RECOMMENDATIONS FOR MEASURING STUDENT INVESTMENT IN COLLEGE

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May 2021

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SUMMARY

A definition and equity-minded framework for understanding postsecondary value must consider students' investment in college, in addition to their returns. Student investment includes costs beyond tuition and fees. In order to be successful in school, students must be able to cover the cost of books, supplies, and transportation to and from class. Additionally, having sufficient resources for housing and food are crucial for allowing students to focus on their coursework without needing to work long hours to cover those expenses. Furthermore, student investment should include costs incurred over the entire length of a student's enrollment, rather than looking only at costs in one year.

There are a number of ways that student investment can be measured, including full cost of attendance (COA, also known as sticker price), net price (COA minus grant aid), and opportunity costs in the form of forgone earnings. This paper explores those options and makes recommendations for how student investment should be measured with ideal data and with data that are currently available, including U.S. Department of Education (ED) data that are available for all colleges and nonpublic data that institutions may be able to access for their own students.

The recommendations in this paper are based on an extensive review of research and analyses of publicly available data, as well as discussion with staff members at the Institute for Higher Education Policy (IHEP), the Bill & Melinda Gates Foundation, and members of the Postsecondary Value Commission Research Task Force. The paper also identifies issues that require more research and includes recommendations for improving publicly available data to allow colleges and policymakers to better measure student investment.

Summary Recommendations

A calculation for measuring the economic returns of postsecondary education should define students' investment as the net price over the entire length of their enrollment, including the cost of student loan interest. The net price accounts for tuition and non-tuition expenses and grant and scholarship aid, and should not be limited to students who received financial aid.

Ideally, net price would be calculated by tracking students' costs and grant aid longitudinally through their time enrolled. To examine differences by program and completion status, as well as explore equity implications, net price should be disaggregated by program of study, completion status, race/ethnicity, gender, and family income.

However, publicly available data do not allow for this ideal measurement. Using publicly available data, student investment should be calculated as the net price for all first-time, full-time (FTFT) undergraduates, weighted by living arrangement, and covering the expected length of a credential. In most cases, ED cost data are only available at the college level, not broken out by program. Colleges with access to more granular student-level data can use that information to improve upon the publicly available data calculation, in order to get closer to the ideal approach.

COST OF ATTENDANCE (COA)

Most conceptualizations of student investment in college rely on some measure of cost of attendance (COA). Before addressing the best ways to measure student investment as part of the Postsecondary Value Framework, it is important to understand how COA is defined, how it is used, what it includes, and what its limitations are.

COA measures students' total educational expenses for attending a particular college, including living costs.[i] It sets a limit on the amount of financial aid students can receive, and is used by students to make decisions about where to apply and attend, as well as how to budget for college expenses. Additionally, COA refers to costs to the student, not costs to the college of providing education.

Components of COA

The Higher Education Act (Sec. 472) specifies the components that colleges must include when estimating COA. Historically, ED has been prohibited from regulating how colleges determine the budgets for each component, but recently passed legislation will allow ED to regulate all COA components besides tuition and fees, starting in 2023 (Consolidated Appropriations Act, 2021).[ii] Financial aid administrators can make case-by-case adjustments to a student's COA to accommodate exceptional circumstances, through a process called "professional judgment."

Table 1 summarizes the expenses that must be included for all students, expenses that must be included for certain students, and expenses that are not required in COA according to federal guidelines but should be included based on my review of the research. The expenses listed in this table reflect current federal guidelines; some changes will go into effect in 2023, due to the Consolidated Appropriations Act of 2021. Colleges are currently allowed to include health insurance fees, healthcare costs, internet costs, and cell phone plan costs in COA, and some already do. However, those expenses are not required to be included in COA, and it is not always clear whether colleges have included them in their COA estimates. Below the table, there is a discussion of why those expenses should be added to COA, and why certain other expenses should not be added to COA.

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i   For background on COA, see Federal Student Aid 2019b, NASFAA 2018, and New America 2016.

ii   The Consolidated Appropriations Act of 2021 made a number of changes to COA and the calculation of financial aid eligibility, which generally go into effect on July 1, 2023.

Table 1: Components of cost of attendance (COA)[1]

For all students, COA includes:	For students who face these expenses, COA also includes:	Expenses that should be added to COA, if not already included in colleges' estimates
• Tuition and fees (including required equipment rental or purchase) • Room • Board (food) • Books and supplies (including an allowance for the rental/ purchase of a personal computer) • Transportation (can include costs for operating and maintaining, but not purchasing, a vehicle) • Miscellaneous personal expenses	• Dependent care expenses • Disability-related expenses • Cooperative education program expenses • Study abroad expenses • Cost of a first professional credential (currently optional, required starting in 2023) • Educational loan fees (required for federal loans; private loan fees are currently optional but are not allowed after 2023)	• Health insurance and healthcare costs • Internet costs • Cell phone plan costs • Room and board for students living with family[2]

1. While it is not recommended to add student loan interest to Cost of Attendance since COA is used to determine aid eligibility, it is recommended that student loan interest be included when calculating students' full investment, as discussed later in the paper.

2. While room and board are already included in the COA definition, colleges are currently not able to report those costs for students living with family to ED's Integrated Postsecondary Education Data System (IPEDS). As a result, public COA data do not include those expenses. Note that the Consolidated Appropriations Act of 2021 specifies that, starting in 2023, this room and board allowance for dependent students living with parents cannot be zero.

Expenses That Should Be Added to COA

To provide a more realistic assessment of the expenses that students are expected to face, colleges should be required to include the cost of health insurance, healthcare, internet, and cell phone plans when estimating COA. Being able to cover healthcare, internet, and cell phone plan costs is especially crucial during the COVID-19 pandemic, as students face the public health crisis and colleges increasingly rely on virtual learning. Additionally, to improve COA data, ED should require colleges to report room and board costs for students living with family.

> **Colleges should be required to include the cost of health insurance, healthcare, internet, and cell phone plans when estimating COA.**

Health Insurance and Healthcare

Colleges should be required to include estimates of health insurance and healthcare costs in COA, and some already do.[iii] Health problems detract from students' ability to succeed in college, and healthcare costs can be substantial. In a Wisconsin HOPE Lab ethnography, between 21 percent and 54 percent of students (depending on the college) experienced health issues and faced unexpected costs of hundreds of dollars or more in a single year (Goldrick-Rab & Kendall 2016). Similarly, almost all of the students interviewed by the Southern Education Foundation expressed concerns about being able to afford medical, dental, and other healthcare costs (Assalone et al. 2018).

Ideally, colleges should use data for their own students or region to estimate health insurance and healthcare costs. Since COA is used to determine financial aid eligibility and used by students for budgeting, estimates should be customized for each college's student population, as much as possible. Colleges that charge health insurance and health services fees to students should include those charges in COA and clearly indicate that they are included. Ideally, colleges or states should conduct surveys to estimate the cost of healthcare,[iv] though some may not have sufficient resources to collect those data on a regular basis.

If more detailed data are not available, healthcare and health insurance costs can be estimated using the Bureau of Labor Statistics' (BLS) Consumer Expenditure Survey (CES).[v] This survey includes data on average annual spending on healthcare, which includes spending on health insurance, medical services, drugs, and medical supplies. CES is used by the College Board in its student living expense budgets (College Board n.d.) and is used to estimate healthcare costs in the MIT Living Wage Calculator (Nadeau 2019).[vi] If using CES, I recommend using average healthcare costs for the age range of typical students at a given college, since healthcare costs tend to increase substantially with age (BLS 2018). For example, in 2017-18, the average annual healthcare costs for individuals aged 25-34 were $1,781, compared to $4,450 for individuals aged 65 and older. See Table 2 below for details.

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iii   Colleges are currently allowed to include a health insurance fee in their COA (NASFAA 2018), though it is not required. For example, UC Berkeley and Columbia University include in their COAs premiums for their student health insurance plans, which can be waived with proof of other insurance (UC Berkeley 2020, Columbia University 2020). Some colleges also include healthcare costs in COA, such as Stanford University and the University of California system (Stanford University 2020, University of California 2019).

iv   For example, questions about healthcare costs are included in the California Student Aid Commission's (CSAC) Student Expenses and Resources Survey (SEARS), as well as the University of California's Cost of Attendance Survey (University of California 2019, CSAC n.d.).

v   Tables from the Consumer Expenditure Surveys are available at *https://www.bls.gov/cex/tables.htm*. It is also possible to access public use microdata to calculate average healthcare costs for specific subgroups of individuals.

vi   Note that the MIT Living Wage Calculator uses data from CES for the costs of medical services, drugs, and medical supplies, but a different data source for health insurance costs. State-level estimates for health insurance costs were calculated using the Health Insurance Component Analytical Tool provided by the Agency for Healthcare Research and Quality. Those data are broken out in ways that are not necessary for the COA calculation for college students; for example, there is no need to break out employer-sponsored insurance plans when measuring student investment.

Table 2: Average annual healthcare costs for individuals by age, CES 2017-18

	Total one person (all age categories)	Under 25 years	25-34 years	35-44 years	45-54 years	55-64 years	65 years and older
Healthcare (total)	$2,940	$474	$1,781	$2,367	$2,425	$2,886	$4,450
Health insurance	$1,981	$276	$1,235	$1,521	$1,545	$1,824	$3,111
Medical services	$517	$95	$347	$568	$506	$654	$628
Drugs	$340	$65	$136	$204	$299	$303	$561
Medical supplies	$102	$38	$63	$74	$75	$104	$150

Note: Figures are drawn from BLS 2018, which examines the annual expenditures of individuals who either live alone or share a household but are financially independent. Respondents to the Consumer Expenditure Survey must be at least 16 years old.

Internet

Colleges should be required to include internet costs in their COA estimates, and some schools already do.[vii] Those expenses have become increasingly necessary to succeed in college, especially during the COVID-19 pandemic, as more colleges are relying on virtual learning. To estimate the cost of internet connectivity, colleges or states should ideally conduct their own surveys, which would provide more customized results for their student population and region. If more detailed data are not available, I recommend using data from the Organisation for Economic Co-operation and Development (OECD) on fixed broadband costs.[viii] The OECD regularly collects data from its member countries on broadband prices, penetration, usage, and speeds. The most recent OECD data list the average cost of high-speed internet in the United States as $61/month, or $732/year (OECD 2017).[ix]

Cell Phone Plans

Colleges should be required to include cell phone plan costs in their COA estimates, and some schools already do.[x] Like internet costs, cell phone plans are ongoing expenses that students face while enrolled. College students use mobile technology to access coursework, complete assignments, and communicate with instructors and other students (Seilhamer et al. 2018).

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vii   For example, the California Student Aid Commission (CSAC) and the University of California system include internet costs as a utility in their room and board estimates (June 2, 2020 email response from Jessica Moldoff from CSAC, University of California 2019).

viii   OECD's Broadband Portal is available at *http://www.oecd.org/sti/broadband/broadband-statistics/*.

ix   In these data, "high user" is defined as 25 megabits per second and above. "Low user" is defined as at least 0.250 megabits per second, speeds that may be too slow for the needs of college students.

x   For example, the University of Florida includes cell phone plan costs in its COA, and the California Student Aid Commission includes phone costs in its Student Expense Budget for California colleges (June 2, 2020 email response from Jessica Moldoff from CSAC, University of Florida n.d.).

To estimate the cost of cell phone plans, colleges or states should ideally conduct their own surveys, which would provide more customized results for their student population and region. If more detailed data are not available, I recommend using national averages from CES for the age range of typical students at a given college, as shown in Table 3.

Table 3: Average annual cell phone service costs for individuals by age, CES 2017-18

	Total one person (all age categories)	Under 25 years	25-34 years	35-44 years	45-54 years	55-64 years	65 years and older
Cellular phone service	$570	$291	$698	$876	$793	$664	$406

Note: Figures are drawn from BLS 2018, which examines the annual expenditures of individuals who either live alone or share a household but are financially independent. Respondents to the Consumer Expenditure Survey must be at least 16 years old. It is not clear why cell phone service costs vary substantially by age, and more research is needed into the role of shared phone plans.

Room and Board for Students Living with Family

To improve COA data, ED should require colleges to report room and board costs for students living with family. Currently, colleges are not able to report those data to ED's Integrated Postsecondary Education Data System (IPEDS 2019), even though research shows that a substantial share of students living at home still purchase food and/or pay rent (University of California 2019, Goldrick-Rab & Kendall 2016). For example, 80 percent of commuter students at the University of California reported that they paid for groceries, and about half paid for rent and utilities (University of California 2019). Furthermore, even if families are not passing all of those costs on to students, room and board are still expenses for which the family is responsible, so they are making an "in-kind" contribution to students' college expenses. It is not uncommon for families to end up covering parts of a student's COA, particularly for dependent students.

The IPEDS omission of room and board expenses for students living with family artificially deflates COA at colleges with large shares of students living with family, making those colleges look more affordable than they actually are. Colleges should already have these data available. The National Association for Student Financial Aid Administrators (NASFAA) advises colleges to include room and board costs for commuter students (NASFAA 2018), and the Institute for College Access & Success (TICAS) found that all 41 colleges included in its analysis assumed room and board costs for students living with family (TICAS 2016). Additionally, starting in 2023, colleges will be explicitly prohibited from estimating $0 room and board expenses in their COA for dependent students living with their parents (Consolidated Appropriations Act, 2021).

> **ED should require colleges to report room and board costs for students living with family.**

Expenses That Should Not Be Added to COA for All Students

Though colleges should be able to provide allowances for students' purchases of computers or cell phones, those expenses should be included in COA on a case-by-case basis, via the professional judgment process. More research would be needed to support the addition of those costs to COA for all students, particularly since the vast majority of undergraduates already have access to laptops and smartphones (Galanek et al. 2018, Gonzales et al. 2018), as will be further discussed below. Additionally, concerns about students' ability to cover expenses outside their period of enrollment would be best addressed through a reevaluation of the financial aid formula rather than fundamentally redefining COA to include living expenses incurred during periods of non-enrollment.

Cost of Purchasing a Computer

Most, if not all, college students need computer access to keep up with coursework, particularly as more colleges are relying on virtual learning due to the COVID-19 pandemic. The federal definition of COA includes an allowance for the rental or purchase of a personal computer (Federal Student Aid 2019b), and students can request increases to their COA if they incur those expenses, typically up to a maximum amount and only once in a specified time period.[xi]

However, it is not clear that colleges should be required to include the cost of a computer purchase in COA for all students. Recent surveys have found that the vast majority of undergraduates have access to laptops (Galanek et al. 2018, Gonzales et al. 2018), and the professional judgment process provides a way for students to obtain COA increases if they do not already have a computer and need to purchase one. Additionally, there is variation in the cost of computers that students may purchase for college, both based on individual needs (e.g., certain majors may require higher computer specifications) and preferences. Addressing computer purchase costs through professional judgment accounts for these individual needs. Before determining whether the cost of purchasing a computer should be added to the COA for all students, more research would be needed into whether professional judgment is sufficient in this context. It would be helpful to solicit feedback from colleges, students, and other stakeholders on how many students need COA increases to purchase computers for college, how well professional judgment works in providing those COA increases, and whether increased virtual learning due to COVID-19 necessitates changes to the existing process.

Cost of Purchasing a Cell Phone

Because college students use mobile technology for educational purposes, as well as to communicate with instructors and other students (Seilhamer et al. 2018), smartphones should be treated like computer equipment and colleges should provide case-by-case COA increases for students who need to purchase them. As with computers, it is not clear that cell phone purchase costs should be added to COA for all students because many students already have cell phones and may not need to purchase a new one for college. Recent surveys show that the vast majority of

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xi   For example, UC Berkeley undergraduates can request to increase their COA by up to $3,000 for the purchase of a computer, once every three years (UC Berkeley n.d.), and Alabama A&M University allows up to $3,000 for a computer purchase, only once as an undergraduate (Alabama A&M University n.d.).

undergraduates have access to a smartphone (Galanek et al. 2018, Gonzales et al. 2018), and smartphone ownership has become quite ubiquitous in the United States in general. In fact, the Pew Research Center found that more than 90 percent of adults under age 50 own a smartphone (Anderson 2019).

Notably, however, some colleges explicitly exclude cell phone purchase costs from COA increases via professional judgment.[xii] It would be helpful to solicit input from college financial aid administrators to determine how they currently treat cell phone purchase costs and why.

Colleges should provide case-by-case COA increases for students who need to purchase smartphones.

Expenses During Periods of Non-Enrollment

COA is defined by ED as "an estimate of that student's educational expenses for the period of enrollment" (Federal Student Aid 2019b), but there is concern about whether financial aid calculations allow students to keep enough resources to support expenses outside their period of enrollment (e.g., during the summer, for students attending colleges with traditional academic calendars). One way to address that issue is by increasing COA to include a student's living expenses incurred during periods of non-enrollment. However, for both substantive and logistical reasons, I recommend addressing this issue by reevaluating the financial aid formula rather than by fundamentally redefining COA.

The federal needs analysis considers the financial resources and expenses of students and their families when calculating how much they can be expected to contribute to the cost of college, and is used to determine eligibility for financial aid. Therefore, the best way to ensure that students and families have sufficient resources to cover expenses beyond the period of enrollment is for policymakers to modify the federal needs analysis so that it adequately accounts for living expenses, including living expenses for periods of non-enrollment. Specifically, Congress should ensure that the income protection allowance (IPA) adequately reflects the cost of basic living expenses. The expected family contribution (EFC)—which will be renamed the Student Aid Index (SAI) starting in 2023—subtracts certain "allowances" from income to determine a family's available income that can be used to cover college costs.[xiii] One of those allowances is the IPA, which is intended to cover a family's basic living expenses, including food, housing, transportation, clothing and personal care, medical care, and other family consumption. IPAs have been criticized for being too low (García 2019, TICAS 2017) and the Consolidated Appropriations Act of 2021 increases IPAs starting in the 2023-24 award year. Policymakers should evaluate whether those levels are high enough to ensure that students have sufficient resources and financial aid to cover their family's basic needs. Increasing the IPA decreases students' EFCs (or SAIs), which would increase their eligibility for financial aid.

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xii   For example, Stanford University and the College of Southern Nevada do not increase COA based on phone purchases (College of Southern Nevada n.d., Stanford University n.d.).

xiii   For background on EFC, see Federal Student Aid 2019a and Collins 2016. Note that, starting in 2023, EFC will be changed to the "Student Aid Index" (SAI), as the result of the Consolidated Appropriations Act of 2021.

To illustrate why these expenses during periods of non-enrollment should not be added to COA, consider colleges that meet the full financial need of their students. Those colleges provide enough financial aid to cover the gap between COA and a family's ability to pay, after other state and federal financial aid is applied. Adding students' expenses for periods of non-enrollment to COA would in essence make those colleges responsible for covering students' costs of living while they are not enrolled, which would be an unfair burden for colleges.

There are also logistical challenges in calculating students' expenses for periods of non-enrollment. For example, students living on-campus during the academic year may not be able to keep their housing over the summer, and some may choose to find off-campus housing while others go home to stay with their families. Students' non-housing expenses may also differ from their expenses while enrolled.

Limitations of Existing COA Data

Within the Postsecondary Value Framework, student investment should be measured using the total cost of attendance, including tuition and non-tuition expenses. However, there are many limitations to existing public data on COA, which are reported by colleges to IPEDS.

First, for a number of reasons, colleges' estimates of living costs may not match up with students' actual expenses. Students have a wide range of needs and preferences, which can be difficult for colleges to predict and account for in their overall COA estimates. Additionally, students can face large differences in tuition and fees based on the specific program in which they are enrolled, which are not accounted for in institution-level averages in public IPEDS data.[xiv] Colleges may also face internal pressures to underestimate their COA in order to look more affordable and/or limit the number and amount of loans students can borrow. In fact, researchers have identified a minority of colleges that have increased tuition but reduced off-campus living allowances in order to lower their overall COA (Dancy & Fishman 2016b, Kelchen 2016).

In surveys and interviews, students have reported facing costs above their colleges' COA estimates for on-campus housing and meal plans, books, supplies, transportation, and other expenses. Students describe being burdened by the unpredictable cost of books, particularly charges for digital access codes required to access online course materials, which are even more salient in today's COVID-19 context (Coles et al. 2020, Peters et al. 2019, Assalone et al. 2018, Cochrane & Szabo-Kubitz 2016, Goldrick-Rab & Kendall 2016). Colleges' estimates of transportation costs can assume that students live nearby and exclude the cost of traveling between campuses and workplaces (TICAS 2018). Students also report unexpected fees for security deposits, taking classes online, placement exams, and specialized equipment (Goldrick-Rab & Kendall 2016).

It would be illuminating to quantify the discrepancy between published prices and actual student expenses, but there are insufficient quantitative data on actual student expenses. Data on students' actual expenses are limited to surveys and interviews that are not conducted frequently; for example,

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xiv   Some colleges charge different tuition and/or fees by program, but it is difficult to quantify the prevalence of this practice and there are no comprehensive data on actual charges by program. Neither IPEDS (required annual reporting to ED) nor the College Board's Annual Survey of Colleges (voluntary reporting) ask whether colleges charge differential tuition by program. In IPEDS, colleges that operate on a calendar system that differs by program or offer programs on a continuous basis (program-year reporters) are asked to provide cost data for their six largest programs only.

ED's National Postsecondary Student Aid Study (NPSAS) is only conducted every four years. Despite the limitations of using colleges' COA estimates in IPEDS, they are currently the only widely available data on college costs.

Moreover, as a broader issue, there is little standardization in how colleges estimate COA, particularly for living expenses. This limits the accuracy and comparability of COA estimates across colleges. ED's guidance states:

> There are a variety of methods to arrive at average costs for your students: periodic surveys of your student population, assessing local housing costs or other pertinent data, or other reasonable methods you may devise which generate accurate average costs for various student cohorts (Federal Student Aid 2019b).

NASFAA suggests existing sources of data on expenses and ways colleges can collect their own data (e.g., by using student surveys), but does not recommend a specific approach (NASFAA 2018). Colleges' methodologies for estimating COA may be limited by resources or technical capabilities. Additionally, current COA data are limited by wide variation in living expenses within a given college, such as cost differences in meal plans and on-campus housing options. For all housing options, colleges can decide whether to assume students are living with or without roommates. Note that some standardization in the calculation of living expenses will take effect starting in 2023; for example, colleges will be required to estimate food allowances for the equivalent of three meals per day and will be required to use the greater of average or median housing costs for students living on-campus (Consolidated Appropriations Act, 2021).

Due to their lack of standardization, colleges' COA estimates can vary due to their methodology rather than differences in the costs their students actually face. For example, some colleges in the same geographic area have been found to produce substantially different estimates for off-campus housing costs (Kelchen et al. 2017, Dancy & Fishman 2016a). Kelchen et al. (2017) found that off-campus living allowances in downtown Philadelphia ranged from $7,790 at Peirce College to $18,365 at Drexel University. Nearly half of all colleges calculated living allowances that were at least 20 percent higher or lower than the researchers' estimates of students' actual living costs.[xv]

THE IDEAL APPROACH FOR MEASURING STUDENT INVESTMENT

When determining how to measure student investment in the Postsecondary Value Framework, it is constructive to first envision the ideal approach and the data that are needed to support that calculation. The ideal approach is used to guide the development of measurement approaches based on publicly available data and institutionally-held data, which are discussed in a later section of this paper.

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xv   Note, however, that the researchers' estimates of living costs may not accurately capture students' experiences either. They estimated county-level living costs for housing (for different roommate scenarios), food, transportation, health care costs, and other expenses using government and third-party data. Then, they compared those estimates of living costs to colleges' reported living allowances to IPEDS. Additionally, there may be valid reasons for a college to have different cost estimates than other schools in the same area, such as differences in their student populations and within-county variation in housing costs.

Overview of Ideal Approach

An equity-minded framework for measuring postsecondary value should calculate students' investment as the net price over the entire length of their enrollment, including the cost of student loan interest. Ideally, net price would be calculated by tracking students' tuition and non-tuition costs and grant aid longitudinally through their time enrolled. As much as possible, net price should be calculated based on how much students actually pay directly to colleges[xvi] and how much grant aid they receive over the length of their programs, as well as how much students should expect to pay to cover living expenses while enrolled, using updated estimates of housing and other costs. To examine differences by program and completion status, as well as explore equity implications, net price should be disaggregated by program of study, completion status, race/ethnicity, gender, and family income.

Net price (COA minus grant aid) better captures students' out of pocket investments in college than sticker price (COA) because many students receive grant aid to help cover their costs. Additionally, incorporating grant aid helps acknowledge the extent to which colleges have financial aid policies that may reduce out-of-pocket costs for lower income students.[xvii] Net price should be calculated for all undergraduates, not just those who receive financial aid. Colleges that award large amounts of grant aid to a small number of students could have a very low net price that does not reflect the experience of most students, if net price is only calculated for those who receive aid.

Student investment should take into account the cost of student loan interest. Almost four in ten undergraduates took out student loans during the 2015-16 year (U.S. Department of Education 2019), so it is important to acknowledge the additional costs of financing college through borrowing. In fact, the statutory COA definition already includes student loan fees. Ideally, the cost of student loan interest would be calculated based on students' actual amounts borrowed and interest rates. However, more research is needed to determine the best methodology for estimating student loan interest, particularly given the availability of income-driven repayment (IDR) plans. Monthly payments and interest accrual in IDR are affected by a borrower's income, family size, loan type (subsidized vs. unsubsidized), and other factors, which can change over time. Additionally, some borrowers in IDR receive forgiveness on their unpaid loan balances after making qualifying payments for a certain period of time (e.g., 20 or 25 years), and thus do not end up paying all of their accrued interest. For this reason, it may be overly complex to attempt to estimate student loan interest paid by borrowers in IDR.

Table 4 summarizes the major differences between the ideal approach for measuring student investment and approaches that are based on publicly available data or nonpublic data that institutions may have access to. All of these measurement approaches aim to capture net price across students' time enrolled, but much of the publicly available data are only available at the college level and cover a limited subset of students. Colleges that have access to more granular student-level data can use that information to improve upon the publicly available data calculation, to get closer to the ideal approach. Ultimately, larger changes to higher education data collection will be needed to support the ideal approach, namely the creation of a student level data network (SLDN).

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xvi   It would be helpful to explore the feasibility of using college bursars' data on direct costs. Questions include which costs are covered (e.g., only tuition and fees, or also on-campus charges for room and board) and whether the data can be disaggregated by program and attendance status (number of credits taken).

xvii   Note that institutional grant aid can include merit aid that is not based on financial need. Colleges that provide large amounts of institutional grant aid based on merit may not end up being very affordable to students from low-income backgrounds.

Table 4: Measuring Student Investment with Ideal Data, Institutional Data, and Publicly Available Data

	Ideal Data	Non-Public Institutional Data	Publicly Available Data
Can estimate net price, including students who do not receive financial aid	X	X	X
Can estimate the cost of student loan interest	X	X	X
Can be based on student-level data	X	X	
Can include students beyond first-time, full-time undergraduates (FTFTs)	X	X	
Can account for students who do not complete their programs	X	X	
Can include housing and food costs for students living with family	X	X	
Can track costs, grant aid, and time enrolled longitudinally	X	X	
Can disaggregate net price by program, race/ethnicity, gender, and income[1]	X	X	

1. The recommended approach with publicly available data does not use IPEDS net price by income because those data are limited to students receiving Title IV financial aid, which would understate costs for students who do not receive financial aid.

The ideal approach for calculating student investment would include more than just first-time, full-time (FTFT) undergraduates and longitudinally track students through their time enrolled, but more research is needed to determine how to incorporate part-time and transfer students, as well as how to best track students at the program level. Though students do incur opportunity costs when attending college, there are equity and other concerns raised by the use of forgone earnings as a proxy for living expenses while enrolled. Thus, net price should account for the cost of students' living expenses while enrolled, rather than using forgone earnings. Those issues are discussed in more detail below.

Which Students Should Be Included

Ideally, student investment should be measured for the most comprehensive group of students possible and longitudinally track students through their time enrolled instead of only looking at their costs and grant aid during the first year. This ideal is difficult to attain with publicly available data, much of which is limited to first-year net prices for FTFT students. Those data are problematic because some colleges do not enroll FTFT undergraduates, FTFT undergraduates are a small share of the student population at other colleges, and at some institutions, net price changes notably after the first year. Nonpublic institutional data can better capture these students' realities, until larger changes are made to higher education data collection to support the ideal approach.

> **Ideally, student investment should be measured for the most comprehensive group of students possible and longitudinally track students through their time enrolled instead of only looking at their costs and grant aid during the first year.**

While it is clear that net price should be calculated to include continuing students in addition to first-time students, more research is needed to determine how to calculate net price for part-time and transfer students. It would be helpful to explore whether there can be insights drawn from National Student Clearinghouse (NSC) data, state longitudinal data systems, or institutional/system data around what cost and grant aid look like for part-time and transfer students. This is both in terms of data availability (e.g., whether it is possible to track the costs that students incur and the grants that they receive at each institution they attend, for each year they are enrolled; and whether it is possible to link costs for part-time students to their level of attendance, such as the number of credits they're taking) and in terms of how meaningful those data are (e.g., is there so much variation within those groups that their data would be difficult to interpret and compare?).

Conceptually, it is not clear how to calculate net price for part-time students in a way that is meaningful and comparable across colleges. Net price would capture students taking between 1-11 units, which is a large range. Combining part-time and full-time students together would make it more difficult to interpret to what extent a college's low net price indicates a large share of part-time students or costs that are truly lower. It may be possible to calculate a full-time-equivalence adjustment using the attendance status of part-time students, but it would be helpful to look at institutional data to see how much this calculation would add to only using net price for full-time students. Additionally, there are open questions around how to account for students who switch between full-time and part-time status.

There are also complicated issues to resolve regarding how to calculate net price for transfer students. Given that the Postsecondary Value Commission's goal is to assess value at the institutional and program level and drive institutional improvement, there are cases in which it may not make sense to include costs that students incurred at the other colleges they attended. For example, consider a student who completes a low-quality program at College A, is not able to find a job in that field, and transfers to College B where they complete a credential that helps them acquire a well-paying job. In this case, it may not make sense to include the costs this student incurred at College A before they transferred. On the other hand, there are certain use cases where it would be meaningful to capture costs incurred at other colleges. For example, it could be helpful to evaluate whether transfer policies between two-year and four-year colleges are working as intended, or if students are taking longer than expected to complete their credentials.

How To Track Students Over Their Time Enrolled

When measuring student investment, it would be most meaningful to examine costs over the entire length of a student's enrollment in their program, rather than looking only at annual costs. This would account for full costs, as well as differentiate between colleges that do a better or worse job of graduating students on time. In the ideal approach, students would be tracked longitudinally through their time enrolled, including which program of study they pursued and whether they completed a credential.

In this student investment calculation, it would be more appropriate to track costs incurred during the time that students are actively enrolled than to estimate costs for the calendar years elapsed between students' entry into college and exit from college. Data show that these approaches to measuring time enrolled can yield very different results. At the national level, NSC found that the average time enrolled for associate's degree completers at public two-year colleges is 3.4 years, compared to an average of 5.6 years elapsed between entry and exit (Shapiro et al. 2016).

Similarly, institution-level data from the University of Texas show that the average time enrolled for completers at some campuses increases by about one semester when looking at time elapsed between entry and exit, rather than time actively enrolled (Troutman 2020). These differences are due to students "stopping out" of college temporarily, and can also be affected by the treatment of part-time students.

However, there are open questions around how to best track students at the program level over their time enrolled, particularly students who do not complete. Other program-level data from ED are limited to completers and track students based on when they completed their programs, rather than when they started their programs (U.S. Department of Education 2020). More research is needed to determine whether it is best to track students based on their entry into or exit from programs, and evaluate the methodological issues involved with each approach. For example, tracking students based on their entry into programs may be complicated by the fact that some students do not declare a major immediately when entering college, and may switch majors during college. It may be more straightforward to track students based on the programs they exited, whether they completed or dropped out.

How Data Should Be Disaggregated

Ideally, the data on student investment should be disaggregated by program of study, completion status, race/ethnicity, gender, and family income. Those break-outs would allow for an evaluation of differences between programs and differences between completers and noncompleters, as well as the equity implications of differences in net price by student subgroup. If part-time and transfer students are included, they should be broken out as well.

Alternative Considered: Forgone Earnings

Another way to look at the cost of attending college is to consider opportunity costs in the form of forgone earnings. Although many students work while enrolled, any time they spend in school takes away from time they could otherwise use more fully in the workforce. Some or all of those forgone earnings would have covered living costs that students would have incurred even if they were not enrolled in college.

There is no consensus among researchers about whether student investment should include opportunity costs, and three recent studies on college costs and returns do not include forgone earnings (Itzkowitz 2020, Carnevale et al. 2019, College Board 2019). Other studies included direct college costs (such as tuition, fees, books, and other supplies) and used forgone earnings in lieu of indirect expenses (EMSI 2018, Payscale 2018, Belfield & Bailey 2017, Webber 2016, Abel & Deitz 2014, Daly & Bengali 2014, Greenstone & Looney 2011, Johnson 2009). A summary of this research is provided in Appendix A.

For the purpose of measuring student investment for the Postsecondary Value Framework, net price should account for the cost of students' living expenses while enrolled, rather than using forgone earnings. It is problematic to use forgone earnings as a proxy for living expenses because they can end up being much lower or much higher than students' living expenses, depending on what population of workers is included in the forgone earnings calculation. For example, my analysis of

recent data from ED and the U.S. Census Bureau and research on the State University System of Florida (Johnson 2009) reveal cases where costs calculated using forgone earnings are much lower than the net price. Using low forgone earnings to proxy living costs would underestimate the funds students need to cover food, housing, and other expenses. See Appendix A for more detail about these analyses. It is more appropriate for the student investment calculation to account for students' living expenses while enrolled, since those estimates can be based on colleges' assessment of the costs their students experience.

Additionally, there are equity concerns with using forgone earnings because they vary substantially based on factors like gender and race/ethnicity (Urban Institute 2017). Those differences are not related to how much students would need to pay for living expenses while enrolled.

MEASURING STUDENT INVESTMENT WITH PUBLICLY AVAILABLE AND NONPUBLIC INSTITUTIONAL DATA

While the above approach envisions how to best calculate student investment with ideal data, the reality is that current data availability is quite far from ideal. To be able to test out and apply the student investment calculation in the current context, it is necessary to develop an approach for measuring student investment with data that are currently available. This includes ED data that are publicly available for all colleges and nonpublic data that institutions may be able to access for their own students. Colleges that have access to more granular student-level data can use that information to improve upon the publicly available data calculation, to get closer to the ideal approach.

The sections below detail the components of a student investment calculation that uses publicly available data and nonpublic institutional data. As illustrated in Table 4, there are major differences between the ideal approach and a calculation using publicly available data. Though it is possible to estimate net price using publicly available data, much of those data cover a limited subset of students and are only available at the college level, not broken out by program. Additionally, publicly available data track students one year at a time, while the ideal data would track students' costs and grant aid longitudinally through their time enrolled. Publicly available data also do not allow net price to be disaggregated by program, race/ethnicity, gender, or family income. These limitations and others are discussed in more detail below.

Recommended Approach with Publicly Available Data

To measure student investment in college with publicly available data, I recommend estimating the net price for all first-time, full-time (FTFT) undergraduates, weighted by living arrangement, over the expected length of a given credential or program. Net price should be calculated as the total COA for FTFT undergraduates minus the average grant aid received by FTFT undergraduates, not limited to those who received financial aid. The COA should be weighted by living arrangement, using the living arrangement distribution of FTFT grant aid recipients. To capture costs over multiple years, the annual net price should be multiplied by the expected length of the predominant credential offered by the college or by the length of particular programs, if program-level data are available. This approach to estimating costs over the expected length of a credential or program assumes that students complete, and does not account for students who drop out early.

To estimate the cost of student loan interest with publicly available data, it is necessary to make simplifying assumptions about interest rates and repayment plans. One option is to use the average debt amount for borrowers at each college and the federal student loan interest rate for the year students entered that college, and assume that borrowers repay their loans under a 10-year standard repayment plan.[xviii] The resulting interest estimate can be multiplied by the share of students who borrow and then added to the net price. The share of students at each college who borrow federal loans and borrowers' median loan amounts when entering repayment are available from ED's College Scorecard, though those data have some limitations.[xix] Colleges can add precision to this calculation and disaggregate borrowing figures by completion status, program, and other factors by using borrower-level data from the National Student Loan Data System (NSLDS) and other institution-held data.

Adjustments by Living Arrangement

When calculating net price with publicly available data, the college-reported COA data in IPEDS should first be weighted by living arrangement, and the missing room and board costs for students living with family should be estimated by using the costs for students living off-campus, not with family.

COA estimates can vary considerably based on whether students are planning to live on-campus, off-campus with family, or off-campus, not with family, and colleges report separate COAs for each of these three living arrangements. In order to combine those estimates into one figure, the student investment calculation could use a weighted average of the costs associated with each living arrangement, or use the costs associated with the predominant living arrangement. My analysis of IPEDS data, detailed in Appendix B, found that calculating costs weighted by living arrangement allows for more precision than using costs associated with the predominant living arrangement, particularly in cases where on-campus costs differ substantially from off-campus costs and where the share of students living on-campus does not differ much from the share of students living off-campus, not with family.

Importantly, in this weighted average calculation, the cost data for students living with family should include estimates of room and board. As discussed earlier, IPEDS data do not include those costs, though many colleges do estimate room and board for students living with family in the COAs they provide on their websites and all colleges will be required to do so starting in 2023 (Consolidated Appropriations Act, 2021). If using IPEDS data, it would be preferable to apply the living expenses for students living off-campus, not with family to students living with family, rather than assume that students living with family have no housing or food costs. This workaround may end up overstating costs for students living with family[xx] but, absent changes to IPEDS data reporting, this student investment calculation should assume that students living with family do face housing and food expenses, given the research evidence.

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xviii   Borrowers are automatically placed in the 10-year standard plan if they do not select a different repayment plan.

xix   For example, in some cases College Scorecard data are only available for groups of campuses, not for each campus separately. Additionally, the share of students receiving federal loans is based on an entry cohort (students who entered college in a given year), while the median debt at repayment is based on an exit cohort (students who graduated or withdrew from college in a given year).

xx   For example, NASFAA advises colleges, "For students without dependents living with their parent(s), the room and board allowances are determined by the institution, which takes into consideration that these students may have lower room and board costs than those not living at home" (NASFAA 2018).

Ideally, average costs should be calculated as a weighted average based on the living arrangement of all full-time undergraduates. If available, colleges should use their own data on the number of students living on-campus, off-campus with family, or off-campus, not with family, and the costs associated with each living arrangement. Unfortunately, those data are not publicly available. In IPEDS, colleges are only asked to report on the living arrangements of FTFT undergraduates who received grants or FTFT undergraduates who received Title IV aid. As shown in an Institution for Higher Education Policy (IHEP) analysis, the living arrangement distribution of FTFT grant recipients and Title IV aid recipients are similar to the distribution of all FTFT undergraduates, but differ substantially from the living arrangement distribution of all undergraduates and certain groups of full-time undergraduates. See Appendix C for more details. If using IPEDS data, I recommend using the living arrangement distribution of FTFT undergraduates who received grant aid because FTFT grant recipients made up a larger group of students than FTFT Title IV recipients at most of the colleges included in my analysis described in Appendix B.

Calculating Net Price

There are a number of options for calculating net price using publicly available IPEDS data, each of which have their own limitations, as described below. For the purpose of measuring student investment in the Postsecondary Value Framework, net price should be calculated by subtracting the average grant aid received by all FTFT undergraduates from the total COA for FTFT undergraduates, which is weighted by living arrangement. Average grant aid should be calculated by dividing the total amount of grant aid awarded to FTFT undergraduates (from federal, state, local, institutional, or other sources) by the total number of FTFT undergraduates in the IPEDS financial aid cohort.[xxi] This calculation accounts for the likelihood that students receive grant aid; in other words, it counts the full COA as the net price for students who receive $0 in grant aid.

Using IPEDS data, average grant aid can be calculated for all undergraduates (including part-time students) or for FTFT undergraduates only. Using average grant aid for FTFT undergraduates is better aligned with the IPEDS cost and living arrangements data, which are also based on FTFT undergraduates. However, average grant aid received by FTFT undergraduates may overstate grant aid received by all undergraduates, since first-year students may be more likely to receive grants or receive larger grants than other undergraduates.[xxii] If available, colleges should use their own data on the average grant aid received by all full-time undergraduates.[xxiii]

For the purpose of this framework, I do not recommend using the net price data calculated in IPEDS because they are limited to students who received financial aid and are weighted by living arrangement using a methodology that includes incomplete costs for students living with family. IPEDS calculates the average net price for FTFT grant aid recipients, which would understate costs for other students, particularly at colleges where many students do not receive grant aid. IPEDS also calculates the average net price by income for FTFT recipients of Title IV aid (federal grant aid,

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xxi   This approach is more precise than multiplying the percent of undergraduates receiving grant aid by the average grant aid awarded to grant aid recipients, because the percent variable is rounded to the nearest 1%.

xxii   The front-loading of grants can occur through intentional program design and/or students not meeting Satisfactory Academic Progress (SAP) or other grant requirements.

xxiii   In this calculation, the cost data are for full-time students, so the data on average grant aid should reflect full-time students as well.

federal work-study, federal Perkins loans, and federal Stafford loans).[xxiv] This cohort does not include all students who receive grant aid (e.g., if they only receive state or institutional grant aid) and it includes some but not all students who do not receive grant aid. This muddiness can make the data difficult to interpret. Additionally, the net price for the lowest income students is not representative of the college costs that most students face, particularly at colleges where many students are in higher income brackets.

Measuring Time to Degree (TTD)

To fully account for students' investment, net price should be calculated for the entire length of their enrollment in their credential or program, rather than looking only at annual costs. If using publicly available data, I recommend multiplying annual net price by the expected time to completion for the predominant credential[xxv] and institutional level of each college, using the assumptions in Table 5. Notably, this approach assumes that students complete their programs, and does not account for students who drop out before completing. Though the ideal approach tracks costs and grant aid longitudinally across students' actual time enrolled, regardless of their completion status, the student investment calculation with publicly available data relies on an estimate of time to degree (TTD).

Table 5: Expected time to degree (TTD), based on predominant credential and institutional level

Predominant Credential	Expected Time to Degree (TTD)
Bachelor's degree (all college levels)	4 years
Associate's degree (all college levels)	2 years
Certificate (four-year colleges)	4 years
Certificate (two-year colleges)	2 years
Certificate (less-than-two-year colleges)	1 year

Note: This table is a modification of the program length methodology used by Carnevale et al. 2019. It breaks out predominantly certificate-granting colleges by institutional level because certificates vary in length and 37% of predominantly certificate-granting colleges are 2-year or 4-year colleges.

This approach is consistent with recent research that adjusts annual net price based on predominant credential (Itzkowitz 2020, Carnevale et al. 2019), though Carnevale et al. (2019) assume delays in graduation for most program lengths. Other researchers have multiplied annual costs by the expected lengths of four-year and two-year degrees, though their calculations are not explicitly tied to the predominant credential at specific colleges (Daly & Bengali 2014, Greenstone & Looney 2011, Johnson 2009). Note that this calculation applies to colleges operating on a standard academic calendar, which report COA to IPEDS across a full academic year. See "Note About Colleges That Report Program-Level Data" for a discussion about how program-year reporters can be incorporated.

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xxiv   This cohort definition does not include Parent PLUS loans, which are also considered Title IV financial aid.

xxv   Predominant credential is available from ED's College Scorecard data file and is calculated using IPEDS Completions data.

This calculation is easy to understand, communicate, and apply, but likely underestimates TTD and does not differentiate between colleges where students take more or less time to complete their programs. While it is possible to adjust the TTD figures in Table 5 to account for across-the-board delays in graduation (e.g., using 150% time), I recommend using the expected TTD, without delays. Assuming longer TTD for all colleges would unfairly penalize institutions that successfully graduate their students within a shorter amount of time. Additionally, it is not clear what TTD to use for predominantly certificate-granting colleges, given the lack of national data on actual time enrolled for certificate completers.[xxvi] While NSC has calculated the average time enrolled for bachelor's and associate's degree completers, there are no comparable data for certificate completers (Shapiro et al. 2016). Certificate programs can vary substantially in length, so it would be difficult to determine what to assume as the delay in graduation for certificate completers.

Using Institution-Level Data to Measure Time Enrolled

If colleges have the data available, they should calculate average time enrolled using actual data on their students, tracked longitudinally. For example, the University of Texas system has explored a variety of ways to measure time enrolled for their students, including breakouts by completion status (Troutman 2020). Using nonpublic institutional data could produce more accurate estimates of time enrolled than the available public data, and help differentiate between colleges that are doing a better or worse job of graduating students on time. Ideally, colleges would be able to track the time that students are actively enrolled, so they can include and break out students who did not complete their programs.

However, there are outstanding questions around how to best measure time enrolled. While NSC provides a model for how TTD can be calculated at the credential level (Shapiro et al. 2016, National Student Clearinghouse n.d.), more research is needed to determine a specific methodology for how to best calculate time enrolled by program of study, including students who do not complete their programs. One question is how to best measure the time that students are actively enrolled. In its national report, NSC defines time enrolled as "the number of weeks that are equivalent of one academic year (30 weeks) of active, full-time enrollment" (Shapiro et al. 2016). However, this is an imperfect measure for colleges with nontraditional calendars and those that offer shorter intersessions or modules. Additionally, colleges with longer terms end up having very few students who complete within exactly two or four academic years in this calculation, because NSC has a shorter definition of "academic year" than the colleges do. Given these limitations, more research is needed to assess whether changes should be made to this methodology, for the purpose of calculating student investment.

Furthermore, as discussed under the ideal approach, more research is needed to determine whether to track time enrolled based on when students entered or exited their programs, and how to resolve methodological issues that arise. For example, tracking time enrolled at the program level based on entry cohorts may be complicated by the fact that some students do not declare a major immediately when entering college, and may switch majors during college. More broadly, it would be helpful to discuss with institutions what their current system capabilities are and what improvements to their data systems would be needed to accurately measure time enrolled at the program level.

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xxvi   For example, in the cash flow assumptions for their ROI analysis, Carnevale et al. 2019 assume delays in graduation for all types of colleges except predominantly certificate-granting colleges that are less-than-two-year colleges.

Alternative Considered: Using IPEDS Graduation Rate Data to Estimate TTD

Instead of using the expected TTD based on predominant credential, it is possible to use IPEDS graduation rate data to estimate average TTD for each college. Appendix D includes more details about this calculation. This approach aims to differentiate between colleges with varying TTD, but its accuracy is hindered by the prevalence of missing data and other limitations.

Many colleges do not have the detailed IPEDS graduation rate data needed to estimate TTD, including 65 percent of for-profit four-year colleges (when using the 200% Graduation Rate Survey). Colleges may be missing these data because they do not enroll FTFT undergraduates, or because they offer bachelor's degrees but do not have bachelor's-degree-seeking students in a given year.[xxvii] If IPEDS graduation rate data are used to estimate TTD, a methodology must be developed for addressing missing data, and complex workarounds could reduce the reliability of the entire student investment calculation. The simplest approach is to omit colleges that are missing the data needed to estimate TTD, but that would preclude valuable insights that may be gleaned from cost and outcome data that are available for those schools. Meanwhile, there are fairness issues involved with assuming a TTD of 100% of normal time or applying a standard delay in graduation (such as 150% of normal time) to colleges that are missing detailed graduation rate data in IPEDS.[xxviii]

Even when IPEDS graduation rate data are available, there are limitations that may lead to inaccurate estimates. First, IPEDS graduation rates are only available for FTFT undergraduates, and FTFT graduation rates may not be representative of the rates for all students.[xxix] Additionally, this approach is imprecise because it applies the longest period to the completers within each graduation rate. Students who complete between 101%-150% of normal time are treated as if they took 150% of normal time to complete, even though they could have actually taken less time. Finally, using IPEDS graduation rates to estimate TTD excludes students who take more than 150% (if using the IPEDS GRS data) or 200% (if using GR200) of normal time to finish their programs. This is especially a concern because the data are based on the time elapsed between a student's entry and completion, which can be longer than the time students are actively enrolled, due to stop-outs. For associate's degree completers at public two-year colleges, NSC found that the average time elapsed between entry and exit is 5.6 years (Shapiro et al. 2016), which is more than 200% of normal time for those programs.

Nevertheless, it would be helpful to explore whether to apply this calculation to a subset of colleges that have the requisite IPEDS graduation rate data available. To test the accuracy of these TTD estimates, the TTD estimated using IPEDS graduation rate data could be compared to the TTD

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xxvii   The detailed graduation rate data in IPEDS (100%, 125%, 150%, and 200% normal time) are only available for bachelor's-degree-seeking students at four-year colleges. For other degree- or certificate-seeking students at four-year colleges, only 150% graduation rates are available. In IPEDS, the classification of institutional level (four-year, two-year, less-than-two-year) is based on the highest award offered by the college (RTI 2015), even if the highest award is not the predominant credential.

xxviii For example, if missing TTD data are filled in with 150% of normal time based on institution level, community colleges that are categorized as four-year colleges (based on their highest degree offered) would be penalized, compared to other community colleges that do not offer four-year degrees. If predominant credential is used to determine "normal time" for colleges that are missing IPEDS graduation rate data, then colleges that are predominantly associate's-degree-granting and have no bachelor's-degree-seeking students in a given year (and thus have no IPEDS graduation rate data available) would be unfairly advantaged compared to other predominantly associate's-degree-granting colleges that had some bachelor's-degree-seekers, since those colleges would have IPEDS graduation rate data for that longer program.

xxix   While the IPEDS Outcome Measures data include part-time and non-first-time students, using those data would lead to less precision for calculating time to degree at two-year colleges. This is because the shortest time period measured is four years, which is 200% of normal time for a two-year program.

calculated by specific institutions, using longitudinal student-level records, and/or national, state, or sector averages for TTD calculated using ED's longitudinal surveys. This comparison can also be made for colleges that are missing the detailed IPEDS graduation rate data, to test potential workarounds.

How Data Should Be Disaggregated

Publicly available data do not allow for any disaggregation of net price data.[xxx] If colleges have access to additional data of their own, this net price calculation should be broken out by completion status, program, and demographic subgroups of students (e.g., family income, race/ethnicity, and gender). This would account for cost variation by program and help identify differences between the net price of completers and noncompleters, as well as allow for an evaluation of the equity implications of net price differences across groups of students.

Note About Colleges That Report Program-Level Data

The recommended approach described above applies to colleges operating on a standard academic calendar, which report college-level COA to IPEDS across a full academic year. More research is needed to determine how to calculate student investment for program-year (PY) reporters, which include colleges that operate on a calendar system that differs by program and colleges that offer programs on a continuous basis.[xxxi] The data for PY reporters are not easily aggregated or compared. For example, ED's summary tables on COA and net price are limited to academic-year reporters only (Ginder et al. 2018a, Ginder et al. 2018b). As context, in the 2018 IPEDS universe, a little over 2,400 colleges are PY reporters, though some may not have the necessary COA, grant aid, and living arrangement data to calculate net price.

PY colleges report COA to IPEDS for the length of their six largest programs, but do not have program-level data on grant aid (IPEDS 2019). Instead, their grant aid data are calculated at the college level, over the length of an academic year. To calculate net price over the length of each program, the average grant aid figures could be adjusted to match the length of each program. For example, the largest program at Pacific College is a 26-month Licensed Practical/Vocational Nurse Training, which is just over two years.[xxxii] The grant aid data cover one academic year, so it could make sense to multiply the average grant aid received by about two to match the time period covered by the cost figures. More research is needed to evaluate this approach and to determine whether additional adjustments should be made based on the length of each college's academic year.

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xxx   The recommended approach with publicly available data does not use IPEDS net price by income because those data are limited to students receiving Title IV financial aid, which would understate costs for students who do not receive financial aid.

xxxi   Other researchers have incorporated PY reporters by using the net price data for FTFT grant recipients provided by IPEDS, rather than calculating net price for all FTFT undergraduates separately. In the IPEDS calculation of net price for FTFT grant recipients, PY colleges report extra data for their largest program, which allows ED to calculate net price for an academic year, rather than the full length of that program. However, since this student investment calculation looks at costs for the length of a given program, it would be more accurate to use the reported program lengths rather than converting the data to annual figures and then multiplying them out using a general assumption about program lengths.

xxxii   See Pacific College's profile on ED's College Navigator website: *https://nces.ed.gov/ collegenavigator/?q=pacific+college&s=all&id=422695#expenses*. Accessed June 18, 2020.

Additionally, when exploring how to incorporate PY reporters in a student investment calculation that is limited to publicly available data, it would be helpful to test how cleanly the CIP codes and credential levels reported in IPEDS match to program-level College Scorecard data on earnings. If the data on returns cannot be easily matched at the program level, it may not make sense to calculate program-level net price for those colleges either.

Limitations of Publicly Available Data

There are a number of limitations to using publicly available IPEDS data to calculate student investment, and colleges with access to granular student-level data can achieve a more accurate calculation.

First, colleges' estimates for COA may not match up with students' actual expenses, as discussed under "Limitations to Existing COA Data." Using college-level averages also masks cost differences by program. As discussed under "Expenses That Should Be Added to COA," COA data in IPEDS do not currently include room and board charges for students living with family. Applying the room and board charges for students living off-campus, not with family to those living with family is a rough workaround that acknowledges the housing and food costs those students incur, but the amounts may not be accurate.

Additionally, much of the IPEDS data used in this calculation is limited to FTFT undergraduates, a population that may not be representative of all students at a given college. The data on living arrangements are only available for an even smaller subset of students: FTFT undergraduates who received grant aid or Title IV aid.

More broadly, there are limitations to using cross-sectional cost and grant aid data from IPEDS to estimate total net price. Ideally, student investment and returns would be calculated using longitudinal data that track the same cohort of students through their time in college. Multiplying annual net price for FTFT undergraduates by their expected time to completion may understate total student investment. It does not account for likely COA increases over time, or the fact that FTFT students may receive larger amounts of grant aid than continuing or part-time students. Students may also switch between full-time and part-time status over the course of their education, and many take longer than normal time to complete their credentials. Additionally, multiplying annual net price by the expected time to completion does not differentiate between colleges based on their success in graduating their students on time and does not account for students who drop out before completing.

It is worth exploring whether to use multiple years of COA and grant data from IPEDS, rather than multiplying the most recent year of data by the expected TTD. That approach would account for COA changes over time, but it may still overstate grant aid because each year of data would be for a FTFT cohort. It would be helpful to test how much precision is actually added by this approach, by comparing net price estimated using multiple years of IPEDS data with net price calculated by colleges using longitudinal student-level records.

Finally, publicly available data are limited because they not allow net price to be disaggregated by students' demographic characteristics, such as race/ethnicity, gender, and family income.[xxxiii]

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xxxiii   The recommended approach with publicly available data does not use IPEDS net price by income because those data are limited to students receiving Title IV financial aid, which would understate costs for students who do not receive financial aid.

Recommendations for Data Improvement

There is a crucial need to improve and standardize colleges' COA estimates, as well as increase transparency about how those estimates are constructed. At a minimum, ED should provide clearer guidance to colleges on how to calculate COA, to make those estimates easier to compare (Coles et al. 2020, Kelchen et al. 2017, Fishman et al. 2016, Goldrick-Rab & Kendall 2016). Goldrick-Rab and Kendall (2016) go a step further and recommend that Congress require ED to calculate living costs for all colleges, using existing federal data, and make those data available to colleges. Fishman et al. (2016) also urge ED to hold colleges accountable for using an appropriate method of estimating COA. Recently passed legislation takes a step forward, but additional COA improvements should still be considered. The Consolidated Appropriations Act of 2021 standardizes some elements of the calculation of living expenses and allows ED to regulate COA components besides tuition and fees, starting in 2023 (Consolidated Appropriations Act, 2021).

Transparency around how colleges create their COA estimates and which expenses are included would also help students, researchers, and policymakers. Students could determine whether their colleges' COA estimates reflect their personal circumstances (Fishman et al. 2016), and researchers and policymakers could evaluate the reasonableness of assumptions made by colleges. While the Consolidated Appropriations Act of 2021 will require colleges to disclose COA elements on any portions of their website describing tuition and fees, more transparency is still needed around how those estimates are calculated.

Additionally, as discussed under "Expenses That Should Be Added to COA," colleges should be required to include the costs of health insurance, healthcare, internet, and cell phone plans in COA. When reporting COA data to IPEDS, colleges should be required to include room and board costs for students living with family.

At the national level, policymakers should support the development of a student level data network (SLDN) that would allow for more comprehensive data on costs, financial aid, and time to degree than what is currently possible in IPEDS.[xxxiv] A SLDN would better measure students' progress through their programs and their time to completion, including transfers between colleges. Additionally, a SLDN would include students beyond FTFT undergraduates and allow for breakouts by program, credential level, race/ethnicity, gender, and age. Those disaggregations are best handled in a SLDN, since colleges would face a greatly increased reporting burden if all these breakouts were required in IPEDS.

> **There is a crucial need to improve and standardize colleges' COA estimates, as well as increase transparency about how those estimates are constructed.**

> **Policymakers should support the development of a student level data network (SLDN).**

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xxxiv   For example, the bipartisan and bicameral College Transparency Act of 2019 would overturn the ban on student-level data collections and create a secure, privacy-protected student level data network within ED's National Center for Education Statistics. For more information about the College Transparency Act, see IHEP n.d.

Furthermore, investments and improvements should be made to colleges' data systems so that they are better able to calculate net price and time enrolled for their students, tracking cohorts longitudinally and breaking them out by program, completion status, and demographic subgroups.

CONCLUSION

Postsecondary institutions play a vital role in providing pathways to economic mobility and stability to students, particularly students from low-income backgrounds, students of color, and women. To determine how much economic value students receive from their education, it is necessary to account for their investment. While there are limitations to publicly available data, using IPEDS and College Scorecard data to estimate net price for all FTFT undergraduates, over the entire length of their credentials, would be a step forward in acknowledging the full costs that students face. The conversation about college costs must not be limited to tuition and fees, and students, colleges, and policymakers should all be aware of how costs are affected by time to completion. Drawing attention to the limitations of COA data can also help drive improvements that would make COA better reflect the expenses that students face.

The most complete and accurate calculations of student investment will require improvements to the data systems of many colleges and systems, so that they can longitudinally track students' costs, grant aid, and time enrolled. Breaking out the data by program, race/ethnicity, gender, and family income would allow colleges to examine the equity implications of net price differences across types of students. On the national level, a student level data network would provide more comprehensive data on costs, financial aid, and time to degree than are currently publicly available. With these improved data, colleges and policymakers could identify ways to help more students reap the economic benefits of a postsecondary credential.

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APPENDIX A: ANALYSIS OF FORGONE EARNINGS AS AN ALTERNATIVE WAY TO MEASURE STUDENT INVESTMENT

Besides net price and COA, another way to measure the cost of attending college is to consider opportunity costs in the form of forgone earnings. Although many students work while enrolled, any time they spend in school takes away from the time they could otherwise spend more fully participating in the workforce. Some or all of those forgone earnings would have covered living costs that students would have incurred even if they were not enrolled in college.

This appendix discusses how researchers have and have not incorporated opportunity costs when measuring student investment, as well as what the data show about how costs calculated using forgone earnings compare to costs that separately account for students' living expenses while enrolled. Based on this research, I do not recommend using forgone earnings as a proxy for living expenses when measuring student investment for the Postsecondary Value Framework.

Summary of Others' Research

There is no consensus on how to measure student investment in college. Researchers approach the issue in a variety of ways—some include opportunity costs, calculated using different approaches, while others focus on cost of attendance or net price and do not include forgone earnings at all.

Three recent studies on college costs and returns do not include forgone earnings. The College Board's *Trends in College Pricing 2019* report actually uses living expenses as a proxy for forgone earnings, "[b]ecause of the difficulty of measuring this cost" (College Board 2019). Additionally, in its recent report on the return on investment (ROI) of college, the Georgetown Center on Education and the Workforce does not incorporate opportunity costs "because the forgone earnings vary according to individual circumstances" (Carnevale et al. 2019). For example, potential students could choose not to or be unable to work full-time or year-round, particularly if they live in areas with few job opportunities. Most recently, Third Way's proposed "Price-to-Earnings Premium" uses net price on the student investment side of the equation, without incorporating forgone earnings (Itzkowitz 2020).

Of the studies that looked at opportunity costs, some incorporate forgone earnings without trying to capture other college costs. Instead, they focus on labor market returns, looking at earnings before, during, and after college enrollment (Belfield 2015, Faler 2015, Liu et al. 2015, Liu & Belfield 2014). However, since this framework is aimed at driving institutional improvement, student investment should include factors that colleges have more control over. Forgone earnings are largely out of colleges' control, while colleges have more influence over the net prices their students face.

Other studies that incorporate forgone earnings do include direct college costs[xxxv] (Belfield & Bailey 2017, Daly & Bengali 2014, Greenstone & Looney 2011, Johnson 2009), and some studies also incorporate measures of grant aid (EMSI 2018, Payscale 2018, Webber 2016, Abel & Deitz 2014). In these studies, opportunity costs are largely used in lieu of indirect expenses (i.e., forgone earnings are not included in addition to indirect expenses), though forgone earnings are not explicitly described as a proxy for what students would need to spend on living expenses while in college.

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xxxv   Some of these analyses include books and supplies in addition to tuition and fees, while others focus solely on tuition and fees.

Other researchers have noted that living expenses and forgone earnings should not be added together, since that would double count the portion of forgone earnings that would have paid for living expenses (Baum and McPherson 2011).

While some studies accounted for students' earnings while enrolled when calculating forgone earnings (Belfield & Bailey 2017, Belfield 2015, Faler 2015, Liu et al. 2015, Liu & Belfield 2014, Johnson 2009, Jacobson et al. 2003), they were not attempting to estimate opportunity costs beyond students' living expenses. There is no existing methodology for calculating "partial forgone earnings," and it's not clear whether the necessary data even exist. Additionally, as discussed below, there are cases where forgone earnings are actually lower than students' living expenses.

Findings and Recommendations

Using data from the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS) and the U.S. Census Bureau's American Community Survey (ACS), I explored the implications of using forgone earnings to proxy living expenses while students are enrolled in college. Based on my analysis and others' research, I recommend that the student investment measurement calculate net price by using the cost of students' living expenses while enrolled, rather than using forgone earnings. It is difficult to use forgone earnings as a proxy for living expenses because they can end up being much lower or much higher than students' living expenses, depending on what population of workers is included in the forgone earnings calculation. It is more appropriate for the student investment calculation to account for students' living expenses while enrolled, since those estimates can be based on colleges' assessment of the costs their students experience. Additionally, there are equity concerns with using forgone earnings because they vary substantially based on factors like gender and race/ethnicity, which are unrelated to how much students would need to pay for living expenses while enrolled.

As shown in Tables A6-A8 under "Details About Analysis and Data Tables," there is wide variation in forgone earnings depending on which age group is considered and whether the population includes all individuals (regardless of whether they have earnings), only individuals with earnings, or only full-time workers with earnings. There is no consensus in the research about how forgone earnings should be calculated, though some studies are limited by the populations included in their datasets. For example, analyses using state workforce data may only include workers with earnings, because individuals with no earnings records in a given state could be working outside the state or in a job that is not covered by the state's Unemployment Insurance (UI) program.

When calculated for certain groups of workers, forgone earnings can be much lower than students' living expenses. For example, as shown in Table A1 below, the sum of net direct costs at public four-year colleges in the NYC metro area and average earnings for high school graduates aged 18-23 is only about $4,600, including individuals with no earnings.[xxxvi] Even when limited to workers with earnings, costs calculated using forgone earnings are substantially lower than the net price, which specifically accounts for the cost-of-living expenses while enrolled. For more details about these figures, see Table A5.

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xxxvi   When calculating forgone earnings, Greenstone & Looney (2011) also include workers with no earnings, "reflect[ing] the fact that high school workers are less likely to find a full-time job and more likely to be unemployed."

Table A1: Comparison of net direct costs plus forgone earnings, net price, and sticker price (NYC metro area, 2017-18)

	Public four-year colleges in NYC metro area
Net direct costs plus forgone earnings (including those with no earnings)	$4,614
Net direct costs plus forgone earnings (limited to workers with earnings)	$13,814
Net price for all FTFT undergraduates (off-campus, not with family)	$20,486
Sticker price (off-campus, not with family)	$27,473

Johnson (2009) also found that net direct costs plus forgone earnings for the State University System of Florida were much lower than net price. Table A2 below presents a summary of his findings.

Table A2: Comparison of net direct costs plus forgone earnings and other methods of calculating COA, for students attending the State University System of Florida, 2007-08 (Johnson 2009)

	State University System of Florida
Net direct costs plus forgone earnings	$9,204
Net price for all undergraduates (including room and board, transportation, and other expenses)	$13,731

Note: The figures for net tuition and fees, books and supplies, room and board, transportation, and other expenses are national averages for public four-year colleges, taken from the College Board's 2007 Trends in College Pricing report. Johnson 2009 calculated forgone earnings by comparing the earnings of Florida high school graduates who enrolled in the State University System with those who did not continue their education the following fall.

These high school graduates are not earning enough to cover their living expenses if they decided to enroll in college.[xxxvii] Using their wages as a proxy for living expenses would underestimate how much students need to cover food, housing, and other costs necessary to get through college successfully.

On the other hand, there are cases where forgone earnings can overstate college costs, particularly when earnings are calculated for older workers, limited to those with earnings, and compared to colleges with low costs. For example, at the national level, the average earnings of workers aged 24-29 (excluding individuals with no earnings) are higher than the full sticker price for students attending a community college and living off-campus, not with family ($21,718 vs. $17,345), even without adding net direct costs to the forgone earnings. See Tables A3 and A6 for more details.

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xxxvii To address concerns about low-wage workers, the MIT Living Wage Calculator (*https://livingwage.mit.edu/*) estimates wage rates for minimum standards of living. However, the calculator requires specifying a state and a specific family situation (number of adults working, number of children), which would add complexity or require making simplifying assumptions for this calculation. Moreover, COA is still a more direct way to measure student investment in college than using a living wage to proxy living costs while enrolled.

Additionally, there are equity concerns with using forgone earnings in the student investment calculation. Other research shows a large amount of variation in earnings based on gender and race/ethnicity (Urban Institute 2017). These wage inequities do not track to differences in what students would need to spend on educational expenses.

For these reasons, I do not recommend using forgone earnings as a proxy for living expenses in the student investment calculation for the Postsecondary Value Framework. The details about my analysis are described below.

Details About Analysis and Data Tables

Using data from IPEDS and ACS, I compared four methods of calculating student investment in college:

1. Total cost of attendance (sticker price), including tuition and fees, room and board, books and supplies, and other personal expenses. This approach does not account for financial aid.

2. Net price for all first-time, full-time (FTFT) undergraduates, calculated as the total cost of attendance minus the average grant aid received by all FTFT undergraduates. This approach accounts for the share of students who receive grant aid.

3. Net price for FTFT undergraduates who received grant aid. This approach does not account for the share of students who receive grant aid.

4. Net direct costs plus forgone earnings. This approach subtracts average grant aid from direct costs, which for this purpose are defined as expenses that students only incurred because they were enrolled in college—namely, tuition, fees, books, and supplies.[xxxviii] Forgone earnings are calculated as the median wage/salary earnings for individuals with a high school diploma or GED and not attending school. Figures are calculated for various age ranges and types of workers (all individuals, those with earnings, and full-time workers with earnings).

Note that for option 1 (total COA, or sticker price) and option 2 (net price for all FTFT undergraduates), figures are provided separately for students living on-campus and those living off-campus, not with family.[xxxix] Meanwhile, in the IPEDS calculations for the net price of FTFT grant recipients (option 3), averages for room and board and other expenses are weighted by living arrangement (i.e., the number of FTFT grant recipients living on-campus, off-campus with family, and off-campus, not with family).

Estimates were calculated for the nation overall, the state of Texas, and the New York City (NYC) metro area, overall and broken out by sector. Tables A3-A5 provide summary figures, while Tables A6-A8 provide the underlying data for option 4 (net direct costs plus forgone earnings). Below the tables, there is a detailed explanation of the data, methodology, and limitations.

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xxxviii If considered as a proxy for living costs, forgone earnings track more closely to what students would actually spend on living costs (i.e., indirect expenses minus grant aid) than for the total amount colleges estimate for living costs (not including grant aid). Therefore, option 4 combines forgone earnings with a direct cost figure that subtracts out grant aid.

xxxix Cost data for students living off-campus with family were excluded due to limitations in the IPEDS data. As discussed under "Expenses That Should Be Added to COA," colleges are not able to report room and board costs for students living with family. Since those expenses are only excluded for students in that particular living arrangement, those data are not comparable to the total costs for students living on-campus or off-campus, not with family.

Table A3: Comparison of approaches for calculating student investment – National averages

Sector	# of colleges in cost data	Option 1: Sticker Price		Option 2: Net Price for All FTFT Undergraduates		Option 3: Net Price for FTFT Grant Recipients	Option 4: Net Direct Costs plus Forgone Earnings, by Age and Worker Population					
		TCOA on-campus	TCOA off-campus, not with family	TCOA on-campus minus grant aid	TCOA off-campus, not with family, minus grant aid	Net price for FTFTs who received grant aid	Age 18-23, including those with no earnings	Age 18-23, workers with earnings	Age 18-23, full-time workers with earnings	Age 24-29, including those with no earnings	Age 24-29, workers with earnings	Age 24-29, full-time workers with earnings
Public 4-year	728	$23,585	$23,080	$17,079	$17,079	$12,516	$12,049	$16,915	$22,395	$18,986	$25,173	$29,155
Private nonprofit 4-year	1,282	$44,432	$41,811	$26,143	$25,321	$22,315	$20,882	$25,748	$31,228	$27,819	$34,006	$37,988
Private for-profit 4-year	227	$37,299	$30,831	$29,897	$25,597	$21,789	$21,131	$25,997	$31,477	$28,068	$34,255	$38,237
Public 2-year	868	$15,247	$17,345	$10,950	$13,445	$7,299	$9,700	$14,566	$20,046	$16,637	$22,824	$26,806
Private nonprofit 2-year	81	$30,454	$29,808	$23,423	$24,640	$19,397	$19,010	$23,876	$29,356	$25,947	$32,134	$36,116
Private for-profit 2-year	183	$38,095	$29,499	$33,085	$24,792	$20,560	$19,998	$24,864	$30,344	$26,935	$33,122	$37,104
Public less-than-2-year	16	$14,396	$20,686	$8,163	$16,831	$11,384	$13,089	$17,955	$23,435	$20,026	$26,213	$30,195
Private nonprofit less-than-2-year	3	n/a	$28,933	n/a	$25,349	$22,828	$25,237	$30,103	$35,583	$32,174	$38,361	$42,343
Private for-profit less-than-2-year	38	$30,680	$26,409	$28,834	$21,906	$18,991	$18,616	$23,482	$28,962	$25,553	$31,740	$35,722
Overall	3,426	$34,758	$29,463	$21,847	$20,372	$16,143	$16,039	$20,905	$26,385	$22,976	$29,163	$33,145

Source: Author's calculations using cost and financial aid data from IPEDS for the 2017-18 year and median earnings from the U.S. Census Bureau's American Community Survey (ACS) 2017, 5-year estimates, accessed using IPUMS USA: Version 9.0 [dataset]. Minneapolis, MN: IPUMS, 2019. https://doi.org/10.18128/D010.V9.0.

Table A4: Comparison of approaches for calculating student investment – Texas state averages

Sector	# of colleges in cost data	Option 1: Sticker Price		Option 2: Net Price for All FTFT Undergraduates		Option 3: Net Price for FTFT Grant Recipients	Option 4: Net Direct Costs plus Forgone Earnings, by Age and Worker Population					
		TCOA on-campus	TCOA off-campus, not with family	TCOA on-campus minus grant aid	TCOA off-campus, not with family, minus grant aid	Net price for FTFTs who received grant aid	Age 18-23, including those with no earnings	Age 18-23, workers with earnings	Age 18-23, full-time workers with earnings	Age 24-29, including those with no earnings	Age 24-29, workers with earnings	Age 24-29, full-time workers with earnings
Public 4-year	39	$22,047	$21,940	$15,551	$15,671	$10,933	$11,199	$16,788	$21,235	$18,151	$24,620	$27,642
Private nonprofit 4-year	47	$40,088	$38,466	$24,187	$24,005	$21,752	$20,076	$25,665	$30,112	$27,028	$33,497	$36,519
Private for-profit 4-year	14	$34,400	$28,312	$28,078	$23,639	$20,575	$20,697	$26,286	$30,733	$27,649	$34,118	$37,140
Public 2-year	60	$13,436	$16,044	$9,430	$12,376	$6,320	$8,994	$14,583	$19,030	$15,946	$22,415	$25,437
Private nonprofit 2-year	4	$17,702	$26,069	$8,528	$21,406	$17,205	$16,589	$22,178	$26,625	$23,541	$30,010	$33,032
Private for-profit 2-year	10	n/a	$26,038	n/a	$21,764	$17,256	$18,900	$24,489	$28,936	$25,852	$32,321	$35,343
Public less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Private nonprofit less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Private for-profit less-than-2-year	2	n/a	$28,846	n/a	$26,611	$17,526	$18,741	$24,330	$28,777	$25,693	$32,162	$35,184
Overall	176	$26,721	$25,255	$17,378	$18,008	$13,593	$14,219	$19,808	$24,255	$21,171	$27,640	$30,662

Table A5: Comparison of approaches for calculating student investment – New York City metro area averages

Sector	# of colleges in cost data	Option 1: Sticker Price		Option 2: Net Price for All FTFT Undergraduates		Option 3: Net Price for FTFT Grant Recipients	Option 4: Net Direct Costs plus Forgone Earnings, by Age and Worker Population					
		TCOA on-campus	TCOA off-campus, not with family	TCOA on-campus minus grant aid	TCOA off-campus, not with family, minus grant aid	Net price for FTFTs who received grant aid	Age 18-23, including those with no earnings	Age 18-23, workers with earnings	Age 18-23, full-time workers with earnings	Age 24-29, including those with no earnings	Age 24-29, workers with earnings	Age 24-29, full-time workers with earnings
Public 4-year	13	$28,102	$27,473	$21,392	$20,486	$6,280	$4,614	$13,814	$21,204	$13,814	$22,112	$26,937
Private nonprofit 4-year	57	$37,086	$42,550	$24,104	$29,487	$19,521	$14,329	$23,529	$30,919	$23,529	$31,827	$36,652
Private for-profit 4-year	7	$48,140	$37,909	$39,146	$29,882	$26,119	$17,044	$26,244	$33,634	$26,244	$34,542	$39,367
Public 2-year	7	n/a	$26,728	n/a	$20,946	$6,788	$4,065	$13,265	$20,655	$13,265	$21,563	$26,388
Private nonprofit 2-year	7	$44,315	$35,354	$39,197	$30,278	$24,177	$14,557	$23,757	$31,147	$23,757	$32,055	$36,880
Private for-profit 2-year	10	$35,913	$38,342	$30,737	$31,186	$26,669	$17,536	$26,736	$34,126	$26,736	$35,034	$39,859
Public less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Private nonprofit less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Private for-profit less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Overall	101	$36,563	$38,053	$25,048	$27,909	$18,422	$12,889	$22,089	$29,479	$22,089	$30,387	$35,212

Table A6: Underlying calculations for option 4 (net direct costs plus forgone earnings) – National averages

Sector	Direct costs minus grant aid	Forgone earnings (median wage/salary earnings for those with a HS diploma/GED and not attending school), by age and worker population					
		Age 18-23, including those with no earnings	Age 18-23, workers with earnings	Age 18-23, full-time workers with earnings	Age 24-29, including those with no earnings	Age 24-29, workers with earnings	Age 24-29, full-time workers with earnings
Public 4-year	$3,455	$8,594	$13,460	$18,940	$15,531	$21,718	$25,700
Private nonprofit 4-year	$12,288	$8,594	$13,460	$18,940	$15,531	$21,718	$25,700
Private for-profit 4-year	$12,537	$8,594	$13,460	$18,940	$15,531	$21,718	$25,700
Public 2-year	$1,106	$8,594	$13,460	$18,940	$15,531	$21,718	$25,700
Private nonprofit 2-year	$10,416	$8,594	$13,460	$18,940	$15,531	$21,718	$25,700
Private for-profit 2-year	$11,404	$8,594	$13,460	$18,940	$15,531	$21,718	$25,700
Public less-than-2-year	$4,495	$8,594	$13,460	$18,940	$15,531	$21,718	$25,700
Private nonprofit less-than-2-year	$16,643	$8,594	$13,460	$18,940	$15,531	$21,718	$25,700
Private for-profit less-than-2-year	$10,022	$8,594	$13,460	$18,940	$15,531	$21,718	$25,700
Overall	$7,445	$8,594	$13,460	$18,940	$15,531	$21,718	$25,700

Table A7: Underlying calculations for option 4 (net direct costs plus forgone earnings) – Texas state averages

Sector	Direct costs minus grant aid	Forgone earnings (median wage/salary earnings for those with a HS diploma/GED and not attending school), by age and worker population					
		Age 18-23, including those with no earnings	Age 18-23, workers with earnings	Age 18-23, full-time workers with earnings	Age 24-29, including those with no earnings	Age 24-29, workers with earnings	Age 24-29, full-time workers with earnings
Public 4-year	$2,620	$8,579	$14,168	$18,615	$15,531	$22,000	$25,022
Private nonprofit 4-year	$11,497	$8,579	$14,168	$18,615	$15,531	$22,000	$25,022
Private for-profit 4-year	$12,118	$8,579	$14,168	$18,615	$15,531	$22,000	$25,022
Public 2-year	$415	$8,579	$14,168	$18,615	$15,531	$22,000	$25,022
Private nonprofit 2-year	$8,010	$8,579	$14,168	$18,615	$15,531	$22,000	$25,022
Private for-profit 2-year	$10,321	$8,579	$14,168	$18,615	$15,531	$22,000	$25,022
Public less-than-2-year	n/a	$8,579	$14,168	$18,615	$15,531	$22,000	$25,022
Private nonprofit less-than-2-year	n/a	$8,579	$14,168	$18,615	$15,531	$22,000	$25,022
Private for-profit less-than-2-year	$10,162	$8,579	$14,168	$18,615	$15,531	$22,000	$25,022
Overall	$5,640	$8,579	$14,168	$18,615	$15,531	$22,000	$25,022

Source: Author's calculations using cost and financial aid data from IPEDS for the 2017-18 year and median earnings from the U.S. Census Bureau's American Community Survey (ACS) 2017, 5-year estimates, accessed using IPUMS USA: Version 9.0 [dataset]. Minneapolis, MN: IPUMS, 2019. https://doi.org/10.18128/D010.V9.0.

Table A8: Underlying calculations for option 4 (net direct costs plus forgone earnings) – New York City (NYC) metro area averages

Sector	Direct costs minus grant aid	Forgone earnings (median wage/salary earnings for those with a HS diploma/GED and not attending school), by age and worker population					
		Age 18-23, including those with no earnings	Age 18-23, workers with earnings	Age 18-23, full-time workers with earnings	Age 24-29, including those with no earnings	Age 24-29, workers with earnings	Age 24-29, full-time workers with earnings
Public 4-year	$1,404	$3,210	$12,410	$19,800	$12,410	$20,708	$25,533
Private nonprofit 4-year	$11,119	$3,210	$12,410	$19,800	$12,410	$20,708	$25,533
Private for-profit 4-year	$13,834	$3,210	$12,410	$19,800	$12,410	$20,708	$25,533
Public 2-year	$855	$3,210	$12,410	$19,800	$12,410	$20,708	$25,533
Private nonprofit 2-year	$11,347	$3,210	$12,410	$19,800	$12,410	$20,708	$25,533
Private for-profit 2-year	$14,326	$3,210	$12,410	$19,800	$12,410	$20,708	$25,533
Public less-than-2-year	n/a	$3,210	$12,410	$19,800	$12,410	$20,708	$25,533
Private nonprofit less-than-2-year	n/a	$3,210	$12,410	$19,800	$12,410	$20,708	$25,533
Private for-profit less-than-2-year	n/a	$3,210	$12,410	$19,800	$12,410	$20,708	$25,533
Overall	$9,679	$3,210	$12,410	$19,800	$12,410	$20,708	$25,533

Source: Author's calculations using cost and financial aid data from IPEDS for the 2017-18 year and median earnings from the U.S. Census Bureau's American Community Survey (ACS) 2017, 5-year estimates, accessed using IPUMS USA: Version 9.0 [dataset]. Minneapolis, MN: IPUMS, 2019. https://doi.org/10.18128/D010.V9.0.

Data and Methodology for Appendix A

The data sources for this analysis were the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS) and the U.S. Census Bureau's American Community Survey (ACS) 2017, 5-year estimates, accessed using IPUMS USA: Version 9.0 [dataset]. Minneapolis, MN: IPUMS, 2019. *https://doi.org/10.18128/D010.V9.0*.

Some variable names are listed below in all caps and italics (e.g., INCWAGE).

The NYC metro area was defined as colleges located in the five counties associated with the five boroughs of NYC: Bronx County (Bronx), Kings County (Brooklyn), New York County (Manhattan), Queens County (Queens), and Richmond County (Staten Island).

Notes on IPEDS Data and Calculations

Colleges are required to annually report their COA and student financial aid estimates to IPEDS.

The IPEDS cost of attendance and financial aid data are from the 2017-18 academic year, which was the most recent year available for the financial aid data when this analysis was conducted. The data are limited to colleges that operate on a standard academic calendar (academic-year reporters) and do not include colleges that operate on a calendar system that differs by program or offer programs on a continuous basis (program-year reporters). The total cost of attendance is calculated using in-district tuition and fees. Some colleges charge different tuition for in-district, in-state, and out-of-state students.

The figures are unweighted means, which means that they represent averages across institutions, not across students.

Colleges are only included in this calculation if they have non-missing data for the relevant cost of attendance and financial aid variables. Some colleges report COA data but no financial aid data for FTFTs. This could be because the colleges do not enroll FTFT undergraduates or because they went through institutional changes (e.g., mergers or new campuses). By only including cases with nonmissing data, the calculated averages are more comparable. Otherwise the average for one figure (e.g., total cost of attendance) could be based on a different group of colleges than the average for another figure (e.g., net price for FTFT grant recipients), and those differences could be due to the composition of colleges rather than the mode of calculation. Due to these filters, the cost averages shown in these tables may not match other cost averages by sector.

For option 1 (total COA, or sticker price) and option 2 (net price for all FTFT undergraduates), figures are provided separately for students living on-campus and those living off-campus, not with family. Cost data for students living off-campus with family were excluded due to limitations in the IPEDS data. As discussed under "Expenses That Should Be Added to COA," colleges are not able to report room and board costs for students living with family. Since those expenses are only excluded for students in that particular living arrangement, those data are not comparable to the total costs for students living on-campus or off-campus with family. In contrast, for the IPEDS calculations for the net price of FTFT grant recipients (option 3), averages for room and board and other expenses are weighted by living arrangement (the number of FTFT grant recipients living on-campus, off-campus with family, and off-campus, not with family), though this option assumes that students living with family do not incur food or housing costs.

The data on college sector, state, and county are taken from the 2018-19 academic year, which was the most recent year of data available when this analysis was conducted.

The net price data (option 3) are limited to FTFT undergraduates who received grant aid from federal, state, or local governments, or the institution. For comparability, the calculation of average grant aid uses data for FTFT undergraduates and not undergraduates overall.

Notes on ACS Data and Calculations

ACS is the largest household survey in the United States.[xl] Responses are mandatory, and the ACS had a 92 percent response rate in 2018 (U.S. Census Bureau n.d.). About 3.5 million households are sampled (U.S. Census Bureau 2018), and that large sample size makes it possible to produce reliable estimates for small geographical regions and specific demographic groups. Some researchers have used ACS data to analyze forgone earnings (Ma et al. 2019, Urban Institute 2017, and Webber 2016).

Median earnings were calculated using the 2017 ACS, five-year estimates, accessed using IPUMS USA: Version 9.0 [dataset]. Minneapolis, MN: IPUMS, 2019. *https://doi.org/10.18128/D010.V9.0*. The five-year estimates were used because they provide more reliable data, particularly for geographic areas with smaller populations (U.S. Census Bureau 2018). Since this analysis drilled down to the state and county levels, median earnings were calculated using the five-year estimates. Future research could examine the sample sizes for the median earnings calculations in the NYC metro area to make sure they are not too small.

Median earnings were calculated for individuals with a high school diploma or GED (EDUCD) who are not currently enrolled in school (SCHOOL). Values are in 2017 dollars and represent the amount earned in the previous year. Medians are weighted using PERWT, a variable that indicates how many people in the U.S. population are represented by a given person in the IPUMS sample.[xli]

Median earnings represent wage and salary income (INCWAGE), which includes wages, salaries, commissions, cash bonuses, tips, and other money income received from an employer. It is also possible to look at total personal earned income (INCEARN), which includes income earned from a person's own business or farm. However, INCEARN can be negative if a person's business/farm expenses are higher than their gross receipts, which complicates the calculation of forgone earnings. In contrast, INCWAGE is never negative.

When looking at full-time workers, full-time is defined as typically working 35 or more hours per week (UHRSWORK).

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xl   For more information about ACS, see Pew Research Center n.d., U.S. Census Bureau 2019, U.S. Census Bureau 2018, Weldon Cooper Center for Public Service 2017, and U.S. Census Bureau 2016.

xli   For more information about sample weights in IPUMS, see *https://usa.ipums.org/usa/intro.shtml#weights*.

APPENDIX B: COMPARISON OF APPROACHES FOR CALCULATING NET PRICE

Using data from the U.S. Department of Education's (ED) Integrated Postsecondary Education Data System (IPEDS), I compared six approaches for calculating net price by living arrangement. This includes four options for calculating average net price and two options for calculating average costs by living arrangement (predominant living arrangement and a weighted average based on living arrangement). For two of the net price options (options 3 and 4), the underlying data elements are already weighted by living arrangement.

The four options for calculating average net price are:

1. <u>Net price for all undergraduates</u>, calculated as the total cost of attendance for first-time, full-time (FTFT) undergraduates minus the average grant aid received by all undergraduates. This approach accounts for the share of students who receive grant aid, but the grant aid data are not limited to full-time students.

2. <u>Net price for all FTFT undergraduates</u>, calculated as the total cost of attendance for FTFT undergraduates minus the average grant aid received by FTFT undergraduates. This approach accounts for the share of students who receive grant aid, and the grant aid data represent the same group of students as the cost data.

3. <u>Net price for FTFT undergraduates who received grant aid.</u> This approach does not account for the share of students who receive grant aid, and the underlying net price data are already weighted by living arrangement using data that do not include housing and food expenses for students living with family.

4. <u>Net price for FTFT undergraduates who received Title IV federal financial aid and who have family incomes between $0 and $30,000.</u> This approach does not account for the share of students who receive grant aid, and the underlying net price data are already weighted by living arrangement using data that do not include housing and food expenses for students living with family.

The two options for adjusting cost data based on living arrangement are:

A. Predominant living arrangement, using the costs associated with the predominant living arrangement for FTFT undergraduates who received grant aid. This calculation only considers students living on-campus and off-campus, not with family, due to limitations in the cost data for students living with family.

B. Weighted average based on living arrangement, using the distribution across living arrangements for FTFT undergraduates who received grant aid. This calculation includes the share of students who live off-campus with family, but applies the cost data for students living off-campus, not with family to the students living with family. Note that this methodology differs from the calculations used by ED in the underlying data for net price options 3 and 4.

Estimates were calculated for the nation overall, the state of Texas, and the New York City (NYC) metro area, overall and broken out by sector. A summary of limitations, findings, and recommendations is provided below. Tables B2-B4 provide the number of colleges covered by each approach and Tables B5-B7 provide the average net price estimates. Below the tables, there is a detailed explanation of the data and methodology.

Limitations of Approaches

When evaluating these approaches, it is important to note the limitations of each.

While the first two options for calculating net price factor in students' likelihood of receiving grant aid, there are limited data available on average grant aid. Ideally, net price would be calculated by subtracting the average grant aid received by all full-time undergraduates from total costs, because the cost data are for full-time students. However, using publicly available IPEDS data, average grant aid can only be calculated for all undergraduates (including part-time students) or for FTFT undergraduates only. There are limitations to using data specific to FTFT undergraduates. Some colleges do not enroll FTFT undergraduates and for others, FTFT undergraduates are a small share of their student population. Using average grant aid received by FTFT undergraduates may overstate grant aid, since first-year students may be more likely to receive grants or receive larger grants than other undergraduates.[xlii]

The third option for calculating net price is limited to FTFT undergraduates who receive grant aid, which would understate costs for students who do not receive grant aid.

The fourth option for calculating net price is limited to FTFT undergraduates who receive Title IV aid (federal grant aid, federal work-study, federal Perkins loans, and federal Stafford loans).[xliii] This cohort does not include all students who receive grant aid (e.g., if they only receive state or institutional grant aid) and it includes some but not all students who do not receive grant aid. Additionally, these data are more representative for lower income students than higher income students, because a larger share of students from lower income groups receive Title IV aid, which are largely awarded based on financial need. As shown in Table B1 below, about four in five students with family incomes of $48,000 or less received Title IV aid in 2015-16, compared to only two in five students with family incomes above $110,000. Therefore, this analysis looks at average net price for students in the lowest income bracket, with family incomes between $0 and $30,000.

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xlii   The front-loading of grants can occur through intentional program design and/or students not meeting Satisfactory Academic Progress (SAP) or other grant requirements.

xliii   This cohort definition does not include Parent PLUS loans, which are also considered Title IV financial aid.

Table B1: Likelihood of receiving Title IV financial aid by family income, 2015-16

Family Income	Did not receive Title IV aid	Received Title IV aid
$0-$30,000	20%	80%
$30,001-48,000	17%	83%
$48,001-75,000	35%	65%
$75,001-110,000	46%	54%
$110,001+	59%	41%

Source: Author's calculations using data from the U.S. Department of Education, National Postsecondary Student Aid Study (NPSAS). Data include full-time undergraduate students who entered college in calendar year 2015 or 2016. For this calculation, Title IV aid does not include Parent PLUS loans.

There are also substantial limitations in the data available to adjust costs by living arrangement to estimate a single average net price. First, there are no publicly available data on the number of all undergraduates or all FTFT undergraduates by living arrangement. In IPEDS, colleges are only asked to report on the living arrangements of FTFT undergraduates who received grants or FTFT undergraduates who received Title IV aid. Those distributions by living arrangement may not be representative of all undergraduates or all FTFT undergraduates, including those who did not receive financial aid.

Additionally, the cost data for students living off-campus with family are incomplete. Colleges are not able to report room and board costs for students living with family (IPEDS 2019), even though research shows that a substantial share of students living at home still purchase food and/or pay rent (University of California 2017, Goldrick-Rab & Kendall 2016). When calculating average net price in the data that underlie options 3 and 4, ED weights the cost data by living arrangement using a methodology that includes costs for students living with family. Since those costs exclude room and board, those net price averages likely understate actual costs.

Option A (predominant living arrangement) accounts for this limitation by excluding students who live with family. As a result, this approach does not include cost data for colleges where FTFT grant recipients are only reported to live off-campus with family (i.e., no students live on-campus or off-campus, not with family). Option B (weighted average) applies the costs for students living off-campus, not with family to those living off-campus with family. However, students living with family may actually face lower living costs than those living off-campus, not with family. The National Association for Student Financial Aid Administrators (NASFAA) advises colleges, "For students without dependents living with their parent(s), the room and board allowances are determined by the institution, which takes into consideration that these students may have lower room and board costs than those not living at home" (NASFAA 2018).

Findings

Overall, the six approaches are similar in terms of the number of colleges with available data, and the two approaches for adjusting costs based on living arrangement lead to very similar estimates. There are substantial differences between the four net price options, which are not surprising given which students are included in each approach.

In terms of coverage, the six approaches have a comparable number of colleges with available data. See Tables B2-B4 for the detailed college counts by sector. The largest number of colleges have data available for option 3 (average net price for FTFT grant recipients). That approach uses data calculated by ED, rather than combining data from different IPEDS surveys, reported across different collection years, where some data points can be missing. Fewer colleges have data for option 4 (net price for FTFT Title IV aid recipients with family incomes $0-$30,000) because some colleges do not have any students in that specific group.

Nationally, there are 69 more colleges with available data to calculate option B (weighted average of costs by living arrangement) than option A (predominant living arrangement): 3,459 colleges compared to 3,390. This is largely due to the treatment of students living off-campus with family. In 65 of those cases, FTFT grant recipients were only reported to live off-campus with family (i.e., none live on-campus or off-campus, not with family). The calculation for predominant living arrangement excludes those students, while the calculation for weighted averages uses the off-campus, not-with-family costs for those students. In the other four cases, the predominant living arrangement for FTFT grant recipients was on-campus, but no on-campus costs were reported.

Looking at average net price, for options 1 and 2 (net price for all undergraduates and net price for all FTFT undergraduates), there is not a substantial difference between calculating costs for the predominant living arrangement or as a weighted average based on living arrangement. The averages are very similar at the national level, and very similar for most institutions as well. Of the 3,390 colleges with data for both living arrangement calculations, 2,463 (73%) have net price estimates for option A that are within $100 of option B. Only 247 colleges have net price estimates that differ by more than $1,000 between the living arrangement approaches. For many of those colleges, there is a large difference in costs for students living on-campus versus those living off-campus, not with family.

For example, at Long Island University (NY), 37% of FTFT grant recipients in 2017-18 lived on-campus, 62% lived with family, and 2% lived off-campus, not with family.[xliv] More students lived on-campus than off-campus, not with family, so the predominant living arrangement approach (option A) uses the on-campus total costs of $55,198. Meanwhile, the weighted average approach applies the off-campus, not-with-family costs of $66,478 to the 63% of students who live off-campus (both with family and not with family), which leads to much higher net price estimates.

There are large differences in average net price between options 1-4, which likely reflect differences in which students are represented in each approach. The net price is higher in option 1 than option 2, which could be due to first-year undergraduates receiving larger grants than returning undergraduates, and/or the average grant aid received by all undergraduates being lower due to the inclusion of part-time students. The net price is substantially lower in option 3, because it only includes students who received grant aid. The net price is lowest in option 4, because lower income students tend to receive larger amounts of grant aid.

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xliv   Sums do not add up to 100% due to rounding.

Recommendations

Based on this analysis, I recommend calculating the net price for all FTFT undergraduates (option 2), using a weighted average by living arrangement (option B). However, there are notable data limitations involved with using publicly available IPEDS data for this calculation, no matter which approach is chosen. Those concerns are discussed in the "Limitations of Approaches" section above.

I strongly prefer options 1 and 2 over options 3 and 4 because it is important to account for students' likelihood of receiving grant aid. Calculating net price only based on grant recipients would understate costs for other students. Colleges that award large amounts of grant aid to a small number of students could have a very low net price that does not reflect the experience of most students. Additionally, the net price for the lowest income students is not representative of the college costs that most students face.

I do not have a strong preference between options 1 and 2 as there are trade-offs to both approaches. Option 2 has better alignment between the cost and grant data, since both are based on FTFT undergraduates. It is based on a more limited cohort of students than option 1, but it is less messy from a data perspective. Notably, using option 2 leads to lower average net prices than option 1 for 85% of colleges in this analysis (2,854 of 3,338 colleges).

Ideally, average costs should be calculated as a weighted average based on the living arrangement of all students and the cost data for students living with family would include estimates of room and board. Given the data challenges of using publicly available IPEDS data to adjust costs by living arrangement, I slightly lean toward using option B (the weighted average approach), applying the costs for students living off-campus, not with family to those living with family. Using weighted averages allows for more precision than using the predominant living arrangement, particularly in cases where on-campus costs differ substantially from the off-campus costs and where the share of students living on-campus does not differ much from the share of students living off-campus, not with family. However, applying the costs for students living off-campus, not with family to those living with family may lead to inaccurate and overstated cost estimates. If colleges have access to granular data on their own students, they should calculate the weighted average of costs by living arrangement using costs for students living with family that include room and board estimates for that population.

Data Tables

Table B2: Number of colleges covered in each approach for calculating net price by living arrangement – National totals

Sector	Total # of colleges	Option 1: Net Price for All Undergraduates		Option 2: Net Price for All FTFT Undergraduates		Option 3: Net Price for FTFT Grant Recipients	Option 4: Net Price for FTFT Title IV Aid Recipients with Incomes $0-$30,000
		A) Predominant living arrangement	B) Weighted average by living arrangement	A) Predominant living arrangement	B) Weighted average by living arrangement	Weighted average by living arrangement	Weighted average by living arrangement
Public 4-year	794	723	729	723	729	729	728
Private nonprofit 4-year	1,658	1,265	1,287	1,265	1,287	1,291	1,252
Private for-profit 4-year	427	231	246	231	246	248	233
Public 2-year	874	861	868	861	868	869	869
Private nonprofit 2-year	123	73	82	73	82	82	78
Private for-profit 2-year	246	184	189	184	189	189	186
Public less-than-2-year	17	13	15	13	15	16	16
Private nonprofit less-than-2-year	6	2	3	2	3	3	2
Private for-profit less-than-2-year	46	38	40	38	40	40	40
Overall	4,191	3,390	3,459	3,390	3,459	3,467	3,404

Source: Author's calculations using cost and financial aid data from IPEDS for the 2017-18 year. Limited to academic-year reporters. Note: Options 3 and 4 use average net price data calculated in IPEDS, which are weighted by living arrangement using data that do not include housing and food expenses for students living with family.

Table B3: Number of colleges covered in each approach for calculating net price by living arrangement – Texas

Sector	Total # of colleges	Option 1: Net Price for All Undergraduates		Option 2: Net Price for All FTFT Undergraduates		Option 3: Net Price for FTFT Grant Recipients	Option 4: Net Price for FTFT Title IV Aid Recipients with Incomes $0-$30,000
		A) Predominant living arrangement	B) Weighted average by living arrangement	A) Predominant living arrangement	B) Weighted average by living arrangement	Weighted average by living arrangement	Weighted average by living arrangement
Public 4-year	48	39	39	39	39	39	39
Private nonprofit 4-year	62	47	47	47	47	47	47
Private for-profit 4-year	27	14	15	14	15	15	14
Public 2-year	60	60	60	60	60	60	60
Private nonprofit 2-year	6	4	4	4	4	4	4
Private for-profit 2-year	10	10	10	10	10	10	10
Public less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a
Private nonprofit less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a
Private for-profit less-than-2-year	2	2	2	2	2	2	2
Overall	215	176	177	176	177	177	176

Source: Author's calculations using cost and financial aid data from IPEDS for the 2017-18 year. Limited to academic-year reporters. Note: Options 3 and 4 use average net price data calculated in IPEDS, which are weighted by living arrangement using data that do not include housing and food expenses for students living with family.

Table B4: Number of colleges covered in each approach for calculating net price by living arrangement – New York City metro area

Sector	Total # of colleges	Option 1: Net Price for All Undergraduates		Option 2: Net Price for All FTFT Undergraduates		Option 3: Net Price for FTFT Grant Recipients	Option 4: Net Price for FTFT Title IV Aid Recipients with Incomes $0-$30,000
		A) Predominant living arrangement	B) Weighted average by living arrangement	A) Predominant living arrangement	B) Weighted average by living arrangement	Weighted average by living arrangement	Weighted average by living arrangement
Public 4-year	17	13	13	13	13	13	13
Private nonprofit 4-year	76	53	58	53	58	58	55
Private for-profit 4-year	10	7	7	7	7	7	7
Public 2-year	7	7	7	7	7	7	7
Private nonprofit 2-year	9	6	7	6	7	7	7
Private for-profit 2-year	11	10	10	10	10	10	10
Public less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a
Private nonprofit less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a
Private for-profit less-than-2-year	1	0	0	0	0	0	0
Overall	131	96	102	96	102	102	99

Source: Author's calculations using cost and financial aid data from IPEDS for the 2017-18 year. Limited to academic-year reporters. Note: Options 3 and 4 use average net price data calculated in IPEDS, which are weighted by living arrangement using data that do not include housing and food expenses for students living with family.

Table B5: Comparison of approaches for calculating net price by living arrangement – National averages

Sector	# of colleges in cost data	Option 1: Net Price for All Undergraduates		Option 2: Net Price for All FTFT Undergraduates		Option 3: Net Price for FTFT Grant Recipients	Option 4: Net Price for FTFT Title IV Aid Recipients with Incomes $0-$30,000
		A) Predominant living arrangement	B) Weighted average by living arrangement	A) Predominant living arrangement	B) Weighted average by living arrangement	Weighted average by living arrangement	Weighted average by living arrangement
Public 4-year	722	$18,311	$18,358	$16,946	$16,993	$12,551	$9,735
Private nonprofit 4-year	1,232	$28,724	$28,777	$26,002	$26,056	$22,675	$18,017
Private for-profit 4-year	218	$26,044	$26,031	$24,989	$24,976	$21,287	$20,832
Public 2-year	861	$14,862	$14,912	$13,284	$13,335	$7,321	$6,198
Private nonprofit 2-year	72	$24,416	$24,489	$23,848	$23,921	$19,919	$19,192
Private for-profit 2-year	181	$25,529	$25,471	$25,067	$25,008	$20,859	$20,646
Public less-than-2-year	13	$15,696	$15,696	$15,193	$15,193	$10,840	$10,353
Private nonprofit less-than-2-year	1	$23,040	$23,040	$21,968	$21,968	$19,319	$16,800
Private for-profit less-than-2-year	38	$22,363	$22,352	$21,838	$21,826	$19,128	$18,921
Overall	3,338	$22,330	$22,370	$20,509	$20,549	$16,189	$13,509

Source: Author's calculations using cost and financial aid data from IPEDS for the 2017-18 year. Limited to academic-year reporters with nonmissing data for all approaches. Note: Options 3 and 4 use average net price data calculated in IPEDS, which are weighted by living arrangement using data that do not include housing and food expenses for students living with family.

Table B6: Comparison of approaches for calculating net price by living arrangement – Texas state averages

Sector	# of colleges in cost data	Option 1: Net Price for All Undergraduates		Option 2: Net Price for All FTFT Undergraduates		Option 3: Net Price for FTFT Grant Recipients	Option 4: Net Price for FTFT Title IV Aid Recipients with Incomes $0-$30,000
		A) Predominant living arrangement	B) Weighted average by living arrangement	A) Predominant living arrangement	B) Weighted average by living arrangement	Weighted average by living arrangement	Weighted average by living arrangement
Public 4-year	39	$17,475	$17,480	$15,477	$15,482	$10,933	$9,072
Private nonprofit 4-year	47	$26,346	$26,376	$24,288	$24,319	$21,752	$18,289
Private for-profit 4-year	13	$23,868	$23,868	$22,914	$22,914	$19,924	$19,368
Public 2-year	60	$13,623	$13,818	$11,832	$12,027	$6,320	$5,478
Private nonprofit 2-year	4	$22,208	$22,327	$20,885	$21,004	$17,205	$18,548
Private for-profit 2-year	10	$22,452	$22,452	$21,764	$21,764	$17,256	$17,357
Public less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a
Private nonprofit less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a
Private for-profit less-than-2-year	2	$25,532	$25,532	$26,611	$26,611	$17,526	$17,720
Overall	175	$19,497	$19,575	$17,756	$17,835	$13,505	$11,869

Source: Author's calculations using cost and financial aid data from IPEDS for the 2017-18 year. Limited to academic-year reporters with nonmissing data for all approaches. Note: Options 3 and 4 use average net price data calculated in IPEDS, which are weighted by living arrangement using data that do not include housing and food expenses for students living with family.

Table B7: Comparison of approaches for calculating net price by living arrangement – New York City metro area averages

Sector	# of colleges in cost data	Option 1: Net Price for All Undergraduates		Option 2: Net Price for All FTFT Undergraduates		Option 3: Net Price for FTFT Grant Recipients	Option 4: Net Price for FTFT Title IV Aid Recipients with Incomes $0-$30,000
		A) Predominant living arrangement	B) Weighted average by living arrangement	A) Predominant living arrangement	B) Weighted average by living arrangement	Weighted average by living arrangement	Weighted average by living arrangement
Public 4-year	13	$22,332	$22,625	$20,054	$20,347	$6,280	$3,479
Private nonprofit 4-year	50	$27,814	$28,597	$26,631	$27,413	$21,310	$17,864
Private for-profit 4-year	7	$32,879	$31,857	$32,150	$31,129	$26,119	$24,217
Public 2-year	7	$22,871	$22,871	$20,946	$20,946	$6,788	$5,633
Private nonprofit 2-year	6	$33,394	$33,147	$31,283	$31,036	$26,011	$26,126
Private for-profit 2-year	10	$33,147	$32,999	$31,404	$31,256	$26,669	$26,122
Public less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a
Private nonprofit less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a
Private for-profit less-than-2-year	0	n/a	n/a	n/a	n/a	n/a	n/a
Overall	93	$27,990	$28,343	$26,512	$26,865	$19,358	$16,832

Source: Author's calculations using cost and financial aid data from IPEDS for the 2017-18 year. Limited to academic-year reporters with nonmissing data for all approaches. Note: Options 3 and 4 use average net price data calculated in IPEDS, which are weighted by living arrangement using data that do not include housing and food expenses for students living with family.

Details About Data and Methodology

The data source for this analysis was the U.S. Department of Education's (ED) Integrated Postsecondary Education Data System (IPEDS). Colleges are required to annually report their cost of attendance (COA) and student financial aid estimates to IPEDS.

The IPEDS cost of attendance and financial aid data are from the 2017-18 academic year, which was the most recent year available for the financial aid data when this analysis was conducted. The total cost of attendance is calculated using in-district tuition and fees. Some colleges charge different tuition for in-district, in-state, and out-of-state students. The data on college sector, state, and county are taken from the 2018-19 academic year, which was the most recent year of data available when this analysis was conducted.

The NYC metro area was defined as colleges located in the five counties associated with the five boroughs of NYC: Bronx County (Bronx), Kings County (Brooklyn), New York County (Manhattan), Queens County (Queens), and Richmond County (Staten Island).

This analysis only includes colleges that operate on a standard academic calendar (academic-year reporters) and does not include colleges that operate on a calendar system that differs by program or offer programs on a continuous basis (program-year reporters). Program-year reporters provide cost data covering the length of their longest programs, so their cost data cannot easily be combined with the annual cost data for academic-year reporters. Program-level cost data are more appropriate for calculating costs for specific programs at a given college than for calculating national averages; for example, ED's summary tables on COA and net price are limited to academic-year reporters only (Ginder et al. 2018a, Ginder et al. 2018b).

The averages are unweighted means, which means that they represent averages across institutions, not across students.

Colleges are only included in the calculations of average net price if they have non-missing data for all six approaches. By only including cases with non-missing data, the calculated averages are more comparable. Otherwise the average for one figure (e.g., net price for FTFT Title IV aid recipients with family incomes $0 to $30,000) could be based on a different group of colleges than the average for another figure (e.g., net price for FTFT grant recipients), and those differences could be due to the composition of colleges rather than the mode of calculation. Due to these filters, the cost averages shown in these tables may not match other cost averages by sector.

To calculate average costs by living arrangement, I used data on the living arrangements of FTFT grant recipients. There are no publicly available data on the number of all undergraduates or all FTFT undergraduates by living arrangement. While data are available on the living arrangements of FTFT undergraduates who received Title IV aid, FTFT grant recipients make up a larger group of students than FTFT Title IV recipients at most of the colleges included in this analysis.

The calculation of costs for the predominant living arrangement only considers students living on-campus and off-campus, not with family. This is because the cost data for students living off-campus with family do not include room and board expenses. As a result, this approach does not include cost data for colleges where FTFT grant recipients are only reported to live off-campus with family (i.e., none live on-campus or off-campus, not with family). There were a few cases where colleges did not report cost information for the living arrangement that was most common among FTFT grant

recipients. There were also three cases where the same number of FTFT grant recipients were reported to live on-campus and off-campus, not with family. For those cases, I applied the average of the on-campus and off-campus, not-with-family costs.

To calculate option B (weighted average based on living arrangement), I used the distribution across living arrangements for FTFT undergraduates who received grant aid. This calculation includes the share of students who live off-campus with family, but applies the cost data for students living off-campus, not with family to the students living with family. For this calculation, I excluded students whose living arrangement was unknown.

Options 3 and 4 use average net price data calculated in IPEDS, which are weighted by living arrangement using a methodology that includes costs for students living with family.

APPENDIX C: IHEP ANALYSIS OF LIVING ARRANGEMENT DISTRIBUTIONS

This analysis was conducted by the Institute for Higher Education Policy (IHEP) to evaluate options for weighting cost data by living arrangement, when calculating student investment with publicly available data. Colleges would ideally be able to use their own data on the number of students living on-campus, off-campus with family, or off-campus, not with family, and the costs associated with each living arrangement. Unfortunately, publicly available data only include the living arrangements of first-time, full-time (FTFT) undergraduates who received grant aid and FTFT undergraduates who received Title IV financial aid.

To assess how well the living arrangement distribution of FTFT grant aid recipients and FTFT Title IV aid recipients represent the distribution for all FTFT undergraduates and all undergraduates, IHEP analyzed nationally-representative data from the U.S. Department of Education's National Postsecondary Student Aid Study (NPSAS). As shown in Table C1 below, the distribution of living arrangements for FTFT grant recipients and FTFT Title IV aid recipients are similar to the distribution for all FTFT undergraduates, but differ substantially from the distribution for all undergraduates across all living arrangements and all full-time undergraduates living off-campus (with parents and not with parents).

Table C1: IHEP analysis of living arrangement distributions, 2015-16 (NPSAS)

	On-campus	Off-campus, not with parents	Off-campus, living with parents	Attended more than one institution (No living arrangement data available)
All undergraduates	14.1%	51.3%	24.8%	9.7%
All full-time undergraduates	24.6%	45.6%	22.9%	6.8%
All FTFT undergraduates	23.5%	41.9%	28.2%	6.3%
FTFT grant recipients	26.8%	39.9%	27.2%	6.1%
FTFT Title IV recipients	24.9%	41.4%	26.7%	7.0%

APPENDIX D: USING IPEDS GRADUATION RATE DATA TO ESTIMATE TIME TO DEGREE

In this analysis, I used IPEDS data from GR200 (200% Graduation Rates) to estimate the average time to degree at four-year and two-year colleges. A similar calculation could be applied using IPEDS data from GRS (150% Graduation Rates). I did not include less-than-two-year colleges in this analysis because, at the time, I had not determined what to use as "normal time" for those colleges.[xlv]

I used the following formulas to calculate average time to degree at each college:

Four-year colleges (bachelor's-degree-seeking students only)

$$\frac{\begin{array}{c} \text{\# of students completing within 100\% of normal time, multiplied by 4} \\ + \\ \text{\# of students completing between 101\%-150\% of normal time, multiplied by 6} \\ + \\ \text{\# of students completing between 151\%-200\% of normal time, multiplied by 8} \end{array}}{\text{Total \# of students completing within 200\% of normal time (8 years)}}$$

Divided by

Total # of students completing within 200% of normal time (8 years)

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xlv   In their ROI calculation, Carnevale et al. 2019 assume a negative cash flow of one year for predominantly certificate-granting colleges that are less-than-two-year colleges. Based on that methodology, it could make sense to assign less-than-two-year colleges a "normal time" of one year for the purposes of estimating TTD using IPEDS graduation rate data.

Two-year colleges (all degree- or certificate-seeking students)

# of students completing within 100% of normal time, multiplied by 2

\+

# of students completing between 101%-150% of normal time, multiplied by 3

\+

# of students completing between 151%-200% of normal time, multiplied by 4

Divided by

Total # of students completing within 200% of normal time (4 years)

Table D1: Estimated average time to degree (TTD), by sector – National

Sector	Total # of colleges	# of colleges with average TTD data	% of colleges with average TTD data	Average TTD (years)
Public 4-year	796	606	76%	5.15
Private nonprofit 4-year	1,687	1,193	71%	4.67
Private for-profit 4-year	473	164	35%	4.90
Public 2-year	968	956	99%	2.67
Private nonprofit 2-year	159	108	68%	2.17
Private for-profit 2-year	757	586	77%	2.37

Source: Author's calculations using 200% graduation rate data from IPEDS, as reported in 2018.

Table D2: Distribution of average time to degree (TTD) at four-year colleges, by sector – National

Sector	At least 4 but less than 5 years (# of colleges)	At least 5 but less than 6 years (# of colleges)	At least 6 years (# of colleges)	At least 4 but less than 5 years (% of colleges)	At least 5 but less than 6 years (% of colleges)	At least 6 years (% of colleges)
Public 4-year	239	335	32	39%	55%	5%
Private nonprofit 4-year	939	161	93	79%	13%	8%
Private for-profit 4-year	99	28	37	60%	17%	23%

Source: Author's calculations using 200% graduation rate data from IPEDS, as reported in 2018. Calculations are limited to colleges with available data to estimate TTD.

Table D3: Distribution of average time to degree (TTD) at two-year colleges, by sector – National

Sector	At least 2 but less than 2.5 years (# of colleges)	At least 2.5 but less than 3 years (# of colleges)	At least 3 years (# of colleges)	At least 2 but less than 2.5 years (% of colleges)	At least 2.5 but less than 3 years (% of colleges)	At least 3 years (% of colleges)
Public 2-year	276	511	169	29%	53%	18%
Private nonprofit 2-year	95	10	3	88%	9%	3%
Private for-profit 2-year	368	190	28	63%	32%	5%

Source: Author's calculations using 200% graduation rate data from IPEDS, as reported in 2018. Calculations are limited to colleges with available data to estimate TTD.

Data and Methodology Notes

The data source for this analysis was the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS), GRS200 (200% Graduation Rates), as reported in the 2018 collection year. Colleges are required to annually report their graduation rates to IPEDS.

At four-year colleges, the GRS200 data represent the 2010 entering cohort of first-time, full-time (FTFT) bachelor's degree seeking undergraduates. At two-year colleges, the GRS200 data represent the 2014 entering cohort of FTFT degree- or certificate-seeking undergraduates.

The estimates for average time to degree (TTD) are unweighted means, which means that they represent averages across institutions, not across students.