Should the Government Tax Nonprofits? Insights from the Net Investment Income Tax on Nonprofit Colleges

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Abstract

The nonprofit sector has historically enjoyed tax exemptions for its role in providing public goods. This paper examines whether taxing nonprofits could benefit society more than granting exemptions by evaluating their responses to taxation. The 2017 Tax Cuts and Jobs Act introduced a net investment income tax that targeted wealthy nonprofit 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 shifting, net investment income tax, college endowment

JEL Codes—H22, H26, L31, I23

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1 Introduction

The 2017 Tax Cuts and Jobs Act (TCJA) introduced the Net Investment Income Tax (NIIT), a 1.4% excise tax targeting selected nonprofit colleges' investment returns.[1] Referred to by some scholars as the endowment tax, it aims to address wealth disparities among institutions and encourages the use of endowment returns for education rather than wealth accumulation. However, the affected colleges argue that this tax burden may hinder their ability to support core education and research activities, potentially leading to reductions in financial aid for disadvantaged students.[2] Concerns have also been raised regarding potential gaming of the system, as the tax applies only to colleges surpassing specific student enrollment and asset thresholds. Scholars fear that colleges might manipulate their enrollment or endowment size, resulting in a decrease in educational resources (Fishman, 2018; Hinrichs, 2018). An open question remains regarding how colleges will respond to the tax and the potential effects on educational quality and equity.

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). The NIIT came into effect in 2018, so I track colleges during the period around the reform from 2010 to 2022. Utilizing a difference-in-differences (DD) framework, I evaluate colleges' tax avoidance (i.e., attempts to be exempted from the tax) 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 combined and

[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.

compared to government revenue earned to assess the overall benefits and costs associated with the tax change.

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 on room and board. Of the total NIIT-related increase in tax revenue of $324 million, I estimate students bear most of the cost, $287 million, or nearly 88%, in the form of higher tuition and room-and-board fees. However, colleges do not cut spending or reduce enrollment. Thus, the findings suggest that 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 I estimate translates to over $350 million in net benefits. These results suggest that with the right incentive and policy design, nonprofits can be encouraged to increase their provision of public goods, benefiting society on the whole.

The most closely related study to this paper is Ryan et al. (2024), which provides initial empirical evidence on colleges' behavioral responses to the NIIT. They utilized the SCM to evaluate the behavioral responses of eight colleges, concluding that some responded to taxation by increasing enrollment, raising attendance costs, or cutting financial aid.[3] Still, their analysis provided limited evidence on *aggregate* behaviors.[4] Moreover, there remains a lack of evidence regarding the consequences of colleges' behavioral responses. This paper extends the analyses by conducting a more comprehensive and robust evaluation of colleges' behavioral responses, both aggregate and individual. Additionally, it examines the consequences and implications of such responses on government revenue, equitable access to higher education, and overall societal benefits.

[3] However, their estimation only involves three years (2015–17) 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 impact 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.

The current study contributes to the broader debate on the justification of tax exemptions for nonprofits, a sector that has long benefited from significant tax exemptions.[5] Scholars have also asserted that indirect government support for nonprofits via tax exemption is as significant as direct support through subsidies and contracts (Brody & Cordes, 2006; Humphreys & Solomon, 2012; De Alva & Schneider, 2015; Baum & Lee, 2019). While the rationale for tax exemption is that nonprofits provide public goods (Hassan et al., 2000; Stevens, 2010; Zare et al., 2022), critics have argued that nonprofits do not always use the tax benefits to enhance their services (D. Zimmerman, 1991; Cowan, 2007; Nichols & Santos, 2016; Herring et al., 2018; Propheter, 2019). 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.

Whether taxing nonprofits would generate better or worse outcomes depends on how they respond to taxation. There is extensive literature exploring nonprofits' responses to taxation, but some key aspects of how nonprofits respond have been overlooked. In particular, while previous 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 tax policy changes. These aspects of tax-shifting behavior are critical for understanding the justification of nonprofit tax exemption. The present study elucidates nonprofits' tax-shifting behaviors by offering evidence of their price-setting behaviors and changes in service populations. This study finds that, although colleges do not cut financial aid and expenditures, they respond by increasing tuition and charges. Additionally, colleges shift educational opportunities from historically underserved groups to international students (who pay higher tuition). The results provide important empirical evidence regarding how taxing nonprofits, while not altering overall service levels, could ultimately redistribute access to public service and diminish societal benefits.

[5] At the federal level, Brody & Cordes (2006) estimated the annual tax exemption for nonprofits at $45 billion, accounting for nearly 2% of total 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 the state and local tax revenue. Breaking it down by industry, Baum & Lee (2019) estimated the tax exemption for nonprofit colleges at $22 billion; Rosenbaum et al. (2015) found that the total tax benefit for nonprofit hospitals was $25 billion.

Another important aspect of nonprofits' response to taxation is their avoidance behavior. Prior research has examined how nonprofits manipulate their revenue to circumvent regulatory thresholds (St. Clair, 2016; Marx, 2018) or misreport data on financial statements to avoid taxation (Omer & Yetman, 2007; Hofmann, 2007). However, prior studies have focused on organizations *reducing* their size or merely manipulating numbers without changing actual service levels. Few studies have considered scenarios where organizations are incentivized via tax policy to *expand* their service levels and where there is the potential for taxation to enhance rather than reduce the provision of public goods. This study offers insights by examining thresholds based on assets per student. The distinct policy context provides two key avenues for analysis: first, it allows for the evaluation of responses to a threshold directly tied to the size of the service population (i.e., students), a factor not previously explored, and generates new knowledge related to a different pattern of tax avoidance behavior by nonprofits. Additionally, the policy offers colleges two opposite avenues for avoidance,— either by increasing student enrollment or reducing assets. While the former leads to an increase in services, the latter results in a reduction of organizational resources. This setting enables the current study to test the hypothesis of whether nonprofits prefer to maximize their output rather than minimize cost, thereby enhancing understanding of 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 this cutoff and all public colleges are still exempted from this taxation.[6] The policy went into effect on January 1st, 2018.

The tax threshold is based on student population and asset size. However, the IRS leaves some discretion to colleges. Specifically, the IRS defines student size as "the daily average number of

[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.

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 as long as the approach is consistently applied.[7] In other words, colleges could manipulate the values by either changing the student/asset size or applying differing calculation methods (Fishman, 2018).

The IRS initially estimated the tax would be applied to 25 to 40 colleges (ACE, 2019). Specifically, 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 status 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.

Prior studies suggest that taxation of endowments or investment returns could be an effective way to address wealth inequalities among institutions and encourage colleges to invest their resources for educational purposes instead of wealth accumulation (Cowan, 2007; Willie, 2012; Sherlock et al., 2018; Fishman, 2018). However, concerns have been raised about potential tax avoidance and shifting behaviors. Firstly, as the tax applies only to colleges surpassing specified thresholds in student enrollment and assets, scholars fear that colleges might manipulate their student or endowment sizes to avoid the tax, resulting in decreased educational resources (Fishman, 2018; Hinrichs, 2018).

Secondly, many colleges have 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 colleges also delivered similar messages via public statements. Specifically, Stanford University faced a $42.9 million tax bill in 2019 and mentioned that the tax would harm their ability to pro-

[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.

vide financial aid and support their academic mission (Selig, 2020). Similarly, MIT estimated the tax would cost them $10 million per year and constrain their expenditures toward scholarships, education, and research (Stendahl, 2017). The tax also imposes a heavy debt on smaller colleges with smaller endowments. For example, Trinity University calculated that the tax would create an additional $3 million annual bill and 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 at 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.

3 Theoretical Framework

This section establishes the theoretical framework for understanding colleges' responses to the NIIT. When the government imposes taxes, organizations might first consider whether there is any way to avoid the regulation. Section 3.1 examines this perspective, labeling it as "tax avoidance." If organizations find no way to avoid the tax and eventually must bear its cost, they might opt to cut spending or raise revenues to offset the tax payment. Section 3.2 explores this approach, referring to it as "tax shifting."

3.1 Tax Avoidance

Nonprofits, while not aiming to be profit-seeking, are also motivated to reduce their tax liabilities and maximize their available resources (Omer & Yetman, 2007; Schmidt, 2007). Prior research has indicated that nonprofit organizations respond to tax or regulatory thresholds by manipulating their revenue or other financial variables (Sansing & Yetman, 2006; St. Clair, 2016; Marx, 2018).

However, how and to what extent organizations engage in tax avoidance behavior depends on the technology available for manipulation and the costs associated with such responses (Slemrod & Yitzhaki, 2002; Katz et al., 2015; Guenther et al., 2017; McClure, 2023). The technology available refers to the ability of an organization to manipulate the values corresponding to tax thresholds or tax bases to reduce tax bills along with the technology used to conceal such behavior (Slemrod & Yitzhaki, 2002). Other associated costs include the operational costs of implementing the avoidance behavior and the potential reputational or revenue loss associated with manipulating the financial values (Austin & Wilson, 2015, 2017; McClure, 2023).

Given these considerations, nonprofits might differ from for-profits in tax avoidance behaviors. Firstly, nonprofits and for-profits respond differently to asset-related thresholds. For-profit firms often reduce reported asset values to avoid taxes, while nonprofits are less likely to lower their reported assets (Hosono et al., 2018; Cespedes et al., 2021; 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 image (Keating & Frumkin, 2003; Calabrese, 2011; McDonald III & Goodman, 2021). For instance, Homonoff et al. (2020) found nonprofits with negative assets inflated their values to zero to present financial health to donors.

Secondly, nonprofits and for-profits differ in whether changes in financial metrics result from misreporting or actual production behavior. For-profits' revenue reductions are primarily due to misreporting (Almunia & Lopez Rodriguez, 2014; Carrillo et al., 2017; Bachas & Soto, 2021), while nonprofits' revenue changes are driven more by actual production responses (St. Clair, 2016; Marx, 2018). This difference is due to higher transparency requirements within the nonprofit sector (Hale, 2013; Harris & Neely, 2021). Thus, nonprofits may have inadequate technology to fully conceal their misreporting and would need to seek a real production response.

Based on existing literature, I anticipate that nonprofit colleges will respond to the tax threshold. Since the tax applies to colleges with more than 500 students and over $500,000 in assets per student, colleges can manipulate either enrollment or asset values. Colleges near the student cutoff may reduce enrollment below 500, while those near the asset cutoff may either increase enrollment or decrease assets. Although previous studies have not examined thresholds related to service populations, the fact that nonprofits can respond to policy thresholds by reducing revenues (St. Clair, 2016; Marx, 2018) or increasing payout rates (Sansing & Yetman, 2006) suggests they might also respond to these thresholds by either decreasing or increasing service level.

However, colleges are less likely to manipulate their assets due to donor restrictions and government transparency regulations. The NIIT targets endowment assets, which are donor-contributed and more restricted. Therefore, colleges are more likely to respond by changing student enrollment rather than asset values.

3.2 Tax Shifting

This section explores how nonprofit colleges might engage in tax-shifting behavior. Specifically, organizations could shift tax burden in three ways: Firstly, by reducing the service *quantity*. In the case of NIIT, colleges might reduce student enrollment. Secondly, reduce service *quality*. In the setting of colleges' response, they might reduce spending on instruction or research. Finally, additional revenue can be generated by increasing charges on service populations. In the setting of colleges' response, this would involve raising tuitions or other student charges. While this response type might not directly alter service quantity or quality, it might increase the cost to access the service, thereby altering the service's *distribution*.

3.2.1 Nonprofits' Tax Shifting Behaviors

Existing research has 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-profit firms typically respond to taxation by increasing prices (Felix, 2007; Politi & Mattos, 2011; Sullivan & Dutkowsky, 2012; Gaarder, 2019) or reducing production levels (Vartia, 2008; Schwellnus & Arnold, 2008; Djankov et al., 2010; Arulampalam et al., 2012; Fuest et al., 2018), such predictions do not necessarily apply to nonprofits.

Previous studies examining how nonprofits respond to taxation echo the theoretical perspective that they tend not to engage in tax shifting. The nonprofit sector that best mimics the higher education setting 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; Zare et al., 2022). Specifically, 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 (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% rate for those with lower payout rates. 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 examines the impact of variations in property tax exemption on nonprofit activities. For example, Grimm Jr (1999) and Fei et al. (2016) found that nonprofits only had minimum to null responses to changes in property tax. However, they only evaluated the effect on revenue and did not examine whether nonprofits changed their spending or service level.

In summary, existing 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 seek to maximize their service output (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 unresolved.

3.2.2 Colleges' Responses to Financial Shock

To identify the potential responses of nonprofit colleges to the NIIT, this section examines into the literature exploring how colleges navigate financial shocks. Numerous studies have examined the effect of endowment shocks on colleges' financial dynamics (Brown et al., 2014; Rosen & Sappington, 2019; Bulman, 2022). 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. They also found a symmetrical post-recession effect. In contrast, Bulman (2022) found no evidence that colleges would raise tuition or reduce institutional financial aid in response to negative investment returns.

A parallel branch of research has explored public colleges' responses to government funding cuts. While funding cuts differ from taxation, being granted a tax exemption can be seen as indirect government support. Studies have linked reductions in government funding to subsequent tuition increases at public colleges (Kane & Orszag, 2003; Mumper & Freeman, 2005; Mitchell et al., 2019; Civera et al., 2021). This literature revealed that public colleges may increase tuition or introduce new charges in response to funding cuts (Kane & Orszag, 2003; Mumper & Freeman, 2005; Filippakou et al., 2019; Civera et al., 2021). Additionally, due to restrictions on tuition levels, they might further reduce spending to address revenue reductions (Kane & Orszag, 2003; Mumper & Freeman, 2005; Altundemir, 2012).

In summary, previous research indicates that colleges adjust to changes in endowment returns and government funding. 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. Public colleges' responses to funding cuts suggest private nonprofit colleges might respond similarly when tax exemptions are removed.

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.[9] The IPEDS is an annual survey conducted by the U.S. Department of Education's (ED) National Center for Education Statistics (NCES).[10] All higher education institutions participating in federal student aid programs are required to respond to the survey. The data provides information on colleges' characteristics, 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.[11] Nonprofit colleges with gross receipts greater than $200,000 or total assets greater than $500,000 are required to file Form 990. Specifically, within about 2,000 nonprofit colleges reported in the IPEDS survey, over 1,500 (72%) have filed Form 990.[12] Consequently, given the asset cutoff of the Form 990 requirement, all institutions potentially subject to the NIIT would be required to file Form 990 data, including information on organizations' financial information and taxation status.

[9] 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.

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

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

[12] This paper uses the crosswalk table of Unit ID number and Employer Identification Number (EIN) provided by the Urban Institute (see https://educationdata.urban.org/documentation/colleges.html#nccs_990-forms) supplemented by additional rough matching based on institution names in the IPEDS and Form 990 datasets. Some colleges may still be unmatched due to significant name discrepancies between the two datasets. Additionally, many of the colleges that do not file Form 990 are religiously affiliated and are therefore exempt from filing Form 990 under certain conditions (see https://www.irs.gov/charities-nonprofits/annual-exempt-organization-return-who-must-file).

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.[13] For the asset value, the "value of endowment assets at the end of the fiscal year" as reported in the IPEDS data is used. 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 itself. As defined by the IRS, the asset cutoff of the NIIT 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.[14]

When defining the tax and treatment status, this paper uses nominal values to measure financial resources. However, in order to make the estimates of spending or asset changes comparable over time, I adjust the monetary variables according to the Consumer Price Index (CPI). 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.[15] The values are then denoted as real dollars for the 2010–11 fiscal year. The result remains robust without this adjustment.

4.3 Sample

The samples included in this study are nonprofit colleges that participated in the IPEDS survey from 2010 to 2022 and e-filed Form 990 every year from 2010 to 2021.[16] Some colleges report to the survey but fail to answer some questions. Following Fernandez et al. (2023), this paper imputes the missing value by using the data of the same institution in the surrounding years. It further excludes

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

[14] 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 but only asks them to indicate whether they are subjected to the tax on Form 990.

[15] 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.

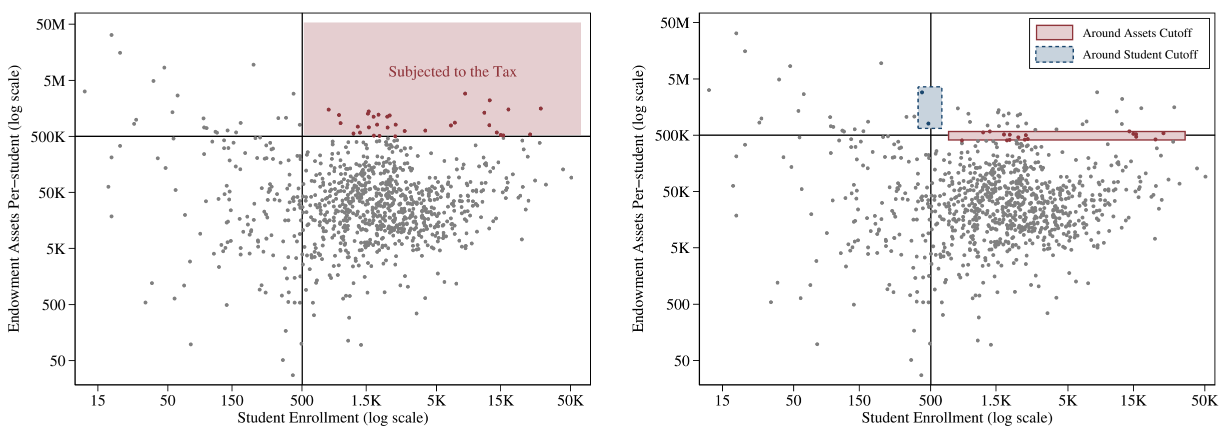
[16] I do not require all colleges to have already filed their Form 990 return in the latter years as the timing of organizations doing so can vary. This paper further complements the dataset by manually collecting data from paper Form 990 (in scanned PDF format) data for colleges that reported per student assets above $500,000 in IPEDS data.

colleges that have experienced mergers with other colleges,[17] substantial expansions, or closures of a branch,[18] or engages in remote education for more than 50% of students.[19] The adjustment of this sample selection is necessary because these colleges would experience large fluctuations in their student populations or finance variables and would introduce unnecessary noise into the analysis.

I categorize colleges 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, therefore, are 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

(a) Colleges Subjected to the Tax　　(b) Colleges Around the Tax Cutoff



Note: The samples are private nonprofit colleges that reported in IPEDS and filed Form 990 every year from 2010 to 2022. 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.

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 within 400 to 600). Due to the

[17] I exclude Thomas Jefferson University and Philadelphia University, which combined in 2017.

[18] I exclude the following: (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.

[19] 37 colleges were excluded for this criterion.

small sample size, this paper opts not to focus on this group.[20] 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
# Student above 500	759	8	9	24
# Student below 500	125	5	2	20

Notes: Samples are non-profit colleges reported in the IPEDS and e-filed Form 990 every year from 2010 to 2022. The student enrollment and endowment assets information were in 2016. The number of total students is the sum of full-time 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 asset amounts are reported in nominal values.

5 Empirical Strategy

The primary empirical strategy in this paper involves employing a difference-in-differences (DD) framework.[21] To complement the results, I also utilize a triple-difference (DDD) design (provided in the Appendix B) and Synthetic Control Method (SCM). The empirical strategy and settings for each approach are discussed in subsequent sections.

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

[21] As the sample size near the cutoff is very small, utilizing a bunching analysis to explore manipulation behavior is unsuitable. Figure A1 in Appendix A shows the distribution of endowment assets per student. No clear bunching pattern is observed, possibly due to the small sample size.

5.1 Difference-in-Differences

This paper investigates colleges' tax avoidance and shifting behaviors. The DD framework is applied to both estimations but with varying sample settings and treatment definitions.

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 (in 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:

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

Where Y_{it} is the outcome of interest for college i in year t. $Cutoff_i$ is a dummy variable indicating whether the colleges are near the cutoff (i.e., in 2016 had endowment assets per student between $400,000 to $600,000).[22] $Post_t$ 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, thus, 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.[23] θ_i is the college fixed effect. δ_t is the year fixed effect. $Above_i$ is a dummy variable indicating that the colleges were above the cutoff (i.e., had endowment assets per student in 2016 above $500,000). The specification includes the above-cutoff-status-by-year fixed effects ($Above_i \times \delta_t$)

[22] The asset value is measured as the end-of-year balance of the fiscal year, referring to June 2017 for most colleges.

[23] 80% of treated colleges have fiscal cycles beginning in July (exactly in the middle of the year). The results remain robust when redefining the $Post$ variable according to the fiscal cycle of each college.

to 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 ($X_i \times \delta_t$). Specifically, this paper includes the Carnegie categorization interacting with the time variable to establish comparisons among institutions of the same type. ε_{it} is the error term. The key interest parameter is β_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. In the robustness check, the sample in the control group was further restricted to those with selectivities and reputations similar to those in the treatment group. The results remain robust.

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 would be exempted. The treatment status is defined using pre-policy values (in 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:

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

Where Y_{it} represents the outcomes of interest for colleges i in year t. $Treat_i$ is a dummy variable indicating that the colleges met the tax threshold (i.e., had endowment assets per student above \$500,000) in 2016. The definitions of $Post_t$, θ_i, δ_t, and ε_{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 the comparison is based on colleges with similar characteristics.[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 conditional on the fixed effect. The event study version of equation (2) ensures that the treatment and control 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. In Appendix B, a DDD design was employed which introduces small colleges as an additional control group. In Appendix A, I establish comparisons based on colleges with similar selectivities and rankings. The results are robust across this alternative specification.

The key parameter in equation (2) is β_1, indicating 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 β_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 whole sample is used, and the results remain robust.

5.2 Synthetic Control Method

DD models are helpful in constructing the average treatment effect but would be limited in understanding the heterogeneous response. However, 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.

[24] In all analysis, I 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. Notably, in some cases, a college in the control group might fail to find a match with a college in the treatment group. For example, there are no associated colleges in the treatment group, and there are no treated colleges in Florida and many other states. Under this setting, if a college is of a category without any treated college AND in a state without any treated college, it would not contribute to the estimation of β_1.

To elucidate the effect on individual colleges, this paper utilizes the synthetic control method (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). Figure A2 in Appendix A shows the top 20 institutions that receive the highest weights.

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 in the treatment group. Specifically, the treatment effect of a given college i in year t is estimated as follows:

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

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 ($\sum_{j=1}^{M} w_j^* (Y_{jt} - \overline{Y_j})$). The synthetic control is 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.

Equation (3) provides the estimated treatment effect of a single unit i in a given period t. The average treatment effect is further calculated using the following equations:

$$\overline{\beta_t} = \frac{1}{N}\sum_{i=1}^{N}\beta_{it} \tag{4}$$

Where $\overline{\beta_t}$ is the average treatment effect during period t. N is the total number of treated units. The average treatment effect is computed as the simple average of all treated units. Then, the average treatment effect in the full post-treatment period is calculated as follows:

$$ATT = \frac{1}{T - T_0 + 0.5}\left(0.5 \times \overline{\beta_{t=T_0}} + \sum_{t>T_0}^{T}\overline{\beta_t}\right) \tag{5}$$

The term T represents the maximum time period in the sample. T_0 denotes the years of policy implementation (in this case, 2017). The expression $T - T_0 + 0.5$ accounts for the fact that the year 2017 is half-treated. $\overline{\beta_{t=T_0}}$ is the average treatment effect during the first year of the policy's implementation (2017). This is multiplied by 0.5 to give it the appropriate weight considering the partial treatment. The second part of the equation involves the summation $\sum_{t>T_0}^{T}\overline{\beta_t}$, which sums the average treatment effects in each of the remaining post-treatment periods (when $t > T_0$). The overall calculation is then divided by $T - T_0 + 0.5$ to obtain the average effect. In simpler terms, the Average Treatment Effect (ATT) is computed by combining the partially treated year (2017) with the average treatment effects for all subsequent years, adjusting for the duration of the post-treatment period. This provides a comprehensive measure of the treatment effect over time.

To provide inference statistics, this paper employs a permutation test. Specifically, I first estimate equation (3) for each control unit in the donor pool, obtaining nearly a thousand placebo estimates. In each permutation test, a corresponding set of placebo estimates is randomly selected, matching the actual number of treated units in the study. For each selected set of units in a permutation, equations (4) and (5) are then applied to calculate the ATT. This process is repeated for 1,000 permutations to generate a distribution of placebo ATT values for comparison with the actual results. The permutation p-value is calculated by comparing the actual estimates with the distribution of the placebo estimates. The details of the permutation method are discussed in Appendix C.

6 Empirical Results

6.1 Tax Avoidance

6.1.1 Distances to Tax Threshold

This section reviews the statistics of nonprofit colleges potentially subjected to the NIIT and assesses their motivation and ability to manipulate values for tax exemption. Table A2 in Appendix A provides statistics estimates of how close these colleges are to the assets per student thresholds, considering both the numerator (asset values) and denominator (student population). The distances to the threshold denote the colleges' difficulties and motivation to avoid the tax. If colleges only need to make minor adjustments to be exempted, they might be strongly motivated.

The evaluation suggests that colleges just above the cutoff only require small adjustments, such as decreasing their asset values by 0.05% to 15% or increasing their student population by 0.05% to 17%, to qualify for tax exemptions. Some colleges that are very close to the cutoff only need to increase their student enrollment by less than 50 students. This group is motivated to respond promptly to the policy, as a minor change can lead to tax exemption.

In contrast, colleges just below the cutoff are also motivated to respond since the tax threshold will not adjust with inflation or endowment growth. Therefore, more colleges will be subject to the tax over time. As shown in Table A2, colleges just below the cutoff are expected to meet the tax threshold if their endowment values grow by 7% to 24%. However, many have an average endowment growth rate of 3% to 6%. Thus, if they do not respond, they are expected to be subject to the tax within 3 or 4 years. Consequently, this group is motivated to adjust their student population or asset values promptly after the policy goes into effect.

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 assets 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.

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

In contrast, the estimation reveals that colleges near the tax threshold insignificantly reduce their total endowment by 0.6% ($p > 0.1$; see Table 4, Panel A, Column (1)), which is essentially null. Exploration of the change of various types of assets also finds no significant changes (see Columns (3) to (8)). Due to increased enrollment and unchanged total endowment, these colleges experience an insignificant 5% drop in their endowment assets per student (see Panel A, Column (2)). Colleges below the tax threshold experience a significant 8% drop in endowment assets per student, primarily driven by increased student population (see Panel B, Column (2)). Considering the statistics shown in Table A2, this 8% drop in assets per student is large enough to offset their average growth rate in asset value and can help them maintain tax exempt status.

Table 4: Endowment and Asset-related Tax Avoidance Behavior

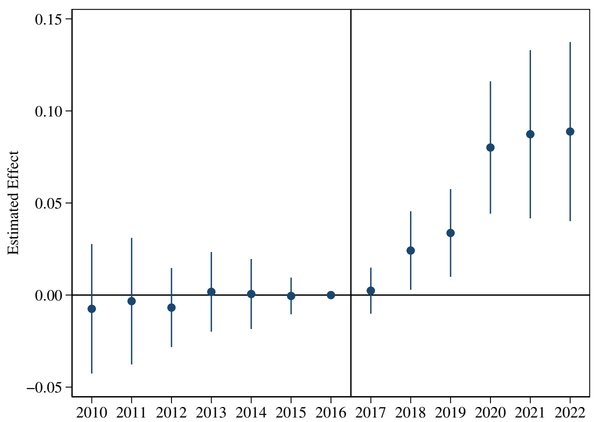
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log Endowment		By Restricted Status		By Category			
	Total	Per-student	Non-restricted	Restricted	Capital	Investment	Others	Liability
Panel A: All Colleges								
$Cutoff \times Post$	0.006	–0.054	0.008	0.040	0.047	0.066	–0.227	0.150
	(0.039)	(0.036)	(0.141)	(0.033)	(0.042)	(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. 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.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

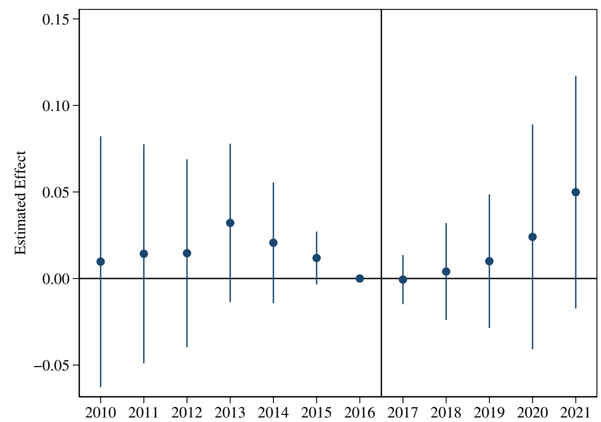
The event study estimation shown in Figure 2 confirms the above findings and the DD assumption. Colleges near and far from the tax threshold show a common trend on enrollment, endowment assets, and assets per student prior to the policy. Furthermore, the dynamic treatment effect estimation shows an increase in student enrollment beginning in 2018, which then became more prominent during the pandemic period (See Figure 2a). The endowment assets per student also began to fall in 2018, with the magnitude expanding over time (See Figure 2c).

Figure 2: Event Study Estimates: Tax Avoidance Behavior

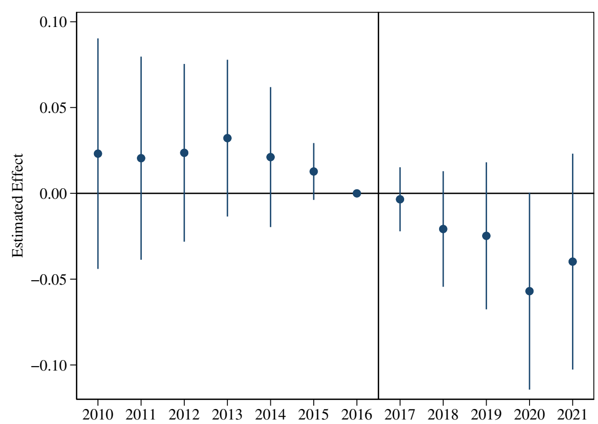
(a) Log Number of FTE Students



(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. 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.

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, in addition to being wealthy, affected colleges tend to be highly selective and prestigious. Table A3 in Appendix A presents the results of a robustness check using only colleges with comparable selectivities and reputations (as defined by Baron's and US News rankings) and concludes similar findings.

6.1.3 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 range of these effects is between 3% to 18%. 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 colleges 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.

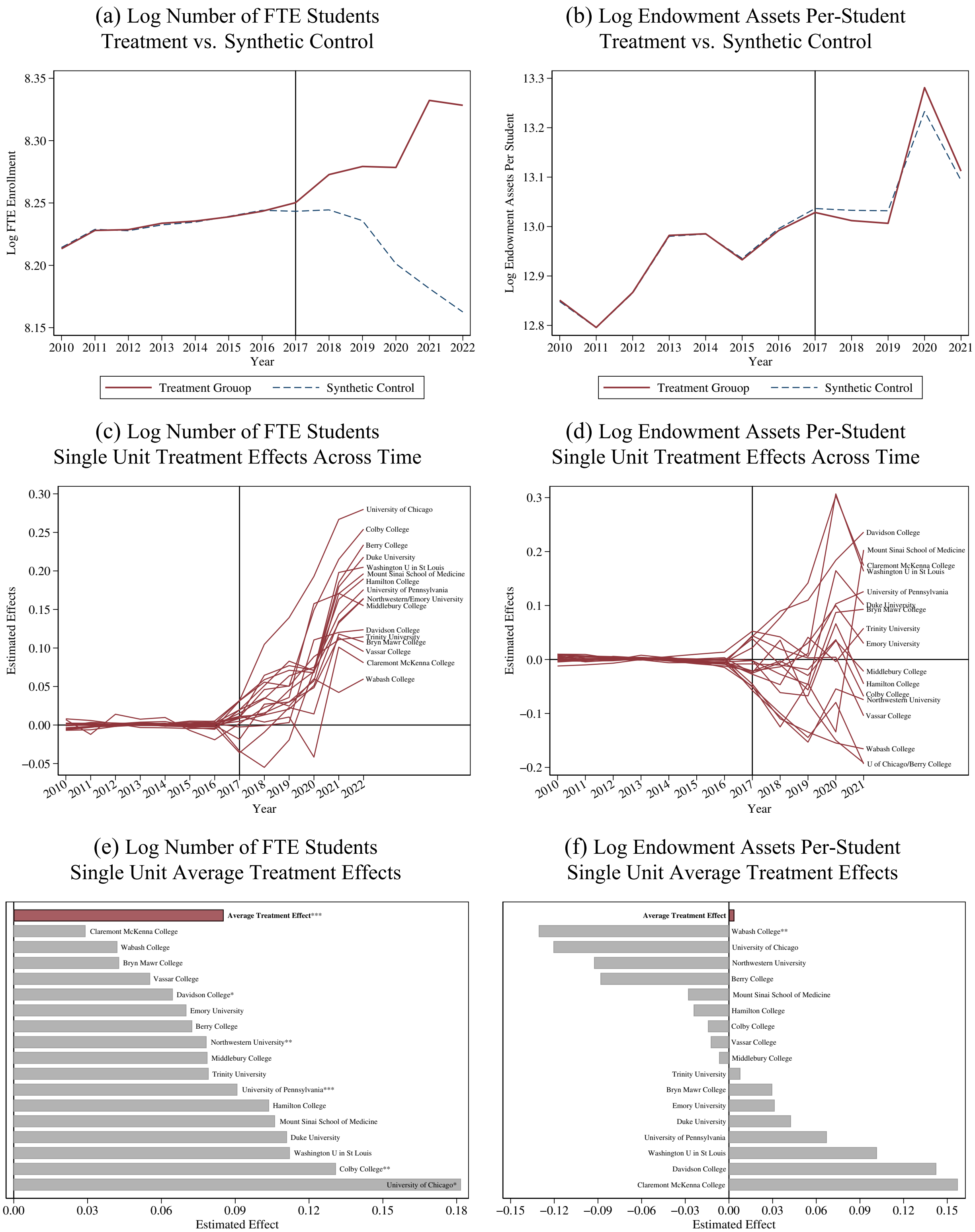
[25] Public records suggest that the increase in enrollment at UChicago is due to an intentionally adopted new strategy (IVY COACH, 2018). In November 2018, the Dean of College at UChicago announced that the university is planning to expand its undergraduate student body to approximately 7,000 (Yee,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

[26] The increase in student enrollment at Colby College might also be driven by their strategic plan. Colby College set up a long-run 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, they had an enrollment management plan designed 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] The investigation of enrollment patterns at WashU also suggests that their enrollment increase is the result of the institution's concerted efforts. WashU established a new office, the Academy for Diversity, Equity, and Inclusion (which has since been renamed the Office of Institutional Equity), 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 rather than undergraduates. In 2017–2018, Duke established a new center, The University Center of Exemplary Mentoring (UCEM), and initiated a series of programs aiming to "expand Duke's capacity to attract, retain, and graduate STEM doctoral students from all backgrounds" (Saff, 2018; Vashisth, 2018). The program has led to a surge in graduate student enrollment, with the total number of FTE graduate students at Duke increasing from 9,000 in 2017 to 11,000 in 2022.

Figure 3: Synthetic Control Method: Tax Avoidance Behavior



Note: The synthetic controls are estimated using SCM. The treatment effects are estimated using equation (3) to (5). 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 the counterfactual obtained from the SCM for individual colleges, I identified colleges that could have been subjected to the tax if they had not manipulated their student population and asset levels but "successfully avoided the tax" based on the actual observed values. Specifically, the manipulation behavior allows two colleges that could have been taxed during the first year of the policy to be exempt from it. These two colleges were the University of Chicago and Berry College, the two closest to the tax threshold prior to the policy (see Table A2). In the second and third years, Trinity University (which was taxed during the first year) and Northwestern University joined the group that "successfully avoided the tax." In 2021, Wabash College also joined the group of successful avoidance. The college was approximately $100,000 away from the tax threshold of assets per student prior to the policy, and given its counterfactual, it could have met the tax threshold in 2021. However, it has been exempted from the tax and continued the exemption status according to the most recent record. 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 their enrollment, they were exempted from the tax in the most recent record. Overall, tax avoidance behavior has allowed seven colleges (or specifically, 12 institution-years in a 5-year time frame) to be (temporarily) exempted from the tax or delay the timing they would be subjected to taxation. The estimated tax loss due to tax avoidance is $31 million (in 2010 real dollars) during the five-year period.[29]

6.2 Tax Shifting

6.2.1 Average Response

Contrary to claims by colleges and theoretical expectations, this paper finds no evidence that colleges subjected to the tax would reduce their spending. Specifically, Table 5 suggests that taxation leads to an insignificant 2% increase in total spending (see Panel A, Column (1)).[30] The event

[29] This amount is calculated by applying the 1.4% tax rate to the net investment income of those colleges that should have been subjected to the tax based on the counterfactual but were eventually exempted from it.

[30] The results presented here are based on the donut sample, i.e., excluding those colleges near the tax threshold. Table A4 in Appendix A shows the estimation based on the full sample and also reveals no significant reduction in spending. Some expenditure categories show an increase in spending, possibly driven by colleges near the cutoff increasing enrollment to avoid the tax.

study evidence presented in Figure 4 shows good common trends prior to the policy and no substantial change after the policy's implementation. The evidence from the DDD setting provides similar results (see Table B1 and Figure B2 in Appendix B).

Table 5 Panels B and C further separate samples into research universities and non-research universities (as defined by Carnegie categorization). Both groups of colleges show no significant expenditure changes. Some suggestive evidence implies that research universities are even less likely to reduce their research spending, but the estimations are non-significant across all groups.

Table 5: 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. 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 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.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

In contrast, colleges respond to taxation by shifting costs to students. Table 6 finds that colleges subjected to the tax increased their listed tuition and charges for room and board after the policy went into effect. Substantial heterogeneous responses exist across institution types. Specifically,

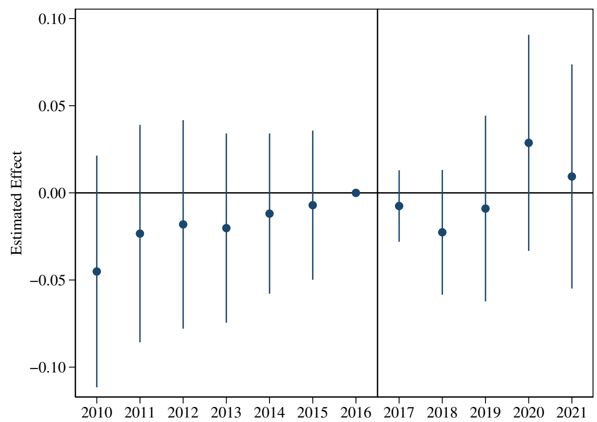


Figure 4: Event Study Estimates: Tax Shifting Behavior on Log Total Expenditure

Note: The coefficients are estimated using the event study version of equation (2). The error bars denote the 95% confidence interval. 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 6: 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. The outcomes are the log enrollment, price, and revenue. All dollars are adjusted by CPI and denoted in 2010 real dollars. Samples are private nonprofit 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 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).
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

while non-research universities increased their undergraduate tuition by 3.3% ($p < 0.05$, see Panel C, Column (2)), research universities opted to increase the graduate tuition by 6.7% ($p < 0.01$, see Panel B, Column (3)). Both types of universities also significantly raised their charges for room and board by 3 to 5% (see Column (4)).[31]

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). Additionally, non-research universities increased undergraduate tuition by 2% in 2018 and by 6% in 2022 (see Figure 5d). The evidence from the DDD also finds significant increases in tuition and charges but with larger point estimates (see Table B2 and Figure B3 in Appendix B).

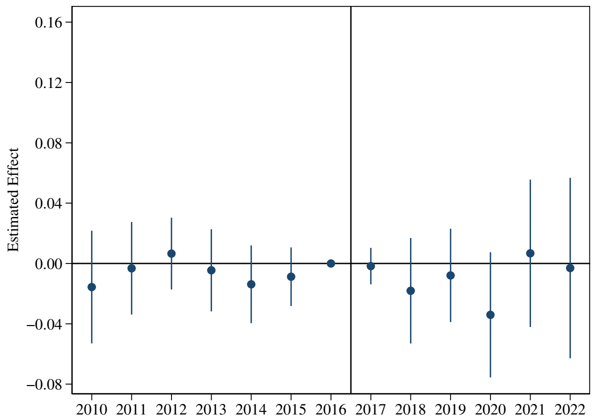
The results also reveal an increase in total enrollment, but only among non-research colleges. Specifically, non-research colleges experienced a significant 6% increase in FTE student enrollment ($p < 0.01$, see Table 6 Panel C, Column (1)), while research universities showed no change (see Table 6 Panel B, 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 6 Panel C, Column (5)) despite the listed tuition rate only increasing by 3%.

A concern with the DD setting is that colleges in the control group differ greatly from those in the treatment group, potentially failing to provide a valid counterfactual. The DDD design in Appendix B partly addresses this concern by demonstrating consistent conclusions with an alternative comparison setup. Table A6 in Appendix A further addresses this issue by using colleges with equivalent selectivities and reputations (as defined by Baron's and US News rankings) as the control group. These estimates are consistent with the main analysis.

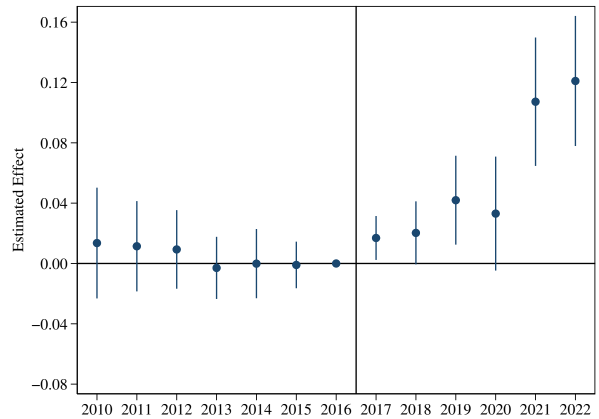
[31] The results presented here are based on the donut sample, i.e., excluding those colleges around the tax threshold. Table A5 in Appendix A reports the estimation based on the full sample and reveals a similar pattern and very close estimates.

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

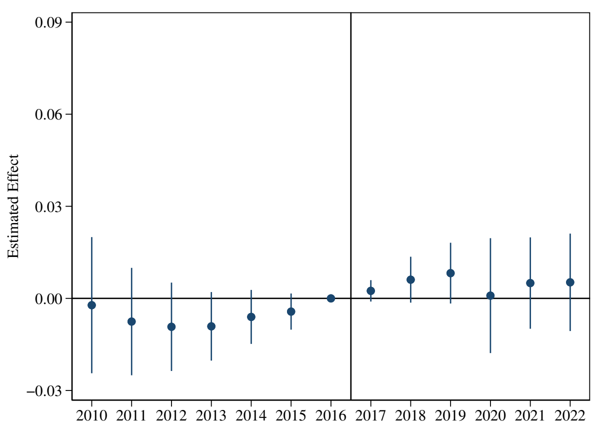
(a) Log FTE Enrollment (Research Universities)



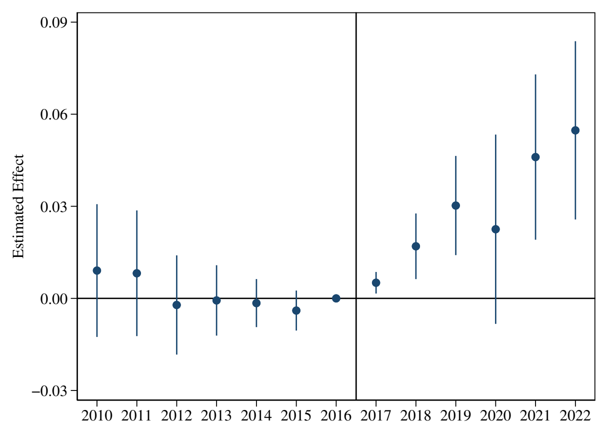
(b) Log FTE Enrollment (Non-Research Universities)



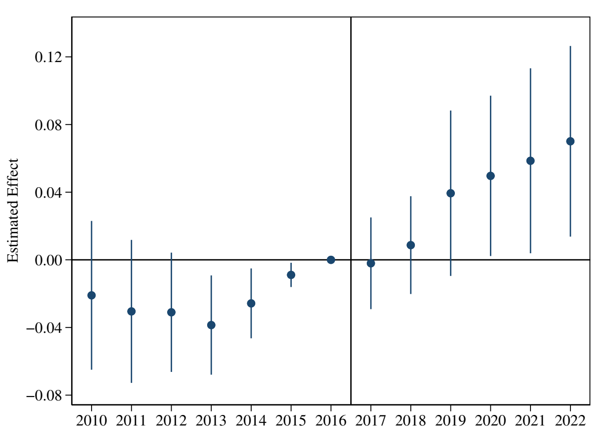
(c) Log Undergraduate Tuition
(Research Universities)



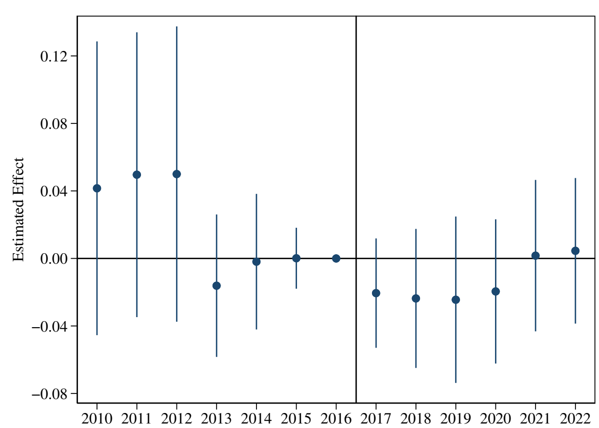
(d) Log Undergraduate Tuition
(Non-Research Universities)



(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).

6.2.2 Individual Institution Response

Figure 6 examines the individual institutional responses using the SCM approach. 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. There is also no clear pattern suggesting that colleges with higher tax bills tend to have more pronounced responses. 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 after the policy's implementation.[32] The magnitudes range from an increase of 27% to a decrease of 4% (see Figure 6f). The dynamic effects reported in Figure 6d demonstrate that most of these colleges show a pattern of gradually increasing their tuition revenue with a temporary drop in 2020, potentially due to COVID-19. The average treatment effect retrieved from pooled SCM is 0.07 ($p = 0.01$), close to the estimate obtained from the DD model. However, there is no pattern showing that colleges with higher tax bills tend to respond more strongly than others.

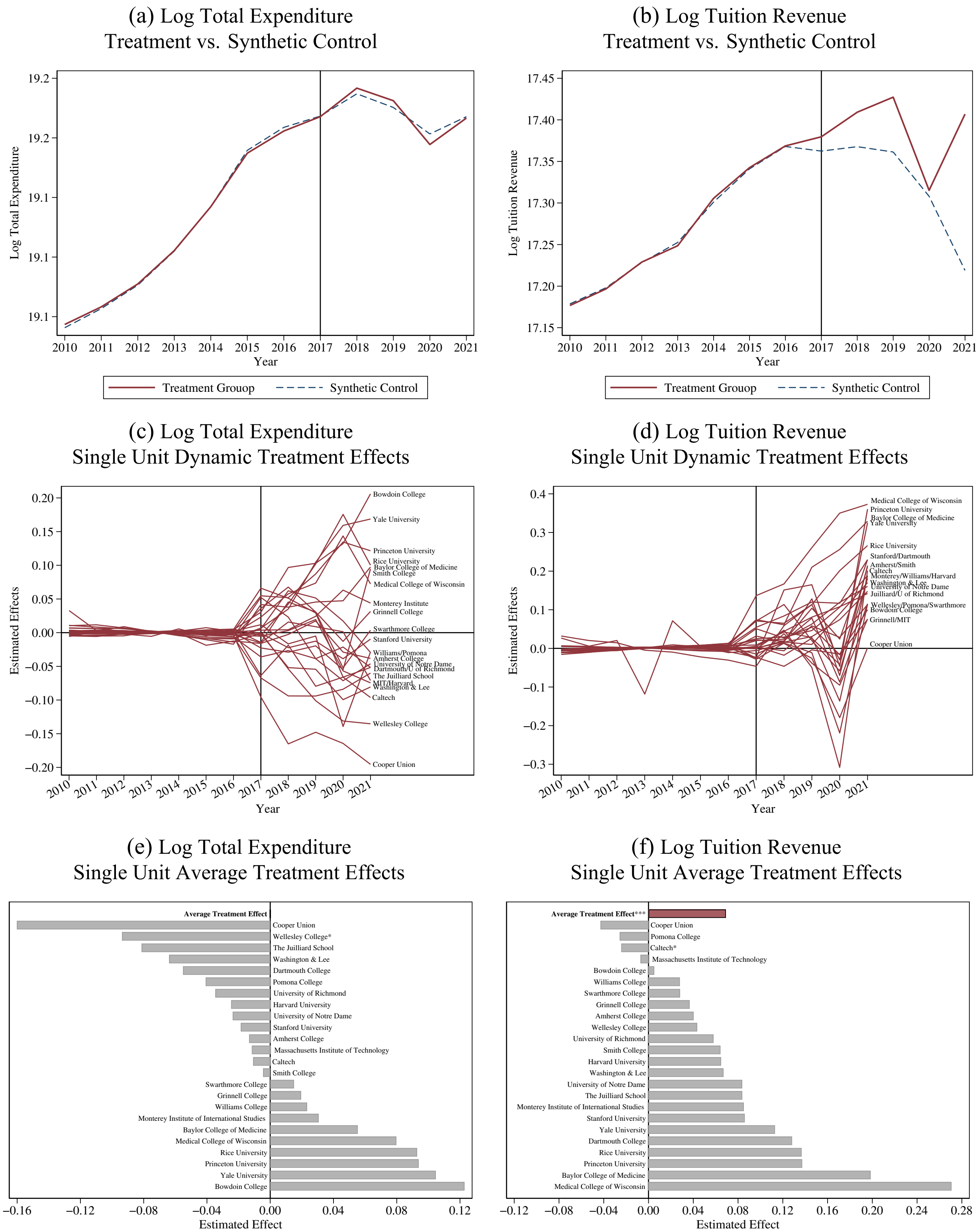
6.3 Impact on Student Composition

Section 6.1 finds that colleges would increase student enrollment to qualify for tax exemption, and Section 6.2 suggests that colleges would increase tuition to shift the tax burden to students. The resulting question then becomes how these changes affect students' educational opportunities. Table 7 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 7 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 also show increases, 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/ethnicities.

[32]The analysis here 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 (5). 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 7: Tax Avoidance and Shifting Behavior on Student Enrollment 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. 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 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. The observation period is from 2010 to 2022.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

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.

Section 6.2 has found that non-research universities paying the tax also increase their enrollment. However, Table 7 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). However, 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 Compare Tax Loss/Revenue to Avoidance/Shifting Consequences

6.4.1 Compare Revenue Loss and Opportunities Generated

Although tax avoidance behavior leads to lost government revenues, it prompts colleges to increase enrollment, which can be seen as a positive social benefit. The colleges affected by taxation tend to be selective colleges. Hence, the enrollment expansion at these colleges could result in additional individual or societal benefits. Previous studies have found a positive effect of attending selective colleges on academic and labor market outcomes compared to less selective ones, even when accounting for pre-enrollment characteristics (Melguizo, 2008; Kapur et al., 2016; Witteveen & Attewell, 2017; S. D. Zimmerman, 2019; Ge et al., 2022). This implies that students could benefit if access to these colleges is expanded.

To evaluate the benefits of enrollment expansion due to tax avoidance, I calculate the additional return of college degrees from these colleges compared to degrees from colleges that are one level lower in selectivity. The detailed methodology is described 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 of these estimates, the benefit generated from enrollment ($350 million) is over 10 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, the interpretation of this estimate is subject to some limitations. Firstly, the estimated benefit is calculated from all colleges (17 colleges) engaged in tax avoidance behaviors (regardless of whether the effort is successful), but the tax loss only considers those that should have been taxed but successfully avoided it (5 colleges). 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.

Secondly, the estimate is only short-term, as colleges are not likely to increase their enrollment indefinitely, but their endowments might continue to grow (at least with inflation). Hence, these colleges might eventually lose motivation for manipulation (though new colleges might fall near the cutoff).

6.4.2 Compare Taxes Paid and Amount Shifted to Students

The evidence in the prior sections finds that taxed colleges increase tuition and other charges. The resulting question is how the taxes paid (which would then become government revenue) compensate for the burden shifted to students via attendance costs.

Table A1 in Appendix A estimates the tax burden accounts for 0.5% of total revenue among taxed colleges. Table 6 finds these colleges increased tuition by 2.4%. With tuition revenue averaging 25% of total revenue among these colleges, a 2.4% increase in tuition might imply a 0.6% increase in total revenue. Therefore, the ratio of taxes paid and burden shifted is roughly 1:1.2.

To obtain a more comprehensive estimate, this section uses evidence from individual institutions' responses estimated from SCM to calculate values for each college. The total costs shifted to students throughout the 5-year period and among all treated colleges were $1,186 million for tuition revenue and $249 million for auxiliary facilities charges (such as room and board) (in 2010 real dollars).[33] In contrast, the estimated 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. The remainder might either be absorbed by colleges' assets, surplus revenues, or insignificant adjustments in other spending categories.

[33] This estimate is only based on the treatment group in the analysis sample, which consists of colleges with more than 500 students and more than $600,000 in assets per student prior to the policy. This sample excludes colleges near the tax threshold and those that initially were not but might later be subjected to the tax.

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 always utilize the tax benefits to enhance their services (D. Zimmerman, 1991; Cowan, 2007; Nichols & Santos, 2016; Herring et al., 2018; Propheter, 2019). The consideration of whether the government should tax nonprofits hinges on how nonprofits would respond to taxation. Nonprofits might engage in tax avoidance behavior by manipulating their finances or services to avoid taxes or shift the tax burden onto their service population or the public. Previous studies examining for-profit organizations have shown 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 utility losses, and whether the consequences outweigh the potential revenue 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, and its findings suggest that taxed colleges increase tuition and charge for on-campus facilities, passing through the tax burden to students. However, they do not reduce financial aid or core education and research 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 cutting services aligns with studies finding that colleges facing financial fluctuations maintain or improve their quality (Bulman, 2022). The findings support theoretical perspectives that nonprofits prioritize social welfare and their missions, choosing approaches that least harm 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 reduce service quality (i.e., cut spending) but instead 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 need 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 their budgets in response to taxation. Additionally, tax payments might be viewed as a cost for an institution, 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. Colleges' public statements and lobbying activities on this policy also demonstrate their sensitivity to the income shock induced by taxation.

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 general nonprofit taxation. Firstly, while the NIIT on colleges has some negative consequences, the worst-case scenario (cutting spending and financial aid) did not occur. Additionally, the benefits generated from the policy exceed the negative costs, so reversing the policy

[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.

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. The government could use the revenue to improve access to higher education and redesign the taxation to offer incentives for positive responses. The 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 general nonprofit taxation policy, 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.

Reference

Abadie, A. (2021). Using synthetic controls: Feasibility, data requirements, and methodological aspects. *Journal of Economic Literature*, *59*(2), 391–425.

Abadie, A., Diamond, A., & Hainmueller, J. (2010). Synthetic control methods for comparative case studies: Estimating the effect of california's tobacco control program. *Journal of the American Statistical Association*, *105*(490), 493–505.

ACE. (2019). Treasury Department releases endowment tax draft rules. American Council on Education. *American Council on Education*. Retrieved December, 25, 2022, from https://www.acenet.edu/News-Room/Pages/Treasury-Department-Releases-Endowment-Tax-Draft-Rules.aspx

Almunia, M., & Lopez Rodriguez, D. (2014). Heterogeneous responses to effective tax enforcement: Evidence from Spanish firms. *Banco de Espana Working Paper*, *1419*. (http://dx.doi.org/10.2139/ssrn.2471467)

Altundemir, M. E. (2012). The impact of the financial crisis on american public universities. *International Journal of Business and Social Science*, *3*(8), 190–198.

Arora, P., Rahmani, M., & Ramachandran, K. (2022). Doing less to do more? optimal service portfolio of non-profits that serve distressed individuals. *Manufacturing & Service Operations Management*, *24*(2), 883–901.

Arulampalam, W., Devereux, M. P., & Maffini, G. (2012). The direct incidence of corporate income tax on wages. *European Economic Review*, *56*(6), 1038–1054.

Austin, C. R., & Wilson, R. J. (2015). Are reputational costs a determinant of tax avoidance? In *2013 American Taxation Association Midyear Meeting: Tax avoidance in an international setting*.

Austin, C. R., & Wilson, R. J. (2017). An examination of reputational costs and tax avoidance: Evidence from firms with valuable consumer brands. *The Journal of the American Taxation Association*, *39*(1), 67–93.

Bachas, P., & Soto, M. (2021). Corporate taxation under weak enforcement. *American Economic Journal: Economic Policy*, *13*(4), 36–71.

Baum, S., & Lee, V. (2019). *The role of college and university endowments*. Urban Institute. (https://vtechworks.lib.vt.edu/bitstream/handle/10919/95075/CollegeUniversityEndowments.pdf)

Bird, R., & Davis-Nozemack, K. (2018). Tax avoidance as a sustainability problem. *Journal of Business Ethics*, *151*(4), 1009–1025.

Blake, J. (2024). A reboot for rural recruitment. *Inside Higher Ed*. Retrieved January, 22, 2024, from https://www.insidehighered.com/news/admissions/traditional-age/2024/01/04/washington-university-ramps-outreach-rural-applicants

Bonnet, C., & Réquillart, V. (2013). Tax incidence with strategic firms in the soft drink market. *Journal of Public Economics*, *106*, 77–88.

Brody, E., & Cordes, J. J. (2006). Tax treatment of nonprofit organizations: A two-edged sword? *Nonprofits and Government: Collaboration and Conflict*, *141*, 149–150.

Brooks, A. C. (2005). What do nonprofit organizations seek? (and why should policymakers care?). *Journal of Policy Analysis and Management*, *24*(3), 543–558.

Brown, J. R., Dimmock, S. G., Kang, J.-K., & Weisbenner, S. J. (2014). How university endowments respond to financial market shocks: Evidence and implications. *American Economic Review*, *104*(3), 931–962.

Bulman, G. (2022). The effect of college and university endowment returns on financial aid, admissions, and student composition. *National Bureau of Economic Research Working Paper*. (https://www.nber.org/papers/w30404)

Calabrese, T. D. (2011). Public mandates, market monitoring, and nonprofit financial disclosures. *Journal of Accounting and Public Policy*, *30*(1), 71–88.

Carnevale, A. P., Wenzinger, E., & Cheah, B. (2022). The most popular degree pays off: Ranking the economic value of 5,500 business programs at more than 1,700 colleges. *Georgetown University Center on Education and the Workforce*.

Carrillo, P., Pomeranz, D., & Singhal, M. (2017). Dodging the taxman: Firm misreporting and limits to tax enforcement. *American Economic Journal: Applied Economics*, *9*(2), 144–164.

Cespedes, J., Nickerson, J., & Parra, C. (2021). Strategically staying small: Regulatory avoidance and the cra. *Available at SSRN 3874987*. (http://dx.doi.org/10.2139/ssrn.3874987)

Chang, T., & Jacobson, M. (2011). What do nonprofit hospitals maximize? evidence from california's seismic retrofit mandate. *National Bureau of Economic Research Working Paper*. (https://users.nber.org/~jacobson/ChangJacobson12.5.10.pdf)

Civera, A., Cattaneo, M., Meoli, M., Paleari, S., & Seeber, M. (2021). Universities' responses to crises: The influence of competition and reputation on tuition fees. *Higher Education*, *82*, 61–84.

Cowan, M. J. (2007). Taxing and regulating college and university endowment income: The literature's perspective. *JC & UL*, *34*, 507.

De Alva, J. K., & Schneider, M. (2015). *Rich schools, poor students: tapping large university endowments to improve student outcomes*. NEXUS Research & Policy Center.

Derrig, K. (2017). Trinity endowment under aim in tax reform policy. Trinitionian. *Trinitonian*. Retrieved December, 25, 2022, from https://trinitonian.com/2017/11/29/trinity-endowment-under-aim-in-tax-reform-policy/

Djankov, S., Ganser, T., McLiesh, C., Ramalho, R., & Shleifer, A. (2010). The effect of corporate taxes on investment and entrepreneurship. *American Economic Journal: Macroeconomics*, *2*(3), 31–64.

Doudchenko, N., & Imbens, G. W. (2016). Balancing, regression, difference-in-differences and synthetic control methods: A synthesis. *National Bureau of Economic Research Working Paper*. (https://www.nber.org/papers/w22791)

Edelson, D. (2016). How do college graduates benefit society at large. *Association of Public and Land-Grant Universities*. (https://www.aplu.org/our-work/4-policy-and-advocacy/publicuvalues/societal-benefits/)

Espinosa, J., & Evans, W. N. (2013). Excise taxes, tax incidence, and the flight to quality: Evidence from scanner data. *Public Finance Review*, *41*(2), 147–176.

Farrell, N. (2017). What factors drive inequalities in carbon tax incidence? decomposing socioeconomic inequalities in carbon tax incidence in ireland. *Ecological Economics*, *142*, 31–45.

Fei, F., Hines Jr, J. R., & Horwitz, J. R. (2016). Are pilots property taxes for nonprofits? *Journal of Urban Economics*, *94*, 109–123.

Felix, R. A. (2007). Passing the burden: Corporate tax incidence in open economies. (https://www.econstor.eu/handle/10419/95465)

Fernandez, F., Hu, X., & Umbricht, M. (2023). Examining Wyoming's endowment challenge program: A synthetic control analysis. *Research in Higher Education*, *64*, 654–674.

Filippakou, O., Tapper, T., Filippakou, O., & Tapper, T. (2019). Moving from the public to the private funding of english higher education: The imposition of student tuition fees. *Creating the Future? The 1960s New English Universities*, 75–83.

Fishman, J. J. (2018). How big is too small: Should certain higher educational endowments' net investment income be subject to tax. *Cornell JL & Pub. Pol'y*, *28*, 159.

Fuest, C., Peichl, A., & Siegloch, S. (2018). Do higher corporate taxes reduce wages? *American Economic Review*, *108*(2), 393–418.

Gaarder, I. (2019). Incidence and distributional effects of value added taxes. *The Economic Journal*, *129*(618), 853–876.

Ge, S., Isaac, E., & Miller, A. (2022). Elite schools and opting in: Effects of college selectivity on career and family outcomes. *Journal of Labor Economics*, *40*(S1), S383–S427.

Grimm Jr, R. T. (1999). Reforming property tax exemption policy in the nonprofit sector: Commercialism, collective goods, and the donative theory. *Nonprofit Management and Leadership*, *9*(3), 241–259.

Guenther, D. A., Matsunaga, S. R., & Williams, B. M. (2017). Is tax avoidance related to firm risk? *The Accounting Review*, *92*(1), 115–136.

Hale, K. (2013). Understanding nonprofit transparency: The limits of formal regulation in the american nonprofit sector. *International Review of Public Administration*, *18*(3), 31–49.

Harris, E. E., & Neely, D. (2021). Determinants and consequences of nonprofit transparency. *Journal of Accounting, Auditing & Finance*, *36*(1), 195–220.

Hassan, M., Wedig, G. J., & Morrisey, M. A. (2000). Charity care by non-profit hospitals: the price of tax-exempt debt. *International Journal of the Economics of Business*, *7*(1), 47–62.

Herring, B., Gaskin, D., Zare, H., & Anderson, G. (2018). Comparing the value of nonprofit hospitals' tax exemption to their community benefits. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*, *55*, 0046958017751970.

Hill, K., Hoffman, D., & Rex, T. R. (2005). *The value of higher education: Individual and societal benefits*. Arizona State University.

Hinrichs, P. L. (2018). College endowments. *Economic Commentary*(2018-04). doi: 10.26509/frbc-ec-201804

Hofmann, M. A. (2007). Tax-motivated expense shifting by tax-exempt associations. *Journal of the American Taxation Association*, *29*(1), 43–60.

Homonoff, T., Spreen, T. L., & Clair, T. S. (2020). Balance sheet insolvency and contribution revenue in public charities. *Journal of Public Economics*, *186*, 104177.

Hosono, K., Hotei, M., & Miyakawa, D. (2018). Tax avoidance by capital reduction: Evidence from corporate tax reform in japan. *Asian Finance Association (AsianFA) 2018 Conference*. (http://dx.doi.org/10.2139/ssrn.3105794)

Humphreys, J., & Solomon, A. (2012). *Public investment in private higher education: Estimating the value of nonprofit college and university tax exemptions*. Tellus Institute. (https://ssrn.com/abstract=2148586)

Hung, C., & Berrett, J. (2021). Service delivery under pressure: The effect of donor-imposed financial restrictions. *Public Performance & Management Review*, *44*(3), 580–601.

IVY COACH. (2018). University of chicago class size expansion (2018). *IVY COACH*. Retrieved January, 22, 2024, from https://www.ivycoach.com/the-ivy-coach-blog/college-admissions/university-of-chicago-class-size-expansion/

Kane, T. J., & Orszag, P. (2003). *Funding restrictions at public universities: Effects and policy implications*. Washington, DC: Brookings Institution.

Kapur, N., Lytkin, N., Chen, B.-C., Agarwal, D., & Perisic, I. (2016). Ranking universities based on career outcomes of graduates. In *Proceedings of the 22nd ACM SIGKDD international conference on knowledge discovery and data mining* (pp. 137–144).

Katz, S. P., Khan, U., & Schmidt, A. (2015). Tax avoidance and dupont measures of future performance. *Columbia Business School Research Paper*(15-29).

Keaggy, D. T. (2022). Washu hits major milestone: Class of 2026 is 20% pell grant-eligible, 15% first-generation. *The Source*. Retrieved January, 22, 2024, from https://source.wustl.edu/2022/08/washu-hits-major-milestone-class-of-2026-is-20-pell-grant-eligible-15-first-generation/

Keating, E. K., & Frumkin, P. (2003). Reengineering nonprofit financial accountability: Toward a more reliable foundation for regulation. *Public Administration Review*, *63*(1), 3–15.

Marion, J., & Muehlegger, E. (2011). Fuel tax incidence and supply conditions. *Journal of Public Economics*, *95*(9-10), 1202–1212.

Marx, B. M. (2018). The cost of requiring charities to report financial information. *Munich Personal RePEc Archive*. (https://mpra.ub.uni-muenchen.de/88660/)

McClure, C. G. (2023). How costly is tax avoidance? evidence from structural estimation. *The Accounting Review*, *98*(6), 353–380.

McDonald III, B. D., & Goodman, C. B. (2021). The truth about honesty in the nonprofit sector. *Public Administration Quarterly*, *45*(2), 188–210.

Melguizo, T. (2008). Quality matters: Assessing the impact of attending more selective institutions on college completion rates of minorities. *Research in Higher Education*, *49*, 214–236.

Mitchell, M., Leachman, M., & Saenz, M. (2019). State higher education funding cuts have pushed costs to students, worsened inequality. *Center on Budget and Policy Priorities*, *24*, 9–15.

Mumper, M., & Freeman, M. L. (2005). The causes and consequences of public college tuition inflation. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (pp. 307–361). Springer.

Nerudová, D., & Dobranschi, M. (2016). The impact of tax burden overshifting on the pigovian taxation. *Procedia-Social and Behavioral Sciences*, *220*, 302–311.

Nichols, A. H., & Santos, J. L. (2016). A glimpse inside the coffers: Endowment spending at wealthy colleges and universities. In *Higher education policy for minorities in the United States*. The Education Trust.

Omer, T. C., & Yetman, R. J. (2007). Tax misreporting and avoidance by nonprofit organizations. *Journal of the American Taxation Association*, *29*(1), 61–86.

Politi, R. B., & Mattos, E. (2011). Ad-valorem tax incidence and after-tax price adjustments: evidence from brazilian basic basket food. *Canadian Journal of Economics/Revue canadienne d'économique*, *44*(4), 1438–1470.

Prentice, C. R., & Clerkin, R. M. (2023). The influence of nonprofit financing and operations on the acquisition of unrestricted and restricted donations. *Nonprofit Management and Leadership*, *24*(1), 211–225.

Propheter, G. (2019). Excessive revenue underforecasting: Evidence and implications from New York City's property tax. *The Palgrave Handbook of Government Budget Forecasting*, 217–240.

Riley, C. (2019). Wash u in st. louis pledges low-income missouri students can attend 'free of charge'. *Spring Field News-Leader*. Retrieved January, 22, 2024, from https://www.news-leader.com/story/news/education/2019/10/03/washington-university-st-louis-pledges-free-tuition-low-income-missouri-students/3836259002/

Rosen, H. S., & Sappington, A. J. (2019). The impact of endowment shocks on payouts. *The Journal of Higher Education*, *90*(5), 690–716.

Rosenbaum, S., Kindig, D. A., Bao, J., Byrnes, M. K., & O'Laughlin, C. (2015). The value of the nonprofit hospital tax exemption was $24.6 billion in 2011. *Health Affairs*, *34*(7), 1225–1233.

Ryan, C., Marsicano, C., Bernhardt, A., & Martin, R. (2024). Gaming the endowment tax. *Florida Tax Review*, *forthcoming*.

Saff, D. (2018). Duke aims to bring minorities into stem graduate programs. *The Daily Tar Heel*. Retrieved January, 28, 2024, from https://www.dailytarheel.com/article/2018/01/duke-minority-program

Sansing, R., & Yetman, R. (2006). Governing private foundations using the tax law. *Journal of Accounting and Economics*, *41*(3), 363–384.

Schmidt, A. P. (2007). Discussion of tax misreporting and avoidance by nonprofit organizations. *Journal of the American Taxation Association*, *29*(1), 87–92.

Schwellnus, C., & Arnold, J. M. (2008). Do corporate taxes reduce productivity and investment at the firm level?: Cross-country evidence from the amadeus dataset.

Selig, K. (2020). Facing $43 million bill, university warns endowment tax will hamper financial aid. *The Stanford Daily*. Retrieved December, 25, 2022, from https://stanforddaily.com/2020/02/14/facing-43-million-bill-university-warns-endowment-tax-will-hamper-financial-aid/

Sherlock, M. F., Crandall-Hollick, M. L., Gravelle, J., & Stupak, J. M. (2018). *College and university endowments: Overview and tax policy options*. Congressional Research Service Washington, DC.

Sherlock, M. F., & Gravelle, J. G. (2009). *An overview of the nonprofit and charitable sector*. Congressional Research Service.

Slemrod, J., & Yitzhaki, S. (2002). Tax avoidance, evasion, and administration. In A. J. Auerbach, M. Feldstein, & M. S. Feldstein (Eds.), *Handbook of public economics* (Vol. 3, pp. 1423–1470). Elsevier.

St. Clair, T. (2016). How do nonprofits respond to regulatory thresholds: Evidence from New York's audit requirements. *Journal of Policy Analysis and Management*, *35*(4), 772–790.

Stendahl, M. (2017). MIT, Harvard say GOP's endowment tax will cost them millions. *Boston Business journal*. Retrieved December, 25, 2022, from https://www.bizjournals.com/boston/news/2017/12/21/mit-harvard-say-gops-endowment-tax-will-cost-them.html

Stevens, S. A. (2010). Tax aid and non-profit organizations. *EC Tax Review*, *19*(4).

Sullivan, R. S., & Dutkowsky, D. H. (2012). The effect of cigarette taxation on prices: an empirical analysis using local-level data. *Public Finance Review*, *40*(6), 687–711.

Surysekar, K., Turner, E. H., & Wheatley, C. M. (2015). On the association between donor-imposed financial inflexibility and future donations to charitable organizations. *Journal of Management Accounting Research*, *27*(1), 63–79.

Taylor, G., Al-Hadi, A., Richardson, G., Alfarhan, U., & Al-Yahyaee, K. (2019). Is there a relation between labor investment inefficiency and corporate tax avoidance? *Economic Modelling*, *82*, 185–201.

Taylor, P., Parker, K., Fry, R., Cohn, D., Wang, W., Velasco, G., & Dockterman, D. (2011). *Is college worth it? college presidents, public assess*. Pew Research Center.

Trostel, P. A. (2015). *It's not just the money the benefits of college education to individuals and to society*. Lumina Foundation.

Vartia, L. (2008). How do taxes affect investment and productivity?: An industry-level analysis of OECD countries. (https://doi.org/10.1787/18151973)

Vashisth, S. (2018). New scholarship program aims to increase underrepresented minorities in graduate stem disciplines. *The Chronicle*. Retrieved January, 28, 2024, from https://www.dukechronicle.com/article/2018/01/new-scholarship-program-aims-to-increase-underrepresented-minorities-in-graduate-stem-disciplines

Willie, M. (2012). Taxing and tuition: A legislative solution to growing endowments and the rising costs of a college degree. *BYU L. Rev.*, 1665.

Witesman, E. M., & Fernandez, S. (2013). Government contracts with private organizations: Are there differences between nonprofits and for-profits? *Nonprofit and Voluntary Sector Quarterly*, *42*(4), 689–715.

Witteveen, D., & Attewell, P. (2017). The earnings payoff from attending a selective college. *Social Science Research*, *66*, 154–169.

Yee, W. Y. (2018). Boyer says college aims to reach 7,000 students. *The Chicago Maroon*. Retrieved January, 22, 2024, from https://chicagomaroon.com/26313/news/boyer-raises-possible-switch-semester-system-meeti/

Zare, H., Eisenberg, M. D., & Anderson, G. (2022). Comparing the value of community benefit and tax-exemption in non-profit hospitals. *Health Services Research*, *57*(2), 270–284.

Zimmerman, D. (1991). Nonprofit organizations, social benefits, and tax policy. *National Tax Journal*, *44*(3), 341–349.

Zimmerman, S. D. (2019). Elite colleges and upward mobility to top jobs and top incomes. *American Economic Review*, *109*(1), 1–47.

Online Appendix: For Online Publication

Appendix A: Additional Results

Appendix B: Triple-Difference Design for Tax Shifting

Appendix C: Methodology Details on Permutation Test for SCM

Appendix D: 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: Tax Avoidance Behavior: Restricting Sample to Top Universities

	(1)	(2)	(3)	(4)	(5)	(6)
	Barron's Rank Above Very Competetive			US News' Ranking Top 100		
	Log FTE	Log Endowment		Log FTE	Log Endowment	
	Enrollment	Total	Per-Student	Enrollment	Total	Per-Student
$Cutoff \times Post$	0.066***	0.004	–0.058	0.054***	0.007	–0.044
	(0.019)	(0.037)	(0.037)	(0.019)	(0.040)	(0.039)
Observations	3,900	3,600	3,600	1,807	1,668	1,668

Note: The coefficients are estimated using equation (1). Standard errors clustered at the institution level in parentheses. The outcomes in columns (1) and (4) are log student enrollment. The outcomes in columns (2) and (5) are log endowment assets. The outcomes in columns (3) and (6) are log endowment assets per student. 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 Rank 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 in columns (1) and (4) and 2010 to 2021 in the remaining columns.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table A4: 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 A5: Enrollment, Tuition, and Charge-related Tax Shifting Behavior (All Sample)

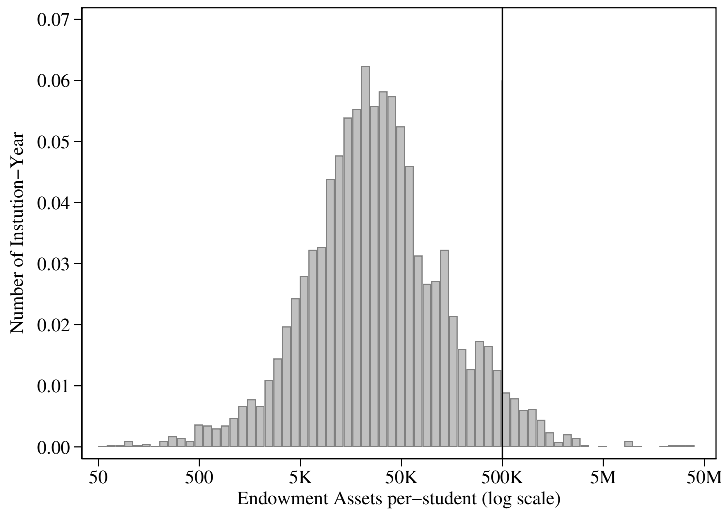
	(1)	(2)	(3)	(4)	(5)	(6)
	Log FTE	Log Listed Price			Log Total Revenue	
	Enrollment	Undergrad Tuition	Graduate Tuition	Room & Board	Tuition	Auxiliary
Panel A: All Colleges						
$Treat \times Post$	0.035**	0.023***	0.011	0.029***	0.133***	0.013
	(0.015)	(0.008)	(0.022)	(0.011)	(0.027)	(0.045)
Observations	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).
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

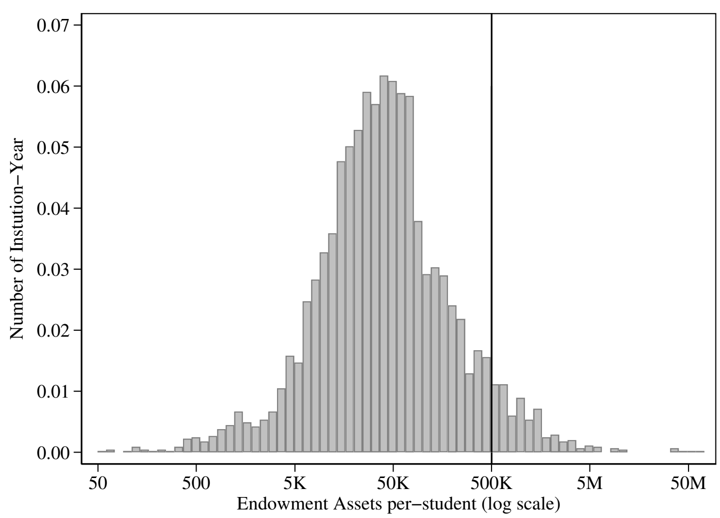
Table A6: Tax Shifting Behavior: Restricting Sample to Top Universities

	(1)	(2)	(3)	(4)	(5)	(6)
	Barron's Rank Above Very Competetive			US News' Ranking Top 100		
	Total Expenditure	Listed Tuition	Tuition Revenue	Total Expenditure	Listed Tuition	Tuition Revenue
$Treat \times Post$	0.005	0.027*	0.109**	–0.055	0.018*	0.042
	(0.036)	(0.014)	(0.047)	(0.050)	(0.010)	(0.050)
Observations	3,324	3,601	3,324	1,380	1,495	1,380

Note: The coefficients are estimated using equation (2). Standard errors clustered at the institution level in parentheses. The outcomes are log total expenditure (columnns (1) and (4), log listed undergrad tuition (columns (2) and (5)), and log total tuition revenue (column (3) and (6)). 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 Rank 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 in columns (1), (2), (4) and (5) and 2010 to 2021 in the remaining columns.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$



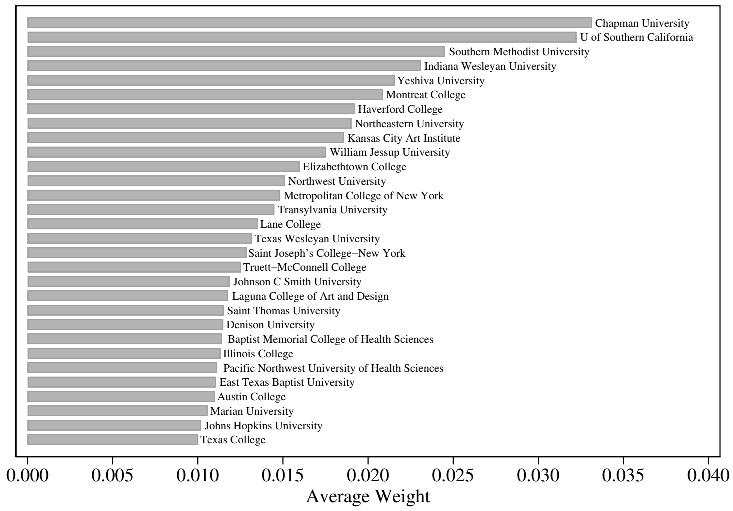
(a) Fiscal Year 2010 to 2016



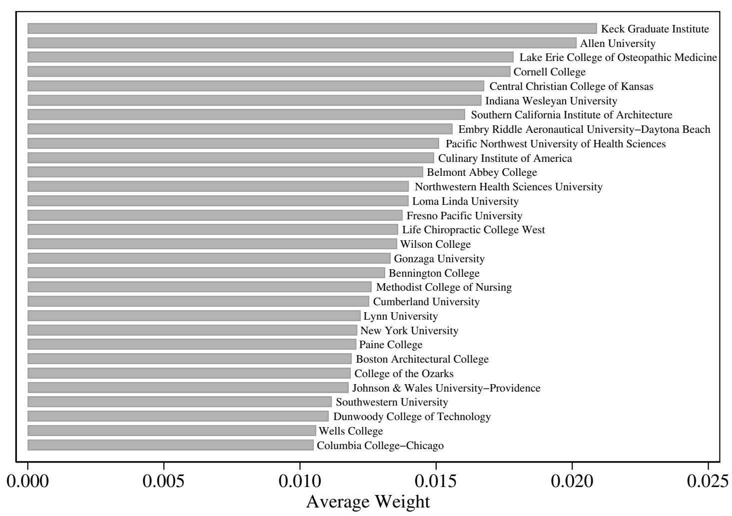
(b) Fiscal Year 2017 to 2021

Figure A1: Distribution of Endowment Assets Per-student

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.



(a) Tax Avoidance Analysis



(b) Tax Shifting Analysis

Figure A2: Distribution of SCM Weights

Note: The figure shows the top 20 colleges with the highest weights obtained from SCM analysis. The horizontal axis shows the average weights across all treated units and all variables.

Appendix B: Triple-Difference Design for Tax Shifting

B1 Empirical Strategy

In the main analysis, I use the DD framework to estimate colleges' tax-shifting behaviors, which comparing colleges subjected to the tax (treatment group) with those that meet the student threshold but not the asset threshold (the control group). However, given the substantial difference in the asset values, the two groups might not share common trends in their spending and revenue. Specifically, Figure B1a shows that the treated colleges have a faster growth rate in their total expenditure compared to the colleges in the control group.

Despite the inclusion of fixed effects leading to an improvement of the pre-treatment common trend, the concern of the DD setting still remains. Particularly, wealthy and non-wealthy colleges might respond differently to other macro environment shocks, such as COVID. Hence, this study further applies a triple-difference (DDD) framework to test the robustness of the results. In particular, 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:

$$Y_{it} = \alpha_0 + \beta_1 Large_i \times Wealthy_i \times Post_t + \theta_i + Large_i \times \delta_t + Wealthy_i \times \delta_t + \varepsilon_{it} \tag{B1}$$

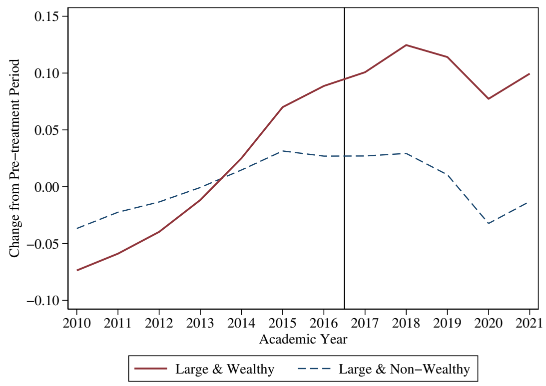
Where $Large_i$ is a dummy variable indicating that the colleges had a student population above 500 in 2016. $Wealthy_i$ is a dummy variable indicating that the colleges had endowment assets per student above $500,000 in 2016. The equation includes the student population by year fixed effect ($Large_i \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 \delta_t$) accounts for the potential difference in trends between wealthy and non-wealthy colleges. θ_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 β_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 B1a), the same pattern appears in the comparison between "small, wealthy colleges" versus "small, non-wealthy colleges" (see Figure B1c). Figure B1e compares the gap in two paired comparisons and shows the same trend over time.

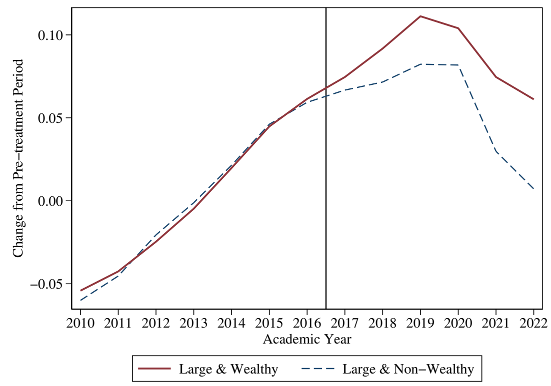
This paper employs DD in the primary setting while using DDD as a robustness check. The choice of the preferred specification involves a trade-off between bias and precision. While the DDD framework is better suited to correct the bias of comparing colleges with different asset levels, it necessitates 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.

Figure B1: Tax Shifting: Trend in Total Expenditure and Tuition

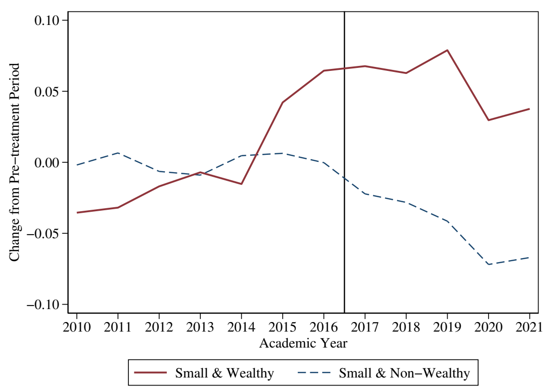
(a) Log Total Expenditure
(Large Colleges)



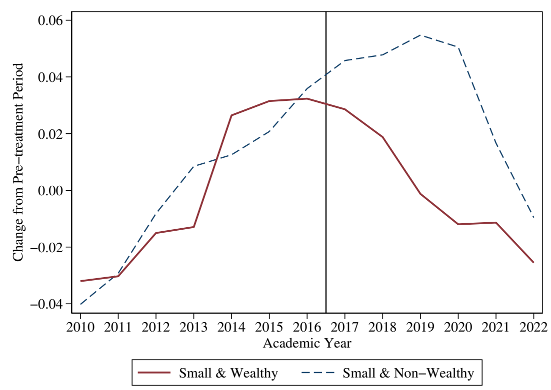
(b) Log Undergraduate Tuition
(Large Colleges)



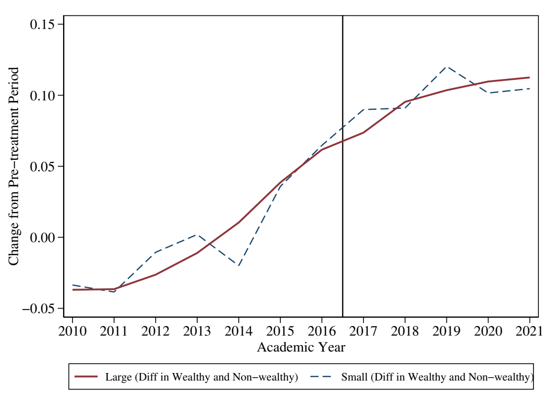
(c) Log Total Expenditure
(Small Colleges)



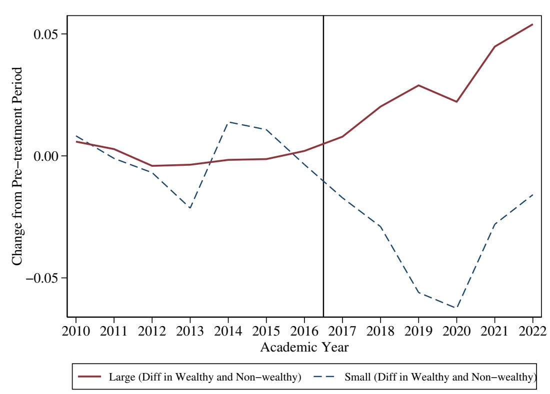
(d) Log Undergraduate Tuition
(Small Colleges)



(e) Log Total Expenditure
(DDD)



(f) Log Undergraduate Tuition
(DDD)



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.

B2 Empirical Results

The DDD results of the impact on expenditure are quite similar to the DD estimations. Table B1 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 B1: Expenditure-related Tax Shifting Behavior (DDD Setting)

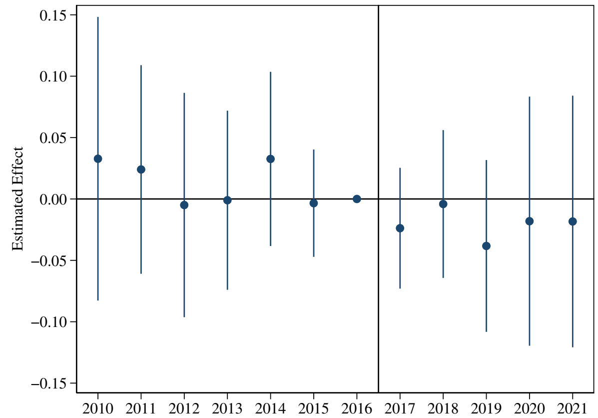
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Log Expenditure						
	Total	Instruction	Research	Public Service	Institution Support	Auxiliary Facilities	Institution Grant
$Large \times Wealthy \times Post$	0.002	0.025	0.029	0.140**	0.102	0.042	0.249
	(0.043)	(0.043)	(0.054)	(0.059)	(0.108)	(0.047)	(0.411)
Observations	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 B2 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.

The results on tuition hikes align with the general pattern of DD results but with larger estimates. Table B2 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 of the point estimates, the 95% confidence intervals overlap with the estimates from DD. The event-study estimates (see Figure B3), once again, confirm the parallel trend in the pre-intervention period and show that the increase in tuition has gradually increased over time.

Figure B2: Event Study Estimates: Tax Shifting Behavior on Total Expenditure



Note: The coefficients are estimated using the event study version of equation (C1). 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).

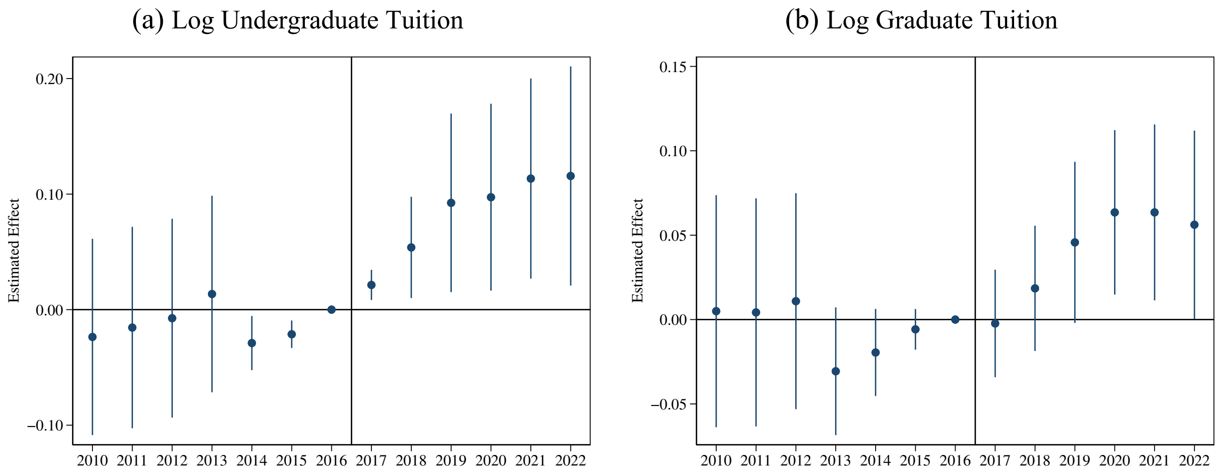
Table B2: Enrollment, Tuition, and Charge-related Tax Shifting Behavior (DDD Setting)

	(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 B1 provides insight into the inconsistency in effect sizes between the DD and DDD models. As demonstrated in Figure B1b, 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

Figure B3: Event Study Estimates: Tax Shifting Behavior



Note: The coefficients are estimated using the event study version of equation (C1). 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).

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.

This concern is backed up by evidence from the second control group from the DDD model. Figure B1d 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 C: 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

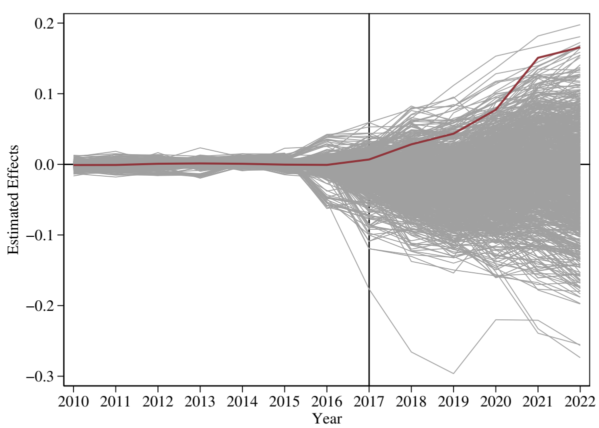
Step 2: Estimating placebo treatment effects:

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 (4)). 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.

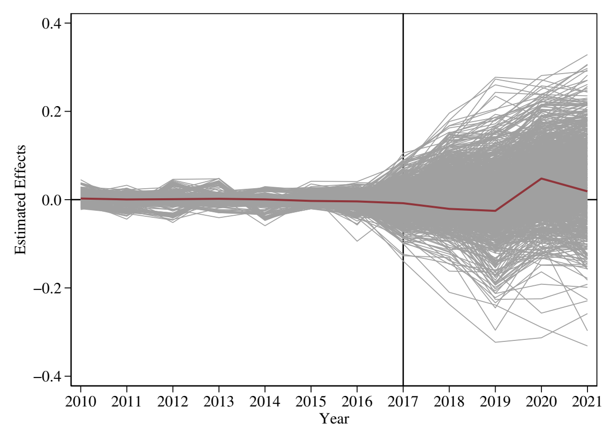
By this stage, I can already compare the actual estimates with the placebo ones to obtain the permutation p-values (for a single time period). Figure C1 demonstrates the distribution of the placebo estimates placed along with the actual estimates. These placebo estimates serve as the potential distribution 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

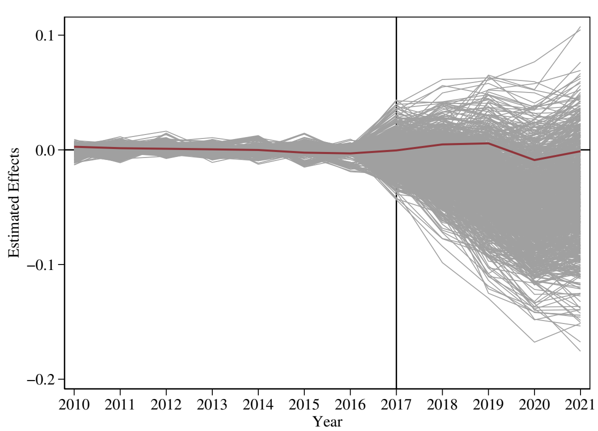
(a) Tax Avoidance:
Log Number of FTE Students



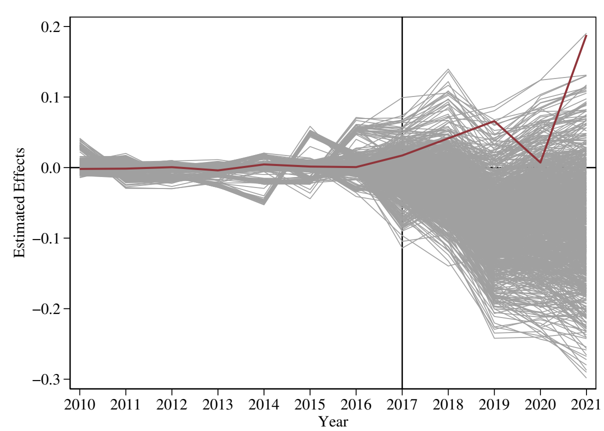
(b) Tax Avoidance:
Log Endowment Assets Per-Student



(c) Tax Shifting: Log Total Expenditure



(d) Tax Shifting: Log Tuition Revenue



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 (5) 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

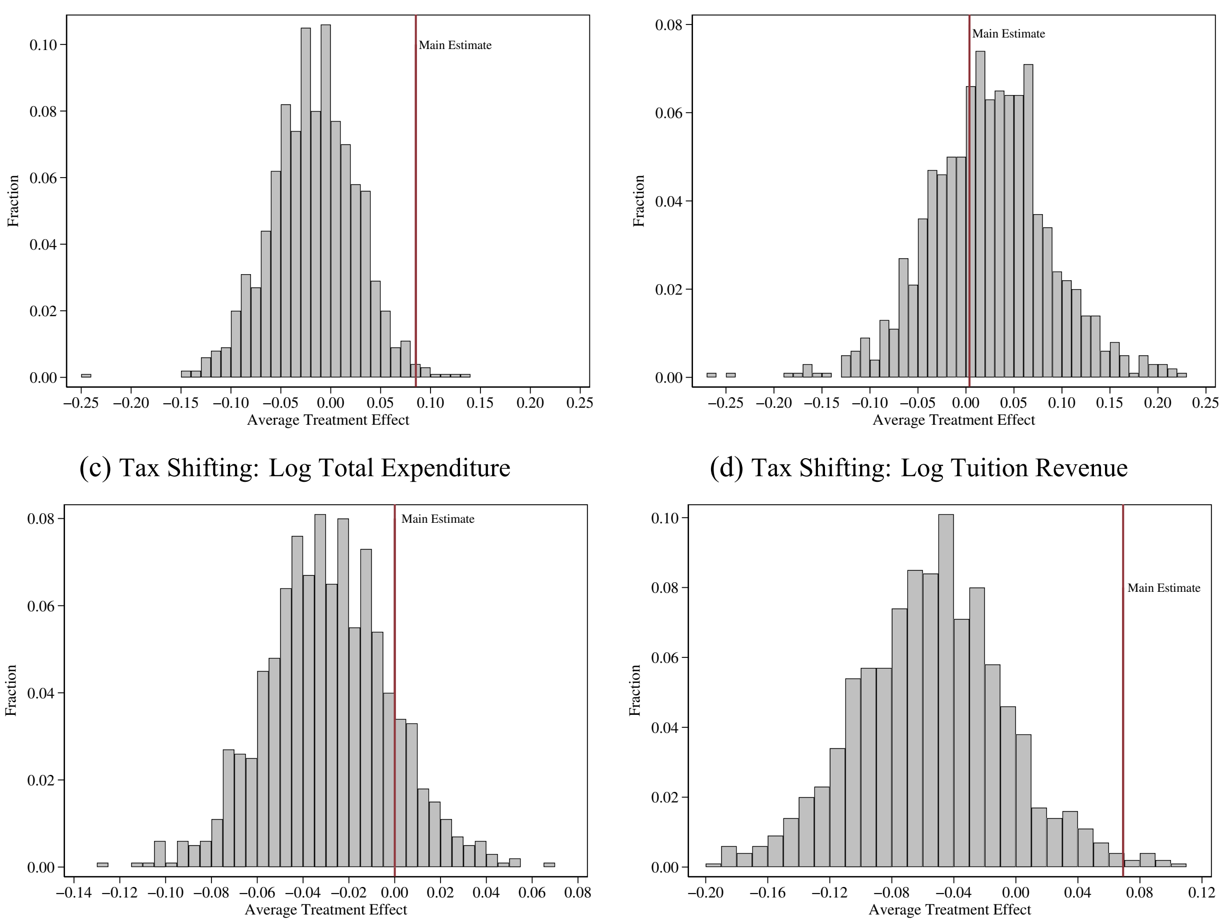


Table C2: Enrollment-related Tax Avoidance Behavior: SCM Results

	(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 (5). 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 (5). 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 (5). 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 (5). 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:

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

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 D: 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 D1 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 D1: 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†	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 (4). 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.
† 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 D1, 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 categorization.[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:

$$\begin{aligned} NetBenefit_{ij} =& IncreaseEnrollment_i \times CompletionRate_i \\ & \times SelectivePremiums_j \times AvgNetBenefit \end{aligned} \tag{D1}$$

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 D1 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 D1 illustrates the ranges of estimation based on different assumptions. The estimates range from $350 million to $1,300 million.

Figure D1: Estimation of Total Net Benefit from College Enrollment Expansion