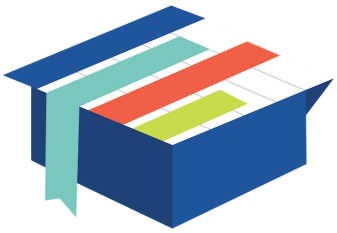

PSEO COALITION

Debt and Earnings in Graduate School: Moving Beyond Standard Measures for the Typical Student in the Short Term

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CJ Libassi and Julia Turner

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Debt and Earnings in Graduate School: Moving Beyond Standard Measures for the Typical Student in the Short Term

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Abstract

This brief combines data from the Census Bureau and the US Department of Education to study earnings and debt for graduates of doctoral programs of professional practice. We present earnings trajectories within and across fields of study, moving beyond short-term metrics to provide a more comprehensive view of economic returns. Our findings highlight significant variation in earnings both across and within fields, particularly in medicine, law, and dentistry, where institutional differences impact outcomes substantially. Despite growing debt burdens, cumulative earnings over the first decade post-graduation typically outweigh loan amounts for the professional programs we study. The earnings trajectories we present have implications for student loan repayment, highlighting the importance of income-driven repayment options for graduates facing initially low salaries. This analysis informs current policy debates surrounding federal graduate lending and loan repayment programs, emphasizing the need for nuanced approaches that consider program-specific value propositions to ensure both access to education and responsible fiscal policy.

I. Introduction

Graduate student borrowing has grown substantially over the past decade, outpacing undergraduate borrowing growth. Federal student loan debt has grown considerably, with graduate students holding approximately half of all outstanding federal student loan debt despite representing only about 15% of total enrollment in higher education (Meyer, 2022). A recent report from the US Department of Education's (ED) Office of the Chief Economist showed that almost all of this growth since 2015 has been in health fields, with by far the largest share of the growth coming from professional programs in medicine (Libassi et al., 2025)

According to recent data, the average graduate student took out nearly $55,000 cumulatively (undergraduate and graduate loans combined), with professional degree holders borrowing an average of $92,500 (NCES, 2023). This growing debt burden has raised questions about the sustainability of current graduate education financing models and their implications for both individual borrowers and the federal fisc.

The rapid escalation in graduate borrowing has triggered significant media and policy attention. Major news outlets have published numerous stories on cases of graduates with six-figure debt burdens from programs yielding modest salary premiums, often highlighting graduates from programs with historically low average private earnings, such as film or studio art (Korn & Fuller, 2021). This media and political attention has led some to propose that federal lending for graduate studies be tied to measures of program quality or expected earnings outcomes, with some suggesting that federal graduate lending be eliminated altogether.[1] As of this writing, House Republicans have advanced a major budget reconciliation bill that would limit lifetime graduate student borrowing at $100,000, while professional students would not be allowed to borrow more than $150,000 for their studies.

Until recently, data to support or contradict these arguments--specifically for graduate students--has been scarce. The Department of Education's College Scorecard's earnings measures have been limited to the short-run, only recently providing earnings data through five years post-graduation, and program-level data for graduate borrowers has been largely non-existent.[2] Without these data, it has been difficult to understand both sides of the ledger in the value proposition of graduate school and whether high- or low-earning fields of study have been driving the run up in graduate borrowing.

This report aims to fill that void for a crucial area of graduate studies: professional programs.[3] These programs are often very high cost, consistently the source of many of the six figure debt burdens that capture the public's attention.[4] These programs account for roughly 30% of annual federal lending to graduate students, even as they enroll just 15% of such borrowers.[5] They also produce many of the country's highest earning professionals, educating doctors, dentists, and lawyers. We take advantage of a newly improved data landscape to provide insight into the relationship between

[1] For a range of recent proposals, see: Arnold et al. (2024).
[2] The Scorecard's program-level debt has been limited to cumulative amounts for completers and has struggled to provide a full picture because of the challenges presented by privacy suppression.
[3] For simplicity, throughout this text we will refer to professional programs (credential level 7 in the College Scorecard data). These types of credentials are often also referred to as "first professional" programs and are distinct from master's programs in their length (often 3 years or more) and from doctoral programs in their career preparation rather than research focus. The PSEO data refers to these programs as doctoral programs of professional practice. We limit our analysis to professional programs because they are the only graduate programs for which PSEO reports earnings at the 4-digit CIP-by-institution level. Though this limits our sample, compared with the more general 2-digit groupings that other graduate programs have earnings reported for,, 4-digit CIPs often contain only one related 6-digit CIP within their grouping or refer to groups of 6-digit CIPs that are similar enough to not expect drastically different earnings patterns.
[4] Indeed, ED's Office of the Chief Economist report found that professional programs in dentistry and medicine alone accounted for 44% of all borrowers who take out more than $100,000 in a year.
[5] Calculated from Table 5 in OCE, 2025.

borrowing and medium-term earnings for these key fields. First, the Census Bureau's Post-Secondary Employment Outcomes (PSEO) data provide earnings estimates for graduates of select colleges and universities at the 25th, 50th, and 75th percentiles measured 1, 5, and 10 years post-graduation. These data give us the ability to study earnings trajectories at different parts of the distribution for a variety of professional programs. In addition, the Department of Education's Office of the Chief Economist recently released first-of-its-kind program-level annual and cumulative federal borrowing amounts for all graduate programs nationwide that provide us with the ability to compare these earnings with debt levels at the same programs.

Specifically, we focus on six of the largest professional doctorate degree programs: veterinary medicine (DVM;VMD), law (JD), dentistry (DDS; DMD), medicine (MD), pharmacy (PharmD), and rehab/therapeutic professions (DPT). Details on the choice of these programs can be found in Section III. Our approach offers three key contributions to existing research: first, we examine longer-term earnings trajectories that better reflect career progression; second, we include the earnings of the full student population at select schools rather than restricting to federal borrowers; and third, we analyze earnings distributions at the 25th and 75th percentiles, revealing important patterns beyond median outcomes.

Our analysis reveals that earnings levels are quite high overall across the professional programs we study, though trajectories vary substantially both across and within fields. Using the longer-run measures offered by PSEO, we show that cumulative earnings over just the first ten years following graduation often outweigh graduate debt burdens by a factor of 10. Finally, we relate earnings growth to borrowers' implied repayment obligations under a variety of repayment plans. This analysis comes at a time when policymakers are considering significant reforms to federal graduate lending and loan repayment programs that could substantially impact access to and the financial structure of graduate education in the United States. This brief contributes evidence to inform these ongoing discussions about the appropriate role of federal lending in supporting graduate education across diverse fields and institutions.

II. Background on Graduate Debt

Our analyses will focus on the ratio of debt to earnings. While this relationship is not a direct measure of the returns to a degree, it is a strong indicator of whether a borrower can manage their loan payments, which is important to both the borrower and the federal government. Knowing how much debt students incur and how that relates to their earnings trajectories can help us understand the basic affordability of the

investment they have made. Students and policymakers may initially judge a degree's value by the graduates' ability to afford monthly debt payments, which could lead to the undervaluation of degrees that have low initial returns but a high return on investment in the long-run. To that end, our goal is to give a more complete picture of these ratios than has been available to date due to the lack of program-level graduate debt data and medium term earnings.

Still, as we explore these patterns it is important to keep in mind what the recent best causal estimates say about the return on investment for a variety of fields. In general, causal estimates for graduate school are high. Altonji & Zhu (2025) estimate a weighted average effect across all graduate degrees of about 17% (0.159 log points), roughly similar from the average return to master's degree that Minaya, Scott-Clayton, and Zhou (2024) estimate for programs in Ohio of 14.9% (0.139 log points). Altonji & Zhu (2025) emphasize the wide range of estimates across the programs they study. In particular they note the difference between the returns between very high earnings programs, such as professional degrees in medicine which they determine have an 82% return (0.60 log points) and law degrees which result in a 57% (.453 log points) increase in earnings, and much lower return programs such as curriculum and instruction (3.6%) or clinical psychology (3.5%). Using a national sample for a limited set of programs, Altonji and Zhong (2021) show that these returns are not just limited to Texas and Ohio, estimating that graduate programs in medicine increase their students earnings by 73% (0.549 log points), law programs do so by 52% (0.416), MBA programs by 12% (0.11) and master's in engineering by 11% (0.103), though they estimate earnings returns in arts and humanities master's programs that are zero or negative.

Despite the high average returns, calls for reform to graduate education abound, with rapid growth in graduate borrowing and an outsize share of large individual loan balances. Concern both for students and taxpayers underpin much of this desire for policy action. Critics worry that high balances will leave borrowers with an unsustainable repayment burden or that federal programs to ease repayment burdens (such as income-driven repayment) or encourage public service careers (e.g. public service loan forgiveness) will lead to the government losing money on the loans it issues. Our findings provide a complement to the reassuring causal evidence on this front by showing that for the types of professional programs in health fields that make up a large share of the growth in federal borrowing over the last few decades, borrowers' earnings are very high and can easily support even quite high debt levels.

III. Description of PSEO and Non-PSEO Data Sources

The data for this project come from two primary sources: 1) The PSEO earnings files for four groups of pooled cohorts, each spanning five graduation years: 2001-05, 2006-10, 2011-2015, and 2016-20 and 2) the ED graduate debt file for the 2016-2019 graduating cohorts. The PSEO data provides 25th percentile, median, and 75th percentile earnings at one, five, and 10 years after exit for all graduates (regardless of aid status) of professional programs with at least 30 completers. The graduate debt file from ED provides average cumulative borrowing amounts (both unsubsidized Stafford and Graduate PLUS debt) for the pooled four-year cohort of graduates for all programs in the United States with at least 40 completers who ever borrowed federal student loans for that program. Combining these two sources allows us to match typical debt amounts to the typical earnings amounts provided by PSEO.

The Postsecondary Employment Outcomes is a US Census Bureau data product that uses microdata from select partner colleges and universities throughout the United States[6] to connect information about students' studies (primarily for our purposes, their field and degree of study) to earnings outcomes from the Longitudinal Employer-Household Dynamics (LEHD) data maintained by Census, which contains earnings records from all unemployment insurance (UI) systems nationwide. This means that most students working in a UI covered job in the United States will have observable earnings.[7] PSEO then creates a variety of aggregates for these earnings data and makes them publicly available for analysis. In our case, we use both field-of-study level and program-level data aggregates for graduate degree programs to characterize the long-term earnings experience of students in different fields of study across institutions and throughout the nation as a whole.[8]

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[6] Note that the colleges and universities included in the PSEO data are more likely to be public, although private colleges are included on a state-by-state basis. Full details on colleges and universities included in these data can be found at https://lehd.ces.census.gov/data/pseo_experimental.html.

[7] Note that individuals need to meet two conditions (in addition to working in a UI-covered job) to be eligible for inclusion in UI data. First, the graduate must have earned more than full time equivalent (35 hours a week for 50 weeks) at the prevailing federal minimum wage. Second, the graduate must have three or more quarters of non-zero earnings. This limits the interpretation of our results to those who are working full-time schedules.

[8] Field-of-study refers to the subject matter of the degree and our aggregates at this level combine all students in the PSEO sample nationwide who are in a program that shares the same credential level (in this case, only professional programs) and 4-digit classification of instructional program (CIP) code. By contrast, program-level aggregates combine data only for students in the same professional program field of study at the same institution. For example, our field of study aggregates contain data for all law students in programs that partner with PSEO, while our program-level aggregates contain just the data for the students at a specific law school.

Combining Datasets

To compare earnings from PSEO to debts from ED's program level data, we combine the PSEO employment file's records with the Department's cumulative debt data.[9] PSEO offers these data for four pooled graduation cohorts (2001-2005, 2006-10, 2011-15, and 2016-20), while ED provides two pooled graduation cohorts (2016-19 and 2020-23). The best overlap is therefore between PSEO's 2016-20 cohort and ED's 2016-19 cohorts, which will serve as the basis of our match, however, to take full advantage of the 10-year earnings data, we compare 2006-10 earnings cohorts (adjusted for inflation) to 2016-2019 debts for some analyses.

We retain all fields of study with at least 10 matched programs across the PSEO and ED data, which provides us with data for doctoral programs in professional practice for Veterinary Medicine (CIP4 = 1.80), Law (22.01), Dentistry (51.04), Medicine (51.12), Pharmacy (51.20), and Rehab/Therapeutic Professions (51.23). We use these fields, or subsets of these fields, for the remainder of the brief.

IV. Results

Earning Evolutions Across Field and Program

We begin by using the PSEO data to plot earnings 1, 5, and 10 years after graduation for graduates of professional programs across the fields of study where we have a large enough population of programs that can be matched to the ED data. Figure 1 shows these earnings trajectories for Medicine (MD) and Pharmacy (PharmD) graduates. Post-graduate 1-, 5-, and 10-year earnings are plotted for the 2001 and 2006 cohorts, while 1- and 5-year earnings are plotted for the 2011 cohort.[10] Medians are shown by the solid line, while the shaded area represents the 25th and 75th percentile ranges; all earnings values are inflated to 2022 dollars.[11]

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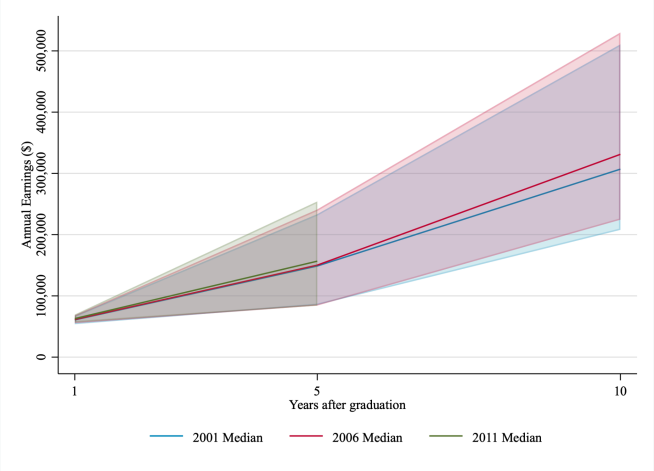
[9] The PSEO data and ED data are aggregated to slightly different levels and for different cohorts. A full summary of these differences is available in Appendix Figure A1. The PSEO data is available at a more granular definition of the institution level (8-digit OPEID vs ED's 6-digit reporting, which is essentially the difference between campus and system-level reporting), but a less granular field-of-study reporting level (4- vs. 6-digit CIP). PSEO cohorts are pooled across 5 years, while ED cohorts are pooled across 4 years.

[10] Earnings are inflated to 2022 dollars using the CPI-U by the PSEO. See PSEO Help and Documentation for further information (PSEO, 2024).

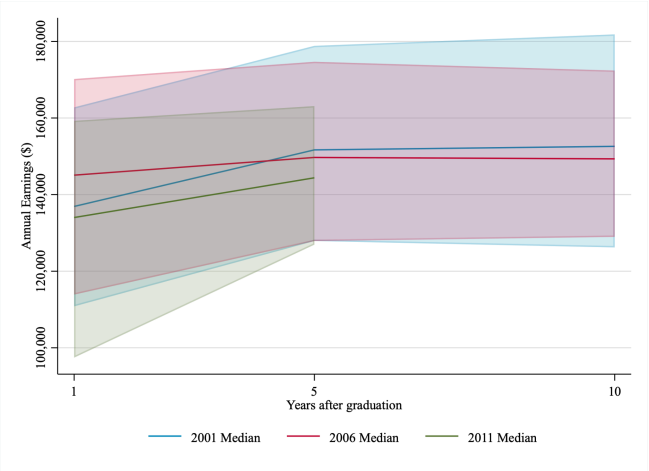
[11] Figures 2 and 3 use state-level aggregations in the PSEO data (agg_level=36) to capture as many individuals as possible at the field-of-study level. We take this approach instead of manually aggregating up from the program (institution) to the state-level, which misses outcomes for students that are censored due to small cell sizes. The difference in outcomes using state-level aggregation compared to program-level aggregation can be seen in Appendix Table A2. Note that differences in earnings are minor. Results are comparable when using institution-level aggregations.

Figure 1. Earnings Trajectories in the PSEO Across Cohorts

Panel A. Medicine (CIP 51.12)



Panel B. Pharmacy (CIP 51.20)



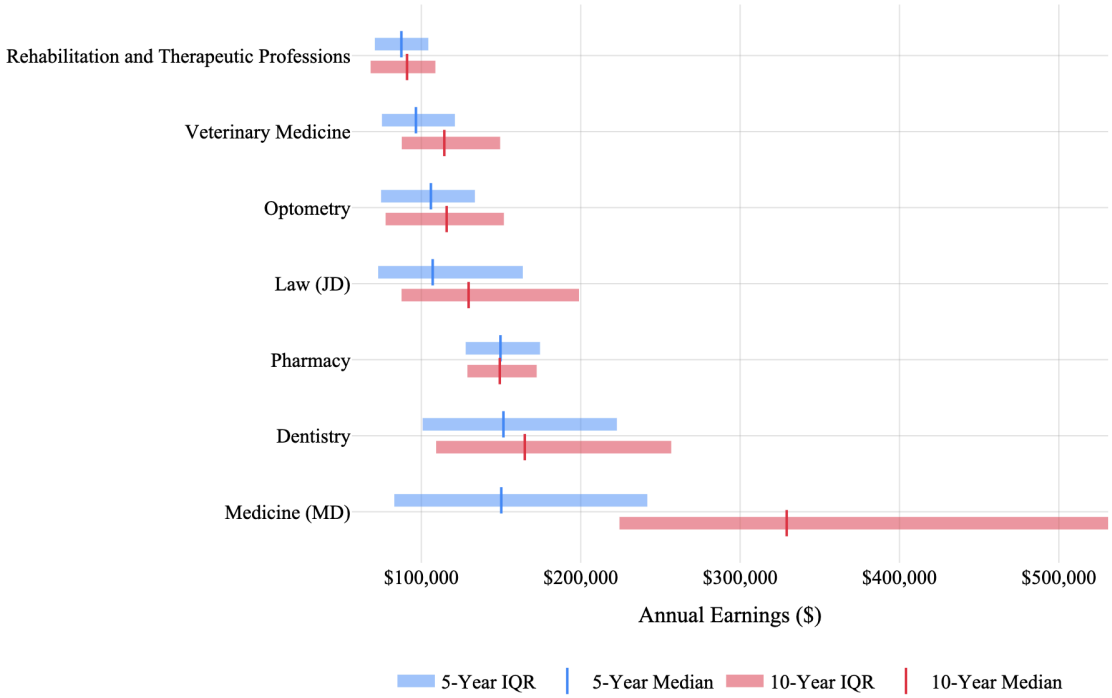
Notes: This figure shows earnings trajectories at the CIP level for various cohorts in the PSEO. Shading represents the 25th and 75th percentiles. Post-graduation earnings for years 1, 5, and 10 are available for the 2001 and 2006 pooled cohorts; 1- and 5-year earnings are available for the 2011 cohort.

Across cohorts, earnings trajectories are fairly stable over time. Despite some level differences in 1-year earnings for PharmD graduates, the patterns are largely similar. Among MD graduates, cohorts are nearly identical, showing enormous growth between 5 and 10 years post-graduation, at which point many of these graduates are finishing their residency training period. Another hallmark of the MD graduate earnings trajectories is the very tight range of earnings across percentiles in year one post-graduation. Whereas Pharmacy graduate earnings span from roughly $100,000 at the 25th percentile to between $160,000 and $180,000 at the 75th percentile in year one, MD graduate earnings are highly concentrated around $65,000. This uniformity is due to the nature of residency as a training program and the standardized earnings that are commonplace as a result.

Figure 2 shows the range of earnings by field 5 and 10 years after graduation for the 2006 cohort. Median income increased between years 5 and 10 after graduation for all programs, except Pharmacy programs, where earnings declined by roughly $500 (less than a 0.3% decline). Nearly all fields see not just an increase in median earnings, but a shifting of the entire interquartile range, meaning that the 25th, 50th, and 75th percentile earnings for graduates of a given program are all higher 10 years after graduation than 5 years. Rehabilitation and Therapeutic Professions represent the exceptions to this rule: this group sees a widening rather than a shifting of the IQR, in which earnings at the 25th percentile decline between 5 and 10-years post-graduation while median and 75th percentile earnings increase. Many factors could drive a widening of the IQR between 5- and 10-years post-graduation. Although PSEO limits data to those

graduates meeting full-time equivalent work schedules, declining earnings at the 25th percentile between 5- and 10-years post-graduation could reflect employment changes on the intensive margin due to (slightly) reduced working hours, geographic changes that reflect cost-of-living reductions, or other idiosyncratic shifts in labor force participation due to the COVID-19 pandemic.[12]

Figure 2. Interquartile Range of Earnings by Program



Notes: This figure shows the interquartile range of earnings for graduates in the 2006 cohort at 5 and 10 years after graduation. This figure uses PSEO's state-level aggregation, which allows us to capture more students than the institution-level aggregation collapsed to the CIP level. Whereas the institution-level aggregation censors small cell sizes, the state-level aggregation uses all observed graduate earnings. The results are nearly identical; Appendix Table A2 shows slight differences in detail.

Medicine (MD) graduates experience a significant, positive shift in earnings between 5- and 10-years post-graduation, with substantial growth occurring as they transition from the training phase of residency into independent practice. The earnings trajectory during this period is notably steep, particularly when comparing the interquartile range (IQR) at the 5-year and 10-year marks. Specifically, the 25th percentile earnings in year 10 nearly exceed the 75th percentile earnings in year 5, illustrating the significant income escalation that occurs as physicians complete their residency training and begin to practice independently.

This earnings growth is, in large part, a reflection of the completion of residency, which is a mandatory phase in the education and professional development of MD graduates.

[12] It should also be noted that PSEO captures only wage earnings. Business earnings, which may be particularly relevant for professional doctorate holders, are not captured by these data.

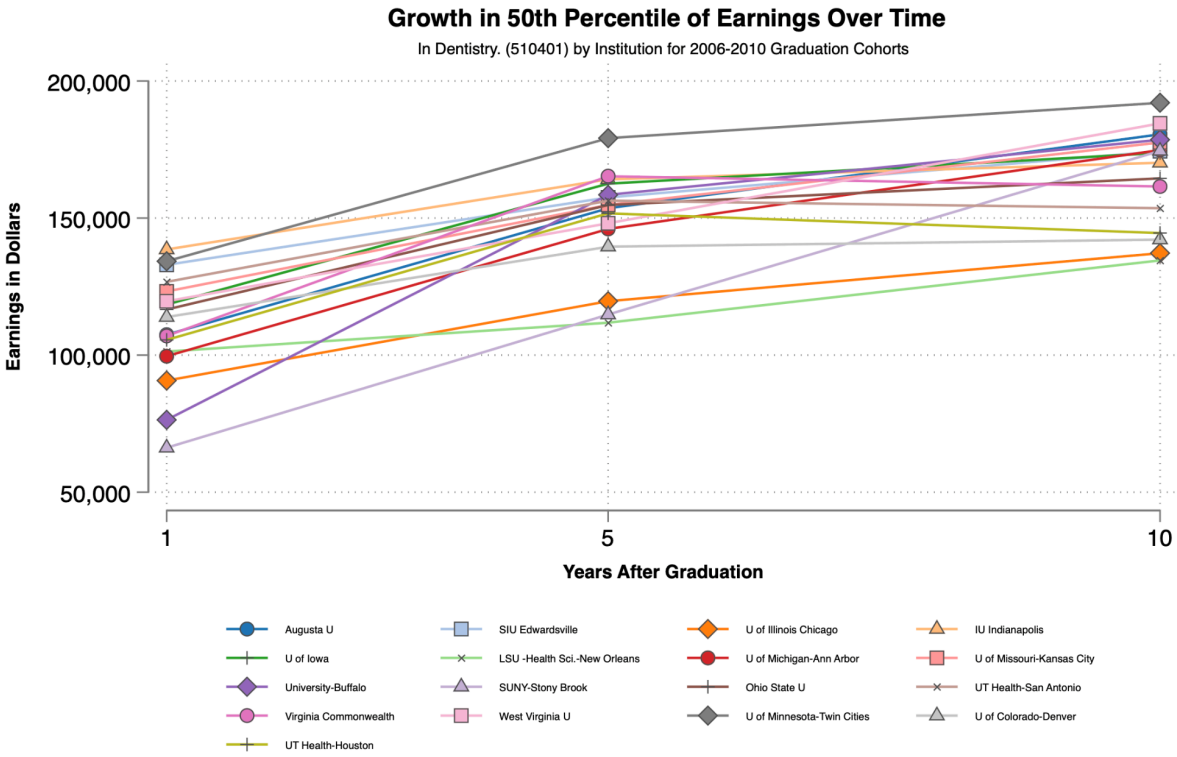
Residency programs, which typically span 3 to 7 years depending on the specialty, are characterized by a relatively low salary structure, as the primary focus during this time is on clinical training, supervision, and further education. According to the American Association of Medical College's 2024 Survey of Resident Fellow Stipends, program year 1 residents in 2024 earned an average salary of $68,000, with slight variations based on geographic location and medical specialty (AAMC, 2024).

Once physicians complete residency and become fully licensed practitioners, their earnings increase substantially. This jump is influenced by several factors, including the end of supervised training, the attainment of board certification in their chosen specialty, and the demand for their services in the medical market. The 10-year post-graduation earnings reflect a physician's entry into a stage of professional stability, where they are no longer constrained by residency pay scales and begin to earn salaries commensurate with the full responsibilities of their practice. Moreover, income growth during this period is heavily influenced by specialty choice. Specialties such as neurosurgery or orthopedic surgery tend to offer the highest post-residency earnings, whereas fields such as internal medicine and pediatrics typically exhibit slower earnings growth. (Gottlieb et al., 2025).

Earnings Dispersion Across Fields of Study

Of course, prospective graduate students must choose not only what graduate field of study to pursue but also where to get their degree. An important aspect of what the PSEO data allow us to show is how earnings and debt outcomes vary across institutions within graduate fields of study. Do all medical schools show the stark jump in earnings that is apparent at the field level in Figure 2 above? Do all institutions with professional programs in Rehabilitation and Therapeutic Professions have comparatively modest growth in their earnings or is there a more dramatic earnings growth at some schools? These types of questions, and how they covary with the debt students take on to attend these programs, can shed light on the variety of repayment experiences students are likely to have and how burdensome their debt payments may or may not be. This program-level variation is of direct policy interest, particularly in the context of new loan limit policy proposals; recent analysis from the Urban Institute (Blagg, 2025) demonstrates that ignoring these differences can create uneven impacts across programs.

Figure 3. Growth in Median Earnings Over Time (Dentistry)

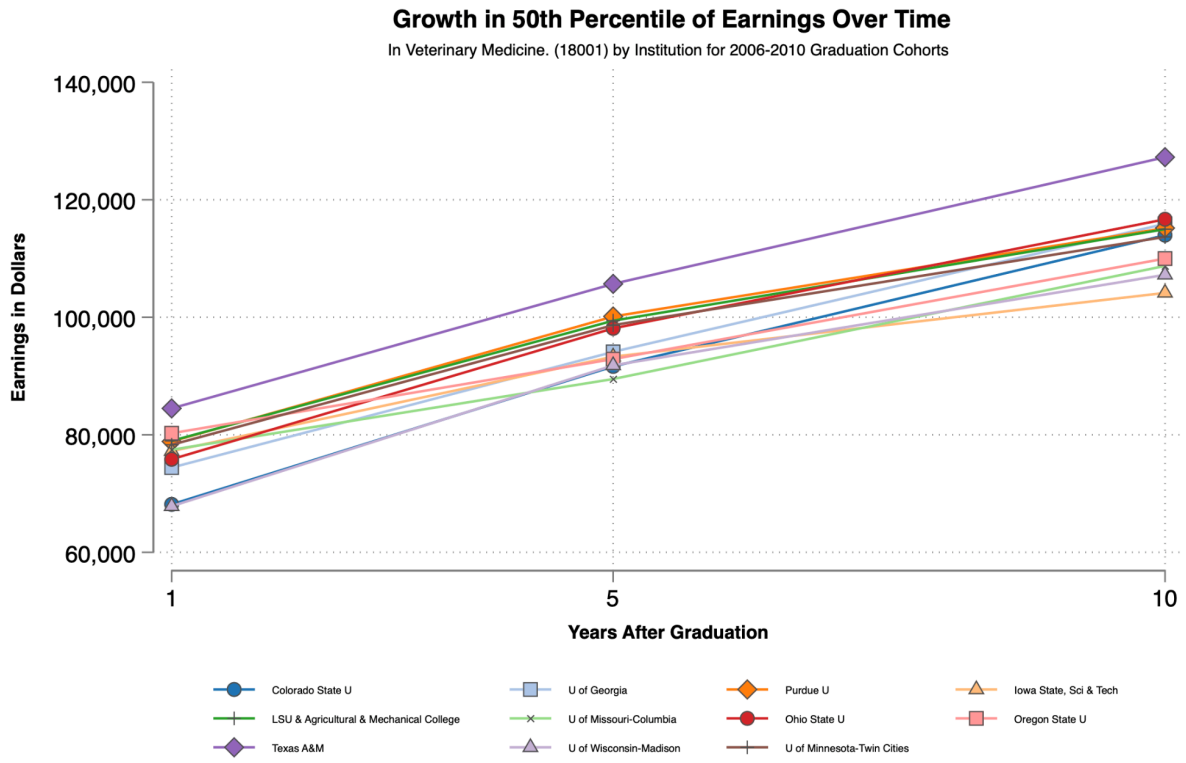


Notes: This figure displays the trajectory of median (50 percentile) earnings for graduates from Dentistry professions programs (CIP 51.0401) across 17 different institutions. Data represents the 2006-2010 graduation cohorts, tracking earnings from year 1 through year 10 post-graduation. Values for intermediate years (2-4 and 6-9) were linearly interpolated between these observed timepoints by dividing the total earnings growth between observed points (years 1, 5, and 10) equally across the intervening years, creating constant year-to-year growth rates within each segment.

Figure 3 shows similar earnings trajectories at the institution level. Here we limit to median earnings for graduates of dentistry programs for each institution with a sufficient number of graduates with available earnings data. Here we can see that, at the program level, there are often a variety of stories playing out as students progress in their careers after graduation. Across programs there are differences in both the *level* of earnings and in the *growth trajectory*. For example, graduates of the SUNY-Stony Brook start out earning less than half of their peers at IU Indianapolis ($66,223 vs. $138,548), a gap that shrinks by $23,000 to $49,324 by year five after graduation and closes completely at year ten ($174,502 for SUNY grads vs. $170,190 for IU grads). Graduates of SUNY-Stony Brook overtake those from IU Indianapolis due to faster earnings growth between years 1 and 10, with a 164% increase, compared to just 23% for IU Indianapolis. The drivers of this variation across programs is unclear; low levels of earnings in early years could signal a higher likelihood of entering a secondary training period (optional residency, for example) or could reflect differing returns to the degree.

When we instead examine these same types of patterns for veterinary medicine programs in our data, a much more uniform pattern emerges. Figure 4 shows the same growth trajectories across the programs in our sample. Despite a narrower y-axis range (a fact that should amplify differences in trajectories relative to the larger range for dentistry programs), growth is much more uniform across institutions, even as Texas A&M sets itself apart in earnings *levels* at each time horizon.

Figure 4. Growth in Median Earnings Over Time (Veterinary Medicine Programs)



Notes: This figure displays the trajectory of median (50 percentile) earnings for graduates from Veterinary Medicine programs (CIP 18001) across 11 different institutions. Data represents the 2006-2010 graduation cohorts, tracking earnings from year 1 through year 10 post-graduation. Values for intermediate years (2-4 and 6-9) were linearly interpolated between these observed timepoints by dividing the total earnings growth between observed points (years 1, 5, and 10) equally across the intervening years, creating constant year-to-year growth rates within each segment. All earnings values reported in constant 2022 dollars.

These examples help demonstrate an intuition we aim to make more concrete: to best understand how different the earnings experience is for graduates across programs in a field of study, we need to measure variation in both their earnings level and their growth rates. Table 1 shows the first of these measures by recording the standard deviation of aggregated program earnings for each field of study at each earnings quantile and measurement horizon available in the PSEO data.[13] Here we can see that

[13] One source of differential variability across fields here may be measurement error induced by differences in the number of students and programs with earnings data. Appendix Table A3 presents the counts of total students across these fields, the number of programs, and typical median program size to help assess such concerns. We are reassured that the thousands of students in each field covered by the

fields such as veterinary medicine have quite tight earnings distributions, varying by about $4,000-$6,000 across all measurement groupings. By contrast, law schools in our sample vary by between $17,000 and $60,000, depending on the quantile and horizon. Here again, medical schools show how atypical their earnings patterns are, as they stand out for both having atypically uniform earnings in year one after graduation (the artificially compressed residency earnings period), only to fan out to have some of the widest earnings dispersion in years five and ten after graduation.

Table 1: Standard Deviation in Earnings Across Programs by Field

	Years Since Graduation		
	1 Year	5 Years	10 Years
Field of Study			
Veterinary			
25th	6,218	3,570	5,848
50th	4,971	4,785	6,366
75th	4,998	5,588	5,677
Law			
25th	20,708	17,469	18,197
50th	38,439	36,207	30,628
75th	48,492	56,683	60,287
Dentistry			
25th	12,806	15,059	13,167
50th	18,807	16,402	16,329
75th	24,705	22,153	24,536
Medicine			
25th	2,666	12,760	14,069
50th	3,138	28,475	25,999
75th	3,198	28,288	16,346
Pharmacy			
25th	10,651	4,064	4,660
50th	8,099	5,266	3,923
75th	8,478	7,366	6,007
PT & Similar			
25th	6,462	6,607	6,704
50th	6,101	7,952	6,996
75th	8,406	9,711	8,308

Note: Values for graduates between 2006-10 and represent the program-weighted average standard deviation of earnings at each quantile across years of programs at different time horizons after graduation. Data source: PSEO Database joined with College Scorecard and OCE debt data. All earnings values reported in constant 2022 dollars.

data and quite large program sizes at the median and believe this should mean that these standard deviations are a useful measure of true earnings variability across fields and programs in our sample.

The other dimension of program-level differences, how earnings grow from year one to year ten, is presented in Table 2. This table shows both the average growth between these two measurement points and the standard deviation in these growth rates across programs. This allows us to see how fields vary in their typical earnings growth, as well as how different programs within those fields are from each other in their growth patterns. For example, medicine's outlier growth rates are immediately visible as dramatically different from other fields, ranging from 315% growth for earners at the 25th percentile to 686% for those at the 75th percentile. On the other end, pharmacists hardly see any growth on average, with between 2% and 15% growth, depending on the earnings quantile. Still, there is a fair amount of dispersion in these growth rates for pharmacists as the standard deviation ranges from 5% to 13.2%, meaning that some programs have growth trajectories that deviate significantly from what is typical in their field. Still, students entering pharmaceutical programs can generally feel much more certain about their expected earnings--regardless of which program they attend *or* where they land in the distribution of earnings for their program--than a student in law, dentistry, or medicine. Students in these latter programs have large earnings growth on average, but also a great deal of variation in those growth patterns depending on which program students attend.

Table 2: Typical Percent Change in Earnings from Years 1-10 Across Fields and Program

	Earnings Percentile					
	25th		50th		75th	
	Avg	SD	Avg	SD	Avg	SD
Field of Study						
Veterinary	59.0	18.4	50.1	9.6	60.3	6.8
Law	63.1	25.8	66.1	30.1	70.9	29.0
Dentistry	61.7	28.3	53.4	33.4	72.6	48.3
Medicine	314.7	34.3	452.9	54.2	686.3	48.4
Pharmacy	15.0	13.2	3.3	5.8	1.7	5.0
PT & Similar	0.6	8.0	14.9	4.7	18.9	4.3

Note: Values for graduates between 2006-10 and represent the program-weighted average percentage change in earnings at each quantile between years 1 and 10. The standard deviation of each measure is the typical percentage point deviation from the mean percentage change in earnings across this same period. Data are PSEO Database joined with College Scorecard and OCE debt data.

Taken together, the wide variety of earnings levels and growth patterns underscores the value of examining the financial outcomes for students at a program level. To this end, we present the earnings values at each quantile and time horizon for all

professional programs we matched to the Department of Education graduate debt data in the tables in Appendix D. The patterns there reveal a few additional interesting facts. For example, graduates of elite law schools earn a significant premium compared to graduates of other law schools in our sample. The median graduate of the University of Virginia ($206,668), University of Michigan ($188,514), and UT Austin ($180,353) earns more than double what median graduates at the lowest earning law schools in our sample earn.

Still, the dispersion in median earnings between schools is less than the interquartile range for earnings at many of the highest earning schools. For example, while the median student earns over $123,000 more than their median peer at the lowest earning law school, UVA students at the 75th percentile of their institution's 10-year earnings distribution take home $223,000 more than their peers at the 25 percentile. At medical schools, this pattern is even more apparent (the IQR at virtually all programs is at or near $300,000). In these programs, cross-specialty differences mean that students at the same institution vary more in their earnings than cross-institutional differences, which at the median is about $100,000 across institutions in our sample.

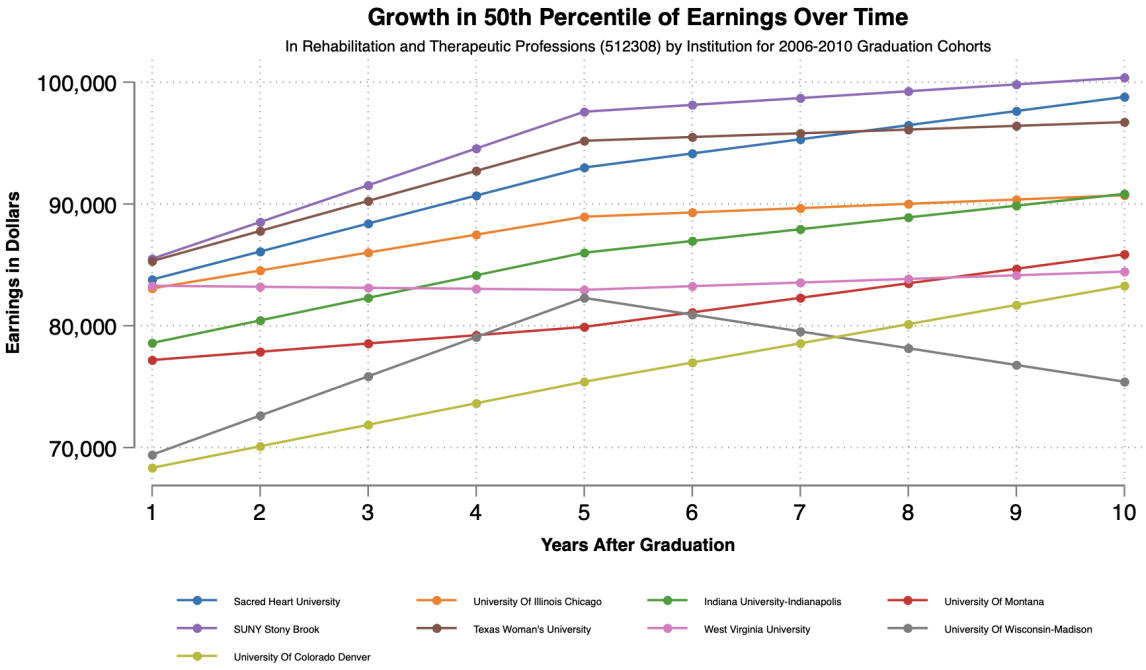
Earnings versus Debt

These varied experiences are interesting in their own right, but they naturally raise the question about how student earnings covary with an important expense students will face after they graduate: repaying their graduate debt. Do institutions where students can expect to earn more also have the highest debt levels? Or are the debt burdens distributed in ways that do not correspond to earnings outcomes? We often examine such relationships by comparing earnings levels at a single point in time (say, typical earnings 3 years after graduation) to the stock of debt a student accrues while in school. However, in this brief we can take advantage of the multiple time horizons and longer earning periods to construct a measure that better captures the full trajectory of earnings over the early part of a student's career. This is important for two reasons. First, we have shown not only that programs vary in their earnings levels (something that might be well captured at a single point in time), but also in their earnings growth patterns. Both are important when trying to understand earnings patterns. Second, since the total graduate debt a student holds is a stock measure and their earnings are a flow, capturing much of the cumulative earnings a student can expect upon the completion of their degree can give us something closer to the total dollars out and in.

To do this, we sum up earnings across the period we observe (years one through ten after graduation). Because we do not directly observe earnings between years one, five, and ten, we assume a constant growth rate in the years between observed earnings. To show this in action, Figure 5 plots a version of the program-level earnings

plot for Rehabilitation and Therapeutic professional programs. Here we have dots for each year after graduation, with years 1, 5, and 10 containing observed data, and all years in between using interpolated values. From the graph it is easy to see the linear relationship we impose on the earnings and how those line segments are allowed to vary before and after 5 years. This is perhaps starkest for UW-Madison, where earnings have a positive slope in years one through five before declining from year five to year ten.

Figure 5. Growth in Median Earnings Over Time (Rehabilitation and Therapeutic)



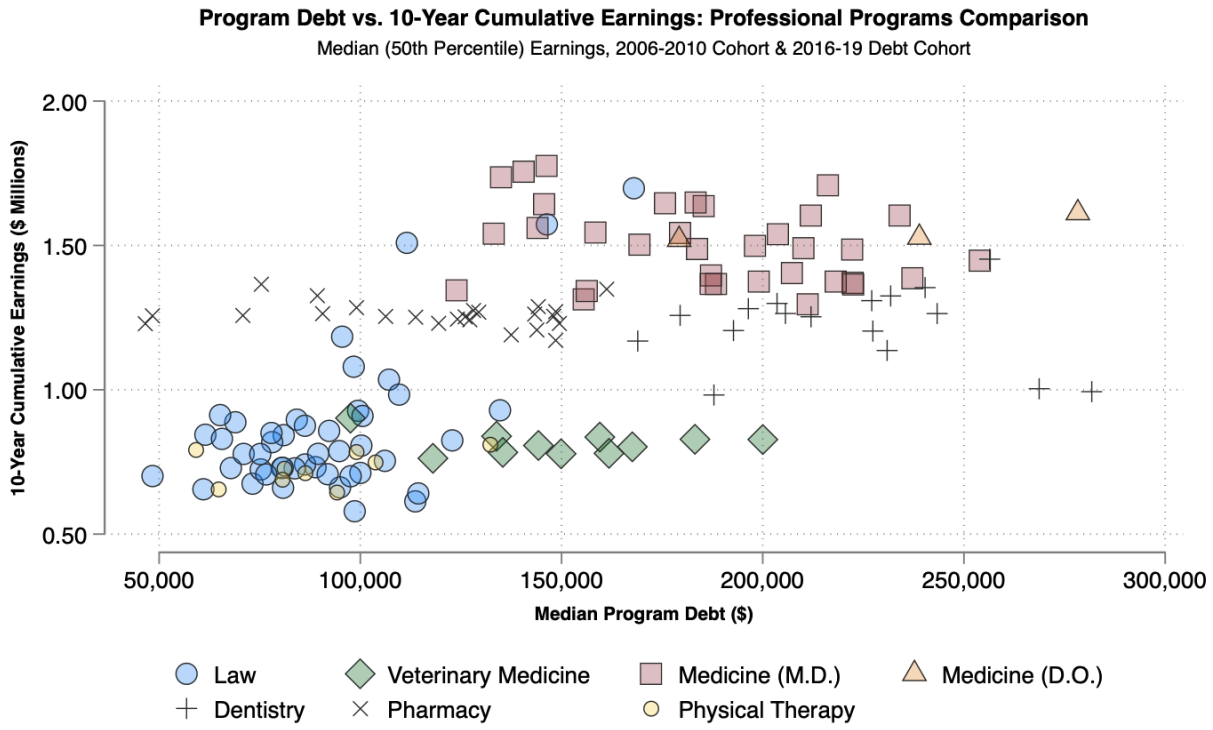
Notes: This figure displays the trajectory of median (50 percentile) earnings for graduates from Rehabilitation and Therapeutic professions programs (CIP 51.2308) across nine different institutions. Data represents the 2006-2010 graduation cohorts, tracking earnings from year 1 through year 10 post-graduation. Values for intermediate years (2-4 and 6-9) were linearly interpolated between these observed timepoints by dividing the total earnings growth between observed points (years 1, 5, and 10) equally across the intervening years, creating constant year-to-year growth rates within each segment.

Once we have done this calculation for all programs in all fields, we discount the earnings to present value and sum these values across the 10 year period in which a graduate from each program would be in standard repayment on their loans.[14] We can then relate these amounts to the cumulative debt load that graduates take on in pursuit of degrees in these programs. To demonstrate this relationship across programs

[14] Consistent with OMB Circular A-94, Appendix D, we discount the constant-dollar earnings at a 3% real rate, roughly the same as the sum of OMB's estimate of the 2% long-run risk-free real Treasury yield and OMB's 1.1% default risk premium—because graduate earnings are uncertain and positively correlated with aggregate economic conditions.

in all fields, Figure 6 shows how the cumulative debt and earnings values relate to one another.

Figure 6. Program Debt vs. 10-Year Cumulative Earnings



Notes: 2006-2010 PSEO earnings cohort where 1, 5, and 10 year earnings are observed and years 2-4 and 6-9 are interpolated linearly. These plots show cumulative earnings over a graduate's first decade in the workforce, with sums discounted annually to present value using 3% real rate. Debt data from US Department of Education's Office of the Chief Economist, Graduate Debt Data Release (2016-2019 cohorts).

Here a few patterns emerge. First, it is worth noting just how much earnings over just the first 10 years of a graduate's career dwarf cumulative debt, with the earnings sums often over 10 times the debt for those same programs. Even programs with the least favorable ratios in our data--two very high debt but only moderately high earning dentistry programs--have earnings over three and a half times their debts in just this initial 10 year period. Second, fields seem to cluster together in similar regions of the debt and earnings space, though with some notable outliers. For example, although debt levels do vary for medical school graduates, their earnings and debt levels are both high relative to programs in other fields, meaning they land in a cluster at the top right of the figure. By contrast, legal and physical therapy programs cluster toward the lower left hand corner of the plot, borrowing less than their peers in the other fields we examine, but earning less as well. In this way, the outlying earnings and debt of the top earning law schools are especially notable, making those programs look more like low-debt medical schools. Finally, within fields, debt does not seem responsive to

earnings amounts, with little obvious systematic increase or decrease of earnings as you look across higher and lower debt programs.

Policy-Relevant Extensions

A common concern about graduate student debt is that borrowers who take out these loans may be unable to repay them, potentially creating a financial burden for both the individual borrowers and taxpayers who ultimately back federal loan programs. Although Figures 1-6 show strong earnings trajectories for many graduates of programs covered in this brief, there are important timing factors to take into account when considering how and when borrowers will pay back their student loans. This section uses several repayment plan formulas along with assumptions (detailed in Appendix C) about the borrower to model the repayment trajectories for graduates who both earn the median and hold the median amount of debt (both at the CIP level). This exercise allows us to better understand what the repayment burden looks like for a roughly typical borrower graduating with each of the degrees we have so far discussed.

In this exercise, we compare four payment plans:[15]

- **Standard Plan:** The traditional student loan repayment option that divides the total loan amount into equal monthly payments over a 10-year period. This straightforward plan remains the default option for federal student loans and is designed for borrowers with stable incomes who can afford consistent payments.
- **SAVE Plan (Saving on a Valuable Education):** Introduced in 2023 as a replacement for the REPAYE plan, this income-driven plan was the most generous option available. It shields income up to 225% of the federal poverty line from payment calculations and requires borrowers to pay just 10% of discretionary income above this threshold. Borrowers with over $22,000 in original principal for their undergraduate (graduate) qualify for outstanding balance forgiveness after 20 (25) years of on-time payments. Borrowers with smaller loans can qualify for earlier forgiveness in as soon as 10 years.
- **PAYE Plan (Pay As You Earn):** Established in 2012 and expanded in 2014, this plan protects income up to 150% of the federal poverty line and caps monthly payments at 10% of discretionary income, never exceeding what would be paid under the Standard plan. Borrowers enrolled in PAYE qualify for outstanding balance forgiveness after 20 years of on-time payments.
- **ICR Plan (Income-Contingent Repayment):** The oldest income-driven plan, created in 1994, which calculates payments based on the lower of two formulas:

[15] For simplicity, we do not model the more arcane and minor elements of the IDR program such as their treatment of unpaid interest.

either 20% of discretionary income (defined as income above 100% of the poverty line) or a sliding scale payment based on a 12-year repayment schedule adjusted by income factors. Borrowers enrolled in ICR qualify for outstanding balance forgiveness after 25 years of on-time payments.

The inclusion of three income-driven repayment plan options is relevant given recent legal challenges to the SAVE plan. In spring 2024, a contingent of Republican-led states filed two parallel lawsuits seeking to block the SAVE plan, and more recently, the 8th Circuit Court of Appeals upheld an injunction against the SAVE and REPAYE plans. As a result of these legal challenges, approximately 8 million borrowers enrolled in SAVE have been placed in administrative forbearance and the Department of Education has reopened applications for several alternative income-driven repayment plans, including Income-Based Repayment (IBR), Pay As You Earn (PAYE), and Income-Contingent Repayment (ICR). Given the legal uncertainty surrounding this plan, it is important to keep in mind that its terms may not ultimately be available to borrowers. The alternative plans (PAYE and ICR) remain available but with significant uncertainty about their forgiveness components due to the same legal challenges that have affected SAVE. In the analysis that follows, we show SAVE, PAYE, and ICR as potential alternatives to the Standard plan. For our current purposes we ignore the forgiveness provisions of these plans, typically an important feature of IDR, given the current uncertainty about SAVE's shorter forgiveness periods, as well as the longer time horizons on which graduate debt is typically forgiven under the older plans (20-25 years).

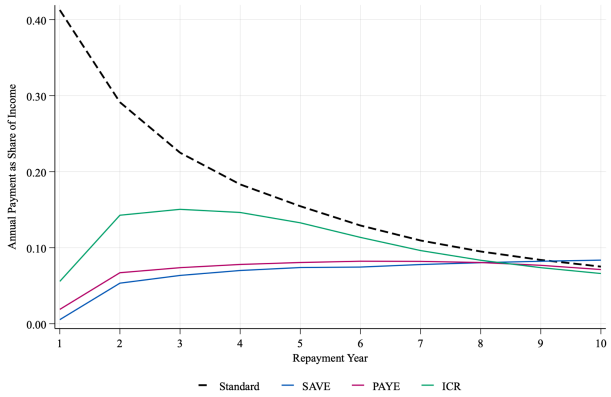
Figure 7 shows the annual student debt payment as a share of pre-tax income for MD and JD graduates. Representing loan payments as a share of income allows for a better understanding of how these payments interact with the borrowers' overall finances. The analogous plots in levels (annual), are shown in Appendix figure A2. The downward sloping patterns in Panels A and B are characteristic of a commonly cited concern about the Standard student loan repayment plan (the black dashed line). The standard plan requires equal monthly payments over 10 years, which--for borrowers with significant debt and initially low income--can create a significant burden on personal finances. Take, for example, the MD graduates shown in Panel A. As shown in Figure 2, MD graduates see mechanically low earnings in the early years post-graduation due to residency training requirements and traditionally low resident salaries. Under the Standard plan, the MD graduate is paying 30-40% of their pre-tax income towards their student loans in the first two years post-graduation.[16] This represents an enormous

[16] This calculation takes into account a 6-month grace period after graduation during which borrowers do not have to make payments toward their loans. This, along with other timing considerations and assumptions are discussed in detail in Appendix C.

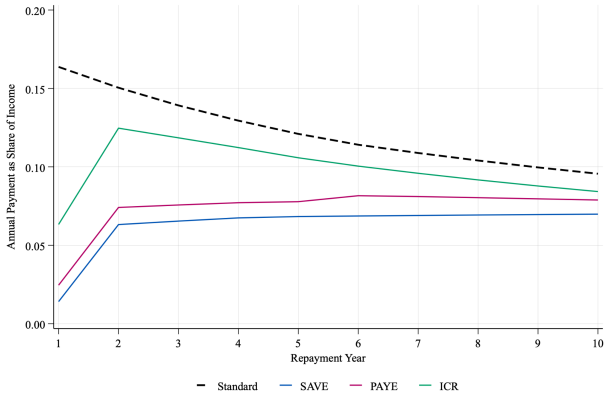
burden on the borrower's finances during some of the most formative years of training.[17]

Figure 7. First 10 Years of Annual Student Debt Payments as a Share of Income

Panel A. Medicine (median earner, median debt)



Panel B. Law (median earner, median debt)



Notes: This figure shows annual student debt payments as a share of total, pre-tax income under different repayment plans. The standard 10-year repayment plan is shown in black (dashed). The Saving on a Valuable Education (SAVE) is shown in Blue, PAYE is shown in pink, and income-contingent repayment (ICR) is shown in green. The method and assumptions underlying these figures are explained in detail in Appendix C. Panel A shows payments for a median-earner graduate of a professional degree in Medicine who holds roughly the median amount of debt. Panel B shows the analogous figure for JD graduates.

Of course this drops rapidly for the MD graduate as their income continues to grow until, in Year 10, the borrower is paying a higher percentage of their pre-tax income towards their loans under the SAVE plan than the Standard plan. The evolution of these payment trajectories demonstrates the purpose of IDR plans in contrast to the Standard repayment plan. As borrowers begin to see the returns to their human capital investments, they are responsible for paying back their loans. The payment responsibilities grow *with* a borrower's income rather than remaining fixed throughout the repayment period. This flexibility is particularly valuable for graduates entering fields with steeper earnings trajectories, such as medicine and law. While the Standard plan creates a front-loaded burden during early career years when earnings are lowest, IDR plans such as SAVE, PAYE, and ICR adjust payments according to financial capacity—initially lower when income is constrained, then increasing as career

[17] Note that borrowers in residency programs can apply for residency forbearance in which they are placed on mandatory forbearance and are not required to make payments towards their loans. Although data on residency forbearance are limited, we can bound the number of medical residents who take up this option using publicly available data from Federal Student Aid (FSA, 2025). In 2019, the quarterly number of borrowers who were in mandatory forbearance *of any kind* was between 30,000 and 60,000 borrowers. The American Association of Medical Colleges (AAMC) reported that in 2019 there were 139,848 active medical residents (AAMC, 2019). This would imply that at most 43% of medical residents took up the residency forbearance program compared to a reported 73% of medical students who graduated with debt in 2019 (AAMC, 2020).

progression leads to higher earnings.[18] In this mold, IDR plans require payments for 20-25 years (in most cases) rather than the standard 10-year plan. This allows for a longer "on-ramp" in which earnings (and payments) can grow.

For JD graduates shown in Panel B, this income-responsive approach similarly alleviates financial strain during crucial early career development.[19] By calibrating repayment obligations to actual earnings, IDR plans reduce financial distress and default risk among new professionals. The crossover point in Year 10, where IDR payments exceed Standard plan payments for MD graduates, demonstrates the progressive nature of these plans—as borrowers realize substantial returns on their educational investment, they contribute proportionally to loan repayment without the initial burden of fixed payments. This approach balances borrower protection during vulnerable early career stages with financial responsibility as the value of graduate education manifests in earnings growth.

V. Discussion and Conclusions

Our analysis of graduate education outcomes across professional doctoral programs highlights the earnings trajectories of graduates and, combined with data on total graduate debt, explores implications for loan repayment. The data demonstrate that earnings trajectories vary substantially both across and within fields, with some programs showing dramatic growth over time and others exhibiting more modest but stable earnings patterns. Most notably, after starting at a low baseline wage during additional training periods, medical graduates experience extraordinary earnings growth as they transition from residency to practice. In contrast, pharmacy graduates see minimal earnings growth over the same period. However, both groups have a high average wage, many times the typical debt levels they incur. This variation highlights the importance of considering longer-term earnings trajectories rather than focusing solely on short-term outcomes when evaluating the financial returns of graduate education.

[18] Note that in addition to IDR and Standard plans, there are extended and graduated repayment options intended to mitigate the financial burden of a Standard plan. These plans tend to have lower take-up: in Q4 of 2019, just over 3 million borrowers were enrolled in Extended or Extended-Graduated plans compared to just under 11 million enrolled in Standard plans and just under 8 million enrolled in IDR plans (FSA, 2025).

[19] Note that JD graduates at the 25th percentile of earnings are bearing an even higher burden of payments in the early years post-graduation. Appendix Figure A3 shows that 25th percentile earners are paying between 20 and 25% of their pre-tax income towards student loans under the standard plan in the first several years post-graduation.

The program-level analysis reveals considerable heterogeneity in outcomes within fields of study, particularly for law, dentistry, and medicine, where both earnings levels and growth patterns vary significantly across institutions. In contrast, other fields like veterinary medicine and pharmacy show more uniform earnings patterns across institutions. Importantly, our data show that graduate debt burdens in these fields, while substantial, are typically easily outweighed by cumulative earnings over time.

The relationship between repayment obligations and earnings trajectories underscores the value of income-driven repayment plans for graduate borrowers, particularly in fields where earnings growth is delayed or initial salaries are modest relative to debt burdens. For professional programs with steep earnings trajectories like medicine, IDR plans effectively shift repayment burdens from the early career phase—when graduates may be in training or establishing their practice—to later years when their financial capacity has increased substantially. This approach to loan repayment better aligns financial obligations with the realization of returns, potentially improving access to professional education while maintaining accountability for borrowers.

As policymakers contemplate reforms to federal graduate lending and repayment programs, our findings, in conjunction with the emerging causal evidence on returns to graduate school, suggest that most students who complete the professional degree programs we study end up earning over the medium term far in excess of what they accrue in debt and that a substantial portion of these earnings are the direct result of their degree. This is not to say there are no bad investments to be had in graduate school, but given the generally high earnings levels we observe for professional school graduates in this report, policymakers should be wary of preventing students from making high return investments that would pay dividends for both the borrower and for taxpayers. Indeed, taxpayers should care not only about the narrow budgetary math of dollars repaid on federal student loans, but also about the broader benefits to the government's balance sheet (to say nothing of society's flourishing) of facilitating the types of human capital investments that have been shown to pay very large dividends, with graduates earning more and paying higher taxes as a result. Given the wide variation in earnings outcomes we observe, and the evidence in the literature that there is also considerable variation in the causal returns, policy approaches should be careful about using blunt instruments to limit borrowing such as the proposed elimination of subsidized loans and sweeping changes to IDR plans. Instead, a more nuanced approach that considers the program-specific value proposition of a degree would better serve students and taxpayers alike.

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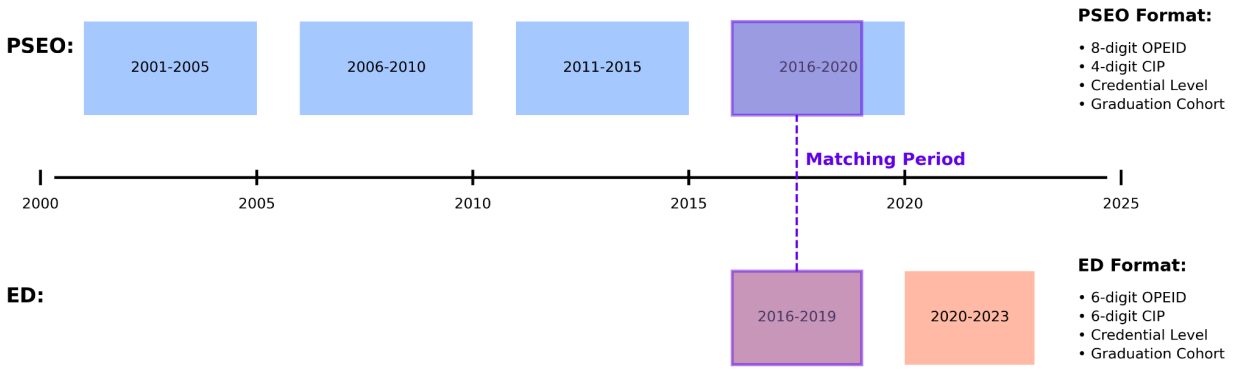
Appendix A: Tables and Figures

Figure A1. Data Comparison - PSEO vs. ED



Notes: This figure shows the cohort comparison across PSEO and ED datasets as described in Section III. Text describes data formatting. Matching period is indicated in purple.

Table A1. Summary Statistics: PSEO versus Scorecard

		Matched Programs	Non-Missing Matched	School Count		Students per Year		Median Earnings (1yr)		Median Earnings (5yr)	
		(1)	(2)	PSEO (3)	Scorecard (4)	PSEO (5)	Scorecard (6)	PSEO (2016) (7)	Scorecard (2016) (8)	PSEO (2011) (9)	Scorecard (2014) (10)
Veterinary Medicine	01.80	14	12	14	31	2,302	2,596	90,242	100,548	106,167	120,712
Education Administration and Supervision	13.04	3	--	6	10	146	271	119,056	69,286	136,251	85,469
Law (LLM, JD)	22.01	58	46	55	173	9,953	19,709	82,816	86,981	109,062	120,877
Clinical Counseling and Applied Psychology	42.28	6	--	8	4	161	43	58,653	72,150	93,758	82,355
Chiropractic	51.01	3	2	3	10	240	1,439	52,019	49,051	60,173	60,133
Communication Disorders Sciences and Services	51.02	26	2	26	6	383	106	76,924	70,330	85,377	70,624
Dentistry	51.04	22	21	23	56	2,254	3,559	121,928	116,891	160,139	156,929
Medicine (MD)	51.12	55	46	55	144	11,414	18,580	64,069	65,205	156,682	172,427
Optometry	51.17	7	7	7	17	594	752	98,540	98,779	120,332	120,536
Pharmacy	51.20	45	32	46	87	6,424	7,645	110,782	101,042	144,393	142,512
Public Health	51.22	1	--	1	2	38	126	58,668	74,724	73,625	86,502
Rehabilitation and Therapeutic Professions	51.23	52	21	52	57	4,121	2,400	76,769	74,773	87,277	82,526
Registered Nursing	51.38	46	6	48	29	2,102	895	129,617	123,949	135,076	140,629

Notes: This table uses data from the PSEO and College Scorecard. Column 2 restricts matched programs from column 1 to those with non-missing data for the focal cohort (2016) in both datasets. For columns 3-8 (school and student counts and 1 year earnings), the PSEO data use the 2016-2018 pooled cohorts, which includes the 2016-17, 2017-18, and 2018-19 cohorts, and the College Scorecard data uses the 2016-17 and 2017-18 pooled cohorts. Students per year takes a simple yearly average using the number of cohorts included in the pooled sample. Columns 9 and 10 use PSEO cohort 2011, which pools 2011-2015 cohorts, and Scorecard 2014 cohort, which pools 2014-2015 cohorts. Earnings from both PSEO and Scorecard are adjusted to 2022 dollars using the CPI.

Table A2. Average Difference in Earnings and Student Counts Across Aggregation Levels

Cohort	P25 earnings	P50 Earnings	P75 Earnings	Student Count
2001	-453	-486	-53	2,348
2006	-637	-1,226	-920	2,826
2011	14	-97	133	3,272
2016	-260	-358	199	2,834

Notes: This table shows differences in earnings between PSEO levels of aggregation. In this table, aggregation at the state level is compared to aggregation at the institution level, both collapsed to the cohort level. The table shows that institution-level aggregation collapsed down to the CIP-by-cohort level misses--on average across CIPs weighted by student count--between 2,000 and 3,000 students, but that earnings are comparable. This suggests that there is little relationship between small programs (censored at the institution level) and earnings.

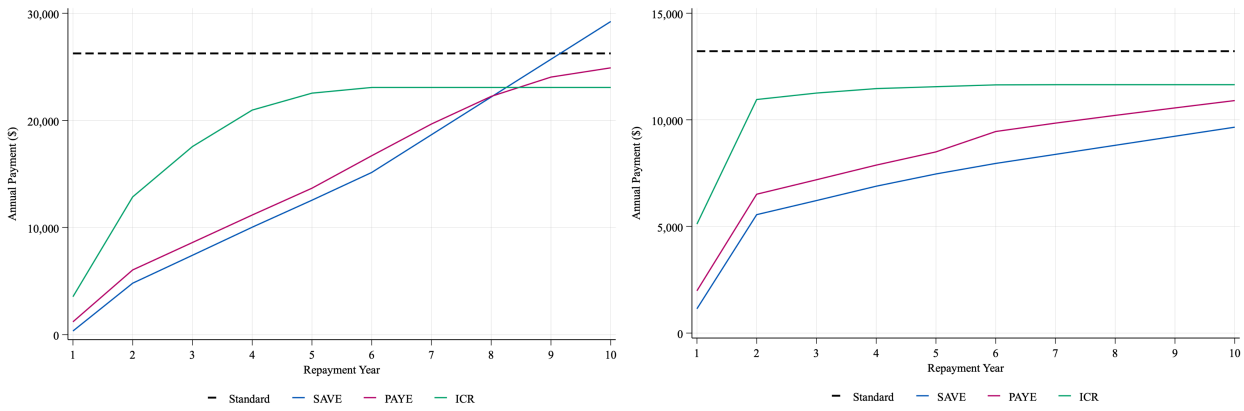
Table A3. Graduate & Program Counts and Median Program Size by Field of Study and Years Since Graduation

	Years Since Graduation								
	1 Year			5 Years			10 Years		
	Tot N Grads	Tot N Progs	P50 of Prog. N	Tot N Grads	Tot N Progs	P50 of Prog. N	Tot N Grads	Tot N Progs	P50 of Prog. N
Field of Study									
Veterinary	4,347	11	340	4,151	11	333	4,020	11	313
Law	31,588	46	602	33,407	46	636	30,897	46	590
Dentistry	4,474	17	274	4,643	17	291	4,811	17	306
Medicine	18,899	34	533	19,807	34	597	20,509	34	600
Pharmacy	11,254	24	506	11,144	24	498	10,726	24	472
PT & Similar	1,358	9	149	1,284	9	138	1,201	9	132

Notes: Counts pooled graduating cohorts 2006–10. 'Tot N Grads' is the number of graduates in this field of study across programs, 'Tot N Progs' is the number of distinct 6-digit-CIP programs at different institutions in the PSEO data, and 'P50 of Prog. N' is the median graduate count per program. Figures are constant across percentiles. Data: U.S. Census Bureau PSEO, linked to College Scorecard and OCE debt files.

Figure A2. Annual Student Debt Payments in Dollars

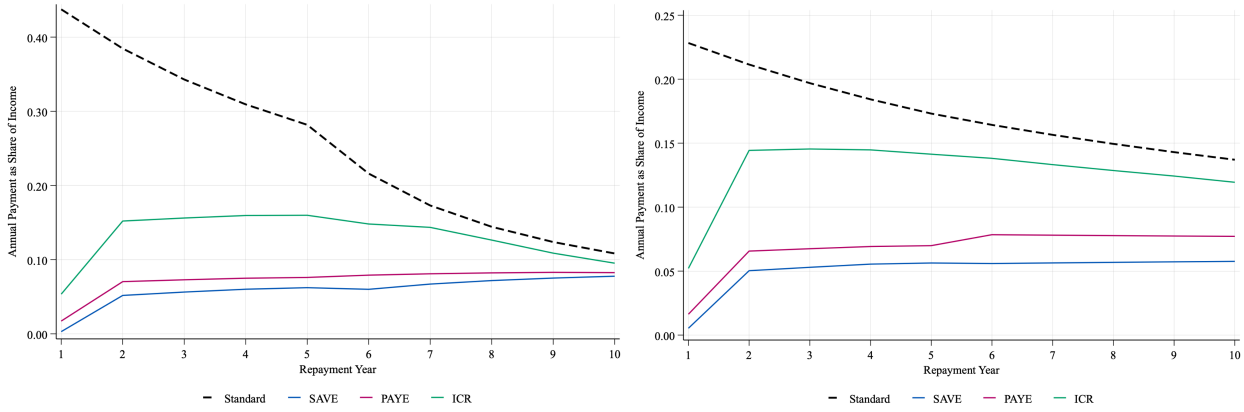
Panel A. Medicine (median earner, median debt) **Panel B.** Law (median earner, median debt)



Notes: This figure shows annual student debt payments under different repayment plans. The standard 10-year repayment plan is shown in black (dashed). The Saving on a Valuable Education (SAVE) is shown in Blue, PAYE is shown in pink, and income-contingent repayment (ICR) is shown in green. The methods and assumptions underlying these figures are explained in detail in Appendix C. Panel A shows payments for a median-earner graduate of a professional degree in Medicine who holds roughly the median amount of debt. Panel B shows the analogous figure for JD graduates.

Figure A3. Annual Student Debt Payments as a Share of Income (p25 Earners)

Panel A. Medicine (p25 earner, median debt) **Panel B.** Law (p25 earner, median debt)



Notes: This figure shows annual student debt payments under different repayment plans. The standard 10-year repayment plan is shown in black (dashed). The Saving on a Valuable Education (SAVE) is shown in Blue, PAYE is shown in pink, and income-contingent repayment (ICR) is shown in green. The methods and assumptions underlying these figures are explained in detail in Appendix C. Panel A shows payments for a 25th-percentile earner graduate of a professional degree in Medicine who holds roughly the median amount of debt. Panel B shows the analogous figure for JD graduates.

Appendix B: Availability of Earnings Data by Cohort

A major advantage of the PSEO data is that it is the only publicly available data with earnings aggregates at the program level (i.e. 6-digit OPEID by 4-Digit CIP by Credential type). One disadvantage of these longer measurement horizons, however, is the fact that the data is unavailable for more recent cohorts. In the PSEO data availability by cohort is as follows:

Table B1: Earnings Data Availability in PSEO

Pooled Cohorts	1-Year Earnings	5-Year Earnings	10-Year Earnings
2001-2005	Yes	Yes	Yes
2006-2010	Yes	Yes	Yes
2011-2015	Yes	Yes	No
2016-2020	Yes	No	No

Ideally we would align these earnings cohorts to match the debt data available from the Office of the Chief Economist (2016-2019 academic year graduation cohorts). However, 5- and 10-year earnings records are not yet available through the PSEO for these groups. This produces a tradeoff between using extrapolated earnings values that would better align the cohorts and using debt values from more recent cohorts but comparing them to earnings data for the most recent groups for which it is available (all in 2022 dollars). Given the stable earnings patterns we observe across cohorts in earlier time horizons in Figure 2, we choose the latter option. Given how quickly debt has been growing, we believe this is the more conservative choice from the perspective of finding a favorable debt-to-earnings ratio for programs, as it pits today's debt levels against yesterday's earnings. In results available upon request we have also constructed extrapolated earnings values using a regression-based approach to use the relationship between 1- and 5-year earnings across years and autocorrelation in the same earnings measure (i.e. lagged measures of 5- and 10-year earnings across cohorts) to extrapolate earnings to periods where it is missing. This allows us to produce a version of Figure 7 with these aligned cohorts and extrapolated earnings. We see very little difference across the resulting figure when done in this way.

Appendix C: IDR Analysis

This appendix describes the construction of student loan payments under four student loan repayment plans featured in Section 4: the standard 10-year plan, the SAVE plan, the PAYE plan, and the ICR plan. The calculations incorporate earnings data, debt levels, and federal poverty guidelines to determine monthly payments and track payment progress over time.

Data Sources and Timing

The analysis draws on three primary data sources. First, earnings data from PSEO provides program-level earnings information. As described in Section 3, we use 2016 cohorts from PSEO and Scorecard to maximize comparability between the two datasets. The PSEO earnings are extrapolated using the approach described in Appendix B. Using the 2016 cohort, we make several assumptions about timing: first and foremost that all borrowers graduate in the Summer (July). For 2016 graduates, this means that the first year of earnings spans July 2016 through June 2017. Using estimates of Year 1 post-graduate earnings from PSEO, we assume that year 1 earnings are measured sometime between July 2016 and June 2017. These assumptions carry through to subsequent years. Calendar year earnings are thus constructed as weighted averages of academic years to account for the timing of income measurement.

Second, debt data from College Scorecard provides information on loan amounts and types. We use Scorecard-provided information about the share of loans that are unsubsidized versus PLUS loans to calculate a weighted average interest rate based on the share of each loan type in the total debt. Data on historical interest rates are pulled from Federal Student Aid (FSA) Unsubsidized and PLUS interest rates are assumed to be a simple average of interest rates for the three years preceding graduation year. For example, for the 2016 graduating cohort, we use an average of 2014, 2015, and 2016 interest rates for each type of loan. This implicitly assumes that a student's borrower is distributed evenly across years.

Finally, we pull Federal Poverty Level (FPL) data from the Census to calculate discretionary income levels under each repayment plan. The FPL data are projected forward (for years 2025 onwards) using inflation adjustments to maintain real purchasing power over time. For both poverty levels and IDR payment calculations, we assume a family size of one (i.e., we assume the borrower is single).

Payment Calculation Methodology

The payment calculations begin with the timing of graduation and income measurement. Students are assumed to graduate in July, with their first payment period beginning the following January. For the first payment period (Jan-Dec 2017 for 2016 graduates), payments are based on the previous year's income, which consists of six months of zero earnings (pre-graduation) and six months of first-year post-graduation earnings. For subsequent payment periods, payments are based on a weighted average of the previous academic year's earnings and the current academic year's earnings.

A six-month grace period follows graduation, during which no payments are required. However, interest continues to accrue on unsubsidized loans during this period and capitalizes at the end of the grace period, increasing the total loan balance.

The calculations for each repayment plan type are detailed below:

- The standard 10-year plan uses the standard amortization formula to calculate equal monthly payments over 120 months.
- The SAVE plan protects income up to 225% of the federal poverty line. Above this threshold, the borrower owes 10% of income with no payment cap.[20]
- The PAYE plan protects income up to150% of the federal poverty line. Above this threshold, the borrower owes 10% of income, but caps payments at the standard 10-year payment amount.
- The ICR plan takes the lesser of 20% of discretionary income (income above 100% of FPL) or a 12-year fixed payment adjusted by an income factor. The income adjustment factor ranges from 50% for those at or below the poverty line to 100% for those at or above 200% of the poverty line, with linear interpolation between these points.

Key Assumptions

Several important assumptions underlie these calculations in addition to those already mentioned. First, all borrowers are assumed to have a family size of one, which affects their FPL-based income protection levels. Second, borrowers are assumed to make all

[20] Note that our use of 10% assumes that the borrower holds only graduate loans. Cumulative undergraduate and graduate debt would be subject to a weighted average of a 5% and 10% payment rate on income over and above the discretionary income threshold.

payments in-full and on-time, with no missed payments or deferments. Third, the analysis focuses on graduate loans only, with equal borrowing across years (resulting in an equal split between interest rates). The timing of income measurement is also important. Earnings are measured in July of each year, and calendar year earnings are constructed as weighted averages to account for the academic year structure. Pre-graduation earnings are assumed to be zero. The grace period is set at six months after graduation, during which interest accrues and capitalizes on unsubsidized loans. Finally, all calculations are performed at the program (CIP code) level, with results weighted by the number of graduates in each program.

Appendix D: Detailed Earnings Tables by Programs within Each Field of Study

Table D1. Earnings Trajectory at Select Time Points Following Graduation in Veterinary Medicine for the Interquartile Range of Earners at Each Institution

	Years Since Graduation								
	1 Year			5 Years			10 Years		
	Earnings Percentile			Earnings Percentile			Earnings Percentile		
	25th	50th	75th	25th	50th	75th	25th	50th	75th
Institution									
Iowa State, Sci & Tech	60,011	77,221	91,327	72,121	93,294	116,665	81,645	104,162	144,409
U of Wisconsin-Madison	46,648	67,839	88,406	70,312	91,819	115,199	85,894	107,233	141,502
U of Missouri-Columbia	59,169	77,459	96,174	71,380	89,492	118,536	78,342	108,741	143,685
Oregon State U	64,931	80,263	94,203	72,862	92,887	111,605	81,211	109,990	144,092
U of Minnesota-Twin Cities	55,985	78,297	92,145	76,476	98,668	120,008	87,694	113,680	147,447
Colorado State U	45,179	68,159	88,247	69,238	91,638	119,452	82,207	113,981	151,072
LSU A&M	56,119	78,970	97,450	76,814	99,425	125,579	85,345	114,996	150,219
Purdue U	61,097	78,859	94,126	78,596	100,139	121,575	89,376	115,184	151,239
U of Georgia	52,197	74,421	87,994	75,029	94,120	114,279	91,012	115,914	151,839
Ohio State U	54,317	75,838	92,992	78,716	98,113	121,781	93,408	116,683	148,585
Texas A&M	63,921	84,487	104,132	78,801	105,685	132,240	97,463	127,250	161,865

Note: Values for graduates between 2006-10 and are all in 2022 dollars. Sorted by 50th percentile earnings at year 10. Data source: PSEO Database joined with College Scorecard and OCE debt data.

Table D2. Earnings Trajectory at Select Time Points Following Graduation in Law for the Interquartile Range of Earners at Each Institution

	Years Since Graduation								
	1 Year			5 Years			10 Years		
	Earnings Percentile			Earnings Percentile			Earnings Percentile		
	25th	50th	75th	25th	50th	75th	25th	50th	75th
Institution									
Southern A&M-Baton Rouge	35,404	49,005	72,371	49,253	70,042	98,920	54,366	83,485	121,442
Texas Southern	34,068	50,533	70,743	53,853	73,868	102,177	63,641	90,343	122,852
Regent U	40,724	55,249	74,416	57,858	77,429	102,918	66,365	91,479	132,312
U of Montana	51,386	59,888	70,129	67,081	81,344	96,259	71,303	94,817	130,528
U of Wyoming	52,420	65,359	76,171	67,791	85,345	113,741	72,255	96,813	133,371
SIU Carbondale	43,576	55,366	70,223	60,168	79,342	103,269	73,787	97,230	142,498
U of Toledo	38,816	56,398	77,969	58,568	76,730	106,010	70,703	97,699	144,105
Northern Illinois	42,510	57,542	70,347	61,254	76,565	101,790	73,548	99,096	144,351
West Virginia U	49,056	63,146	88,537	65,653	90,974	118,073	68,091	99,249	141,229
U of Hawaii-Manoa	55,721	69,485	87,664	72,563	85,942	107,920	81,183	102,073	134,038
U of Akron	44,867	62,663	89,397	63,263	87,109	123,603	75,506	103,745	151,406
CUNY School of Law	44,408	58,064	75,118	65,841	85,201	109,358	80,688	104,143	133,094
U of Southern Maine	47,584	62,716	81,247	58,501	83,552	110,411	69,624	104,311	151,406
U of Missouri-Kansas City	44,617	59,528	82,899	59,984	81,793	117,813	73,453	105,556	151,015
Cleveland State U	43,460	62,556	92,613	61,471	86,663	121,035	75,060	106,174	154,403
IU Indianapolis	49,071	68,035	99,969	64,229	86,132	123,883	77,460	107,275	164,096
Hamline U	43,763	58,079	80,124	60,824	80,774	110,193	77,351	108,977	150,337
U of South Carolina-Columbia	49,108	62,185	91,640	66,264	90,889	127,778	79,045	110,729	168,322
U of Missouri-Columbia	44,899	58,161	81,295	62,547	86,141	122,265	77,605	111,958	169,699
U of Cincinnati	48,330	68,686	103,304	66,401	92,414	129,454	74,195	111,971	162,824
University-Buffalo	48,525	67,639	94,281	69,282	92,775	122,835	82,889	112,566	156,311
U of St Thomas	45,630	59,553	74,725	64,112	84,775	115,213	83,334	112,992	157,169
U of Colorado-Boulder	54,332	71,117	103,967	70,425	94,407	139,515	85,394	118,541	174,927
Pennsylvania State U	50,026	64,516	87,364	67,292	90,590	125,208	83,188	119,064	171,826
LSU A&M	47,723	70,102	97,343	67,636	97,838	130,678	78,191	119,090	172,210
U of Oregon	47,199	65,110	85,406	70,649	92,215	119,505	90,366	120,168	162,493
U of Arizona	50,860	75,682	113,269	68,833	98,359	143,389	88,045	122,991	180,448
U of Wisconsin-Madison	52,883	74,053	139,778	65,877	95,883	155,197	82,714	123,163	187,721
Texas Tech	50,697	72,567	103,829	72,107	101,399	152,093	88,356	124,342	190,573
U of Alabama	48,720	68,392	109,306	65,584	101,810	142,620	84,013	125,289	183,993
Georgia State U	56,484	76,680	117,054	74,584	106,126	162,331	84,068	128,369	203,337
U of Georgia	55,482	77,398	131,758	71,721	107,055	164,347	84,946	129,954	205,272
DePaul U	46,343	65,887	94,950	70,084	95,389	141,606	90,105	130,011	196,235
IU Bloomington	50,429	72,140	112,576	72,280	104,400	145,069	86,841	130,570	192,695
U of Richmond	53,004	68,850	97,078	74,364	101,695	137,677	89,835	130,703	185,112
U of Iowa	53,299	78,680	137,072	74,337	109,007	162,320	88,877	132,198	204,088
Ohio State U	56,198	82,857	132,754	77,070	106,615	155,912	89,520	138,347	207,650
Loyola Chicago	54,782	76,390	116,420	76,917	108,103	156,481	99,429	143,198	212,361
U of Minnesota-Twin Cities	54,457	83,195	149,355	74,609	117,127	175,766	97,847	144,660	224,840
William & Mary	62,404	94,613	159,155	81,201	122,295	185,081	100,655	146,894	220,454
Washington & Lee	31,232	46,401	62,115	76,438	115,906	181,027	94,203	152,202	227,543
George Mason	62,821	88,186	154,079	92,491	130,069	197,573	119,534	159,795	236,439
U of Houston	65,115	101,638	170,047	91,692	139,626	218,741	110,432	175,064	273,814
UT Austin	90,627	175,752	231,293	99,097	175,502	275,595	111,825	180,353	305,710
U of Michigan-Ann Arbor	96,208	163,566	211,121	109,594	194,630	278,360	121,566	188,514	310,826

U of Virginia	126,035	180,573	220,613	127,977	205,799	294,065	139,472	206,668	362,500

Note: Values for graduates between 2006-10 and are all in 2022 dollars. Sorted by 50th percentile earnings at year 10. Data source: PSEO Database joined with College Scorecard and OCE debt data.

Table D3. Earnings Trajectory at Select Time Points Following Graduation in Dentistry for the Interquartile Range of Earners at Each Institution

	Years Since Graduation								
	1 Year			5 Years			10 Years		
	Earnings Percentile			Earnings Percentile			Earnings Percentile		
	25th	50th	75th	25th	50th	75th	25th	50th	75th
Institution									
LSU Health Sci.-New Orleans	61,294	101,317	154,079	71,033	111,832	179,250	95,009	134,570	198,397
U of Illinois Chicago	57,318	90,721	147,843	71,970	119,687	175,202	83,826	137,214	220,574
U of Colorado-Denver	67,160	113,903	158,916	97,911	139,571	194,137	97,109	142,174	207,573
UT Health-Houston	59,869	105,556	176,370	100,434	151,740	230,134	91,479	144,534	235,949
UT Health-San Antonio	72,607	126,730	179,835	96,259	156,370	240,026	94,884	153,607	246,247
Virginia Commonwealth	63,462	107,014	157,633	108,953	165,303	245,773	106,476	161,516	268,249
Ohio State U	68,460	116,635	151,747	110,145	154,747	224,722	115,081	164,507	266,804
IU Indianapolis	90,543	138,548	184,118	110,158	164,138	250,571	122,940	170,190	266,050
U of Iowa	79,768	118,457	159,313	109,007	162,562	230,073	122,480	173,767	266,531
SIU Edwardsville	91,194	132,935	172,881	106,375	157,545	235,680	104,688	174,398	262,228
SUNY-Stony Brook	47,894	66,223	81,999	66,980	114,814	183,883	109,007	174,502	310,315
U of Michigan-Ann Arbor	61,182	99,621	147,564	86,235	146,061	215,836	112,141	174,813	270,962
U of Missouri-Kansas City	77,316	123,240	168,166	106,615	154,808	226,246	122,762	177,624	272,045
University-Buffalo	54,994	76,390	99,992	110,636	158,477	224,475	118,912	178,589	265,083
Augusta U	58,123	107,465	146,952	111,716	153,583	232,278	125,083	180,573	269,919
West Virginia U	79,255	119,654	152,891	107,572	148,097	201,541	120,968	184,545	273,016
U of Minnesota-Twin Cities	92,386	134,254	173,268	127,147	179,148	241,352	125,146	192,072	280,976

Note: Values for graduates between 2006-10 and are all in 2022 dollars. Sorted by 50th percentile earnings at year 10. Data source: PSEO Database joined with College Scorecard and OCE debt data.

Table D4. Earnings Trajectory at Select Time Points Following Graduation in Medicine for the Interquartile Range of Earners at Each Institution

	Years Since Graduation								
	1 Year			5 Years			10 Years		
	Earnings Percentile			Earnings Percentile			Earnings Percentile		
	25th	50th	75th	25th	50th	75th	25th	50th	75th
Institution									
U of Hawaii-Manoa	59,663	62,223	64,782	78,428	129,592	231,382	191,383	287,326	483,157
U of Colorado-Denver	54,083	60,687	68,406	91,780	169,986	255,077	211,034	296,261	500,304
Old Dominion-EVMS	52,479	58,969	68,105	78,422	143,481	247,808	211,231	299,107	506,396
SUNY-Stony Brook	60,753	71,630	80,857	82,490	109,804	201,804	211,207	303,209	511,525
UT Health-San Antonio	53,364	60,083	70,254	100,875	184,695	275,713	208,728	304,666	513,935
UT Southwestern	56,398	63,332	71,101	104,086	177,148	270,065	218,266	305,424	512,973
UTMB-Galveston	55,466	61,678	70,260	112,232	203,432	296,013	216,983	307,465	517,152
U of Toledo	51,509	57,661	67,675	75,407	135,371	235,265	229,426	308,906	516,687
U of Virginia	54,349	58,856	67,763	76,680	125,369	217,838	218,011	310,150	520,234
Pennsylvania State U	54,846	58,974	68,159	78,129	135,659	214,499	217,211	319,751	527,666
NE Ohio Medical U	53,460	58,297	66,552	73,899	125,685	232,009	219,947	320,779	528,180
Virginia Commonwealth	51,633	58,126	66,828	74,316	123,783	209,690	225,869	327,671	531,625
University-Buffalo	56,965	62,988	69,462	76,814	119,368	212,771	224,157	328,144	531,862
U of Illinois Chicago	57,852	61,682	64,679	76,365	139,399	232,239	227,800	329,307	532,443
SUNY Upstate Medical	58,387	66,412	71,794	77,820	114,408	210,221	223,051	330,546	533,063
Augusta U	56,171	60,046	63,731	73,200	118,571	215,880	224,325	330,735	533,158
U of Wisconsin-Madison	55,060	61,962	70,997	83,505	161,954	248,010	225,573	333,676	534,628
West Virginia U	58,808	61,653	64,089	80,124	149,981	243,407	225,459	335,664	535,621
U of Missouri-Kansas City	51,581	56,853	65,900	75,083	125,083	239,572	213,890	335,941	535,761
UT Health-Houston	58,241	63,855	71,244	120,405	206,464	293,605	232,119	340,372	537,975
U of South Carolina-Columbia	57,246	61,311	64,370	75,038	155,683	245,528	223,455	342,158	538,868
U of Michigan-Ann Arbor	54,499	59,480	67,843	74,095	105,973	191,720	223,336	342,689	539,134
U of Arizona	51,469	57,217	66,110	76,476	146,061	230,141	225,894	344,940	540,260
U of Cincinnati	51,609	56,581	66,261	75,593	135,976	220,478	228,602	357,607	546,594
LSU Health Sci.-New Orleans	57,529	64,679	69,479	76,071	144,905	240,241	235,485	358,474	547,027
IU Indianapolis	51,364	58,410	67,563	80,255	162,469	271,314	245,495	361,648	548,614
Marshall U	57,409	60,972	63,638	101,317	197,538	278,211	239,932	366,401	550,991
Ohio State U	53,464	60,821	68,315	75,947	127,055	217,799	242,749	369,203	552,391
SIU Carbondale	56,948	60,977	63,972	79,635	180,919	265,163	256,099	373,640	554,610
U of Iowa	55,566	65,778	69,756	83,316	161,028	247,238	247,617	374,938	555,259
U of Missouri-Columbia	50,728	54,317	64,793	80,543	165,159	242,563	244,996	375,491	555,535
Loyola Chicago	57,223	61,648	65,196	77,456	150,071	241,956	256,099	378,980	557,279
U of Minnesota-Twin Cities	57,966	61,889	64,943	86,938	192,371	284,148	260,421	382,661	559,121
LSU Health Sci.-Shreveport	50,535	58,097	66,822	79,322	158,112	250,793	256,853	388,719	562,149

Note: Values for graduates between 2006-10 and are all in 2022 dollars. Sorted by 50th percentile earnings at year 10. Data source: PSEO Database joined with College Scorecard and OCE debt data.

Table D5. Earnings Trajectory at Select Time Points Following Graduation in Pharmacy, Pharmaceutical Sciences, and Administration for the Interquartile Range of Earners at Each Institution

	Years Since Graduation								
	1 Year			5 Years			10 Years		
	Earnings Percentile			Earnings Percentile			Earnings Percentile		
	25th	50th	75th	25th	50th	75th	25th	50th	75th
Institution									
U of South Carolina-Columbia	123,005	152,094	172,076	128,075	146,825	167,695	120,568	141,414	162,015
U of Louisiana-Monroe	119,992	133,870	153,938	122,049	140,891	163,861	122,507	143,367	163,742
U of Georgia	111,198	142,910	164,162	126,552	145,345	164,800	118,937	143,980	163,621
Ohio State U	111,557	139,543	168,890	125,971	147,010	172,847	121,769	144,407	168,209
U of Iowa	109,348	135,559	161,247	122,379	143,062	167,011	124,444	145,283	165,837
U of Montana	113,447	137,153	160,507	127,474	147,502	168,810	124,119	145,701	165,859
West Virginia U	112,536	147,206	170,570	127,840	147,995	170,364	126,969	146,896	167,454
SIU Edwardsville	132,461	148,340	167,109	135,023	150,172	170,606	131,370	147,016	165,467
Purdue U	108,770	146,328	173,896	126,278	147,580	173,838	128,253	147,130	168,297
U of Wyoming	123,187	146,900	167,923	130,447	147,639	167,135	124,368	147,374	168,916
Virginia Commonwealth	113,861	147,362	175,010	125,503	148,674	174,656	130,120	147,710	169,197
U of Cincinnati	119,868	147,843	174,426	127,508	148,396	172,975	131,870	148,303	169,534
University-Buffalo	115,617	141,231	166,903	126,914	146,717	169,901	130,036	148,766	174,002
U of Wisconsin-Madison	102,358	141,971	170,102	123,047	146,609	174,838	129,232	149,091	171,537
U of Houston	107,700	141,324	170,953	129,396	154,079	178,767	132,640	150,258	174,875
U of Illinois Chicago	104,645	140,134	153,844	132,148	149,496	171,051	129,573	150,439	175,669
U of Michigan-Ann Arbor	74,615	118,659	158,340	115,142	140,526	171,960	128,899	151,076	178,668
Texas Southern	131,823	162,781	184,056	134,170	163,735	195,661	134,186	151,591	175,068
U of Arizona	99,759	138,765	168,751	126,131	148,890	174,446	134,570	151,977	175,907
UT Austin	122,480	156,533	181,087	126,536	156,650	184,592	129,030	152,565	179,470
U of Missouri-Kansas City	115,021	147,455	173,981	129,966	151,204	175,823	136,083	153,010	177,369
U of Minnesota-Twin Cities	101,994	143,624	167,780	133,674	149,868	170,868	130,837	153,284	175,907
Oregon State U	121,368	146,609	169,473	131,120	150,629	172,825	133,553	156,387	179,124
Shenandoah U	129,758	156,949	186,245	133,032	159,630	187,969	134,643	156,961	185,903

Note: Values for graduates between 2006-10 and are all in 2022 dollars. Sorted by 50th percentile earnings at year 10. Data source: PSEO Database joined with College Scorecard and OCE debt data.

Table D6. Earnings Trajectory at Select Time Points Following Graduation in Rehabilitation and Therapeutic Professions for the Interquartile Range of Earners at Each Institution

	Years Since Graduation								
	1 Year			5 Years			10 Years		
	Earnings Percentile			Earnings Percentile			Earnings Percentile		
	25th	50th	75th	25th	50th	75th	25th	50th	75th
Institution									
U Wisconsin-Madison	59,370	69,411	81,626	64,611	82,291	96,313	53,087	75,407	93,748
U of Colorado-Denver	56,036	68,338	81,686	58,142	75,407	97,754	59,506	83,286	103,462
West Virginia U	73,922	83,286	94,884	70,546	82,955	93,748	59,019	84,448	102,642
U of Montana	67,666	77,188	88,664	65,900	79,908	96,018	65,900	85,875	103,335
U of Illinois Chicago	77,188	83,070	89,881	68,195	88,956	100,370	72,437	90,721	107,891
IU Indianapolis	68,345	78,589	90,385	70,627	86,001	100,353	70,223	90,830	107,253
Texas Women's U	73,625	85,315	103,525	78,080	95,193	113,948	65,359	96,725	118,730
Sacred Heart	73,180	83,800	94,506	77,783	92,992	103,776	81,848	98,794	116,516
SUNY-Stony Brook	66,416	85,499	105,196	74,932	97,577	121,368	70,763	100,382	122,663

Note: Values for graduates between 2006-10 and are all in 2022 dollars. Sorted by 50th percentile earnings at year 10. Data source: PSEO Database joined with College Scorecard and OCE debt data.