Excess in Texas: An investigation of the effect of state policies concerning excess credit hours on student success
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Introduction

Scholars have found persistent disparities in college completion for racial/ethnic minorities, low-income students, and first-generation college students (e.g., Bound, Lovenheim, & Turner, 2010, 2012; Flores, Park, & Baker, 2017). Research also shows that historically disadvantaged students, particularly those who identify as women, Black, or low-income, borrow at the highest rates, borrow the largest amounts of student loans, and struggle the most with repayment (e.g., AAUW, 2017; Hillman, 2015). One way states have begun to focus on balancing the need to control student debt while encouraging on-time graduation is by implementing policies regarding "excess semester credit hours" (ESCH), defined as any credit hours above the cumulative number required for an undergraduate degree (Kramer, Holcomb, & Kelchen, 2018). These policies assess a fee to students at public institutions when they exceed a set number of cumulative credit hours (e.g., students with more than the 120 credit hours needed for a bachelor's degree). These elevated fees range from charging 120% of the tuition rate to charging the out-of-state tuition rate for the ESCH. The aim of such policies is to discourage students from taking a large number of courses that are unnecessary for their degrees, thereby limiting both the time to degree and the undergraduate debt incurred. As of 2013, nine states had adopted some type of ESCH policy (Arizona, Florida, Massachusetts, Nevada, North Carolina, Texas, Utah, Virginia, and Wisconsin) (Kramer et al., 2018).

In practice, however, evidence suggests that ESCH policies can harm students, institutions, and states on a number of outcomes, such as increased student debt loads, decreased likelihood of employment, reduced earnings, and loss of state appropriations or funding for institutions (see Kramer et al., 2018 for a review). For example, since the students most impacted by ESCH policies are generally from lower socioeconomic backgrounds or are the first in their families to go to college (Kramer et al., 2018), these policies could differentially affect students who are already less likely to complete a college degree. However, while the extant research has raised important concerns about unintended consequences, it is difficult to give institutional practitioners or state policymakers advice on the costs and benefits of ESCH policies without more detailed information on the impact of ESCH on student success (graduation and student loan accumulation), particularly for historically underrepresented students.

Theoretical Framework

Human capital theory aids in understanding how students make education-related decisions (Becker, 1964). According to Becker (1964), students must evaluate the costs of enrolling in college–including both the direct costs of attendance and indirect costs (e.g., foregone earnings)–and the potential individual and societal returns to the increase in their human capital by acquiring new skills and knowledge. If the benefits outweigh those costs, then human capital theory predicts that students will enroll for another year of education. This theory allows for adjustments in the calculation of costs and benefits for students who do not face the same challenges that the so-called traditional college student faces.

Human capital theory applies to the proposed research project in that states wishes to influence student course-taking behavior by changing the costs associated with attendance. The theory of action for the ESCH policy is that, by increasing the cost to in-state students pursuing

credit hours beyond those required for their degree program, those students will only choose to take courses that will help them complete their degree. However, if the fees associated with ESCH do not increase the students' perceived costs of additional education, then the theory of action is not upheld, and it is unlikely that the ESCH policy will help states meet their completion and undergraduate student debt goals. There are often benefits to taking additional credit hours. Students who switch majors, pursue more than one major, or plan to transfer are likely to attempt additional credit hours and these would all count toward the students' cumulative number of undergraduate credit hours. This could outweigh students' concerns about the additional fees related to ESCH. Alternatively, if the fees associated with ESCH increase the costs of additional education too much, students may react by dropping out of college.

Research Questions

The proposed project explores both how ESCH policies differ across institutions within a single state, as well as how institutions and students differentially respond to the policies. In reaction to disparities in graduation rates and the potential negative consequences of large debt burdens to both the student and society (Baker & Doyle, 2017; Flores et al., 2017; Looney & Yannelis, 2015; Rothstein & Rouse, 2011; THECB, 2015), Texas implemented an ESCH policy for Texas residents (in-state students) in 1999. The state legislature revised the ESCH policy in 2006, creating stricter guidelines for the number of credit hours that would violate the policy.

This work takes advantage of the policy revision to investigate two aspects of the Texas ESCH policy: the fidelity of implementation and the impact of the policy. First, this project will examine how institutions assessed fees (how often and the amount) to students who attempted ESCH after the revision of the Texas policy. Second, it will assess the effect of the ESCH policy on the likelihood of graduation and total student loan accumulation of Texas undergraduate students. Fee assessment, likelihood of graduation, and cumulative student loan debt are appropriate measures to understand reactions to this policy. The fee amount is the critical mechanism institutions can use to (dis)incentivize student behavior, while the state primarily monitors ESCH to evaluate institutions' progress on students' timely completion with a reasonable amount of undergraduate debt. The proposed project will address the following set of research questions:

1. To what extent do institutions assess a fee on students attempting an excess number of semester credit hours?
2. Did the revision in the excess semester credit hours policy affect student success (defined as graduation and student loan accumulation)? Does this effect vary by students' race/ethnicity, gender, income, or parental education?

Texas is a useful state for a case study for three reasons. First, for Texas bachelor's degree earners, having a shorter time-to-degree is associated with less cumulative undergraduate debt and smaller debt-to-income ratios (Baker, revise and resubmit). Recent causal research (Kramer et al., 2018), however, finds evidence that ESCH policies can increase undergraduate cumulative student debt (as the policies increase the price of an additional credit but do not incentivize students to reduce the number of credit hours they attempt), indicating a need for additional research in order to better understand the impact of these policies.

Second, the results of the proposed project would be useful beyond Texas. The state is near the national average of residents with at least a bachelor's degree (THECB, 2016). Texas is also near the national average for tuition and fees, ranking 20th for public four-year institutions (THECB, 2016). Median household income was approximately $53,000 in 2014, ranking Texas number 23 nationally (THECB, 2016). Further, Texas has approximately 5.2 million PK-12 students and 1.5 million higher education students. Together, these features make it likely that other states' policymakers would find the results from research conducted on data from Texas useful for their own contexts. A case study of Texas's ESCH policy will improve the scholarly understanding of one of the mechanisms states use to increase completion while minimizing debt and will provide evidence for the creation and implementation of better-targeted state and institutional policies.

Third, Texas maintains a robust K-20 administrative database that provides the most current and in-depth data available on student experiences and backgrounds. These data allow a unique opportunity to investigate the statewide ESCH policy's effect on institutional and student behavior. For these reasons, stakeholders from Texas and other states have expressed interest in research that investigates the variation in fees associated with ESCH and the relationship between introduction of stricter criteria for ESCH and student success.

Review of Relevant Research

The proposed project seeks to further the knowledge base on policies influencing college students' likelihood of completion and accumulation of undergraduate debt. The literature relevant to the purpose of the proposed study focuses on the following: (1) college pricing and student success, and (2) US ESCH policies' effects on student success.

First, scholars have found evidence that college pricing can influence student success, often defined as credit accumulation or completion. Researchers focused on US higher education have generally not been able to directly test the relationship between ESCH policies and student success. Instead, the researchers often analyze the historical changes in overall tuition pricing or per-credit-pricing and student success (e.g., Hemelt & Marcotte, 2011; Hemelt & Stange, 2016). The most direct research on this topic generally focuses on international collegiate pricing. Heineck, Kifmann, and Lorenz (2006) studied the association between a tuition increase in Germany and students' time-to-degree. During the analytical time period of the study, the majority of states in Germany did not charge college students tuition unless the students did not complete their degree within a certain number of semesters (the number of semesters depending on the state) (Heineck et al., 2006). Analyzing a single institution's administrative data, the authors used discrete-time survival analysis to find that students in certain majors (i.e., economics, public administration) faced with tuition increases were also more likely to complete college with a shorter time-to-degree. However, Heineck and colleagues (2006) also found that students majoring in biology, physics, psychology, and public administration who were exposed to the tuition policy had a higher hazard of dropping out of college.

In order to provide clarity in light of these mixed findings, Garibaldi, Giavazzi, Ichino, and Rettore (2011) used a regression discontinuity design and investigated the effect of increasing the tuition of economics students attending an Italian university in their last "regular

year" of college (i.e., for a bachelor's degree in the US, this would be the fourth year). The authors found that an increase of 1,000 euros in tuition decreased the time-to-degree for students, while not increasing the dropout rate. While Garibadli et al. (2011) were able to produce causal estimates that show a positive effect of ESCH-like policies, the authors could only study economics students (due to the institutional data available) and could only estimate local average treatment effects due to the identification strategy. The Heineck et al. (2006) study, while correlational, included students from a variety of majors, which could explain the different conclusions the two research teams infer. Overall, there appears to be mixed, international evidence on the efficacy of marginal pricing policies, though the causal research suggests charging students for ESCH could decrease time-to-degree. The proposed project would contribute to filling this gap in the literature by providing evidence on time-to-degree for students with a variety of majors exposed to a US ESCH policy (in addition to other measures of student success).

Second, little research has been conducted on US ESCH policies' effects on student success. Though the causal research on Italian institutions is informative, the US and Italian higher education contexts strongly differ, particularly in the variation in net price that students face (based in part on variability in federal, state, and institutional financial aid). The most rigorous research on US ESCH policies used a difference-in-difference (DD) framework to analyze the national effect of state ESCH policies for bachelor's degree recipients. The authors of that research found little to no evidence supporting an increase in on-time completion due to ESCH policies (Kramer et al., 2018). They did find, however, that the policies increased the median amount of debt accumulated by students. This effect was exacerbated for students from first-generation and low-income backgrounds.

The proposed project seeks to expand this work in two ways. First, Kramer and colleagues (2018) were not able to assess how institutions implemented the ESCH policy. The authors cite that Texas adopted an ESCH policy, but institutions actually varied in how often students were assessed a fee. It would be useful to analyze the fees that institutions actually charged to students in order to better understand how ESCH policies work. Second, Kramer and colleagues (2018) used the number of bachelor's degrees produced and four- and six-year graduation rates as proxies for ESCH behavior. Most states, however, include two-year institutions, which traditionally do not offer bachelor's degrees, in their policies. Therefore, ESCH policies could be viewed as unsuccessful due to a negligible increase in the number of bachelor's degrees produced (which Kramer et al., 2018 found). However, the policies could actually increase completion at the associate's degree level, which researchers have not previously used as a measure of student success. State higher education analysts in Texas found that, in recent years, bachelor's degree earners have maintained the same number of ESCH while associate's degree earners decreased their number by five credit hours (THECB, 2017). Given such different trends, it is necessary to focus on students earning both associate's and bachelor's degrees in order to assess the efficacy of ESCH policies. Texas's rich administrative database allows for the proposed project to address both of these concerns.

Data

Prior research primarily focuses on national, longitudinal datasets that do not contain data on whether an institution actually assessed a fee or how many credits students earned (such as the US Department of Education's Integrated Postsecondary Education Data System [IPEDS]). To fully investigate ESCH policies, a repository of linked college applications, financial aid records, and postsecondary transcripts is critical. For this reason, the proposed project will primarily use Texas state administrative data to analyze the relationship between the revision of the ESCH policy and institutions' ESCH fees and student success. For both research questions, the analytical sample is all public two- and four-year institutions in the state of Texas.

Since 1999, Texas has not provided funding to institutions for in-state students who attempt ESCH and allows institutions to charge up to the out-of-state tuition rate for those students to compensate for the loss of funding (*Texas Education Code* Section 54.014). In 2006, the Texas legislature revised the ESCH policy by reducing the threshold at which students would incur a fee (e.g., for a bachelor's degree the policy changed from 45 ESCH incurring a fee to 30 ESCH incurring a fee). Students who enrolled in higher education before the fall of 2006 were held to the prior, less strict ESCH policy. Therefore, the analytical years of interest are between academic years 2002-2003 and 2015-2016 (4 years before and 10 years after the policy revision). Students will be linked to the year in which they enrolled in higher education (following THECB guidelines for ESCH calculation). Below are the primary measures of interest.

Research Question #1 Outcome: Excess Credit Hours Fee

This project will identify the actual fee assessed, before the application of financial aid, at each institution for in-state students who attempt semester credit hours beyond the set threshold. The administrative database contains the exact tuition rate and amount of fees charged to each student. The outcome will be the amount of the fee assessed to students.

Research Question #2 Outcomes: Student Success

This project will identify the likelihood of graduation (within 150% of normal time) for students and the cumulative amount of undergraduate debt when the student leaves higher education (either by earning a credential or dropping out). The administrative database includes the semester each student earned a credential in addition to detailed data on student borrowing behaviors. The outcomes will be: (1) graduation, and (2) cumulative undergraduate debt.

Student and Institutional Characteristics (Control Variables)

In addition to the primary outcome measures, the administrative database provides a detailed set of measures covering students' demographics and financial aid use. I will include the following student characteristics: students' age at college entry, race/ethnicity, gender, parental education, income, financial dependency status, and number of years receiving an Expected Family Contribution of zero (as a measure of students with significant financial need to pay for college). I will supplement this student-level data with institutional data from IPEDS. These variables will include percentage tenured/tenure-track faculty, endowment size, and the share of scholarships/grants funded by the institution.

Analysis Plan

The proposed project will use a combination of an ordinary least squares (OLS) regression and difference-in-difference (DD) analytic strategy to estimate the institutional and student responses to the ESCH policy revision. Research question 1 will use OLS to estimate the relationship between the policy shift in 2006 and ESCH fees, while controlling for the student and institutional characteristics previously discussed. This portion of the proposed project will not produce causal estimates. However, it will allow for a better understanding of how ESCH fees vary and what student and institutional characteristics are associated with that variation. This will allow the proposed project to identify the extent to which institutions assess a fee for students attempting an excess of credit hours, based on their degree program.

Research question 2 will be investigated using DD to estimate the causal effect of the implementation of the revised ESCH policy on the measures of student success, while controlling for the student and institutional characteristics previously discussed. When DD is used to investigate the causal effect of policy shifts, the model generally includes a measure of time difference and treatment difference (Somers, Zhu, Jacob, & Bloom, 2013). In order to investigate the robustness of the estimates, the proposed project will include multiple definitions of treatment. In preferred specifications, the treatment group will be in-state students and the comparison group will be out-of-state students. Researchers have more confidence that the comparison group is a good counterfactual of the treatment group if both groups had parallel trends in the outcome variables before policy adoption (Blundell & Costa Dias, 2000). Before 2006, while in-state students tended to take slightly more credit hours than out-of-state students, the trends for both groups of students were similar. To test for robustness of the effects, I will also estimate these models using alternative treatment and comparison groups: students who attempted between 31 and 44 ESCH (inclusive) prior to the policy shift in 2006 and students who attempted at most 30 ESCH. These students could be a useful comparison because, according to the policy, students with less than or equal to 30 ESCH were never subject to the additional fees while students with between 31 and 44 ESCH only began incurring fees after the policy revision. There is no evidence yet that this alternative treatment and comparison pairing upholds the parallel trends assumption. Though, even if the parallel trends assumption is not met, I will be able to use comparative interrupted time series analysis instead of DD to check for the robustness of the estimates, since that method requires less stringent assumptions to produce causal estimates (Somers et al., 2013).

The following analytical model will be used for research question 2:

$$Y_{st} = \beta_0 + \beta_1 Treated_s + \beta_2 Post_t + \beta_3 (Treated_s * Post_t) + \boldsymbol{X_{st}}\gamma + \epsilon_{st}$$

In the above model, Y is one of the two measures of student success (a binary indictor for graduation or cumulative student debt) for student s in year t. The coefficient β_1 represents the estimated difference in the outcome of interest for students in the comparison and treated groups prior to ESCH policy revision. The coefficient β_2 represents the estimated difference in the outcome of interest before and after the ESCH policy revision for the students in the comparison group. The coefficient β_3 is the primary coefficient of interest and estimates the difference in the outcome of interest after the ESCH policy shift for students in the treatment group (estimate of

the causal effect). All models include a vector of student and institution characteristics, represented by X. Alternate specifications will include an institution fixed effect to control for time-invariant characteristics of institutions. Prior research has found that ESCH policies have stronger effects on low-income and first-generation college students (Kramer et al., 2018). Thus, the models will also be estimated allowing for differential effects based on students' racial/ethnic identification, gender, income background, and parental education. This will allow the proposed project to answer whether the ESCH policy revision influences student success and whether that effect varies based on student demographics.

Contribution to the Field and Significance of Work

If Texas's theory of action is correct, ESCH policies would decrease the number of ESCH by incentivizing student or institutional behavior. If the theory of action is not correct, these policies could penalize students who switch majors, transfer, or plan to transfer. It is also important to know if these types of policies harm historically disadvantaged students (such as racial/ethnic minorities and low-income students). For example, students without strong college-going knowledge may take longer to discover their pathway in higher education due to a lack of college-going resources, such as college counseling (Redford & Hoyer, 2017). Although it is not useful for these students to take superfluous courses, human capital theory predicts a concerning unintended policy consequence: creating thresholds for ESCH could increase the costs to an additional year of education so much that certain students choose to drop out. Therefore, instead of the ESCH policy encouraging students to complete their degrees faster and with less undergraduate debt, the ESCH policy could be encouraging certain students to leave higher education with undergraduate debt and no credential.

The proposed project would be the first study to use such a high degree of detailed information about US institutions' fee-charging, as well as students' course-taking behavior. Due to this and the outlined identification strategy, the results of the proposed project will likely produce causal estimates of the effect of ESCH policy on student success. The proposed project would provide key stakeholders, such as practitioners and policymakers, with more information about how state ESCH policies are implemented and how the policies affect student success. The results of the proposed project would also provide the field with stronger evidence on institutional implementation of state policy and how such implementation can result in intended, and unintended, effects for students historically underrepresented within higher education.

Dissemination Plan

I expect that the proposed project's findings will be of interest to scholars, policymakers, and practitioners. I intend to disseminate the findings at the American Educational Research Association conference and at the Association for Education Finance and Policy conference. I plan to submit two articles from this study to peer-reviewed journals (e.g., *Educational Evaluation and Policy Analysis* and *Education Finance and Policy*). Finally, I intend to write at least two policy briefs on the results for the Brookings Institution and the Education Commission of the States.

Variable List

Texas Education Research Center

Note: These variables will come from all 14 years of the analytical time period (academic years 2002-2003 to 2015-2016). I provide the name for the variable in the most recent year of data but have the correct variable names for all 14 years.

Excess Semester Credit Hours Fee (RQ #1 Outcome)
fadcost	Tuition and fees
stusch	Number of attempted credit hours

Student Success (RQ #2 Outcome)
graddegr	Type of credential earned (e.g., AA, AS)
gradlev	Level of credential earned
fadperkins	Perkins loan amount
fadcal	College Access Loan amount
fadprimcare	Primary Care Student loan amount
fadotherloans	Other long-term loan amount
fadunsubfed	Unsubsidized Federal Direct loans amount
fadsubfed	Subsidized Federal Direct loans amount
fadbot	Be On Time loan amount
fadhb3015ln	HB3015 loan amount

Student Characteristics (Control Variables)
stuage	Age at college entry
stueth	Race/ethnicity
stugen	Gender
fadmgrade	Father's education
fadfgrade	Mother's education
fadparadjinc	Parental income (dependent students)
fadstuadjinc	Student income (independent students)
faddepend	Financial dependency status
fadfamcontrib	Expected Family Contribution

Merging, Data Cleaning, or Sample Creation Variables
id2	Unique student id
stufice	Institution id (FICE code)
stuclass	Student classification (e.g., first-year)
stutui	In-state resident
stuyear	Year of enrollment
stusem	Semester of enrollment

Integrated Postsecondary Education Data Systems

Note: These variables will come from all 14 years of the analytical time period (academic years 2002-2003 to 2015-2016). I provide the name for the variable in the most recent year of data but have the correct variable names for all 14 years.

Institutional Characteristics (Control Variables)

facstat	Faculty and tenure status
sistot1	All ranks
sisprof	Professors
sisascp	Associate professors
sisastp	Assistant professors
sisinst	Instructors
sislect	Lecturers
sisnork	No academic rank
f1fha	Does institution own endowment assets?
f1h01	Value of endowment beginning of fiscal year
f1h02	Value of endowment end of fiscal year
f1e05	Institutional grants from restricted resources
f1e06	Institutional grants from unrestricted resources
f1e07	Total gross scholarships and fellowships

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