# Institutional Responses and Societal Outcomes of the Net Investment Income Tax on Nonprofit Colleges

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September 20, 2024

Latest version: https://yungyutsai.github.io/papers/EndowmentTax.pdf

**Abstract**

A select few non-profit colleges in the US have managed enormous endowments that annually generate considerable capital gains which have been historically tax-exempt. The 2017 Tax Cuts and Jobs Act introduced a net investment income tax that targeted these colleges to enhance tax equity and wealth distribution within higher education. This paper examines colleges' behavioral responses and their effects on educational access. Findings reveal that taxed colleges increased tuition, shifting the burden to students and reducing college access to historically underserved groups. Conversely, colleges that can maneuver around the tax, increase their enrollment to circumvent the enrollment-related tax threshold, thereby creating more educational opportunities despite revenue losses. These findings underscore the potential for policy design to guide institutional responses to taxation in ways that benefit society.

*Keywords—Tax Cuts and Jobs Act, tax avoidance, tax incidence, net investment income tax, college endowment*

*JEL Codes—H22, H26, L31, I23*

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# 1 Introduction

A few selective private non-profit colleges in the United States manage enormous endowments that generate considerable capital gains which have been historically tax-exempt (Sherlock et al., 2018; Quinn, 2019; Bird-Pollan, 2021). Scholars and policymakers have noted that this wealth is disproportionately concentrated and often used for accumulation rather than educational purposes (Frey, 2002; Cowan, 2007; Nichols & Santos, 2016), questioning the justification for tax exemption. In response, the 2017 Tax Cuts and Jobs Act (TCJA) introduced the Net Investment Income Tax (NIIT) — a 1.4% excise tax — on these nonprofit colleges' investment returns.[1] However, affected colleges argue the tax burden may reduce their ability to support education and financial aid.[2] Concerns also exist about potential system gaming, as the tax only applies to colleges above specific enrollment and asset thresholds. Scholars worry this might lead to manipulated enrollment or endowment sizes, potentially decreasing educational resources (Fishman, 2018; Hinrichs, 2018).

This paper evaluates nonprofit colleges' behavioral and fiscal responses to the NIIT. I examine whether and to what extent colleges manipulate their enrollment or assets to avoid the tax. Additionally, the study investigates whether taxed colleges adjusted tuition, reduced financial aid, or cut other spending to offset the tax burden. Finally, the paper assesses the consequences of these behavioral responses on tax revenue (or losses) and societal benefits (or costs).

I combine data from the Integrated Postsecondary Education Data System (IPEDS) with Form 990 data from the Internal Revenue Service (IRS), tracking colleges from 2010 to 2022. Utilizing a difference-in-differences (DD) framework, I evaluate colleges' tax avoidance (i.e., attempts to be tax-exempted) and cost-shifting behaviors (i.e., paying taxes but passing the burden onto others). Additionally, I utilize the synthetic control method (SCM) to evaluate the responses of individual colleges in terms of taxes paid or avoided, and the amount shifted to students. This information is then compared to government revenue to assess the overall societal benefits and costs.

[1] This tax only applies to colleges with more than 500 students and more than $500,000 in assets per student.

[2] In March 2018, 48 colleges wrote a joint letter to Congress to raise this concern. Retrieved Jan 10, 2023, from https://ofr.harvard.edu/files/ofr/files/march_2018_endowment_tax_letter_to_leadership_from_schools.pdf.

I find that nonprofit colleges engaged in both tax-shifting and avoidance behaviors. Firstly, colleges that ultimately pay the tax bill opt to shift the burden to students by increasing tuition and charges for room and board. Of the total NIIT revenue of $324 million annually, students bear $287 million (88%) in the form of higher tuition and room-and-board fees. However, colleges do not cut spending or reduce enrollment. Thus, the tax-shifting behavior does not lead to a reduction in the quality or quantity of public goods provided. Secondly, some colleges increase student enrollment to circumvent the tax threshold based on assets per student. Although this type of tax avoidance behavior leads to a $31 million loss in government revenue, it creates an additional 9,600 student enrollment opportunities, which translate into over $350 million in net benefits. These results suggest that with well-designed incentives and policies, nonprofits can be encouraged to increase their provision of public goods, benefiting society on the whole.

The most closely related study is Ryan et al. (2024), which provides initial empirical evidence of colleges' responses to the NIIT. Using SCM for eight colleges, they found some increased enrollment and costs, or reduced aid.[3] However, their analysis offered limited evidence on *aggregate* behaviors.[4] The present paper expands on this prior work by comprehensively evaluating both aggregate and individual college responses and examines the consequences for government revenue, educational access, and societal benefits.

The current study contributes to the broader debate on the justification of nonprofit tax exemptions, a significant part of forgone tax revenue.[5] While the rationale for tax exemption is that nonprofits provide public goods (Hassan et al., 2000; Stevens, 2010; Mayhew & Waymire, 2015; Zare et al., 2022), critics have argued that nonprofits do not always use the tax benefits they receive

[3]However, their estimation only involves three years (2015–2017) during the pre-intervention period, which might be insufficient for valid SCM projections (Abadie, 2021). Hence, a more robust analysis using a longer pre-intervention period to examine the policy's effect remains necessary.

[4]They provided descriptive statistics of trends in finance and enrollment metrics and found no obvious changes in student enrollment in colleges close to the tax threshold. For taxed colleges, they identified no clear evidence of an aggregate pattern of increases in attendance costs and found a slightly downward trend in financial aid. However, they did not apply a formal DD analysis to examine the data.

[5]At the federal level, Brody & Cordes (2006) estimated the annual tax exemption for nonprofits at $45 billion, accounting for 2% of federal tax revenue. At the state and local levels, Sherlock & Gravelle (2009) estimated annual tax exemptions for nonprofits range from $31 to $48 billion, roughly 2.4 to 3.7% of state and local tax revenues. For the higher education industry, Baum & Lee (2019) estimated the tax exemption for nonprofit colleges at $22 billion.

to enhance services (D. Zimmerman, 1991; Cowan, 2007; Nichols & Santos, 2016; Herring et al., 2018; Propheter, 2019a). This paper examines the debate on nonprofit tax exemptions by providing insights on whether taxation would prompt institutions to reduce their services and harm society.

Nonprofits' response to taxation is crucial in determining outcomes, yet key aspects remain understudied. While prior studies have investigated whether nonprofits respond to taxation by reducing service levels (Grimm Jr, 1999; Fei et al., 2016; Herring et al., 2018), there is little research into precisely how nonprofits change who they serve or how they charge for services in response to taxation. This study addresses this gap by examining colleges' tax-shifting behaviors, finding that they increase tuition and shift opportunities from underserved groups to economically advantaged students. These findings demonstrate how taxing nonprofits could redistribute access to public services, even when overall service levels remain unchanged.

Another important aspect of nonprofits' response is their tax avoidance behavior. Prior research on nonprofits' tax avoidance has focused on revenue manipulation (St. Clair, 2016; Marx, 2018) and financial misreporting (Omer & Yetman, 2007; Hofmann, 2007). While these studies were concerned with organizations *reducing* their size or manipulating numbers without changing service levels, they did not consider scenarios where organizations are incentivized to *expand* their service. The distinct policy context of NIIT provides two key avenues for analysis. Firstly, it allows for the evaluation of responses to a threshold directly tied to the size of the service population (i.e., students). Secondly, the policy offers two contrasting avoidance strategies: increasing enrollment or reducing assets. This paper utilizes this feature to test whether nonprofits prioritize output maximization over cost minimization, offering new insights into their behavioral considerations.

# 2 Policy Background

The 2017 TCJA imposed a new NIIT on nonprofit colleges with large endowments. According to the regulation, nonprofit colleges with more than 500 tuition-paying students and more than \$500,000 in assets per full-time equivalent (FTE) student would be subjected to a 1.4% excise tax on net investment income. Nonprofit colleges that do not meet the cutoffs and all public colleges remain exempted from this taxation.[6] The policy went into effect on January 1st, 2018.

The tax threshold is based on student enrollment and asset size. However, the IRS leaves some discretion to colleges. Specifically, the IRS defines student size as "the daily average number of full-time students, with part-time students being taken into account on a full-time equivalent basis," but it is up to colleges to decide how to convert part-time students into full-time equivalents. Additionally, the IRS defines assets as the "aggregate fair market value of assets" but allows colleges to use any reasonable method to evaluate their assets.[7]

The IRS initially estimated the tax would be applied to 25 to 40 colleges (ACE, 2019). In actuality, during the first year of the policy, 33 colleges were subjected to the tax. Table 1 lists the colleges potentially affected by the tax and their tax statuses from 2018 to 2022. As the taxation thresholds have not changed, the number of colleges subject to the tax would increase over time as institutions' endowments grow. As of 2021, 40 colleges were affected by the tax.

Despite the good intention of the policy to address wealth inequalities among institutions and encourage colleges to invest resources for educational purposes rather than wealth accumulation (Cowan, 2007; Willie, 2012; Sherlock et al., 2018; Fishman, 2018), concerns have been raised about potential tax avoidance and cost-shifting. Firstly, as the tax applies only to colleges surpassing specified student enrollment and asset thresholds, scholars fear that colleges might manipulate their student or endowment sizes to avoid the tax, resulting in decreased available educational resources (Fishman, 2018; Hinrichs, 2018).

Secondly, many colleges stated that the policy could force them to shift the tax burden to students by cutting spending or raising tuition. In March 2018, 48 colleges wrote a joint letter to Congress stating that the new tax placed a significant burden on them and limited their ability to provide financial aid to low-income students and support core educational activities.[8] Individual

[6] Public colleges are not subjected to the policy. Notably, none of the public colleges fully meet the tax thresholds. In contrast, for-profit colleges have always been subject to income tax, just as private firms are.

[7] Tax Cuts and Jobs Act — EO Provision. Retrieved Dec 24, 2022, from https://www.irs.gov/pub/newsroom/1-excise-tax-on-net-investment-income-colleges-4968-13701_508.pdf

[8] Endowment Tax Letter to Leadership. Retrieved Jan 10, 2023, from https://ofr.harvard.edu/files/ofr/files/march_2018_endowment_tax_letter_to_leadership_from_schools.pdf.

Table 1: List of Colleges Affected by the Net Investment Income Tax

| | Student Enrollment | | Endowment Assets | | Tax Status | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | FTE | Total ($ Million) | Per-student ($ Thousand) | 2018 | 2019 | 2020 | 2021 | 2022 |
| **Panel A: Student above 500, and per student Asset above 600K** | | | | | | | | | |
| Princeton University | 8,181 | 8,082 | 23,353 | 2,890 | Y | Y | Y | Y | Y |
| Yale University | 12,458 | 12,383 | 27,217 | 2,198 | Y | Y | Y | Y | Y |
| Harvard University | 29,908 | 23,697 | 37,096 | 1,565 | Y | Y | Y | Y | Y |
| Stanford University | 17,184 | 16,448 | 24,785 | 1,507 | Y | Y | Y | Y | Y |
| Middlebury Institute of International Studies at Monterey | 786 | 717 | 1,074 | 1,497 | Y | Y | Y | Y | N |
| Pomona College | 1,563 | 1,558 | 2,165 | 1,389 | Y | Y | Y | Y | Y |
| Massachusetts Institute of Technology | 11,376 | 11,247 | 14,832 | 1,319 | Y | Y | Y | Y | Y |
| Swarthmore College | 1,543 | 1,542 | 1,956 | 1,268 | Y | Y | Y | Y | Y |
| Amherst College | 1,849 | 1,849 | 2,248 | 1,216 | Y | Y | Y | Y | Y |
| The Juilliard School | 939 | 872 | 1,046 | 1,200 | Y | Y | Y | Y | Y |
| California Institute of Technology | 2,240 | 2,239 | 2,641 | 1,179 | Y | Y | Y | Y | Y |
| Williams College | 2,150 | 2,127 | 2,383 | 1,121 | Y | Y | Y | Y | Y |
| Grinnell College | 1,699 | 1,672 | 1,871 | 1,119 | Y | Y | Y | Y | Y |
| Rice University | 6,855 | 6,662 | 5,836 | 876 | Y | Y | Y | Y | Y |
| Cooper Union for the Advancement of Science and Art | 964 | 929 | 799 | 860 | Y | Y | Y | Y | Y |
| Bowdoin College | 1,806 | 1,803 | 1,456 | 808 | Y | Y | Y | Y | Y |
| Wellesley College | 2,482 | 2,392 | 1,931 | 807 | Y | Y | Y | Y | Y |
| University of Notre Dame | 12,393 | 12,256 | 9,685 | 790 | Y | Y | Y | Y | Y |
| Dartmouth College | 6,409 | 6,335 | 4,956 | 782 | Y | Y | Y | Y | Y |
| Medical College of Wisconsin | 1,297 | 1,178 | 876 | 744 | Y | Y | Y | Y | Y |
| Baylor College of Medicine | 1,569 | 1,565 | 1,134 | 724 | Y | Y | Y | Y | Y |
| Washington and Lee University | 2,160 | 2,156 | 1,547 | 718 | Y | Y | Y | Y | Y |
| University of Richmond | 4,131 | 3,745 | 2,374 | 634 | Y | Y | Y | Y | Y |
| Smith College | 2,896 | 2,838 | 1,767 | 623 | Y | Y | Y | Y | Y |
| **Panel B: Student above 500, and per student Asset between 500 to 600K** | | | | | | | | | |
| Emory University | 14,067 | 13,009 | 7,613 | 585 | Y | Y | Y | Y | Y |
| Claremont McKenna College | 1,347 | 1,346 | 784 | 583 | Y | Y | Y | Y | Y |
| Icahn School of Medicine at Mount Sinai | 1,203 | 1,203 | 675 | 561 | Y | Y | Y | Y | Y |
| University of Pennsylvania | 24,960 | 22,559 | 12,213 | 541 | Y | Y | Y | Y | Y |
| Washington University in St Louis | 15,047 | 13,655 | 7,215 | 528 | Y | Y | Y | Y | Y |
| Duke University | 15,735 | 15,218 | 7,911 | 520 | Y | Y | Y | Y | Y |
| Bryn Mawr College | 1,708 | 1,661 | 853 | 513 | Y | Y | Y | Y | Y |
| Hamilton College | 1,883 | 1,873 | 955 | 510 | Y | Y | Y | Y | Y |
| Trinity University | 2,466 | 2,401 | 1,201 | 500 | Y | N | Y | Y | Y |
| **Panel C: Student above 500, and per student Asset between 400 to 500K** | | | | | | | | | |
| University of Chicago | 15,775 | 14,136 | 6,617 | 468 | N | N | N | Y | N |
| Berry College | 2,174 | 2,115 | 969 | 458 | N | Y | N | Y | Y |
| Middlebury College | 2,549 | 2,520 | 1,074 | 426 | N | N | N | Y | Y |
| Northwestern University | 21,823 | 18,924 | 7,948 | 420 | N | N | N | Y | Y |
| Vassar College | 2,424 | 2,411 | 1,003 | 416 | N | N | N | Y | N |
| Colby College | 1,879 | 1,879 | 775 | 413 | N | N | N | Y | N |
| Davidson College | 1,796 | 1,796 | 727 | 405 | N | N | N | Y | Y |
| Wabash College | 842 | 842 | 340 | 404 | N | N | N | N | N |
| **Panel D: Student between 400 to 600, and per student Asset above 500K** | | | | | | | | | |
| Soka University of America | 430 | 430 | 1,239 | 2,882 | N | N | N | N | N |
| Principia College | 479 | 479 | 377 | 788 | N | N | N | N | N |

*Note:* The student enrollment and endowment assets information were in 2016. Full-time equivalent (FTE) is calculated as the sum of full-time and one-third of part-time students. Endowment asset amounts are reported in nominal values. Tax status indicates whether a college is subject to the net investment income tax (NIIT) in a specific year. **Y** refers to being subject to the net investment income tax, while **N** refers to not being subject. The NIIT applies to colleges with over 500 students and more than $500,000 in endowment assets per student.

colleges also delivered similar messages via public statements. For example, Stanford mentioned that the tax would harm their ability to provide financial aid and support academic mission (Selig, 2020), MIT assered that the tax would constrain their expenditures toward scholarships, education, and research (Stendahl, 2017), and Trinity University stated that the tax bill would force them to increase tuition or reduce aids (Derrig, 2017).

Table A1 in Appendix A provides insightful statistics on the expenditures and revenues of colleges subject to the tax and offers a basis for estimating the expected tax bills derived from their net investment incomes. The estimated tax bills for the affected colleges, computed using a 1.4% tax rate, average $13 million annually (ranging from $1 million to nearly $60 million). This figure accounts for 0.5% of total revenue (ranging from 0.04% to 1%) or 1.3% of total expenditures (ranging from 0.04% to 3%) for the institutions.

Although the current tax liability seems to be minor compared to the endowment size and only affects a few colleges, several proposals have been introduced to increase the tax rate and/or extend the scope of targeted colleges. For example, Bill S.3514 proposed to increase the tax rate from 1.4% to 35% for colleges with total endowment assets above $10 billion.[9] H.R.8883 proposed to increase the tax rate to 10% and extend the subject to colleges with per-student endowment assets greater than $250,000 (which would affect more than 150 colleges).[10] Bill S.3465 proposed to impose a one-time 6% tax rate on the total market values of endowment assets for those institutions with endowment assets above $9 billion.[11] Evaluating the overall societal impact of the current policy would serve as an important basis for considering these alternative proposals.

# 3 Literature Review

This section reviews literature on nonprofits and colleges' responses to taxation or financial shocks, focusing on tax avoidance and cost-shifting.

[9]See https://www.congress.gov/bill/118th-congress/senate-bill/3514 for details.
[10]See https://www.congress.gov/bill/117th-congress/house-bill/8883 for details.
[11]See https://www.congress.gov/bill/118th-congress/senate-bill/3465 for details.

## 3.1 Tax Avoidance

Nonprofits, while not profit-seeking, are also motivated to reduce tax liabilities and maximize available resources (Omer & Yetman, 2007; Schmidt, 2007). Prior research indicated that nonprofit organizations respond to tax or regulatory thresholds by manipulating their revenue or financial variables (Sansing & Yetman, 2006; St. Clair, 2016; Marx, 2018). For example, St. Clair (2016) and Marx (2018) found nonprofits *reduce* their revenue to avoid the financial reporting or auditing requirement. Additionally, Sansing & Yetman (2006) discovered that private foundations increase their payout rate to qualify for a lower tax rate.

However, while for-profits often reduce reported asset values to avoid taxes (Hosono et al., 2018; Cespedes et al., 2021), nonprofits are less likely to do so (Marx, 2018). Nonprofits' assets are typically subject to donor restrictions, limiting their ability to dispose of assets (Surysekar et al., 2015; Hung & Berrett, 2021; Prentice & Clerkin, 2023). Additionally, nonprofits rely on public support, making their financial statistics publicly accessible, and underreporting assets would harm their public images (Keating & Frumkin, 2003; Calabrese, 2011; McDonald III & Goodman, 2021). For example, Homonoff et al. (2020) found nonprofits with negative assets inflated their values to zero to present financial health. Therefore, despite that the NIIT leaves spaces for colleges to manipulate either their asset values or student enrollment for tax exemption, they are more likely to change student enrollment than asset values due to donor restrictions and transparency regulations.

## 3.2 Tax Shifting

### 3.2.1 Nonprofits' Tax Shifting Behaviors

Research indicated that nonprofits tend to maximize their service output (Brooks, 2005; Chang & Jacobson, 2011) or social welfare (Witesman & Fernandez, 2013; Arora et al., 2022) rather than profit. Therefore, while for-profits typically respond to taxation by increasing prices (Politi & Mattos, 2011; Sullivan & Dutkowsky, 2012; Gaarder, 2019) or reducing production (Djankov et al., 2010; Arulampalam et al., 2012; Fuest et al., 2018), nonprofits might not do so.

Prior studies examining how nonprofits respond to taxation echo this theoretical perspective. The nonprofit sector that best mimics higher education is the hospital industry. Previous studies have explored how nonprofit hospitals respond to taxation by comparing their community service levels with those of for-profits (Rosenbaum et al., 2015; Herring et al., 2018; Propheter, 2019b; Zare et al., 2022). For example, Herring et al. (2018) found that within the same state, nonprofit hospitals tend to provide more community service than their for-profit counterparts and that this gap does not change in association with the generosity of tax exemption. These findings imply that nonprofit hospitals would not adjust their service levels in response to taxation (and tax exemption).

Another study that is directly connected to the policy setting of the present paper provides evidence of how private foundations respond to NIIT. Sansing & Yetman (2006) utilized a special dual tax rate system in which foundations with an endowment payout rate exceeding 5% were subjected to a 1% tax rate on their investment income rather than the 2%. They found that foundations just below the cutoff (subject to a higher tax rate) do not significantly differ from those just above in terms of the proportion of assets used for charity purposes and payroll payments. This evidence implies that they do not shift the tax cost by cutting service levels.

A separate line of inquiry has examined the impact of variations in property tax exemption on nonprofit activities. Grimm Jr (1999) and Fei et al. (2016) found that nonprofits only had minimum to null responses to changes in property tax. However, these studies only evaluated the effect on revenue and did not examine whether nonprofits modified their spending or service levels.

In summary, prior studies on hospitals, private foundations, and property taxes suggest a null or minimal connection between taxation and the production levels of nonprofits, implying a tendency for nonprofits to avoid shifting their tax burden by reducing spending or service levels. This observation aligns with the literature that nonprofits tend to maximize service outputs (Brooks, 2005; Chang & Jacobson, 2011). However, these studies only used spending or revenue as an index of service level and did not directly examine the effects on the service population. Additionally, many of these studies did not evaluate whether nonprofits shift costs by increasing service charges. Therefore, the question of how nonprofits respond to taxation remains unanswered.

### 3.2.2 Colleges' Responses to Financial Shock

Numerous studies have examined the effect of endowment shocks on colleges' financial dynamics. Brown et al. (2014) suggested that colleges reduce their endowment payout rate and trim tenured faculty positions in response to negative investment shocks. Similarly, Rosen & Sappington (2019) found a 13 to 14% increase (decrease) in payouts following a 10% positive (negative) investment return shock. Bulman (2022) revealed that a 10% increase in endowment values led to a 2.5% increase in core spending but no change in tuition rates and financial aid.

A parallel branch of research has explored public colleges' responses to government funding cuts. This literature revealed that public colleges increase tuition and charge (Kane & Orszag, 2003; Mumper & Freeman, 2005; Filippakou et al., 2019; Civera et al., 2021) or reduce spending (Kane & Orszag, 2003; Mumper & Freeman, 2005; Altundemir, 2012) in response to the funding cuts.

In summary, previous research indicates that colleges often cut spending when faced with decreasing investment income or government funding. While tuition increases have not been strongly linked to endowment shocks, they are considered during government funding reductions, possibly due to the short-term nature of endowment changes.

# 4 Data and Sample

## 4.1 Data

This paper incorporated data from the IPEDS and Form 990. The data period for finance variables spanned 2010 to 2021 and was extended to 2022 for other variables.[12] The IPEDS is an annual survey conducted by the U.S. Department of Education's (ED) National Center for Education Statistics (NCES).[13] All higher education institutions participating in federal student aid programs are required to respond to the survey. The data provides information on colleges' characteristics,

[12]Throughout the paper, the year notation denotes the beginning of the fiscal year or academic year. For most colleges, the fiscal year begins in July and ends in June of the following year. For example, 2017 denotes the fiscal year from July 2017 to June 2018 and the academic year from Fall 2017 to Summer 2018.

[13]The data is available at https://nces.ed.gov/ipeds/

student enrollment (categorized by enrollment status, level of study, and race/ethnicity), and financial information (including subcategories of revenues, expenditures, scholarships, and tuitions).

Form 990 is the tax return filed by tax-exempt organizations.[14] Nonprofit colleges with gross receipts greater than \$200,000 or total assets greater than \$500,000 are required to file Form 990. Specifically, among approximately 2,000 nonprofit colleges reported in the IPEDS survey, 1,500 (72%) were matched to Form 990 data.[15]

## 4.2 Variables

The primary variables determining taxation statuses are student enrollment and total assets. I define full-time equivalent (FTE) students as the sum of full-time students and a one-third ratio of part-time students.[16] For the asset value, the "value of endowment assets at the end of the fiscal year" as reported in the IPEDS data is used. Additionally, this paper uses the values reported in the IPEDS instead of those of Form 990 because the former includes the assets of the college itself and its affiliated organizations, while the latter only includes the assets of the institution. As defined by the IRS, the NIIT asset cutoff should consider the assets from related organizations. Furthermore, this paper finds that the variables constructed by IPEDS are better aligned with the real tax status.[17]

When defining the tax and treatment status, this paper uses nominal values to measure financial resources. However, to render the estimates of spending or asset changes comparable over time, the monetary variables are adjusted according to the Consumer Price Index (CPI) and denoted as real dollars for the 2010–11 fiscal year.[18]

[14] The data is available at https://www.irs.gov/charities-nonprofits/form-990-series-downloads

[15] This paper uses the crosswalk table of Unit ID and Employer Identification Number (EIN) provided by the Urban Institute (see https://educationdata.urban.org/documentation/colleges.html#nccs_990-forms) supplemented by rough matching based on institution names in the IPEDS and Form 990. Some colleges remain unmatched due to name discrepancies between the two datasets. Many colleges that do not file Form 990 are religiously affiliated and exempt from filing the Form 990.

[16] This approach matches how the IPEDS defines FTE when calculating student-faculty ratios.

[17] While it would be better to use whatever variables the IRS utilizes, the IRS allows colleges to calculate these variables and determine the taxation status themselves. Additionally, the IRS does not require colleges to report student enrollment, only asking them to indicate whether they are subjected to the tax on Form 990.

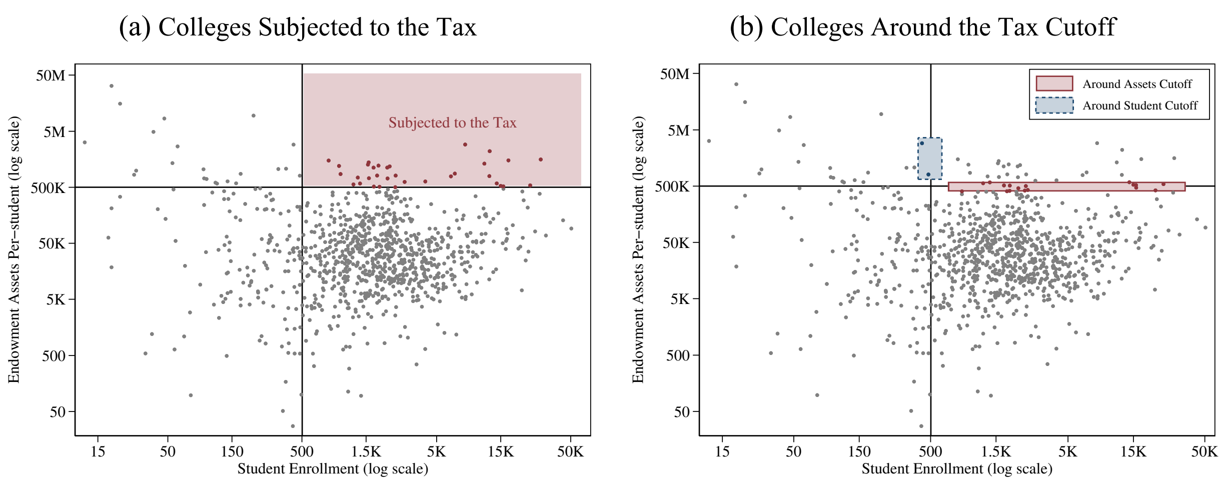
[18] The annual CPI used for adjustment was calculated based on the monthly CPI according to each institution's specific start and end month of their fiscal year. For example, for an institution that begins its fiscal year in July and ends in June, the CPI for the 2015–16 fiscal year is computed by the average monthly CPI from July 2015 to June 2016.

## 4.3 Sample

The samples included in this study consist of nonprofit colleges that participated in the IPEDS survey from 2010 to 2022 and filed Form 990 every year from 2010 to 2021.[19] Following Fernandez et al. (2023), this paper imputes the missing value by using the data of the same institution in the surrounding years. I further exclude colleges that have experienced mergers with other colleges,[20] substantial expansions, closures of a branch,[21] or engages in remote education for more than 50% of its students.[22] These adjustments are necessary because these colleges would experience large fluctuations in outcomes of interest and introduce unnecessary noise into the analysis.

Colleges were categorized into different groups based on whether they meet the enrollment and asset thresholds. Figure 1 plots the distribution of colleges by student population (horizontal axis) and endowment assets per student (vertical axis). The upper-right corner denotes the area where colleges meet both thresholds and are therefore subject to the tax (see Figure 1a). Colleges near the boundary would be those with the motivation to engage in tax avoidance (see Figure 1b).

Figure 1: Distribution of Samples by Student Enrollment and Endowment Per student




*Note:* The horizontal axis denotes the total number of students (the sum of full-time and part-time students). The vertical axis denotes the endowment assets per student (full-time equivalent students). Endowment assets are reported in nominal values. The vertical line stands for the student enrollment cutoff. The horizontal line stands for the endowment assets cutoff. Each dot stands for one college. The data is as of the year 2016.

[19] I do not require all colleges to have filed Form 990 in the latter years as the timing of organizations doing so vary.

[20] Excluded are Thomas Jefferson University and Philadelphia University, which combined in 2017.

[21] The following are excluded: (1) Mayo Clinic Alix School of Medicine, which expanded its four-year medical school to the Mayo Clinic Arizona campus in 2017. (2) Rensselaer at Hartford, which closed its distance learning center in Groton in 2018. (3) Vanderbilt University, which opened a new innovation center—the Wond'ry—in 2015.

[22] A total of 37 colleges were excluded for this criterion.

There are only two colleges above the assets cutoff (with more than \$500,000 in assets per student) but close to the enrollment cutoff (with student populations ranging from 400 to 600). Due to the small sample size, this paper opts not to focus on this group.[23] Conversely, 17 colleges are above the student cutoff (with a student population of more than 500) but are near the asset cutoff (with assets per student between \$400,000 and \$600,000). Nine of these are just above the cutoff (with assets per student within \$500,000 and \$600,000), and another eight are just below the cutoff (with assets per student within \$400,000 and \$500,000). Table 2 summarizes the sample sizes by student population and assets per student in 2016.

Table 2: Sample Size by Student Population and Endowment Asset Per Student

| | Endowment Assets Per student | | | |
|---|---|---|---|---|
| | Below 400 K | 400 to 500 K | 500 to 600K | Above 600K |
| # Students above 500 | 759 | 8 | 9 | 24 |
| # Students below 500 | 125 | 5 | 2 | 20 |

*Notes:* The number of total students is the sum of full- and part-time students. Endowment assets per student are calculated as endowment asset values divided by full-time equivalent (FTE) students (with one part-time student taken into account as one-third of full-time students). Endowment assets are reported in nominal values.

# 5 Empirical Strategy

The primary empirical strategy in this paper is a difference-in-differences (DD) design. The DD framework applies to tax avoidance and shifting analysis but with varying sample settings and treatment definitions. Section 5.1 details the empirical setting. Additionally, this paper applies the Synthetic Control Method (SCM) to obtain estimates for each college and uses these results to estimate societal costs and benefits.

A key challenge in the empirical design is that the NIIT applies only to a select number of non-profit colleges, which differ significantly from institutions unaffected by the policy. This policy's nature makes identifying an ideal comparison group difficult. In the primary analysis, I use all colleges not affected by the policy as the comparison group to retain a larger sample size and retrieve more precise estimates, while acknowledging the potential limitations of this approach.

[23] A SCM has been applied to these two institutions and found no abnormal change in their enrollment.

To address the concerns, I conduct two additional analyses. Firstly, in Appendix B, I restrict the sample to institutions of comparable academic standing and reputation (as defined by Barron's Selectivity Index and U.S. News rankings). While colleges affected by NIIT are often high-ranking and selective, some art colleges and medical schools are wealthy enough to be subject to the tax but may not share the same elite status. This restricted sample provides a more plausible comparison but is not used as the main result to avoid excluding some treated colleges.

Secondly, in Appendix C, I apply a triple-difference (DDD) design, introducing an additional comparison group: wealthy colleges (meeting the asset threshold) with fewer students (not meeting the enrollment cutoff) and thus unaffected by the tax. This approach aims to control for potential trends related to institutional wealth. However, the small sample size of wealthy but small colleges introduces more noise into the estimates.

While each approach has limitations, the consistency of results across these varied methodologies demonstrates the robustness of the findings. By employing multiple strategies and transparently discussing their strengths and weaknesses, this study aims to provide a comprehensive and nuanced analysis of the NIIT's effects on college behavior.

## 5.1 Difference-in-Differences

### 5.1.1 Tax Avoidance

In analyzing tax avoidance, the samples are limited to colleges that meet the tax threshold for student enrollment. The DD setup is then based on comparisons of colleges that are *near* (treatment group) and *far* (comparison group) from the assets per student threshold. The status of distance from the cutoff is defined using pre-policy values (as of 2016).

The design is based on the assumption that only colleges near the threshold are motivated to manipulate their enrollment and asset values to gain tax exemption. In contrast, colleges far from the cutoff would either be safe (far below the threshold) or destined to be taxed (far above the threshold). Therefore, the analysis compares the change in outcomes across time between colleges with and without motivation for avoidance. The estimation equation is as follows:

$$Y_{it} = \beta_1 Cutoff_i \times Post_t + \theta_i + Above_i \times \delta_t + X_i \times \zeta_t + \varepsilon_{it} \tag{1}$$

Where $Y_{it}$ is the outcome of interest for college $i$ in year $t$. $Cutoff_i$ is a dummy variable indicating whether the college is near the cutoff (i.e., having in 2016 endowment assets per student between \$400,000 to \$600,000). $Post_t$ is a dummy variable indicating whether the policy is effective. The policy became effective on January 1st, 2018. However, since the 2017 fiscal year usually includes the second half of 2017 and the first half of 2018, the policy would be partially effective for the 2017–18 fiscal year. I assign the value to be 0.5 in 2017 and 1 after 2018. In the robustness check, I test different specifications where I treat the year 2017 as 0% to 100% treated or drop the 2017 observations (see Figures A2 and A3). The estimates remain consistent across these alternative specifications. $\theta_i$ is the college fixed effect. $\delta_t$ and $\zeta_t$ are year fixed effects. $Above_i$ is a dummy variable indicating that the college was above the cutoff (i.e., had endowment assets per student in 2016 above \$500,000). The above-cutoff-status-by-year fixed effects ($Above_i \times \delta_t$) account for potential differences in trends between those subject and those not subject to the tax. The equation further includes the time-invariant college characteristics-by-year fixed effect ($X_i \times \zeta_t$). This paper includes the Carnegie categorization interacting with the time variable to establish comparisons among institutions of the same type. $\varepsilon_{it}$ is the error term. The key parameter of interest is $\beta_1$, indicating the responses of colleges near the cutoff following the policy's implementation.

The identification assumption within this setting is that the colleges near the cutoff should have followed the same outcome trend as those far from the cutoff in the absence of the policy. This paper evaluates this assumption by examining the pre-policy parallel trend using an event-study design. Additionally, robustness checks in the Appendix using alternative comparison groups and a DDD design further validate the main findings by addressing potential concerns about differential trends between treated and control institutions.

#### 5.1.2 Tax Shifting

Within the tax shifting analysis, attention is directed toward colleges meeting the tax threshold on student enrollment, and compares those *meeting* and *not meeting* the assets per student threshold. Those meeting the threshold would be subjected to the NIIT, while those not meeting it would be exempted. The treatment status is defined using pre-policy values (as of 2016). Additionally, colleges near the cutoff (i.e., with endowment assets per student in 2016 between $400,000 to $600,000) are excluded, as their response might be confounded by tax avoidance behavior. Therefore, the analysis compares the change in outcomes over time between colleges subjected to and not subjected to taxation. Specifically, the following equation is estimated:

$$Y_{it} = \beta_1 Treat_i \times Post_t + \theta_i + X_i \times \delta_t + \varepsilon_{it} \tag{2}$$

$Treat_i$ is a dummy variable indicating that the colleges met the tax threshold (i.e., had endowment assets per student greater than $500,000) in 2016. The definitions of $Y_{it}$, $Post_t$, $\theta_i$, $\delta_t$, and $\varepsilon_{it}$ are the same as in equation (1). The specification also includes a time-invariant college characteristics-by-year fixed effect ($X_i \times \delta_t$) to ensure a valid comparison within similar institutions.[24]

The identification assumption is that colleges subject to the tax should have followed the same outcome trend as those exempt from the tax in the absence of the policy, at least conditionally based on the fixed effect. The event study version of equation (2) ensures that the treatment and comparison groups follow a similar trend prior to the policy. In the robustness check, the empirical setting and sample construction were further adjusted to examine the sensitivity of the analysis. The results are robust across this alternative specification.

The key parameter in equation (2) is $\beta_1$, which indicates the change in the outcome variable of colleges subjected to tax after the policy went into effect compared to the change in the control group during the same period. This paper defines the treatment status using pre-policy variables, which might experience a change after policy implementation. The estimated $\beta_1$ would typically represent the intent to treat (ITT). In the primary analysis, colleges near the cutoff are excluded, so the remaining samples are less likely to experience a change in treatment status. Therefore, the estimate could be viewed as the average treatment effect on the treated (ATT). In the robustness check, the entire sample set is used, and the results remain robust.

[24] All analysis include Carnegie categorization-by-year fixed effect. The analysis of expenditure further includes interaction terms with state-fixed effects and continuous measurements of student population and assets during the baseline period.

## 5.2 Synthetic Control Method

DD models are helpful in constructing the average treatment effect but would be limited in understanding the heterogeneous response. Since each college is distinct in terms of its proximity to the threshold and the size of the expected tax payment (see Table A1 and A2 in Appendix A), understanding the treatment effect on individual colleges is crucial.

This paper utilizes the SCM to examine the treatment effect on each individual college. SCM constructs the counterfactual of a single observation by using a weighted combination of non-treated observations (the donor pool). The weights are then determined by minimizing the difference in pre-intervention observed characteristics (Abadie et al., 2010).

This paper utilizes the demeaned pre-treatment outcome variables to compute the SCM weights. Specifically, each pre-treatment outcome variable subtracts the mean of the institution during the pre-intervention period. This practice, similar to the inclusion of the institution fixed effect in the DD model, provides the benefit of improving the pre-treatment fit (Doudchenko & Imbens, 2016).

In the tax avoidance analysis, the treatment group is comprised of colleges near the asset cutoff, while the donor pool consists of those far from the asset cutoff. Only colleges that meet the student threshold are included. In the tax shifting analysis, the treatment group comprises colleges subjected to the tax (meet both student and asset thresholds), while the donor pool includes colleges that meet the student threshold but not the asset threshold. Colleges near the cutoff are excluded. The estimation is performed separately for each college using the following formula:

$$\widehat{\beta_{it}} = (Y_{it} - \overline{Y_i}) - \sum_{j=1}^{M} w_j^* (Y_{jt} - \overline{Y_j}) \tag{3}$$

Where the estimated treatment effect ($\widehat{\beta_{it}}$) is defined as the difference between the observed demeaned outcome of the treated college ($Y_{it} - \overline{Y_i}$) and the synthetic control ($\sum_{j=1}^{M} w_j^* (Y_{jt} - \overline{Y_j})$), constructed as a weighted average of the colleges in the donor pool. $w_j^*$ is a vector of weights that minimizes the difference in the pre-treatment outcomes. $j$ is each of the control units in the donor pool, and $M$ is the total number of units in the donor pool. To provide inference statistics, this paper employs a permutation test. The permutation method details are discussed in Appendix C.

# 6 Empirical Results

## 6.1 Tax Avoidance

### 6.1.1 Distances to Tax Threshold

This section analyzes nonprofit colleges that are potentially subject to NIIT, assessing their motivation and ability to manipulate values for tax exemption. Table A2 in Appendix A shows colleges' proximity to assets-per-student thresholds. The evaluation suggests that colleges just above the cutoff need only minor adjustments (0.05–15% asset decrease or 0.05–17% student increase) to qualify for exemption, with some needing fewer than 50 additional students. This group is highly motivated to respond promptly.

Colleges just below the cutoff are also motivated, as the threshold does not adjust for inflation or endowment growth. These colleges would meet the threshold with 7–24% endowment growth, but many average only 3–6% growth, potentially becoming subject to the tax within 3 to 4 years without adjustments. Both groups thus have incentives to adjust student enrollment or asset values promptly after policy implementation.

### 6.1.2 Average Response

The results reveal that colleges near the assets per student threshold tend to manipulate their student enrollment rather than asset size. Specifically, colleges around the cutoff increase their FTE enrollment by 6% ($p < 0.01$, see Table 3, Panel A, Column (1)) after the policy is effective. The effect is roughly equivalent to 500 students per institution. The enrollment change is largely driven by full-time students (up by 6.7%) and undergraduate students (up by 8%). Panels B and C further separate colleges by whether they are above or below the asset threshold. Colleges below the tax threshold demonstrate larger responses to enrollment expansion than those above the threshold. This pattern implies that colleges manipulate student enrollment to avoid future tax treatment.

Colleges near the tax threshold show an insignificant 0.6% reduction in total endowment ($p > 0.1$; Table 4, Panel A, Column (1)), with no significant changes in various asset types (Columns

Table 3: Student Enrollment-related Tax Avoidance Behavior

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Log FTE | By Enrollment Status | | By Student Level | |
| | Enrollment | Full-time | Part-time | Undergraduate | Graduate |
| **Panel A: All Colleges** | | | | | |
| $Cutoff \times Post$ | 0.064*** | 0.067*** | –0.004 | 0.080*** | 0.031 |
| | (0.022) | (0.022) | (0.131) | (0.027) | (0.181) |
| Observations | 10,308 | 10,308 | 10,308 | 10,308 | 10,308 |
| Baseline Mean (Thousand) | 6.915 | 6.617 | 0.894 | 3.774 | 3.141 |
| **Panel B: Colleges Below the Assets Threshold** | | | | | |
| $Cutoff \times Post$ | 0.107*** | 0.111*** | 0.057 | 0.107*** | 0.182 |
| | (0.025) | (0.025) | (0.171) | (0.033) | (0.300) |
| Observations | 9,879 | 9,879 | 9,879 | 9,879 | 9,879 |
| Baseline Mean (Thousand) | 5.578 | 5.288 | 0.870 | 3.242 | 2.336 |
| **Panel C: Colleges Above the Assets Threshold** | | | | | |
| $Cutoff \times Post$ | 0.038* | 0.039 | –0.055 | 0.073 | –0.155 |
| | (0.022) | (0.023) | (0.214) | (0.047) | (0.161) |
| Observations | 377 | 377 | 377 | 377 | 377 |
| Baseline Mean (Thousand) | 8.103 | 7.798 | 0.915 | 4.246 | 3.857 |

*Note:* The coefficients are estimated using equation (1). Standard errors clustered at the institution level in parentheses. Panel B restricted the sample to colleges with assets per student less than \$500,000 in 2016. Panel C restricted the sample to colleges with assets per student of more than \$500,000 in 2016. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 4: Endowment and Asset-related Tax Avoidance Behavior

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Log Endowment | | By Restricted Status | | By Category | | | |
| | Total | Per-student | Non-restricted | Restricted | Capital | Investment | Others | Liability |
| **Panel A: All Colleges** | | | | | | | | |
| $Cutoff \times Post$ | 0.006 | –0.054 | 0.008 | 0.040 | 0.047 | 0.066 | –0.227 | 0.150 |
| | (0.039) | (0.036) | (0.141) | (0.033) | (0.042) | (0.044) | (1.031) | (0.094) |
| Observations | 9,515 | 9,515 | 9,515 | 9,515 | 9,515 | 9,515 | 9,515 | 9,515 |
| Baseline Mean (Million) | 3,153 | 0.442 | 2,018 | 2,165 | 2,552 | 3,843 | 11 | 1,688 |
| **Panel B: Colleges Below the Assets Threshold** | | | | | | | | |
| $Cutoff \times Post$ | 0.012 | –0.085* | –0.080 | 0.072 | 0.065 | 0.042 | –1.100 | 0.044 |
| | (0.054) | (0.046) | (0.217) | (0.048) | (0.069) | (0.054) | (1.257) | (0.083) |
| Observations | 9,119 | 9,119 | 9,119 | 9,119 | 9,119 | 9,119 | 9,119 | 9,119 |
| Baseline Mean (Million) | 2,213 | 0.388 | 1,133 | 1,643 | 1,492 | 2,588 | 20 | 1,063 |
| **Panel C: Colleges Above the Assets Threshold** | | | | | | | | |
| $Cutoff \times Post$ | 0.041 | 0.005 | 0.078 | 0.022 | 0.008 | 0.130 | 1.013 | 0.270 |
| | (0.044) | (0.048) | (0.062) | (0.036) | (0.046) | (0.078) | (1.752) | (0.217) |
| Observations | 348 | 348 | 348 | 348 | 348 | 348 | 348 | 348 |
| Baseline Mean (Million) | 3,989 | 0.491 | 2,805 | 2,628 | 3,494 | 4,958 | 3 | 2,243 |

*Note:* The coefficients are estimated using equation (1). Standard errors clustered at the institution level in parentheses. Panel B restricted the sample to colleges with assets per student less than \$500,000 in 2016. Panel C restricted the sample to colleges with assets per student of more than \$500,000 in 2016. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

(3) to (8)). Due to increased enrollment and stable endowments, these colleges experience a non-significant 5% drop in endowment assets per student (Panel A, Column (2)). Colleges below the threshold see a significant 8% drop in endowment assets per student, mainly due to increased student population (Panel B, Column (2)). This 8% drop is sufficient to offset their average asset value growth, potentially maintaining their tax-exempt status.

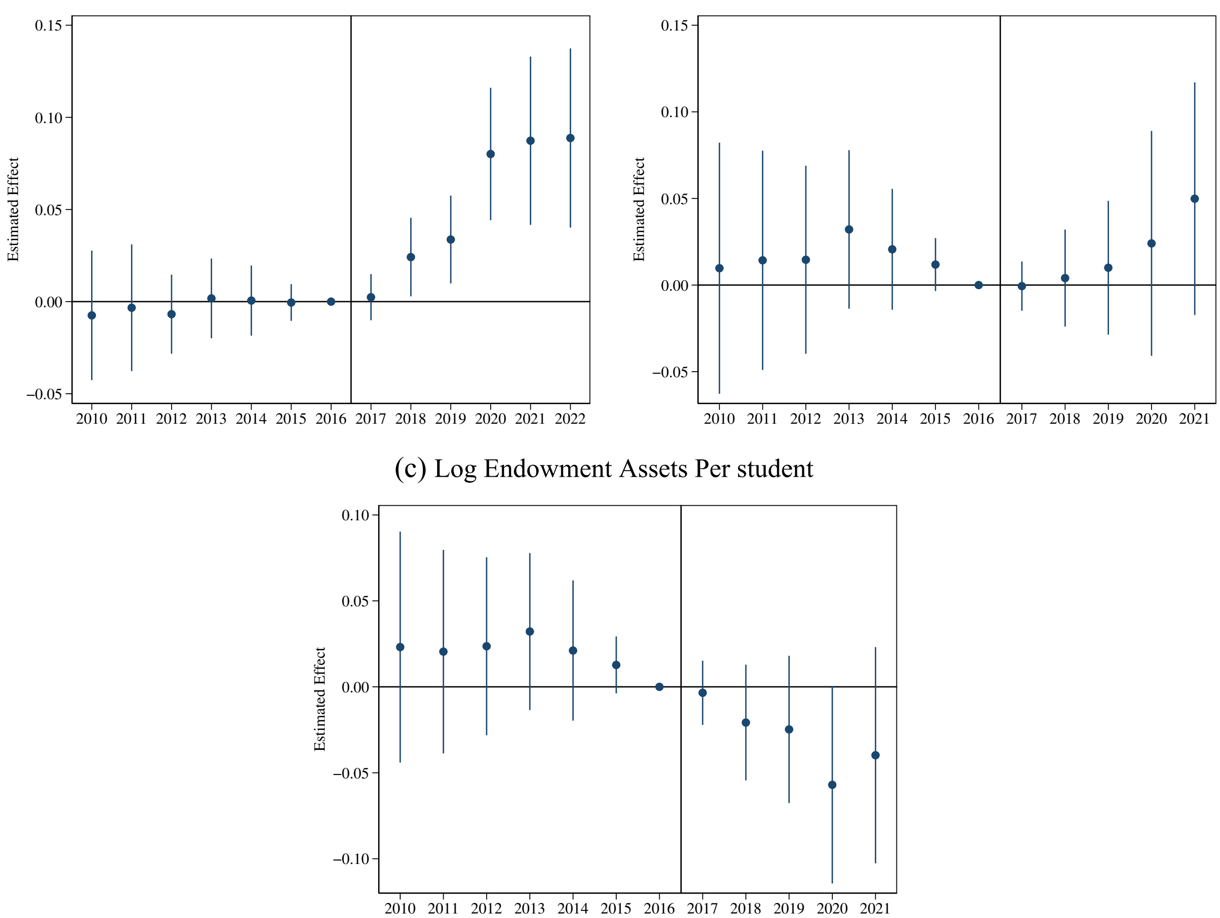
The event study estimation shown in Figure 2 confirms the DD assumption, showing common pre-policy trends in enrollment, endowment assets, and assets per student for colleges near and far from the tax threshold. Furthermore, dynamic treatment effect estimates reveal increased student enrollment from 2018 which intensified during the pandemic (Figure 2a). Endowment assets per student began declining in 2018, with the effect growing over time (Figure 2c).

Figure 2: Event Study Estimates: Tax Avoidance Behavior

(a) Log Number of FTE Students

(b) Log Total Endowment Assets

(c) Log Endowment Assets Per student




*Note:* The coefficients are estimated using the event study version of equation (1). The error bars denote the 95% confidence interval.

### 6.1.3 Robustness Check

One concern with the DD approach is that colleges potentially affected by the tax may differ substantially from those that are not, leading to different responses to the macro environment. Typically, affected colleges tend to be not only wealthy but also highly selective and prestigious. Hence, I construct two additional samples: the first is restricted to those with Barron's Selectivity Index of most competitive, highly competitive, or very competitive; the second restricts to those ranked top 100 by US News (for either National Universities or Liberal Arts Colleges ranking). Table 5 presents key findings, while Appendix B demonstrates the comprehensive results.

Table 5: Tax Avoidance Behavior: Robustness Checks

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Barron's Index $\geq$ Very Competetive | | US News' Ranking Top 100 | | DDD | |
| Log Values | FTE Enrollment | Endowment Per-Student | FTE Enrollment | Endowment Per-Student | FTE Enrollment | Endowment Per-Student |
| $Cutoff \times Post$ | 0.066*** | –0.058 | 0.054*** | –0.044 | | |
| | (0.019) | (0.037) | (0.019) | (0.039) | | |
| $Large \times Cutoff \times Post$ | | | | | 0.163 | –0.466* |
| | | | | | (0.138) | (0.273) |
| Observations | 3,900 | 3,600 | 1,807 | 1,668 | 12,233 | 11,292 |

*Note:* The coefficients in Columns (1) to (6) are estimated using equation (1). The coefficients in Columns (7) to (9) are estimated using equation (1). Standard errors clustered at the institution level in parentheses. Columns (1) to (3) restrict to those with Barron's Selectivity Index as most competitive, highly competitive, or very competitive. Columns (4) to (6) restrict to those with US News Ranking among the top 100 in 2016. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

The estimated effect remains consistent across these alternative sample restrictions. Colleges around the cutoff significantly increase their enrollment by 6.6% (selective colleges subsample; see column (1) of Table 5) or 5.4% (top-ranking college subsample; see column (3) of Table 5), very close to the 6.4% estimate of the main result.

Given that institutional wealth is the primary criterion determining tax status, I conducted a DDD design comparing colleges with similar wealth but unaffected by the policy due to small student size. This design compares gaps between large and small colleges (by student enrollment) within those around and distant from the endowment asset cutoff. Appendix C provides methodological details and comprehensive results, while Table 5 illustrates the key insight from this setting.

The results align with the main findings about increase enrollment, though the estimates are noisier. Nevertheless, the event study design of the setting (see Figure C2) suggests that the positive trend in student enrollment is likely valid and not merely driven by random noise.

#### 6.1.4 Individual Institution Response

Figure 3 shows the evaluation of effects on individual institutions using the SCM approach. All colleges near the tax cutoff show an increase in enrollment after the policy's implementation (see Figure 3e). Particularly, the University of Chicago had the largest response, with a student enrollment increase of 18%,[25] followed by Colby College (13% increase),[26] Washington University in St Louis (11%),[27] and Duke University (11%).[28] The pooled estimate of the average effect among all colleges is 0.085 ($p = 0.008$), which aligns with the DD model result.

Regarding the response related to assets per student, half (9 of 17) of the colleges show a negative change in this variable, ranging from a negative 14% to a positive 16% (see Figure 3f). The institutions with the most substantial negative responses are Wabash College (–13%), the University of Chicago (–12%), and Northwestern University (–9%). The pooled estimate of average effect among all colleges is 0.004 ($p = 0.647$); however, when considering only the colleges below the cutoff, the pooled average estimate is –0.04, echoing the DD model finding that the results are driven by colleges below the tax threshold.

[25] Public records suggest that the increase in enrollment at UChicago is due to an intentionally adopted new strategy (IVY COACH, 2018). In November 2018, the Dean of College at UChicago announced that the university is planning to expand its undergraduate student body to approximately 7,000 (Yee, 2018). The UChicago undergraduate student body then showed an increase from 6,300 in 2017 to 7,000 in 2020.

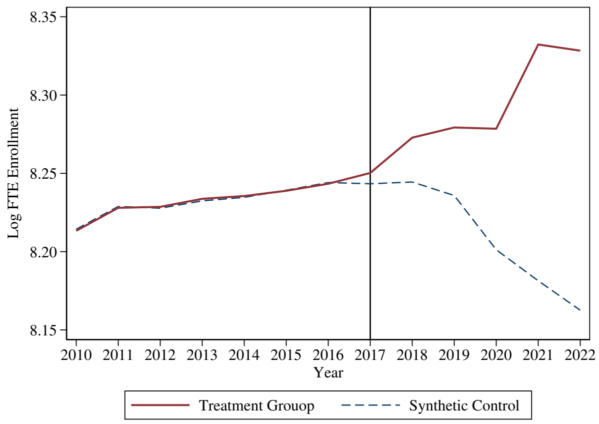
[26] Colby College sets up a strategic plan every five years. Their 2017–2022 plan had a specific goal to "employ strategies to expand revenue through increased enrollment." (See https://www.colbycc.edu/Assets/Documents/About/strategic-plan/operational-report-2017-18.pdf.) However, such goals were absent in their 2012–2017 plan. Instead, at that time, their plan was to manage enrollment based on their "current capacity." (See https://www.colbycc.edu/Assets/Documents/Faculty/HLC/assurance-filing16.pdf.) Notably, the student body of Colby College has increased from 1,800 in 2017 to 2,200 in 2022.

[27] WashU established a new office, the Academy for Diversity, Equity, and Inclusion, in 2018. While the primary goal of the office is equity, the university has proposed a series of strategies, including forging partnerships with community-based organizations to enhance college access for disadvantaged students and launching recruitment programs in rural areas to reach high school graduates (Riley, 2019; Keaggy, 2022; Blake, 2024).

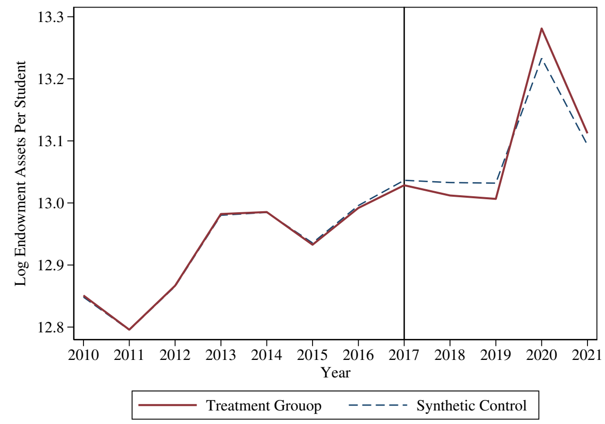
[28] Duke's enrollment increase was more driven by graduate students. In 2017–2018, Duke established a new center, The University Center of Exemplary Mentoring (UCEM), and initiated programs to "expand Duke's capacity to attract, retain, and graduate STEM doctoral students" (Saff, 2018; Vashisth, 2018). The program led to a surge in graduate student, with the total number of FTE graduate students increasing from 9,000 in 2017 to 11,000 in 2022.

Figure 3: Synthetic Control Method: Tax Avoidance Behavior

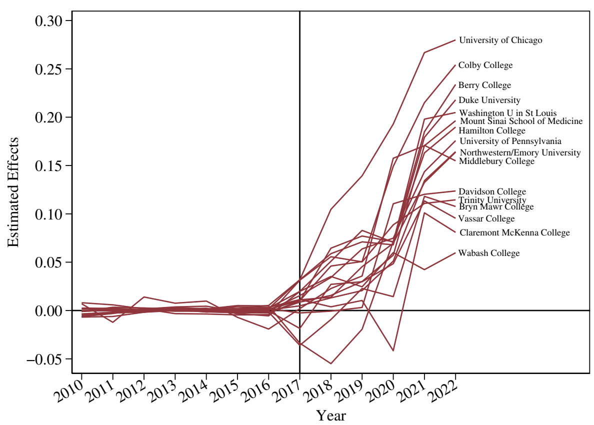
(a) Log Number of FTE Students
Treatment vs. Synthetic Control



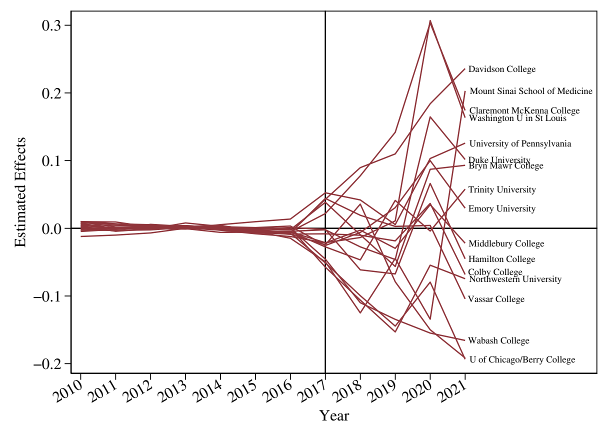

(b) Log Endowment Assets Per-Student
Treatment vs. Synthetic Control



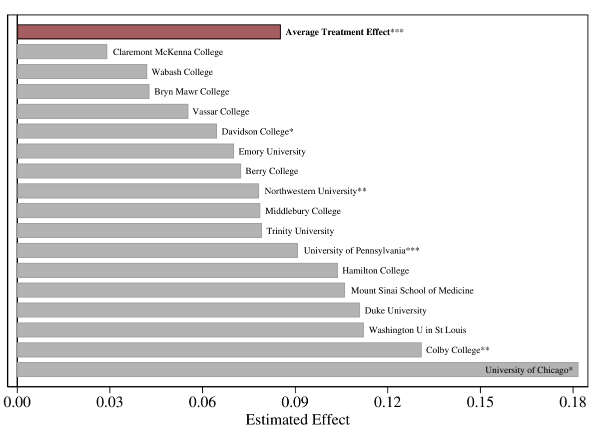

(c) Log Number of FTE Students
Single Unit Treatment Effects Across Time



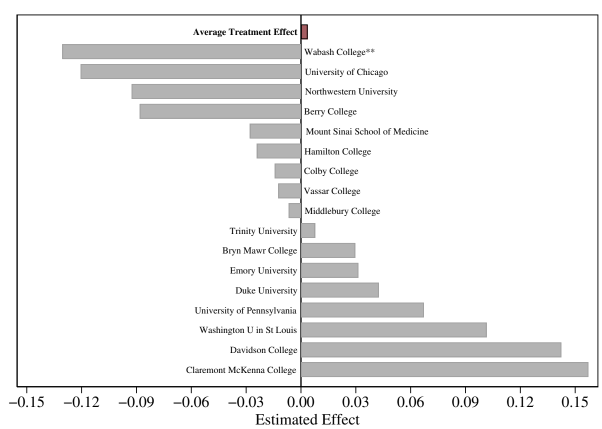

(d) Log Endowment Assets Per-Student
Single Unit Treatment Effects Across Time




(e) Log Number of FTE Students
Single Unit Average Treatment Effects




(f) Log Endowment Assets Per-Student
Single Unit Average Treatment Effects




*Note:* The synthetic controls are estimated using SCM. The treatment effects are estimated using equation (3) to (**??**). The error bars denote the 95% confidence interval. The samples are private nonprofit colleges that reported in IPEDS and filed Form 990 every year from 2010 to 2022, with a student population above 500 in 2016. FTE (full-time equivalent) is calculated as the sum of full-time and one-third of part-time students.

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Using SCM-derived counterfactuals, I identified colleges that could have been subjected to the tax if they had not manipulated enrollment and assets but "successfully avoided the tax" based on the actual observed values. The manipulation allows two colleges — University of Chicago and Berry College — that could have been taxed in 2018 to be exempt. In 2019 and 2020, Trinity University and Northwestern University joined the group that "successfully avoided the tax." In 2021, Wabash College could have met the tax threshold, given its counterfactual, but has been exempted due to manipulation. Vassar College and Colby College were subjected to the tax in 2021 and should have continued to be so in 2022, but due to increases in enrollment, they were exempted. Overall, tax avoidance behavior has allowed seven colleges to be (temporarily) exempted from the tax or delay the timing they would be subjected to taxation. The estimated tax loss due to avoidance is $31 million (in 2010 real dollars) over five years.[29]

## 6.2 Tax Shifting

### 6.2.1 Average Response

This study finds no evidence of reduced spending due to taxation. Table 6 suggests that taxation leads to an insignificant 2% increase in total spending (see Panel A, Column (1)).[30] Panels B and C separate samples into research and non-research universities. Both show no significant expenditure changes. The event study evidence presented in Figure 4 shows good common trends prior to the policy and no substantial change afterward.

In contrast, colleges respond to taxation by shifting costs to students. Table 7 finds that taxed colleges increased their listed tuition and charges for room and board after the policy went into effect. Substantial heterogeneous responses exist across institution types. While non-research universities increased their undergraduate tuition by 3.3% (Panel C, Column (2)), research universities opted to increase the graduate tuition by 6.7% (Panel B, Column (3)). Both groups significantly increased their charges for room and board by 3 to 5% (Column (4)).[31]

[29] Calculated by applying the 1.4% tax rate to the net investment income.

[30] These results are based on the donut sample, i.e., excluding colleges near the tax threshold. Table A3 in Appendix A shows the estimation based on the full sample and also reveals no significant reduction in spending.

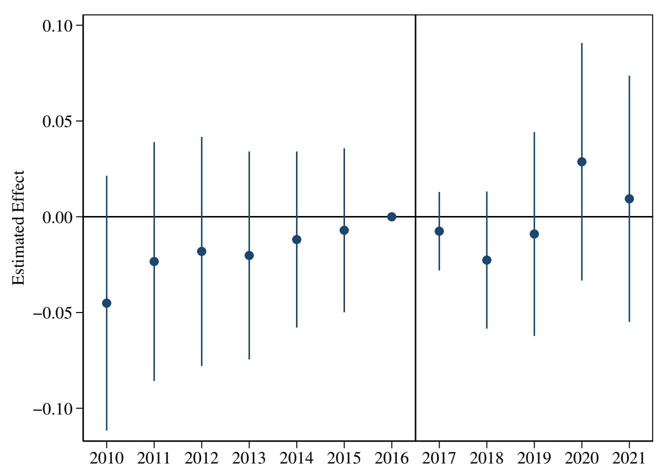
[31] The results presented here are based on the donut sample, i.e., excluding those colleges around the tax threshold.

Table 6: Expenditure-related Tax Shifting Behavior

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | Log Expenditure | | | | | | |
| | Total | Instruction | Research | Public Service | Institution Support | Auxiliary Facilities | Institution Grant |
| **Panel A: All Colleges** | | | | | | | |
| $Treat \times Post$ | 0.020 | –0.002 | 0.005 | 0.021 | –0.007 | –0.019 | 0.220 |
| | (0.034) | (0.037) | (0.087) | (0.097) | (0.047) | (0.046) | (0.160) |
| Observations | 9,252 | 9,252 | 9,252 | 9,252 | 9,252 | 9,252 | 9,252 |
| Baseline Mean (Million) | 1,524 | 478 | 222 | 28 | 121 | 459 | 123 |
| **Panel B: Research Universities** | | | | | | | |
| $Treat \times Post$ | 0.062 | 0.047 | 0.267 | –0.104 | –0.112 | 0.014 | –0.037 |
| | (0.069) | (0.071) | (0.171) | (0.142) | (0.091) | (0.074) | (0.129) |
| Observations | 3,672 | 3,672 | 3,672 | 3,672 | 3,672 | 3,672 | 3,672 |
| Baseline Mean (Million) | 2,866 | 957 | 411 | 15 | 227 | 871 | 227 |
| **Panel C: Non-Research Universities** | | | | | | | |
| $Treat \times Post$ | 0.019 | 0.006 | –0.075 | 0.126 | 0.053 | –0.014 | 0.259 |
| | (0.042) | (0.051) | (0.103) | (0.130) | (0.060) | (0.058) | (0.211) |
| Observations | 5,472 | 5,472 | 5,472 | 5,472 | 5,472 | 5,472 | 5,472 |
| Baseline Mean (Million) | 407 | 79 | 65 | 38 | 33 | 115 | 36 |

*Note:* The coefficients are estimated using equation (2). Standard errors clustered at the institution level in parentheses. The outcomes are the log expenditure by spending category. Column (1) is the total expenditure. Column (2) is the sum of instructional and academic support expenditures. Column (3) is the sum of research and independent operation expenditure. Column (4) is the public service expenditure. Column (5) is the institutional support expenditure, which includes spending on operational support, administrative services, and management. Column (6) is the sum of auxiliary facilities, hospital, and student service expenditure. Column (7) is the net institutional grant aid to students, including scholarships and fellowships. All dollars are adjusted by CPI and denoted in 2010 real dollars. All Panels exclude colleges with endowment assets per student between \$400,000 and 600,000 in 2016 (i.e., only include the donut sample). Panel B restricted the sample to colleges categorized as doctoral or master institutions in the Carnegie categorization. Panel C restricted the sample to colleges not categorized as doctoral or master institutions in the Carnegie categorization. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Figure 4: Event Study Estimates: Tax Shifting Behavior on Log Total Expenditure




*Note:* The coefficients are estimated using the event study version of equation (2). The error bars denote the 95% confidence interval.

Table A4 in Appendix A reports the estimation based on the full sample and reveals a similar pattern and estimates.

Table 7: Enrollment, Tuition, and Charge-related Tax Shifting Behavior

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Log FTE | Log Listed Price | | | Log Total Revenue | |
| | Enrollment | Undergrad Tuition | Graduate Tuition | Room & Board | Tuition | Auxiliary |
| **Panel A: All Colleges** | | | | | | |
| $Treat \times Post$ | 0.034** | 0.024*** | 0.008 | 0.042*** | 0.142*** | 0.041 |
| | (0.016) | (0.009) | (0.024) | (0.013) | (0.033) | (0.047) |
| Observations | 10,087 | 10,087 | 10,087 | 10,087 | 9,311 | 9,311 |
| Baseline Mean (Thousand) | 6.037 | 39.033 | 28.449 | 11.451 | 162,878 | 61,246 |
| **Panel B: Research Universities** | | | | | | |
| $Treat \times Post$ | –0.005 | 0.011 | 0.067*** | 0.034* | 0.036 | 0.096 |
| | (0.022) | (0.009) | (0.023) | (0.019) | (0.036) | (0.090) |
| Observations | 4,069 | 4,069 | 4,069 | 4,069 | 3,756 | 3,756 |
| Baseline Mean (Thousand) | 11.127 | 41.906 | 39.592 | 12.289 | 304,929 | 113,932 |
| **Panel C: Non-Research Universities** | | | | | | |
| $Treat \times Post$ | 0.060*** | 0.033** | –0.031 | 0.047*** | 0.211*** | 0.005 |
| | (0.019) | (0.013) | (0.035) | (0.017) | (0.045) | (0.049) |
| Observations | 6,018 | 6,018 | 6,018 | 6,018 | 5,555 | 5,555 |
| Baseline Mean (Thousand) | 1.795 | 36.639 | 19.164 | 10.752 | 44,503 | 17,341 |

*Note:* The coefficients are estimated using equation (2). Standard errors clustered at the institution level in parentheses. Panel B restricted the sample to colleges categorized as doctoral or master institutions in the Carnegie categorization. Panel C restricted the sample to colleges not categorized as doctoral or master institutions in the Carnegie categorization. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

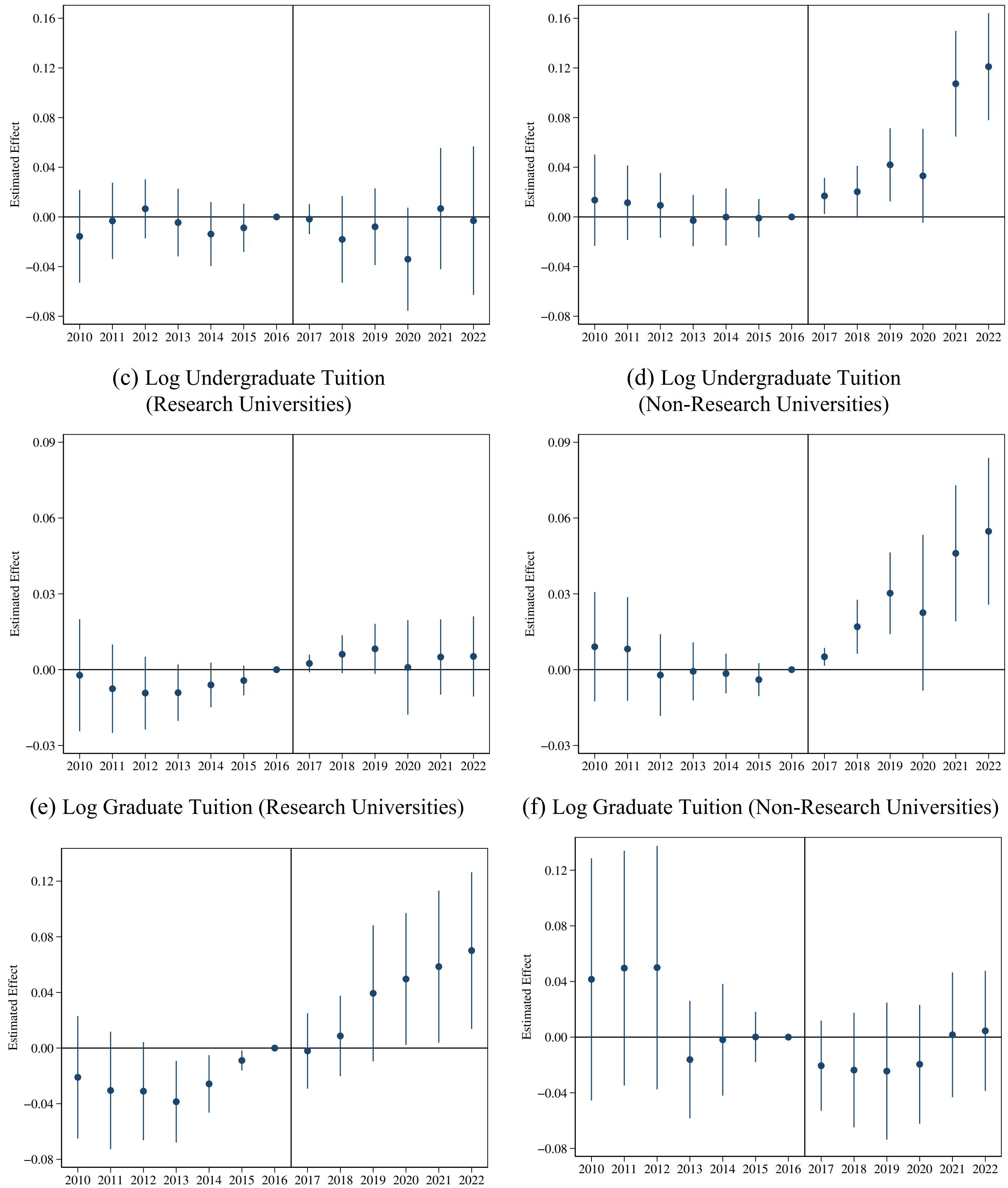
Regarding dynamic effect, Figure 5 demonstrates a gradual increase in tuition. Research universities increased graduate tuition by 4% in 2019 and increased this to approximately 7% in 2022 (see Figure 5e). Non-research universities increased undergraduate tuition by 2% in 2018 and by 6% in 2022 (see Figure 5d).

The results also reveal increased total enrollment, but only among non-research colleges, which experienced a significant 6% increase in FTE student enrollment ($p < 0.01$, see Table 7 Panel C, Column (1)). Increasing student enrollment might be a strategy that colleges adopted to boost revenue, as evidenced by a 20% significant increase in total tuition revenue for non-research colleges (see Table 7 Panel C, Column (5)) despite the listed tuition rate only increasing by 3%.

### 6.2.2 Robustness Check

A concern with the DD setting is that colleges in the comparison group differ greatly from those in the treatment group, potentially failing to provide a valid counterfactual. Appendix B addresses this issue by using colleges with equivalent selectivity and reputation as the comparison group.

Figure 5: Event Study Estimates: Tax Shifting Behavior by Institution Types




(a) Log FTE Enrollment (Research Universities)

(b) Log FTE Enrollment (Non-Research Universities)

(c) Log Undergraduate Tuition (Research Universities)

(d) Log Undergraduate Tuition (Non-Research Universities)

(e) Log Graduate Tuition (Research Universities)

(f) Log Graduate Tuition (Non-Research Universities)

*Note:* The coefficients are estimated using the event study version of equation (2). The error bars denote the 95% confidence interval. The samples are private nonprofit colleges that reported in IPEDS and filed Form 990 every year from 2010 to 2022, with a student population above 500 in 2016, and exclude colleges with endowment assets per student between $400,000 and 600,000 in 2016 (i.e., only include the donut sample).

Table 8 provides key estimates, while the Appendix presents the full results. Results from subsamples with similar selectivity and top ranking mirror the main findings. Taxed colleges maintain spending but increase listed tuition by 2–3 %, close to the main estimate.

Table 8: Tax Shifting Behavior: Robustness Checks

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| | Barron's Index $\geq$ Very Competetive | | | US News' Ranking Top 100 | | | DDD | | |
| | Total Exp. | Listed Tuition | Tuition Rev. | Total Exp. | Listed Tuition | Tuition Rev. | Total Exp. | Listed Tuition | Tuition Rev. |
| $Wealthy \times Post$ | 0.005 | 0.027* | 0.109** | –0.055 | 0.018* | 0.042 | | | |
| | (0.036) | (0.014) | (0.047) | (0.050) | (0.010) | (0.050) | | | |
| $Large \times Wealthy \times Post$ | | | | | | | 0.002 | 0.100*** | 0.214 |
| | | | | | | | (0.043) | (0.033) | (0.212) |
| Observations | 3,324 | 3,601 | 3,324 | 1,380 | 1,495 | 1,380 | 11,004 | 11,004 | 11,004 |

*Note:* The coefficients are estimated using equation (2). Standard errors clustered at the institution level in parentheses. The outcomes are log total expenditure (Columns (1), (4), and (7)), log listed undergrad tuition (Columns (2), (5), and (8)), and log total tuition revenue (Columns (3), (6), and (9). Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. Columns (1) to (3) restrict to those with Barron's Selectivity Index as most competitive, highly competitive, or very competitive. Columns (4) to (6) restrict to those with US News Ranking among the top 100 in 2016. The observation period is from 2010 to 2022 for listed tuition and 2010 to 2021 in the remaining columns.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

I employed a DDD design to further address this concern, using small but wealthy colleges as additional comparison groups. This approach compares the differences in gaps between large and wealthy (the taxed colleges) and large but not wealthy colleges with the same gaps between small wealthy and non-wealthy institutions. With full triple interaction with the time effect, this method controls for time trends associated with institutional wealth and enrollment size. Appendix C presents the methodological details and the full analysis.

Table 8 demonstrates the key estimates from the DDD design, finding a null response in spending and a positive increase in tuition. The point estimate on tuition increase is larger than the main results, potentially because small, wealthy colleges were able to maintain lower tuition during the pandemic while large, wealthy colleges (the taxed colleges) did not. Despite some variation in magnitude, the key insights remain consistent across these robustness checks.

### 6.2.3 Individual Institution Response

Figure 6 examines the individual institutional responses using the SCM. The estimated responses of the effect on total expenditure range from a decrease of 16% to an increase of 12% (see Figure 6e). However, most estimates are not significant. The average treatment effect retrieved from pooled SCM is 0.00004 ($p = 0.135$), which is essentially null.

In terms of tuition revenue, 20 out of 24 colleges saw increases in total tuition revenue.[32] The magnitudes range from an increase of 27% to a decrease of 4% (see Figure 6f). The average treatment effect retrieved from pooled SCM is 0.07 ($p = 0.01$), close to the DD model's estimate.

## 6.3 Impact on Student Composition

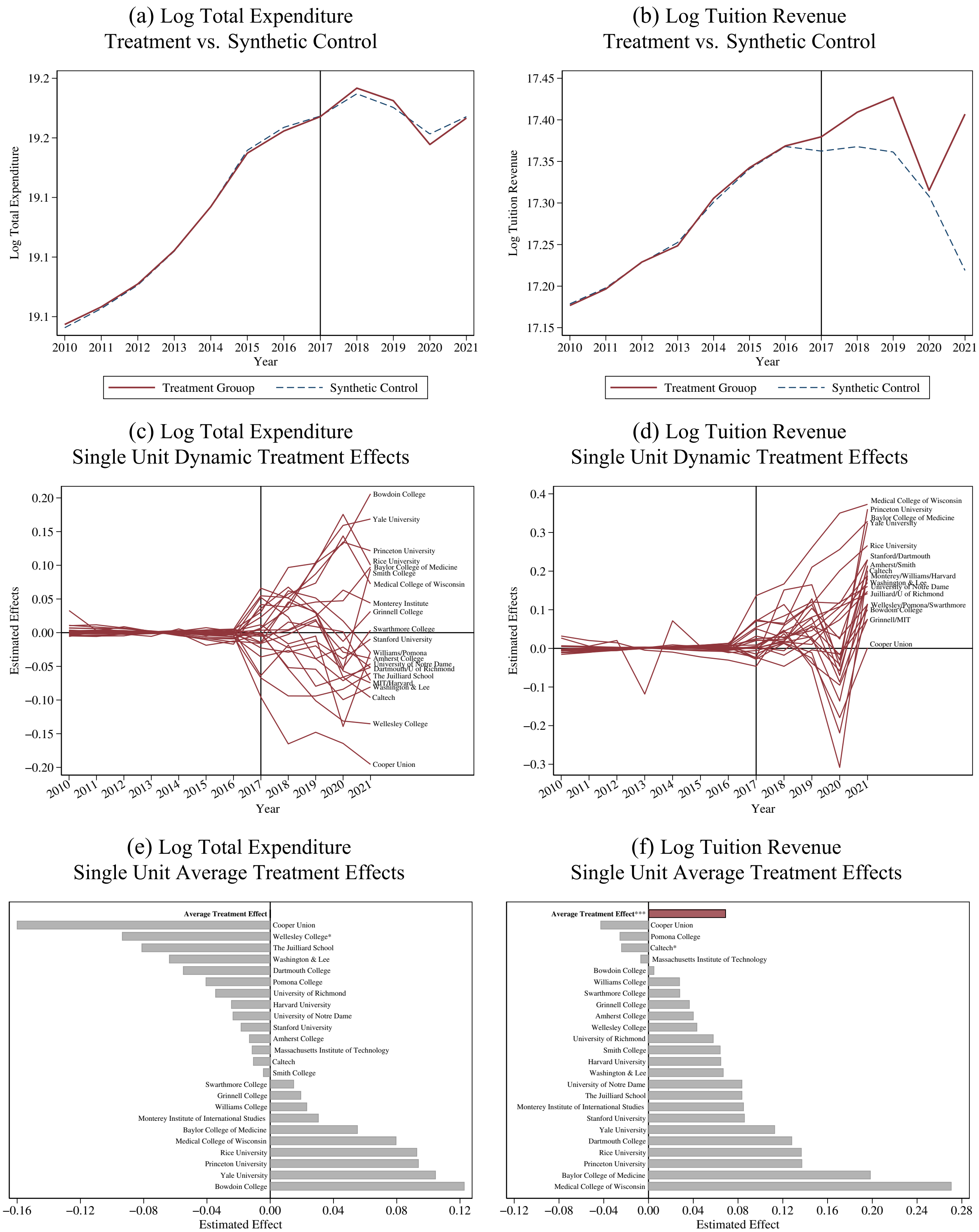
Section 6.1 finds that colleges would increase student enrollment to qualify for tax exemption, and Section 6.2 suggests that institutions would increase tuition to shift the tax burden to students. The resulting question then becomes how these changes affect students' educational opportunities. Table 9 explores this question by examining the effect based on students' racial/ethnic composition.

The enrollment increase triggered by tax avoidance seems to benefit all student groups. Table 9 Panel A reveals that tax avoidance leads to an increase in student enrollment in all racial categories. Specifically, Whites experience a significant increase of 8.5% ($p < 0.01$; see Panel A, Column (1)). Black, Hispanic, and Asian students also increase, but the estimates are non-significant. Other minorities demonstrate a significant 23% increase ($p < 0.01$; see Panel A, Column (5)), mostly driven by change among students who identified as two or more races or ethnicities.

In contrast, the increase in education costs driven by tax shifting seems to harm students from historically underrepresented groups. Colleges subjected to the tax experienced a significant drop in Hispanic enrollment of 13% ($p < 0.01$; see Panel B, Column (3)). In contrast, nonresident aliens (NRA; i.e., international students) increased by 10% ($p < 0.1$; see Panel B, Column (6)), which implies that colleges might attempt to recruit students who will pay higher tuition rates.

[32] This analysis takes total tuition revenue as a summarized index of change in the listed tuition prices and total enrollments. When separately examining tuition changes, 22 colleges increased their undergraduate tuition, and 21 colleges increased their graduate tuition.

Figure 6: Synthetic Control Method: Tax Shifting Behavior




*Note:* The synthetic controls are estimated using SCM. The treatment effects are estimated using equation (3) to (**??**). The error bars denote the 95% confidence interval. The samples are private nonprofit colleges that reported in IPEDS and filed Form 990 every year from 2010 to 2022 and exclude colleges with endowment assets per student between $400,000 and 600,000 in 2016.

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table 9: Student Enrollment-related Tax Avoidance and Shifting Behavior by Race/Ethnicity

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Log FTE Enrollment | | | | | |
| | White | Black | Hispanic | Asian | Other Minority | NRA |
| **Panel A: Tax Avoidance, All Colleges** | | | | | | |
| $Cutoff \times Post$ | 0.085*** | 0.038 | 0.071 | 0.055 | 0.233*** | 0.022 |
| | (0.031) | (0.040) | (0.049) | (0.047) | (0.058) | (0.070) |
| Observations | 10,308 | 10,308 | 10,308 | 10,308 | 10,308 | 10,308 |
| Baseline Mean (Thousand) | 2.331 | 0.298 | 0.386 | 0.646 | 0.176 | 0.889 |
| **Panel B: Tax Shifting, All Colleges** | | | | | | |
| $Treat \times Post$ | 0.022 | 0.007 | –0.128*** | 0.017 | –0.069 | 0.102* |
| | (0.026) | (0.033) | (0.041) | (0.039) | (0.048) | (0.058) |
| Observations | 10,087 | 10,087 | 10,087 | 10,087 | 10,087 | 10,087 |
| Baseline Mean (Thousand) | 2.739 | 0.336 | 0.516 | 0.840 | 0.262 | 1.159 |
| **Panel C: Tax Shifting, Research Universities** | | | | | | |
| $Treat \times Post$ | –0.023 | 0.033 | –0.128** | –0.054 | –0.040 | 0.009 |
| | (0.036) | (0.050) | (0.056) | (0.055) | (0.071) | (0.088) |
| Observations | 4,069 | 4,069 | 4,069 | 4,069 | 4,069 | 4,069 |
| Baseline Mean (Thousand) | 2.739 | 0.336 | 0.516 | 0.840 | 0.262 | 1.159 |
| **Panel D: Tax Shifting, Non-Research Universities** | | | | | | |
| $Treat \times Post$ | 0.052 | –0.011 | –0.129** | 0.063 | –0.088 | 0.162** |
| | (0.036) | (0.044) | (0.056) | (0.053) | (0.064) | (0.077) |
| Observations | 6,018 | 6,018 | 6,018 | 6,018 | 6,018 | 6,018 |
| Baseline Mean (Thousand) | 2.739 | 0.336 | 0.516 | 0.840 | 0.262 | 1.159 |

*Note:* The coefficients in Panel A are estimated using equation (1). The coefficients in Panel B to D are estimated using equation (2). Standard errors clustered at the institution level in parentheses. The outcomes are log full-time equivalent (FTE) students by race/ethnicity. Other minorities include Native Hawaiian and Pacific Islander (NHPI), American Indians and Alaska Natives (AIAN), and two or more races. NRA stands for non-resident alien. Panels B to D exclude colleges with endowment assets per student between $400,000 and 600,000 in 2016 (i.e., only include the donut sample). Panel C restricted the sample to colleges categorized as doctoral or master institutions in the Carnegie categorization. Panel D restricted the sample to colleges not categorized as doctoral or master institutions in the Carnegie categorization. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Section 6.2 has found that non-research universities paying the tax also increase their enrollment. However, Table 9 Panel D reveals that the increase in enrollment is driven more by international students (increased by 16%, $p < 0.05$, see Column (6)). Whites and Asians also show insignificant increases (5% and 6%, respectively). Hispanic students show a significant 13% decrease in enrollment ($p < 0.05$, see Column (3)). Thus, the enrollment increases driven by tax-shifting do not seem to benefit domestic students, at least not those in disadvantaged groups.

## 6.4 Monetizing Policy Outcomes

### 6.4.1 Comparing Revenue Loss and Opportunities Generated

Tax avoidance behavior, while leading to government revenue loss, prompts selective colleges to increase enrollment. Studies suggest positive effects of attending selective colleges on academic and labor market outcomes (Melguizo, 2008; Kapur et al., 2016; Witteveen & Attewell, 2017; S. D. Zimmerman, 2019; Ge et al., 2022), implying potential benefits from expanded access.

To evaluate the benefits of enrollment expansion, I calculate the additional return of college degrees from these colleges compared to degrees from colleges that are one level lower in selectivity. The methodology is detailed in Appendix D. Using various assumptions, the total estimated net benefit (including individual and societal benefits) ranges from $350 million to $1,300 million.

Taking the lower bound of these estimates, the benefit generated from enrollment ($350 million) is over ten times the revenue loss ($31 million throughout the five-year period) due to tax avoidance. This underscores the potential social value created through enrollment expansion in response to tax incentives, emphasizing the broader positive outcomes beyond fiscal considerations.

However, this interpretation has limitations. The benefit calculation includes all 17 colleges engaged in avoidance behaviors, while tax loss considers only 5 successful cases. Therefore, the comparison refers to an overall policy effect and does not imply that granting a $1 tax exemption would lead to a $10 social benefit. Additionally, this short-term estimate does not account for potential long-term changes in college motivation for manipulation as endowments grow.

### 6.4.2 Comparing Taxes Paid and Amount Shifted to Students

The evidence in the prior sections reveals that taxed colleges increase tuition and charges, raising the question of how taxes paid compared with the burden shifted to students. A comprehensive estimate using SCM for individual institutions over 5 years shows $1,186 million shifted through tuition and $249 million through auxiliary charges (2010 real dollars).[33] In contrast, the estimated

[33] This estimate is based only on the treatment group in the analysis sample, thus excluding colleges near the tax threshold and those that initially were not, but might later be, subjected to the tax.

tax revenue from the NIIT for the same analysis sample is approximately \$1.621 billion (in 2010 real dollars) throughout the 5-year sample period. Combining these calculations, colleges shifted 88% of their tax burden to students. Thus, for each \$1 of taxes paid for the NIIT, colleges increase students' attendance cost by \$0.88.

# 7 Conclusion

Nonprofits have long benefited from generous tax exemptions, representing a form of invisible government support through tax spending. However, scholars have raised concerns regarding the justification for this tax exemption, questioning whether nonprofits utilize the tax benefits to enhance their services (D. Zimmerman, 1991; Cowan, 2007; Nichols & Santos, 2016; Herring et al., 2018; Propheter, 2019a). The consideration of whether the government should tax nonprofits is dependent on how nonprofits respond to taxation. They might engage in tax avoidance behavior by manipulating their finances or services or shift the tax burden onto their service population or the public. Prior studies examining for-profit organizations have revealed that tax avoidance and shifting behaviors can result in inefficiency or inequity (Nerudová & Dobranschi, 2016; Farrell, 2017; Felix, 2007; Bird & Davis-Nozemack, 2018; G. Taylor et al., 2019). However, few studies have examined how nonprofits' responses to taxation translate into societal benefits or losses, and whether the consequences outweigh the revenues from taxation.

This paper explores how nonprofits respond to government taxation by examining nonprofit colleges' reactions to the NIIT introduced by the TCJA. This policy represents the government's first attempt at regulating public charities' endowments and taxing their investment income. The context provides a unique opportunity to evaluate nonprofits' responses to taxation and whether these responses might reduce the provision of public goods and diminish overall societal benefits.

This paper identifies three key findings. Firstly, it reveals that nonprofit colleges engage in tax avoidance behavior but in a manner that benefits society. The NIIT targets colleges with more than 500 students and over \$500,000 in endowment assets per student, allowing colleges to manipulate their student enrollment or endowment assets to maintain their tax exemption. The findings also suggest that colleges near the threshold responded by increasing enrollment rather than reducing endowment assets, aligning with theoretical expectations that nonprofits maximize service output (Brooks, 2005; Chang & Jacobson, 2011). This pattern is evident at the aggregate level and is common among colleges near the threshold. This behavioral pattern offers the government an opportunity to design tax policies that guide nonprofits in socially beneficial ways.

Secondly, this paper examines tax-shifting behavior, revealing that taxed colleges increase tuition and charge for on-campus facilities, passing the tax burden onto students. However, they do not reduce financial aid or expenditures, despite claims in public statements and lobbying. This aligns with previous studies indicating that taxes on nonprofits might not impact service levels (Grimm Jr, 1999; Fei et al., 2016; Herring et al., 2018). Colleges' choice to increase tuition instead of reducing services aligns with studies finding that colleges facing financial fluctuations maintain or improve their quality (Bulman, 2022). These findings support theoretical perspectives that nonprofits prioritize social welfare and their missions when facing tax burdens.

The response pattern also has implications for public goods provision. In the specific context evaluated in this paper, colleges facing taxes choose not to reduce their service quantity (i.e., reduce student enrollment) or quality (i.e., cut spending), but increase costs for their service population to access services (i.e., increase tuition and charges). While this behavioral response does not alter the overall service level, it may change the distribution of service access. Specifically, analysis suggests that tuition increases redistribute enrollment from historically underserved groups (particularly Hispanic students) to international students who may possess more financial resources.

In terms of the magnitude of the response, the estimation from SCM suggests that for each \$1 paid to the government, colleges increase the attendance cost to students by \$0.88. This response magnitude concurs with the ranges seen in prior literature on the tax-shifting behaviors of firms. Specifically, past studies of various goods found that for each \$1 increase in tax, retail prices increased by \$0.6 to \$1.4 (Marion & Muehlegger, 2011; Espinosa & Evans, 2013; Bonnet & Réquillart, 2013).

However, this response magnitude is greater than those observed in previous studies on colleges' responses to endowment shocks. For example, Bulman (2022) found a 10% endowment shock driven by the investment market leads to a 2.5% change in core spending, which is much lower than the estimate in the present study.[34] The reason that these colleges' response magnitudes are more aligned with firms' tax-shifting behaviors rather than how colleges respond to their endowment returns could be due to the structure of the income shock. Changes in spending or revenue require budget adjustments that are difficult to significantly alter in a short period. While the NIIT is based on endowment returns, colleges only have to pay the bill after the return is realized and not until the following year when the tax return is due. Hence, it is easier for colleges to adjust budgets in response to taxation. Additionally, tax payments might be viewed as an institutional cost, while investment shocks may be considered temporary, with losses in one year potentially compensated in another. Therefore, institutions might respond more to taxation than to investment shocks.

Finally, a detailed analysis of costs and benefits finds that tax avoidance behaviors led to a $31 million loss in tax revenue over a five-year period but created an additional 9,600 enrollment opportunities, translating to over $350 million in personal or social benefits. In contrast, taxation earned the government $1,621 million in revenue over the same period but also imposed higher attendance costs for students, totaling $1,435 million (88% of the total tax payment). Overall, for this specific policy, the total benefits (sum of government revenue and the implied benefits due to enrollment expansion) may exceed the burden borne by society (the increased costs borne by students). However, despite the overall increase in societal benefits, concerns about equity (redistribution of educational opportunity) should not be ignored. Whether the policy is ultimately beneficial depends on whether the government can use the generated revenue to compensate the groups harmed by the policy.

Based on these findings, this paper offers several policy recommendations regarding the NIIT on colleges and nonprofit taxation in general. Firstly, while the NIIT on colleges has some negative consequences, the worst-case scenario (cutting spending and financial aid) did not occur. Addition-

[34] Using the sample construction as used in Bulman (2022), this figure can be transformed into a 25% revenue shock and a corresponding 2.4% total spending cut.

ally, the benefits generated from the policy exceed the negative costs, so reversing the policy is not recommended since returning tax payments to colleges may not ensure the money is used to improve educational equity. Bulman (2022) and Brown et al. (2014) found that colleges often use endowment returns to become more selective or to accumulate wealth rather than enhance equity. Thus, the government could use the revenue to improve access to higher education and redesign the taxation to offer incentives for positive responses. These findings also suggest colleges are willing to expand enrollment to gain tax exemption status. Therefore, the policy could grant tax exemptions or deductions based on the proportion or amount spent from endowment assets, incentivizing colleges to improve service quality and equity.

Secondly, for nonprofit taxation policy in general, this paper identifies that nonprofits respond differently to taxation than for-profit organizations, thus, allowing the government to tax nonprofits without diminishing societal benefits. Crucially, nonprofits tend to maximize their service levels and social welfare and will be willing to respond to taxation by providing more public goods, even if it costs them more. Most government taxation or regulatory thresholds are based on the logic that larger and more capable organizations should pay more or do more. However, this logic may be unsuitable for nonprofits. If the rationale for nonprofit tax exemption is that they provide public goods, then larger and more capable nonprofits (conditional on also providing more public goods) might deserve even more generous tax benefits. The evidence in this paper also suggests that a well-designed tax structure can encourage nonprofits to respond in ways that align with desirable social outcomes. Though concerns about tax shifting do exist, since nonprofits care about their mission and social welfare, they may choose approaches that best preserve their values. Therefore, taxing nonprofits does not necessarily lead to unacceptable consequences. The overall social welfare implications depend on whether the government can use its tax revenues to address potential burden transfers due to tax shifting.

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## Online Appendix: For Online Publication

Appendix A: Additional Results

Appendix B: Restricting Sample to Selective Colleges

Appendix C: Triple-Difference Design

Appendix D: Methodology Details on Permutation Test for SCM

Appendix E: Estimation Net Benefit of Enrollment Expansion

The Online Appendix is available at:

https://yungyutsai.github.io/papers/EndowmentTax_OnlineAppendix.pdf

# Appendix A: Additional Results

Table A1: Estimated Net Investment Income Tax Payment

| | Average Expenditure / Revenue / Payment ($ Million) | | | | Share of Invest Rev. to Total Rev. | Share of Est. Tax to Total Exp. | Share of Est. Tax to Total Rev. |
|---|---|---|---|---|---|---|---|
| | Total Expenditure | Total Revenue | Investment Revenue | Estimated NIIT | | | |
| **Panel A: Student above 500, and per student Asset above 600K** | | | | | | | |
| Princeton University | 1,541 | 3,803 | 3,073 | 43.03 | 58.23% | 2.79% | 0.82% |
| Yale University | 3,458 | 6,129 | 3,400 | 47.61 | 43.44% | 1.36% | 0.61% |
| Harvard University | 4,416 | 7,412 | 4,192 | 58.68 | 42.82% | 1.36% | 0.60% |
| Stanford University | 5,176 | 7,707 | 3,336 | 46.70 | 35.71% | 0.91% | 0.50% |
| Pomona College | 149 | 290 | 216 | 3.02 | 47.66% | 2.19% | 0.67% |
| Massachusetts Institute of Technology | 3,253 | 5,379 | 2,997 | 41.96 | 40.46% | 1.29% | 0.57% |
| Swarthmore College | 154 | 306 | 235 | 3.29 | 52.61% | 2.18% | 0.74% |
| Amherst College | 194 | 484 | 344 | 4.82 | 51.52% | 2.50% | 0.72% |
| The Juilliard School | 98 | 152 | 87 | 1.22 | 36.80% | 1.26% | 0.52% |
| California Institute of Technology | 2,822 | 2,951 | 304 | 4.26 | 9.07% | 0.15% | 0.13% |
| Williams College | 227 | 513 | 355 | 4.97 | 50.67% | 2.20% | 0.71% |
| Grinnell College | 114 | 327 | 234 | 3.27 | 58.51% | 2.96% | 0.82% |
| Rice University | 658 | 1,031 | 583 | 8.16 | 37.45% | 1.22% | 0.52% |
| Cooper Union for the Advancement of Science and Art | 69 | 98 | 69 | 0.96 | 67.83% | 1.40% | 0.95% |
| Bowdoin College | 153 | 353 | 256 | 3.59 | 50.13% | 2.39% | 0.70% |
| Wellesley College | 200 | 404 | 264 | 3.70 | 46.75% | 1.92% | 0.65% |
| University of Notre Dame | 1,111 | 2,528 | 1,674 | 23.43 | 43.18% | 2.20% | 0.60% |
| Dartmouth College | 781 | 1,460 | 754 | 10.55 | 37.21% | 1.38% | 0.52% |
| Medical College of Wisconsin | 1,034 | 1,103 | 113 | 1.58 | 8.20% | 0.15% | 0.11% |
| Baylor College of Medicine | 1,811 | 1,838 | 118 | 1.65 | 5.64% | 0.09% | 0.08% |
| Washington and Lee University | 148 | 227 | 130 | 1.82 | 36.28% | 1.24% | 0.51% |
| University of Richmond | 258 | 401 | 241 | 3.37 | 34.45% | 1.32% | 0.48% |
| Smith College | 201 | 340 | 186 | 2.60 | 36.72% | 1.39% | 0.51% |
| **Panel B: Student above 500, and per student Asset between 500 to 600K** | | | | | | | |
| Emory University | 5,581 | 6,280 | 853 | 11.94 | 12.10% | 0.21% | 0.17% |
| Claremont McKenna College | 111 | 229 | 94 | 1.32 | 30.17% | 1.27% | 0.42% |
| Icahn School of Medicine at Mount Sinai | 2,833 | 2,980 | 83 | 1.17 | 2.73% | 0.04% | 0.04% |
| University of Pennsylvania | 9,370 | 11,344 | 1,566 | 21.92 | 11.95% | 0.23% | 0.17% |
| Washington University in St Louis | 3,011 | 4,158 | 1,435 | 20.09 | 23.92% | 0.66% | 0.33% |
| Duke University | 5,825 | 7,147 | 1,707 | 23.90 | 17.82% | 0.41% | 0.25% |
| Bryn Mawr College | 111 | 186 | 90 | 1.26 | 35.73% | 1.18% | 0.50% |
| Hamilton College | 124 | 189 | 101 | 1.41 | 34.89% | 1.15% | 0.49% |
| Trinity University | 123 | 203 | 115 | 1.61 | 43.62% | 1.31% | 0.61% |
| **Panel C: Student above 500, and per student Asset between 400 to 500K** | | | | | | | |
| University of Chicago | 3,464 | 3,869 | 654 | 9.15 | 13.44% | 0.26% | 0.19% |
| Berry College | 82 | 138 | 86 | 1.20 | 45.98% | 1.47% | 0.64% |
| Middlebury College | 237 | 302 | 112 | 1.57 | 27.86% | 0.69% | 0.39% |
| Northwestern University | 2,132 | 2,758 | 1,055 | 14.77 | 28.72% | 0.71% | 0.40% |
| Vassar College | 171 | 208 | 86 | 1.20 | 27.74% | 0.70% | 0.39% |
| Colby College | 141 | 253 | 103 | 1.44 | 28.47% | 1.02% | 0.40% |
| Davidson College | 118 | 223 | 111 | 1.55 | 36.19% | 1.29% | 0.51% |
| Wabash College | 48 | 62 | 22 | 0.31 | 23.56% | 0.67% | 0.33% |
| **Panel D: Student between 400 to 600, and per student Asset above 500K** | | | | | | | |
| Soka University of America | 51 | 124 | 66 | 0.92 | 22.22% | 1.89% | 0.31% |
| Principia College | 39 | 62 | 48 | 0.67 | 62.34% | 1.77% | 0.87% |

*Note:* The data are averaged from 2017 to 2021. Estimated NIIT is calculated by multiplying investment revenue by 1.4%. For observations with negative investment returns, the tax amount is defined as 0. All monetary amounts are adjusted by CPI and reported in 2010 real dollars.

Table A2: Distance of Endowment Assets and Student Enrollment from Tax Threshold

| | Distance of from Endowment Threshold | | | | Average Growth Rate | |
|---|---|---|---|---|---|---|
| | Endowment Assets | | FTE Enrollment | | Endowment Assets | FTE Enrollment |
| | $ Million | % | Count | % | | |
| **Panel A: Student above 500, and per student Asset above 600K** | | | | | | |
| Princeton University | –19,312 | –82.70% | 38,625 | 477.93% | 5.36% | 0.76% |
| Yale University | –21,025 | –77.25% | 42,051 | 339.59% | 6.14% | 1.11% |
| Harvard University | –25,248 | –68.06% | 50,496 | 213.09% | 2.65% | 0.78% |
| Stanford University | –16,561 | –66.82% | 33,122 | 201.37% | 7.13% | –0.22% |
| Middlebury Institute of International Studies at Monterey | –715 | –66.60% | 1,431 | 199.44% | 1.77% | 0.35% |
| Pomona College | –1,386 | –64.01% | 2,772 | 177.89% | 4.35% | 0.10% |
| Massachusetts Institute of Technology | –9,209 | –62.09% | 18,418 | 163.75% | 7.45% | 1.28% |
| Swarthmore College | –1,184 | –60.56% | 2,369 | 153.58% | 4.69% | 0.31% |
| Amherst College | –1,324 | –58.88% | 2,647 | 143.17% | 5.71% | 0.52% |
| The Juilliard School | –610 | –58.34% | 1,220 | 140.02% | 4.59% | –0.11% |
| California Institute of Technology | –1,521 | –57.61% | 3,043 | 135.88% | 8.74% | 0.50% |
| Williams College | –1,320 | –55.39% | 2,640 | 124.15% | 5.43% | 0.38% |
| Grinnell College | –1,035 | –55.33% | 2,070 | 123.85% | 4.28% | 0.49% |
| Rice University | –2,505 | –42.92% | 5,009 | 75.20% | 4.63% | 2.52% |
| Cooper Union for the Advancement of Science and Art | –334 | –41.84% | 669 | 71.93% | 4.64% | –0.92% |
| Bowdoin College | –555 | –38.09% | 1,109 | 61.53% | 8.56% | 0.44% |
| Wellesley College | –735 | –38.06% | 1,470 | 61.43% | 4.28% | –0.43% |
| University of Notre Dame | –3,557 | –36.73% | 7,114 | 58.05% | 7.36% | 0.58% |
| Dartmouth College | –1,789 | –36.09% | 3,578 | 56.48% | 6.43% | 0.84% |
| Medical College of Wisconsin | –287 | –32.77% | 574 | 48.74% | 10.98% | 0.98% |
| Baylor College of Medicine | –351 | –30.97% | 702 | 44.86% | 6.35% | 0.84% |
| Washington and Lee University | –469 | –30.32% | 938 | 43.52% | 4.13% | –0.09% |
| University of Richmond | –501 | –21.11% | 1,002 | 26.76% | 4.22% | –0.73% |
| Smith College | –348 | –19.72% | 697 | 24.56% | 3.88% | –1.16% |
| **Panel B: Student above 500, and per student Asset between 500 to 600K** | | | | | | |
| Emory University | –1,109 | –14.56% | 2,217 | 17.04% | 5.89% | 0.37% |
| Claremont McKenna College | –111 | –14.18% | 222 | 16.52% | 6.64% | 0.93% |
| Icahn School of Medicine at Mount Sinai | –74 | –10.90% | 147 | 12.24% | 1.94% | 1.93% |
| University of Pennsylvania | –934 | –7.65% | 1,868 | 8.28% | 11.08% | 0.07% |
| Washington University in St Louis | –387 | –5.37% | 775 | 5.67% | 5.37% | 1.59% |
| Duke University | –302 | –3.82% | 604 | 3.97% | 5.83% | 0.59% |
| Bryn Mawr College | –22 | –2.63% | 45 | 2.70% | 4.29% | 0.06% |
| Hamilton College | –18 | –1.91% | 36 | 1.94% | 5.20% | 0.22% |
| Trinity University | –1 | –0.05% | 1 | 0.05% | 3.96% | –0.11% |
| **Panel C: Student above 500, and per student Asset between 400 to 500K** | | | | | | |
| University of Chicago | 451 | 6.81% | –902 | –6.38% | 2.71% | 0.89% |
| Berry College | 89 | 9.20% | –178 | –8.43% | 4.17% | 1.14% |
| Middlebury College | 186 | 17.34% | –372 | –14.78% | 3.12% | 0.04% |
| Northwestern University | 1,515 | 19.06% | –3,029 | –16.01% | 6.65% | 0.85% |
| Vassar College | 203 | 20.26% | –406 | –16.85% | 3.71% | –0.01% |
| Colby College | 164 | 21.21% | –329 | –17.50% | 4.25% | 0.50% |
| Davidson College | 171 | 23.44% | –341 | –18.99% | 6.18% | 0.51% |
| Wabash College | 81 | 23.73% | –162 | –19.18% | 0.15% | –0.50% |

*Note:* The distances from the endowment threshold are calculated as the amount/number/proportion of endowment/students needed to be increased or decreased in order to make a college meet the tax threshold to be exempted from the tax or a college below the thresholds to be subject to the tax. The average growth rates were averaged from 2010 to 2016. All monetary amounts are reported in nominal values.

Table A3: Expenditure-related Tax Shifting Behavior (All Sample)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | Log Expenditure | | | | | | |
| | Total | Instruction | Research | Public Service | Institution Support | Auxiliary Facilities | Institution Grant |
| **Panel A: All Colleges** | | | | | | | |
| $Treat \times Post$ | 0.044 | 0.009 | 0.037 | 0.161 | 0.026 | 0.038 | –0.015 |
| | (0.032) | (0.032) | (0.079) | (0.136) | (0.082) | (0.045) | (0.040) |
| Observations | 9,372 | 9,456 | 9,456 | 9,456 | 9,456 | 9,456 | 9,456 |
| Baseline Mean (Million) | 1,726 | 478 | 222 | 123 | 28 | 459 | 121 |
| **Panel B: Research Universities** | | | | | | | |
| $Treat \times Post$ | 0.104* | 0.044 | 0.210 | –0.032 | 0.002 | 0.096 | –0.097 |
| | (0.060) | (0.060) | (0.136) | (0.103) | (0.117) | (0.073) | (0.072) |
| Observations | 3,744 | 3,756 | 3,756 | 3,756 | 3,756 | 3,756 | 3,756 |
| Baseline Mean (Million) | 3,373 | 957 | 411 | 227 | 15 | 871 | 227 |
| **Panel C: Non-Research Universities** | | | | | | | |
| $Treat \times Post$ | 0.027 | 0.013 | –0.037 | 0.228 | 0.093 | 0.022 | 0.036 |
| | (0.037) | (0.043) | (0.095) | (0.180) | (0.120) | (0.056) | (0.053) |
| Observations | 5,520 | 5,592 | 5,592 | 5,592 | 5,592 | 5,592 | 5,592 |
| Baseline Mean (Million) | 445 | 79 | 65 | 36 | 38 | 115 | 33 |

*Note:* The coefficients are estimated using equation (2). Standard errors clustered at the institution level in parentheses. The outcomes are the log expenditure by spending category. Column (1) is the total expenditure. Column (2) is the sum of instructional and academic support expenditures. Column (3) is the sum of research and independent operation expenditure. Column (4) is the public service expenditure. Column (5) is the institutional support expenditure, which includes spending on operational support, administrative services, and management. Column (6) is the sum of auxiliary facilities, hospital, and student service expenditure. Column (7) is the net institutional grant aid to students, including scholarships and fellowships. All dollars are adjusted by CPI and denoted in 2010 real dollars. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. Panel B restricted the sample to colleges categorized as doctoral or master institutions in the Carnegie categorization. Panel C restricted the sample to colleges not categorized as doctoral or master institutions in the Carnegie categorization. The observation period is from 2010 to 2021.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

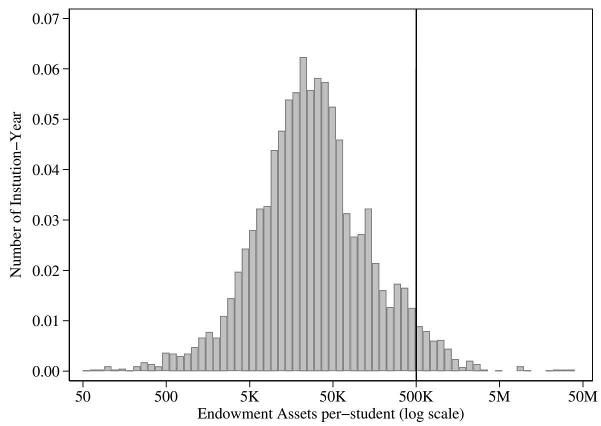
Table A4: Enrollment, Tuition, and Charge-related Tax Shifting Behavior (All Sample)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Log FTE | Log Listed Price | | | Log Total Revenue | |
| | Enrollment | Undergrad Tuition | Graduate Tuition | Room & Board | Tuition | Auxiliary |
| **Panel A: All Colleges** | | | | | | |
| $Treat \times Post$ | 0.035** | 0.023*** | 0.011 | 0.029*** | 0.133*** | 0.013 |
| | (0.015) | (0.008) | (0.022) | (0.011) | (0.027) | (0.045) |
| Observations | 10,308 | 10,308 | 10,308 | 10,308 | 9,515 | 9,515 |
| Baseline Mean (Thousand) | 6.037 | 39.033 | 28.449 | 11.451 | 162,878 | 61,246 |
| **Panel B: Research Universities** | | | | | | |
| $Treat \times Post$ | 0.009 | 0.014 | 0.034 | 0.025* | 0.039 | 0.096 |
| | (0.022) | (0.010) | (0.030) | (0.014) | (0.030) | (0.070) |
| Observations | 4,160 | 4,160 | 4,160 | 4,160 | 3,840 | 3,840 |
| Baseline Mean (Thousand) | 11.127 | 41.906 | 39.592 | 12.289 | 304,929 | 113,932 |
| **Panel C: Non-Research Universities** | | | | | | |
| $Treat \times Post$ | 0.054*** | 0.029*** | –0.006 | 0.033** | 0.201*** | –0.046 |
| | (0.020) | (0.011) | (0.031) | (0.015) | (0.038) | (0.055) |
| Observations | 6,148 | 6,148 | 6,148 | 6,148 | 5,675 | 5,675 |
| Baseline Mean (Thousand) | 1.795 | 36.639 | 19.164 | 10.752 | 44,503 | 17,341 |

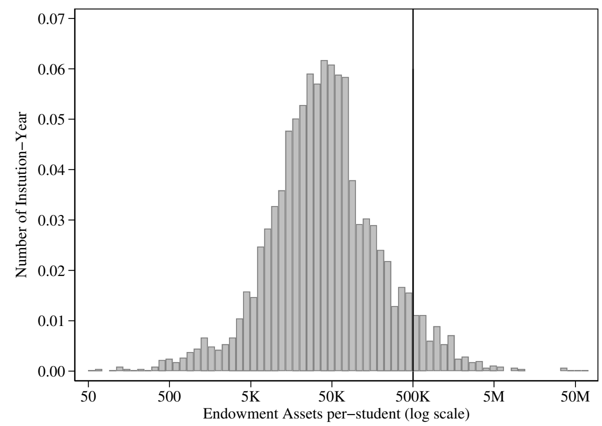
*Note:* The coefficients are estimated using equation (2). Standard errors clustered at the institution level in parentheses. The outcomes are the log enrollment, price, and revenue. All dollars are adjusted by CPI and denoted in 2010 real dollars. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. Panel B restricted the sample to colleges categorized as doctoral or master institutions in the Carnegie categorization. Panel C restricted the sample to colleges not categorized as doctoral or master institutions in the Carnegie categorization. The observation period is from 2010 to 2022 for columns (1) to (4) and 2010 to 2021 for columns (5) and (6).
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Figure A1: Distribution of Endowment Assets Per-student

(a) Fiscal Year 2010 to 2016



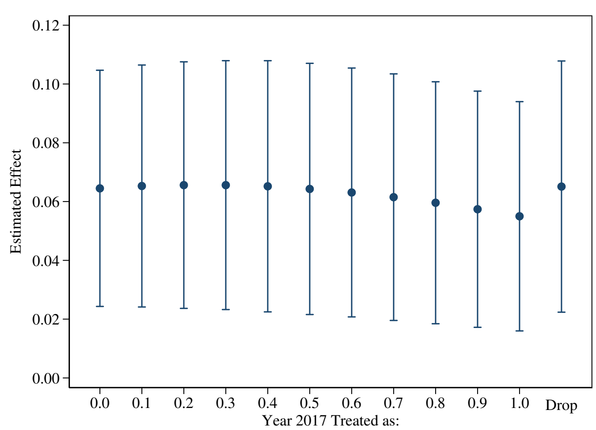

(b) Fiscal Year 2017 to 2021



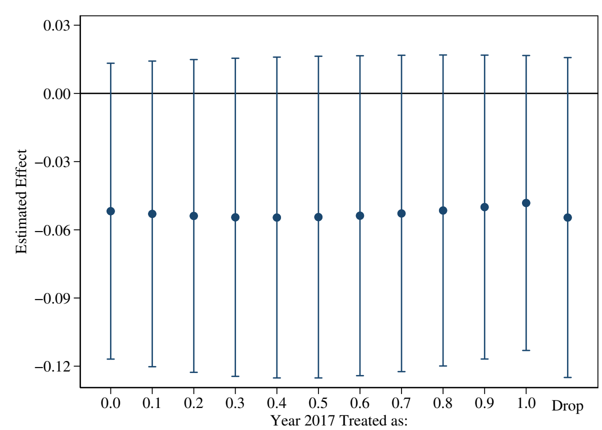

*Note:* The samples are private nonprofit colleges that reported in IPEDS and filed Form 990 every year from 2010 to 2022. Endowment assets per student are calculated as endowment asset values divided by full-time equivalent (FTE) students (with one part-time student taken into account as one-third of full-time students). Endowment asset amounts are reported in nominal values.

Figure A2: Tax Avoidance Behaviors: Robustness Check by Definitions of Treated Period

(a) Log Number of FTE Students

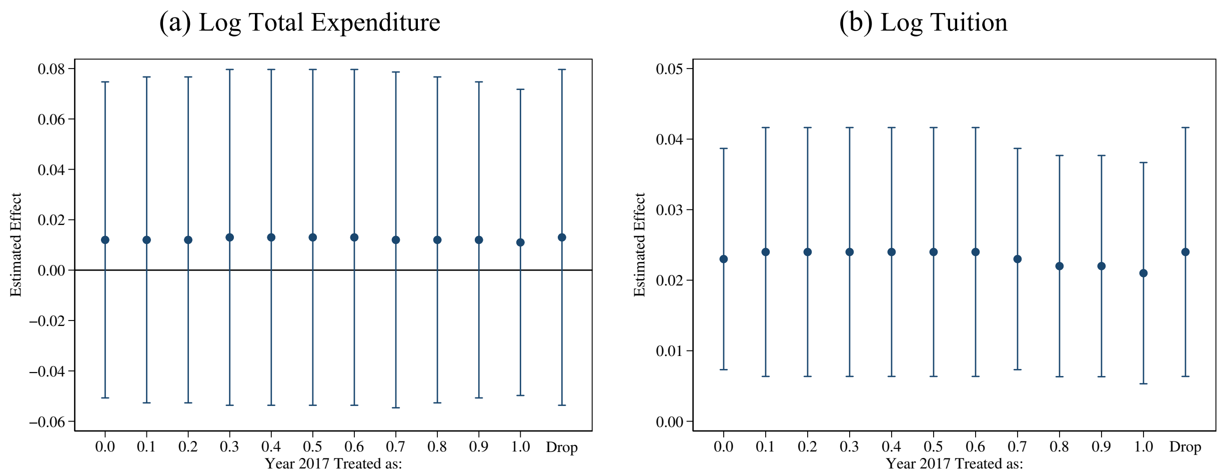



(b) Log Endowment Assets Per student




*Note:* The coefficients are estimated using equation (1). The error bars denote the 95% confidence interval. The samples are private nonprofit colleges that reported in IPEDS and filed Form 990 every year from 2010 to 2022, with a student population above 500 in 2016. FTE (full-time equivalent) is calculated as the sum of full-time and one-third of part-time students.

Figure A3: Tax Shifting Behaviors: Robustness Check by Definitions of Treated Period




*Note:* The coefficients are estimated using equation (2). The error bars denote the 95% confidence interval. The samples are private nonprofit colleges that reported in IPEDS and filed Form 990 every year from 2010 to 2022, with a student population above 500 in 2016. FTE (full-time equivalent) is calculated as the sum of full-time and one-third of part-time students.

# Appendix B: Restricting Sample to Selective Colleges

## B1 Empirical Design

A primary concern in the DD setting of the main analysis is the potential disparity between the treatment group (colleges taxed or near the tax threshold) and the comparison group, which typically consists of less wealthy and less selective institutions. This fundamental difference raises questions about the validity of the comparison group as a counterfactual for the treatment group.

To address this concern, I restrict the comparison group to institutions more closely resembling those in the treatment group. Beyond their wealth, most colleges subject (or potentially subject) to the NIIT are characterized by high selectivity and prestige. For instance, among the 41 colleges in our treatment group (including those taxed and those very close to the threshold), 32 are categorized as "most selective" in the Barron's Selectivity Index, three are classified as "highly competitive," and one is considered "very competitive." The remaining five are categorized as "specialized institutions." Furthermore, in the U.S. News Rankings, 32 of these colleges ranked in the top 50 (either of the ranking list of National Universities or Liberal Arts Colleges), with one ranked between 50-100 and another between 100-150.

It is reasonable to posit that colleges with similar levels of selectivity and prestige might react similarly to macroeconomic environments. These highly selective institutions typically compete with one another to attract students, and they tend to pursue similar admission strategies (Smith et al., 2018). Colleges with comparable reputations and academic rankings also tend to share similar financial metrics and management strategies (Volkwein & Sweitzer, 2006). Previous studies suggest that restricting comparisons to institutions with similar academic standing could provide a more reliable basis for analysis (Stange, 2015; Zhu et al., 2021; Bennett, 2022).

To construct more appropriate comparison groups, I link the dataset to the 2016 Barron's Selectivity Index and U.S. News rankings (for both National Universities and Liberal Arts Colleges). I created two sub-samples: one restricting to institutions in Barron's top three selectivity categories and another including those ranked in the top 100 by U.S. News in 2016.

Table B1 details the sample sizes in these sub-samples. It is important to note that while this approach restricts the comparison group to institutions more similar to the treatment group, it also excludes some treatment group institutions that are less selective and prestigious than their counterparts. This refined sample selection strategy aims to create a more comparable control group, addressing concerns about the uniqueness of the treated institutions and the potential lack of a reasonable counterfactual. By focusing on institutions with similar prestige and selectivity, we enhance the validity of our DD design, although we acknowledge the trade-off in sample size and the potential exclusion of some treated institutions.

Table B1: Number of Units in Each Sub-sample

| | Number of Units | |
|---|---|---|
| Sub-sample | Treatment Group | Comparison Group |
| **Tax Avoidance** | | |
| Main Results | 17 | 776 |
| Barrons Selectivity Index Above Very Competetive | 16 | 288 |
| US News' Ranking Top 100 | 14 | 127 |
| **Tax Shifting** | | |
| Main Results | 24 | 752 |
| Barrons Selectivity Index Above Very Competetive | 20 | 268 |
| US News' Ranking Top 100 | 19 | 108 |

## B2 Empirical Results

### B2.1 Tax Avoidance

Table B2 replicates the main results of colleges' manipulation behaviors related to student enrollment using our alternative, more selective samples. The findings suggest that colleges around the cutoff increased their FTE enrollment by 5.4% to 6.6%, closely aligning with our main estimate of 6.4%. This consistency across sample specifications strengthens our confidence in the robustness of these results. The decomposition results by enrollment status and education level also echo the main findings. Figure B1 demonstrates the dynamic effect based on the event study design, with the trajectory of the response aligning closely with the main results.

Table B2: Student Enrollment-related Tax Avoidance Behavior: Selective Colleges

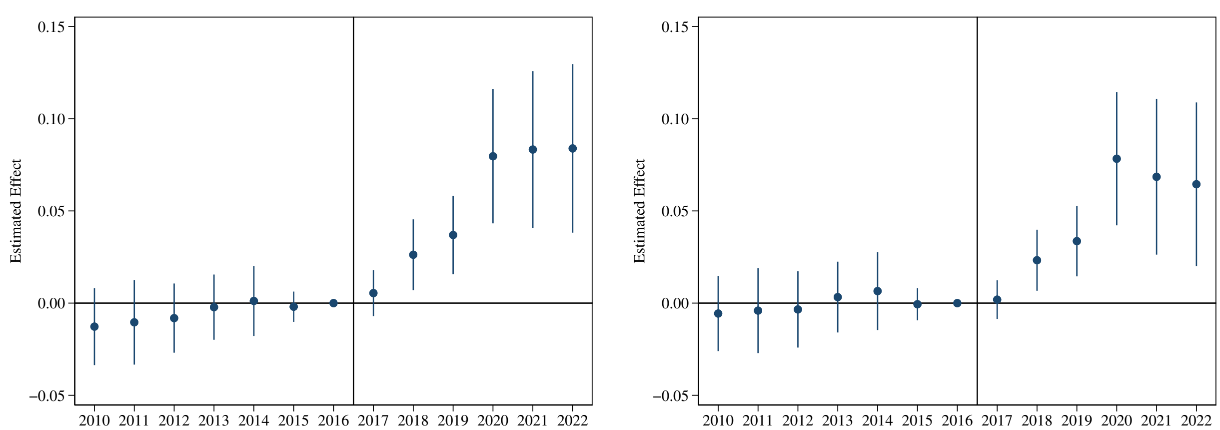
| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Log FTE | By Enrollment Status | | By Student Level | |
| | Enrollment | Full-time | Part-time | Undergraduate | Graduate |
| **Panel A: Barron's Rank Above Very Competetive** | | | | | |
| $Cutoff \times Post$ | 0.066*** | 0.067*** | 0.037 | 0.063*** | 0.094 |
| | (0.019) | (0.019) | (0.137) | (0.024) | (0.193) |
| Observations | 3,900 | 3,900 | 3,900 | 3,900 | 3,900 |
| Baseline Mean (Thousand) | 7.272 | 6.955 | 0.950 | 4.010 | 3.262 |
| **Panel B: US News' Ranking Top 100** | | | | | |
| $Cutoff \times Post$ | 0.054*** | 0.054*** | 0.089 | 0.047* | 0.154 |
| | (0.019) | (0.020) | (0.145) | (0.025) | (0.214) |
| Observations | 1,807 | 1,807 | 1,807 | 1,807 | 1,807 |
| Baseline Mean (Thousand) | 7.988 | 7.630 | 1.072 | 4.274 | 3.714 |

*Note:* The coefficients are estimated using equation (1). Standard errors clustered at the institution level in parentheses. The outcomes are log students enrollment. The number of full-time equivalent (FTE) students is defined as the sum of full-time and one-third of part-time students. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. Panel A restricts the sample to those with Barron's Rank as most competitive, highly competitive, or very competitive. Panel B restricts the sample to those with US News Ranking among the top 100 in 2016. The observation period is from 2010 to 2022.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Figure B1: Tax Avoidance Behavior: Log Number of FTE Students

(a) Barron's Index Above Very Competetive

(b) US News' Ranking Top 100




*Note:* The coefficients are estimated using the event study version of equation (1). The error bars denote the 95% confidence interval. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. Figure B1a restricts the sample to those with Barron's Rank as most competitive, highly competitive, or very competitive. Figure B1b restricts the sample to those with US News Ranking among the top 100 in 2016.

Table B3 examines endowment asset manipulation. Consistent with the main results, I find a null response in total endowment and across various asset categories. This consistency suggests our results are not driven by differences between highly and less selective institutions. Figure B2 illustrates the event study analysis, showing temporal patterns of endowment responses mirror our main analysis, reinforcing the robustness of our results across institutional profiles.

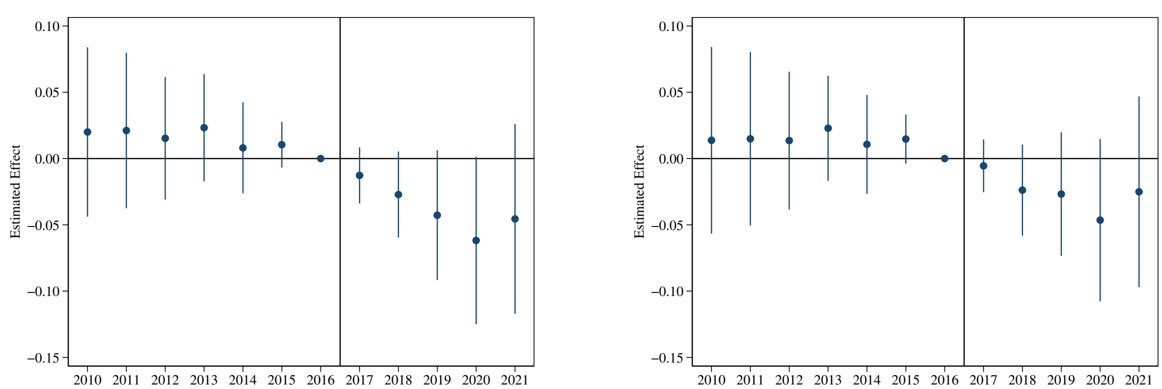
Table B3: Endowment and Asset-related Tax Avoidance Behavior: Selective Colleges

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Log Endowment | | By Restricted Status | | By Category | | | |
| | Total | Per-student | Non-restricted | Restricted | Capital | Investment | Others | Liability |
| **Panel A: Barron's Rank Above Very Competetive** | | | | | | | | |
| $Cutoff \times Post$ | 0.004 | –0.058 | –0.003 | 0.023 | 0.039 | 0.054 | –0.167 | 0.151 |
| | (0.037) | (0.037) | (0.141) | (0.030) | (0.043) | (0.043) | (1.064) | (0.098) |
| Observations | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 |
| Baseline Mean (Thousand) | 3,312 | 0.438 | 2,128 | 2,259 | 2,609 | 4,041 | 12 | 1,715 |
| **Panel B: US News' Ranking Top 100** | | | | | | | | |
| $Cutoff \times Post$ | 0.007 | –0.044 | –0.033 | 0.018 | 0.037 | 0.055 | 0.002 | 0.123 |
| | (0.040) | (0.039) | (0.173) | (0.032) | (0.048) | (0.048) | (1.172) | (0.109) |
| Observations | 1,668 | 1,668 | 1,668 | 1,668 | 1,668 | 1,668 | 1,668 | 1,668 |
| Baseline Mean (Thousand) | 3,643 | 0.438 | 2,389 | 2,468 | 2,932 | 4,478 | 13 | 1,940 |

*Note:* The coefficients are estimated using equation (1). Standard errors clustered at the institution level in parentheses. The outcomes are log endowment assets. All dollars are adjusted by CPI and denoted in 2010 real dollars. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. Panel A restricts the sample to those with Barron's Rank as most competitive, highly competitive, or very competitive. Panel B restricts the sample to those with US News Ranking among the top 100 in 2016. The observation period is from 2010 to 2021.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Figure B2: Tax Avoidance Behavior: Log Endowmenr Per Student

(a) Barron's Index Above Very Competetive (b) US News' Ranking Top 100




*Note:* The coefficients are estimated using the event study version of equation (1). The error bars denote the 95% confidence interval. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. Figure B2a restricts the sample to those with Barron's Rank as most competitive, highly competitive, or very competitive. Figure B2b restricts the sample to those with US News Ranking among the top 100 in 2016.

### B2.2 Tax Shifting

Table B4 presents a similar analysis focusing on tax-shifting behaviors. The results show a null effect on total spending and in most spending categories, consistent with our main findings. The only exception is the estimate of total spending on institutional grants. While the main result shows no significant impact on institutional grants, the subsample focusing on selective colleges demonstrates a 9% to 41% increase in grant spending ($p < 0.1$). However, it is important to note that due to the smaller sample size, these estimates are less precise. Figure B3 illustrates the dynamic effects based on the event study design. The Barron's Index sample shows a pattern very similar to the main findings, while the US News sample demonstrates a minor, non-significant negative trend in total spending after policy adoption.

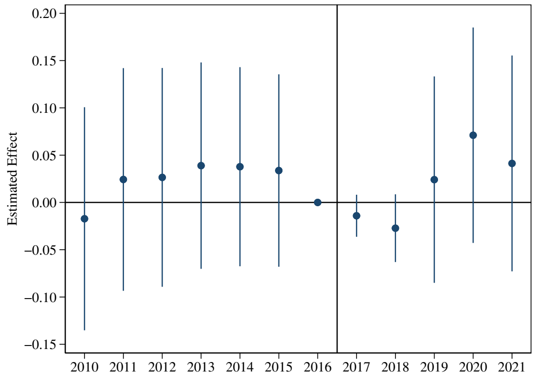
Table B4: Expenditure-related Tax Shifting Behavior: Selective Colleges

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | Log Expenditure | | | | | | |
| | Total | Instruction | Research | Public Service | Institution Support | Auxiliary Facilities | Institution Grant |
| **Panel A: Barron's Rank Above Very Competetive** | | | | | | | |
| $Treat \times Post$ | 0.005 | –0.004 | 0.096 | 0.129 | –0.053 | 0.017 | 0.418* |
| | (0.036) | (0.038) | (0.114) | (0.140) | (0.054) | (0.050) | (0.232) |
| Observations | 3,324 | 3,324 | 3,324 | 3,324 | 3,324 | 3,324 | 3,324 |
| Baseline Mean (Million) | 1,614 | 552 | 222 | 8 | 134 | 490 | 143 |
| **Panel B: US News' Ranking Top 100** | | | | | | | |
| $Treat \times Post$ | –0.055 | –0.028 | 0.142 | 0.089 | –0.167* | –0.107 | 0.093* |
| | (0.050) | (0.058) | (0.218) | (0.306) | (0.088) | (0.067) | (0.052) |
| Observations | 1,380 | 1,380 | 1,380 | 1,380 | 1,380 | 1,380 | 1,380 |
| Baseline Mean (Million) | 1,731 | 591 | 239 | 9 | 143 | 526 | 151 |

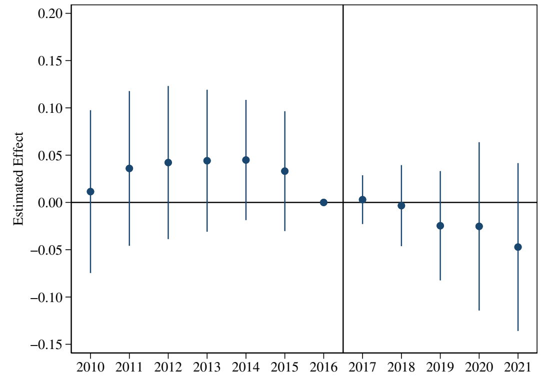
*Note:* The coefficients are estimated using equation (2). Standard errors clustered at the institution level in parentheses. The outcomes are the log expenditure by spending category. Column (1) is the total expenditure. Column (2) is the sum of instructional and academic support expenditures. Column (3) is the sum of research and independent operation expenditure. Column (4) is the public service expenditure. Column (5) is the institutional support expenditure, which includes spending on operational support, administrative services, and management. Column (6) is the sum of auxiliary facilities, hospital, and student service expenditure. Column (7) is the net institutional grant aid to students, including scholarships and fellowships. All dollars are adjusted by CPI and denoted in 2010 real dollars. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. All Panels exclude colleges with endowment assets per student between $400,000 and 600,000 in 2016 (i.e., only include the donut sample). Panel A restricts the sample to those with Barron's Rank as most competitive, highly competitive, or very competitive. Panel B restricts the sample to those with US News Ranking among the top 100 in 2016. The observation period is from 2010 to 2021.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Figure B3: Tax Shifting Behavior: Log Total Expenditure

(a) Barron's Index Above Very Competetive




(b) US News' Ranking Top 100

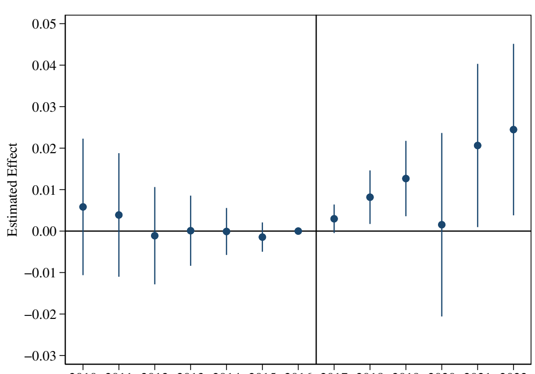



*Note:* The coefficients are estimated using the event study version of equation (2). The error bars denote the 95% confidence interval. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. Figure B3a restricts the sample to those with Barron's Rank as most competitive, highly competitive, or very competitive. Figure B3b restricts the sample to those with US News Ranking among the top 100 in 2016.

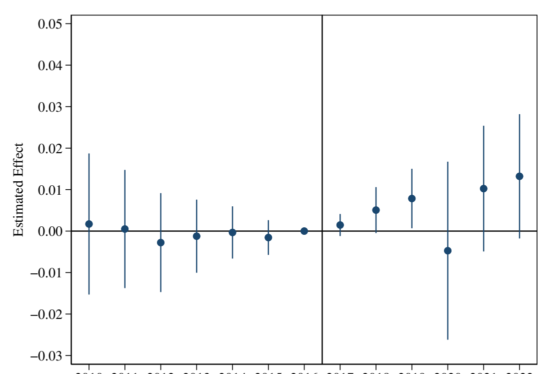
Table B5 investigates responses in tuition and charges. The results indicate that taxed colleges increase listed undergraduate tuition by 1.8% to 2.7%, close to the main estimate of 2.4%. Figure B4 demonstrates the dynamic effects based on the event study design. Both samples show similar trends, though the US News sample exhibits a smaller magnitude of effect. The response in room & board charges shows some variation across samples. Results restricted to institutions with higher Barron's Selectivity Index demonstrate an increase in charges of 4.4% (close to the main estimate of 4.2%), while results based on top-ranking colleges show an insignificant 1.8% response.

Figure B4: Tax Shifting Behavior: Log Listed Undergraduate Tuition

(a) Barron's Index Above Very Competetive




(b) US News' Ranking Top 100




*Note:* The coefficients are estimated using the event study version of equation (1). The error bars denote the 95% confidence interval. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. FigureB4a restricts the sample to those with Barron's Rank as most competitive, highly competitive, or very competitive. Figure B4b restricts the sample to those with US News Ranking among the top 100 in 2016.

Table B5: Enrollment, Tuition, and Charge-related Tax Shifting Behavior: Selective Colleges

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Log FTE | Log Listed Price | | | Log Total Revenue | |
| | Enrollment | Undergrad Tuition | Graduate Tuition | Room & Board | Tuition | Auxiliary |
| **Panel A: Barron's Rank Above Very Competetive** | | | | | | |
| $Treat \times Post$ | 0.015 | 0.027* | 0.007 | 0.044*** | 0.109** | 0.014 |
| | (0.027) | (0.014) | (0.027) | (0.015) | (0.047) | (0.064) |
| Observations | 3,601 | 3,601 | 3,601 | 3,601 | 3,324 | 3,324 |
| Baseline Mean (Thousand) | 6.917 | 43.415 | 28.498 | 12.995 | 187,940 | 71,791 |
| **Panel B: US News' Ranking Top 100** | | | | | | |
| $Treat \times Post$ | 0.009 | 0.018* | 0.023 | 0.018 | 0.042 | –0.010 |
| | (0.025) | (0.010) | (0.030) | (0.014) | (0.050) | (0.078) |
| Observations | 1,495 | 1,495 | 1,495 | 1,495 | 1,380 | 1,380 |
| Baseline Mean (Thousand) | 7.321 | 43.915 | 27.851 | 12.990 | 200,481 | 76,417 |

*Note:* The coefficients are estimated using equation (2). Standard errors clustered at the institution level in parentheses. The outcomes are the log enrollment, price, and revenue. All dollars are adjusted by CPI and denoted in 2010 real dollars. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. All Panels exclude colleges with endowment assets per student between $400,000 and 600,000 in 2016 (i.e., only include the donut sample). Panel A restricts the sample to those with Barron's Rank as most competitive, highly competitive, or very competitive. Panel B restricts the sample to those with US News Ranking among the top 100 in 2016. The observation period is from 2010 to 2022 for columns (1) to (4) and 2010 to 2021 for columns (5) and (6).
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

### B2.3 Enrollment Composition

Table B6 explores the effects on student enrollment by race/ethnicity. In general, the results align well with the main findings. Tax avoidance behaviors lead to an increase in student enrollment across almost all racial/ethnic groups (with the exception of Black students in the US News subsample). Conversely, tax-shifting behaviors result in a significant decrease in Hispanic student enrollment. The US News sample additionally identifies a significant negative effect on Black student enrollment. These results from more selective subsamples largely corroborate our main findings, suggesting that the observed effects on enrollment composition are consistent across different institutional profiles.

Table B6: Student Enrollment-related Tax Avoidance and Shifting Behavior by Race/Ethnicity

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Log FTE Enrollment | | | | | |
| | White | Black | Hispanic | Asian | Other Minority | NRA |
| **Panel A: Tax Avoidance, Barron's Rank Above Very Competetive** | | | | | | |
| $Cutoff \times Post$ | 0.085*** | 0.019 | 0.106** | 0.069* | 0.212*** | 0.018 |
| | (0.024) | (0.033) | (0.043) | (0.038) | (0.051) | (0.056) |
| Observations | 3,900 | 3,900 | 3,900 | 3,900 | 3,900 | 3,900 |
| Baseline Mean (Thousand) | 3.447 | 0.433 | 0.572 | 0.950 | 0.259 | 1.318 |
| **Panel B: Tax Avoidance, US News' Ranking Top 100** | | | | | | |
| $Cutoff \times Post$ | 0.072*** | –0.038 | 0.091*** | 0.046 | 0.184*** | 0.035 |
| | (0.022) | (0.030) | (0.029) | (0.032) | (0.054) | (0.045) |
| Observations | 1,807 | 1,807 | 1,807 | 1,807 | 1,807 | 1,807 |
| Baseline Mean (Thousand) | 3.723 | 0.480 | 0.607 | 1.074 | 0.283 | 1.495 |
| **Panel C: Tax Shifting, Barron's Rank Above Very Competetive** | | | | | | |
| $Treat \times Post$ | 0.002 | –0.037 | –0.105*** | 0.022 | –0.018 | 0.111** |
| | (0.022) | (0.030) | (0.039) | (0.035) | (0.046) | (0.051) |
| Observations | 3,692 | 3,692 | 3,692 | 3,692 | 3,692 | 3,692 |
| Baseline Mean (Thousand) | 3.135 | 0.387 | 0.592 | 0.956 | 0.304 | 1.336 |
| **Panel D: Tax Shifting, US News' Ranking Top 100** | | | | | | |
| $Treat \times Post$ | –0.012 | –0.078*** | –0.124*** | 0.028 | 0.011 | 0.042 |
| | (0.020) | (0.026) | (0.026) | (0.028) | (0.048) | (0.040) |
| Observations | 1,625 | 1,625 | 1,625 | 1,625 | 1,625 | 1,625 |
| Baseline Mean (Thousand) | 3.315 | 0.412 | 0.615 | 1.017 | 0.319 | 1.426 |

*Note:* The coefficients in Panel A and B are estimated using equation (1). The coefficients in Panel C and D are estimated using equation (2). Standard errors clustered at the institution level in parentheses. The outcomes are log full-time equivalent (FTE) students by race/ethnicity. Other minorities include Native Hawaiian and Pacific Islander (NHPI), American Indians and Alaska Natives (AIAN), and two or more races. NRA stands for non-resident alien. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. Panels C and D exclude colleges with endowment assets per student between $400,000 and 600,000 in 2016 (i.e., only include the donut sample). Panel A and B restrict the sample to those with Barron's Rank as most competitive, highly competitive, or very competitive. Panels C and D restrict the sample to those with US News Ranking among the top 100 in 2016. The observation period is from 2010 to 2022.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

# Appendix C: Triple-Difference Design

## C1 Empirical Strategy

In the main analysis, I use the DD framework to estimate colleges' tax avoidance and shifting behaviors. In the tax avoidance analysis, the treatment group consists of colleges near the asset threshold of the NIIT, while the comparison groups include those far away from the threshold. In the tax shifting analysis, I compare colleges subjected to the tax (treatment group) with those that meet the student threshold but not the asset threshold (the comparison group). However, in both settings, given the substantial difference between treatment and comparison groups, concern exists about whether they would have shared the same trend in the outcome variables. Despite the event study analysis demonstrating a parallel pre-treatment trend (at least conditional on the fixed effect), the concern of the DD setting still remains.

Hence, this study further applies a triple-difference (DDD) framework to test the robustness of the results. In the main analysis, I only included colleges that met the student threshold and separated the samples into treatment and comparison groups depending on the distance to the assets threshold. In the DDD design, I further introduce those colleges that do not meet the student threshold as additional comparison groups. The setup slightly differs between the tax avoidance and shifting analysis.

### C1.1 Tax Avoidance

In the tax avoidance analysis, I compare the colleges around the assets threshold and those far away between those meeting the student threshold and those not. In other words, I compare two differences: (1) the difference between the cutoff sample (with endowment assets per student within \$400,000 to \$600,000 in 2016) and the non-cutoff sample within large colleges (with student enrollment greater than 500 in 2016); (2) the same difference but within small colleges (with student enrollment less than 500 in 2016). And then, I track the change in the gaps between these two differences across time. Specifically, I estimate the following equation:

$$Y_{it} = \alpha_0 + \beta_1 Large_i \times Cutoff_i \times Post_t \tag{C1}$$
$$+ \theta_i + Large_i \times \delta_t + Cutoff_i \times \zeta_t + Above_i \times \phi_t + \varepsilon_{it}$$

Where $Large_i$ is a dummy variable indicating that the colleges had a student population above 500 in 2016. $Cutoff_i$ is a dummy variable indicating that the colleges had endowment assets per student within \$400,000 and \$600,000 in 2016. The equation includes the student population by year fixed effect ($Large_i \times \delta_t$), which accounts for the potential difference in trends between large and small colleges. Similarly, the inclusion of the distance to the cutoff status by year fixed effect ($Cutoff_i \times \zeta_t$) accounts for the potential difference in trends between those colleges that have similar levels of wealth and those not. $\theta_i$ is the institution fixed effect, which absorbs the interaction term of $Large_i \times Cutoff_i$. These three terms stand for the full interactions to establish the DDD setting. Similar to the equation (1), the specification includes the above-cutoff-status-by-year fixed effects ($Above_i \times \phi_t$) to account for potential differences in trends between those subject and those not subject to the tax. The key parameter is $\beta_1$, which indicates the behavioral response of colleges that have the motivation of tax avoidance.

The empirical assumption of the DDD is that the difference in outcomes between "large, around assets cutoff" and "large, not around assets cutoff" colleges would have followed the same trend as the difference between "small, around assets cutoff" and "small, not around assets cutoff" colleges in the absence of the policy. This assumption might be valid as the primary factors determining colleges' enrollment and finance metrics would be their student body and available resources.

### C1.2 Tax Shifting

In the tax shifting analysis, I separate colleges into four groups by both the student and assets threshold. Colleges meeting the student threshold (with student enrollment greater than 500 in 2016) are categorized as large and small otherwise. Colleges meeting the asset threshold (with endowment assets per student above \$500,000 in 2016) are categorized as wealthy and non-wealthy otherwise. As demonstrated in Figure 1a, this categorization groups colleges into four quadrants, with the upper right corner denoting the treatment group.

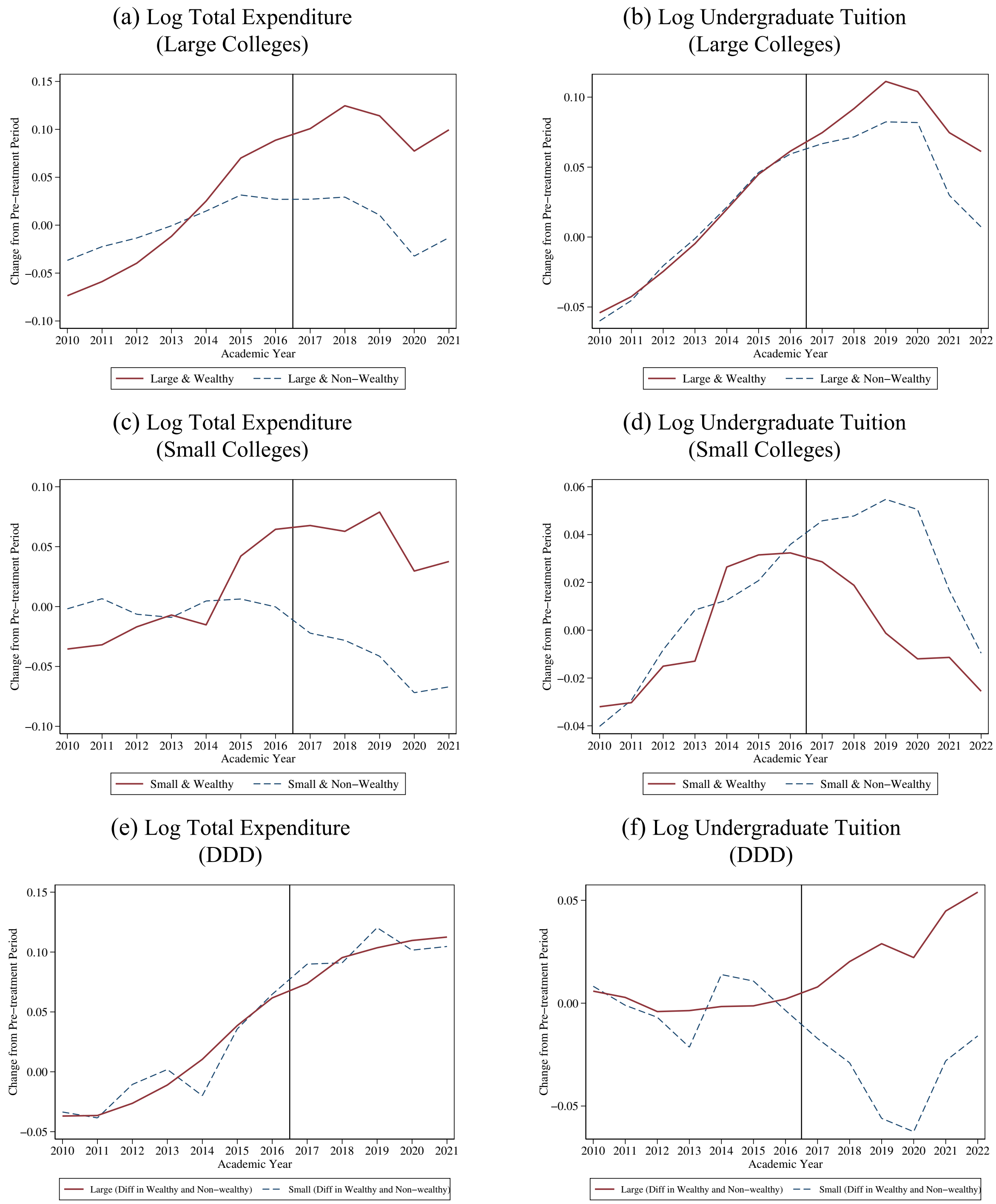
The basic idea of the DDD setting is to compare the changes in the gap between large wealthy and large non-wealthy colleges as well as the gap between small wealthy and small non-wealthy colleges. This analysis consists of all colleges (including those that unmet the student threshold) but still excludes those around the cutoff to prevent confounding from tax avoidance behaviors. Specifically, I estimate the following equation:

$$Y_{it} = \alpha_0 + \beta_1 Large_i \times Wealthy_i \times Post_t + \theta_i + Large_i \times \delta_t + Wealthy_i \times \zeta_t + \varepsilon_{it} \qquad \text{(C2)}$$

Where $Large_i$ is a dummy variable indicating that the colleges had a student population above 500 in 2016. $Wealthy_i$ is a dummy variable indicating that the colleges had endowment assets per student above $500,000 in 2016. The equation includes the student population by year fixed effect ($Large_i \times \delta_t$), which accounts for the potential difference in trends between large and small colleges. Similarly, the inclusion of asset size by year fixed effect ($Wealthy_i \times \zeta_t$) accounts for the potential difference in trends between wealthy and non-wealthy colleges. $\theta_i$ is the institution fixed effect, which absorbs the interaction term of $Large_i \times Wealthy_i$. These three terms stand for the full interactions to establish the DDD setting. The key parameter is $\beta_1$, which indicates the impact of policy on the colleges subject to the NIIT.

The empirical assumption of the DDD setting is that the difference in outcomes between "large, wealthy" and "large, non-wealthy" colleges would have followed the same trend as the difference between "small, wealthy" and "small, non-wealthy" colleges in the absence of the policy. In other words, the DDD design assumes that the gap between wealthy and non-wealthy colleges would be the same between colleges with various student sizes. This assumption might be valid as the primary factors determining colleges' finance metrics would be their service population and available resources. This paper further evaluates the assumption by examining the pre-treatment parallel trend. Specifically, while "large, wealthy colleges" (treated group) hold a faster growth rate in expenditure than the "large, non-wealthy colleges" (see Figure C1a), the same pattern appears in the comparison between "small, wealthy colleges" versus "small, non-wealthy colleges" (see Figure C1c). Figure C1e compares the gap in two paired comparisons and shows the same trend over time.

Figure C1: Tax Shifting: Trend in Total Expenditure and Tuition




*Note:* The samples are private nonprofit colleges that reported in IPEDS and filed Form 990 every year from 2010 to 2022 and exclude colleges with endowment assets per student between $400,000 and 600,000 in 2016 (i.e., only include the donut sample). The horizontal axis denotes the year (using the start year of the academic/fiscal year). The vertical axis denotes the percent change in the outcome variable from the pre-treatment period. The vertical line denotes the year of policy implementation. Large (small) colleges are colleges with more (less) than 500 students in 2016. Wealthy (non-wealthy) colleges are colleges with more (less) than $500,000 endowment assets per student (in nominal values) in 2016.

This paper employs DD in the primary setting while using DDD as a robustness check. The choice of the preferred specification involves a trade-off between bias and precision. While the DDD framework is better suited to correct the bias of comparing colleges with different asset levels, it necessitates the introduction of a comparison group of small but wealthy colleges. Most of these colleges are arts or medical schools. Due to their small student population and significant assets, they typically experience frequent and substantial fluctuations in spending. This setting, therefore, introduces more noise to the estimation and leads to larger standard errors.

## C2 Empirical Results

### C2.1 Tax Avoidance

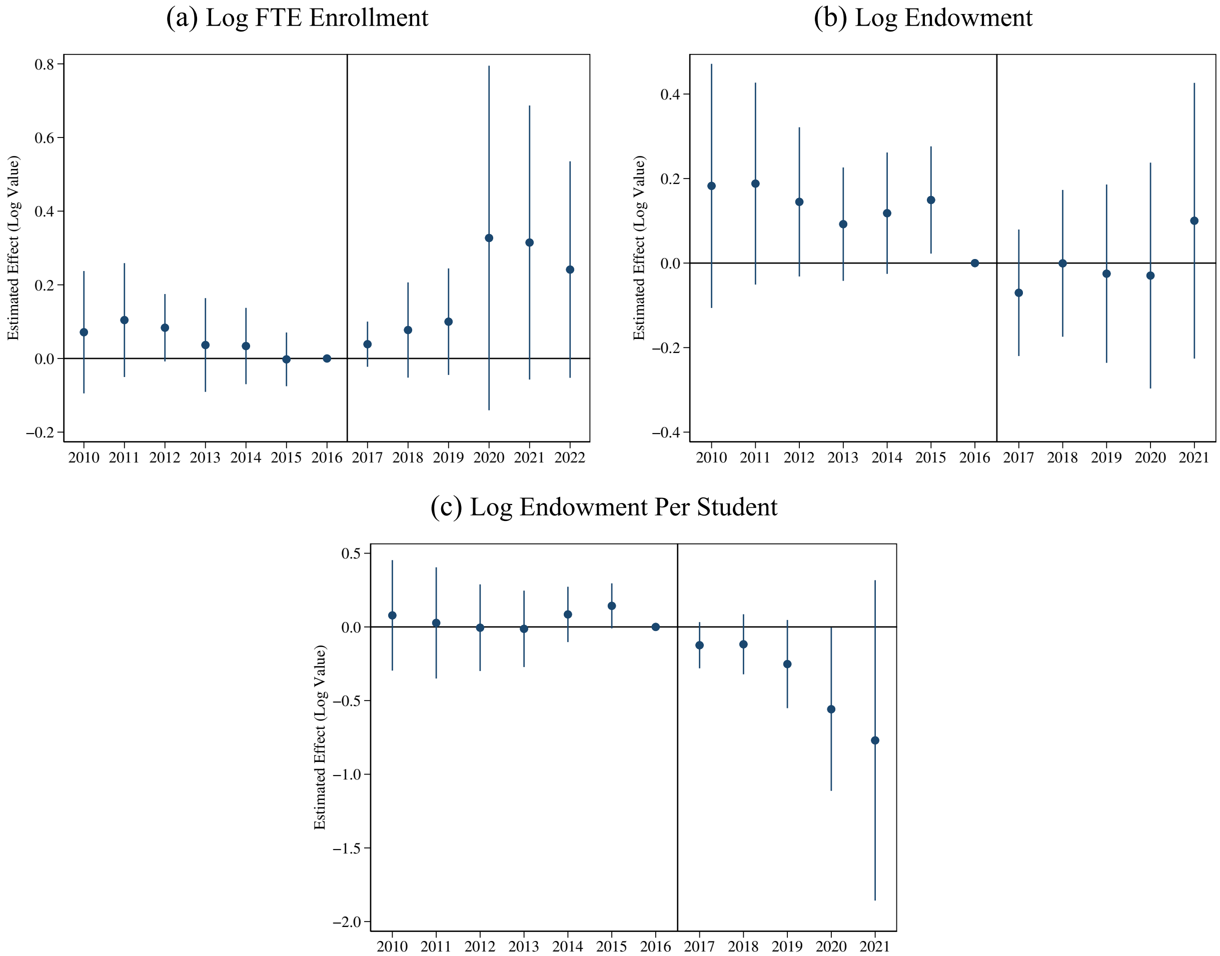
The DDD results of the student enrollment-related tax avoidance align with the main findings, though with larger standard errors. Table C1 demonstrates that colleges around the cutoff increase their FTE enrollment by 16% after the policy implementation, despite the estimate being non-significant. The event study results in Figure C2a show a good pre-treatment common trend and a clear pattern of increase in enrollment among the "large and around cutoff" group, despite all estimates being non-significant. The noisier estimates are likely due to fluctuations in student enrollment among smaller colleges. Despite this limitation, the pattern in student enrollment among affected colleges is still evident and aligns with the main findings.

Table C1: Student Enrollment-related Tax Avoidance Behavior: DDD Setting

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Log FTE | By Enrollment Status | | By Student Level | |
| | Enrollment | Full-time | Part-time | Undergraduate | Graduate |
| $Large \times Cutoff \times Post$ | 0.163 | 0.182 | 0.090 | 0.038 | 0.195 |
| | (0.138) | (0.167) | (0.134) | (0.103) | (0.216) |
| Observations | 12,233 | 12,233 | 12,233 | 12,233 | 12,233 |
| Baseline Mean (Thousand) | 4.928 | 4.715 | 0.639 | 2.678 | 2.250 |

*Note:* The coefficients are estimated using equation (E1). Standard errors clustered at the institution level in parentheses. The outcomes are log students enrollment. The number of full-time equivalent (FTE) students is defined as the sum of full-time and one-third of part-time students. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. Panel B restricted the sample to colleges with assets per student less than $500,000 in 2016. Panel C restricted the sample to colleges with assets per student of more than $500,000 in 2016. The observation period is from 2010 to 2022.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Figure C2: Event Study Estimates: Avoidance Behavior




*Note:* The coefficients are estimated using the event study version of equation (C2). The error bars denote the 95% confidence interval. The samples are private nonprofit colleges that reported in IPEDS and filed Form 990 every year from 2010 to 2022, and exclude colleges with endowment assets per student between \$400,000 and 600,000 in 2016 (i.e., only include the donut sample).

Table C2 explores the manipulation behaviors on endowment assets. The results demonstrate a 12% non-significant drop in total endowment for colleges with motivation for tax avoidance. Despite the non-trivial point estimate, the event study result in Figure C2b shows no clear pattern of a drop in asset values after the policy implementation. The overall findings still align with the main results.

Due to the increase in enrollment and unchanged endowment assets, the results show a drop in endowment assets per student (see Column (2) in Table C2 and Figure C2c). Overall, the tax avoidance findings from the DDD setting corroborate the main findings.

Table C2: Tax Avoidance Behavior on Student Enrollment

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Log Endowment | | By Restricted Status | | By Category | | | |
| | Total | Per-student | Non-restricted | Restricted | Capital | Investment | Others | Liability |
| $Large \times Cutoff \times Post$ | –0.121 | –0.466* | –0.036 | 0.118* | 0.040 | 0.107 | –0.606 | –0.065 |
| | (0.131) | (0.273) | (0.224) | (0.062) | (0.093) | (0.071) | (0.903) | (0.185) |
| Observations | 11,292 | 11,292 | 11,292 | 11,292 | 11,292 | 11,292 | 11,292 | 11,292 |
| Baseline Mean (Thousand) | 2,249 | 0.442 | 1,432 | 1,541 | 1,811 | 2,731 | 8 | 1,196 |

*Note:* The coefficients are estimated using equation (1). Standard errors clustered at the institution level in parentheses. The outcomes are log endowment assets. All dollars are adjusted by CPI and denoted in 2010 real dollars. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022, with a student population above 500 in 2016. Panel B restricted the sample to colleges with assets per student less than $500,000 in 2016. Panel C restricted the sample to colleges with assets per student of more than$500,000 in 2016. The observation period is from 2010 to 2021.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

## C2.2 Tax Shifting

The DDD results of the tax shifting response on total expenditure are quite similar to the DD estimations. Table C3 demonstrates that taxed colleges underwent an insignificant 0.2% increase in their total expenditure after the policy intervention (see Column (1)). There are also no negative responses for any of the spending categories.

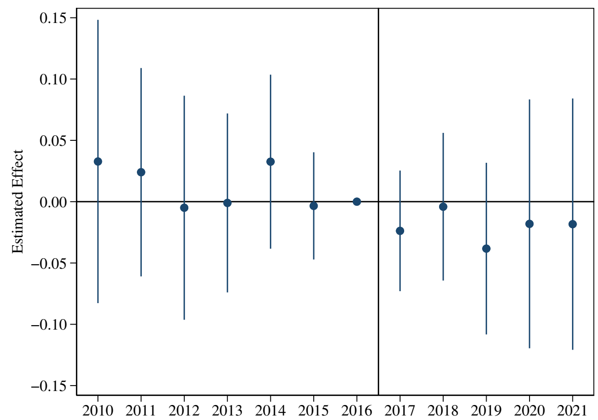
Table C3: Expenditure-related Tax Shifting Behavior: DDD Setting

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | Log Expenditure | | | | | | |
| | Total | Instruction | Research | Public Service | Institution Support | Auxiliary Facilities | Institution Grant |
| $Large \times Wealthy \times Post$ | 0.002 | 0.025 | 0.029 | 0.140** | 0.102 | 0.042 | 0.249 |
| | (0.043) | (0.043) | (0.054) | (0.059) | (0.108) | (0.047) | (0.411) |
| Observations | 11,004 | 11,004 | 11,004 | 11,004 | 11,004 | 11,004 | 11,004 |
| Baseline Mean (Million) | 1,524 | 478 | 222 | 28 | 121 | 459 | 123 |

*Note:* The coefficients are estimated using equation (3). Standard errors clustered at the institution level in parentheses. The outcomes are the log expenditure by spending category. Column (1) is the total expenditure. Column (2) is the sum of instructional and academic support expenditures. Column (3) is the sum of research and independent operation expenditure. Column (4) is the public service expenditure. Column (5) is the institutional support expenditure, which includes spending on operational support, administrative services, and management. Column (6) is the sum of auxiliary facilities, hospital, and student service expenditure. Column (7) is the net institutional grant aid to students, including scholarships and fellowships. All dollars are adjusted by CPI and denoted in 2010 real dollars. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022. All Panels exclude colleges with endowment assets per student between $400,000 and 600,000 in 2016 (i.e., only include the donut sample). The observation period is from 2010 to 2021.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

The event-study estimation reassures the findings. Figure C3 demonstrates non-significant estimates for all the pre-intervention periods, showing a good common trend. The results also suggest a null effect on spending change after the policy intervention.

Figure C3: Event Study Estimates: Tax Shifting Behavior on Total Expenditure




*Note:* The coefficients are estimated using the event study version of equation (C2). The error bars denote the 95% confidence interval. The samples are private nonprofit colleges that reported in IPEDS and filed Form 990 every year from 2010 to 2022, and exclude colleges with endowment assets per student between $400,000 and 600,000 in 2016 (i.e., only include the donut sample).

The results on tuition hikes align with the DD results but with larger estimates. Table C4 finds that taxed colleges underwent a 10% increase in undergraduate tuition ($p < 0.01$, see Column (2)), 5% increase in graduate tuition ($p < 0.1$, see Column (3)), and 6% increase in room and board charge ($p < 0.01$, see Column (4)). Despite the larger magnitude, the 95% confidence intervals overlap with the DD estimates. The event-study estimates (see Figure C4), confirm the parallel trend in the pre-intervention period and show that the tuition has gradually increased over time.

Figure C1 provides insight into the inconsistency in effect sizes between the DD and DDD models. As demonstrated in Figure C1b, colleges that are large and wealthy (subjected to the tax) show a parallel trend in tuition with colleges that are large but non-wealthy (the comparison group in the DD model) prior to the policy. However, the treatment group increased their tuition relatively more than the comparison group after the policy was effective. Despite the good pre-treatment common trend implying that large but non-wealthy colleges could serve as a good counterfactual, concerns remain about whether the common trend assumption would continue to hold true. Particularly, the pandemic might serve as a potential factor that affects the two groups differently.

Table C4: Enrollment, Tuition, and Charge-related Tax Shifting Behavior: DDD Setting

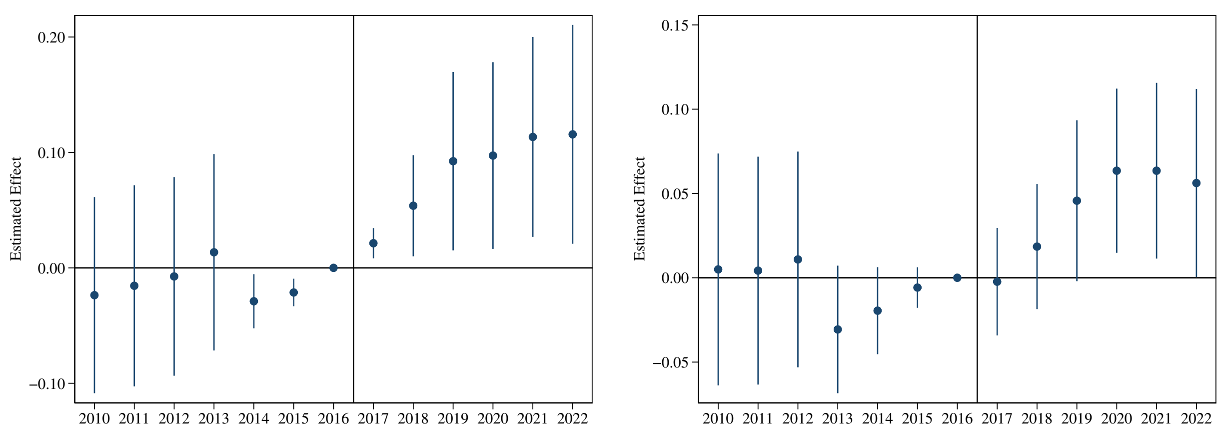
| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Log FTE | Log Listed Price | | | Log Total Revenue | |
| | Enrollment | Undergrad Tuition | Graduate Tuition | Room & Board | Tuition | Auxiliary |
| $Large \times Wealthy \times Post$ | –0.084 | 0.100*** | 0.052* | 0.059*** | 0.214 | –0.138 |
| | (0.079) | (0.033) | (0.028) | (0.017) | (0.212) | (0.135) |
| Observations | 11,004 | 11,004 | 11,004 | 11,004 | 11,004 | 11,004 |
| Baseline Mean (Thousand) | 6.037 | 39.033 | 28.449 | 11.451 | 162,878 | 61,246 |

*Note:* The coefficients are estimated using equation (3). Standard errors clustered at the institution level in parentheses. The outcomes are the log expenditure by spending category. Column (1) is the total expenditure. Column (2) is the sum of instructional and academic support expenditures. Column (3) is the sum of research and independent operation expenditure. Column (4) is the public service expenditure. Column (5) is the institutional support expenditure, which includes spending on operational support, administrative services, and management. Column (6) is the sum of auxiliary facilities, hospital, and student service expenditure. Column (7) is the net institutional grant aid to students, including scholarships and fellowships. All dollars are adjusted by CPI and denoted in 2010 real dollars. Samples are private non-profit colleges that reported in IPEDS and filed Form 990 yearly from 2010 to 2022. All Panels exclude colleges with endowment assets per student between \$400,000 and 600,000 in 2016 (i.e., only include the donut sample). The observation period is from 2010 to 2022 for columns (1) to (4) and 2010 to 2021 for columns (5) and (6).
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Figure C4: Event Study Estimates: Tax Shifting Behavior

(a) Log Undergraduate Tuition

(b) Log Graduate Tuition




*Note:* The coefficients are estimated using the event study version of equation (C2). The error bars denote the 95% confidence interval. The samples are private nonprofit colleges that reported in IPEDS and filed Form 990 every year from 2010 to 2022, and exclude colleges with endowment assets per student between \$400,000 and 600,000 in 2016 (i.e., only include the donut sample).

This concern is backed up by evidence from the second control group from the DDD model. Figure C1d demonstrates that small but wealthy colleges and small and non-wealthy colleges also possess parallel trends prior to the policy, although these groups are more fluctuate due to their small nature. However, small but wealthy colleges show a larger drop in their tuition level during the pandemic period. One explanation could be that they are more able to use their assets to support students with a lower tuition level during hard times. The suspicion is aligned with previous studies' perspective that endowment assets could serve as the "rainy day fund" (Baum & Lee, 2019; Rosen & Sappington, 2019). In the DDD model, the response of small wealthy colleges could serve as a counterfactual for how large wealthy colleges would respond to the macro environment. Since the DDD model predicts that the treated colleges should have been able to control their tuition at a lower level as the small wealthy colleges did, the model produces a causal estimate of a larger relative increase in tuition for the treated colleges. Whether small wealthy colleges could serve as a better counterfactual for the treatment group than large non-wealthy colleges is untestable. Therefore, this paper presents the DD estimate as the lower bound while the DDD estimate as the higher bound.

Overall, the DDD estimates are generally aligned with the DD results. The evidence suggests that taxed colleges do not respond to the taxation by cutting spending but might increase tuition to shift the burden.

# Appendix D: Methodology Details on Permutation Test for SCM

This paper utilize the Synthetic Control Method (SCM) to examine the treatment effect on individual institution. The conventional SCM only offer point estimates but not inference statistics. To obtain the inference statistics, this paper obtains the distribution of the estimates using a permutation test. Specifically, I perform the following steps:

**Step 1: Applying SCM to placebo units:**

In this step, I take each of the units in the donor pool and perform the SCM (using equation (3)). For the analysis on tax avoidance, there were 800 colleges in the donor pool; and in the tax shifting analysis, there were 752 colleges in the donor pool (see Table C1). In this permutation test, the units in the treatment group are excluded from the analysis. The practice in this step provides 800 (752) placebo estimates on each of the single units in the donor pool.

Table C1: Number of Units in Each Analysis

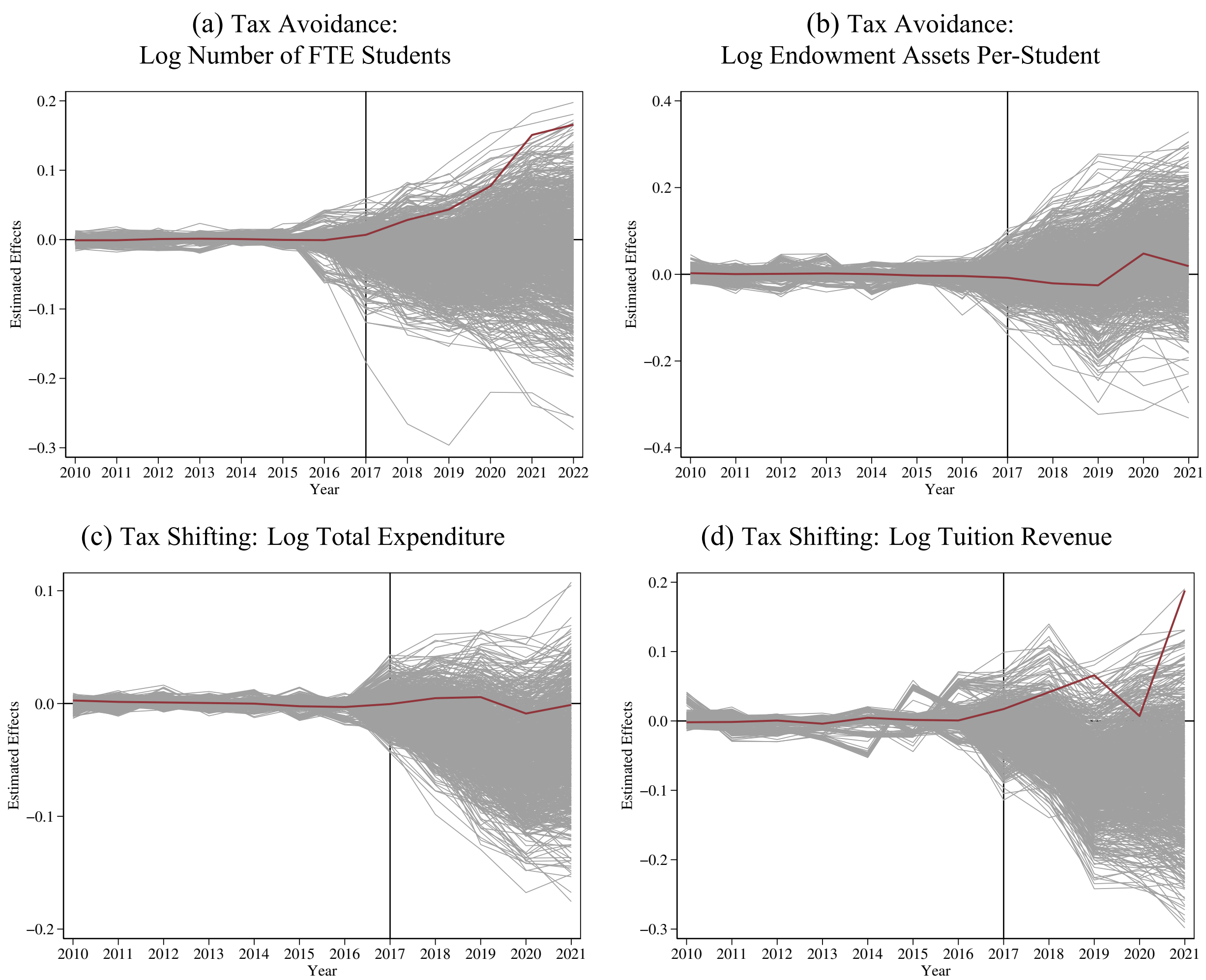
| | Number of Units | |
|---|---|---|
| Analysis | Treatment Group | Donor Pool |
| Tax Avoidance | 17 | 800 |
| Tax Shifting | 24 | 752 |

**Step 2: Estimating placebo treatment effects:**

In this step, I randomly select $N$ placebo estimates from the previous step and calculate the average treatment effect at each time period ($\overline{\beta_t}$; using equation (**??**)). The number $N$ is defined with the actual number of treated units. For example, in the tax avoidance analysis, I randomly selected 17 placebo estimates to take the average; and in the tax shifting analysis, the number would be 24. The procedure is then repeated 1,000 times, resulting in a distribution of the estimates.

By this stage, I can already compare the actual estimates with the placebo ones to obtain the permutation p-values (for a single time period). Figure C1 demonstrates the distribution of the placebo estimates placed along with the actual estimates. These placebo estimates serve as the potential distribution of the estimated $\overline{\beta_t}$ in the absence of the policy. If the actual estimate is located at the range out of most (such as 95%) of the placebo estimates, then the estimated policy effect is likely not due to random. For the estimation of the impact of tax avoidance behavior on student enrollment, the results suggest that the actual estimate is located at the upper bound of the placebo estimates, especially in the latter year (see Figure C1a). For the estimation of the impact of tax-shifting behavior on tuition revenue, the actual estimate is also located at the upper bound of the placebo estimates (see Figure C1d).

Figure C1: SCM Permutation Test: Dynamic Treatment Effect



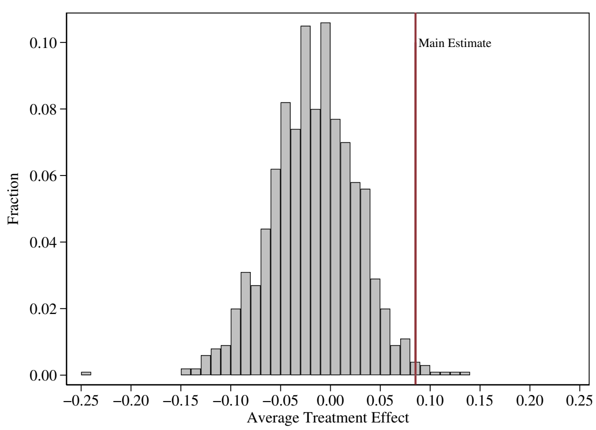
**Step 3: Calculating permutation p-value for ATT:**

The former step obtains the dynamic treatment effect for the placebo units. In the next step, I apply equation (**??**) to compute the ATT for the entire post-treatment period, and then compare the actual estimate with the placebo ones.

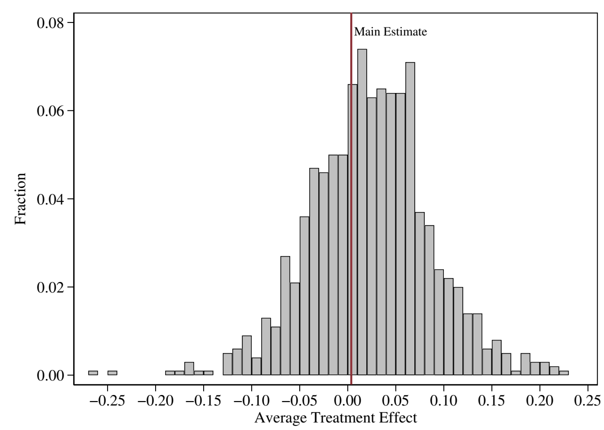
Figure C2 demonstrates the distribution of placebo estimates (the histogram) and the location of the actual ATT (vertical line). The permutation p-value is calculated by counting the number of placebo estimates in excess of the actual estimate. In the case of analysis on tax avoidance impact on student enrollment, the permutation p-value would be 0.008 as only 8 out of 1000 placebo ratio excess the actual value (see Figure C2a). The ATT and permutation p-value of each variable are presented in Table C2 to C5. Most results are alined with the main findings with DD model.

Figure C2: SCM Permutation Test: Average Treatment Effect

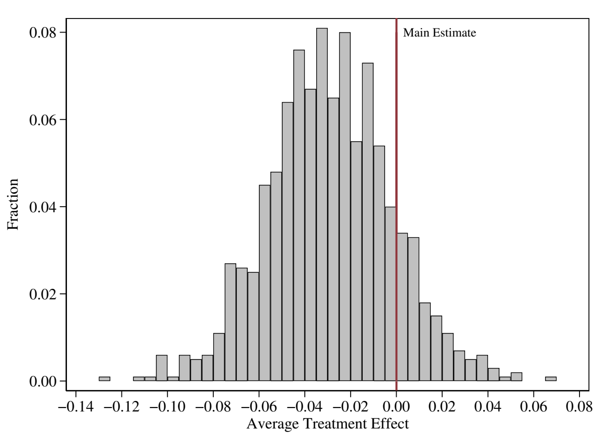
(a) Tax Avoidance:
Log Number of FTE Students




(b) Tax Avoidance:
Log Endowment Assets Per-Student




(c) Tax Shifting: Log Total Expenditure




(d) Tax Shifting: Log Tuition Revenue

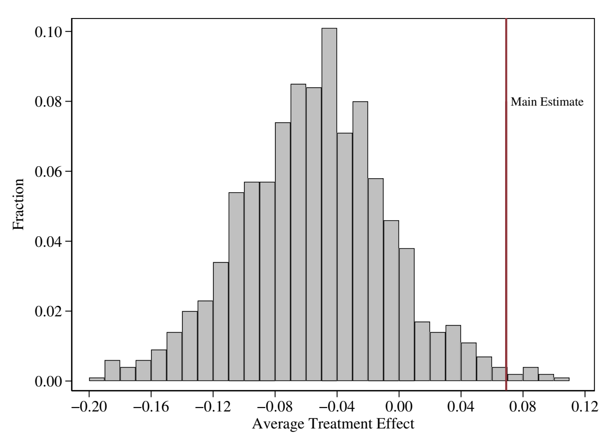


Table C2: Enrollment-related Tax Avoidance Behavior: SCM Results

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Log FTE | By Enrollment Status | | By Student Level | |
| | Enrollment | Full-time | Part-time | Undergraduate | Graduate |
| $ATT$ | 0.085*** | 0.071*** | –0.054 | 0.075* | 0.033 |
| Permutation p-value | 0.008 | 0.004 | 0.694 | 0.057 | 0.144 |
| Range | [0.029,0.182] | [–0.016,0.201] | [–0.729,0.388] | [–0.013,0.147] | [–0.191,1.095] |

*Note:* The $ATT$ are estimated using equation (**??**). The permutation p-values are estimated using Step 3 in Appendix C. Range denotes the minimum and maximum single-institution treatment effect.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table C3: Endowment and Assets-related Tax Avoidance Behavior: SCM Results

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Log Endowment | | By Restricted Status | | By Category | | | |
| | Total | Per-student | Non-restricted | Restricted | Capital | Investment | Others | Liability |
| $ATT$ | 0.060 | 0.004 | 0.285 | 0.103* | 0.028 | 0.107* | 0.076 | 0.070** |
| Permutation p-value | 0.121 | 0.647 | 0.161 | 0.060 | 0.117 | 0.075 | 0.599 | 0.046 |
| Range | [–0.10,0.18] | [–0.13,0.16] | [–0.27,1.49] | [–0.10,0.27] | [–0.08,0.31] | [–0.05,0.46] | [–11.12,12.10] | [–0.39,0.94] |

*Note:* The $ATT$ are estimated using equation (**??**). The permutation p-values are estimated using Step 3 in Appendix C. Range denotes the minimum and maximum single-institution treatment effect.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table C4: Expenditure-related Tax Shifting Behavior: SCM Results

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | Log Expenditure | | | | | | |
| | Total | Instruction | Research | Public Service | Institution Support | Auxiliary Facilities | Institution Grant |
| $ATT$ | 0.000 | 0.076** | 0.049 | 0.208* | 0.023* | 0.002 | –0.151 |
| Permutation p-value | 0.135 | 0.024 | 0.386 | 0.058 | 0.058 | 0.166 | 0.699 |
| Range | [–0.16,0.12] | [–0.08,0.25] | [–0.27,0.28] | [–0.15,1.10] | [–0.16,0.40] | [–0.28,0.34] | [–0.51,0.13] |

*Note:* The $ATT$ are estimated using equation (**??**). The permutation p-values are estimated using Step 3 in Appendix C. Range denotes the minimum and maximum single-institution treatment effect.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table C5: Enrollment, Tuition, and Charge-related Tax Shifting Behavior: SCM Results

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Log FTE | Log Listed Price | | | Log Total Revenue | |
| | Enrollment | Undergrad Tuition | Graduate Tuition | Room & Board | Tuition | Auxiliary |
| $ATT$ | 0.040** | 0.035* | 0.016 | 0.018*** | 0.069** | –0.013 |
| Permutation p-value | 0.040 | 0.050 | 0.155 | 0.009 | 0.010 | 0.254 |
| Range | [–0.14,0.21] | [–0.05,0.08] | [–0.29,0.17] | [–0.14,0.18] | [–0.04,0.27] | [–0.65,0.38] |

*Note:* The $ATT$ are estimated using equation (**??**). The permutation p-values are estimated using Step 3 in Appendix C. Range denotes the minimum and maximum single-institution treatment effect.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

**Step 4: Calculating permutation p-value for single unit:**

To estimate the permutation p-value for single institution, I follow the approach outlined in Abadie et al. (2010) to compute the post/pre mean squared prediction error (MSPE) ratio using the following equation:

$$MSPE\, ratio = \frac{\frac{1}{T - T_0} \sum_{t>T_0}^{T} \left(\overline{\beta_t}\right)^2}{\frac{1}{T_0 - 1} \sum_{t<T_0}^{T_0-1} \left(\overline{\beta_t}\right)^2} \tag{C1}$$

Next, I compared the ratios of the actual estimate to the placebo estimates. The permutation p-value is calculated by counting the number of placebo post/pre-MSPE ratios in excess of the actual ratio. The level of significance of each institution is noted in the Figures 3 and 6 in the manuscript.

# Appendix E: Estimation Net Benefit of Enrollment Expansion

This section estimates the net benefit derived from the enrollment expansion due to tax avoidance behavior. The estimation here is primarily based on the full-time undergraduate students as this group is the major driver of the enrollment effect. I perform the following steps to estimate the net benefits:

**Step 1: Estimated the increase in college degree holders**

Based on the SCM estimation, the 17 colleges around the tax threshold collectively increased their full-time undergraduate enrollment by 9,623 as of 2022. Table E1 reports the estimation for each college. Applying the degree completion rate at these colleges, this increase in enrollment could eventually result in an additional 8,799 college degree holders.[35]

**Step 2: Obtained the net benefit of a college degree from prior studies**

Previous studies have estimated the net personal benefit of earning a college degree to range from \$250 thousand to \$625 thousand (Hill et al., 2005; P. Taylor et al., 2011; Trostel, 2015), while the net social benefit falls between \$350 thousand and \$600 thousand (Hill et al., 2005; Edelson, 2016; Trostel, 2015). Combining the upper (lower) bounds of these estimates yields a total of \$1,225 (\$600) thousand. The estimations of individual benefits primarily hinge on the increase in earnings attributable to the degree, deducted tuition costs, and forgone earnings during college. Conversely, estimations of societal benefit primarily rely on the tax revenue accrued by the government due to increased labor earnings, net of government investment in higher education.

**Step 3: Estimated the premium in return for sample college to less selective colleges**

The increase in degree holders among these colleges might not be "additional." It is possible that these students could have enrolled in another college had these colleges not expanded their access. Therefore, I assume that the expansion in enrollment access essentially "moves up" stu-

[35] The average degree completion rate within 150% of normal time (i.e., 6 years) at these colleges is 88%, ranging from 65% to 97%. The estimation of degree holders is based on applying the degree completion rate in a specific college to the estimate of increased enrollment in the same college.

Table E1: Estimation of Net Benefit from Enrollment Expansion

| | Barron's Ranking | Increase in FT Undergrad | Average Degree Completion Rate | Increase in Bachelor Degree | Estimate Net Benefit ($ Million) |
|---|---|---|---|---|---|
| University of Chicago | Most competitive | 1,695 | 0.956 | 1,620 | 65.118 |
| Emory University | Most competitive | 1,481 | 0.900 | 1,333 | 53.572 |
| Northwestern University | Most competitive | 941 | 0.965 | 908 | 36.505 |
| Washington University in St Louis | Most competitive | 872 | 0.937 | 817 | 32.857 |
| University of Pennsylvania | Most competitive | 741 | 0.961 | 712 | 28.609 |
| Duke University | Most competitive | 701 | 0.966 | 677 | 27.234 |
| Colby College | Most competitive | 538 | 0.880 | 474 | 19.043 |
| Middlebury College | Most competitive | 499 | 0.935 | 467 | 18.781 |
| Vassar College | Most competitive | 482 | 0.920 | 443 | 17.803 |
| Berry College | Very competitive | 457 | 0.647 | 296 | 8.345 |
| Hamilton College | Most competitive | 357 | 0.924 | 330 | 13.259 |
| Davidson College | Most competitive | 288 | 0.916 | 264 | 10.593 |
| Trinity University | Highly competitive | 246 | 0.758 | 187 | 7.502 |
| Claremont McKenna College | Most competitive | 139 | 0.913 | 127 | 5.088 |
| Wabash College | Highly competitive | 119 | 0.753 | 90 | 3.607 |
| Bryn Mawr College | Most competitive | 67 | 0.826 | 56 | 2.240 |
| Mount Sinai School of Medicine | Special | 0.09 | N/A$^\dagger$ | 0 | 0.000 |
| **Total** | | 9,623 | | 8,799 | 350 |

*Note:* The Barron's Ranking is obtained from Barron's Profiles of American Colleges, which categorizes colleges into seven categories: most competitive, highly competitive, very competitive, competitive, less competitive, noncompetitive, and special (usually art or medical schools). The increase in full-time undergraduate enrollment is measured as of 2022. The estimates are retrieved from equation (**??**). The average degree completion is measured as the proportion of bachelor's degree-seeking students who completed a bachelor's degree within 150 percent of the normal time (i.e., six years). The data is as of 2022 (calculated using the 2016 enrollment cohort). The increase in bachelor's degrees is calculated as the product of an increase in enrollment and average degree completion rate. For colleges of most competitive and highly competitive, the net benefit is estimated as 6.7% of the average personal and societal net benefit (i.e., $600 thousand) of college degrees. For colleges that are very competitive, the net benefit is estimated as 4.7% of the average personal and societal net benefit (i.e., $600 thousand) of college degrees.
$^\dagger$ Mount Sinai School of Medicine does not report the degree completion data in the IPEDS.

dents from a less selective college to a more selective one instead of creating a new enrollment. Previous studies have widely established that the premium of attending a selective or elite college would exceed that of attending less selective ones (Kapur et al., 2016; Witteveen & Attewell, 2017; S. D. Zimmerman, 2019; Carnevale et al., 2022). Particularly, as demonstrated in Table E1, the majority of colleges engaged in tax avoidance behavior are categorized as most, highly, or very competitive.

I estimate the benefit of the enrollment expansion in these colleges by assuming the individual counterfactually attends a one-level lower college in Barron's Selectivity Index.[36] Specifically, for colleges categorized as most or highly competitive (tier 1 or 2), I assume that students would have

[36]The categorization is retrieved from Barron's Profiles of American Colleges. The categorization is primarily based on "college selectivity"—computed with high school performance (ranking and GPA), standardized exams, and the admission rate. It categorizes colleges into seven categories: most competitive, highly competitive, very competitive, competitive, less competitive, noncompetitive, and special (usually art or medical schools).

attended very competitive colleges (tier 3) if the colleges had not expanded their access. For colleges categorized as very competitive (tier 3), I assume that students who have attended competitive (tier 4) colleges instead. Notice that I combined the groups of most and highly competitive (tier 1 and 2) as previous studies estimated the college return based on this categorization combined the two groups and did not provide a breakdown estimation (Witteveen & Attewell, 2017).

Witteveen & Attewell (2017) estimates the earning return from most or highly competitive colleges to be 6.7% higher than degrees from very selective colleges in the short run (4 years) and 11.3% higher in the long run (10 years). Besides, the earning return from very selective colleges is 4.7% higher than attending competitive colleges in the short run and 2.1% in the long run. I treat the percentage increase in the earnings for a higher level relative to a lower level college as the premium of attending a more selective college. Then, I define the net benefit of each additional college degree granted from these colleges to be the selective premium multiplied by the estimated total personal and societal net benefits.

**Step 4: Calculated the total net benefit**

Combining the above statistics, I calculated the total net benefit in each college using the below formula:

$$\begin{aligned} NetBenefit_{ij} =& IncreaseEnrollment_i \times CompletionRate_i \\ & \times SelectivePremiums_j \times AvgNetBenefit \end{aligned} \tag{E1}$$

Where the net benefit of college $i$ of selective category $j$ is the product of the increase in degree holders ($IncreaseEnrollment_i \times CompletionRate_i$), the percentage of increase in expected earning relative to less selective colleges ($SelectivePremiums_j$), and the estimated average net personal and society benefits of a college degree ($AvgNetBenefit$). $SelectivePremiums_j$ ranges from 2.1% to 11.3% depending on the selectivity of the colleges and whether the estimation is based on the short run or long run. $AvgNetBenefit$ is obtained from previous studies, ranging from \$600 to \$1,225.

Table E1 reports the most conservative estimates based on the lowest selective premiums and total net benefits. The sum of all colleges leads to a total net benefit of $350 million. Figure E1 illustrates the ranges of estimation based on different assumptions. The estimates range from $350 million to $1,300 million.

Figure E1: Estimation of Total Net Benefit from College Enrollment Expansion