

The Impact of Guaranteed Tuition Policies on Postsecondary Tuition Levels: A Difference-in-Difference Approach

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This study considers the impact of state-level guaranteed tuition programs on postsecondary tuition levels. The analytic framework argues that state-level laws requiring flat tuition rates for four years contain inflationary risk, which encourages institutions to set tuition higher than they otherwise would with annual adjustments. To empirically test this idea, this study uses a national panel dataset and a quasi-experimental difference-in-difference methodological approach, with Illinois' Truth-in-Tuition law serving as the treatment condition. On average, institutions subject to this law increased tuition by approximately \$1,500 in excess of the amount predicted by the trend for institutions not subject to the law. This finding is robust to multiple alternative specifications and supports the idea that state-level guaranteed tuition programs encourage large institutional tuition increases. Implications of these findings for state policymakers, higher education institutional leaders, and college-age students and their families are also discussed.

Keywords: Higher education; Finance; Policy; Quasi-Experimental Analysis; Difference-in-Difference

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The Impact of Guaranteed Tuition Policies on Postsecondary Tuition Levels: A Difference-in-Difference Approach

Ensuring college affordability is perhaps the most critical challenge facing higher education in the United States today and the topic has received much attention from students, families, the media, institutional leaders, and policymakers at the state and national levels. Tuition at U.S. higher education institutions has increased dramatically in recent years. Between 2001 and 2011, in-state tuition rates at four-year public colleges and universities grew at an average rate of 5.6% per year in excess of inflation (College Board, 2011). Concerns about affordability have led policymakers to consider a variety of measures to control and limit tuition growth. One of the more direct approaches has been freezing tuition for one or more years. University systems in Arizona, California, Iowa, Maine, Minnesota, and New Hampshire proposed tuition freezes for the 2012-13 academic year in an effort to compel legislatures to maintain or increase state support (Krogstad, 2012). A related approach involves fixed rate, or guaranteed tuition, in which students do not experience annual increases in tuition.³ These types of programs are becoming more prevalent across the nation. In 2008, 356 higher education institutions had guaranteed tuition plans in the United States (IPEDS, n.d.). By 2011, this number had risen to 467 across 44 states (IPEDS, n.d.).

Some guaranteed tuition programs are the result of state legislation. Whereas institutional programs are enacted by the same policymakers that decide on tuition levels (i.e., institutional leaders and governing boards), state-level guarantee laws are mandated by state legislatures and may impact the tuition setting decisions of institutional leaders depending on the higher

³ We specify our usage of “guaranteed tuition” because there is not consistent usage of this term in the field. For instance, Hauptman (1990b) uses “tuition guarantees” to describe prepaid tuition plans whereby parents pay a specified amount that is guaranteed to cover tuition expenses in the future. Similar language has been used in the popular press to describe prepaid tuition plans. However, these types of savings plans are not the subject of this research.

education governance structure of the state. Illinois, for example, has enacted a state-level guaranteed tuition policy. Illinois' "Truth-in-Tuition" legislation was signed into law in 2003. This law ensures that, beginning in fall 2004, incoming students at Illinois' public four-year institutions pay level tuition rates for the first four years of college (Illinois Public Act 093-0228). While tuition guarantee programs had previously been offered by individual institutions, Illinois' law was novel in that it was mandatory for all public four-year institutions in the state.

There is anecdotal evidence that Illinois' program had some impact on tuition levels. In 2002, Illinois ranked 13th among states in average tuition at four-year public institutions. In 2007 following the implementation of the Truth in Tuition law, this ranking had risen to 6th (COGFA, 2008). In addition, the average tuition growth rate at Illinois four-year public institutions was 12.0% between 2003 and 2007, compared to a national average of 8.8% (COGFA, 2008). This study analyzes whether Illinois' guaranteed tuition policy is associated with higher tuition rates at institutions subject to the policy as compared with institutions not subject to the law.

To date, Illinois is the only state that has enacted guaranteed tuition legislation that applies to all in-state students at public four-year institutions. However, there is considerable interest in these programs in other states. Currently there is proposed legislation in Texas that would create a four-year tuition guarantee program similar to Illinois' law (Ura, 2012; Ward, 2012). Oklahoma passed a "Tuition Lock Program" in 2007 that requires four-year public institutions to offer students the choice of a fixed rate of tuition for the first four years of college in lieu of a standard rate, which is subject to annual increases. The fixed rate is set at a 15% premium over the current standard rate (Oklahoma State Regents for Higher Education, 2011). Whereas Illinois' guaranteed rate applies to all in-state students, Oklahoma's guaranteed rate is optional and, thus, impacts far fewer students. In fact, only 7.3% of incoming students opted-in

to Oklahoma's Tuition Lock program when it was first available in fall 2008 (Sheri Mauck, personal communication, March 19, 2013). The participation rate dropped significantly in fall 2009 to 3.5% and to 2% in fall 2011 (Sheri Mauck, personal communication, March 19, 2013). Both the proposed legislation in Texas and Oklahoma's Tuition Lock law show the amount of interest in the states in guaranteed tuition programs. However, because the Texas law has not yet been passed and Oklahoma's program has a set value of the guarantee, is optional for students and families, and has a very low participation rate, this study is focused only on Illinois' guaranteed tuition law.

This study is structured to answer the following research question: *At public four-year institutions, does the implementation of a state-level guaranteed tuition program lead to changes in annual tuition charges or the aggregate amount of tuition paid by students over four years?* In order to make causal inferences, this study employs a quasi-experimental research design using a difference-in-difference technique.

Review of Related Literature

Although guaranteed tuition policies have received coverage in the media, there is relatively little peer-reviewed literature on the topic. In general, the literature is focused on individual institution programs. In a study predating the first state-level policy, Troutt, McEwen, & Yew (1995) discussed guaranteed tuition programs as institution-specific mechanisms. They suggest that these programs could enhance an institution's retention rate, since they eliminate future tuition increases that may impact attrition. Even in this early study, Troutt, McEwen, and Yew acknowledge the likely existence of a premium in the first year of enrollment, something

that is commonly referred to as frontloading (depicted in Figure 1 and discussed below). They described the programs as analogous to insurance premiums:

Namely, a student who enrolls under a guaranteed (inflation proof) tuition plan will pay a slight increase over what might have been paid in the first year of enrollment under a standard plan. However, this slight increase buys insurance against higher tuition rates in the future. (p. 29)

Thorne and Wright (1999) also focused on single institution plans, examining Western Illinois University's (WIU) guaranteed tuition program. WIU enacted its guaranteed tuition program in 1999, before the State of Illinois mandated the Truth-in-Tuition program for all public institutions. WIU's program actually grew out of a different type of guarantee; their "Gradtrac" program was designed to guarantee graduation within four years if students agreed to meet minimum enrollment hours and other requirements. If students met the requirements and still did not graduate in four years, WIU would waive the tuition for any additional courses needed to graduate.

In another example of an institution-level tuition guarantee program, Supiano (2009) describes the tuition guarantee program at the University of Texas at Dallas that began in 2007. The intent of the program was to "provide simplicity, predictability, and clarity" for students (Supiano, 2009). The National Association of Independent Colleges and Universities (NAICU) identified tuition guarantees in a list of initiatives aimed at enhancing affordability at private institutions. Included in their list of institutions that have experimented with tuition guarantees were Concordia University, a private non-profit institution in Illinois, where the state-level policy requires the state's public institutions to offer guaranteed rates, and Baylor University in Texas, a state that is currently considering a state-level policy (NAICU, n.d.; Ward, 2012).

Some literature is critical of tuition guarantee programs. Morphey (2007), for example, suggests that tuition guarantees are misleading and have negative effects on underrepresented

and poor students since they are less likely to persist and graduate. Because of frontloading, students who do not persist pay more under a guaranteed tuition program than they would with annual tuition increases. Morphew believes that the “non-persistence penalty” will be used to subsidize the cost of educating students who graduate, creating an unfair system. In addition, Morphew points out that the notion of frontloading does not align with the cost of education – underclassmen are typically less costly to educate than upperclassmen. In Morphew’s view, this compounds the inequity inherent in guaranteed tuition programs.

Some literature specifically addresses Illinois’ guaranteed tuition program and the context of its adoption. Kim (2004) described the intention of Illinois’ program as providing stability and predictability in college costs. Thomson (2005) suggests that the law was intended, at least partially, to address rising tuition. Former Governor Rod Blagojevich campaigned against large tuition increases in 2002 and the guaranteed tuition program won out against other proposals to reign in tuition levels, including capping annual increase percentages. Thomson (2005) describes institutions as initially resistant to guaranteed tuition, but they opened up to the idea, perhaps as a more favorable outcome than more restrictive proposals like hard caps on tuition increases.

Few studies have considered the effects of Illinois’ guaranteed tuition policy. However, Robertson (2007) evaluated the effects of the policy on enrollments. He used Illinois’ tuition guarantee legislation as a natural experiment to analyze its effects on enrollments at Chicago State University (CSU) and make inferences about price sensitivity. Minority students at CSU were found to be sensitive to price, with new students displaying more price sensitivity than continuing students. This study aligns with Morphew’s (2007) claim that these programs may have different effects for different groups of students.

General Tuition Pricing Literature

In addition to this specific work on guaranteed tuition programs, there is a general tuition pricing literature that addresses the variables known to affect tuition rates. Unfortunately, this literature does not present a clear consensus of the factors that are associated with changes in tuition levels. Hauptman (1990a), for example, suggests that there is “*no* overarching explanation” for tuition increases (p. vii). This ambiguity has led to what scholars have referred to as “the tuition dilemma” (Hauptman, 1990a), “the paradox of college tuition” (Heller, 2001), and “the tuition puzzle” (Institute for Higher Education Policy, 1999). This ambiguity makes it difficult to identify specific variables associated with tuition changes.

There are a number of features of the higher education sector that make the drivers of tuition setting particularly difficult to identify. For brevity, this literature review will touch upon three of these features (signaling quality, peer effects, and information asymmetry) that prior literature has directly tied to tuition levels. Although the broader higher education finance literature does discuss other features of the sector that theoretically could be drivers of tuition (such as collusion), these have not yet been explored in detail in the empirical academic literature for public institutions.

Clotfelter (1996) describes various approaches to tuition setting that revolve around elevating prices above competitors in order to appear more selective and signal quality. Winston (1997) also draws a connection between tuition and quality, suggesting that, since returns on investment for education are often not realized in the short term, institutions may raise tuition rates to signal quality to consumers who are seeking greater certainty. Likewise, McPherson & Winston (1993) suggest that institutions may have incentives to purchase non-essential and

costly “frills” that serve no direct educational purpose, but may attract students through an increased perception of quality (p. 74).

Rothschild and White (1995) find that universities’ pricing behavior is generally not consistent with their predictions of competitive equilibrium, which indicates that universities do not behave as if they are maximizing financial profits. In their study, they explore several possible reasons for this and touch upon both the complicating roles of peer effects (the unique nature of tuition pricing where customers/students are also inputs) and information asymmetry (where neither students nor institutions are likely to have perfect information). Likewise, Hoxby (1997) argues that changes in higher education markets themselves lead to changes in tuition levels and also impact college quality and students’ college choices as both consumers and inputs, due to the value of peer effects. Other scholars apply Baumol’s “cost disease” theory to higher education and argue that tuition is set similarly to prices in other non-productive sectors (for a more detailed discussion of this theory and its application to higher education see for instance, Baumol & Blackman, 1995).

Despite these complicating features of the higher education market and the lack of consensus in the field about tuition drivers, the literature has produced some evidence that certain variables may be factors that can be used in models related to tuition levels. For instance, Rusk & Leslie (1978) use price theory to predict that tuition at regional peer institutions, proportion of regional enrollments by sector, institutional costs, income of “buyers”, and institutional quality could affect tuition. Not surprisingly, Rusk and Leslie found that some variables impacted tuition more than others. Increases in spending on technology and facilities have also been examined as possible drivers of tuition inflation (Heller, 2001; Harvey, Williams, Kirshstein, O’Malley, & Wellman, 1998). Another possible explanation for rising tuition that has

been explored in the literature is the increase in per student spending (Heller, 2001; Kane, 1999; Mumper & Freeman, 2005). However, other work shows that tuition increases are related more to cost shifting than to increased spending, particularly on instructional-related expenses (Hurlburt & Kirshstein, 2012).

Several scholars have also considered the relationship between the availability of financial aid and tuition (Ehrenberg, 2002; Harvey et al., 1998; Hauptman & Krop, 1998; Kane, 1999). Some of this work has been related to the “Bennett Hypothesis”, which posits that the availability of federal financial aid drives institutional tuition increases (Bennett, 1987). Although this idea has received much political and media attention over the years, there is little empirical evidence to directly support the hypothesis (for a discussion of the nuances of this see for instance, McPherson & Schapiro, 1991; McPherson, Schapiro, & Winston, 1989; Singell & Stone, 2007), except in the for-profit sector (Cellini & Goldin, 2012)

In their investigation of the causes and consequences of tuition inflation at public institutions, Mumper and Freeman (2005) are unable to identify a sole cause, but find that revenue pressures resulting from declining state support is a main contributor. Similarly, the Institute for Higher Education Policy (1999) found “one of the most significant causes of higher prices has been the declining role of public revenues, which are partially offset through higher prices” (p. 5). Others also suggest that declining state support is at least partially responsible for rising tuition (Kane, 1999; Heller, 2001).

Mumper and Freeman (2005) suggest that the inability to identify universal drivers of tuition changes at public institutions is, at least in part, a result of the differences in tuition setting authority across states. This authority may be vested in the legislature, state governing or coordinating board, system board, or individual institution board (McGuinness, 1997). Other

studies have highlighted difficulties with comparing tuition levels across institutions and states. For instance, Lenth (1993) highlights the variation that exists in tuition setting authority, cost factors, waiver and differential policies, and financial aid structures. One common theme across higher education funding and, specifically, tuition pricing literature is that variation exists across states (e.g., Johnson, 1976).

In practice, there is often “broad-based shared responsibility between government and higher education,” which makes tuition setting a political process where “a number of interest groups try to influence the process” (Institute for Higher Education Policy, 1999, p. 24). Building upon this prior literature, this study seeks to contribute both to the literature on guaranteed tuition programs and to the broader literature on tuition setting.

Theoretical Framework

In terms of its theoretical framework, this study relies on price theory to explain institutional pricing behavior that results from the introduction of a state-level guaranteed tuition law. A key assumption in the analytic framework used in this study is that the four-year tuition guarantee is associated with inflationary risk for institutions. This risk is assumed to contain a financial cost, which will be passed on to students in the form of higher tuition rates. The structure of tuition guarantee programs incentivizes institutions to overprice tuition in the first years to ensure revenue levels in the later years of the guarantee. This frontloading of tuition can lead to increases in first-year tuition levels. When comparing freshman rates, it is expected that a guaranteed tuition rate will be higher than a traditional tuition rate, which is allowed to vary annually, due to expected inflation.⁴

⁴ In order to test the effect of guaranteed tuition rates on tuition levels in the first year (to capture a frontloading effect), it would be preferable to have a measure of freshman tuition rates. However, average tuition is the closest

This idea of frontloading is shown in Figure 1, which is based on Morpew (2007). In this example, the first year tuition level for the guaranteed tuition plan is greater than the traditional tuition plan ($\$1,150 > \$1,000$). It is possible that the frontloading levels could be set such that the added revenue collected in the first two years is offset by relatively lower tuition rates for the guaranteed tuition plan in the second two years of the program. As shown in the example in Figure 1, where the traditional tuition plan is assumed to have a 15% annual growth rate, a student would pay the same total cost ($\$4,600$) over four years under either tuition plan. Setting the guaranteed tuition rate to result in the same aggregate four-year cost for incoming students (area $A = B$ in Figure 1) would require perfect information. In practice, annual inflation and growth rates are not known with certainty, introducing risk for the guarantee. Institutions may seek to charge a premium for carrying this risk in the form of higher tuition (such that area $A > B$ in Figure 1). This study will explore the effect of a state-level guaranteed tuition plan both on annual tuition rates and on aggregate tuition rates over four years.

Figure 2 shows a box-and-line conceptual drawing in which the variable of interest is the presence of a state-level guaranteed tuition law. The outcome variable is institutional tuition levels and will be measured as either average annual tuition or total tuition over four years. One key assumption of a difference-in-difference approach is that any unobserved covariates will have the same effect for the treatment and control groups, allowing them to be ignored in the model. The conceptual model also shows the observed predictors of tuition that are included to increase the precision of the estimates. These predictor variables are derived from prior literature and have been grouped into three categories: institutional, state-level, and political controls. The control variables and their data sources are discussed in the following section and in Table 1.

approximate measure available in IPEDS. Guaranteed tuition programs are often not extended to students who are already enrolled in the year in which the law is enacted, which results in the programs not being fully implemented for all cohorts of students until the fourth year of the program.

Methods and Data

In studying the effect of a state-level guaranteed tuition law on institutional tuition levels, this work uses a difference-in-difference approach. Selection bias and omitted variable bias are on-going challenges in the higher education literature (for a more complete discussion see Cellini, 2008). Because of this challenge, this project uses a quasi-experimental research design.

Figure 3 shows a general graphical representation of the difference-in-difference model used in this work. The line chart shows tuition over time. At the enactment of the guaranteed tuition law, the treatment group is expected to experience an increase in tuition in excess of any secular trend experienced by the control group (such that $Tuition_2 > Tuition_1$). The difference in the tuition levels after the enactment of the tuition guarantee law represents the treatment effect, or the excess tuition growth resulting from the policy.

A unique dataset was constructed for this study. This study relies extensively on data from the Integrated Postsecondary Education Data System (IPEDS) that is administered by the U.S. Department of Education, specifically the Finance (F), Institutional Characteristics (IC), and Student Financial Aid (SFA) datasets. In addition, the dataset includes data from the U.S. Census Bureau and the U.S. Bureau of Labor Statistics. These datasets were selected because they offer the best measures of state- and institution-level variables for testing institutional tuition policies.⁵ In order to rigorously specify the analysis, this study will utilize the time-based nature of the panel dataset and fixed effects will be included for institutions and years. This approach will help

⁵ Using the IPEDS dataset as a cross-sectional time series poses some difficulties in data consistency as the dataset was not initially developed to be used in this manner. The Delta Cost Project has made great strides in overcoming some of these analytic issues. However, the Delta Cost Project has its own challenges that make it incompatible with this study. Hence, our selection of source data was made because of the difference in treatment of parent/child campuses in the two datasets. In the Delta Cost Project datasets, multi-campus systems that have reported as “parent-child” in the past are presented in the dataset as one institution. This is particularly troublesome for our study since the University of Illinois – a three campus system, with campuses in Chicago, Springfield, and Urbana-Champaign, in the treatment group of the study – is reported as a single institution. In other words, the true campus-level details (e.g., tuition levels) are only available in the IPEDS dataset.

to control for unobserved heterogeneity and common time trends in the data to better isolate the effect of state-level guaranteed tuition laws on institutional tuition levels. Detailed variable descriptions and source information can be found in Table 1.

Estimating Sample

The dataset used for this work is identified at the institution-year level. The estimating sample is focused on public four-year institutions, since all guaranteed tuition laws have been written to only apply to this sector. In setting the sample, only institutions located in one of the U.S. states are included (all institutions from U.S. territories or the District of Columbia are excluded). Additionally, only active, degree-granting institutions that offer undergraduate degrees, are not U.S. service institutions, and are eligible to participate in Title IV federal financial aid programs are included.⁶ After accounting for missing values, the full estimating sample contains 6,573 observations and is comprised of 641 institutions over the years 2000-2011.

Model Specifications

The analysis is focused on in-state average tuition for full-time undergraduates and aggregate tuition over four years. This study hypothesizes that, following the introduction of a statewide guaranteed tuition law, institutions will increase their tuition levels as compared with institutions not subject to guaranteed tuition laws. In order to test this, the study uses a

⁶ This study uses the following IPEDS variables to make these restrictions: *iclevel*, coded as 1 (four or more years); *control*, coded as 1 (Public); *sector*, coded as 1 (Public, 4-year or above); *cyactive*, coded as 1 (Yes); *deggrant*, coded as 1 (Degree-granting); *ugoffer*, coded as 1 (undergraduate degree or certificate offering). U.S. service institutions, coded as *obereg*=0 (U.S. Service schools), are excluded from the sample as these military institutions do not charge monetary tuition. Title IV federal financial aid program participation is a good measure of institutional accreditation and will ensure that the institutions in the sample can disperse Pell grants. The IPEDS variable, *opeflag*, is used to exclude non-Title IV eligible institutions (coded as 5, 6, or 7).

difference-in-difference empirical approach on data spanning 2000-2011. The dataset is a cross-sectional time series, which means that each variable is identified by institution, i , and year, t . The independent variable of interest seeks to capture those observations (at the institution-year level) for which the guaranteed tuition law applies. The variable of interest is an interaction between an indicator variable ($Illinois_i$) for those institutions located in Illinois and an indicator variable ($Post2004_t$) for the years after the enactment of Illinois' Truth-in-Tuition law. As Illinois' guaranteed tuition law was first implemented in fall 2004, the latter variable is a dummy for the years 2004-2011. Therefore, the basic empirical specification is:

$$Tuition_{it} = \beta(Illinois_i * Post2004_t) + \mathbf{X}_{it}\boldsymbol{\gamma} + \mu_i + \nu_t + \varepsilon_{it} \quad (1)$$

The specification in equation 1 also includes institutional fixed effects (represented by μ_i) and year effects (represented by ν_t); ε_{it} is the error term. \mathbf{X}_{it} is a vector of time-varying control variables. This model is tested separately for both single-year tuition and aggregate tuition over four years.

Alternative control groups. In addition, this study conducts a set of corollary analyses focused on dividing the sample to better isolate control groups and to conduct robustness checks. First, this study restricts the sample in order to conduct the analysis by geographic region. Prior literature has shown that policy ideas can flow through a diffusion process based on geographic proximity (Berry & Berry, 2007). This study tests the guaranteed tuition laws in Illinois while restricting the sample to neighboring states by using the IPEDS region variable (i.e., the Great Lakes region).

Second, the sample is divided by state governing board structure to enable comparisons among states with similar organizational regimes in terms of both the governance of institutions of higher education and these institutions' relationships to state government structures. Often the

governance structure dictates the locus of control for tuition setting authority in each state, so this division enables comparison among states that have similar levels of central authority for higher education. We restrict the sample to only consider states with Coordinating/Planning Governing Boards because this is the type of governance structure that the state of Illinois is categorized as having. In order to identify this subset of states, we rely on the Education Commission of the States (ECS) Postsecondary Governance Structures Database which is based on the higher education governance classification scheme developed by McGuinness (1997). Our data come from Tandberg (personal communication, October 21, 2013).⁷

Third, this study considers institutional tuition levels within different institution peer groups based on the 2000 Carnegie classification system. This data is available from IPEDS and enables separate analyses for different institutional types (i.e., Masters Colleges and Universities I, Doctoral/Research Universities – Extensive, Doctoral/Research Universities – Intensive).⁸

Robustness checks. Finally, this study runs a series of robustness checks that are presented in the appendix. Three of these robustness checks restrict the sample to exclude public four year institutions that instituted institution-level guaranteed tuition programs independently

⁷ Other states that are included in this category of Coordinating/Planning Board governance structure are: Alabama, Arkansas, Colorado, Connecticut, Idaho, Illinois, Kansas, Kentucky, Louisiana, Massachusetts, Minnesota, North Dakota, New Hampshire, Nevada, New York, Ohio, Rhode Island, South Dakota, Tennessee, and Washington. Because this database is only updated periodically, and because governance structure changes are rare within the states, a single year of data was chosen (2004) and used to identify the states with Coordinating/Planning Governing Boards. McGuinness' (1997) typology discusses a number of different types of governance structures. He draws a distinction between governance and coordination with the former designed to govern institutions and the latter designed to coordinate across systems or sectors. A Consolidated Governing Board is a single entity with authority over all postsecondary institutions within the state. There can be separate consolidated governing boards for all two-year and all four-year campuses. A Planning Agency exists in absence of a designated overarching state authority, allowing each institution to set its own decision making criteria or process. A Coordinating Board exists when a governing board has delegated responsibilities outside of itself. In the case of a Regulatory Coordinating Board (or a Coordinating/Planning Board as termed by Tandberg) authorities include academic program approval. By contrast, an Advisory Coordinating Board (or Weak Coordinating Board) has limited authority and serves primarily as a review and recommendation body. The Education Commission of the States dataset (2007) and Tandberg (personal communication, October 21, 2013) have distilled McGuinness' rich discussion of higher education governance structures into a useable quantitative measure.

⁸ This study uses the 2000 Carnegie classification system instead of the 2010 revised system, because the 2000 typology was in place for the majority of the years of the dataset and offers a more straightforward classification scheme.

from state laws or characterize tuition in a non-standard manner. These robustness checks are found in Appendix A. The first restriction is used to exclude all non-Illinois institutions that independently instituted any type of price guarantee including tuition guarantees for in-state or out-of-state students, or a fee guarantee.⁹ Because these institutions might have unobserved differences from other institutions that did not select to implement these programs at the institution-level, the analysis is rerun using a sample that excludes these institutions. A second restriction excludes all of the institutions in the first restriction plus Western Illinois University (WIU). WIU is excluded because it adopted a guaranteed tuition policy prior to the passage of Illinois' Truth-in-Tuition law. The third restriction excludes all institutions in the first two restrictions plus all institutions in the state of California. A number of institutions in California bill all user-based charges in the form of fees. Many of these institutions reported \$0 in tuition for a number of years included in this analysis, since this data pre-dates a re-categorization in the IPEDS dataset to align charges from institutions in California with similar types of charges in other states (which are more typically categorized as tuition). Because of this difference in reporting tuition charges, all institutions in California are excluded in this third restriction.

A final robustness check is to incorporate state-by-year fixed effects in the model. While the basic difference-in-difference model contains institutional and year fixed effects, it is possible that tuition levels could follow different time-based trends in different states. It is possible that Illinois was on a different trajectory than the other 49 states before the start year of the dataset. In this instance, it is possible that the difference-in-difference approach would

⁹ This restriction excludes institutions that independently instituted any type of price guarantee (in-state, out-of-state tuition, or fees) for any year included in the dataset. All institutions in Oklahoma were subject to a tuition guarantee, but, because this was instituted by a state law, these institutions are not excluded from the analysis. In total nine institutions are excluded from the dataset: Missouri Southern State University, Norfolk State University, Northern Arizona University, Tarleton State University, University of Colorado at Boulder, University of Kansas, The University of Texas at Dallas, and The University of Texas at El Paso. The IPEDS variables used to implement this restriction are *chg1tgd*, *chg2tgd*, *chg3tgd*, *chg1fgtd*, *chg2fgtd*, and *chg3fgtd*.

attribute Illinois' prior time-based trend to the effect of the guaranteed tuition law. One remedy for this possibility is to control for state-specific time trends. Prior literature has shown that including state-specific or linear (or quadratic) time trends can matter to estimates produced in difference-in-difference models (see for instance, Friedberg, 1998; Jacobson, LaLonde, & Sullivan, 1993). Fortunately, the nature of our dataset allows for a highly general and flexible specification of these trends. In Appendix B, we present the results of models that include controls for state-by-year fixed effects. In these models, because there are controls for each state each year, we dropped our state-level control variables (discussed below) since there would not be any variation expected in these controls. The models in Appendix B present a difference-in-difference model with institutional and year fixed effects that also incorporates state-by-year fixed effects. These fixed effects were created by constructing dummy variables for each state, then interacting each of these state dummies with each year fixed effect in the model. With twelve years of data and 50 states, this resulted in 600 additional dummy variables being included in each model.

The model with the state-by-year fixed effects is presented in an appendix because it is not clear if the benefit of controlling for this additional potential source of unobserved heterogeneity outweighs the cost of absorbing more of the variation in the variables of interest (average in-state tuition for full-time undergraduates and total tuition over four years). While there have been large increases in public four-year colleges and universities' tuition levels over time, the trend has generally been one of fairly steady increase and not of radical differences across states in year-to-year trends. Because of this, it is not clear that there is enough variation in the tuition measure that the results will not be swamped by the inclusion of the state-by-year fixed effects, in addition to institution and year fixed effects, in a three-way fixed effects model.

Covariates. In addition to the dependent variables (average in-state tuition for full-time students or total tuition over four years) and the independent variable of interest that captures the enactment of Illinois' state-level guaranteed tuition law, a number of control variables are used in this analysis. These control variables are included to increase the precision of the estimates reported and are grouped into three categories: institutional-level, state-level economic, and state-level political controls.

The institution-level covariates include controls for alternative revenue sources (in-state required fees, out-of-state enrollments, and state appropriations), institutional size (total number of undergraduates), and student financial aid (percent of undergraduates receiving any financial aid and federal student aid as measured by gross Pell). Because guaranteed tuition laws only apply to tuition and in-state students, institutions subject to these laws may look to alternative revenue sources or enrollment increases to substitute for tuition revenue. Likewise, the availability of federal, state, institutional, and private student financial aid may impact an institution's tuition decisions.

This study will also control for state-level economic and demographic factors believed to be associated with tuition levels and/or higher education enrollment patterns. These include total state postsecondary enrollment, total state investment in student financial aid, total state revenues, median household income, state unemployment rate, state Gini coefficient (a measure of income inequality within each state), and total state population. These state-level variables are commonly included as covariates in analyses of higher education policy and have been linked to tuition by prior research. Humphreys (2000), for example, shows that unemployment rates can drive enrollments, particularly in the two-year sector. This could plausibly place upward pressures on tuition levels due to increased demand. Similarly, in the case of median household

income, prior literature has argued that institutions could increase their tuitions if their potential consumers (students) have greater financial resources from which to draw (Rusk & Leslie, 1978).

State-level political controls included in the models include the makeup of the state legislature (proportion Republican), the party affiliation of the governor, and the state voter participation rate in presidential elections. These general political controls are often used in the higher education policy literature (see for instance, Delaney and Doyle, 2011; McLendon, Hearn, and Mokher, 2009; Tandberg and Ness, 2011).

Detailed source information for these variables can be found in Table 1. Throughout the analyses, all financial data are adjusted for inflation using the consumer price index (CPI) as measured by the U.S. Bureau of Labor Statistics. All values are adjusted such that 100=2011. Descriptive statistics for the dataset can be found in Table 2. Average in-state tuition for full-time undergraduates is \$4,310.72 in the dataset with a range from \$0.00 to \$23,421.10. On average, total tuition paid over 4 years is \$18,377.74 with a range from \$0.00 to \$77,189.34.

Results

Illinois' Truth-in-Tuition program is found to result in higher tuition than would be expected based on the secular trend. This basic result is found throughout the analyses of the program. Table 3 shows the results of the difference-in-difference model for the first year in which the program was implemented (Post2004) on average tuition rates (Model 1). The model is run as a cross-sectional time series with a full set of controls, and institution and year fixed effects. We find a positive, significant effect ($p < 0.01$). The magnitude of the effect indicates a \$1,479 average increase in tuition following the enactment of Illinois' Truth-in-Tuition law, as compared with institutions not subject to the law.

Table 3 also shows the results of Illinois' Truth-in-Tuition law using a number of different control groups. As opposed to the analysis in Model 1 that uses all public four-year institutions in the U.S. (not Illinois) as the control group, Models 2 and 3 run the analysis using only institutions located in states in the Great Lakes region or only institutions located in states that have the same type of governing board structure as Illinois (Coordinating/Planning Board). When considering only institutions located in the Great Lakes region, we find a similar effect on tuition. We find a positive, significant effect ($p < 0.01$) and the magnitude of the effect is \$1,658. When considering only institutions in states with similar governance structures, we also find a positive, significant effect ($p < 0.01$) and the magnitude of this effect is \$1,593. This consistency in the significance, direction, and magnitude of effect provides confidence in the estimates for the full sample and for both the samples that are restricted by region or type of governance structure.

We next consider differences in the effect of Illinois' Truth-in-Tuition law on different types of institutions. For these analyses we use the 2000 Carnegie classification system to consider the effect of the law on Masters Colleges and Universities I, Doctoral/Research Universities – Extensive, and Doctoral/Research Universities – Intensive.¹⁰ Because each of these institution types operates in unique markets, our expectation is that Illinois' guaranteed tuition law will impact these institutions differently. Remarkably, we find a positive, significant effect for all three of the institutional types ($p < 0.01$). The magnitude of the effect is largest for the two types of research institutions: Doctoral/Research Universities – Intensive (\$1,596), and

¹⁰ These are the only three types of public four-year institutions operating in Illinois during the time period of this study so we did not consider other institutional types. No Illinois institutions change categories in the dataset during the time period of the analysis. Based on the 2000 Carnegie classification system, Illinois institutions are categorized as follows: Masters Colleges and Universities I = Chicago State University, Eastern Illinois University, Western Illinois University, Governors State University, Northeastern Illinois University, University of Illinois at Springfield, Southern Illinois University – Edwardsville; Doctoral/Research Universities--Extensive = University of Illinois at Chicago, University of Illinois at Urbana-Champaign, Northern Illinois University, Southern Illinois University – Carbondale; Doctoral/Research Universities--Intensive = Illinois State University.

Doctoral/Research Universities – Extensive (\$1,595). The magnitude of the effect is smaller, but with a similar magnitude for Masters Colleges and Universities I (\$1,256). It is interesting that the more elite institutions that attract larger numbers of out-of-state students (institutions categorized as Doctoral/Research Universities – Extensive or Intensive) experienced the largest tuition increases following the introduction of the Truth-in-Tuition law. Institutions that are more regionally or locally focused (categorized as Masters Colleges and Universities I) had a smaller magnitude of effect. This may be driven by either the higher average tuitions at both types of Doctoral/Research Universities (so the larger amount might be proportionally similar to the increases at the other institutional type that started with a smaller base tuition) or the broader markets in which these institutions operate, which could enable these types of institutions to charge higher prices with a relatively larger pool from which to draw student demand.

Table 4 shows the results when the model is run on aggregate tuition over four years. This analysis is run to understand if the increases in tuition are a result of frontloading (as discussed above and shown in Figure 1) or are true increases in total prices for students. In this model, we also find a positive, significant effect on tuition ($p < 0.01$) as compared to institutions not subject to a state-level guaranteed tuition law. The magnitude of this effect is \$4,016, which would be approximately \$1,004 per year over four years – within the same range of magnitude as our prior finding for a single year of tuition (as shown in Table 3).¹¹

Appendix A shows a series of three robustness checks of the data in which the analysis is rerun using different estimating samples that exclude particular types of institutions that could potentially bias the results. The first set of results are for an estimating sample that excludes

¹¹ The controls for this aggregate tuition model are representative of the first year of the 4-year aggregate. This approach was chosen because the process of aggregating political variables over four years is unclear and may lack meaning, and because, in the case of guaranteed tuition, the four-year aggregate tuition is effectively determined in the first year.

institutions that adopted institution-level guaranteed tuition programs independently from state laws and is shown in Model 1. With this restricted sample a remarkably similar result is found as in the basic model in Table 3, Model 1. The effect of the guaranteed tuition program is positive and significant ($p < 0.01$) and the magnitude of the effect is \$1,477. The second set of results is found in Model 2, which is comprised of a sample that excludes all of the institutions in Model 1 and Western Illinois University. This restricted sample also produces a positive, significant result ($p < 0.01$) and a very similar magnitude of the effect (\$1,484). The third set of results is shown in Model 3 and restricts the sample to exclude all of the institutions in Models 1 and 2 plus any public four-year institution located in California. In this model the effect is found to be positive and significant ($p < 0.01$) and the magnitude of the effect is \$1,361. All three of these robustness checks show that the estimates produced in the basic model (Table 3, Model 1) are robust to alternative specifications that exclude various types of institutions that could potentially bias the sample.

Appendix B presents the results for the models that are tested when including state-by-year fixed effects in a three-way fixed effects model. Model 1 presents the results for average in-state tuition for full-time undergraduates and Model 2 presents the results for the total aggregate tuition paid over four years. In Model 1, the effect is found to be positive and significant ($p < 0.01$). In this instance the magnitude of the effect (\$1,572) is slightly larger, but of approximately the same magnitude as in the basic model (Table 3, Model 1). Even with the inclusion of state-by-year fixed effects, a positive, significant result is still found on tuition levels at institutions subject to guaranteed tuition laws as compared to institutions not subject to these laws, all else equal.

Appendix B, Model 2 presents the results for total tuition over four years. In this model the effect is found to be positive and significant ($p < 0.01$). However, the magnitude of the result is much larger than in the basic model for total tuition over four years (Table 4). In the three-way fixed effects model, the magnitude is shown to be \$9,610 or a tuition increase of approximately \$2,403 per year, on average, at institutions subject to the guaranteed tuition law as compared to institutions not subject to the law, all else equal. The large magnitude of this finding indicates that the two-way fixed effects model may be underestimating the true effect of guaranteed tuition laws on aggregate tuition paid over four years. Although a three-way fixed effects model might be over-specified in this context, these findings provide support for the basic results and indicate that the two-way fixed effects models are likely underestimating the magnitude of the true effect.

Overall the results of the tests for Illinois consistently show a large and significant effect of the Truth-in-Tuition law on institutional tuition levels. Following the implementation of this law, public four-year institutions in Illinois increased their tuition by approximately \$1,500, on average, as compared to institutions not subject to the law, all else equal. For institutions subject to a guaranteed tuition law, there was also a positive, significant increase in the total amount of tuition paid by students over four years, on average, as compared to institutions not subject to the law, all else equal. This indicates that institutions raised tuition beyond what would have been necessary in a frontloaded model to keep tuition comparable to a variable rate tuition policy (as discussed in Figure 1) and raised tuition levels overall. The magnitude of this effect is large and shows that institutions that were subject to a guaranteed tuition law increased aggregate tuition over four years by \$4,016, on average, as compared to institutions not subject to the law, all else

equal. Taken together, our findings indicate that guaranteed tuition laws contain incentives for institutions to increase overall tuition levels.

Conclusion

This study found evidence of a significant increase in tuition levels when institutions were subject to guaranteed tuition laws. Although these laws offer predictability in tuition levels for students, the incentives built into these programs appear to encourage overall tuition increases, which is not clearly beneficial to students and families. In fact, a guaranteed tuition law appears to be a driver of tuition increases, since institutions increased tuition by \$1,479, on average, following the enactment of the law in Illinois as compared to institutions not subject to a law, all else equal (Table 3).

The size of this increase in tuition is troubling because, while there is likely a value in institutions offering predictability in tuition rates, it is unlikely that the value of that predictability is greater than \$1,500. In the sample, mean tuition across all states in all years was \$4,310.72 (Table 2), so a \$1,500 increase represents an approximately 35% increase in tuition levels. While there is not empirical evidence of the value of predictability in tuition levels, the Tuition Lock program in Oklahoma set the value of the guarantee at 15%. It seems likely that this level is set too high as evidenced by the very low participation rates in Oklahoma's program (only 2% of students opted-in to the program in 2011). However, even if 15% were the proper value of a guarantee, the tuition increases in Illinois have more than doubled this level.

While institutions in Illinois reacted in a manner that was predicted by the incentives built into the Truth-in-Tuition law, our results show that the law is flawed if its intent was to promote college affordability. We think that policymakers in Illinois should consider modifying the law in a way that promotes predictability without incentivizing tuition increases or repealing the Truth-

in-Tuition law. We also think that the results of our study should serve as a cautionary warning to other states that might be thinking of implementing (like Texas) or expanding (like Oklahoma) a guaranteed tuition program. We think that guaranteed tuition programs can be valuable in offering students and families predictability (as evidenced by the increasing number of institutions that voluntarily offer these programs), but should only be mandated by state governments with great care and acknowledgement of the inherent incentives of these programs.

Our future work on guaranteed tuition programs will consider their impact on college student enrollment and completion (Kearney & Delaney, 2014), and state general appropriations for higher education institutions (Delaney & Kearney, 2014). In addition, future exploration is needed to better understand the impact of these laws on other student-level outcomes such as indebtedness and other state funding streams for higher education, such as state spending on student financial aid. We also think that more research should be conducted on related state-level tuition policies such as tuition freezes and tuition caps.

Our findings provide insights into the effectiveness and unintended consequences of state-level guaranteed tuition programs and the incentives imbedded in these programs. In addition, these findings provide a better understanding of the potential effects of tuition policies in general. As such, the findings of this study contribute to the scholarly literature on tuition setting and may be useful for policymakers, institutional researchers, and university leaders in states considering guaranteed tuition or similar policies. In states that already have guaranteed tuition laws, we hope that our findings will encourage state policymakers to either reconsider or restructure these laws in light of the inflationary effect that they have on tuition levels.

References

- Bennett, W. J. (February 18, 1987). Our greedy colleges. *New York Times*, Op. Ed., A27.
Retrieved from: <http://www.nytimes.com/1987/02/18/opinion/our-greedy-colleges.html?src=pm>
- Berry, F. S., & Berry, W. D. (2007). Innovation and diffusion models in policy research. In P. A. Sabatier (Ed.), *Theories of the policy process*, 2nd ed. (pp. 169-200). Westview Press: Cambridge, MA.
- Baumol, W. J. & Blackman, S. A. B. (1995). How to think about rising college costs. *Planning for Higher Education*. 23(4): 1–7.
- Cellini, S. (2008). Causal inference and omitted variable bias in financial aid research: Assessing solutions. *Review of Higher Education*, 31(3), p. 329-354.
- Cellini, S. R., & Goldin, C. (2012). *Does federal student aid raise tuition? New evidence on for-profit colleges*. NBER Working Paper No. 17827. Retrieved from: <http://www.nber.org/papers/w17827>
- Clotfelter, C. (1996). *Buying the best: Cost escalation in elite higher education*. A National Bureau of Economic Research Monograph. Princeton, NJ: Princeton University Press.
- College Board (2011). *Trends in college pricing: 2011*. Retrieved from: http://trends.collegeboard.org/downloads/College_Pricing_2011.pdf
- Commission on Government Forecasting & Accountability [COGFA] (2008, December). *Higher education: Funding and tuition rates*. Retrieved from: <http://www.ilga.gov/commission/cgfa2006/Resource.aspx?id=178>
- Delaney, J. A. & Doyle, W. R. (2011). State spending on higher education: Testing the balance wheel over time. *Journal of Education Finance*, 36(4), p. 343-368.
- Delaney, J. A. & Kearney, T. D. (2014). *Guaranteed Tuition Policies and State General Appropriations for Higher Education: A Difference-in-Difference Analysis*. Working paper.
- Delta Cost Project (n.d.) Retrieved from: <http://www.deltacostproject.org/index.asp>
- Ehrenberg, R. G. (2002). *Tuition rising: Why college costs so much*. Cambridge, MA: Harvard University Press.
- Friedberg, L. (1998). Did unilateral divorce raise divorce rates? Evidence from panel data. *American Economic Review*, 88(3), p. 608-627.
- Harvey, J., Williams, R. M., Kirshstein, R. J., O'Malley, A. S., & Wellman, J. V. (1998). *Straight talk about college costs and prices: Report to The National Commission on the Cost of Higher Education*. Phoenix, AZ: Oryx Press.
- Hauptman, A. M. (1990a). *The college tuition spiral: An examination of why charges are increasing*. Washington, DC: The College Board and American Council on Education.
- Hauptman, A. M. (1990b). *The tuition dilemma: Assessing new ways to pay for college*. Washington, DC: The Brookings Institution.
- Hauptman, A. M., & Krop C. S. (1998). *Federal student aid and tuition growth: Examining the relationship*. New York, NY: Council for Aid to Education.
- Heller, D. E. (2001). *The state and public higher education policy: Affordability, access, and accountability*. Baltimore, MD: The Johns Hopkins University Press.
- Hoxby, C. M. (1997). *How the changing market structure of U.S. higher education explains college tuition*. NBER Working Paper No. 6323. Retrieved from: <http://www.nber.org/papers/w6323>

- Humphreys, B. R. (2000). Do business cycles affect state appropriations to higher education? *Southern Economic Journal*, 67, 398-413.
- Hurlburt, S. & Kirshstein, R. J. (2012). *Spending, subsidies, and tuition: Why are prices going up? What are tuitions going to pay for? A delta data update, 2000-2010*. Washington, DC: American Institutions for Research. Retrieved from:
<http://www.deltacostproject.org/resources/pdf/Delta-Subsidy-Trends-Production.pdf>
- Illinois Public Act 093-0228 (2003). Retrieved from:
<http://www.ilga.gov/legislation/publicacts/fulltext.asp?Name=093-0228>
- Institute for Higher Education Policy. (1999). *The tuition puzzle: Putting the pieces together*. Washington, DC.
- Integrated Postsecondary Education Data System (IPEDS) (n.d.). *IPEDS Data Center* [Data file]. Retrieved from <http://nces.ed.gov/ipeds/datacenter/>
- Jacobson, L. S., LaLonde, R. J., & Sullivan, D. G. (1993). Earnings losses of displaced workers. *American Economic Review*, p. 685-709.
- Johnson, J. L. (1976). Setting tuition levels at public institutions: The case of the University of Washington. *The Journal of Higher Education*, 47, 125-139.
- Kane, T. J. (1999). *The price of admission: Rethinking how Americans pay for college*. Washington, D.C.: Brookings Institution Press.
- Kearney, T. D. & Delaney, J. A. (2014). *A Difference-in-Difference Analysis of Guaranteed Tuition Policies and Higher Education Enrollments and Completions*. Working paper.
- Kim, J. J. (2004, July 27). Putting a cap on tuition expenses: some colleges freeze costs until students graduate, ending steep yearly hikes. *The Wall Street Journal*, p D2.
- Krogstad, J. (2012, November 11). State colleges look at tuition freeze to recoup funding. *The USA Today*. Retrieved from:
<http://www.usatoday.com/story/news/nation/2012/11/11/state-universities-tuition-freeze-budget-cuts/1698379/>
- Lenth, C. S. (1993). *The tuition dilemma: State policies and practices in pricing public higher education*. Denver, CO: State Higher Education Executive Officers.
- Martinez, M. C. (1997). "Understanding policy issues of state higher education finance through case study research." Unpublished paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL. ERIC: ED410835.
- Mauck, S. (March 19, 2013) Personal communication with Sheri Mauck, Associate Vice Chancellor for Budget and Finance, Oklahoma State Regents for Higher Education.
- McGuinness, A. C. (1997). The changing structure of state higher education leadership. L. Goodchild, C. Lovell, E. Hines & J. Gill (Eds.). *Public Policy and Higher Education: ASHE Reader Series*, 125-159.
- McLendon M. K., Hearn, J.C. and Mokher, C. G. (2009) Partisans, professionals and power: The role of political factors in state higher education funding. *The Journal of Higher Education*, 80(6): p. 686-713.
- McPherson, M.S. & Schapiro, M. O. (1991). The student finance system for undergraduate education: How well does it work? *Change: The Magazine of Higher Learning*, 23(3), 16-22.
- McPherson, M.S., Schapiro, M. O., Winston, G. C. (1989). Recent trends in U.S. higher education costs and prices: The role of government funding. *American Economic Review*, 79(2), 253-257.

- McPherson, M. S., & Winston, G. C. (1993). The economics of cost, price, and quality in US higher education. In M.S. McPherson, M. O. Shapiro, & G. C. Winston (Eds.), *Paying the piper: Productivity, incentives and financing in US higher education* (69-99). Ann Arbor, MI: University of Michigan Press.
- Morphew, C. C. (Jan/Feb 2007). Fixed-tuition pricing: A solution that may be worse than the problem. *Change: The Magazine of Higher Learning*, 39(10) 34-39.
- Mumper, M., & Freeman, M. L. (2005). The causes and consequences of public college tuition inflation. J.C. Smart (Ed.). *Higher Education: Handbook of Theory and Research*, Vol. XX, 307-361.
- National Association of Independent Colleges and Universities (n.d.). *Special Initiatives. Enhancing Affordability. Tuition Guarantees*. Retrieved from: http://www.naicu.edu/special_initiatives/affordability/about/enhancing-affordability-pre-2008-09#tuitionguarantees
- Oklahoma State Regents for Higher Education (2009, June 26). *Regents approve tuition freeze for Oklahoma's public colleges and universities*. Retrieved from: <http://www.okhighered.org/news-center/tuition-freeze2009.shtml>
- Oklahoma State Regents for Higher Education (2011, December). *FY 2011-12 tuition impact analysis report*. Retrieved from: <http://www.okhighered.org/studies-reports/tuition-impact-analysis-11-12.pdf>
- Robertson, A. D. (2007). *Measuring the impact of guaranteed tuition plans on enrollment at a minority serving public institution*. (Doctoral dissertation). Retrieved from Proquest. (UMI No. 3255868)
- Rothschild, M., & White, L. J. (1995). The analytics of the pricing of higher education and other services in which the customers are inputs. *Journal of Political Economy*, 103, 573.
- Rusk, J. J., & Leslie, L. L. (1978). The setting of tuition in public higher education. *The Journal of Higher Education*, 49, 531-547.
- Singell, L. D. & Stone, J. A. (2007). For whom the Pell tolls: The response of university tuition to federal grants-in-aid. *Economics of Education Review*, 26(3), 285–295.
- Supiano, B. (April 24, 2009). The psychology of college pricing. *The Chronicle of Higher Education*, A4.
- Tandberg, D. (October 21, 2013). Personal communication with David Tandberg, Assistant Professor of Higher Education, Florida State University.
- Tandberg, D. A. and Ness, E. C. (2011). State capital expenditures for higher education: “Where the real politics happens”. *Journal of Education Finance*, 36:4, p. 394-423.
- Thomson, S. C. (2005, Fall). “Truth in tuition”: Illinois’ novel answer to skyrocketing rates. *National CrossTalk*, 161-166.
- Thorne, C., & Wright, S. W. (1999, April 19). Guaranteed tuition programs gaining in popularity across the country. *Community College Week*, 11, 8.
- Troutt, M. D., McEwen, T., & Yew, B. K. (1995). Some modeling considerations in deciding multi-year guaranteed tuition rates. *Journal for Higher Education Management*, 11, 19-30.
- Ura, A. (2012, December 5). Bill on fixed tuition rates aims to increase affordability of education. *The Daily Texan*. Retrieved from: <http://www.dailytexanonline.com/news/2012/12/04/bill-on-fixed-tuition-rates-aims-to-increase-affordability-of-education>

Ward, M. (2012). Perry outlines plan to lock in college fees. *Austin American-Statesman*.
Retrieved from: <http://www.statesman.com/news/news/local/perry-outlines-plan-to-lock-in-college-fees/nSLZb/>

Winston, G. C. (1997). Why can't a college be more like a firm? *Change: The Magazine of Higher Learning*, 29(5), 32-38.

Figure 1: Example of the Difference in Tuition Levels between Guaranteed and Traditional Tuition Plans

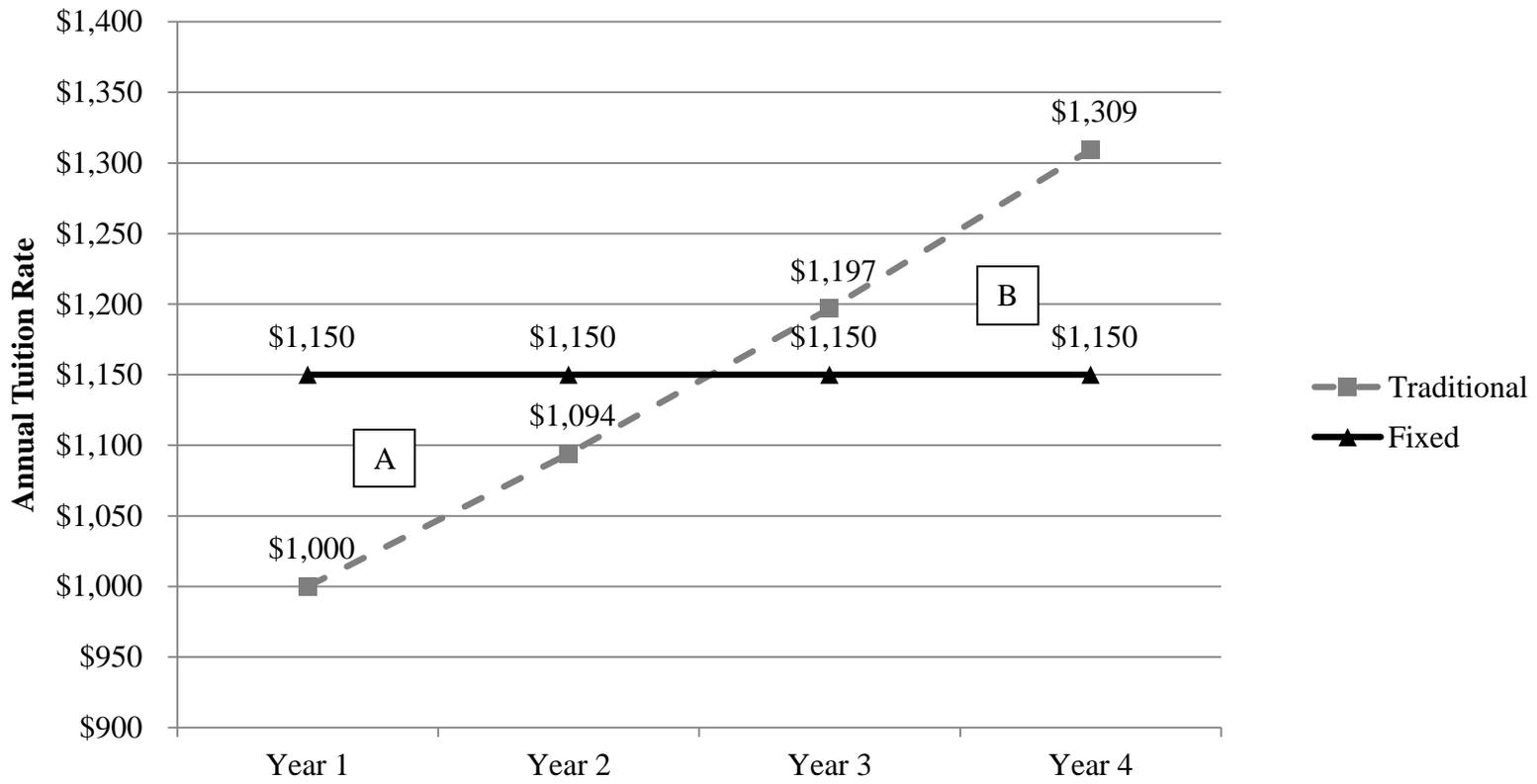
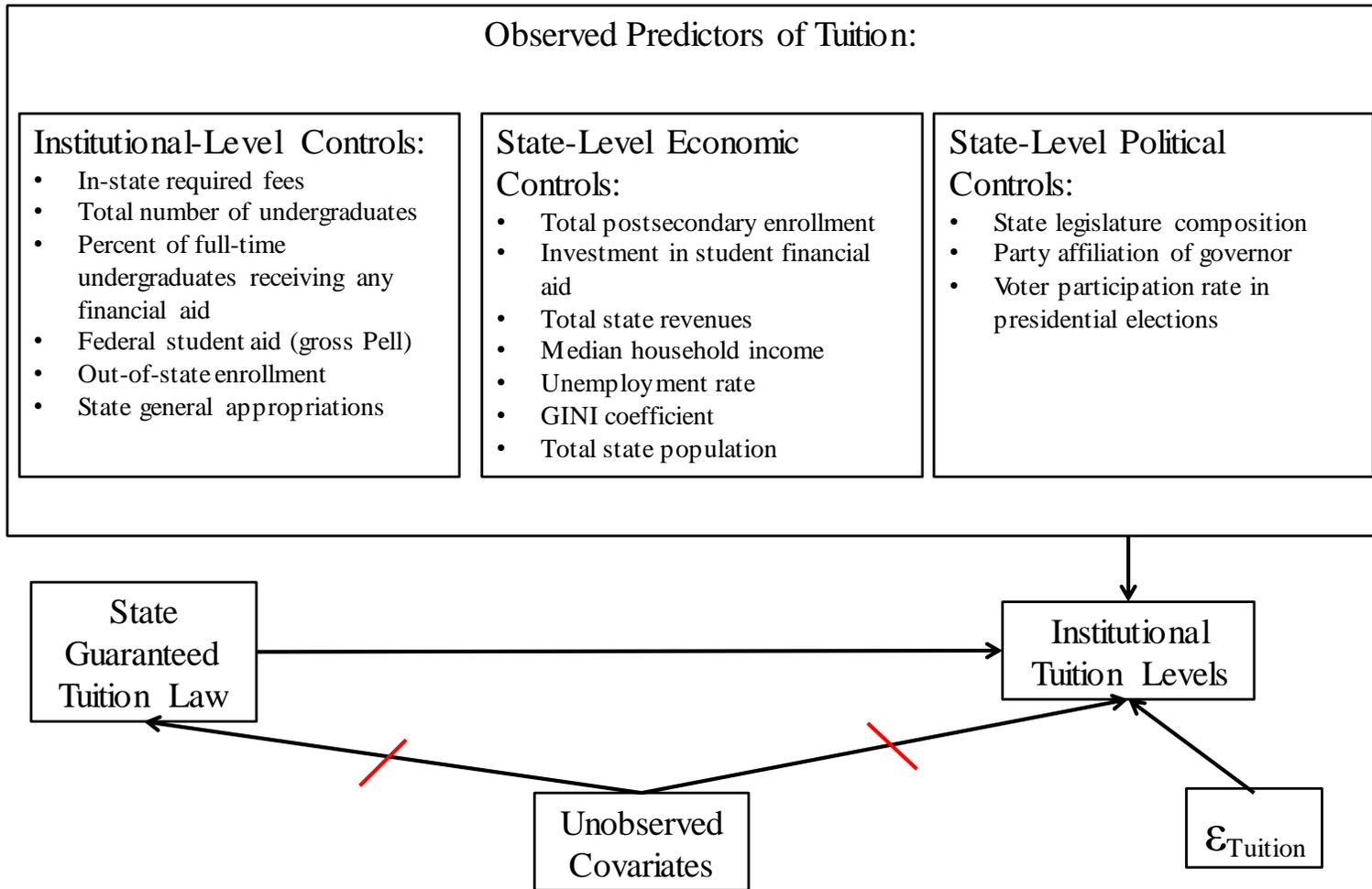
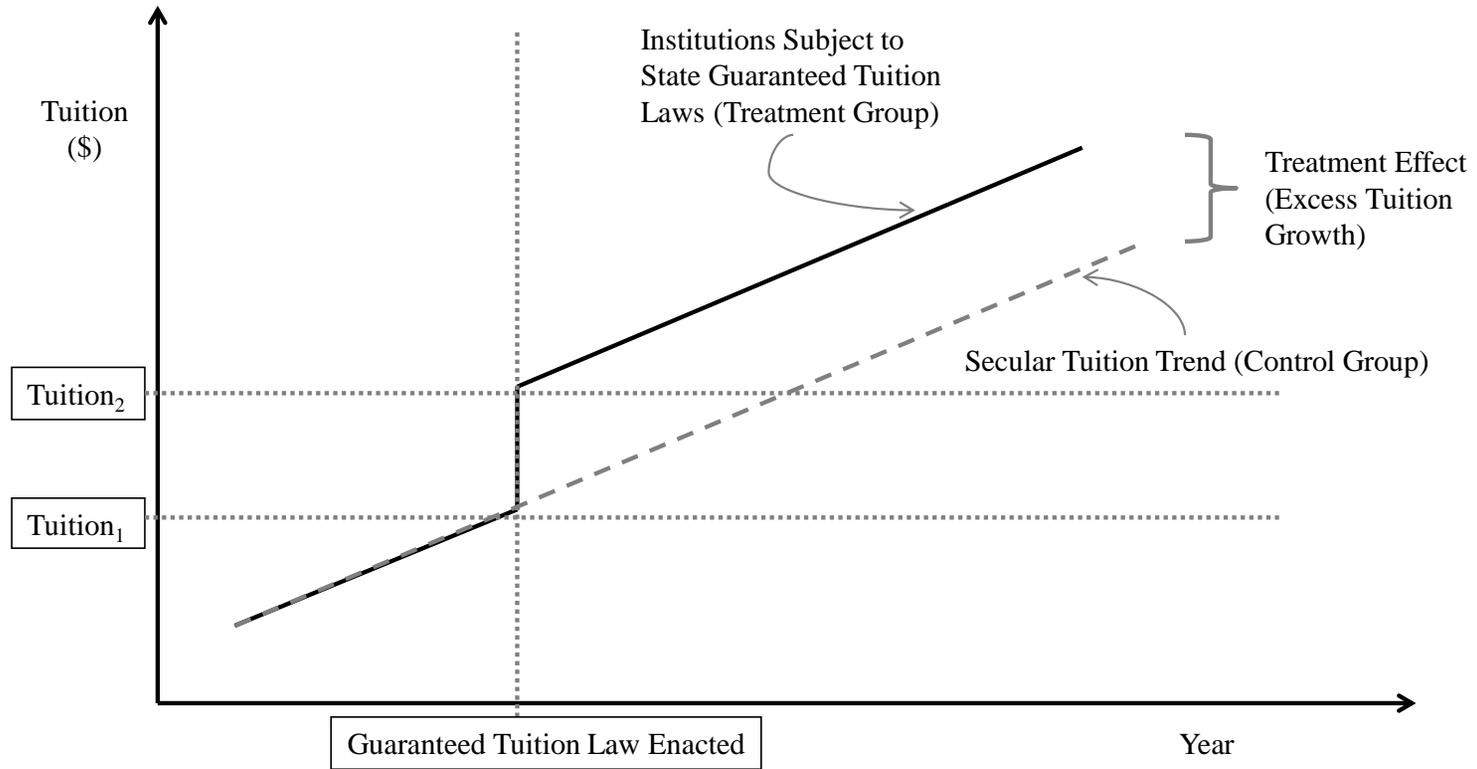


Figure 2: Conceptual Drawing of the Relationships among Variables in Difference-in-Difference Model of State Guaranteed Tuition Laws



Difference-in-difference designs assume that unobserved covariates have the same effect on the treatment and control groups.

Figure 3: Difference-in-Difference Model: Predicted Effect of State Guaranteed Tuition Laws



| Table 1: Variables List | | | |
|--------------------------------|--|--|--------------------|
| Variable Name | Variable Long Name | Variable Description | Source Code |
| tuition2 | In-state average tuition for full-time undergraduates | Charges to full-time undergraduate students for the full academic year 2010-11. In-state average tuition. | 1 |
| fee2 | In-state required fees for full-time undergraduates | Charges to full-time undergraduate students for the full academic year 2010-11. In-state required fees. | 1 |
| scfa2 | Total number of undergraduates | Student Financial Aid and Student Counts - Fall Cohort. Total number of undergraduate students. | 1 |
| anyaidp | Percent of full-time first-time undergraduates receiving any financial aid | Student Financial Aid and Student Counts - Financial Aid. Percentage of all full-time, first-time degree/certificate-seeking undergraduate students who received any financial aid. | 1 |
| e013 | Gross Pell (2000-2001) | Pell grants are a form of federal student aid provided as part of the Higher Education Act of 1965, Title IV, Part A, Subpart I, as amended. This program provides eligible undergraduate postsecondary students with demonstrated financial need with grant assistance to help meet education expenses. | 1 |
| f1e01 | Gross Pell (2002-2011) | Pell grants represents the gross amount of Pell grants disbursed or otherwise made available to recipients by the institution. | 1 |
| scfa13n | Number of students in cohort who are out-of-state | Student Financial Aid and Student Counts - Fall Cohort. The number of full-time first-time degree/certificate-seeking undergraduates who are out-of-state. | 1 |
| a043 | State appropriations (2000-2001) | State appropriations are revenues received by an institution through acts of a state legislative body, except grants and contracts. These funds are for meeting current operating expenses and not for specific projects or programs. | 1 |
| f1b11 | State appropriations (2002-2011) | State appropriations are amounts received by the institution through acts of a state legislative body, except grants and contracts and capital appropriations. Funds reported in this category are for meeting current operating expenses, not for specific projects or programs. | 1 |
| total_enroll | Total Postsecondary Enrollment | Total state enrollment of students enrolled in institutions of postsecondary education by year. | 5 |
| state_aid | Total state financial aid expenditures | Total state investment in student financial aid. | 7 |
| totrev | Total State Revenue | Total revenue of the state by year. | 3 |
| medhouseinc | Median Household Income by State | Median Household Income by State (Households as of March of the following year). | 3 |

| | | | |
|-----------------|---|--|---|
| unemprate | State Unemployment Rate | Unemployment rates for states. Statewide Data. Annual Average. | 2 |
| gini | State Gini Coefficient | State level measure of income distribution. | 8 |
| pop | Population | The total population of each state by year. | 3 |
| rep_prop | Proportion of Republicans in either the State Senate or House | Proportion of Republicans in either the state senate or house by year (Nebraska set to 0.5). | 4 |
| rdgovernf_code2 | Republican Governor | Categorical variable, which indicates 1 if the governor was Republican in each year. | 4 |
| pres_voter | Presidential Voting Rate | Presidential voter participation rate. Linear smoothing used in non-election years to make this a continuous measure. | 3 |
| CPI | Consumer Price Index | Consumer Price Index - All Urban Consumers (Series Id: CUUR0000SA0). Not Seasonally Adjusted. Area: U.S. city average. Item: All items. | 2 |
| obereg | Geographic Regions | IPEDS geographic region codes include: U.S. Service schools; New England; Mid East; Great Lakes; Plains; Southeast; Southwest; Rocky Mountains; Far West; and Outlying areas. | 1 |
| carnegie | 2000 Carnegie | The 2000 Carnegie Classification includes all colleges and universities in the United States that are degree-granting and accredited by an agency recognized by the U.S. Secretary of Education. The 2000 edition classifies institutions based on their degree-granting activities from 1995-96 through 1997-98. Classifications: Doctoral/Research Universities-Extensive; Doctoral/Research Universities-Intensive; Masters Colleges and Universities I; Masters Colleges and Universities II; Baccalaureate Colleges-Liberal Arts; Baccalaureate Colleges-General; Baccalaureate/Associates Colleges; Associates Colleges; Theological seminaries and other specialized faith-related institutions; Medical schools and medical centers; Other separate health profession schools; Schools of engineering and technology; Schools of business management; Schools of art, music, and design; Schools of law; Teachers colleges; Other specialized institutions; and Tribal colleges. | 1 |
| gov_board | Governing Board | Categorical variable, which indicates 1 if a state has a Coordinating/Planning Governing Board structure. | 6 |

| Source Code | Variable Source | URL |
|-------------|--|--|
| 1 | IPEDS Data Center | http://nces.ed.gov/ipeds/datacenter/Default.aspx |
| 2 | U.S. Department of Labor, Bureau of Labor Statistics: CPI State Unemployment Rates | http://www.bls.gov/cpi/ http://www.bls.gov/lau/tables.htm |
| 3 | U.S. Census Bureau: State Revenues Median Household Income Population Presidential Voting | http://www.census.gov/govs/state/ http://www.census.gov/hhes/www/income/data/statemedian/index.html http://www.census.gov/popest/archives/ http://www.census.gov/population/www/socdemo/voting.html |
| 4 | The Council of State Governments. <i>The book of the states: The legislators: Numbers, terms and party affiliations.</i> Lexington, KY: Sharing Capitol Ideas | |
| 5 | National Center for Education Statistics. <i>Digest of Education Statistics.</i> | http://nces.ed.gov/programs/digest/ |
| 6 | Tandberg, D. | Personal communication |
| 7 | National Association of State Student Grant and Aid Programs (NASSGAP), Annual Surveys. | http://www.nassgap.org/viewrepository.aspx?categoryID=3 |
| 8 | Hisnanick, J. L., & Rogers, A. L. (nd). Household Income Inequality Measures Based on the ACS Data: 2000-2005*. Program Participation and Income Transfers Branch, Housing and Household Economic Statistics Division, U.S. Census Bureau. | http://www.census.gov/hhes/www/income/publications/ACS%20inequality%20report%202000-2005_v2.pdf |

Note: A challenge in using the IPEDS data as a cross-sectional time series is that not all of the variables used in this analysis were collected for the entire time period of the study (from 2000-2011). In cases where a single variable was unable to be used for each year, measures of similar variables were combined in order to create a continuous measure for every year of the dataset. This was the case for two of the measures – state appropriations and gross Pell grants. In both cases the concepts are measured by one variable for the years 2000-2001 and a second variable for the years 2002-2011. The definition of the variable does not fundamentally change between the two measures.

| Variable | Mean | Std. Dev. | Min | Max |
|--|---------------------|---------------------|--------------------|----------------------|
| Illinois*Post2004 | 0.01 | 0.11 | 0 | 1 |
| Average In-State Tuition for Full-Time Undergraduates (CPI adjusted) | \$4,310.72 | \$2,296.14 | \$0.00 | \$23,421.10 |
| Total Tuition over Four Years (CPI adjusted) | \$18,377.74 | \$10,310.72 | \$0.00 | \$77,189.34 |
| In-State Fees (CPI adjusted) | \$1,404.63 | \$1,488.76 | \$0.00 | \$11,286.20 |
| Total Number of Undergraduates | 9,597.57 | 8,090.55 | 91 | 61,674 |
| Percent of Full-Time First-Time Undergraduates Receiving Any Financial Aid | 78.31 | 14.28 | 0 | 100 |
| Gross Pell (CPI adjusted) | \$9,583,670.00 | \$9,449,773.00 | \$0.00 | \$170,000,000.00 |
| Number of Out-of-State Students | 237.86 | 393.00 | 0 | 3,525 |
| State General Appropriations (by Institution, CPI adjusted) | \$82,800,000.00 | \$107,000,000.00 | \$0.00 | \$840,000,000.00 |
| Total State Postsecondary Enrollment | 581,451.90 | 578,371.00 | 26,948 | 2,700,000 |
| Total State Investment in Student Financial Aid (CPI adjusted) | \$274,000,000.00 | \$287,000,000.00 | \$0.00 | \$1,300,000,000.00 |
| Total State Revenue (CPI adjusted) | \$60,300,000,000.00 | \$64,200,000,000.00 | \$2,500,000,000.00 | \$330,000,000,000.00 |
| Median Household Income (CPI adjusted) | \$52,353.32 | \$7,467.86 | \$36,709.20 | \$75,938.10 |
| State Unemployment Rate | 6.01 | 2.17 | 2.30 | 13.80 |
| State Gini Coefficient | 0.45 | 0.02 | 0.38 | 0.54 |
| Total State Population | 9,870,663.00 | 8,957,053.00 | 492,982 | 38,000,000 |
| Proportion of Republican Representatives in State Legislature | 0.49 | 0.13 | 0.09 | 0.91 |
| Republican Governor | 1.55 | 0.50 | 1.00 | 2.00 |
| Voter Participation Rate in Presidential Elections | 58.51 | 6.52 | 39.70 | 76.70 |
| Number of obs | 6,573 | | | |
| Number of obs for Total Tuition over Four Years | 5,541 | | | |
| Number of clusters (institutions) | 641 | | | |
| Obs per cluster: min | 1 | | | |
| avg | 10.30 | | | |
| max | 12 | | | |

Std. Dev. not adjusted for clustering. CPI adjustments such that 100=2011. Linear smoothing is used in off-years to make the presidential voter participation rate a continuous measure.

Table 3: Difference-in-Difference Models for Illinois' Truth-in-Tuition Policy on Institutional Tuition Levels 2000-2011

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|---|---|--|---|---|---|
| | Full Controls Institution and Year Fixed Effects Model | Full Controls Institution and Year Fixed Effects Model | Full Controls Institution and Year Fixed Effects Model | Full Controls Institution and Year Fixed Effects Model | Full Controls Institution and Year Fixed Effects Model | Full Controls Institution and Year Fixed Effects Model |
| VARIABLES | Basic Model | Great Lakes Region Only | States with Coordinating/Plann ing Governing Board Structures Only | Masters Colleges and Universities I Only | Doctoral/Research Universities-- Intensive Only | Doctoral/Research Universities-- Extensive Only |
| Illinois*Post2004 | 1,479*** (124.7) | 1,658*** (180.7) | 1,593*** (133.0) | 1,256*** (87.81) | 1,596*** (292.0) | 1,595*** (258.7) |
| In-State Fees (CPI adjusted) | -0.843*** (0.0629) | -0.337 (0.214) | -0.568*** (0.107) | -0.745*** (0.0494) | -0.904*** (0.137) | -0.889*** (0.128) |
| Total Number of Undergraduates | -0.0175 (0.0167) | -0.0233 (0.0159) | -0.00135 (0.0192) | -0.0407** (0.0196) | -0.0496 (0.0444) | 0.0191 (0.0145) |
| Percent of Full-Time First-Time Undergraduates Receiving Any Financial Aid | 2.988** (1.306) | 3.692 (6.938) | 2.213 (1.744) | 3.013* (1.582) | 12.18 (7.518) | 2.038 (4.013) |
| Gross Pell (CPI adjusted) | 1.93e-05*** (6.70e-06) | 4.42e-05** (1.87e-05) | 1.69e-05** (8.37e-06) | 1.19e-05** (5.22e-06) | -6.22e-06 (2.51e-05) | 2.08e-05 (1.43e-05) |
| Number of Out-of-State Students | 0.405*** (0.0922) | 0.0235 (0.237) | 0.352** (0.139) | 0.0150 (0.159) | 0.0288 (0.259) | 0.242** (0.115) |
| State General Appropriations (by Institution, CPI adjusted) | -7.49e-06*** (1.28e-06) | -7.64e-06*** (2.13e-06) | -6.08e-06*** (1.76e-06) | -1.07e-05*** (1.86e-06) | -5.26e-06 (4.77e-06) | -5.13e-06*** (1.23e-06) |
| Total State Postsecondary Enrollment | -0.00203*** (0.000527) | -0.0148*** (0.00252) | -0.00532*** (0.000728) | -0.00343*** (0.000425) | 0.000246 (0.00147) | 0.00134 (0.00130) |
| Total State Investment in Student Financial Aid (CPI adjusted) | 1.03e-06*** (2.94e-07) | -1.68e-06*** (4.62e-07) | -2.15e-07 (2.91e-07) | 8.33e-07*** (2.94e-07) | -1.18e-06 (7.89e-07) | 2.27e-06*** (7.57e-07) |
| Total State Revenue (CPI adjusted) | 1.80e-10 (4.75e-10) | 5.30e-09* (2.76e-09) | 4.11e-10 (1.20e-09) | -7.93e-10* (4.48e-10) | 6.49e-09 (5.03e-09) | 4.07e-09** (1.88e-09) |
| Median Household Income (CPI adjusted) | -0.00531 (0.00545) | 0.0823*** (0.0278) | 0.0216*** (0.00636) | -0.0130* (0.00674) | 0.0267 (0.0185) | -0.0259 (0.0164) |
| State Unemployment Rate | 142.5*** (21.16) | 265.5*** (54.25) | 240.0*** (27.85) | 168.9*** (24.34) | 227.5*** (56.39) | 125.2** (50.58) |
| State Gini Coefficient | -481.5 (1,903) | -9,100 (6,646) | -5,687 (4,110) | 2,268 (2,455) | -1,361 (3,588) | 2,115 (5,136) |
| Total State Population | 0.000300*** (8.33e-05) | -0.00157*** (0.000476) | 0.000800*** (0.000102) | 0.000404*** (6.84e-05) | 0.000332 (0.000270) | -6.22e-05 (0.000205) |
| Proportion of Republican Representatives in State Legislature | -2,274*** (287.9) | -1,217 (2,009) | -1,370*** (524.0) | -2,285*** (357.9) | -1,921** (949.6) | -2,007*** (739.5) |
| Republican Governor | 51.83* (30.45) | 346.6 (242.9) | 217.4*** (34.71) | 19.63 (34.28) | 126.4 (159.3) | -67.30 (91.66) |
| Voter Participation Rate in Presidential Elections | -8,442 (6,389) | 29,49 (64.39) | 21,99 (15.64) | -18,51** (7,625) | -8,906 (28.60) | -2,377 (14.46) |
| Constant | 5,823*** (1,264) | 27,579*** (5,207) | 452.9 (2,400) | 4,903*** (1,445) | 3,324 (3,751) | 7,821** (3,893) |
| Institution Fixed Effects? | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects? | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 6,573 | 962 | 3,518 | 2,785 | 712 | 1,156 |
| R-squared | 0.727 | 0.661 | 0.646 | 0.778 | 0.567 | 0.872 |
| Number of Institutions | 641 | 90 | 328 | 242 | 60 | 102 |

Robust standard errors in parentheses. CPI adjustments such that 100=2011. Linear smoothing is used in off-years to make the presidential voter participation rate a continuous measure. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Difference-in-Difference Model for Illinois' Truth-in-Tuition Policy on Institutional Tuition Levels Using Total Tuition Over Four Years 2000-2008

| VARIABLES | (1) |
|--|--|
| | Full Controls Institution and Year Fixed Effects Model |
| Illinois*Post2004 | 4,016*** (426.3) |
| In-State Fees (CPI adjusted) | -1.197*** (0.255) |
| Total Number of Undergraduates | 0.0777 (0.0530) |
| Percent of Full-Time First-Time Undergraduates Receiving Any Financial Aid | 0.920 (5.760) |
| Gross Pell (CPI adjusted) | 5.19e-05 (3.67e-05) |
| Number of Out-of-State Students | 0.901** (0.366) |
| State General Appropriations (by Institution, CPI adjusted) | -2.99e-05*** (5.13e-06) |
| Total State Postsecondary Enrollment | -0.00625*** (0.00218) |
| Total State Investment in Student Financial Aid (CPI adjusted) | -5.87e-08 (1.28e-06) |
| Total State Revenue (CPI adjusted) | -4.40e-08*** (3.32e-09) |
| Median Household Income (CPI adjusted) | 0.00674 (0.0181) |
| State Unemployment Rate | 625.6*** (106.7) |
| State Gini Coefficient | -3,264 (6,826) |
| Total State Population | 0.00216*** (0.000347) |
| Proportion of Republican Representatives in State Legislature | -5,734*** (1,141) |
| Republican Governor | 155.6 (131.7) |
| Voter Participation Rate in Presidential Elections | -1.012 (23.36) |
| Constant | 8,321* (4,417) |
| Institution Fixed Effects? | Yes |
| Year Fixed Effects? | Yes |
| Observations | 4,809 |
| Number of Institutions | 613 |
| R-squared | 0.565 |

Robust standard errors in parentheses. CPI adjustments such that 100=2011. Linear smoothing is used in off-years to make the presidential voter participation rate a continuous measure. *** p<0.01, ** p<0.05, * p<0.1

Appendix A: Difference-in-Difference Models for Illinois' Truth-in-Tuition Policy on Institutional Tuition Levels 2000-2011

| | (1) | (2) | (3) |
|--|--|---|---|
| | Full Controls | Full Controls | Full Controls |
| | Institution and Year Fixed Effects Model | Institution and Year Fixed Effects Model | Institution and Year Fixed Effects Model |
| VARIABLES | Sample Restricted to Exclude Non-Illinois Institutions that Implemented Institutionally-Set Guarantees | Sample Restricted to Exclude Non-Illinois Institutions that Implemented Institutionally-Set Guarantees or WIU | Sample Restricted to Exclude Non-Illinois Institutions that Implemented Institutionally-Set Guarantees, WIU, or California Institutions |
| Illinois*Post2004 | 1,477*** (122.8) | 1,484*** (133.2) | 1,361*** (129.9) |
| In-State Fees (CPI adjusted) | -0.828*** (0.0627) | -0.828*** (0.0627) | -0.573*** (0.0772) |
| Total Number of Undergraduates | -0.0175 (0.0169) | -0.0172 (0.0169) | -0.000943 (0.0174) |
| Percent of Full-Time First-Time Undergraduates Receiving Any Financial Aid | 2.317* (1.237) | 2.335* (1.237) | 2.255* (1.168) |
| Gross Pell (CPI adjusted) | 1.93e-05*** (6.70e-06) | 1.92e-05*** (6.70e-06) | 1.44e-05*** (5.94e-06) |
| Number of Out-of-State Students | 0.412*** (0.0925) | 0.411*** (0.0925) | 0.356*** (0.0958) |
| State General Appropriations (by Institution, CPI adjusted) | -7.96e-06*** (1.26e-06) | -8.00e-06*** (1.27e-06) | -8.65e-06*** (1.57e-06) |
| Total State Postsecondary Enrollment | -0.00196*** (0.000535) | -0.00196*** (0.000535) | -0.00300*** (0.000940) |
| Total State Investment in Student Financial Aid (CPI adjusted) | 1.15e-06*** (2.91e-07) | 1.16e-06*** (2.91e-07) | 5.49e-08 (2.42e-07) |
| Total State Revenue (CPI adjusted) | 2.55e-10 (4.58e-10) | 2.58e-10 (4.58e-10) | -1.73e-09 (1.23e-09) |
| Median Household Income (CPI adjusted) | -0.00420 (0.00528) | -0.00410 (0.00528) | -0.00398 (0.00523) |
| State Unemployment Rate | 147.8*** (21.10) | 147.4*** (21.12) | 116.4*** (21.12) |
| State Gini Coefficient | -313.4 (1,929) | -289.3 (1,929) | 212.3 (1,892) |
| Total State Population | 0.000254*** (7.86e-05) | 0.000253*** (7.87e-05) | 0.000390*** (9.54e-05) |
| Proportion of Republican Representatives in State Legislature | -2,266*** (291.1) | -2,263*** (291.2) | -1,805*** (286.2) |
| Republican Governor | 58.14* (30.26) | 58.92* (30.27) | 124.2*** (31.29) |
| Voter Participation Rate in Presidential Elections | -7.409 (6.342) | -7.295 (6.348) | -9.276 (6.100) |
| Constant | 6,014*** (1,247) | 5,999*** (1,247) | 5,402*** (1,135) |
| Institution Fixed Effects? | Yes | Yes | Yes |
| Year Fixed Effects? | Yes | Yes | Yes |
| Observations | 6,465 | 6,453 | 6,078 |
| R-squared | 0.725 | 0.725 | 0.663 |
| Number of Institutions | 632 | 631 | 599 |

Robust standard errors in parentheses. CPI adjustments such that 100=2011. Linear smoothing is used in off-years to make the presidential voter participation rate a continuous measure. *** p<0.01, ** p<0.05, * p<0.1

Appendix B: Difference-in-Difference Model for Illinois' Truth-in-Tuition Policy on Institutional Tuition Levels with Three-Way Fixed Effects

| | (1) | (2) |
|--|---|-------------------------------|
| | Full Controls | Full Controls |
| | Three Way Fixed Effects Model | Three Way Fixed Effects Model |
| VARIABLES | Average In-State Tuition for Full-Time Undergraduates | Total Tuition over Four Years |
| Illinois*Post2004 | 1,572*** (211.3) | 9,610*** (502.5) |
| In-State Fees (CPI adjusted) | -0.840*** (0.0836) | -1.390*** (0.374) |
| Total Number of Undergraduates | -0.00445 (0.0114) | 0.0351 (0.0441) |
| Percent of Full-Time First-Time Undergraduates Receiving Any Financial Aid | 0.215 (1.315) | -1.018 (4.708) |
| Gross Pell (CPI adjusted) | 1.78e-05*** (5.64e-06) | 5.77e-05 (3.87e-05) |
| Number of Out-of-State Students | 0.250*** (0.0740) | 0.648** (0.317) |
| State General Appropriations (by Institution, CPI adjusted) | -3.89e-06*** (1.11e-06) | -1.63e-05*** (4.70e-06) |
| Constant | 7,859*** (394.9) | 22,291*** (913.1) |
| Institution Fixed Effects? | Yes | Yes |
| Year Fixed Effects? | Yes | Yes |
| State-by-Year Fixed Effects? | Yes | Yes |
| Observations | 6,573 | 4,809 |
| R-squared | 0.835 | 0.700 |
| Number of Institutions | 641 | 613 |

Robust standard errors in parentheses. CPI adjustments such that 100=2011. *** p<0.01, ** p<0.05, * p<0.1