal funds automatically due to their institutional missions being direct about serving their designated student populations (Santiago, 2006). HSIs are not guaranteed funding due to their designation. In fact, funding for HSIs via Title V derives from the Developing Hispanic-Serving Institutions Program, which requires that applicant institutions provide development plans for proposed service improvements for Latinx students (Santiago, 2006; U.S. Department of Education, 2019). This creates a two-part process for institutions to possibly receive a piece of limited federal funding: becoming eligible via designation followed by applying for available funds via proposals.

Since federal grant funding for HSIs began in 1995, Congress has attempted to increase the limited federal appropriations to meet the growing demand. Federal appropriations for HSIs started at $12 million in 1995 and grew to $95 million by 2005, averaging only about $500,000 per HSI (Gasman et al., 2008). The appropriations bill passed for FY 2018 resulted in the highest amount ever dedicated to funding Title V at $123.2 million towards undergraduate education at HSIs and $11.05 million for graduate education at HSIs (HACU, 2018b). Unfortunately, this historic amount is still not proportional enough to assist all HSIs. As of 2018, only 50% of all HSIs eligible for funding have received any sort of monetary grant (HACU, 2018b). The future does not

show this situation improving, as HSI numbers are only expected to continue increasing (Ortega et al., 2015). Currently, there are 328 institutions known as Emerging HSIs, which are institutions with Latinx students comprising 15%-24% of total enrollment. These 352 Emerging HSIs are expected to join the existing 539 HSIs[3] within the next decade (*Excelencia* in Education, 2018; HACU, 2019b). Therefore, continued federal funding of Title V is a growing necessity (Cuellar, 2015). Further, there are few accountability metrics in place to track the use of the grant funding, with restrictions mainly focused on use of funding towards endowments (Legal Information Institute, 2019).

Underfunding plagues HSIs the worst when compared to other degree-granting institutions (Galdeano, Flores, & Moder, 2012; Cuellar, 2015). While HSIs receive, on average, $3,117 per student from federal appropriations, other degree-granting institutions receive $4,605 federal dollars per student (HACU, 2019b). Underfunding for HSIs has been such an issue that HACU has lobbied for more appropriations from multiple federal departments, including the U.S. Department of Agriculture and the Department of Defense (Galdeano et al., 2012). As previously mentioned, these institutions are already functioning with fewer resources than other institutions (Espinosa et al., 2017), and when coupled with institutional budget cuts, the supportive structure for the already-underserved students at HSIs suffers *(*Kouyoumdjian et al., 2017). These issues continue to persist even though federal appropriations for HSIs have totaled $3.1

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[3] Of these 539 institutions, only 17 are designated as R1 Doctoral Universities with very high research activity and only five are in Texas: Texas Tech University, University of Texas-Arlington, University of Texas-El Paso, University of Houston, and University of North Texas (The Carnegie Classification of Institutions of Higher Education, n.d.; HACU, 2020).

billion since funding began (HACU, 2019b). The underfunding issue brings the spotlight back onto HSI-rich states like Texas. As part of the state's public higher education system, public Texas HSIs are subject to the state's strategic higher education plans and funding model. As previously presented, specific mention of HSIs within Texas's higher education plans is nonexistent.

Lack of HSI Acknowledgement within the Texas Higher Education Plans

Across both plans, the importance of Latinx students for plan success is stated and reiterated. While *CTG* did not meet its set goal for Latinx student enrollment, it did see Latinx enrollment increase by 137% in 15 years (THECB, 2016). The *60x30TX* plan hopes to continue the push for Latinx student success, specifically making note of the growing Latinx population as a major ongoing demographic shift in Texas through 2030 (THECB, 2015). Yet, in neither of the plans, no language acknowledges the need to assist Texas HSIs. As policy plans claiming the criticality of Texas Latinx in achieving higher education success, the lack of mention seems unusual. With Latinx students being concentrated nationally at HSIs, and Texas having the second-most HSIs in the country, this lack of acknowledgement seems misaligned with the state's stated goals. Furthering this disconnect, the state legislation on financing higher education also lacks any form of explicit written acknowledgement of HSIs (LBB, 2016a, 2016b, 2019). Without any sort of specified support initiatives for HSIs within both higher education plans, funding-based support for HSIs at the state level seems opaque in Texas. Instead, the strategic plans outline institutional-wide goals meant to bolster the whole Texas public higher education field using an institutional grouping system.

Texas accountability university peer groups. After the start of *CTG,* the state of Texas created and established a grouping system for the state's public four-year institutions in 2004 (THECB, 2019a). *CTG* was the strategic plan that emphasized and attempted to place measures on the concept of excellence (THECB, 2000). In order to measure institutional excellence, the state saw institutional comparison to be unavoidable (THECB, 2019a). Therefore, the state of Texas grouped its public four-year institutions by various factors that included size, research expenditures and academic missions (see Appendix A for grouping details) (THECB, 2019a). The goal of grouping the state's public universities was to keep the institutions accountable within their own means. The five institutional groups that were created and are still in use are: Research, Emerging Research, Doctoral, Comprehensive, and Master's (THECB, 2019a).

The THECB utilizes the institutional peer groups as a way to track institutional progress annually so that the state can actively help institutions improve (THECB, 2019a). The groups were not created to be limiting, meaning that the label is not permanent for the institution. The state revises each institution per the accountability group each year with the understanding that the institution can develop into a new peer group (THECB, 2019a). At the same time, institutions maintain a sense of autonomy, including the ability to suggest standards to keep or change via group consensus and the option to change peer groups once eligible for a peer group change (THECB, 2019a). While still unconcerned with HSIs, the accountability peer groups provide a better glimpse into what the Texas higher education context looks like for its pubic four-year institutions.

Texas Public Higher Education Context

Figure 1 depicts the Texas public higher education context with all the aspects discussed thus far. The diagram presents the unknown position of HSIs, alongside non-HSIs, within the institutional context. The institutional field is portrayed as a wheel whose motion is influenced by funding and strategy pressures as it is pushed towards *60x30TX* goals, and previously towards *CTG* goals. The accountability groups show their intended role in helping move public higher education towards meeting the goals for 2030, and 2015 before that. The state of Texas dictates the appropriation measures and strategic goals. Underneath this established context are the ever-moving forces of institutional isomorphism and resource dependence. As the institutions respond to the outer state-set pressures and set accountability groups, they engage in more isomorphic tendencies that move away from other identities, like the HSI designation. The more an institution helps the wheel move forward, per state-legitimized metrics, the more legitimate an institution(s) becomes for Texas higher education goals. In meeting such metrics and taking these conceptual steps forward, institutions are provided more appropriations from the state funding model that is also influenced by the higher education strategic plans. Texas state appropriations are one of the principal pressures influencing this institutional context.

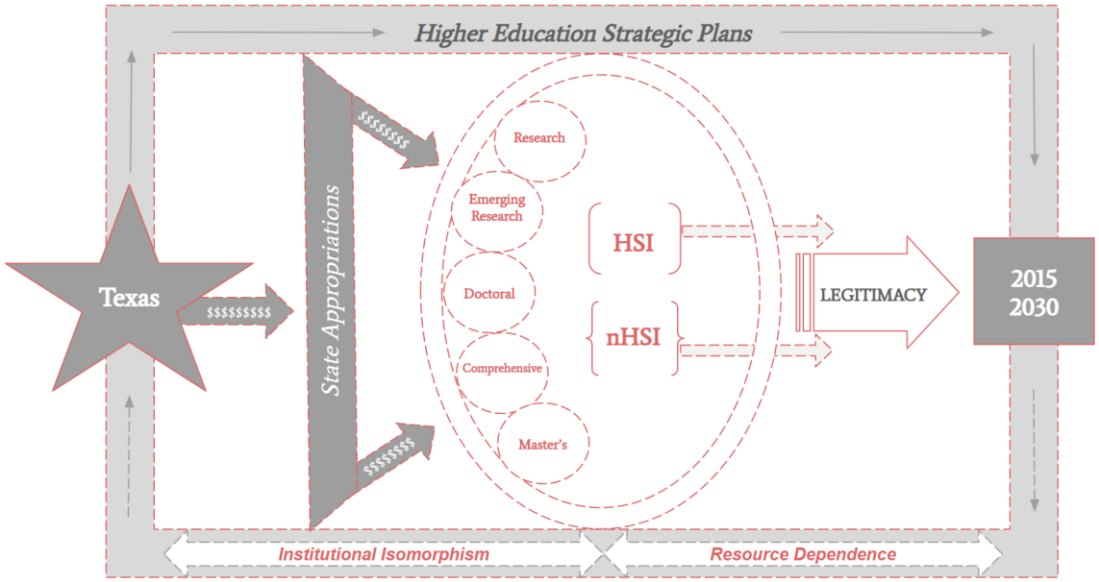

Figure 1. Texas Public Higher Education Context.

Texas State Appropriations

The state of Texas appropriates funds to institutions of higher education through a biennial General Appropriations Act (GAA) (LBB, 2019). The GAA is adopted by the Texas state legislature every two years as a biennium and outlines the appropriations made by the legislature for the following two years (THECB, 2017a). For the 2016-2017 biennium, the Texas legislature appropriated a total of $17.3 billion in the GAA (LBB, 2016b). This amount increased by $154.3 million for the 2018-2019 biennium, totaling in $17.7 billion in the GAA. Article III of the GAA contains the funding for all education facets in the state of Texas, with a separate section for higher education. Allocation of appropriations for Texas higher education is based on five sectors, which together make up the Texas system of public higher education. The five sectors are general academic institutions, health-related institutions, community colleges, state colleges, and technical colleges (LBB, 2016a, 2019). In total for the five sectors, there are 37 public four-year

universities, which are referred to as the general academic institutions, 50 community colleges, a single technical college with six main campuses, three lower-division state colleges, and 12 health-related institutions (LBB, 2016a, 2019). This study only focuses on the 37 public four-year institutions.

State Funding for Public Four-Year Institutions

All state appropriations for public four-year institutions in Texas are financed through four methods: General Revenue Funds, General Revenue-Dedicated Funds, Federal Funds, and Other Funds (LBB, 2016a, 2019). General Revenue Funds provide most of the state's higher education funding, specifically formula funding, and come from sources such as state taxes and fees. General Revenue-Dedicated Funds are fund accounts within General Revenue Funds that are specifically assigned for spending based on legislative decisions and priority (LBB, 2016a, 2019). This funding pool is best understood as an account that holds tuition and student fee revenues from all public institutions, which is then dispersed back as appropriations per state government decision. This means that the balance of General Revenue-Dedicated Funds accumulates over time, as long as institutional revenue amounts exceed state appropriated General Revenue-Dedicated funding.

Federal Funds consist of funding directly from the federal government that includes grants and reimbursements. These funds are not appropriated in the biennial GAA, unless they are received by the THECB or the Texas A&M University System (LBB, 2016a, 2019), and must be expensed solely for the delineated purpose of the funds (TFDM, 2019). Federal Funds constitute the smallest portion of revenue for Texas public higher education, accounting for only 1.3% of all revenue sources for Texas public higher

education in the 2016-2017 biennium (LBB, 2016a). Finally, Other Funds are state funding that are not considered General Revenue Funds or General Revenue-Dedicated Funds. These funds tend to have specialized objectives and can be restricted to certain institutions due to pre-set criteria or constitutional designation.

Texas state appropriations for public four-year institutions consist of the listed four fund types, which then become siphoned between formula and non-formula funding. Both formula and non-formula funding can come from the same funding method, like General Revenue Funds, but can differ under specified stipulations and spending areas. The influence of capital space and legitimized state expectations is evident throughout the state's four-year formula funding models.

Public Four-Year Formula Funding

For the 2016-2017 biennium, approximately 50.4% of Texas state appropriations for the state's 37 public four-year institutions derived from formula funding that uses two formulas and two supplements (LBB, 2016a). Texas legislative appropriations for the state's public institutions include funding for instruction, student services, administration, student financial aid, and facility construction and renovation. Most of the funding for public four-years, approximately 83.1%, is done through the Instruction and Operations (I&O) formula and the Teaching Experience Supplement (LBB, 2019). The remaining 16.9% is calculated using the Infrastructure Support formula and Small Institution Supplement (LBB, 2019).

Instruction and Operations (I&O) formula. The I&O formula is based on SCHs during a three-semester base period, which represents the number of courses the institution provides. These SCHs are weighted based on program of study and the

academic level. Program of study weights are based on relative costs studied by the THECB, and vary depending on the academic level, spanning from lower division, upper division, masters, doctoral and/or special professional (LBB, 2016a). This means that a semester credit hour of liberal arts at the doctoral level will weigh more in the equation than the semester credit hour of liberal arts at the upper division undergraduate level. Both of these credit hours will weigh less than the semester credit hour of engineering at the doctoral level, due to relative cost of offering engineering being a higher expense than that of offering liberal arts. The equation for the formula for the 2016-2017 biennium (LBB, 2016a) was calculated as:

Semester Credit Hours ***x*** *Program/Level Weight* ***x*** *Rate ($55.39)*

Rate is set by the legislature based on available funding and other factors, such as enrollment changes (LBB, 2016a; 2019).

Teaching Experience Supplement. The Teaching Experience Supplement adds an additional weight of 10% per lower and upper-division SCHs taught by T/TT faculty, changing the equation to:

Semester Credit Hours ***x*** *Program/Level Weight* ***x*** *Supplement (0.10)* ***x*** *Rate ($55.39)*

Even though the I&O funding formula for public four-year institutions is used for all 37 institutions in the state, differences in institutional size and in number of T/TT faculty will immediately result in funding gaps using this formula. When looking at T/TT faculty numbers, the range spans from 53 at the University of North Texas at Dallas, an HSI, to 1,705 at the University of Texas at Austin, a non-HSI (THECB, 2018a). Within the funding formula resources for this specific sector of appropriations available from the state of Texas, no mention of HSIs exists.

Infrastructure Support formula. The Infrastructure Support formula is a direct recognition by the state of Texas of the importance of an institution's structural capabilities. Funding that comes from the Infrastructure Support formula funds physical plant support and utilities for public four-year institutions, the state colleges, and the technical colleges (LBB, 2019). The physical plant of a college campus includes buildings, improvements, and land, and it tends to exclude any construction still in progress (NCES, 2019). This formula also has a rate that is set by the legislature based on factors that include available funds and planned changes for any institutional space (LBB, 2016a, 2019). Unlike the rate for the I&O formula, the rate for Infrastructure Support is comprised of two rates: Adjusted Utility Rate plus All Other Rates. The Adjusted Utility Rate is 43.5% of the set rate and reflects historical use of infrastructure funds that pay for utilities at each institution, relative to other institutions (LBB, 2016a). The All Other Rates are 56.5% of the set rate that is constant across institutions and reflects funds spent on physical plant, maintenance, grounds, and custodial services (LBB, 2016a). For the 2016-2017 biennium, the rate was set as $5.62 by the legislature (LBB, 2016a). The total set rate is then calculated as:

(Adjusted Utility Rate **+** *All Other Rates)* ***x*** *Predicted Square Feet*

The predicted square feet portion of the formula is an estimate of future institutional space needs. With the institutional physical campus always under change, Texas has adopted a best-fit prediction to consider the physical size of an institution. The predicted square footage used in the equation only considers each institution's educational and general (E&G) NASF. THECB (2017a) defines E&G space as any net-assignable space on campus used for academic instruction, research, and support of the

institution's mission, but excludes auxiliary spaces (self-supporting places such as residence halls, stores, athletics). Texas legislature arrives to the predicted amount of square footage using by the THECB-developed Space Projection Model which will be covered later. The Space Projection Model exists to consider an institution's physical footprint, while the Small Institution Supplement recognizes an institution's enrollment footprint.

Small Institution Supplement. The state adds a supplement to the infrastructure formula that identifies institutions with small student enrollment. The Small Institution Supplement provides $1.5 million total additional funds per biennium to any public four-year institution that has an enrollment of less than 5,000 students (LBB 2016a; 2019). For any public four-year institution that has between 5,000 and 10,000 students, the supplement begins to decrease starting from the $1.5 million for each additional student (LBB, 2016a). The supplement is based on the consideration that all institutions have a minimum operating cost, and the smaller an institution is, the less it will receive from the set I&O and Infrastructure Support formulas. This supplement benefits HSIs because the majority nationwide, approximately 62%, are small institutions with a full-time enrollment of 5,000 students or less (*Excelencia* in Education, 2019). The state of Texas has also shown a continued interest in supporting this supplement. Prior to 2009, only public four-year institutions with enrollment of 5,000 students or less received the funding, and it was limited to $750,000 per institution (LBB, 2019). This supplement was applied to the state's public community colleges until the 2014-2015 biennium, at which point a new outcomes-based model was introduced as the replacement for two-year institutions (LBB, 2016b; 2019; McKinney & Hagedorn, 2017).

Even though this supplement recognizes the disadvantage smaller institutions face under a size-based funding formula, it is solely based on enrollment numbers. Per the Texas LBB (2016a, 2019), both formulas and supplements are mainly based on enrollment. The Small Institution Supplement is the most direct acknowledgement of the disparities that can exist if only enrollment is considered for state funding. With their focus on SCHs, T/TT faculty teaching courses, and predicted square footage, the two formulas and the teaching supplement are driven by volume. The more SCHs an institution produces, the more I&O funding it receives. This amount increases if those credit hours are taught by T/TT faculty. The infrastructure formula follows with a reliance on the predicted physical space of the institution. As noted, instead of enrollment numbers, the Infrastructure Support formula is based on an institution's predicted physical footprint. With Texas using a biennium system for its state appropriations, it predicts the amount of institutional space it will provide funding for in each upcoming two years. To arrive to these estimates in capital size and expansion, the state legislature uses a space assessment tool called the Space Projection Model.

Space Projection Model

The amount of space an institution needs to function is an important factor embedded within Texas's Infrastructure Support formula. Starting in October 1992, the THECB approved the use of the Space Projection Model for all Texas public institutions, excluding community colleges (THECB, 2005), to assess institutional space needs. As an assessment tool, the Space Projection Model considers an institution's need for new construction, and whether that new construction should be included in general revenue funding for maintenance and operation (THECB, 2005). The general revenue funding for

campus capital is allocated using the Infrastructure Support formula. While the Infrastructure Support formula recognizes the necessity of funds to maintain the integrity of each institution's capital assets and physical plant, the Space Projection Model provides the specific NASF number used in the formula equation (THECB, 2005). The NASF number is a measure of predicted need for space. The THECB utilizes the model under the assumption that it considers differing institutional characteristics, such as level of instruction and faculty numbers, to calculate the predicted space. It is meant to be responsive to factors of scale due to characteristics like smaller space requirements for smaller enrollment sizes as well as differing institutional directions due to institution-specific research activities (THECB, 2005).

Even though the Space Projection Model is meant to consider such existing differences between institutions, it is a review tool that predicts based on already existing spaces, proposals for new capital assets that result in new assignable spaces, and requests for revenue bonds that are to be used for new capital projects (THECB, 2005). As a model that is supposed to respond "to an institution's evolving characteristics" (THECB, 2005, p. 1), the Space Projection Model is supposed to reflect an institution's current place in space needs while also considering the direction it is trying to head in. To understand an institution's evolving characteristics from its predicted space needs, the model categorizes NASF into separate E&G spaces reflective of the state's strategic higher education goals.

The state's focus on the facets of *teaching*, *research*, and *excellence* is a repeated sentiment that extends beyond the current and previous higher education strategic plans and into the Space Projection Model (THECB 2000, 2015). On top of these three areas of

improvement, the state of Texas has also focused on increased college enrollment, retention, and graduation rates for its state population (Perna et al., 2014; THECB 2000, 2015), meaning increased institutional space capacity to serve that expected growth. Per the THECB (2017a), the Space Projection Model is a planning tool that predicts the NASF of space needed for public institutions to achieve their missions of teaching, research, and public service (THECB, 2005). This definition used by the THECB specifically states that the E&G space predicted by the model is assignable E&G Space. Assignable E&G Space is E&G space that is broken down into room type, per institutional facility inventory, that is used for academic instruction and mission support (THECB, 2017a). By this defined course, the Space Projection Model is able to translate Texas's strategic aspirations down to specific space types at its public four-year institutions.

The Academic Five-Factor Model of the Space Projection Model. The Academic Five-Factor Model is a method of categorizing spaces at public four-year institutions into five factors based on room type (THECB, 2005). The model does not include auxiliary spaces, such as bookstores and athletics, due to their ability to generate their own revenue (LBB, 2016a, 2019; THECB, 2005). The five categorized space factors are teaching, library, research, office, and support spaces (THECB, 2005). These five space factors are predicted using data provided by the institutions that is specific to each factor. This data is used to calculate the amount of predicted space needed for each of the five factors, which the model describes as drivers of institutional space. Two of the factors are directly related to measures within the scope of this study, and they are factor one - teaching space and factor four - office space (THECB, 2005). Two other space

factors, factor two - library space and factor five - support space, include library space based on volumes and users, and support spaces that include storage and service area spaces (THECB, 2005). Factor three – research space – relies on research expenditures, which are highly dictated by an institution being classified as high research producing. This factor is not included because HSIs are typically institutions that focus on teaching more so than research (Hurtado & Ruiz Alvarado, 2015). The model and the spaces important for this study (outlined in bold) are shown in Figure 2.

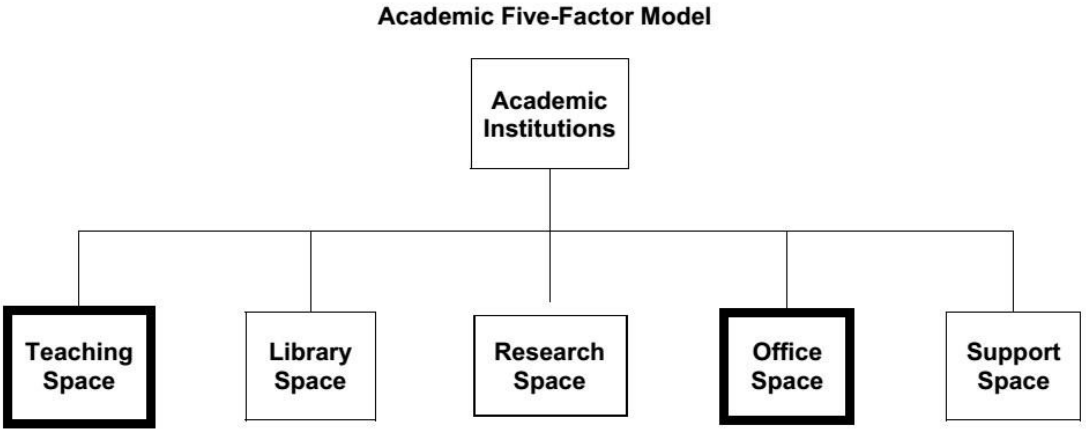

Figure 2. Academic Five-Factor Model. The five types of categorized spaces for public four-year academic institutions in Texas, with the two of focus for this study outlined in bold.

Drivers of teaching space. Factor one of the academic five-factor model is for institutional teaching spaces, which include all rooms used for instructional purposes (THECB, 2005). Per the facilities inventory, room types that fall under teaching spaces include rooms described as classrooms, class labs, lounges, and meeting rooms (THECB, 2005). Teaching spaces are predicted based on the “level and program areas of an

institution's funded semester credit hours" (THECB, 2005, p. 3). Funded SCHs and program area/level are also variables used in the state's I&O formula, meaning that the number of credit hours taught by an institution affects both the instruction and infrastructure state funding formulas. For the teaching space factor, funded SCHs taught by program area and by level of course, per full-time student equivalent (FTSE), predict the amount of teaching space needed by the institution (THECB, 2005). The FTSE is a measure of student enrollment based on a standard full-time load of credit hours, where 15 credit hours per semester counts as full-time for the undergraduate level, 12 credit hours per semester for master's and professional level, and 9 credit hours per semester for the doctorate-level (THECB 2005, 2017). The Space Project Model allows for 100% of undergraduate-level FTSE to be factored into predicted NASF for teaching spaces, with less allowances made for graduate-level FTSE due to these students needing less use of space (THECB, 2005).

Teaching spaces are further categorized into four different programmatic areas based on space requirements. The Space Projection Model assigns 45 square feet of teaching space needed per FTSE as a base, with additional NASF given based on the program area of reported credit hours. More NASF is given for each FTSE if more SCHs exist for programs deemed as space-intensive. Program Area 1 requires the most teaching space and includes programs such as the visual/performing arts and agriculture operations, resulting in an additional 45 NASF per FTSE; Program Area 2 includes engineering and technology and has an additional 30 NASF per FTSE; Program Area 3 includes the biological and physical sciences and provides an additional 15 NASF per FTSE; and Program Area 4, which includes the least space-intensive programs like

liberal arts and social sciences, does not give additional NASF per FTSE past the base (THECB, 2005). Following these guidelines, this means that an undergraduate FTSE enrolled in agricultural sciences is allowed 45 NASF (base) plus an additional 45 NASF, equaling 90 NASF for that FTSE, while an undergraduate FTSE in the liberal arts is only allowed 45 NASF total.

While the predictor for teaching spaces at an institution are shown to be based on production of SCHs by level and program, the driver behind these variables is enrollment size through FTSE. The more FTSE an institution has, the more predicted total NASF is calculated for teaching spaces. The current model attempts at taking this into account by including an economy of scale variable. The variable is a numerical factor of .98 that is applied to the first 1,000 FTSE after reaching 15,000 undergraduate FTSE, that then decreases by .02 for each additional 1,000 undergraduate FTSE after that (THECB, 2005). Like the Small Institution Supplement, these equalizing attempts focus on enrollment sizes and not on institutional characteristics. Even if an institution is recognized for being at an enrollment disadvantage, academic offerings are still tiered with certain disciplines yielding more NASF than others, which leads to more state funding. This means that there is incentivized direction for these institutions to follow in the current context of state funding for teaching spaces. This same pattern exists for office spaces with faculty numbers at Texas public four-year institutions.

Drivers of office space. Institutional office space includes all non-library offices spaces, conferences rooms, and related service areas (THECB, 2005). The academic five-factor model predicts office space using one of two methods, choosing whichever of the two results in the most NASF for the institution. The first method depends on the full-

time equivalent (FTE) faculty that is found on the THECB Faculty Report (THECB, 2005). This method accounts for FTE staff as well, estimating the value to be 1.8 times that of FTE faculty for public four-year institutions. The model uses the predetermined amounts of 190 NASF per faculty FTE and 170 NASF per staff FTE for allowed predicted office space (TEHCB, 2005). This means that if an institution reports 100 faculty FTE, the staff faculty is calculated as 100 x 1.8 = 180 staff faculty. These values are then multiplied to their respective allowance of NASF (190 NASF or 170 NASF) and added together for a total NASF for office space. The second method depends on the current amount of E&G expenditures reported by the institution. This method uses an inflated $1 million amount adjusted to the inflation rate difference from the start of the Space Projection Model in September 1991to the September of the year being used for the space calculation (THECB, 2005). After dividing the reported E&G expenditures by the inflation-adjusted $1 million, the resulting dollar amount is multiplied by 3,500 NASF.

The office space factor is also an expense loop that uses a measure based on institutional size and resources. The more faculty an institution reports, the higher the predicted NASF for office space and thus, their Infrastructure Support. Furthermore, the Teaching Experience Supplement provides more funding when the faculty being reported are tenured/tenure-track. The important role that faculty play in institutional, and state, success was part of *CTG*, specifically as it relates to high-quality research output and a higher number of faculty needed in general (THECB, 2000). Even though the state's strategic aims shifted with the *60x30TX*, the plan emphasized a continuation of the previous plan regarding excellence in teaching (THECB, 2015).

As noted, the Space Projection Model is the tool used for calculating Infrastructure Support based on predicted future capital needs. Outside of space-specific metrics that drive teaching and office NASF, the goal of the model is to forecast the amount of institutional space the state will provide appropriations for. Even though Texas's strategic higher education plans make no mention of capital assets and expenditures (THECB 2000, 2015), the state goals outlined revolve around increased enrollments and excellence-based spending that require capital space and appropriations. On the institutions' side, capital expenditure plans must also be reported. The THECB collects this information, tracking how much, and for what, the state's public four-year institutions plan to build or repair for the upcoming five fiscal years.

The Capital Asset Costs

The current state of capital expenditures across college campuses exists because capital funding has barely been enough to match capital expenditures. The recent construction boom in higher education focuses on capital expenditures towards new facilities versus the maintenance of the old (Kaiser, 2018), as reflected in the Texas Space Projection Model. The existing value for public higher education facilities in the United States stands at approximately $300 billion (Manns, 2004), with approximately $78 billion worth of bond debt accrued from 2006 to 2016 (Eaton, Habinek, Goldstein, Dioun, Santibáñez Godoy, & Osley-Thomas, 2016). These amounts are a large portion of institutional budgets. However, existing literature on capital expenditure support for institutions of higher education remains a very limited topic (Delaney & Doyle, 2014; Ness & Tandberg, 2013).

Historically, increase in capital expenditures during economically prosperous periods has increased the physical capacity of institutions without having to heavily consider enrollment numbers (Delaney & Doyle, 2014). Increasing capacity is also going to be a continual concern nationwide. Postsecondary student enrollment is expected to keep rising from 2014 to 2025 by 15%, with Latinx students making up 32% of that overall increase (Hussar & Bailey, 2017). For Texas and its enrollment-focused strategic plans, this means an added importance of serving its Latinx state population and HSIs. The state recognizes its Latinx population, as well as the expense of institutional expansion.

The THECB is required to collect capital expenditure information from public universities due to Section 61.0572 of the Texas Education Code (THECB, 2018b). This information is inclusive of new construction costs at these institutions. The annual capital expenditure reports collect information on planned construction projects expected to occur over the next five years. For the FY 2018 through 2022, the state is expected to see $14.3 billion in new construction projects planned, which is 68% of the total costs when taking all facilities-related projects into consideration (THECB, 2018b). With such high expected capital costs, Texas public institutions are demonstrating the perceived importance of spending on their capital assets. The question remains whether state funding affects these projected costs or not.

We are at a critical point in time for higher education where institutions are simultaneously seeing increased enrollment of diverse student populations and more restrictions on institutional resources (Núñez et al., 2015). The increased enrollments mean more capital capacity needed, which are both factors that Texas higher education

have shown to value in their strategic planning and formula funding. On the policy-maker side, Hackworth (2019) found that Texas legislators favorably agreed with the sentiment that state funding should be based on an institution's past spending patterns and capital investment requests. These perceptions on institutional spending and capital assets bolsters the notions so far covered on capital within Texas funding. At the federal level, capital assets and funding are also considered for HSIs via Title V.

HSI Capital

A lack of literature exists on the capital expenditures at HSIs, specifically when compared to non-HSIs, due to the limited amount of literature on state-funded capital expenditures in general (Tandberg & Ness, 2011). Yet, regardless of HSI designation or not, capital growth is a process that requires ongoing capital expenditures and affects all institution types (Eaton et al., 2016; Snedden, 1920; Manns, 2004). Like any institution of higher education, HSIs must remain structurally sound and operational to serve their entire student body, specifically their largest subgroup per designation, Latinx students.

Outside of aiming to improve Latinx student academic success at HSIs, Title V also designates appropriated support towards the expansion and enhancement of HSIs (Office of the Legislative Council, 2019). This is explicitly articulated under Part A of Title V – Developing Hispanic-Serving Institutions – that focuses on financially supporting the development, improvement, and quality of the academics at HSIs (U.S. Department of Education, 2019). Of the 15 activities authorized for fund use, Authorized Activity (2) states the allowance of fund use towards the construction, maintenance, renovation, and improvement of institutional facilities (Congressional Research Service, 2018; Legal Information Institute, 2019). This authorization allows for an unspecified

amount of Title V grants to become capital funds for HSIs to use as a capital expenditure towards expanding and maintaining their capital assets. By mentioning this activity under Title V, the federal government is recognizing the importance of institutional integrity at the structural level.

The recognition of capital assets and appropriations by the federal government is evident at the state-level for Texas within its non-formula funding as well. While the state's formula funding model relies on certain measures of production and expenditures imbedded in the Space Projection Model, non-formula funding has specifically aimed funds for capital expenditures. The convoluted nature of Texas state appropriations extends through these non-formula funds, involving set state statues and varied methods of allocation.

Public Four-Year Non-Formula Funding

Funds for public four-year institutions that do not follow formulas for allocation can come from General Revenue Funds, General Revenue-Dedicated Funds, and Other Funds. Specifically, non-formula General Revenue Funds include special items, guaranteed funds for periods of reduced formula funding, worker's compensation insurance, and certain research and capital funding (LBB, 2016a, 2019). Non-formula General Revenue-Dedicated Funds include appropriations for Texas Public Education Grants, departmental initiatives geared towards student-training opportunities, and salary for staff that does not come from General Revenue Funds (LBB, 2016a, 2019). Non-formula Other Funds include specialized fund accounts accessible to specific institutions for predetermined uses, such as the National Research University Fund for helping

criteria-chosen Texas emerging research universities attain more national prominence (LBB, 2016a).

This varied pool of funding tends to have appropriations that the state has specified goals for. The goals tend to be aligned with strategies discussed in the state's higher education plans, such as research-oriented funding. The THECB also considers capital appropriations necessary for improving the capabilities of Texas public higher education. Specifically, they consider funding capital projects through state appropriations as a way to increase both capacity and efficiency of the state's higher education, which is directly supportive of the *60x30TX* completion goal (Eklund, 2018; THECB, 2015). More space becomes more enrollment and more completion measures.

In Texas, state funding to meet institutional capital needs is not derived from formula funding, which is typical across most state public higher education systems (Manns, 2004). The non-formula funding strictly for capital expenditures for Texas public four-year institutions comes predominantly from constitutional funds. For the 2016-2017 biennium, these funds accounted for 21.7% of state appropriations (LBB, 2016a).

Capital funding from constitutional funds. Funding for capital expenditures at public institutions in Texas comes from two constitutionally-sanctioned funds: The Higher Education Fund (HEF) and the Available University Fund (AUF). AUF funds are total investment returns from all investment assets and income from the Permanent University Fund (PUF). For this reason, AUF funds are only accessible to institutions that receive funding from the PUF (LBB, 2016a, 2019; THECB, 2018). Per the THECB, all constitutional funds can be used "to acquire land; construct, equip, repair, or rehabilitate

buildings; and acquire capital equipment" (LBB, 2016a, p. 31), but are treated differently depending on their fund of origin and the institutions they are appropriated to. While AUF funds are considered Other Funds sourcing from investment returns, HEF funds are General Revenue Funds specifically appropriated by statute (LBB, 2016a, 2019; THECB, 2009). This distinction is important to note because of restrictions certain capital funding may have. General Revenue Funds that are appropriated outside of the AUF or HEF, for example, are not allowed to be used for new construction unless it is for uninsured losses caused by natural disasters or if two-thirds of the Legislature votes on the project as showing necessity (LBB, 2016a).

The differences surrounding both constitutional funds extend beyond source, ranging from resource amounts to regulation of the capital funds use. The Texas Constitution dictates the rules around both constitutional funds, giving the legislature authority over use. The legislature has the power of review and approval for any new construction projects at any public four-year institution, outside of UT-Austin, TAMU, or Prairie View A&M University (PVAMU). The legislature rationalizes this system as a way "to assure efficient use" of capital funding and to maintain the "orderly development of physical plants" (LBB, 2016a, p. 31), but does not include the two largest public four-year institutions in the state under power of review. None of the three listed institutions are HSIs and are also members of the institutional group benefitting from the higher-funded AUF.

Capital funding from the Available University Fund (AUF). There are 21 total institutional organizations that benefit from the AUF, and all are either part of the UT or TAMU Systems (THECB, 2009). Only 14 of the 21 organizations are proper four-year

institutions, with the remaining 7 being the two system organizations, service agencies, and affiliated medical centers (LBB, 2016a; THECB, 2009). Of these 14, six are HSIs and eight are non-HSIs. The current member institutions are included in the AUF due to their membership within the UT and TAMU Systems prior to the creation of the HEF in 1985 (THECB, 2014). By comparison, the AUF was founded in 1876 (THECB, 2009). Even as members, the fund has restrictions on which institutions gain full access to the AUF funding pool.

AUF funding comes from the surface lease income of the PUF's 2.1 million acres of land, as well as the total investment returns of the PUF's assets (THECB, 2009). This total estimated value stood at $1.7 billion for the 2016-2017 biennium (LBB, 2016b). Constitutional guidelines dictate the flow and purpose of the AUF funds throughout their allocation process. It purposes that the first use of AUF funds go towards paying bonds used and owed for construction projects at the 21 organizations (LBB, 2016a). Once bond debt has been paid, the remaining monies are to go towards: the support and maintenance needs of UT-Austin, TAMU, and PVAMU; and the administrative expenses of the UT and TAMU Systems (THECB, 2009). The constitution also requires that two-thirds of total AUF funds go to the UT System, and the remaining one-third to the TAMU System (LBB, 2016a). Each system's governing board then decides on the allocation amount for each of their system-member institutions, while following the required priorities of funds use.

Interestingly, this tiered system places all HSI AUF members at the disadvantaged rung. The only access these institutions have to AUF appropriations are for paying back debt issued for existing capital expenditures. The amount available is decided by chance

that they are either in the UT System or TAMU System. Any residual funding, which can be used "for a wide range of programs intended to develop excellence" (THECB, 2009, p. 1), is limited to three non-HSIs that include UT-Austin and TAMU. The HEF was a legislative response to the funding disadvantage that the AUF presented to the rest of Texas's public institutions.

Capital funding from the Higher Education Fund (HEF). The HEF was a result of amendments made to the Texas Constitution in 1984 that allowed for the legislature to set aside capital appropriations for public institutions excluded from PUF revenue (THECB, 2009). There is a total of 30 organizational members in the HEF, with 23 of those being public four-year institutions (THECB, 2009). Of the 23 public four-year institutions, 15 are HSIs and eight are non-HSIs. The number of non-HSIs in the HEF and AUF are currently equal, but there are more HSIs in the HEF than in the AUF. Unlike the AUF, the HEF also includes Texas's technical and two-year state colleges and is open to the possibility of adding more institutions. The start of FY 2016 saw the addition of the University of North Texas at Dallas and the Texas Tech University Health Sciences Center at El Paso to the HEF (LBB, 2016b).

Even though the HEF was established with the intent to make capital appropriations in Texas more equitable to beneficiaries of the PUF-AUF (THECB, 2009), it is treated in a critically different manner. Aside from having a larger member count, the HEF has historically had much less funding available for appropriations. The fund started with $100 million of annual appropriations in 1985 (THECB, 2014), and did not see another increase until 1996 at $175 million (THECB, 2009). The HEF saw an increase of $131.3 million in 2015 (LBB, 2016b), totaling to $656.3 million for the 30 member

organizations for the 2016-2017 biennium (LBB, 2016a). Furthermore, HEF funds follow a more rigid path towards being appropriated to its member institutions. Unlike the wide range of uses AUF funds are allowed for after paying for capital projects and debts, all HEF appropriations must only be used for capital expenditures or to pay back HEF bonds used towards capital projects. Additionally, the amount that each institution receives is decided upon by the state legislature, which uses an allocation model administered by the THECB (THECB, 2016). This means that for a typical appropriation cycle, the HEF funds up to the capital costs and debts for each institution without chance of surplus. The HEF allocation model administered consists of three elements that are used to assess appropriation needs for the public four-year HEF institutions (LBB, 2016a). The three elements are space deficits, condition of facilities, and institutional complexity (Higher Education Assistance Fund Advisory Committee, 1998).

In this model we once again see the role that institutional space plays in appropriation funding. The space deficit element considers the difference between an institution's actual space and the space projection amount that results from the Space Projection Model (HEAFAC, 1998). If no space deficit exists, the institution does not provide HEF funding for this element. The condition of facilities element accounts for renovation and maintenance costs for academic facilities, and the institutional complexity element considers the costs related to running an institution's programming based on the type of institution (HEAFAC, 1998). In essence, these elements are meant to fund the necessary amounts to keep the institution functioning, but not to have the institution grow or expand in capital. Per the Texas Education Code (2015), HEF funds cannot be used for new construction and land acquisition projects without prior approval of the legislature or

the THECB. Conversely, AUF institutions do not deal with this red tape in their capital aspirations. What all institutions can and do use to fund their capital projects are tuition revenue bonds.

Capital funding from tuition revenue bonds. Tuition revenue bonds (TRBs) are bonds issued by the legislature to institutions for the purpose of acquiring, building, improving, or enlarging capital assets (THECB, 2010). These bonds act as a loan that the institution applies for with a designated revenue stream set as the source for the loan payback. Typically, revenue bonds are issued for capital projects that can produce their own steady stream of income, like auxiliary services, but TRBs pledge payment to come from tuition over time (THECB, 2010). The costs of capital projects taken on by TRBs have grown substantially, though, with tuition alone not being enough to fund the TRB payment. In 2015, the 84th Texas Legislature authorized $3.1 billion worth of capital projects funded by TRBs (LBB, 2016a, 2016b), with most of that expense, $2.2 billion, being for capital projects at public four-year institutions (Eklund, 2018). For this reason, since their steady increase in Texas starting in the late 1970s, state appropriations have become necessary for the payback of these TRBs (Cardozier, 2001). Over time, the handling of TRBs has lacked clearly defined direction and become a controversial topic in state politics (see Appendix B).

In what has become typical practice, the Texas state government reimburses institutions for their TRBs through a special line item in the GAA for each institution (THECB, 2010). The line item is part of the Infrastructure Support goal as “Tuition Revenue Bond Retirement” (GAA, 2015) and thus acts as a form of post-project capital appropriation that comes from General Revenue Funds. Historically, the Texas legislature

has funded all, or most, of the TRB debt service for all public four-year institutions through this appropriation (LBB, 2016a). On the non-formula side, constitutional funds can also be used "for payment of debt service on bonds issued for authorized purposes" (LBB, 2016a, p. 31). The willingness of the Texas state government to pay for the debt accrued by institutions' capital projects shows the state's acknowledgement of the importance of capital assets. This attitude extends from state legislators' general support of funding capital project requests (Hackworth, 2019) to clear documentation on fiscal notes stating that while capital debt is not the state's obligation, it historically has reimbursed institutions for the tuition used to pay back the capital debt service (LBB, 2015). Furthermore, the THECB values the addition of institutional capacity via TRBs as necessary to meeting *60x30TX* goals (Eklund, 2018).

Figure 3 presents the relationships and influences within the context of the Texas state funding system. While the solid arrows represent direct influences, the clear arrows represent conceptual relationships. For example, the bigger the enrollment an institution has, the more SCHs and faculty numbers the institution most likely has, and the more capital space the institutions most likely needs. Measures like SCHs reported and faculty numbers directly influence both state appropriations (via the formula funding model) as well as the amount of predicted NASF (via the Space Projection Model).

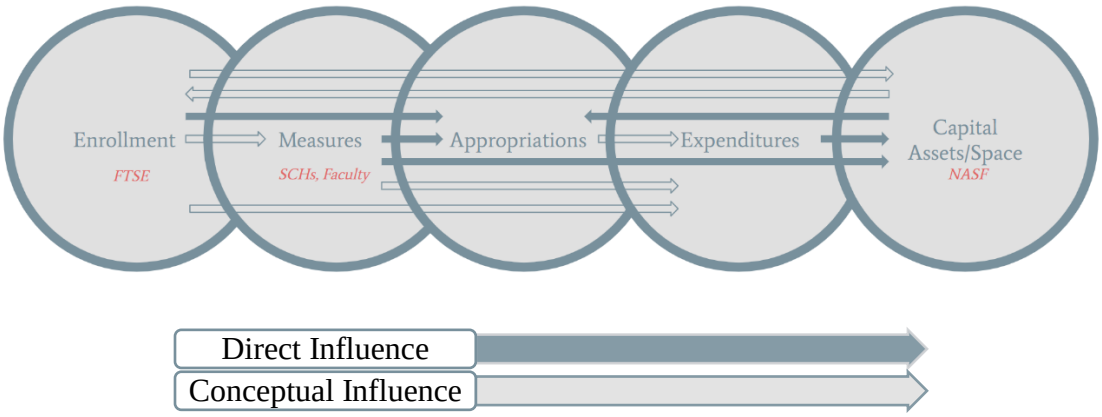

Figure 3. State Funding Relationships and Influences.

The review of literature presents the financially formative situation of HSIs at both the national and state of Texas levels. With researchers trying to understand how to improve the situation of HSIs from various directions, the financial and structural facets of the problem have not been explored in depth. Ortega et al (2015) is one of the sole studies focused primarily on financial resource differences between HSIs and non-HSIs, finding significant differences between the two without mentions of institutional capital expenses. Other studies examine the impact of finances in the form of aid to students (Crisp & Nora, 2010), mention existing financial resource differences across four-year HSIs due to institutional variability (Núñez & Elizondo, 2012), and report on difficulties institutional leaders face when vying for limited Title V funding (Cortez, 2015). Therefore, studying HSI relationships with fiscal resources is an area of research that is significantly needed (Núñez et al., 2015).

Within the state of Texas, the state appropriation system for public higher education is clearly divided between formula and non-formula funding, but both streams have connections with institutional capital assets, expenditures, and campus space. Capital funding comes from non-formula appropriation funds, while Infrastructure

Support derives from formula-based appropriations (LBB, 2016a, 2019). The legitimized measures for institutional success related to enrollment increases, expenditure increases, and the required faculty to achieve these goals are also all associated with institutional space. State appropriations used for formula funding are based on the production of SCHs, number of faculty, and projected institutional space. The projected institutional space elements are also based on SCH amounts, amount of faculty, and certain expenditure amounts. Non-formula funding appropriated into capital-focused constitutional funds are then used on capital expenditures, influencing institutional square footage which is the unit of focus within the Space Projection Model. The literature further outlines how state appropriations in Texas value institutions improving on the legitimized strategic measures for the sake of Texas's future, specifically in the wake of the growing Latinx population. However, it also reveals the absence of specified support, recognition, and role of Texas HSIs in the process.

Chapter III

Methodology

The goal of this study is to understand the potential relationship of HSI designation to state funding amounts and legitimized expenditures and measures, as well as the potential association of HSI designation to the relationships between Texas state funding and legitimized expenditures and measures. The disregard to HSI designation within state funding models and strategies could create an environment conducive to institutional isomorphism, with the lesser-resourced institutions pushed to respond similarly as those attaining more of the state support. Texas state funding consists of state appropriation amounts from both formula-based and non-formula-based funding sources. Legitimized expenditures include operating expenditures and current capital outlay. Institutional expenditures have been found to be correlated with increased student success at institutions enrolling large number of minority and need-based students, like HSIs (Garcia, 2019). Legitimized measures include reported SCHs, T/TT faculty numbers, and four amounts of predicted NASF. SCHs is a proxy for enrollment, due to higher enrollments resulting in more reported SCHs produced. Faculty are a measure used to calculate predicted office space, and T/TT faculty are considered within the formula-based teaching supplement appropriation. Additionally, T/TT faculty numbers are used instead of total faculty numbers because they are more relevant in measuring institutional excellence and rankings (Alperin, Nieves, Schimanski, Fischman, Niles, & McKiernan, 2019; Harley, Acord, Earl-Novell, Lawrence, & King, 2010; Pusser & Marginson, 2013; Schimanski & Alperin, 2018).

The first part of this study hopes to identify significant differences in state funding and institutional expenses and measures between public four-year HSIs and non-HSIs. The purpose of this portion of the study is to see if Texas is providing equitable support to HSIs, given the lack of HSI acknowledgement within the state's higher education strategic plans alongside mention of the importance of Latinx student success. If not, the conceptual understanding is that the state is establishing environmental pressures to its public institutions in the form of unequal state support. The second part of the investigation will then seek to understand if HSI designation affects the correlation between state funding and institutional spending and measures legitimized by the state's strategic higher education plans. The question that arises is whether or not state appropriation amounts matter in the spending behaviors and measures between HSIs and non-HSIs in the context of legitimized expectations. If HSIs are found to be within an environment of unequal state support when compared to non-HSIs, then the relationships between state appropriations and expenditures/measures should not be the same as that of non-HSIs. If so, the institutions are responding to the contextual environment in an isomorphic manner to gain legitimacy within Texas's strategic and funding expectations.

Data Sample

The institutions used in this study are the 37 public four-year[4] institutions in the state of Texas, as identified by the THECB. All the institutions are governed by

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[4] Texas does not provide capital appropriations for two-year institutions. The appropriations model for two-year institutions also follows a drastically different system focused on performance-based metrics, while the four-year funding model does not. Additionally, the legitimized measures considered in this study and derived from the strategic plans are measures that are not within two-year institutional capacities, including research and tenured faculty.

governor-approved and Senate-appointed governing boards, with the THECB and state Legislature collecting the principal amount of their institutional data. Sul Ross State University Rio Grande College (RGC) has its expenditure data included within Sul Ross State University's numbers, even though certain data like tuition is listed separately. Due to this institution missing data values pertinent to this study, the total number of public four-year institutions included becomes 36 institutions. Of the 36 institutions, 20 are federally-designated as HSIs and 16 are non-HSIs, as of FY 2017. Tables 1 and 2 lists the 36 institutions split between HSIs and non-HSIs:

Table 1

List of Public Four-Year HSIs in Texas for Fiscal Year 2017

Institution	*Total Enrollment*	*Total FTSE*	*Total E&G State Appropriations*
Angelo State University	10,189	7,181	34,669,514
Sul Ross State University	1,996	2,228	14,921,093
Texas A&M International University	7,640	5,989	39,736,693
Texas A&M University–Corpus Christi	12,236	9,259	61,390,049
Texas A&M University–Kingsville	8,674	7,390	53,856,642
Texas A&M University–San Antonio	6,460	4,102	29,773,787
Texas State University	38,666	32,325	150,343,981
Texas Tech University	36,634	32,254	211,544,442
Texas Woman's University	15,321	12,135	72,645,826
The University of Texas at Arlington	41,712	32,029	170,956,840
The University of Texas at El Paso	25,020	19,103	111,367,207
The University of Texas at San Antonio	30,674	24,161	142,428,307
The University of Texas of the Permian Basin	7,022	4,358	36,359,672
The University of Texas Rio Grande Valley	27,708	23,360	163,362,781
University of Houston	45,364	37,464	234,632,094
University of Houston–Clear Lake	8,542	6,166	45,143,443
University of Houston–Downtown	13,913	9,644	41,308,339
University of Houston–Victoria	4,351	2,963	21,441,629
University of North Texas at Dallas	3,509	2,560	16,810,765
West Texas A&M University	10,060	7,891	43,744,763

Notes. Total Education and General (E&G) State Appropriations are in dollars ($). FTSE = Full-time student equivalent.

Table 2

List of Public Four-Year Non-HSIs in Texas for Fiscal Year 2017

Institution	*Total Enrollment*	*Total FTSE*	*Total E&G State Appropriations*
Lamar University	13,929	11,924	66,549,343
Midwestern State University	5,661	4,671	25,418,941
Prairie View A&M University	9,125	7,800	64,302,080
Sam Houston State University	20,938	17,574	85,493,273
Stephen F. Austin State University	12,578	10,856	56,521,061
Tarleton State University	13,019	10,762	53,517,369
Texas A&M University	62,802	54,427	404,669,085
Texas A&M University at Galveston	1,998	2,206	22,544,329
Texas A&M University–Central Texas	2,575	1,799	17,529,685
Texas A&M University–Commerce	12,490	9,821	55,173,354
Texas A&M University–Texarkana	2,038	1,549	20,353,296
Texas Southern University	10,237	8,381	75,601,547
The University of Texas at Austin	51,425	46,927	398,015,039
The University of Texas at Dallas	27,642	22,416	148,226,420
The University of Texas at Tyler	9,934	7,300	41,762,135
University of North Texas	38,081	31,715	159,911,662

Notes. Total Education and General (E&G) State Appropriations are in dollars ($). FTSE = Full-time student equivalent.

Keeping and controlling for UT and TAMU as outliers. The data used in this study present UT-Austin and TAMU as two probable outliers. Both institutions claim the highest total operating expenditures of all public four-year institutions, the greatest number of FTE and T/TT faculty, produce the most SCHs, and have some of the highest expenditures of all institutions in the study. Both institutions also have access to state research funding that is restricted to the Research accountability group, of which only UT-Austin and TAMU are members of (LBB, 2016a; THECB 2018a). Even with these stipulations, the per-FTSE system in place narrows the gaps that exist in measure differences between these two institutions and the rest of the sample.

The state of Texas implements the per-FTSE system of reporting annual data in order to be able to compare institutions that differ greatly (THECB, 2018c). When broken down into dollars spent per FTSE, some of the expenditures and measures of UT-Austin and TAMU are no longer the highest in the sample. The large enrollments of both institutions mean more students to consider on a per-student spending scale. Additionally, UT-Austin and TAMU are the two flagship institutions in Texas. Without inclusion in the study, a large portion of Texas public four-year college students are left out, since both have the top two highest total and undergraduate enrollments of all public four-year institutions (THECB, 2018a). Furthermore, even though neither are designated as HSIs, their large enrollments still equate to a large Latinx student population. In fact, both institutions are near the 25% federal threshold to be eligible for HSI status, with percentage of fall 2017 undergraduates being Hispanic at 24.1% for UT-Austin and 23.5% for TAMU (THECB, 2018a). Additionally, at the per-FTSE scale, certain institutions within the second-tier accountability group, *Emerging Research* institutions, have comparable metrics to those of UT-Austin and TAMU. One of the largest in that group, UH, is also an HSI. The LBB (2016a, 2019) notes that the Texas Legislature has certain research funds in place meant to elevate such institutions into the *Research* tier alongside UT-Austin and TAMU in the future.

Data Sources

This study uses data from various data bases and collections available to the general public. The main data sources are the Texas Higher Education Coordinating Board (THECB), the Texas Constitution and General Appropriations Act (GAA), and the THECB Space Projection Model Report. Other data sources include the TAMU and UT-

Austin AUF reports, the Hispanic Association of Colleges and Universities (HACU), and *Excelencia* in Education. The data is specifically from FY 2017 due to this being the most recent year of reported data across all data sources. The most recent Texas biennium that has reportable data is for the years 2016-2017 as well, which also ends with FY 2017. *Excelencia* in Education (2017) has also tracked HSI status for the institutions up through 2017. All financial data are presented in amounts per state-funded FTSE using each individual institution's reported FY 2017 state-funded FTSE (THECB, 2018a, 2018c). FTSE is calculated by taking the sum of all attempted SCHs and dividing it by the following program-specific semester credit hour levels: 15 for undergraduate, 12 for master's and professional practice, 9 for doctoral research/scholarship, and 17 for optometry (THECB, 2017a, 2018a). The state of Texas does this for ease of institutional comparisons (THECB, 2018c). HACU tracks the federal grant funding eligible HSIs have received, with available data through 2015. Of all the data sources, THECB collects the most extensive amount of data of use for this study.

Texas Higher Education Coordinating Board data. The THECB creates a yearly institutional report titled the *Texas Public Higher Education Almanac* (THECB, 2018a, 2019b) alongside a corresponding dataset. This dataset provides information that includes total FTSE, categorized operating expenditures, percentage of total faculty that are T/TT, and T/TT faculty for all public institutions of higher education in Texas. The THECB almanac is necessary as it provides a detailed individual snapshot of each public institution. The THECB also creates allocation summaries, such as the *Sources and Uses of Funds* report (THECB, 2018c), which report appropriation and capital outlay amounts

for each four-year institution per fiscal year. These allocation summary reports include some data that are also found on the GAA and Texas Constitution.

Texas Constitution and General Appropriations Act (GAA) data. The GAA and Texas Constitution provide a great depth of data for this study and come directly from the Texas state government. The GAA (2015) used for this study is for the 2016-2017 biennium and provides formula-based state appropriation amounts, capital appropriations in the form of TRB retirement, fund-specific state research funding, special items funding, teaching supplement amounts, and small institution supplement amounts for each year of the biennium. The Texas Constitution provides HEF allocation amounts for each HEF institution that will act as a control for capital expenditures (Texas Education Code, 2015).

Space Projection Model report. The Space Projection Model Report is created by the THECB (2005). The report provides institution-specific data on reported SCHs per semester, total NASF, predicted NASF, and NASF for teaching, library, research, office, and support spaces (THECB, 2017b). The measures important to this study are reported SCHs, predicted total NASF, teaching NASF and office NASF.

Other data sources. There are four other data sources that provide specific financial data for certain institution groups in this study. The TAMU (The Texas A&M University System, 2017) and UT-Austin (The University of Texas System, 2018) AUF reports for FY 2017 show how much AUF funding was provided for each institution in each respective system. These reports exist because, unlike the HEF, AUF funding is appropriated by the TAMU and UT System governing boards for reach other their member institutions. AUF amounts for each institution are in per FTSE format and used

as a control for capital expenditures. The third source, HACU (2019e), collects data Title V funding since HSI designation does not guarantee receiving this type of federal funding. Finally, *Excelencia* in Education (2017) provides data on the amount of years each institution has been designated as an HSI.

Variables

The variables for this study derive from the focus on institutional capital, along with institutional expenditures and measures legitimized from the Texas higher education strategic plans, the funding model, and the Space Projection Model. All legitimized expenditure and measure variables are related in some capacity to capital, due to the Space Projection Model. Appendix C has the details and sources for all variables in the study.

Independent variables. The independent variables in this study for the first research question (RQ1) are HSI designation (two groups) in one analysis, followed by HSI designation (two groups) alongside accountability groups (four groups) in a second analysis. For the second research question (RQ2), the independent variable is a sum of the formula-based appropriations o*perations support* and *E&G space support*. Together, they are labeled as *formula funds total.* The independent variable for the third research question (RQ3) is the *E&G space support* appropriation only. State appropriation amounts are restricted to funds provided by the state of Texas only, are per FTSE, and depending on the research question, are isolated from their source of origin. *E&G space support,* for example, is reported as part of the overall Infrastructure Support appropriation total, alongside TRB retirement and the Small Institution Supplement.

Dependent variable categories for RQ1. The dependent variables for RQ1 are split among three categories: (1) state appropriations, (2) legitimized expenditures and measures, and (3) legitimized capital expenditures and measures. These three categories include all the variables used in the study, including both the independent and dependent variables for the second and third research questions. The variables within the state appropriations variable category are only treated as dependent variables for RQ1.

Dependent "legitimized expenditure and measures" variables. For RQ2, the legitimized expenditure variable is reported operating expenditures. This amount includes institutional costs that have been identified as important for the completion of Texas higher education strategy goals, as factors in helping predict projected institutional space, and as necessary for institutional capacity to serve students. The THECB provides the operating expenditure amount as a sum of four sub-categories that represent the institution's ability to function and carry out its mission, legitimizing their purpose. Only three of the four sub-categories are included in the operating expenditures variable for this study. "Other" is excluded due to its minimal amount in the total and unrelatedness to this study.

The dependent legitimized measures in the study include T/TT faculty numbers and reported SCHs. These metrics are used in the Space Projection Model to predict needed teaching and office NASF. The underlying legitimacy for these variables is based on the importance of enrollment for Texas higher education previously discussed. Increased enrollments require more faculty, which results in more SCHs attempted.

Dependent "legitimized capital expenditure and measures" variables. For RQ3, capital outlay from current fund sources, as reported on the Sources and Uses of

Funds Report (THECB, 2018c), is the legitimized capital expenditures variable. These capital outlay amounts are the capital expenditures for the construction and acquisition of capital assets for each institution per FTSE for FY 2017, derived from the annual financial report (THECB, 2018c). The three dependent variables directly related to capital measures are predicted NASF for total, office, and teaching spaces. Besides the total, the two space factors included as variables are the spaces related to this study based on the academic five-factor model.

Moderator. The moderator variable used for RQ2 and RQ3 is HSI designation. HSI designation consists of two levels, either HSI or non-HSI in the sample. As a moderator, this qualitative categorical variable acts a direct third variable in the analysis, besides the predictor and outcome variables, that can influence the power of the relationship between predictor and outcome variable (Baron & Kenny, 1986). Due to the state of Texas's lack of direct HSI acknowledgement in both strategic plans and formula funding models, the scope of this study is to consider that differences do exist in the appropriation and expenditure/measure relationships between designation types. If HSI designation does influence in this manner, the variable is said to have a moderator-interaction effect on the correlation between independent and dependent variable(s) (Baron & Kenny, 1986).

Mediators. The analysis will consider two potential mediators: Title V funding for RQ2 and RQ3, and constitutional funds for RQ3. Mediators are variables that better explain, or causally mediate, the relational path between an independent and dependent variable(s) (Baron & Kenny, 1986). Title V funding from the federal government is not a guaranteed source of funds for HSIs. HSIs must apply for Title V funding, which if and

when received, can be used for a variety reasons, inclusive of capital enhancements (HACU, 2019d). If an HSI has received Title V funding, they have more funding available than an HSI that has not received Title V funding. Receiving this funding could influence the amount that the institution spends on capital or other institutional expenditures. Constitutional funds, on the other hand, are available to both HSI and non-HSIs in the sample. Since RQ3 is focused on capital-related expenditures and measures, and because constitutional funding is solely for capital expenses, it may mediate the relationship between appropriations and capital outlay/NASF amounts. If constitutional funding is shown to not mediate the predictor-outcome paths in the analysis, the variable will become a control due to how differently AUF and HEF funding works.

Control variables. The various control variables included in this study are meant to isolate the dependent variables discussed and try to keep all of the four-year institutions on an equal grounding. Control variables will differ based on the correlational analysis and conceptual fit, and are chosen after checking for correlational values between them. Due to the size variability across the 36 institutions, the total student enrollment, actual institutional NASF, percentage of faculty that are T/TT, and total reported SCH are considered as analyses controls. Institutional size is also a factor in certain institutions receiving the Small Institution Supplement, based on enrollment, the Teaching Experience Supplement, based on available T/TT faculty, and E&G total state support amounts. The GAA also has variability across Special Items funding, which is decided on by the legislature's opinion on what is considered important for more allocated funding. Special Items funding can include special capital projects, with certain institutions having limited financial help in this specific category (Najmabadi, 2018;

Watkins, 2017). For these reasons, total E&G state support amounts, which include supplements and special items funding, is a principal control variable that will be controlled for, outside of the formula-based appropriations used as predictor variables in the RQ2 and RQ3. This will help eliminate financial advantages an institution may have due to exclusive appropriations from the GAA.

Additionally, institutional operating revenue amounts, that include tuition and fees, private gifts, grants and contract amounts, federal appropriations, and non-appropriated institutional operating revenue like AUF excellence monies, will also be controlled, for expenditure variable reasons. AUF excellence funds are residual monies leftover after PUF sums have paid for capital debt services that can be used for improving academic excellence at the institutions (THECB, 2018c), but they only go to three AUF institutions (UT-Austin, TAMU, and PVAMU). For HSIs, the length of time in years of having HSI designation and Title V funding since 2012 will also be controlled for, pending correlational levels. HSI designation has identity and federal funding implications. An institution that has been an HSI for a long period of time has a higher change of receiving Title V funding compared to an institution that has been designated more recently. Title V funding is considered since 2012 because of Title V grants being five-year grants, and this study focusing on FY 2017.

Finally, the accountability grouping categorical variable will be controlled for after being transformed into a two-level dummy variable that designates each institution as either high research activity or not high research activity. Using both the THECB accountability group descriptors (THECB, 2019a) and Carnegie basic classification (The Carnegie Classification of Institutions of Higher Education, n.d.), institutions in the

sample that are both “doctoral” institutions or higher per THECB and at least “R2 Doctoral: High research activity” per Carnegie classification are designated as high research institutions. The goal of this control dummy variable is to view analysis results in relation to high research institutions. Doing this also controls for THECB accountability directives. By assigning each public four-year institution an accountability group that has specified institutional strengths of focus, expenditures could lean towards accountability group type. Emerging research universities, for example, may have more to spend on operations than a master’s-focused institution. Accountability groups can affect the amount of funding the institutions have at their disposal, as well as the institutional expenses that they engage in.

Data Analysis

The guiding questions for this study seek to understand *if Texas is providing equitable state financial support to its public four-year HSIs when compared to its public four-year non-HSIs***,** and *if state financial support reflects state-legitimized institutional expenditures and measures differently because of HSI designation***.** To address these questions, this study addresses three research questions by using multivariate analyses of variance (MANOVA) and moderated hierarchical multiple regression (MHMR) analyses. For the first research question, the predictor variables are categorical and the outcomes are continuous. For the remaining two research questions, both the predictor and outcomes variables are continuous.

Research Question 1: *Are there significant differences in all state appropriation types, legitimized institutional expenditures and measures, and capital expenditures and measures between public four-year HSIs and non-HSIs in Texas?* RQ1 is split into two

parts: Part A has the one-way MANOVAs and Part B has the two-way MANOVAs. Multivariate analyses of variance are ideal for this question due to their ability to evaluate differences in means for a set of outcome variables when using grouped predictor variable with two or more levels (Tabachnick, Fidell, & Ullman, 2013). For Part A, the predictor variable has two levels based on institutional designation: HSIs and non-HSIs. The analysis uses one-way MANOVAs to see if significant differences exist between HSIs and non-HSIs in regards to all the study variables by category. There is a total of 11 continuous variables in this study, grouped within the three variable categories. There are four variables under (1) state appropriations, three variables under (2) legitimized institutional expenditures and measures, and four variables under (3) legitimized capital expenditures and measures. This means that Part A of RQ1 has three one-way MANOVA models with varying number of outcomes.

Part B of RQ1 includes the accountability group variable as an additional independent variable alongside the HSI designation variable. The state has already grouped institutions based on institutional characteristics through the accountability grouping system, which allows for this study to assess differences between institutions in a more structured way using the accountability group characteristics. Therefore, two-way MANOVAs are used to gauge significant mean differences for the 11 outcome variables between HSIs and non-HSIs across accountability groups. Of note is that only four out of the five accountability groups contain HSIs, as Texas only has two *Research* universities and neither is an HSI. For this reason, the *Research* accountability group cannot be included in the comparative analysis.

These initial analyses investigate potential differences in state appropriation, legitimized expenditures, and legitimized measures between HSIs and non-HSIs, and across accountability groups. It also helps assess the environmental context that Texas public four-year institutions find themselves in. The analyses for the proceeding two research questions are correlational. Their purpose is to investigate any influence that HSI designation may have on the predictive power of specified appropriation funds on expenditures and measures deemed important by the state of Texas's higher education goals and funding model.

Research Question 2: *Does HSI designation influence the relationships between formula-funded state appropriations and total operating expenditures, reported semester credit hours, and tenured/tenure-track faculty numbers?* The total formula-funded state appropriations in this research question, labeled as *formula funds total*, refers to the total amount of *operations support* funding, found within I&O funding, plus *E&G space support* funding, found within Infrastructure funding. The focus is on these state appropriations because they are derived from the state's formula funded model that is influenced by institutional space projections. Funding that institutions get from the state of Texas is used to cover institutional expenses that are then partially used to predict the amount of space institutions will need in the future. The non-expensed factors that are tracked to predict space rely on institutional resource amounts, specifically the amount of SCHs an institution attempts to produce and/or the amount of faculty the institution has. Serving larger enrollments by teaching more credit hours and having more faculty require more expenses.

I investigate the relationship between the formula funds total, the legitimized expenditure variable, and the legitimized measures variables using three separate MHMR models. Hierarchical multiple regression is used so that I can see if variance of operating expenditures, reported SCHs, and T/TT faculty numbers are explained by the amount of formula funds total of state support HSIs and non-HSIs receive. The analyses use the HSI moderator-interaction term and check for possible Title V mediation effect. There are three separate continuous outcome variables resulting in three total models.

Research Question 3: *Does HSI designation influence the relationships between E&G space support funding and capital outlay, predicted net-assignable square footage for total, office, and teaching spaces?* Since RQ3 is correlational and uses the HSI moderator-interaction term, it also uses MHMR models. The focus of this research is similar to RQ2, except that it is concerned with institutional capital aspects regarding capital appropriations, expenditures, and capital space measures. The MHMRs help show if the variances in capital expenditures, predicted NASF amounts for institutional total, office, and/or teaching spaces are explained by the formula-based space support funding differently due to HSI designation. The predictor variable is the *E&G space support* amount, which is part of the overall formula funded amount in the GAA under Infrastructure Support. This analysis also checks for mediator impact of Title V funding and constitutional funds. There are four separate continuous outcome variables resulting in four total models.

Limitations

The study presents various limitations due to the complex nature of the Texas funding model and different treatment of institutions based on type and system. Dealing

with the state government's funding model means dealing with public funding only. Furthermore, the ongoing research around HSIs also presents a still developing understanding of the designation and what it means for higher education. HSIs are a diverse group of institutions that are still a federal item and not a state-focused issue. With these circumstances to consider, the parameters of this study are restricted to a single state's system of public four-year institutions.

Sample size. Due to the focus on state appropriations, this study only looks at public institutions. Private institutions are not included in the study even though the Texas also has numerous private institutions that are designated as HSIs. Furthermore, the specific aspects of the Texas funding model as related to capital appropriations limited the sample to only public four-year institutions. Of the 37 public four-year institutions, the availability of data omitted one institution, Sul Ross State University RGC, due to its revenue and expenditures being included within that of Sul Ross State University's metrics.

Even though there are more two-year HSIs than four-year HSIs in Texas (THECB, 2018a), two-year institutions are not included in the study because the state funds both institution types very differently. The current Texas funding system for public two-year institutions does not provide capital appropriations (LBB, 2016a, 2019), and is instead performance-based for state funding (McKinney & Hagedorn, 2017). Omitting two-year institutions presents a significant limitation regarding Latinx students. With the state's focus on Latinx population success through college enrollment and education, two-year institutions are pivotal because they enroll a large portion of the Latinx college-going population. Latinx student populations, which drive HSI designation, are

predominantly found at two-year institutions and community colleges nationally and in Texas (Ma & Baum, 2016; Núñez, Sparks, & Hernández, 2011).

Single fiscal year focus. Although this study only considers data from fiscal year 2017, the state of Texas allocates its appropriations every two-years as a biennium. Fiscal year 2017 is the second year of the 2016-17 biennium (GAA, 2015). Typically, many appropriations are split evenly across both years in the biennium, such as the Small Institution Supplement (GAA, 2015), but variations do exist year to year. Furthermore, each biennium reflects Texas Legislature decisions that change biennium to biennium based on institutional requests, funding availability, and areas of strategic focus (Hackworth, 2019; LBB, 2016b, 2019; McGuire, 2017).

Variability of funding sources. Institutions can receive specifically aimed grants from a variety of sources that can influence institutional spending capacity. Grants exist at both the federal and state level, and can come with stipulations around the use of funds. This assortment of funding sources makes it difficult to completely control for other funds that could influence the expenditure capabilities of the sample institutions. The study attempts to control for such funding that is closely related to variables, such as federal Title V grant funding and Texas-specific research grants restricted to only a few institutions in the sample. Additionally, tracking of funding for HSIs that come from Title V is sporadic and limited depending on the fiscal year because of the current proposal-based application system (U.S. Department of Education, 2019).

System differences. Although this study attempts to control for the variability in funding sources that exists across the sample institutions, university systems differences that exist in Texas are an ongoing limitation. The UT and TAMU Systems exercise a

certain degree of autonomy that is not bestowed to other university systems in Texas's public higher education context. A clear example of this is present in the state's capital appropriations process via the constitutional funds. The non-formula state capital appropriations system in Texas has rules based on both the state's constitution and the education code. Depending on the institution, the capital funds can come from either of the sources, but the rules on expensing the funds also vary greatly based on the source. While HEF allocations are set each biennium by the legislature for each HEF institution, AUF allocations are provided to the two beneficiary systems (UT and TAMU) in lump sums to then be appropriated to its member institutions by the system governing boards. Aside from the unequal distribution of the AUF funds between the systems, the discretionary status of AUF fund allocation makes comparisons against HEF fund institutions difficult. Even though both are capital appropriations from the state, the amounts, rules, and process of allocation are drastically different and difficult to compare, specifically for HSIs and non-HSIs within each fund group. Constitutional funds are an important source of capital appropriations for Texas public institutions, but due to system differences, these appropriations are limited to being control variables in this study.

Online enrollment is not considered. The advent of online higher education has introduced institutional infrastructure that increases the reach of educational offerings for colleges and universities. The impact that online enrollment can have on student body size without incurring additional capital space costs can be tremendous. Considering that impact is outside the scope of this study.

Chapter IV

Results

This chapter starts with a statistical check of the sample and the variables used in the proceeding analyses. The statistical analyses include descriptive statistics and normality tests, followed by a discussion on the handling of possible outliers in the sample. The chapter then continues with sections for each of the three research questions, which includes the assumptions checks for both MANOVAs and regressions analyses. The section for research question 1 is divided into two parts: Part A for the one-way MANOVAs and Part B for the two-way MANOVAs. The sections for research questions 2 and 3 include explanations on mediation checks and the control variables used.

Prior to running the analyses, I examined the sample of institutions (N = 36) using descriptive statistics, along with the 11 total independent and dependent continuous variables used in the study. No data were missing from the sample of 36 cases. The FTSE of the 36 public four-year institutions ranged from 1,549 to 54,437. The differences between designation type seem evident for some of the statistics listed, such as the minimums for percent of faculty being tenured/tenure-track being 19% for HSIs while 37% for non-HSIs. Additionally, maximum values for some categories are notably different for non-HSIs, such as total revenue per FTSE, with the HSI maximum being $31,191 and the non-HSI maximum reaching $60,212. Nonetheless, after running descriptive statistics to get an institutional picture of HSIs versus non-HSIs in the sample, the means of both measures and revenues showed comparable numbers between the designation types. Tables 3 and 4 provide a snapshot of the institutions between designation types in the study sample.

Table 3

Sample Statistics for Institutional Measures by Designation for Fall 2017

Variable	*Designation*	*Minimum*	*Maximum*	*Mean*
FTSE	HSI	2,228	37,464	14,128
	Non-HSI	1,549	54,427	15,633
Total Faculty	HSI	134	2,092	787
	Non-HSI	138	2,798	879
Percent of Faculty T/TT	HSI	19%	65%	43%
	Non-HSI	37%	66%	48%
Total Actual NASF	HSI	141,985	3,490,011	1,090,658
	Non-HSI	124,292	8,153,802	1,570,738

Notes. FTSE = Full-time student equivalent. T/TT = Tenured/tenure-track. NASF = Net-assignable square footage.

Table 4

Sample Statistics for Institutional Revenue by Designation for FY 2017

Variable	*Designation*	*Minimum*	*Maximum*	*Mean*
Average Tuition & Fees	HSI	7,124	11,078	8,663
	Non-HSI	6,386	12,162	9,359
Total Revenue	HSI	17,623	31,191	21,810
	Non-HSI	18,393	60,212	26,430
Total E&G State Support	HSI	4,283	8,343	6,307
	Non-HSI	4,865	13,140	7,209

Notes. Amounts are rounded to the nearest whole number. All values are in dollars ($) per-FTSE.

Univariate Normality Tests

Before addressing RQ1, I conducted normality tests of all the study variables. This assumption test was done for each of the 11 variables of the overall sample. The Shapiro-Wilk value resulted in non-statistically significant p-value ($p > .05$) for only the operations support variable. Table 5 shows the descriptive statistics and normality test *p*-values for each of the study's variables. Figure 4 shows the histogram for the only normally distributed variable, operations support, and the histogram for the non-normally

distributed E&G space support variable. The histograms for each of the 11 variables show the that the data is skewed to the right, meaning that the means are larger than the medians. This is most likely occurring due to the influence of some of the larger resourced institutions affecting the numbers in the data. That influence was expected for institutions like UT-Austin and TAMU, which require further examination to understand them as possible outliers within the smaller sample size.

Table 5

Descriptive Statistics and Normality Tests for All Study Variables

Variable	*Minimum*	*Maximum*	*Mean*	*Shapiro-Wilk*
State Appropriations	$3,156	$14,930	$6,395	.000
Operations Support	$1,914	$5,050	$3,499	.164
E&G Space Support	$351	$1,232	$610	.000
TRB Retirement	$50	$3,788	$681	.000
Operating Expenditures	$13,451	$40,421	$17,426	.000
T/TT Faculty	44	1,673	405	.000
Reported SCH	19,734	753,764	201,168	.000
Capital Outlay	$36	$1,788	$456	.000
Predicted Total NASF	188,054	10,436,926	1,902,839	.000
Predicted Office NASF	59,892	3,959,753	595,413	.000
Predicted Teaching NASF	63,592	2,444,977	696,366	.000

Notes. Mean rounded to the nearest whole number. Dollar ($) amounts are per-FTSE. T/TT = tenured/tenure-track. SCH = Semester credit hours. NASF = Net-assignable square footage.

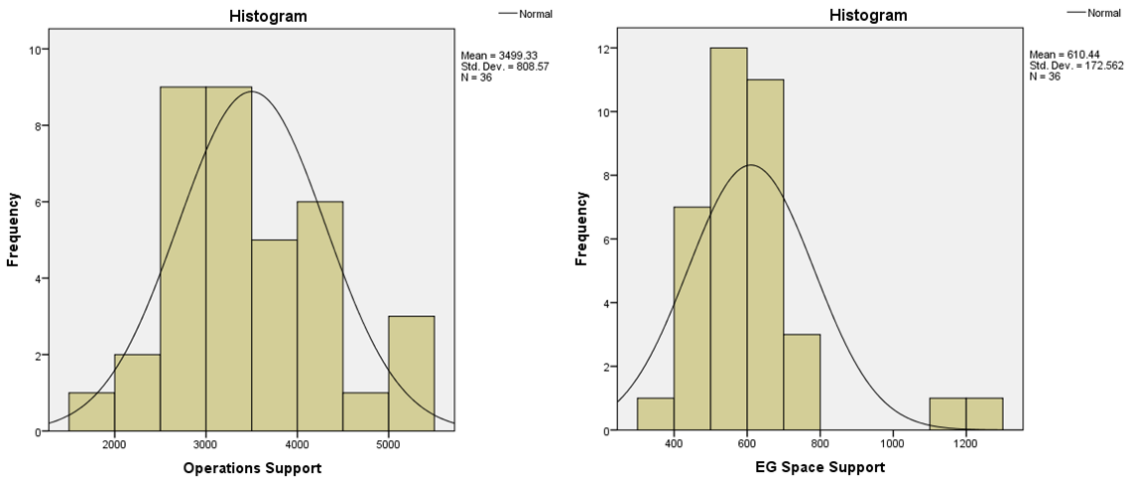

Figure 4. Comparison of Two Distributions. Normal distribution of operations support and non-normal distribution of E&G space support.

Univariate Outliers

I used the z-scores for each of the study variables to detect possible univariate outliers. Typically, the z-score range is within three standard deviations of the mean (Pituch & Stevens, 2015), with considerations made for a range of four standard deviations of the mean (Younger, 1979), but this is for normally distributed data. Nonetheless, Pituch and Stevens (2015) state that the typical z-score range of > 3, inclusive of the z > 4 rule, is acceptable for any type of distribution. Following the z > 4 rule, the following cases within a specific variable were identified as possible outliers: TRB retirement for Texas A&M University – Texarkana, z = 4.471; operating expenditures for UT-Austin, z = 4.578; and office NASF for UT-Austin, z = 4.252. TAMU-Texarkana's TRB retirement per FTSE is much higher than the other cases for this variable, but it is not the highest when considering the total amount for FY 2017. In this situation, TAMU-Texarkana's smaller enrollment size is resulting in a high number for the institution's TRB retirement. UT-Austin, on the other hand, was an expected

outlier given its institutional size and flagship status when compared to other institutions. Given the small sample size and the limited variables affected using the z > 4 rule, these univariate outliers are left in the study and investigated further in the multivariate outlier tests. Furthermore, Shiffler (1988) reasons that for small sample sizes, outliers within the typical terms of standard deviations from the mean are harder to identify as true outliers. Under such circumstances of small sample size and cases understood as potential outliers, researcher judgment using univariate normal Q-Q plots for the variables can be used to assess normality.

Use of Normal Q-Q Plots

Although there are numerous variables that violate normality, MANOVAs and regression analyses are robust to non-normality (Pituch & Stevens, 2015). Furthermore, for small sample sizes that are unequal, as is this case for this study between HSIs and non-HSIs, the researcher can rely on judgement due to difficulty in establishing non-normality via statistical normality tests (Tabachnick et al., 2013). One way of doing this is by using normal Q-Q plots. The observations on the Q-Q plot should resemble a straight line for normality to be deemed defensible (Pituch & Stevens, 2015). The normal Q-Q plots for the continuous variables that violated the Shapiro-Wilk test (see Appendix D for all normal Q-Q plots) show that these data observations are acceptably along the anticipated normal distribution line. Figure 5 shows the normal Q-Q plot for the state appropriations variable for the overall sample, which was statistically significant at $p < .001$. This plot shows the possibility of observable outliers in the data that can be influencing the violation of normality for this specific variable. Nonetheless, outliers can cause issues for small sample sets when running MANOVAs. Checking for multivariate

outliers, and deciding to remove them for the analysis, is part of the assumptions check for MANOVAs in RQ1.

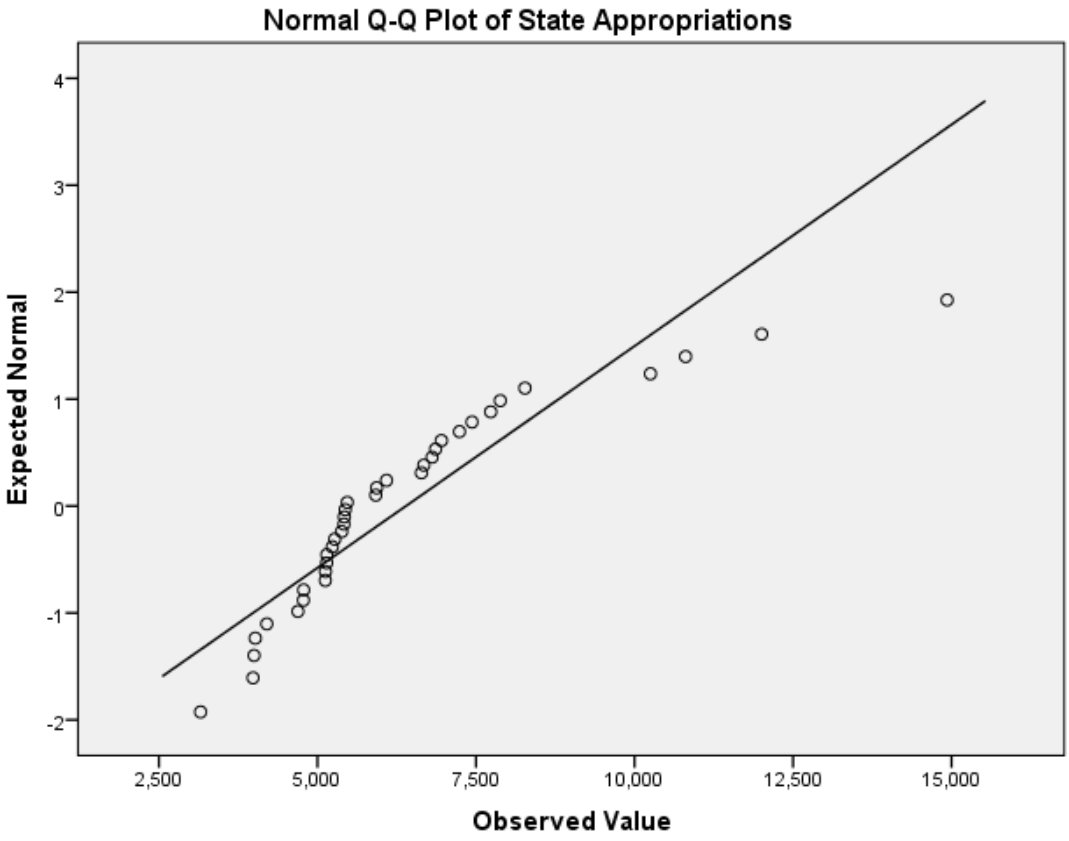

Figure 5. Normal Q-Q Plot of State Appropriations per FTSE.

Research Question 1

Are there significant differences in all state appropriation types, legitimized institutional expenditures and measures, and capital expenditures and measures between public four-year HSIs and non-HSIs in Texas?

RQ1 is foundational for this study because of its contextual importance. In order to understand the institutional environmental that HSIs are in within the state of Texas, this question examines possible differences across the variables as compared to non-

HSIs. Institutional behavior that leans towards isomorphism and resource dependence is based on the relationship and response that institutions have with their environs. If differences do exist in state government appropriations between Texas HSIs and non-HSIs, hypothetically with Texas HSIs receiving less support, then the expenditure behavior and measure amounts may reflect the inequal situation.

RQ1 is broken down into six different MANOVAs, starting with three one-way MANOVAs that use HSI designation as the categorical independent variable in Part A, and three two-way MANOVAs that use HSI designation and accountability group as two categorical independent variables in Part B. The dependent variables are clustered into three groups: (1) state appropriations (including (a) strictly state appropriations, (b) operations support, (c) E&G space support, and (d) TRB retirement appropriations), (2) legitimized institutional expenditures and measures (including (a) operating expenditures, (b) number of T/TT faculty, and (c) total attempted SCHs), and (3) legitimized capital expenditures and measures (including (a) capital outlay expenditures, (b) predicted total NASF, (c) predicted office NASF, and (d) predicted teaching NASF). Prior to running the MANOVAs, I tested each for the MANOVA assumptions of multivariate outliers, linear relationships across the variables using scatterplot matrices, and multicollinearity using the Pearson correlation. If any of the dependent variables violate multicollinearity due to a Pearson $R > .90$, it is best to remove the redundant variables (Tabachnick et al., 2013). Some variables had high correlations ($R > .90$) due to singularity and were removed from the MANOVAs (Tabachnick et al., 2013). Office and teaching NASFs, for example, consist of amounts that are found within the Total NASF amount. The assumption of multivariate normality is typically done by checking for univariate normality for each

variable in the study (Huberty & Olejnik, 2006), which was discussed previously. The homogeneity of variance assumption uses Box's M test of equality of covariance (significant at p <.001) during the analyses.

First, to check for multivariate outliers, the three dependent variable categories of the MANOVAs are used as independent variables for linear regressions that result in Mahalanobis distances. Mahalanobis distance (MD) is a measure of distance between two variables about the multivariate mean that is used to identify multivariate outliers (Tabachnick et al., 2013). The number generated follows a Chi-square (χ^2) distribution with degrees of freedom that match the number of independent variables in the regression. The degrees of freedom are used to find the critical Chi-square number at an alpha level of .001 (α = .001) to set the outlier cut-off point[5] (Pituch & Stevens, 2015). Due to the small sample size of this study and MANOVAs sensitivity to outliers, cases outside the MD cut-off are removed from these analyses, but the analyses are ran again with the outlier case(s) involved to see if results differ.

RQ1 – Part A – One-Way MANOVAs

State appropriations one-way MANOVA. For the first one-way MANOVA looking at the state appropriations variables category, there are four variables (α = .001, critical χ^2 = 18.465) (Pituch & Stevens, 2015). Any case with an MD greater than 18.465 for the state appropriations variables is considered a potential multivariate outlier. The only case above MD = 18.465 was TAMU-Texarkana with a MD = 20.545, meaning that

[5] Even though this study will use MD to set the range for cases to be designated as outliers or not, it is not the only way to deal with outliers in research data. The literature on the treatment of outliers is widely varied and nonunanimous (Cousineau & Chartier, 2010).

this institution was flagged as both a univariate and multivariate outlier. Due to MANOVA sensitivity to outliers, TAMU-Texarkana was removed for the first one-way MANOVA. The scatterplot matrices for the four variables across HSI designation showed a somewhat linear relationship, except for linearity of HSIs for state appropriations with E&G space support and state appropriations with operations support. The multicollinearity assumption was met as none of the variables had a Pearson $R > .90$ (Tabachnick et al., 2013), with the highest correlation being between state appropriations and TRB retirement ($R = .679$, $p < .01$). The correlations between state appropriations and operations support were weak ($R = .138$, $p > .01$), as well as the correlation between TRB retirement and E&G space support ($R = .050$, $p > .01$). This reduces the power of the MANOVA and warrants follow-up independent samples t-tests for further analytical checks of certain variables (see Appendix E). Finally, Box's test of equality of covariance was not violated ($M = 21.989$, $p = .041$).

The descriptive statistics for the first one-way MANOVA show that the means for non-HSIs are higher than for HSIs in state appropriations, operations support, and E&G space support, even though there are five more HSIs than non-HSIs in the analysis. Interestingly, the mean for capital appropriations via TRB retirement was higher for HSIs (see Table 6). The results of the multivariate tests for mean differences between HSI designation and state appropriations were non-statistically significant, $F(4, 30) = .967$, $p > .05$; Pillai's Trace = .114, partial $\eta^2 = .114$. Pillai's Trace was used instead of Wilks' Lambda because it is the most robust statistical value to use for MANOVA when all the assumptions are not met (Finch, 2005; Olson, 1979). These results mean that there is not a statistically significant difference between HSIs and non-HSIs on a linear combination

of state appropriations. The effect size for the analysis shows that only 11.4% of the variability in state appropriation amounts across the four state appropriation variables is explained by designation type.

Table 6

Means for State Appropriation Variables by HSI Designation

Designation	*N*	*Strictly State*	*Operations*	*Space*	*TRB Retirement*
HSI	20	5,983	3,340	572	645
Non-HSI	15	6,376	3,740	660	522

Notes. N represents the number of institutions under each designation for analysis.
All values are in dollars ($) per-FTSE and rounded to the nearest whole number.
TAMU-Texarkana is not included.

Legitimized expenditures and measures one-way MANOVA. The second one-way MANOVA looks at the operating expenditures and T/TT faculty variables. The SCHs legitimized measure variable was excluded because it had a very high correlation with the T/TT faculty variable ($R = .964$, $p < .01$), violating the multicollinearity assumption. Given the importance of faculty in the production SCHs and the role of the T/TT faculty in legitimacy and rankings (Alperin et al., 2019; Harley et al., 2010; Pusser & Marginson, 2013; Schimanski & Alperin, 2018), the T/TT faculty variable was kept in the analysis over SCHs. With two dependent variables remaining, this analysis had a critical Chi-square value of 13.815 ($\alpha = .001$, critical $\chi^2 = 13.815$) (Pitch & Stevens, 2015). UT-Austin was the first case identified as a multivariate outlier (MD = 21.295), and this was the same institution that was a univariate outlier in regards to the operating expenditures variable. After removing UT-Austin, TAMU was flagged as another multivariate outlier (MD = 17.220). This was expected for both institutions due to their flagship status and resource-rich profiles. UT-Austin and TAMU are also the top two

institutions for operating expenditures per FTSE and T/TT faculty numbers. The assumption of linear relationship among the variables was slightly visible, but did not show a strong pattern of linearity for the two remaining dependent variables. The correlation between both variables was also weak as well as negative (R = -.018, p > .05). Due to these two assumptions tests results, Pillai's Trace is used over Wilk's Lambda for the MANOVA, and follow-up independent samples t-tests are needed.

Even after excluding both institutions from the MANOVA, the non-HSIs still had the higher mean for operating expenditures, but not for T/TT faculty numbers (see Table 7). Box's test of equality of covariance was not violated (M = 11.015, p = .017). The results of the multivariate tests for mean differences between HSI designation and legitimized expenditures and measures were non-statistically significant, $F(2, 31)$ = 1.249, p > .05; Pillai's Trace = .075, partial η^2 = .075. These results mean that there is not a statistically significant difference between HSIs and non-HSIs on a linear combination of legitimized expenditures and measures. It is important to note the follow-up investigation of these same variables using independent samples t-tests, as MANOVA is a better fit if the dependent variables are at least moderately correlated (Meyers, Gamst, & Guarino, 2016).

Table 7

Means for Legitimized Expenditures and Measures by Designation

Designation	*N*	*Operating Expenditures*	*T/TT Faculty*
HSI	20	15,938	357
Non-HSI	14	17,327	294

Notes. *N* represents the number of institutions under each designation for analysis. T/TT = tenured/tenure-track. Operating expenditures are in dollars ($) per-FTSE. All values are rounded to the nearest whole number. UT-Austin and TAMU not included. Reported SCH variable not included.

Legitimized capital expenditures and measures one-way MANOVA. The final one-way MANOVA had the ideal outcomes for assumptions testing. There are four dependent variables within the legitimized capital expenditures and measures group, but both office NASF and teaching NASF are amounts within the total NASF number. This causes redundant variables and singularity issues (Tabachnick et al., 2013). Checking the multicollinearity assumption with all four variables results confirms singularity with very high correlations between the two NASF variables (Office NASF, $R = .996$, $p < .01$; Teaching NASF, $R = .989$, $p < .01$) and total NASF. After removing office and teaching NASF variables, the MANOVA is left with two dependent variables and a critical Chi-square value of 13.815 ($\alpha = .001$, critical $\chi^2 = 13.815$).

The only resulting multivariate outlier, UT-Austin (MD = 17.956), is also the institution that was the univariate outlier for office NASF. In removing UT-Austin from the MANOVA, the linear assumption and multicollinearity assumptions were met with moderate, but not statistically significant, correlation between capital outlay and total NASF ($R = .309$, $p > .05$). Table 8 shows the nearly equal means in predicted total NASF between HSIs and non-HSIs, but the higher spending on capital outlay per FTSE for HSIs

over non-HSIs. Box's test of equality of covariance was not violated (M = 10.643, p = .019), but the results of the multivariate tests were not statistically significant, $F(2, 32)$ = 1.375, $p > .05$; Pillai's Trace = .079, partial η^2 = .079. The analysis shows that designation type only accounts for 7.9% of the variability in a combination of the capital outlay and predicted total NASF variables.

Table 8

Means for Legitimized Capital Expenditures and Measures by Designation

Designation	*N*	*Capital Outlay*	*Predicted Total NASF*
HSI	18	$501	1,665,565
Non-HSI	14	$356	1,650,265

Notes. N represents the number of institutions under each designation for analysis. NASF = Net-assignable square footage. Capital outlay is in dollars ($) per-FTSE. All values are rounded to nearest whole number. UT-Austin is not included.

RQ1 – Part B – Two-Way MANOVAs

The second part of RQ1 includes the addition of the accountability groups as a categorical independent variable. In doing so, these analyses assess the interaction effect that HSI designation and accountability groups together have on the dependent variable categories being studied (Meyers et al., 2016). Multivariate design textbooks make few recommendations on appropriate sample size for MANOVAs, with even less recommendations being supported by empirical evidence, specifically for two-way MANOVA designs (Young III, 2006). A typical recommendation is that there be more cases than dependent variables for every observation level (Tabachnick et al., 2013). This is not the case, though, for the Research accountability group because it only has two institutions, UT-Austin and TAMU, and both are non-HSIs. The four other accountability groups have more cases than the highest number of dependent variables for any of the

two-way MANOVAs in this study. For these reasons, the Research accountability group is excluded, resulting in the accountability group independent variable having four levels: Emerging Research, Doctoral, Comprehensive, and Masters. Testing for the assumptions of the two-way MANOVA is the same as those done for the one-way MANOVA. Table 9 shows HSIs and non-HSIs per accountability group.

Table 9

Institution Count Across Designation and Accountability Groups

Designation	*Research*	*Emerging*	*Doctoral*	*Comprehensive*	*Masters*	*Total*
HSI	0	6	4	2	8	20
Non-HSI	2	2	3	4	5	16
Total	2	8	7	6	13	36

Notes. *Research* accountability group is not included in two-way MANOVAs.
Emerging = *Emerging Research.*

State appropriations two-way MANOVA. This MANOVA had two multivariate outliers outside of the critical Chi-square for four degrees of freedom, α = .001, critical χ^2 = 18.465: TAMU-Galveston (MD = 19.898) and TAMU-Texarkana (MD = 21.052). TAMU-Texarkana is the univariate outlier due to its TRB retirement amount per FTSE, and TAMU-Galveston also has a high TRB retirement amount comparatively to the sample. Linear relationships were visible for some of the variable combinations, but not all, weakening the power of the analysis. Furthermore, weak correlations appeared between the operations support (R = -.106, p > .05) and E&G space support (R = .006, p > .05) variables with state appropriations, as well as between TRB retirement and E&G space support (R = -.180, p > .05).

After running the 2x4 two-way MANOVA, Box's test of equality of covariance matrices is not statistically significant (M = 33.636, p = .027). The means for HSIs and

non-HSIs across accountability groups are shown in Table 10. Of note, TRB retirement means are noticeably higher for HSIs across accountability groups, outside of doctoral institutions, specifically for comprehensive and master's institutions. This could be in relation to capital projects undertaken by these institutions for the enrollment increases outlined by the state's strategic plans. The multivariate tests results show that the multivariate main effects of both HSI designation, $F(4, 21) = .352$, $p > .05$; Pillai's Trace = .063, and accountability groups, $F(12, 69) = 1.167$, $p > .05$; Pillai's Trace = .506, were not statistically significant. This indicates that there are no differences between HSI designation nor accountability groups on the dependent variables, with the HSI main effect accounting for 6.3% of total variability and accountability grouping accounting for 16.9%. The multivariate interaction effect of HSI*accountability group has a Pillai's Trace = .116 with $F(12, 69) = .232$, $p > .05$, explaining a non-significant 3.9% of the variance in the model. The effect of accountability groups across state appropriations is the same for HSIs and non-HSIs.

Table 10

State Appropriations Means by Designation and Accountability Groups

Variable	*Accountability*	*Designation*	*Mean*
State Appropriations	Emerging Research	HSI	4,938
		Non-HSI	4,446
	Doctoral	HSI	5,956
		Non-HSI	5,630
	Comprehensive	HSI	6,196
		Non-HSI	5,755
	Masters	HSI	6,726
		Non-HSI	7,167
Operations Support	Emerging Research	HSI	3,649
		Non-HSI	3,943
	Doctoral	HSI	3,732
		Non-HSI	3,630
	Comprehensive	HSI	3,046
		Non-HSI	3,202
	Masters	HSI	2,986
		Non-HSI	3,187
E&G Space Support	Emerging Research	HSI	637
		Non-HSI	608
	Doctoral	HSI	613
		Non-HSI	564
	Comprehensive	HSI	547
		Non-HSI	561
	Masters	HSI	510
		Non-HSI	528
TRB Retirement	Emerging Research	HSI	314
		Non-HSI	192
	Doctoral	HSI	455
		Non-HSI	481
	Comprehensive	HSI	762
		Non-HSI	463
	Masters	HSI	958
		Non-HSI	698

Note. Means are in dollars ($) per FTSE amounts for FY 2017.
TRB = Tuition revenue bonds

Legitimized expenditures and measures two-way MANOVA. Like the one-way MANOVA for legitimized expenditures and measures, the second two-way MANOVA only consisted of two dependent variables due to multicollinearity between reported SCHs and T/TT faculty. Therefore, this analysis had a critical Chi-square value for two degrees of freedom, $\alpha = .001$, critical $\chi^2 = 13.815$, of which no case exceeded as a multivariate outlier. Once again, the linear relationships across predictor groups and outcome variables were visible for some of the combinations, but not all. Weak linearity seemed to be more present for Emerging Research HSIs and Masters HSIs. There was also a weak correlation between the operating expenditures and T/TT faculty numbers ($R = -.018$, $p > .05$).

Box's test was not statistically significant ($M = 23.602$, $p = .299$), showing that there was homogeneity of covariance matrices, but the T/TT faculty variable did not have homogeneity of variances ($p < .05$) violating Levene's test of equality of error variances. For this reason and the small sample size, this two-way MANOVA used a lower statistical significance *p*-value (< .01) for the final multivariate tests results. The multivariate tests results showed that the multivariate interaction effect of HSI*accountability group on the combined dependent variables was not statistically significant, $F(6, 52) = .704$, $p > .01$; Pillai's Trace = .150, accounting for 7.5% of the variance in the model. This means that the effect of accountability groups on operating expenditures and T/TT faculty is the same for HSIs and non-HSIs.

Contrarily, the main effect of accountability groups on the dependent variables was statistically significant, $F(6, 52) = 6.736$, $p < .01$; Pillai's Trace = .875, explaining 43.7% of the variance. The Tests of Between-Subjects Effects table showed that

accountability groups had a statistically significant main effect for T/TT faculty numbers, $F(3, 26) = 19.307$, $p < .01$, but not for operating expenditures, $F(3, 26) = 1.869$, $p > .01$. I then followed with a post hoc analysis of the accountability group main effect on T/TT faculty using the Scheffe post hoc test. To continue with the careful approach towards this model's assumptions violations, I chose the Scheffe post hoc test due to it being the most conservative of the post hoc tests (Meyers et al., 2016). Results show that Emerging Research institutions had statistically significant (p <.01) differences in T/TT faculty numbers from all other accountability groups. T/TT faculty numbers were approximately 357 higher at Emerging Research institutions when compared to Doctoral institutions, 458 when compared to Comprehensive institutions, and 573 when compared to Masters institutions. Emerging Research institutions had a marginal mean for T/TT faculty numbers of 682.833 (SE = 60.870), while Masters institutions had a marginal mean of 128.900 (SE = 42.500). The large estimated marginal mean difference between Emerging Research institutions and the other three accountability groups is visible in Figure 6.

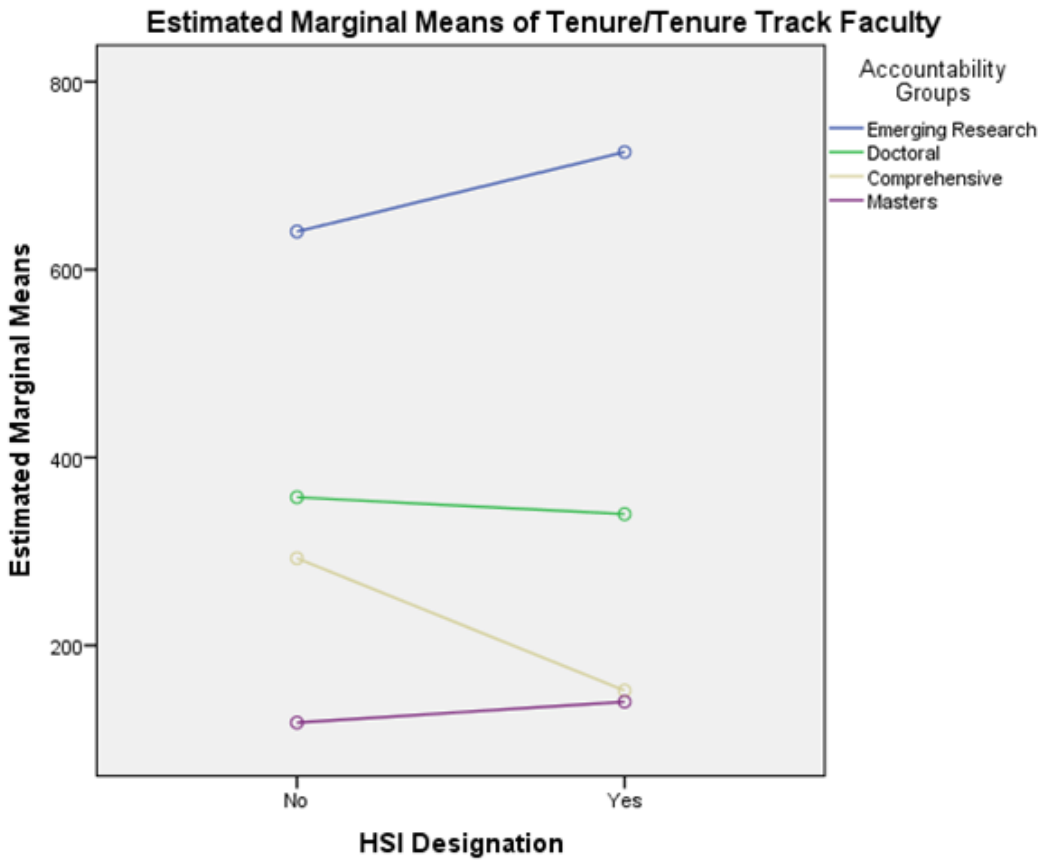

Figure 6. Estimated Marginal Means of T/TT Faculty Numbers for Accountability Groups by Designation

Legitimized capital expenditures and measures two-way MANOVA. The third and final two-way MANOVA used a critical Chi-square value for two degrees of freedom, $\alpha = .001$, critical $\chi^2 = 13.815$, of which no case exceeded as a multivariate outlier. This analysis only included capital outlay and total NASF as the dependent variables because of singularity between office NASF with total NASF and teaching NASF with total NASF. Office and teaching NASFs are part of the total NASF. This model also showed weak linearity, specifically between the variables for Masters HSIs and non-HSIs, reducing the power of the analysis. The correlation between capital outlay and total NASF was within the range for an acceptable relationship but it was not

statistically significant (R = .207, p >.05). Furthermore, the two dependent variables did not have homogeneity of variances per Levene's test of equality of error variances (p <.05). Given these circumstances, this model also utilized a lower statistical significance p-value (< .01) for the final multivariate tests results as well as the Scheffe post hoc test.

The model had homogeneity of covariance matrices (M = 41.121, p = .012), as assessed by Box's test. The interaction effect of HSI*accountability group was not statistically significant, $F(6, 52) = .499$, $p > .01$; Pillai's Trace = .109, attributing to only 5.4% of the variance in the model. This means that the effect of accountability groups on capital outlay and total NASF is the same for both HSIs and non-HSIs. Like the previous two-way MANOVA though, there was a statistically significant, $F(6, 52) = 8.237$, $p <$ .01; Pillai's Trace = .975 main effect of accountability groups on the outcome variables, while HSI designation did not have a statistically significant main effect, $F(2, 25) =$ 1.398, p >.01; Pillai's Trace = .101. The variable that accountability groups had a statistically significant main effect for was total NASF, $F(3, 26) = 42.195$, p <.01, but not capital outlay, $F(3, 26) = 2.111$, p >.01. The Scheffe post hoc analysis shows the Emerging Research group had statistically significant (p <.01) higher predicted total NASF than the other three accountability groups, and had a marginal mean for predicted total NASF of 3,476,766.667 (SE = 223,780.517). Figure 7 shows the estimated marginal means plot for the predicted total NASF. HSI designation, once again, did not result as having a statistically significant effect on the outcome variables.

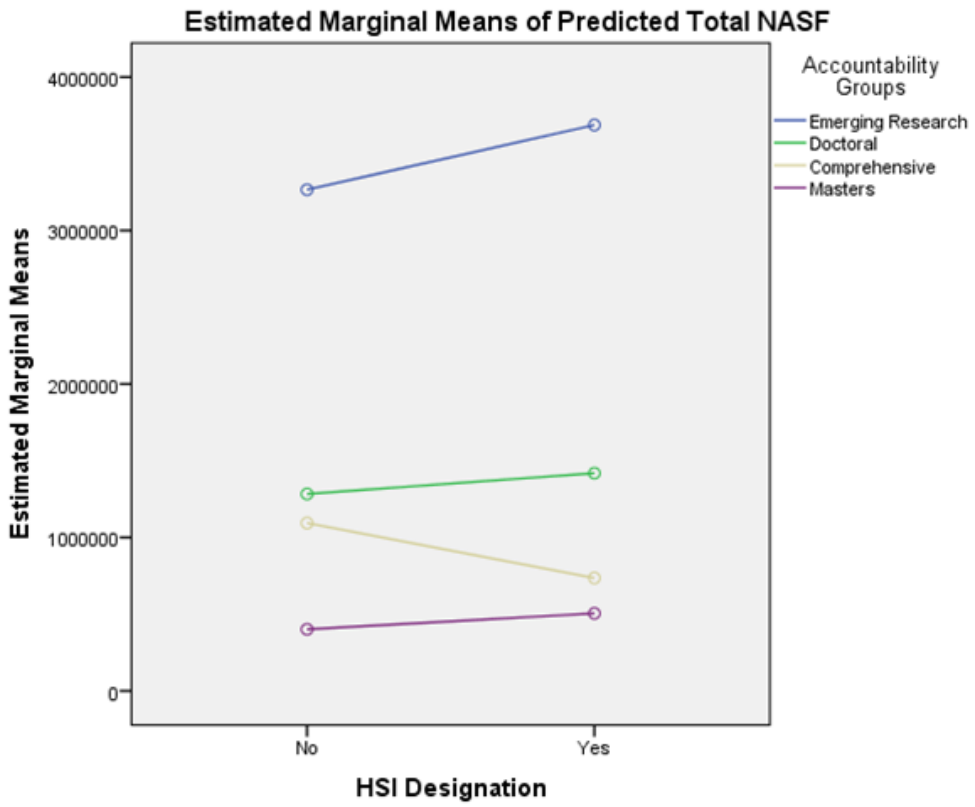

Figure 7. Estimated Marginal Means of Predicted Total NASF for Accountability Groups by Designation.

Research Question 2

Does HSI designation influence the relationships between formula-funded state appropriations and total operating expenditures, reported semester credit hours, and tenured/tenure-track faculty numbers?

For these analyses, the independent variable is a sum of both formula-funded appropriations (*operations support* and *E&G space support*) and called *formula funds total*. These appropriation amounts do not include other non-formula-based appropriations under the I&O and Infrastructure Support sections of the GAA, such as workers' compensation insurance under I&O Support and TRB retirement under

Infrastructure Support. I centered the *formula funds total* to standardize the variable because the specific analysis used is a MHMR that requires an interaction term.

Normality and linearity tests. Prior to beginning the regression analyses, I reviewed the three dependent variables' (operating expenditures, T/TT faculty, and reported SCH) residuals for the normal distribution assumption. Only the operating expenditures outcome variable residuals violated normality. This was expected due to the small sample size and the existing outliers, such as UT-Austin. However, this outlier is important to leave in the analyses given the institutions' profile, its importance in Texas higher education, and its non-HSI status. Also, due to this partial violation of normality and the small sample size, the significance *p*-value for final regression results will be more conservative at < .01. I then checked the linear relationship between the variables by subgroup using scatterplots. The three scatterplots showed visual linear relationships between formula funded appropriations and the three dependent variables.

Title V funding mediation check. I used simple linear regression analyses to check for possible mediation from Title V funding for HSIs across the three dependent variables. This variable tracks any Title V funding received since 2012. The timeframe range starts with 2012 because Title V grants are for five-year periods and the focal year of this study is FY 2017. Hypothetically, having this additional funding can possibly influence how much an HSI spends on operations, hiring more faculty, and thus output more SCHs. It is important to note that not all HSIs in the sample have received any Title V funding, and the amount per FTSE is considerably small for some institutions.

A mediation exists between two variables if their relationship is highly correlated (Tabachnick et al., 2013). For mediations, this should be the case between the

independent variable and the mediator and between the independent variable and the dependent variable (Baron & Kenny, 1986). I first ran separate linear regressions for each dependent variable using the centered *formula funds total* variable as the predictor. Operating expenditures had a positive statistically significant correlation (R = .686, p < .01) with *formula funds total*, which accounted for 47% of the variance in operating expenditures (R^2 = .471). *Formula funds total* also had positive statistically significant correlations with T/TT faculty (R = .511, p < .01) and reported SCHs (R = .446, p < .01). The predictor variable explained 26% of the variance in T/TT faculty (R^2 = .261) and 19.9% of variance in reported SCHs (R^2 = .199). I then checked the correlation between the possible mediator, Title V funding, and the *formula funds total*. The results were a non-statistically significant, but feasible, relationship between the variables (R = -.418; p = .067). Even though the relationship was not significant, I continued with the check to confirm the non-partial mediation.

I followed this same check procedure after splitting the data file between HSIs and non-HSIs. Table 11 shows the statistical results of the three regressions after splitting the file based on designation. The only non-statistically significant result was for reported SCHs for HSIs, while non-HSIs had significant results across all three variables, especially for operating expenditures of which *formula funds total* accounted for approximately 67% of the variance. I then ran separate hierarchical linear regressions for the dependent variables with HSIs only, adding the Title V funding variable in the second model block to note the R^2 change. It was not done for non-HSIs because they do not receive Title V funding. The regressions also resulted in non-statistically significant R^2 changes for the three outcome variables: 13.3% increase for operating expenditures (ΔR^2

= .133, $F_{1,17}$ = 3.782, p > .01), 4% for T/TT faculty (ΔR^2 = .040, $F_{1,17}$ = .910, p > .01), and 5.7% for SCHs (ΔR^2 = .057, $F_{1,17}$ = 1.169, p > .01). Therefore, Title V funding is not a mediating variable for HSIs in these analyses.

Table 11

Correlations, Variance, and Beta Coefficients with Formula Funds Total by Designation

Statistic	*Pearson R*		R^2		*B (SE B)*	
DV	*HSI*	*nHSI*	*HSI*	*nHSI*	*HSI*	*nHSI*
Operating	.520**	.816***	.270	.666	1.246 (.482)*	5.750 (1.089)***
Faculty	.455*	.544*	.207	.296	.157 (.072)*	.285 (.117)*
SCH	.348	.531*	.121	.282	64.538 (40.950)	120.799 (51.578)*

Notes. *p < .05; **p <.01; ***p < .001; nHSI = non-HSI. SCH = Semester credit hours. DV = Dependent variable.

RQ2 control variables. There are six control variables for each of the three regressions: (1) Total enrollment, (2) high research level designation, (3) percentage of faculty that are T/TT, (4) years as an HSI or Title V funding, (5) total operating revenue without state appropriations included, and (6) total state appropriations without both formula funds. Years as an HSI and Title V funding had statistically significant high correlations with one another (R = .738, p <.01) so they were not included together for the regressions. Instead, whichever had the stronger correlation with the dependent variable was included in that regression. Years as an HSI was used as a control for the operating expenditures regression (R = -.202, p >.01), while Title V funding was used as a control for T/TT faculty (R = -.244, p >.01) and for reported SCHs (R = -.232, p >.01). Both were considered and included based on correlation because either can conceptually fit in the regressions.

MHMR setup. Using the centered *formula funds total* variable, I created an interaction variable with the dichotomous HSI designation moderator variable. The

interaction term, *centered formula funds total*HSI designation,* is used for all three MHMRs. Each MHMR has three model blocks that include, in order, the control variables in block one, the separate centered *formula funds total* predictor and the HSI designation moderator variables in block two, and finally the interaction term in block three. The setup of the regression models is to test if HSI designation moderates the relationships between *formula funds total* and legitimized expenditures and measures via the interaction term, after everything else has been considered.

Operating expenditures regression. I first ran the regression without the control variables model included. The results show that without including control variables, the addition of the interaction term had a significant R^2 change ($\Delta R^2 = 0.164$, $F_{1,32} = 15.736$, $p < .01$), explaining 16.4% increase in the variation of operating expenditures. The correlation between the interaction term and the outcome were not statistically significant, though ($R = .209$, $p > .01$). I then included the control variables in the first model block and re-ran the regression.

Due to the decision of leaving all cases included in the analysis, I looked at both leverage points and Cook's distance to gauge outlier influence on the regression. Leverage values consider a numerical cut-off point based on the number of parameter variables (p) plus the intercept and cases in the study (n), using the equation (3*p)/n for small sample sizes (Cohen, Cohen, West, & Aiken, 2003). For this study, p = 4 (intercept, independent variable, and two-group moderator variable), and n = 36 institutions, resulting in a leverage cut-off of (3*4)/36 = 0.33. There were seven institutions with a leverage value beyond 0.33: the two univariate outliers from the initial normality checks (UT-Austin and TAMU-Texarkana), institutions that were flagged as

outliers during the MANOVAs, (TAMU and TAMU-Galveston), UNT-Dallas, TAMU-Kingsville, and UH-Clearlake. I then referred to Cook's distance (D_i) for these seven institutions. A Cook's distance value greater than 1 shows an outlier that is influential in the data for the analysis (Cook & Weisberg, 1982), of which none of the seven exceeded. Additionally, Pituch and Stevens (2015) state that any extreme case with a Cook's distance smaller than 1 does not have major effect on the regression and should not be removed. Instead, it should be understood as valid part of the sample in regards to the study's purpose. The closest to exceeding the Cook's distance limit of 1 was UNT-Dallas (D_i = .174). Even though UNT-Dallas was the most influential point, it is important to note that it is not the institution with the most amount of both formula-funded appropriations nor operating expenditures per FTSE.

Operating expenditures had statistically significant correlations with total enrollment (R = .414, p < .01), operating revenue without state appropriations (R = .888, p < .01), and *formula funds total* (R = .686, p < .01). HSI designation had a correlation at the p <.05 level (R = -.336). None of the control variables severely violated multicollinearity with one another (R < .7). The interaction term was not statistically significant (p >.01), even though it had an acceptable correlation value (R = .209). The model change statistics show that the interaction only accounts for 0.8% of the variance in operating expenditures (ΔR^2 = 0.008, $F_{1,26}$ = 3.663, p > .01). This means that HSI designation does not moderate total formula funds on operating expenditures when including applicable controls. Nonetheless, the coefficients table shows that for every dollar per FTSE increase in operating revenue, there is a $0.55 per FTSE increase in operating expenditures (B = .545, p < .01), and for every dollar per FTSE increase in

total state appropriations outside of formula funds, there is a $0.85 per FTSE increase in operating expenditures (B = .849, p < .01). The predictor of focus for this analysis, the *formula funds total*, was also statistically significant, showing that for every dollar increase per FTSE in formula funds there is a $2.00 per FTSE increase in operating expenditures (B = 2.000, p < .01). Furthermore, the coefficients table shows that the relationship between operating expenditures and designation for HSIs was not statistically significant (p = .652) even though being an HSI resulted in $316.10 per FTSE less in operating expenditures.

I removed the interaction from the regression model because of the non-statistically significant result. The new model did result in a statistically significant R^2 change (ΔR^2 = 0.028, $F_{2,27}$ = 6.128, p < .01) after adding the *formula funds total* and HSI designation variables. Yet, the coefficients table for the non-moderated model shows that while there was a statistically significant positive predictive relationship (B = 1.285, SE = .369; p <.01) between *formula funds total* and operating expenditures, there was not a statistically significant relationship with HSI designation (p >.01).

Tenured/tenure-track faculty regression. The second MHRM looking at T/TT faculty did not include total faculty as a control because it had a very high correlation (R = .975) with total enrollment. Higher enrollment tends to require higher faculty numbers for instruction, meaning that controlling for enrollment could also control for total faculty. Without including the control variables, the interaction term did not have a statistically significant R^2 change (ΔR^2 = .021, $F_{1,32}$ = .923, p > .01), explaining only a 2.1% increase in the variation of T/TT faculty numbers. The correlation between the

variables were not statistically significant either (R = .268, p > .01). I continued with the analysis and added the control variables to the first model block of the regression.

After running the full model regression, I checked for outliers based on the leverage cut-off of (3*4)/36 = 0.33 coupled with any Cook's distance that is greater than 1. There were eight institutions with a leverage value beyond 0.33, but none exceeded a Cook's distance greater than 1. The largest Cook's distance was TAMU (D_i = .406), which is the institution with the second most T/TT faculty in the sample. The interaction term did not result in a statistically significant R^2 change, showing that the interaction only accounted for 0.1% of the variance in T/TT faculty numbers (ΔR^2 = 0.001, $F_{1,26}$ = .974, p > .01). This means that the relationship between formula-funded appropriations and T/TT faculty numbers for HSIs is not different when compared to that same relationship for non-HSIs. HSI designation does not moderate total formula funds on T/TT faculty numbers when taking control variables into account. Due to the non-statistically significant result, I removed the third model block containing the interaction term from the regression and ran another analysis with the *formula funds total* and HSI designation variables only. The new model showed that there was still no statistically significant R^2 change (ΔR^2 = 0.002, $F_{2,27}$ = .706, p > .01) when adding the *formula funds total* and HSI designation variables.

Semester credit hours regression. For the reported SCH outcome variable I considered total faculty as a control again, but more enrollment can also mean more SCHs. I chose to include only total enrollment again because of this consideration along with the high correlation between the two variables. Before adding the controls, I ran the MHMR with the *formula funds total*, HSI designation, and interaction term variables

only. The interaction term did not have a statistically significant R^2 change (ΔR^2 = .018, $F_{1,32}$ = .752, p > .01), accounting for only a 1.8% increase in the variation of SCHs. I continued with the analysis and added the control variables to the first model block of the regression.

After running the full model regression, eight institutions had a higher leverage value than 0.33, but none had a Cook's distance greater than 1. Once again, the eight cases were institutions that have been repeatedly flagged as potential outliers throughout the study: UT-Austin, TAMU-Texarkana, Sul Ross State, TAMU, TAMU-Galveston, UNT-Dallas, TAMU-Kingsville, and UH-Clear Lake. Of these, TAMU and UT-Austin had the highest amount of reported SCHs for Fall 2017. The interaction term did not result in a statistically significant R^2 change, showing that the interaction caused no change in the variance of reported SCHs (ΔR^2 = .000, $F_{1,26}$ = .750, p > .01). The results of the regression indicate that the relationship between an institution's reported SCHs and the amount of formula-funded appropriations they received is similarly unrelated for HSIs and non-HSIs. HSI designation does not influence the amount of SCHs based on formula-funded appropriations. I followed this analysis with a removal of the interaction term. The new model showed that there was still no statistically significant R^2 change (ΔR^2 = 0.001, $F_{2,27}$ = 1.082, p > .01) after including the *formula funds total* variable and HSI designation variable. Table 12 shows the regression beta coefficients for the interaction terms of the MHMR models for operating expenditures, T/TT faculty, and reported SCHs. Table 13 shows the regression beta coefficients for the same models without the interaction term.

Table 12

RQ2 Regression Models' Beta Coefficients with Interaction Variable

Variables	*Operating Expenditures B (SE B)*	*T/TT Faculty B (SE B)*	*Reported SCH B (SE B)*
(Constant)	4932.445 (1642.196)**	-613.233 (99.628)***	-93588.732 (25583.857)**
Total Enrollment	-.036 (.032)	.020 (.002)***	10.914 (.476)***
High Research	164.757 (854.441)	-65.422 (45.868)	8895.118 (11778.635)
% Faculty T/TT	29.338 (28.926)	8.602 (1.750)***	932.834 (449.268)*
Years HSI	9.116 (36.490)	---	---
Title V Funds	---	-.576 (.364)	-127.453 (93.567)
Total OR w/o SA	.545 (.056)***	.014 (.003)***	2.546 (.867)**
Total SS w/o FFT	.849 (.164)***	.014 (.010)	3.476 (2.464)
HSI	-316.100 (693.249)	36.242 (35.327)	1152.896 (9071.687)
cFFT	2.000 (.513)**	.002 (.030)	-3.703 (7.724)
cFFTxHSI	-1.223 (.639)	-.039 (.039)	-8.681 (10.025)

Notes. * $p < .05$; ** $p < .01$; *** $p < .001$. *Operating Expenditures* in dollars ($) per FTSE. T/TT = Tenured/tenure-track. OR = Operating revenue. SA = State appropriations. SS = State support. FFT = Formula funds total. cFFT = Centered *formula funds total*. *cFFTxHSI* = Interaction variable.

Table 13

RQ2 Regression Models' Beta Coefficients without Interaction Variable

Variables	*Operating Expenditures B (SE B)*	*T/TT Faculty B (SE B)*	*Reported SCH B (SE B)*
(Constant)	4917.877 (1721.249)**	-606.329 (99.334)***	-92032.925 (25402.194)**
Total Enrollment	-.029 (.033)	.020 (.002)***	10.983 (.467)***
High Research	-78.598 (885.610)	-72.204 (45.328)	7366.767 (11591.576)
% Faculty T/TT	9.352 (28.274)	7.896 (1.596)***	773.797 (408.111)
Years HSI	17.621 (37.962)	---	---
Title V Funds	---	-.466 (.347)	-102.536 (88.619)
Total OR w/o SA	.592 (.053)***	.015 (.003)***	2.814 (.806)**
Total SS w/o FFT	.912 (.168)***	.016 (.009)	3.910 (2.401)
HSI	-372.136 (725.980)	32.375 (35.092)	281.567 (8973.848)
cFFT	1.285 (.369)**	-.018 (.022)	-8.258 (5.630)

Notes. * $p < .05$; ** $p < .01$; *** $p < .001$. *Operating Expenditures* in dollars ($) per FTSE. T/TT = Tenured/tenure-track. OR = Operating revenue. SA = State appropriations. SS = State support. FFT = Formula funds total. cFFT = Centered *formula funds total*.

Research Question 3

Does HSI designation influence the relationships between E&G space support funding and capital outlay, predicted net-assignable square footage for total, office, and teaching spaces?

For these analyses, the independent variable is the *E&G space support* appropriation found within overall Infrastructure Support in the GAA. This appropriation amount does not include some non-formula-based appropriations under the Infrastructure Support section, which includes TRB retirement and, for certain institutions, the Small Institution Supplement. I standardized the E&G space support variable by centering it so that I could create the interaction term necessary for the MHMR.

Normality and linearity tests. I was able to check for linearity between each of the outcomes with the predictor, and between HSI designations, using scatterplots. All four of the dependent variables had slight linearity that could be visually confirmed. I then checked the residuals of the four dependent variables (capital outlay expenditures, predicted total NASF, predicted office NASF, and predicted teaching NASF) for the assumption of normality. The capital outlay and teaching NASF variables did not have statistically significant Shapiro-Wilk tests, but both total NASF and office NASF did, violating normality. As discussed earlier, violating this assumption is an arising limitation due to the sample being small. It is expected to a certain degree. For the two violating variables, I did a visual inspection of the normal P-P plots to confirm that normality does exist. Figure 8 shows the normal P-P plot for the violating total NASF variable and the normal P-P plot for the non-violating capital outlay variable next to each other for comparison. In continuation of the analyses with the slight violations, the significance *p*-value for this portion of the study will also use a more conservative *p*-value at $< .01$.

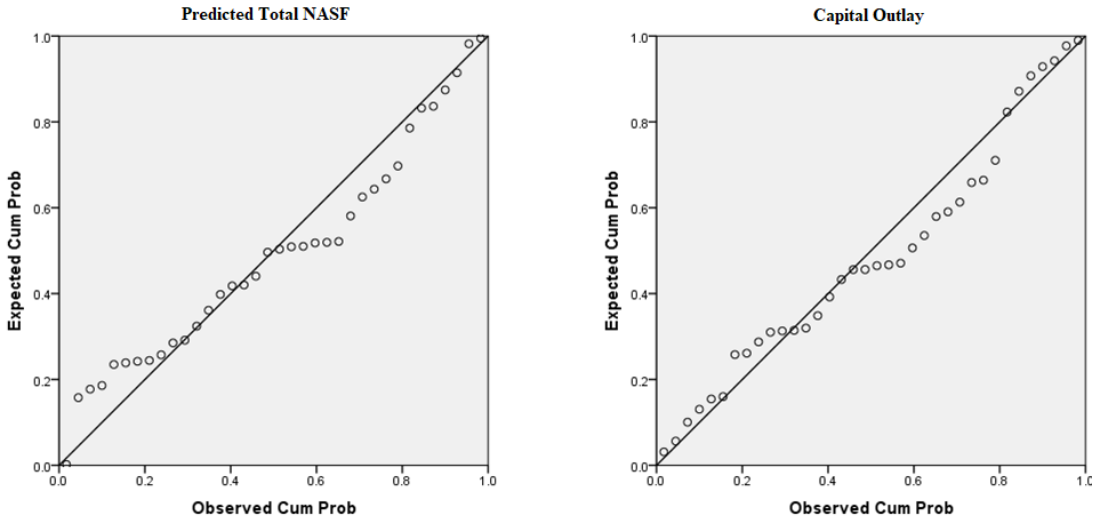

Figure 8. Comparison of Two Normal P-P Plots. Normal P-P plots of regression standardized residuals for the normality-assumption-violating total predicted NASF variable and the non-violating capital outlay variable (Shapiro-Wilk p <.05).

Mediator variables. This analysis has two possible mediator variables: Title V funding for HSIs and Constitutional funds for all institutions. Both variables are in per FTSE format. Conceptually, Title V grants are funds with limited restrictions that can be used towards capital assets at the institution, which can influence capital outlay expenditures and NASF. Constitutional funds are stronger candidates for mediation due to being capital-restricted funding that does not come from formula funding. While Title V is limited to HSIs in the sample, constitutional funding was received by all sample institutions.

I first checked the correlations between the independent variable, E&G space support, and each of the dependent variables. E&G space support funding had a positive statistically significant correlation at the p <.01 level three with capital outlay (R = .780), total NASF (R = .571), and office NASF (R = .602), but a non-statistically significant correlation with teaching NASF (R = .396). The relationship between E&G space support

and the two possible mediators was not statistically significant, with Title V funding specifically having a weak correlation (R = -.083, p >.01). This means that Title V funding was not a possible mediator. Constitutional funds had a stronger, but non-statistically significant (p >.01), correlation with E&G space support (R = .133) than Title V funding. Constitutional funding was checked further to confirm non-mediation.

I ran two-model hierarchical linear regressions with the E&G space support variable in model one, as a control, and the constitutional funding variable in model two to gauge R^2 change for each of the dependent variables. The results indicate that constitutional funds are not mediating the relationship between E&G space support and the capital expenditures and measures for the overall sample. Furthermore, similar results appeared after splitting the file between HSIs and non-HSIs. An interesting note is that constitutional funding did result in larger R^2 changes for HSIs across all four outcome variables, but with non-statistically significant F changes (p >.01). Teaching NASF experienced the most R^2 change across designations, with HSIs having an R^2 change = .139 and non-HSIs an R^2 change = .043.

RQ3 control variables. There are five control variables for each of the four regressions: (1) Total actual NASF or Total FY 2017 SCH, (2) high research level designation, (3) years as an HSI or Title V funding, (4) total state appropriations without E&G space support funds, and (5) constitutional funds. Total enrollment, total faculty, total actual NASF, and total SCHs are all highly correlated with one another (R >.8) and are all conceptually related to institutional size. Therefore, the institutional size control variable that was most correlated with the outcome variable was included in that variable's regression. The institutional size control for capital outlay (R = .626, p <.01),

predicted total NASF (R = .990, p <.01), and office NASF (R = .995, p <.01) is total actual NASF; the institutional size control for teaching NASF (R =.982, p <.01) is total SCHs. Due to higher correlations with the dependent variables, years as an HSI is used as a control for the capital outlay regression (R = -.268, p >.01). Title V funding is controlled for predicted total NASF (R =-.215, p >.01), office NASF (R =-.204, p >.01), and teaching NASF (R =-.236, p >.01).

MHMR setup. For the moderated analysis, I created an interaction variable with the dichotomous HSI designation moderator variable and the *centered space support* variable. The interaction term, *centered space support*HSI designation,* is used for all four MHMRs. Each MHMR has three model blocks that include, in order, the control variables in block one, the separate *centered space support* predictor and the HSI designation moderator variables in block two, and the interaction term in block three. The setup of the regression models is to test if HSI designation moderates the relationships between E&G space support appropriations and legitimized capital expenditures and measures via the interaction term, after everything else has been considered.

Capital outlay regression. I first ran the capital outlay MHMR without the control variables included. The results of this initial test show that the interaction term did not have a statistically significant R^2 change (ΔR^2 = .016, $F_{1,32}$ = 1.466, p > .01), only accounting for 1.6% increase in the variation of capital outlay expenditures, even though capital outlay had an acceptable correlation with the interaction term (R = .280, p > .01). I continued with the controlled MHMR, checking for potential outliers first. Following the same outlier parameters using leverage values and Cook's distance from RQ2, this

regression had five cases with leverage values larger than 0.33. Of the five institutions, none had an influential Cook's distance, but the largest was UT-Austin (D_i = 0.676).

After running the hierarchical regression with the full sample, the interaction term was not statistically significant (ΔR^2 = .013, $F_{1,27}$ = 1.130, p > .01), meaning that HSI designation does not moderate the effect of E&G space support appropriations on capital outlay expenditures when controlling for institutional differences. The only predictor to result in a statistically significant coefficient was the *centered space support* variable (p <.01), showing that for every dollar increase per FTSE in E&G space support there is a $1.50 per FTSE increase in capital outlay expenditures (B = 1.496). The coefficients table also shows that the relationship between capital outlay and HSI designation was not statistically significant (p = .703). Table 14 shows the coefficients for the moderated regressions for all RQ3 outcome variables. I then removed the interaction term from the regression, resulting in a statistically significant change (ΔR^2 = .194, $F_{2,28}$ = 8.477, p < .01). Without the interaction term, the new model explained 19.4% of the variances in capital outlay. Only the coefficients for *centered space support* was statistically significant, though, (B =1.315, p <.01), showing that for every dollar increase per FTSE in E&G space support funds there is a $1.32 per FTSE increase in capital expenditures. Conversely, the HSI designation coefficient was not statistically significant (p = .993), showing a $1.05 per FTSE decrease in capital expenditures for HSIs.

Table 14

RQ3 Regression Models' Beta Coefficients with Interaction Variable

Variables	*Capital Outlay B (SE B)*	*Total NASF B (SE B)*	*Office NASF B (SE B)*	*Teaching NASF B (SE B)*
(Constant)	444.057 (195.639)*	-42203.927 (184574.655)	-100104.807 (68245.839)	50680.842 (39271.186)
Total Actual NASF	.000 (.000)	1.508 (.058)***	.490 (.015)***	---
Total SCH	---	---	---	1.539 (.035)***
High Research	45.911 (119.957)	183880.488 (125191.478)	38092.652 (41297.927)	60800.872 (26127.792)*
Years HSI	-4.995 (5.832)	---	---	---
Title V Funds	---	-42.474 (831.155)	295.529 (305.210)	-205.388 (164.060)
Constitutional Funds	.064 (.086)	-115.522 (87.811)	7.076 (29.993)	6.139 (15.961)
Total SS w/o SpaceS	-.012 (.028)	13.123 (27.539)	6.876 (9.957)	-4.718 (5.626)
HSI	-45.289 (117.733)	13572.955 (91141.060)	-46999.409 (34012.468)	-1292.561 (17961.440)
cSpaceS	1.496 (.370)***	-144.032 (359.056)	.977 (129.123)	23.612 (56.868)
HSIxcSpaceS	-.729 (.686)	-254.788 (638.501)	-484.040 (234.542)*	75.898 (119.501)

Notes. * $p < .05$; ** $p < .01$; *** $p < .001$. *Capital Outlay* in dollars ($) per FTSE.
NASF = Net-assignable square footage. SCH = Semester credit hours.
SS = State support. SpaceS = Space support. cSpaceS = Centered *space support.*
HSIxcSpaceS = Interaction variable.

Total NASF regression. I started the second MHMR looking at total NASF without including the control variables. The interaction term did not have a statistically significant R^2 change ($\Delta R^2 = .000$, $F_{1,32} = .015$, $p > .01$), nor any significant coefficients except for the *centered space support* variable ($p < .01$). I then ran the first regression with the controls, resulting in two influential outliers in UT-Austin ($D_i = 4.167$), one of the largest campuses, and TAMU-Galveston ($D_i = 2.165$), the institution with the second-

highest E&G space support per FTSE. I removed UT-Austin from the regression and ran it again to recheck for influential outliers. Without UT-Austin, there were no more influential outliers flagged, including TAMU-Galveston ($D_i = 0.118$). Included or not, neither one of the models had different results for the moderated model. I proceeded without including UT-Austin, understanding its institutional characteristics regarding this regression.

The analyses revealed that the interaction term did not have a statistically significant R^2 change, explaining for 0% of the variance in predicted total NASF ($\Delta R^2 = .000$, $F_{1,26} = .159$, $p > .01$). The association between E&G space support appropriations and predicted total NASF for HSIs is not different when compared to that same relationship for non-HSIs. After removing the interaction term, the new main effects model showed that there was still no statistically significant R^2 change ($\Delta R^2 = .000$, $F_{2,27} = .347$, $p > .01$), with neither the *centered space support* variable nor the HSI designation variable having statistically significant coefficients ($p > .01$). Neither variable was predictive of total predictive institutional NASF. The coefficient for total actual NASF was the only positively statistically significant coefficient, showing that for every increase in a unit of one actual NASF, there is an increase of 1.5 predicted total NASF ($B = 1.511$, $p < .01$).

Office NASF regression. For the office NASF MHMR, without control variables, the interaction term also did not have a statistically significant R^2 change ($\Delta R^2 = .003$, $F_{1,32} = .153$, $p > .01$), nor any significant coefficients except for the *centered space support* variable ($p < .01$). The interaction term did not have a statistically significant R^2 change ($\Delta R^2 = .001$, $F_{1,27} = 4.259$, $p > .01$) when the control variables were

introduced into the model. After removal of the interaction term, the model change became weaker and remained non-statistically significant (ΔR^2 = .000, $F_{2,28}$ = .700, p > .01) after introducing both HSI designation and *centered space support* funds into the regression. Similar to predicted total NASF, HSI designation did not moderate the relationship between E&G space support appropriations and predicted office NASF.

Teaching NASF regression. Without controls included, the *centered space support*HSI designation* interaction term did not cause a significant R^2 change (ΔR^2 = .021, $F_{1,32}$ = .801, p > .01), although it was stronger than that of both the total NASF and office NASF regressions. Once the controls were added, the regression was still not statistically significant (ΔR^2 = .000, $F_{1,27}$ = .403, p > .01). Like the regression for office NASF, removing the interaction term did not strengthen the model for teaching NASF and resulted in non-statistically significant R^2 change (ΔR^2 = .000, $F_{2,28}$ = .383, p > .01). Table 15 shows the coefficients for all the RQ3 non-moderated regressions without the interaction term included. The relationship between E&G space support appropriations and predicted teaching NASF for Texas public institutions was not statistically different due to HSI designation.

Table 15

RQ3 Regression Models' Beta Coefficients without Interaction Variable

Variables	*Capital Outlay B (SE B)*	*Total NASF B (SE B)*	*Office NASF B (SE B)*	*Teaching NASF B (SE B)*
(Constant)	419.503 (194.723)*	-49317.679 (180828.753)	-117755.419 (71539.881)	53694.325 (38565.942)
Total Actual NASF	.000 (.000)	1.511 (.057)***	.502 (.015)***	---
Total SCH	---	---	---	1.532 (.034)***
High Research	-8.153 (108.897)	167606.221 (116504.762)	-2173.679 (38458.346)	67720.996 (23493.155)**
Years HSI	-6.136 (5.746)	---	---	---
Title V Funds	---	-75.646 (814.010)	251.832 (321.707)	-198.379 (161.936)
Constitutional Funds	.033 (.081)	-123.503 (84.162)	-13.622 (29.866)	9.192 (15.057)
Total SS w/o SpaceS	-.002 (.027)	16.020 (26.148)	13.541 (9.952)	-5.773 (5.317)
HSI	-1.045 (110.388)	24977.041 (85186.346)	-25110.008 (34145.417)	-4687.835 (16963.784)
cSpaceS	1.315 (.330)***	-215.885 (305.767)	-126.417 (119.831)	37.984 (51.614)

Notes. * $p < .05$; ** $p < .01$; *** $p < .001$. *Capital Outlay* in dollars ($) per FTSE. NASF = Net-assignable square footage. SS = State support. SpaceS = Space support. cSpaceS = Centered *space support*.

Chapter V

Discussions and Implications

The primary goal of this study was to understand if there was a relationship of HSI designation to state funding, legitimized expenditures, and legitimized measures. Specifically, it considered if Texas public four-year institutions designated as HSIs were in a disadvantaged position due to the lack of designation consideration within the state's public higher education strategies and formula funding models. Additionally, it examined if HSI designation had any association to the relationships between Texas state funding and legitimized expenditures and legitimized measures. It sought to understand this explicitly by examining if the context of state appropriations was translating to differences in correlations with legitimized institutional expenditures and measures between designations. The two hypotheses were:

Hypothesis 1: Unequal appropriation, expenditure, and measure amounts would exist for HSIs as compared to non-HSIs.

Hypothesis 2: Within an unequal public higher education context, HSIs would still have similar relationships between appropriations and legitimized outcomes to non-HSIs.

Thus, designation would not matter because of institutional isomorphic tendencies within a context of legitimized state expectations and unequal state support. Furthermore, per resource dependence on legitimacy, even if an unequal funding context exists between designations, HSIs would still show similar expenditures and measures because of the cyclically rewarding nature of the Texas funding model.

While studies have examined differences between HSIs and non-HSIs from various perspectives, including student characteristics and outcomes (Cuellar, 2015;

Garcia, 2013; Garcia, Patrón, Ramirez, & Hudson, 2018; Rodríguez & Galdeano, 2015), institutional transformation from designation (Garcia, 2018, 2019; Hurtado & Ruiz Alvarado, 2015; Torres & Zerquera, 2012), and institution-student relationships (Zeledón-Pérezsan, 2019), few have considered quantitative differences in responses to external forces (Garcia et al., 2019). Few studies also exist that examine the fiscal relationship that HSIs have with public state funding (Garcia et al., 2019; Ortega et al., 2019). The results from this study address this existing gap in HSI literature, specifically within a state leading in HSI and Latinx representation.

This chapter revisits the study foci with discussion of the findings from the analyses. It also includes discussion on how the results provide direction for future policy, specifically as a response to HSIs in Texas. The final section will involve suggestions on future research opportunities regarding HSIs.

Discussion

The discussion of the study results deliberates the role that HSI designation held within the Texas public higher education context for four-year institutions. The analyses conducted sought to see if HSI designation mattered comparatively to non-HSIs within this context, specifically when looking at appropriation, expenditure, and measure differences, as well as the association the designation had to the legitimized variable groups. It also discusses the results after the inclusion of the state-sanctioned accountability groups alongside HSI designation. Even after controlling for institutional aspects that caused drastic differences across the institutions, the HSI designation appeared to have minimal influence on differences and associations. Instead, the amount of formula funding and accountability groups explained much more within the Texas

public higher education context. The discussion highlights how isomorphic tendencies may have already taken place for Texas public four-year institutions as a response to the state's ongoing strategic goals and expectations, leaving HSI designation as a shrouded factor existing in the background.

The impact of HSI designation. The first analyses required the use of multivariate analyses to explore the possible presence of significant differences between the 20 HSIs in the sample compared to the 16 non-HSIs across the 11 study variables. The results of the one-way MANOVAs only considering HSI designation were not statistically significant, failing to reject the null hypothesis that Texas public HSIs and non-HSIs are similar across appropriations received, institutional expenditures, and legitimized measures. This means that the differences solely based on designation are minimal for FY 2017, and therefore, the Texas state funding context is not apparently disadvantageous towards HSIs as compared to non-HSIs. The lack of existing significant differences between designations could also imply that the institutional context in Texas may already have had isomorphic tendencies. In the overall organizational field, Texas HSIs as a group do not differ significantly from the non-HSI peer institution group, even though the literature states that they typically do. Garcia (2017, 2019) pushes against such comparisons of differences between HSIs and non-HSIs for these reasons. In going against benchmarking HSIs against non-HSIs, HSIs are instead supported for the institutions that they already are, identifying outcomes to improve and identities to establish *within* the designation group.

Even though the results suggest that differences do not exist between designation types, this does not mean that there are no differences at all. The mean differences across

state appropriations per FTSE between designations showed non-HSIs having higher means for the majority, including state appropriations ($6,376 versus $5,983) and operations support ($3,740 versus $3,340). Although this was also the case for E&G space support ($660 versus $572), that difference per FTSE is $88, evidencing the minimality that could have led to the non-significance in the statistical results. National advocacy for HSI support compared to non-HSI institutions tends to remonstrate even minimal dollar-per-student differences (HACU, 2019b), with the varied research on HSIs also considering the effect that differences in fiscal support have at the student level (Núñez et al., 2015). Focusing efforts at the student level aligns with Texas higher education strategy focused on producing a larger college educated state population (THECB, 2015). Yet, while the non-significant results provide a positive sense of support for Texas HSIs within the state's public four-year ranks, the visible dollar differences in the data allude to the state's known misalignment between stated educational priorities and actual use of fiscal resources (Perna et al., 2014; THECB, 2018d). It also suggests that Texas is doing just enough to maintain a somewhat equal institutional foundation for its public four-year system, but not essentially doing *more* for its HSIs. This is despite the existing research informing of their continual disadvantaged place in higher education (Benitez, 1998; De Los Santos & De Los Santos, 2003; Gasman et al., 2008; HACU, 2019d), especially within Texas in regards to underperformance (Fletcher & Webster, 2010) and the state's history of lesser-than fiscal treatment of its own HSIs (Flack, 2003; Santiago, 2006). The South Texas/Border Initiative presents a clear example of unequal state funding that Texas has carried out in its history towards its predominantly-Latinx public four-year institutions in south Texas (Flack, 2003).

The impact of HSI designation and accountability groups. The addition of accountability groups to the multivariate analyses further revealed the stated misalignment between state strategy and state funding. Results show that there were still no statistical differences on state appropriations between designation types when also considering accountability groups. However, accountability groups on their own did show significant differences on T/TT faculty numbers and predicted total NASF, and accounted for more of the difference across the measures than HSI designation did. This may explain the state of Texas's use of accountability groups to classify their public four-year institutions, given the more explanatory factors involved in categorization when compared to the limited two-level HSI designation (THECB, 2019a). Institutions classified as *Emerging Research* are expected to have more T/TT faculty and bigger campuses than those specialized up to the *Masters* level, while an HSI designation does not convey such specific characteristics. Yet, while accountability groups are fluid titles (as made evident in the group name *Emerging Research*) that can change after state revisions (THECB, 2019a), HSIs are set by reaching a Latinx student number metric that is not subsiding (*Excelencia* in Education, 2019). Their non-influence in relation to the state's accountability groups further strengthens the evidence that the current system in place in Texas is not considering HSI status.

The state's top-tier accountability group of institutions, *Research*, was not included because it did not have any non-HSIs. This group only included UT-Austin and TAMU, which were known unusual cases in the sample. However, their inclusion where possible in the research was necessary to truly take designation differences into account. As the two flagship state institutions, UT-Austin and TAMU presented clear distinctions

between themselves and the rest of the state's public four-year institutions. This aspect is well-known across sources, from in-state deliberations regarding advantageous access to funds use (THECB, 2014) to literature and reports stating their potential difference in appropriation allocations, top-tier research production, and capital asset capabilities (Perna et al., 2014; Watkins, 2017; Weinberg, 2019). Nonetheless, their significant enrollment size, their designations as both public non-HSIs and Emerging HSIs per their institutional Latinx student population (HACU, 2019b; THECB, 2018a), and the study's small sample size made them integral for the investigation. This is besides the evident heavy fiscal investment made in state appropriations to both institutions and their respective systems (LBB, 2016b, 2019; THECB, 2009).

The influence of HSI designation. The second part of the study relied on predictive modelling using MHMRs to see if relationships between the variables of interest existed, and if the relationships were influenced by HSI designation. The results for this part of the study utilized a more conservative alpha level ($\alpha = .01$) in response to the small sample, the outlier aspect, and the violations of assumptions that occurred due to the nature of the data. The lower alpha level for statistical significance safeguards from committing type I errors of rejecting a true null hypothesis (Benjamin et al., 2018), which for this part of the study meant rejecting that the relationships between appropriations and expenditures and/or measures are not different due to HSI designation. The seven regressions resulted in that conclusion. None of the hierarchical regressions showed that HSI designation had a moderating effect on the predictive paths between state funding and expenditures or measures, when all controls were considered.

Controlling major institutional characteristics. All the controls were conceptually founded and confirmed as appropriate based on correlational levels with the other variables. Ultimately, they attempted to keep such a diverse set of institutions without fiscal, metric, or capital footprint advantages over one another. Controlling for high research level designation and the total amount of state appropriations received through the GAA (without including the specific appropriation amounts that acted as predictors in each regression) was done across all seven regressions. High research level institutions were controlled for because of the powerful resources advantage they hold, including funding, faculty, capital assets and expenditure capabilities (Morphew & Baker, 2004; Morphew & Huisman, 2002; Pusser & Marginson, 2013). Texas supports UT-Austin and TAMU flexing these advantages to increase the chances of meeting the state's goal of improved national rankings in higher education (THECB, 2000, 2015, 2019b). This makes the high research level control particularly important for reigning in both institutions as outliers. Moreover, HSIs are generally not research-oriented institutions (Hurtado & Ruiz Alvarado, 2015). Controlling for state appropriations, outside of the operations and E&G space support appropriations, included additional formula supplements, institution-specific research grants, legislative-appointed special line items, and strategy-based appropriations, of which all vary from institution to institution. In fact, Texas lawmakers have described the extensive *special item*s section of the GAA as unnecessarily costly and uneven between institutions (Najmabadi, 2018).

The important influence of formula-funded appropriations. There were only two regression coefficients that indicated a predictive relationship from the appropriations, and neither was moderated by HSI designation. Receiving more formula-

based operations and E&G space support funding total was shown to increase an institution's operating expenditures, and an increase in E&G space support funds was shown to increase an institution's capital expenditures. HSI designation, on the other hand, did not associate with the expenditures and measures legitimized by the state. Interestingly, the importance of capital aspects found within Texas strategic plans and the funding model did not translate over into the study results. Even though the projection of institutional space is based off expenditures and measures, which in turn are conceptually influenced by funding streams and appropriations, state funding did not resonate with capital measures. This could possibly be due to the controls used, or other variables not included in this study but that may matter within the state's complex funding model. Institutional size appeared as an influential issue once. After including control variables, UT-Austin appeared as an influential outlier for the predicted NASF for office spaces. Still, including UT-Austin in that specific analysis did not change the non-statistically significant results.

The enigma of the HSI designation. Regardless of being an HSI or not, the appropriations-outcome relationships were not statistically different. Both HSI and non-HSIs in the sample showed an increase in operating expenditures and capital expenditures the more state appropriations they received. The lack of statistically significant differences due to HSI designation suggests that institutions are behaving similarly in response to the legitimized context. These results touch on to the lack of impact that the HSI designation has on institutional expenditures and measures, and echo the findings from the MANOVA analyses in which accountability groups affected the outcomes more. These results also seem to point to the lack of understanding surrounding HSI

institutional identity that is abundant in the literature (Franco & Hernández, 2018; Garcia, 2016; Malcom-Piqueux & Lee, 2011), and the challenge in uniformly characterizing institutions labeled as HSIs (Núñez et al., 2016). Additionally, the effect of accountability groups present in the first analyses leaves questions as to their possible impact in the regression relationships. If that were to be the case, it inquires on the isomorphic tendencies that the accountability groups are placing on Texas public four-year institutions, irrespective of their HSI identity; an institutional identity still in flux.

Result from this quantitative study help shed light on the place that Texas public four-year HSIs are in within the state's intricate formula-based appropriations system and higher education strategies, but from a macro perspective. Analyses did not delve into the details of individual institutional characteristics nor measures at the individual student level. They focused instead on the Texas public higher education funding mechanism and how the HSI designation fares within it at the institutional level. While the Texas public higher education context is founded on this appropriations system, it is also driven by the state's higher education strategic plans, and ultimately, maintained by the appropriations granted as a response to both contextual structures. The analyses results suggest that Texas HSIs are not without adequate state support when compared to public non-HSIs. They further propose that HSI designation does not influence state appropriations on the outcomes chosen. While these findings provide a slim glimpse into the fiscal state of public HSIs within an HSI-rich state, they also highlight the ambiguity that dominates the literature on fully understanding the designation and its future direction.

Implications for Policy

Texas is at a pivotal crossroads involving many moving pieces: a struggling Latinx college population (Schak et al., 2019; TACHE, 2019); ambitious higher education strategic goals (Perna et al., 2014); a vastly diverse public higher education system (Perna et al., 2014; THECB, 2018a); a large number of in-state public HSIs (*Excelencia* in Education, 2018, 2019); an expansive and expensive higher education capital footprint (THECB, 2018b); and legislators questioning a byzantine state appropriations system (Watkins, 2017; Najmabadi, 2018). The various factors in play provides a starting point for many different directions that future policy can take. Texas lawmakers can undertake the critical task of reviewing all these factors and imbedding their state's HSIs into the mix for future policy direction, moving away from pressuring isomorphic tendencies that bury previously existing institutional identities. The results of this study point to the lost sense of the HSI designation within the confines of the state's higher education system and its legitimized expectations. All the while, the state's higher education coordinating board has already recognized not meeting set higher education goals for Texas Latinx college students in regards to enrollment and completion gaps (THECB, 2016). This is besides the plethora of research that exists pointing to the concentration of Latinx at HSIs nationwide and in Texas (Garcia et al., 2019; HACU, 2019d), and the continued lack of formal recognition HSIs apparent across state-sanctioned materials (Eklund, 2018; LBB, 2016a, 2019; Paredes, 2016; THECB, 2000, 2005, 2009, 2010, 2014, 2015, 2016, 2017, 2018a, 2018b, 2018c, 2018d, 2019a, 2019b).

Continued need to formally recognize HSIs. While the study hypotheses expected to find inequalities for Texas HSIs, the findings of no differences in state

funding and measures when compared to non-HSIs calls to question the intentions state policies have in supporting these institutions better. In Texas's history of assorted and drastic higher education policy changes, many have attempted to help marginalized student populations (Flores & Park, 2015). Even so, the state's underrepresented populations, namely Latinx, have continued to enroll in less-selective and typically less-resourced state institutions (Horn & Flores, 2012; Perna et al, 2014). Today, the state's initiatives in addressing these issues remain disconnected from the cited importance of HSIs to these populations. In fact, the coordinating board's formula-funding recommendations report for the current 2020-2021 biennium acknowledge Latinx as highly represented in the Texas young adult population, as traditionally underrepresented within the state's higher education system, and as critical for strategic success (THECB, 2018d). However, HSIs remain unmentioned. The suggested results ask why, if the state is doing enough, and whether lawmakers can do more. They also question if and how the state's strategic plans are reflecting into institutional behaviors.

Misdirection towards performance-based funding. Future policy options are starting to include a total rehaul of the current funding model (Najmabadi, 2018) and a shift towards performance-based funding for Texas public four-year institutions (Hamilton, 2012; Paredes, 2016; Walters, 2017). Specifically, recommendations make mention of a graduation-based bonus program that provides more state funding for more bachelor's degrees awarded to at-risk students (Paredes, 2016; THECB, 2018d). Yet, performance-based measures already in place for Texas two-year colleges have shown to place institutional benefit at odds with enrolling traditionally at-risk student populations (McKinney & Hagedorn, 2017). If a four-year HSI is rewarded for performance-based

outcomes, the serving-focus may shift from its own students to its own resource-driven survival. Taking this policy direction for HSIs has already shown to be a detrimental route for their HSI identity (Franco & Hernandez, 2018; Garcia, 2019) and their typically marginalized student body populations (Contreras & Contreras, 2015; Núñez & Elizondo, 2012; Núñez et al., 2015). Theoretically, performance-based funding strategies can further push institutions into isomorphic tendencies as well, in that they are responding to state-established strengths versus focusing on individual institutional strengths. It is similar to institutions engaging in academic drift behaviors when there is an external emphasis on research production (Morphew & Huisman, 2002).

The importance of continued state support. If Texas policymakers continue to leave HSI designation out of future planning, findings from this study at least provide some evidence of specific funding that can influence expenditures in general for all its public four-year institutions. While results did not display relational strengths across many of the variables, they did show that operations and E&G space support funding does somewhat influence capital growth and operating expenditures. More state funding supportive of institutional expenditures and growth are beneficial across all public institution types, especially when it is known that higher education institutions rely heavily on state funding that is constantly at risk of budget cuts (Dougherty & Natow, 2015; Ikpa, 2016). For Texas, more capital growth also assists the state make strides towards its lofty 2030 strategic goals (THECB, 2015). Ideally, increasing E&G space support funding will offset the THECB future recommendation of decreasing the Small Institution Supplement (THECB, 2018d) when half of the HSIs in the sample benefit from this supplement.

In his work on policy formation, Kingdon (1984) found that sizeable policy changes come into fruition when problems, policies, and politics collide. Texas lawmakers and agencies have identified target problems to ensure meeting strategic higher education goals, are considering deconstructing its established funding model, and have agreed on legislation that heavily invests in higher education debt retirement up through 2020 (LBB, 2015; McGuire, 2017). Being more than midway through the current *60x30TX* higher education plan, Texas is in a prime position to take charge and implement policy changes that continue fiscal investment into their higher education, and hopefully take steps in finally recognizing their public four-year HSIs.

Future Research

The findings of this study call for more extensive research on the role of HSIs within state-constrained contexts. HSIs are federal constructs that have remained *above* the state level within existing research trying to understand their role at the national level. States like Texas, with large numbers of HSIs and extensively available institutional data, are ideal settings for researchers to engage in deeper exploration of the overall HSI designation. By doing so, diversity in institutional identity can flourish and be built upon, instead of giving way to identical institutional behavior being driven by external pressures.

Texas two-year HSIs. Parallel to this study, research opportunity exists to evaluate the state's entire HSI system, inclusive of two-year colleges and technical state colleges, or just solely focused on Texas two-year HSIs. Texas has more two-year HSIs than four-year HSIs, but if assessed together, research can help provide a better portrayal of the designation's place within the state's higher education system. This study focused

only on four-year institutions because of Texas's dissimilar funding and capital-assessing procedures between the two institution types. Nonetheless, two-year institutions in Texas open opportunistic avenues to explore the current state of the public institutions that house 39% of the state's Latinx undergraduate college students (Ma & Baum, 2016). With Texas already having a performance-based funding model in place for its public two-year institutions (LBB, 2016b; 2019), new research can better identify the specific factors that may or may not be working for at-risk populations within this system. McKinney and Hagedorn (2017) found that the current performance-based funding system for Texas community colleges is not encouraging these institutions to recruit typically at-risk populations due to jeopardizing the amount of funding they may obtain from the state. Future research can help find what aspects are actually helping Latinx populations at these institutions, with this ultimately being advantageous in meeting state strategic goals.

Other strategic goals and institutional variables. While appropriations, expenditures, and measures were variables that were derived from the state's documented attention to enrollment, capital growth, and legitimized goals, Texas higher education strategies provide other areas of focus as well. Specifically, given the *60x30TX* goals of improved marketable skills and reduced student debt (THECB, 2015), future studies can attempt to analyze these types of student-level metrics for Latinx graduates from both HSIs and non-HSIs. On the variable side, different sources of income, like operating revenue which includes endowment and auxiliary monies, showed to be significantly related to operating expenditures, T/TT faculty, and reported SCH. Similar to *special items* funding (GAA, 2015), operating revenue can vary drastically across institutions and

systems, meaning that such differences could also exist, and be influential, in the HSI versus non-HSI context. The variability could be a symptom of the size of the state, though, presenting another direction worth exploring in future research.

Localized contexts. The vast size of the state of Texas presents differences across regions, demographics, and campus settings, calling for a research focus within localized contexts. Academic reports have mentioned the size of the state as a detrimental factor in its strategic goals (Perna et al., 2014), revealing research opportunities concerning regional characteristics. Regional differences could be an important factor in tackling new research on HSIs creatively. One such route could be a reimagined HSI-specific accountability grouping system, like Núñez, Crisp, and Elizondo's (2016) developed typology of HSIs. A specialized typology system that only includes HSIs, considers regional differences, and is structurally similar to the current accountability groups, could ease the task of policymaking around HSIs and lead to more targeted state funding. Taking such a route legitimizes outcomes and measures based on existing HSI strengths (Garcia, 2019) within the confined context of the HSI designation. Moreover, as related to capital assets, Texas relies on local taxing districts to provide capital funding for physical plant needs of two-year public institutions (LBB, 2016a, 2019). At such a localized community level, the town-gown relationship becomes an important factor to consider that drifts from the current study's focus on the state-institution associations.

Qualitative approaches. Qualitative research can also enhance the results of these studies a great deal. Qualitative inquiry, especially for policy on HSI funding in a context like the one in Texas, can provide a glimpse into possible reasons for the missing HSI narrative from state policy history. The Texas legislature's decisions surrounding

current state higher education policies also has potential for further research, specifically on the motivators behind funding decisions (Hackworth, 2019). At the institutional leadership and student perspective levels, the ecological contexts of HSIs can also be studied qualitatively. Studies around the impact of HSI transformation away from previous institutional identity (Cabrera, Franklin, & Watson, 2017), the role of campus climates on learning environment contexts (Cuellar, 2015; González, 2003; Hurtado, Alvarez, Guillermo-Wann, Cuellar, & Arellano, 2012; Kiyama et al., 2015), and the influence of external state pressures on institutional student resources (Arana, Castañeda-Sound, Blanchard, & Aguilar, 2011) demonstrate related ecological avenues that can enhance understanding on the roles of HSI.

Research on the effect of campus planning and architectural form on student outcomes and perceptions (Hajrasouliha, 2017, 2019) is also offering new branches for lawmakers to engage in for new policymaking. Taking a multidisciplinary approach on higher education research can illuminate new pathways that could lead to innovative solutions for longstanding problems. Research on HSIs, in its extensive but comprehensive nature, may need this type of novel exploration in order to arrive to a definitive and reframed grasp of the what these institutions may need from public state funding.

Conclusion

In Texas, institutional capital space matters beyond its mere physical footprint. In fact, it involves most everything having to do with the functioning of the institution itself. Moreover, for Texas public institutions of higher education, the expected campus size, the institutional costs, the state funding, the faculty, and the students all interplay with the

state's higher education strategic goals and formula-funded appropriations model. Yet, an important aspect missing from the Texas higher education system is the position of HSIs within its layered institutional context. This absence is perplexing for a state so explicitly invested on the collegiate success of a growing Latinx population. As this population continues to grow, so too will the state's HSI numbers and the incentive to finally acknowledge these vital institutions within Texas public higher education. Instead, for the time being, Texas HSIs appear to be present only as a federal designation lost beneath numerous state objectives, without state-sanctioned mention, and within an existing state fiscal support system that seems impartial to designation.

The results from this study provide preliminary evidence that the Texas public higher education context for four-year institutions does not benefit nor disadvantage HSIs within the existing state funding structure. While this lack of disproportional treatment between the state's HSIs and non-HSIs presents an institutional atmosphere that is supported equally by the state government, it also introduces many questions on whether this is the best route for Texas to take. From a benchmarking perspective, the current equity-based structure does not seem to be addressing the growing Latinx state population that did not meet strategic targets for Latinx college enrollment by 2015. Even more puzzling is the state's continued tracking of Latinx student metrics, such as acknowledging that 30% of all bachelor's degrees granted by public institutions were to Latinx students (THECB, 2016), and continued admittance of needing to do more for this population (THECB, 2018d), without assessing the role of state HSIs. From an institutional identity standpoint, the current structure's apparent focus on enrollment-based metrics and accountability objectives disregards student body makeups that are

identified via designations like HSIs. Instead, the existing direction to assign accountability groupings further pressures institutions to engage in institutional isomorphism and potentially ignore relevant identity-based strengths that are unrelated to measurable institutional factors or outcomes. The current funding structure in Texas appears to be sufficient for the state's HSIs when viewed as solely public four-year institutions, but many more questions arise to judge if the structure is enough for these institutions when viewed as minority-serving institutions mainly *serving* Latinx students. Texas legislators and higher education policymakers are left with the task of questioning if future structural adjustment should provide more for the state's public four-year HSIs.

These findings emphasize an underlying theme present across research on HSIs, and that is the misunderstanding surrounding these institutions. This study contributes to the relevance of this issue as there seems to be an ongoing lost sense of what Hispanic-serving means to an institution. The literature is rife with studies on the multiple disadvantages these institutions face, and the extensive institutional diversity that exists alongside the designation's rampant growth in numbers. Researchers continue trying to make sense of what HSIs are and will become, of who and how they are to serve, and of what kind of support aids them best. All the while, HSIs continuously undergo change as a unique institutional group in higher education. This recurring change coupled with the inescapable dependence of public funding makes public HSIs susceptible to the blurring of institutional identity caused by institutional isomorphism. It makes them hard to pin down within the scope of institutional understanding, and it leaves them always worthy of another more profound analytical look, especially in states like Texas. For Texas, with only a decade left in its *60x30TX* higher education strategic plan, questions remain on

whether the state will meet its lofty strategic goals, and whether it will recognize HSIs in the process. For now, the current state of Texas Hispanic-Serving Institutions, in one of the most Latinx-populated and HSI-rich states in the nation, remains obscure.

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Appendix A

State of Texas Institutional Accountability Groups

The Research universities peer group only consists of Texas A&M University (TAMU) and the University of Texas at Austin (UT – Austin). Research universities are all-encompassing, offering undergraduate through professional degree programs, with a stronger focus on research spending and graduate student production than any of the other four groups (THECB, 2019a). Emerging Research universities are specifically focused on the Texas higher education mission of teaching, research, and service (THECB, 2019a). This peer group is expected to spend on research and produce graduate level degrees, but not at nearly the same level as Research universities. For example, Emerging Research institutions are expected to award at least 30 PhD degrees every year, while Research institutions are expected to award 200 or more PhD degrees annually (THECB, 2019a). Emerging Research institutions include Texas State University, Texas Tech University, and the University of Houston (THECB, 2019a). Doctoral universities are also expected to focus on the state mission of teaching, research, and service, while focusing on doctoral graduates based on regional need (THECB, 2019a). Doctoral institutions are expected to award at least 10 PhD degrees every year, and the group includes Sam Houston State University and Texas Southern University (THECB, 2019a). The Comprehensive and Master's peer groups are dedicated to Master's level graduate education. The difference is that Comprehensive institutions have the option of also offering doctoral degrees based on regional needs or in the institutions' best disciplines, and Master's institutions are expected to focus efforts on offering high quality undergraduate education (THECB, 2019a). The state of Texas identifies these two peer

groups as important gateways to a college education in general. Institutions within the Comprehensive group include Lamar University and Prairie View A&M University (PVAMU), while Master's institutions include Sul Ross State University and the University of Houston – Downtown (UHD) (THECB, 2019a).

The benefit of the accountability system in place for Texas is that it is an attempt at controlling the variability of public universities. With the peer groups, the institutions are counted for what their strengths were and currently are. For Texas HSIs, this means that institutional characteristics are being fit under an equitable lens, from an outcome measure and mission vantage point. The state is acknowledging institutional differences in its public four-year system, but based out of the state's strategic plans that miss mentioning HSIs. The HSI designation hides beneath the peer group designation, aligned towards legitimized institutional expectations set in motion by the state. Furthermore, outside of access to specific funds for advancing research goals (LBB, 2016b, 2019), the peer groups play a minimal role in the state funding model. Instead, state funding for public higher education in Texas follows a formulated and layered system that legitimizes teaching, research, spending, and space.

Appendix B

Controversial TRBs

TRBs have not had a set procedural understanding within the Texas legislature since their inception in the 1970s. What initially began as an authorization for a limited number of institutions (UT-Austin, TAMU, Texas Tech, UH, UT-Rio Grande Valley) to issue the bonds for new campus construction has grown over time to include all public four-year, health-related, state and technical colleges (THECB, 2018c). As evidenced in the LBB's house bill fiscal notes (LBB, 2015), the state's assumed commitment and responsibility for issuing and retiring TRBs is a continuously ambiguous practice. The legislature views the bonds as both non-obligatory yet fiscally important to the state. Furthermore, no set procedure or statute is in place to make TRB retirement a state responsibility, nor to guide on the authorization and evaluation of new TRB projects (McGuire, 2017). These stipulations have resulted in a TRB system that uses public monies for debt repayment, fluctuates on appropriation amounts and opinion with every Texas legislature, and causes problematic effects on the institutions that rely on them for capital projects

The first large dispute related to TRBs came from the Texas Supreme Court case *LULAC v. Richards* which argued that the nine state institutions along the Texas-Mexico border were not getting comparable state funding to other state institutions (Flack, 2003). As a result of the case, in 1989, the Texas legislature increased special items funding and TRB retirement for these institutions through the South Texas/Border Initiative (Flack, 2003). Issues continue in existence today, with institutions relying on legislative mood for capital project funding. UTSA, for example, had plans to expand their campus into

downtown using $126 million in TRBs that failed to authorize because the state senate prioritized hurricane recovery and preparation efforts over assuming university debt (Torralva, 2019). Approximately $3.8 billion in TRBs fell through from that failed bill, which was strongly blocked by Lt. Gov. Dan Patrick due to his “hostility towards higher education”, even though he signed off on more than $3 billion in TRBs back in 2015 (Weinberg, 2019). Institutions are then left to find other sources of funding for their capital projects, with some institutions having the advantage of being part of a large university system. This year UTSA was granted funding from the UT Board of Regents for purchasing the land for their downtown expansion, and has ongoing plans to fund construction of a new College of Business with other means other than tuition and fees (Peck, 2020). The volatile nature of TRB decisions, mixed with its use of public funds, changing state priorities, and political leanings within the Texas legislature make it an appropriation type that will continue being uncertain for each biennium.

Appendix C

Variable Details and Sources Tables

Table C1

State Appropriations Variables, Time Period, and Sources

Name	*Description*	*Period*	*Data Source*
State Appropriations	State appropriation amount that excludes state grants and contracts, AUF excellence funds, and HEF capital funds	FY 2017	*Sources and Uses Report* (THECB, 2018c)
Operations Support	Formula-funded appropriation allocated via the Instruction and Operations (I&O) Goal	FY 2017	*General Appropriations Act* (GAA, 2015)
E&G Space Support	Formula-funded appropriation allocated via the Infrastructure Support Goal	FY 2017	*General Appropriations Act* (GAA, 2015)
TRB Retirement	Capital appropriation in the form of an institutional reimbursement for capital projects allocated via the Infrastructure Support Goal	FY 2017	*General Appropriations Act* (GAA, 2015)

Note. All variables are in dollars ($) per-FTSE format. TRB = Tuition revenue bonds.

Table C2

Legitimized Expenditure and Measures Variables, Time Period, and Sources

Name	*Description*	*Period*	*Data Source*
Operating Expenditures	Sum of expenditures on (1) instruction, research, and academic support, (2) student services and scholarship, and (3) institutional support and operations and maintenance (O&M) of plant	FY 2017	*2018 Almanac* (THECB, 2018a)
T/TT Faculty	Number of tenured/tenure-track faculty per institution	Fall 2017	*2019 Almanac* (THECB, 2019b)
Reported SCH	Total reported semester credit hours per institution across all degree levels	Fall 2017	*Space Projection Report* (THECB, 2017b)

Note. Operating expenditures are in dollars ($) per-FTSE format.
T/TT = Tenured/tenure-track. SCH = Semester credit hours.

Table C3

Legitimized Capital Expenditure and Measures Variables, Time Period, and Sources

Name	*Description*	*Period*	*Data Source*
Capital Outlay	Capital expenditures on the construction and acquisition of capital assets	FY 2017	*Sources and Uses Report* (THECB, 2018c)
Predicted Total NASF	Predicted total E&G net-assignable square footage per institution	Fall 2017	*Space Projection Report* (THECB, 2017b)
Predicted Office NASF	Predicted net-assignable square footage for office spaces per institution	Fall 2017	*Space Projection Report* (THECB, 2017b)
Predicted Teaching NASF	Predicted net-assignable square footage for teaching spaces per institution	Fall 2017	*Space Projection Report* (THECB, 2017b)

Note. Capital expenditures are in dollars ($) per-FTSE format. NASF = Net-assignable square footage. FY = Fiscal year.

Table C4

Regression Control Variables by RQ, Time Period, and Sources

Variable	*RQ*	*Description*	*Period*	*Data Source*
Total Enrollment	2	Total institutional headcount, including all full-time and part-time students	Fall 2017	*2018 Almanac* (THECB, 2018a)
Total Actual NASF**	3	Total actual amount of institutional space in NASF	Fall 2017	*Space Projection Report* (THECB, 2017b)
Total SCH**	3	Total yearly semester credit hours reported on the CBM004 report for each institution	FY 2017	*Texas Public GAI Expenditure Study* (THECB, 2019c)
High Research Level Designation*	2, 3	Dummy variable created to designate institutions that are classified as high research activity/producing per both THECB Accountability Groups and Carnegie Classification	2019	*Accountability in Higher Education* (THECB, 2019a) *Basic Classification Descriptions* (Carnegie Classification, 2020)
Percentage of Faculty T/TT	2	Percentage of total faculty that are tenured/tenure-track for each institution	Fall 2017	*2019 Almanac* (THECB, 2019b)
Years as an HSI***	2, 3	Number of years an institution has been designated as an HSI since 1994	2017	*Fall Enrollment and Institutional Characteristics Survey* (*Excelencia* in Education, 2017)
Title V Funding***	2, 3	Title V grant funding received since 2012 per FTSE	2012-15	*Office of Policy Analysis and Information* (HACU, 2019e)
Constitutional Funds	3	Capital appropriations received from either the AUF or HEF per FTSE	FY 2017	*AUF System Reports* (TAMU System, 2017; UT System, 2018) *HEF Allocations* (Texas Education Code, 2015)
Total Operating Revenue	2	Total operating sources from state grants and contracts, AUF excellence funds, tuition and fees, federal grants and contracts, and institutional revenue (endowment, private gifts and grants, local grants, sales and services, and auxiliary enterprises); excludes State Appropriations variable amount and Constitutional Funds	FY 2017	*Sources and Uses Report* (THECB, 2018c)
Total E&G State Support****	2	Total amount of Educational and General State Support appropriations excluding formula-funded Operations Support and E&G Space Support	FY 2017	*General Appropriations Act* (GAA, 2015)
	3	Total amount of Educational and General State Support appropriations excluding formula-funded E&G Space Support	FY 2017	*General Appropriations Act* (GAA, 2015)

Notes. *included in all seven regressions. **/***variables interchanged due to multicollinearity with one another; chosen based on higher correlation (*R)* level with outcome variable. ****Total E&G space support includes any additional funding from the Teaching Experience and/or Small Institution Supplements

Appendix D

Normal Q-Q Plots for All Variables

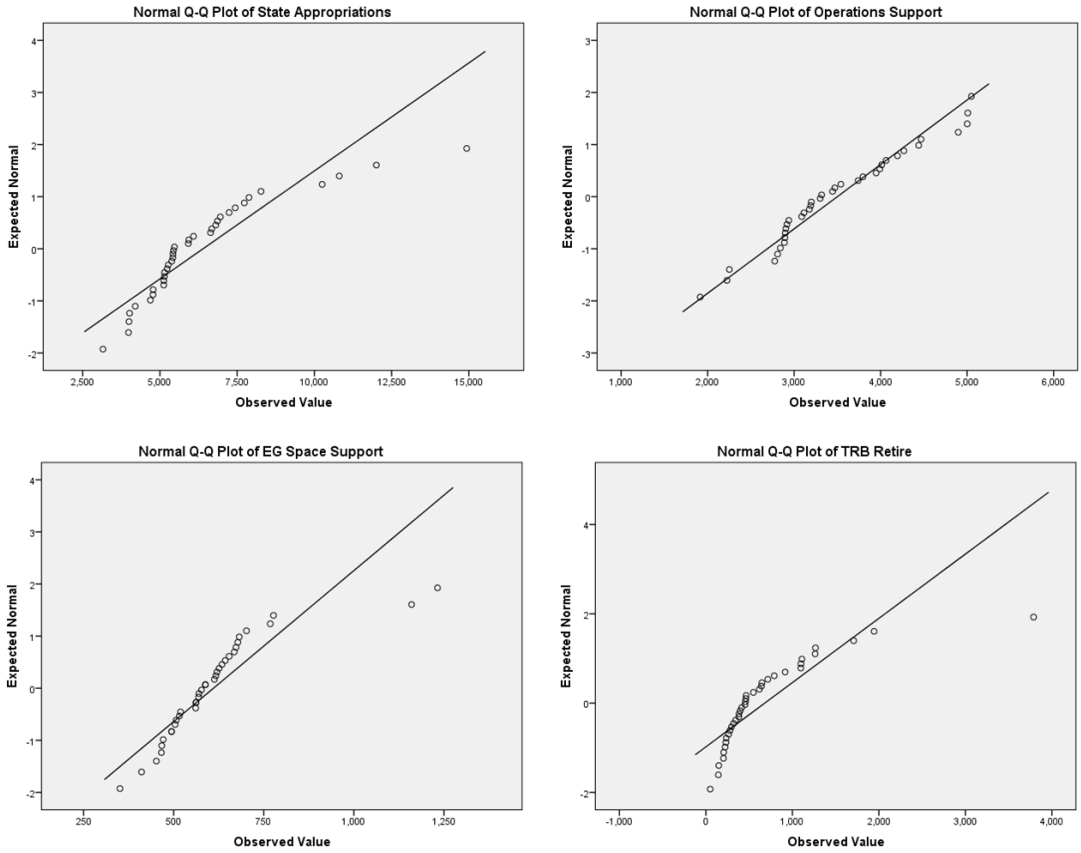

Figure D1. Normal Q-Q Plots for State Appropriations Variables.

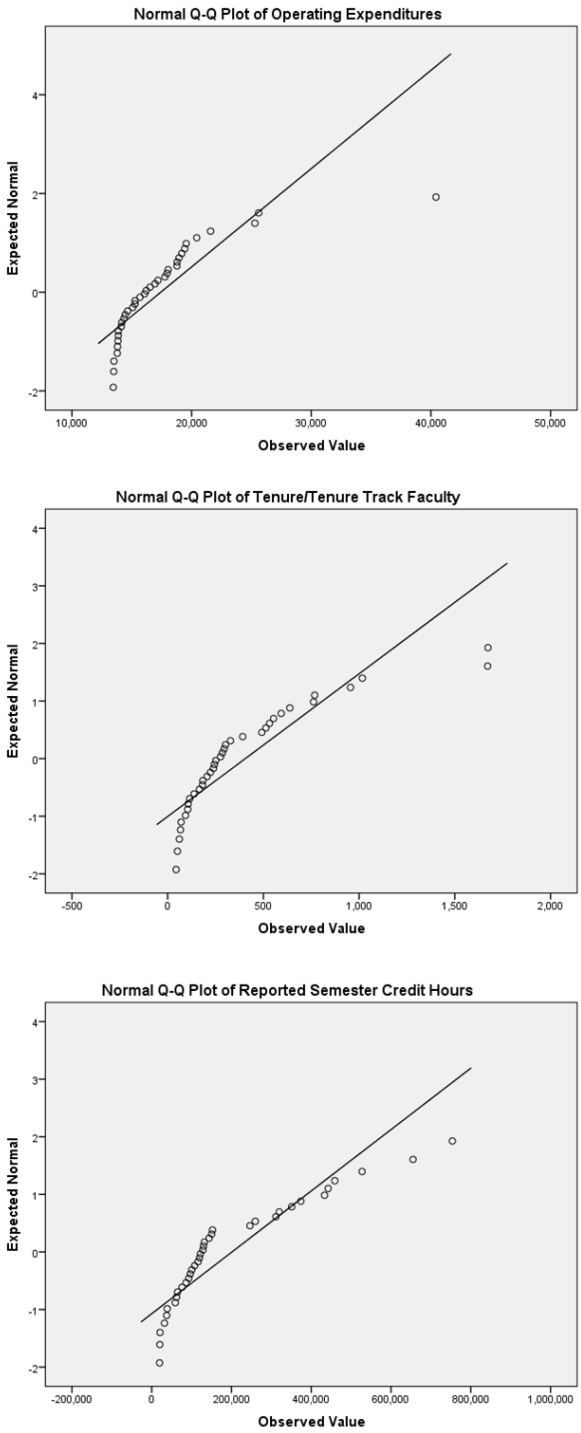

Figure D2. Normal Q-Q Plots for Legitimized Expenditure and Measures Variables.

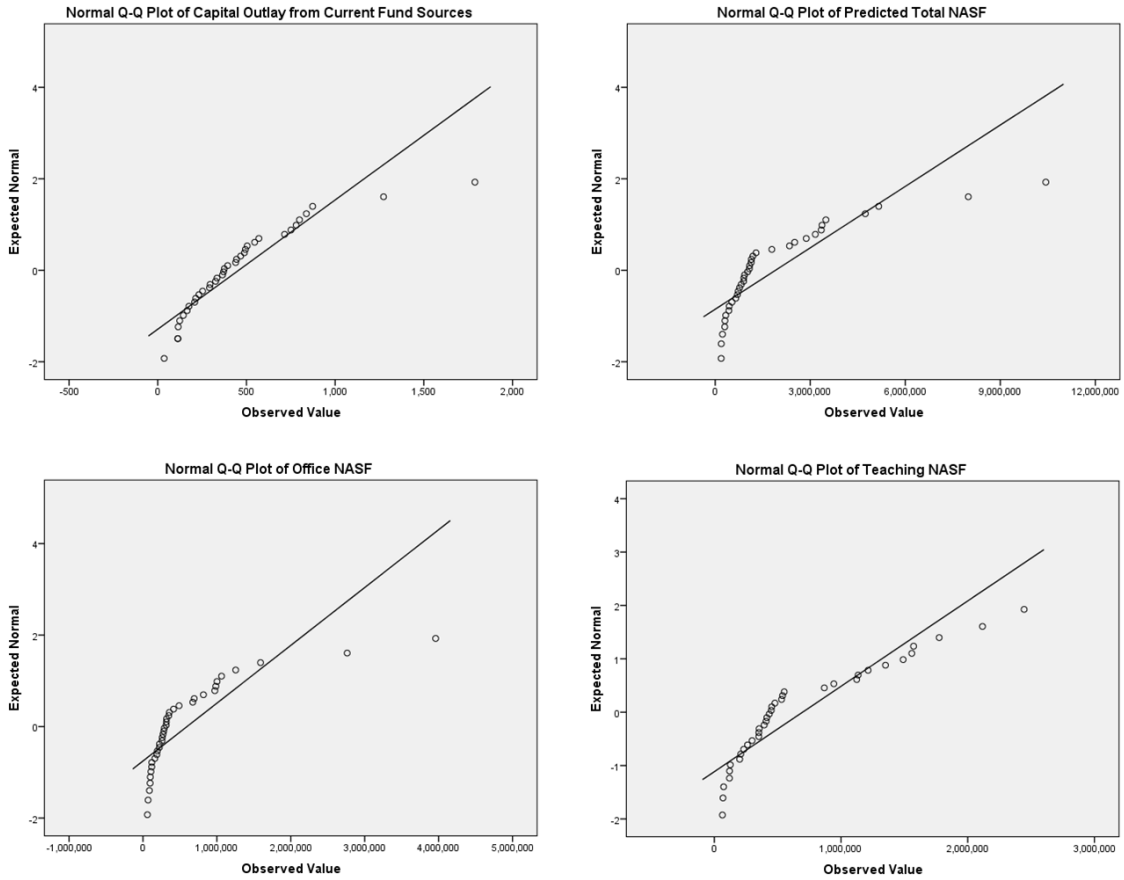

Figure D3. Normal Q-Q Plots for Legitimized Capital Expenditure and Measures Variables

Appendix E

Independent Samples t-Tests for One-Way MANOVAs and Log Transformed Data

The three one-way MANOVAs resulted in non-statistically significant results. To follow-up these results, I considered independent samples t-tests to further investigate if statistically significant differences exist between the means of HSIs and non-HSIs across some of the variables. I decided to choose variables that were included in the one-way MANOVAs, but that also did not violate assumptions for the independent samples t-tests. Issues with assumptions became present again using the non-transformed data for most of the variables, specifically dealing with violation of normality for the dependent variables across both groups and the presence of outliers. Using a log transformation fixed the normality violation for all but four variables (all four being for non-HSIs), but still with some outliers present.

I first checked using the non-transformed data. The non-transformed variables I chose to test mean differences for, in order from the first three one-way MANOVAs, are operations support appropriations, operating expenditures, and capital outlay. The operations support variable for non-HSIs violated the normality assumption (p <.05), but it was not severe and there were no outliers for either group. Operations support violated the homogeneity of variance assumption because Levene's test for equality of variances was statistically significant (p <.05). Using the equal variances not assumed results, the analysis found there was not a statistically significant difference in the operations support, $t(32.668) = -1.343$, p >.05, between HSIs (M = 3339.80, SD = 809.544) and non-HSIs (M = 3698.75, SD = 786.779).

I continued with the operating expenditures variable, which violated normality for non-HSIs (p <.05) and had a single outlier with UT-Austin. Given the understood institutional profile of UT-Austin, I removed the institution for the t-test, resulting in no other outliers for the variable. Operating expenditures without UT-Austin included did not violate Shapiro-Wilk for either group (p >.05), but did violate Levene's test for equality of variances (p <.05). Using the equal variances not assumed results, there was not a statistically significant difference in the operating expenditures, $t(19.724) = -1.713$, p >.05, between HSIs (M = 15937.50, SD = 2091.160) and non-HSIs (M = 17878.73, SD = 3997.611). Results were still not statistically significant with UT-Austin included in the analysis.

Capital outlay did not violate normality, but it did have UT-Austin as a non-HSI outlier and Texas Tech as an HSI outlier. I removed both institutions because of their institutional profiles (Texas Tech being the third-largest HSI in the sample but with the most capital outlay expenditures per FTSE), resulting in no other outliers present. Once again, equal variances were not assumed (p <.05) and the amounts were not statistically significant, $t(17.252) = -1.783$, p >.05, between HSIs (M = 328.37, SD = 135.985) and non-HSIs (M = 501.00, SD = 354.949). Results did not differ with UT-Austin and Texas Tech included in the t-test.

Log-transforming the data for these same three variables resulted in only slight normality violations (p <.05) for the non-HSI group in operations support and operating expenditures, and in a single outlier (UT-Austin) in operating expenditures. Regardless, the analyses also violated Levene's test for equality of variance across all three variables and resulted in non-statistically significant mean differences between HSIs and non-HSIs.

Results remained unchanged for operating expenditures after removal of UT-Austin as well. These independent samples t-tests further confirm the non-statistically significant differences between HSIs and non-HSIs shown by the one-way MANOVAs.