The Association for Institutional Research
Webinar Series Presents

The University of Texas System and the United States Census Bureau Partnership – Data Tell the Story

Instructors:

The University of Texas System, Office of Strategic Initiatives

Stephanie A. Bond Huie, Ph.D., Vice Chancellor

David R. Troutman, Ph.D., Associate Vice Chancellor

Longitudinal Employer-Household Dynamics (LEHD) Research Group

United States Census Bureau, Center for Economic Studies

Andrew Foote, Ph.D., Economist

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Slide one: Introductions.

The Association for Institutional Research Webinar Series Presents The University of Texas System and the United States Census Bureau Partnership – Data Tell the Story

Instructors are: Doctor Stephanie Huie, Vice Chancellor for Strategic Initiatives at the University of Texas System. Doctor David Troutman, Associate Vice Chancellor for Institutional Research and Decision Support, and Andrew Foot, Economist for the U.S. Census Bureau Longitudinal Employer-Household Dynamics (LEHD) Research Group

Housekeeping

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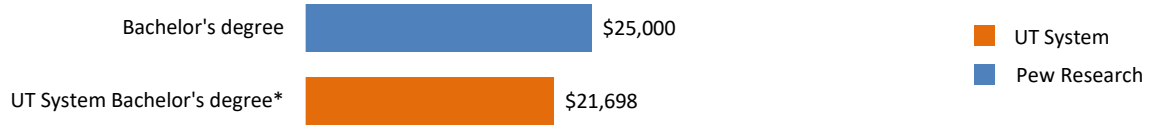
Presented by:

- **Stephanie A. Bond Huie**, Ph.D., Vice Chancellor
- **David R. Troutman**, Ph.D., Associate Vice Chancellor
- **Andrew Foote**, Ph.D., Economist

Higher Education Environment

- Value of a degree
- Return on investment (ROI)
- Rising cost of education
  - Student debt



Sources: FADS and Pew Research Center analysis of Federal Reserve Board's 2016 Survey of Household Economics and Decisionmaking.
*First-time students who entered in academic years 2002-2015

Slide 4: Higher Education Environment.

Within our society, there's ongoing concern about the value of a college degree, and what is the ultimate return on investment – also known as ROI – related to that degree. Media and other outlets have been discussing the rising cost of higher education, as well as education in general. This is due to a few things. One specifically, is the reduction in state appropriations associated with higher education. In response, higher education has increased tuition over time to compensate for that, thus creating somewhat of a student debt crisis in our country. However, when you compare and contrast UT System student debt for bachelor's degree recipients versus overall bachelor degree recipients (based on research conducted by the Pew Research Institute), the student debt of a bachelor's degree recipient is $25,000 versus $21,698 for a UT System bachelor's degree. So, we're still doing a great job, but we need to continue our effort to really understand the value of education as it relates to student debt and the results of earnings potential.

Existing Barriers / Proposed Solutions

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Slide 5. Existing Barriers and Proposed Solutions.

Past and Current Federal Efforts

- Higher Education Act (2008)
  - Student-level record ban
- U.S. Department of Education – College Scorecard (2013)
  - Online consumer tool showing cost/value of education
- Promoting Real Opportunity, Success, and Prosperity through Education Reform (PROSPER) Act (2017)
- College Transparency Act (2017)

Slide 6: Past and Current Federal Efforts.

In 2008, the Department of Education and the government passed the Higher Education Act. The Act banned the linking of student-level record information. Basically, what that means is that the U.S. Department of Education, the IRS, the U.S. Census Bureau, and all the other branches within the federal government cannot link a student's social security number across those datasets. This provides a challenge for providing information to students and parents about the value of education.

So, in 2013, the U.S. Department of Education created the College Scorecard. The College Scorecard is an online consumer tool, showing cost and value of education. It also provides graduation rates, tuition, student profiles, and a variety of information. However, this information is limited to only those students who completed a Free Application for Federal Student Aid (FAFSA), and took out loan debt when comparing and contrasting the cost and the value of earnings.

In 2017, there were two acts proposed to the government -- the PROSPER Act, which stands for Promoting Real Opportunity, Success, and Prosperity through Education Reform, and the College Transparency Act. The PROSPER Act is really just an updated version of the Higher Education Act. It creates a dashboard technology that would provide parents and students information. But, it's still involves the same stakeholders -- those students who completed a FAFSA, and took out loan debt. The College Transparency Act goes beyond both previous acts and allows for student-level record data to be linked across all federal

agencies.

UT System's Partnership with the U.S. Census Bureau

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United States Census Bureau

Slide seven: UT System's Partnership with the U.S. Census Bureau.

To go beyond the barriers that exist currently as they relate to the record ban, UT System sought to create a partnership with the U.S. Census Bureau. The U.S. Census Bureau contains all unemployment insurance wage records for all 50 states through a program called LEHD, which stands for the Longitudinal Employer-Household Dynamics Program. Prior to this partnership, UT System had an agreement with the Texas Workforce Commission to look at unemployment records for those individuals who stayed and worked within the state of Texas. However, if students were to migrate outside the state of Texas, we would not have any information on them. With the Texas Workforce Commission data, we account for about 33 percent of our graduate students in our wage records; whereas, if we use the Census, we could actually explore and increase match rates to 90%.

The Partnership – U.S. Census Bureau Longitudinal Employer-Household Dynamics Program (LEHD)

- MOA, September 2016, 10-year agreement, New Census Public Data Product
  - Estimated earnings 1, 5, and 10 years out for graduates of UT System (2001 to 2015) academic and health institutions
  - Earnings for programs of study at each institution. Earnings are at the 4-digit CIP level for baccalaureate and professional degrees (e.g., 14.02 - Aerospace Engineering) and 2-digit level for master's and doctoral degrees (e.g., 14 - Engineering)
  - Earnings estimated at the 25th, median, and 75th percentiles
  - See Post-Secondary Employment Outcomes (PSEO) on the LEHD webpage at https://lehd.ces.census.gov/data/pseo_beta.html

Slide eight discusses the partnership between the U.S. Census Bureau and UT System.

A Memorandum of Agreement was established in September of 2016.

It's a 10-year agreement that will provide estimated earnings for one, five, and 10 years after graduation for UT System graduates, with cohorts starting as early as 2001 and as recent as 2015, for UT System's academic and health institutions.

Earnings will be provided at the program level of study for each institution. Earnings are at the four-digit CIP level for baccalaureate and professional degrees. For example, 14.02 is aerospace engineering, where you can compare and contrast other types of four-digit level CIPs for civil engineering, electrical engineering, etc. Earnings are at the two-digit CIP level for master's and doctoral degrees – in this case, engineering is a 14.

We did this because of the limitations with reporting. We know with master's and doctoral degrees there are fewer students; so, we had to make sure we received information back from the Census, because anything less than 30 people within a cell size would be returned to us with an N/A. We wouldn't have the information, so that's why we were strategic with doing the four-, versus the two-level CIP.

Not only is Census going to provide us median earnings, they're also going to provide us the 25th and the 75th percentiles. This will provide us a distribution within that sample to really understand the fluctuations of earnings by program level. This is something that was

specifically requested by the students when speaking to them about what information they would like to see.

The Partnership – A Benefit for Higher Education

- Pathway for higher education institutions to access national program level data on post-graduation earnings
- Serves as a proof of concept
  - Federal unit record data systems
  - Privacy

Slide nine: The Partnership - A Benefit for Higher Education.

This partnership benefits higher education because it provides the pathway for our higher education institutions to access national program level data on post-graduation earnings. And, it really serves as a proof of concept for the federal government to understand how you can link federal unit record data systems together. To address any privacy concerns with the earnings potentials for students, it should be noted that we would never be able to identify an individual student within our dataset. At the same time, we're providing insightful information for parents and students to make decisions on what types of majors to pursue in the context of financing their educational experience.

UT System's Solution –

Slide ten: The UT System Solution - seekUT.

What Is seekUT?

- seekUT is a free, online consumer tool developed with the input of students for students
  - Shows a 10-year data span of earnings in the context of average loan debt, by program
  - Offers the ability to compare earnings and debt by various programs side-by-side
  - Goes beyond the median to show percentiles
  - Indicates the percent of students who continue their education beyond baccalaureate degree

Slide eleven: What Is seekUT?

SeekUT is a free, online consumer tool developed with the input of students, for students. It shows a 10-year data span of earnings in the context of average loan debt, by program. It offers the ability to compare earnings and debt, by various programs side-by-side. It goes beyond the median and shows percentile, and it indicates the percent of students who continue their education beyond their baccalaureate degree. Keep in mind, all this information we're providing was requested by the students within a series of focus groups, to better understand or meet the needs of what they're looking for as they're pursuing a degree.

Students and Parents Benefit from seekUT

- Provides valuable information about career trajectories (degree requirements, graduate school information, and industries where graduates work)
- Enables better financial planning
- Enhances salary negotiations and benchmarking through data

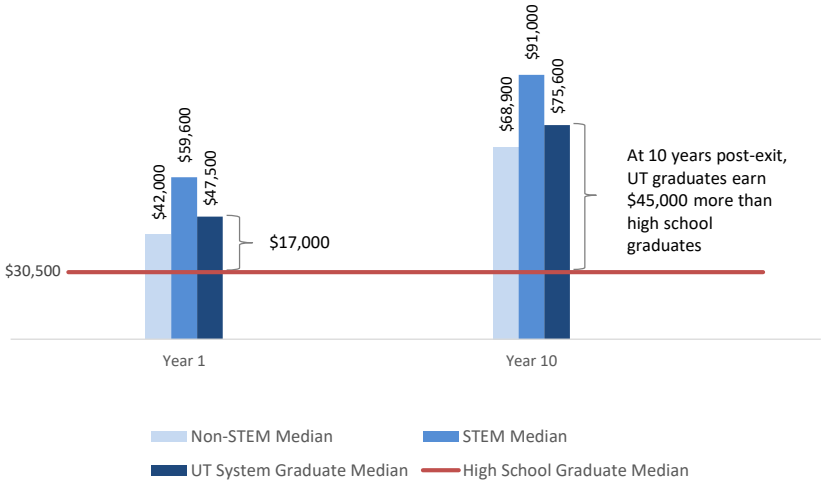
Slide 12: Students and Parents Benefit from seekUT.

There's important additional data uses resulting from this effort besides providing an opportunity to produce a seekUT tool. The benefits include: providing valuable information about career trajectories (degree requirements, graduate school information, and industries where graduates work), enabling better financial planning, and enhancing salary negotiations and benchmarking through data.

Important Additional Data Uses

Slide 13: Important Additional Data Uses

Communicating ROI to Policymakers – National

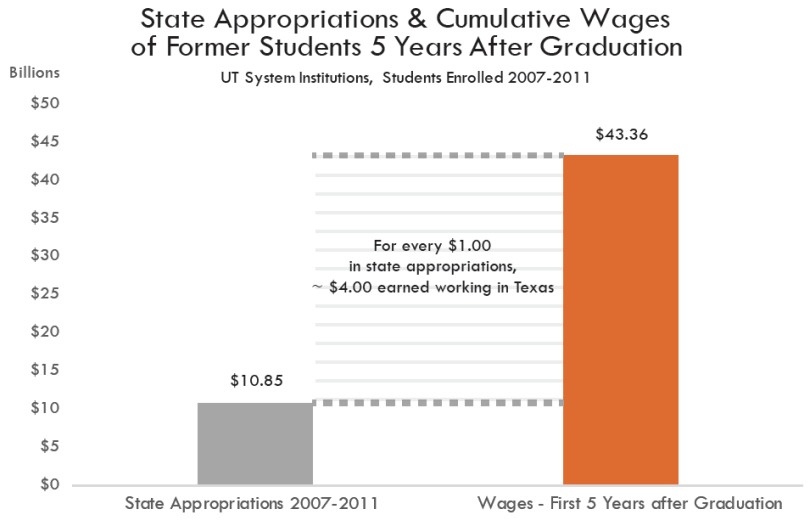


Slide 14: Communicating ROI to Policymakers – National

This slide shows the communication of ROI to policy makers, nationally. Within this, there's a graph that provides 1st-year earnings and 10th-year earnings, comparing and contrasting students with a STEM degree with those students who have a non-STEM degree. It provides the median earnings, which in year one equate to about $42,000. In year one, STEM median earnings are about $59,600. And then we have of an overall UT System graduate making $47,500 in year one. With that, we compare and contrast the high school graduate median earnings based off the U.S. Census Bureau information. The high school graduate median is about $30,500.

When you compare the overall high school graduate median to the 1st-year UT System graduate median, UT System graduate medians are about $17,000 more their first year out. Keep in mind that the high school graduate median accounts for all ages within the workforce. And, we also do this for the 10-year median earnings. We find the non-STEM median is about $68,900 dollars. For STEM median, it's about $91,000. The overall UT System graduate median is $75,600. Once again, if you compare those numbers with the high school graduate medians, at 10-year post-exit, UT graduates earn about $45,000 more than high school graduates.

Communicating ROI to Policymakers – Texas



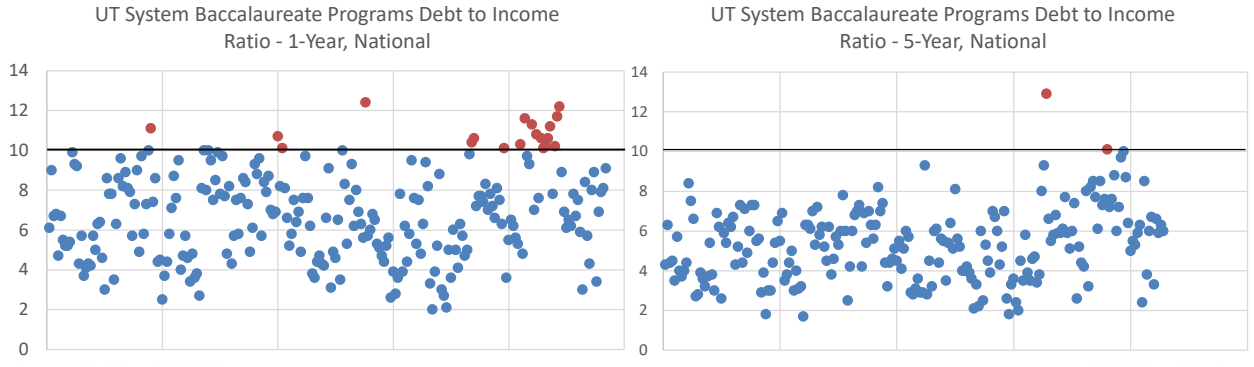
Slide 15: Communicating ROI to Policy Makers: Texas.

One activity we have done using the Texas UI wage records is to examine the relationship between state appropriations and cumulative wages of our former students, five years after graduation. We accounted for the amount of state appropriations for a series or cohort of students, who were enrolled from 2007 to 2011, which resulted in about $10.85 billion. And then we followed those students over time to examine their wages in the first five years after graduation. What we found is, individuals who were enrolled from 2007 to 2011 earned $43.36 billion dollars in the first five years within the state of Texas alone.

We can take those two numbers and identify that every one dollar in state appropriations results in approximately four dollars earned by those working in Texas. Keep in mind, these are all earnings. These earnings can be used to purchase a house, pay for state and local taxes, or make a variety of different purchases. So, it really does benefit the state of Texas.

Monitoring Program Performance – National

- For UT System academic baccalaureate programs
  - 92% have debt-to-income ratio of 10% or less – 1 year after graduation
  - 99% have debt-to-income ratio of 10% or less – 5 years after graduation



Slide 16: Monitoring Program Performance Nationally.

This slide provides two scatter plots. Both scatter plots provide program information for debt-to-income ratios. The Y-axis shows the ratio, which can range from zero up to 14. Using the National U.S. Census Bureau data, we were able to calculate a debt-to-income ratio for our programs, one year after graduation and five years after graduation. What we found is that 92 percent of our programs have a debt-to-income ratio of 10 percent or less, one year after graduation. 99 percent of our programs have a debt-to-income ratio of 10 percent or less, five years after graduation. Based on the current literature, researchers have indicated that a student should not exceed undergraduate student level debt of 10 percent as it relates to their debt to income.

Communicating ROI of Liberal Arts Degrees, National

- Median first-year earnings for 2/3 of graduates of UT System non-STEM programs are higher than the national individual median income of $34,963
- Notable median incomes include
  - Music, $50,856
  - Rhetoric and composition, $46,790
  - Romance languages and literature, $42,841
  - Philosophy, $39,729

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Slide 17: Communicating ROI of Liberal Arts Degrees Nationally.

Using the national U.S. Census Bureau data, we were able to identify a median earnings level for our liberal arts degrees. Liberal arts is always under the microscope of society to understand the value of a liberal arts degree. Using our relationship with the U.S. Census Bureau, we were able to identify a median level for first-year earnings for two thirds of our graduates of UT System non-STEM programs, showing they are higher than the national individual median income of $34,963. Said another way, half of our students' first-year earnings for two thirds of our graduates of UT System non-STEM programs are higher than the national median average of $34,963.

It's also great to note that there are certain programs within UT System that are doing quite well as they relate to earnings for liberal arts degrees. For example, students with a degree in music from the University of Texas El Paso are making $50,856 their first year out. Students who receive degrees in writing, composition, romance languages and literature, and philosophy from UT Arlington are making close to, or more than, $40,000 their first year out. And, keep in mind that first year out is always your starting earning position; thereafter, you will be making more money, typically - unless, you change careers.

College Scorecard Comparison

Slide 18: College Scorecard Comparison

More Precise than College Scorecard

- Scorecard displays earnings for a portion of students
- Degree completers earn more
  - Median wage baccalaureate degree recipients - $58,000
  - $43,900 for non-completers (TX UI Data)
- Scorecard underestimates earnings for UT campuses
  - Differences for 5th-year comparison range from $3,588 to $10,743 (TX UI Data), and
  - Differences for 10th-year comparison range from $9,162 to $20,244 (TX UI Data)

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Slide 19: More Precise than College Scorecard.

Right now, the Department of Education Scorecard displays earnings for a portion of students. The Scorecard only provides information for those students who've taken out loan debt and includes individuals regardless of whether they did, or did not complete their degree. With that, we can really examine the differences between seekUT and the College Scorecard. We're able to look at our degree completers versus our non-degree completers, and we've found that degree completers earn more. The median wage for baccalaureate degree recipients is about $58,000 for our degree completers, compared to $43,900 for our non-completers, using our Texas UI wage data.

Ultimately, the College Scorecard underestimates earnings for UT campuses. Those differences can range from $3,600 at the 5th-year comparison to almost $11,000. And then, the difference of the 10th-year comparison ranges from about $9,000 to more than $20,000. So, there are some large differences when you're looking at the 5th- and 10th-year earnings for our students, when you're comparing the U.S. Department of Education Scorecard to the seekUT tool.

More Precise than College Scorecard

- College Scorecard only represents earnings of federal financial aid recipients
  - 32% to 62% of UT students receive federal aid
  - This results in lower reported wages for UT System institutions
- The Scorecard earnings data at institution level
  - UT System baccalaureate degree holders
    - Median 1st year earnings: $54,200 for STEM majors and $39,900 for non-STEM major (see *Major Matters Most**)

*dashboard.utsystem.edu/sites/default/files/upload/UT-SystemGeorgetownReport.pdf

Slide 20: More Precise than College Scorecard.

The College Scorecard only represents federal financial aid recipients. About 32 to 62 percent of UT students receive federal aid. This results in lower reported wages for UT System institutions because those students who come from more affluent families who do not need aid to pay for school would not be accounted for in the College Scorecard.

The College Scorecard earnings data is at the institutional level versus the program level. This provides much less useful information for students and parents to make their decisions, when pursuing a degree. For example, if you go to the Scorecard, it will provide the median earnings for UT Austin versus UT El Paso versus UT Arlington. Whereas, using the seekUT tool, you can examine the specific program. You can look at electrical engineering, music, liberal arts, and use a variety of different ways to examine the information. It's more detailed in nature.

The median first-year earnings for STEM majors is about $54,200, and for non-STEM majors it's about $39,000. This shows that there is a wide variety of earnings potential by program. So, it's better for students and parents to have that information versus the overall institutional level.

Questions

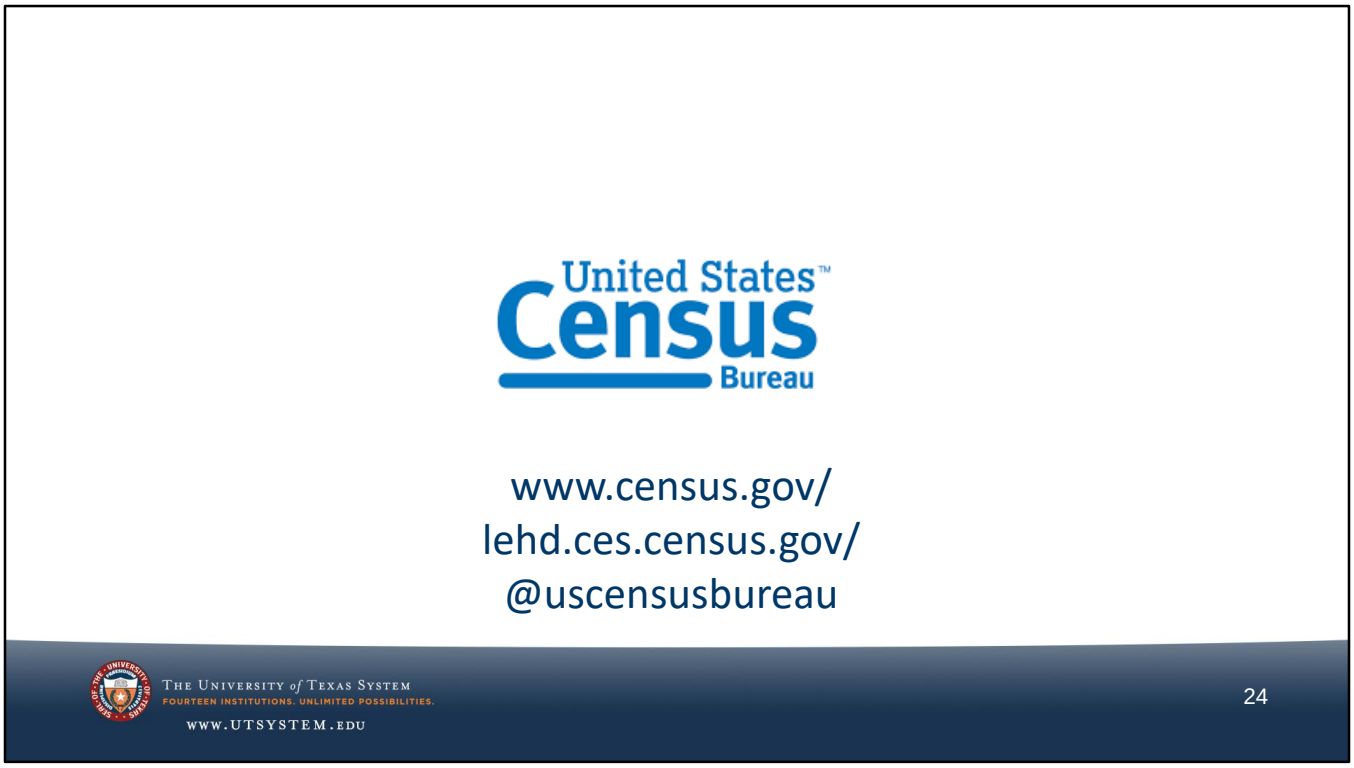
Let's pause for some questions.

seekUT Demonstration

slide 22: seekUT Demonstration

Slide 23: UT System's seekUT tool.

Seekut.utsystem.edu
@utsystem #seekUT



Slide 24: United States Census Bureau

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PSEO Methodology

Andrew Foote
Economist, LEHD
U.S. Census Bureau

Slide 25: U.S. Census Bureau PSEO Methodology – Introduction

Andrew Foote; Economist, LEHD; U.S. Census Bureau

Disclaimer: Any opinions and conclusions expressed herein are those of the author(s) and do not necessarily represent the views of the U.S. Census Bureau. All results have been approved for disclosure.

Earnings Methodology

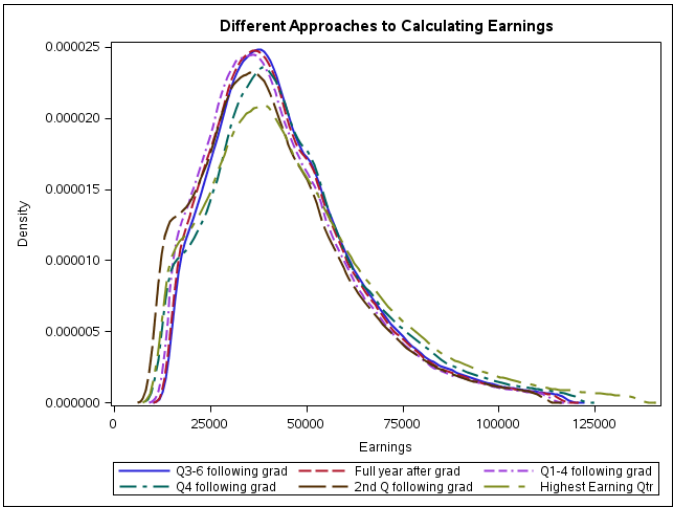
- One weakness of state-level earnings data is that each state has a different approach to calculating annual earnings.
- One goal of the PSEO is to standardize that across states

Slide 26: Earnings Methodology

• One weakness of state-level earnings data is that each state has a different approach to calculating annual earnings
• One goal of the PSEO is to standardize that across states

Comparing Methodologies

- Annual earnings calculations all very similar
- Annualized earnings calculations have heavier tails
- Quarterly earnings are particularly lumpy, due to seasonality of pay, number of pay periods per quarter.



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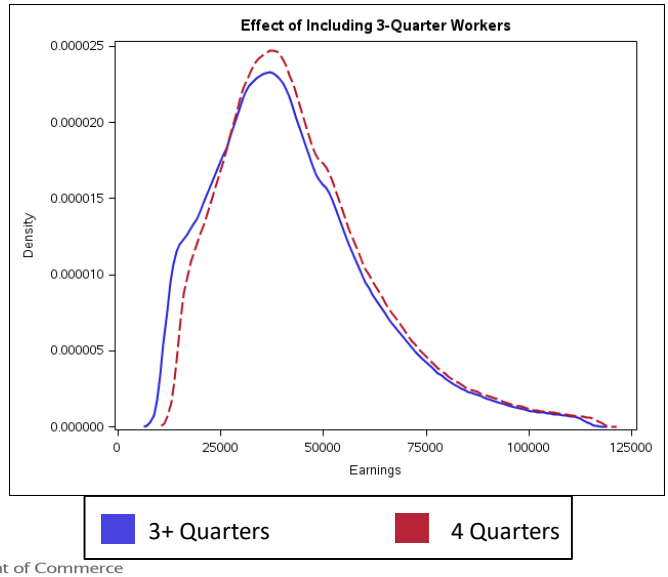
Slide 27: Comparing Methodologies

Graph shows Different Approaches to Calculating Earnings

• Annual earnings calculations all very similar
• Annualized earnings calculations have heavier tails
• Quarterly earnings are particularly lumpy, due to seasonality of pay, number of pay periods per quarter

Number of Quarters



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Slide 28: Number of Quarters

Graph shows the Effect of Including 3-Quarter Workers

Our Methodology

- Total calendar year earnings from all jobs
- Two labor force attachment conditions:
  - At least three quarters of positive earnings
  - At least FTE at prevailing minimum wage
- We consider each person-degree as a separate observation

Slide 29: U.S. Census Bureau – Our Methodology

• Total calendar year earnings from all jobs
• Two labor force attachment conditions: 1) At least three quarters of positive earnings, 2) At least FTE at prevailing minimum wage
• We consider each person-degree as a separate observation

What about student privacy?

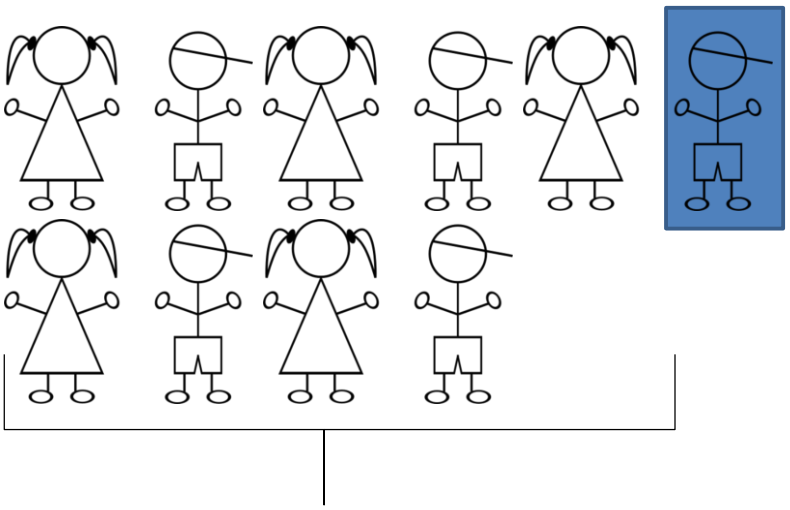
Slide 30: What about student privacy?

Protecting the Microdata

- Title 13 requirements
  - The existence of a job held by an individual is confidential
- We do not have a monopoly on microdata
- All previous statistical releases considered public knowledge

Slide 31: Protecting the Microdata

• Title 13 requirements - The existence of a job held by an individual is confidential
• We do not have a monopoly on microdata
• All previous statistical releases considered public knowledge



In-State Average Earnings: $80,000

National Average Earnings: $85,000

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Slide 32: U.S. Census Bureau – In-State Average Earnings vs. National Average Earnings

Graph shows In-State Average Earnings of $80,000 compared to National Average Earnings of $85,000

Solution: Differential Privacy

- Differential privacy guarantees that outputs from two neighboring databases (differing by one observation) not differ by a significant extent
- Formally, it puts an upper bound on how much I can update my priors about an individual's characteristics

Slide 33: Solution: Differential Privacy

• Differential privacy guarantees that outputs from two neighboring databases (differing by one observation) not differ by a significant extent
• Formally, it puts an upper bound on how much I can update my priors about an individual's characteristics

Example of Differentially Private Protection

- Output: How many people in room are above 6 feet tall?
- True answer: 6
- Sensitivity: 1
- Noise: Laplace(1/ε)
- Protected Answer: 8

Slide 34: Example of Differentially Private Protection

- Output: How many people in room are above 6 feet tall?
- True answer: 6
- Sensitivity: 1
- Noise: Laplace(1/ε)
- Protected Answer: 8

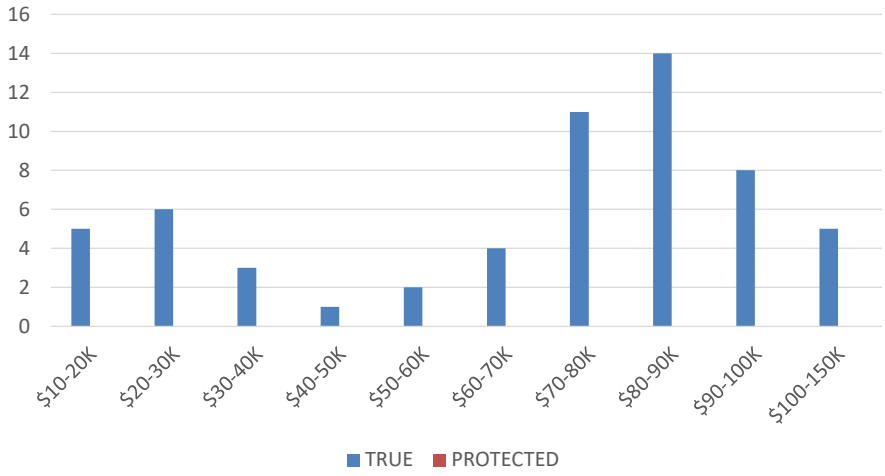
Implementing DP

- For the PSEO Graduate Earnings data, we construct a histogram
- Add noise to each histogram bin
- Calculate the percentiles from the noisy histogram values

Slide 35: Implementing DP

- For the PSEO Graduate Earnings data, we construct a histogram
- Add noise to each histogram bin
- Calculate the percentiles from the noisy histogram values

Simulated Data



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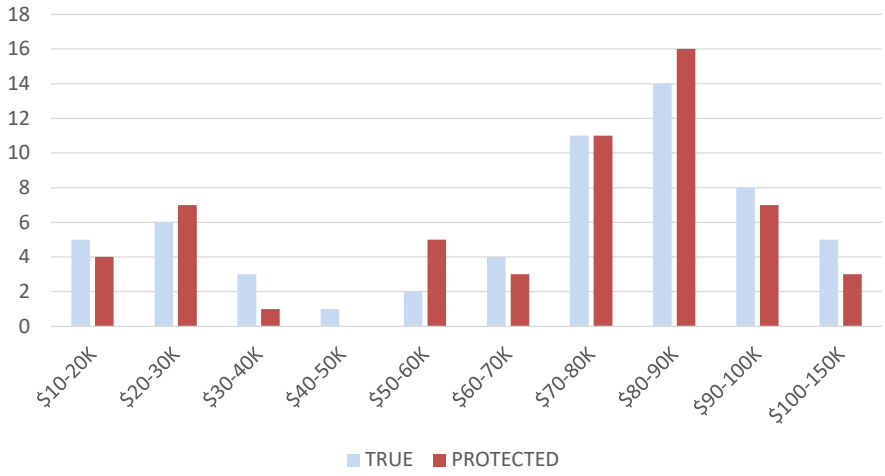
Slide 36: Simulated Data

Graph shows True and Protected data

Simulated Data with Noise



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Slide 37: Simulated Data with Noise

Graph shows True and Protected simulated data with noise

Protection Continued

- Functions of differentially private outputs retain privacy guarantee.
- We take the protected histograms, and extract percentiles from the resulting CDF.

Slide 38: Protection Continued

- Functions of differentially private outputs retain privacy guarantee
- We take the protected histograms and extract percentiles from the resulting CDF

Drawbacks

- Small cells will be distorted more on average
  - We do not report cells with protected count < 30
- 25th and 75th percentiles are more noisy on average

Slide 39: Drawbacks

• Small cells will be distorted more on average. We do not report cells with protected count < 30
• 25th and 75th percentiles are more noisy on average

Future Release

- In addition to earnings outcomes, we want to produce employment outcomes, which would summarize where graduates from University X with degree Y are employed (geography and industry)

Slide 40: Future Release

In addition to earnings outcomes, we want to produce employment outcomes, which would summarize where graduates from University X with degree Y are employed (geography and industry)

Questions

Slide 41: Questions