The AIR Professional File

Fall 2021 Volume

Supporting quality data and
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FALL 2021 VOLUME OVERVIEW

Completing a degree that leads to gainful employment at a reasonable cost is a key desired outcome of higher education. Many stakeholders want reliable job placement and return-on-investment information to understand how well institutions achieve this outcome. Prospective students want help making decisions about whether to attend college, where to attend, and what major to select. College graduates are interested in earnings data for their degrees so that they are better prepared for salary negotiations. State policymakers are concerned with student loan default rates and the shares of graduates choosing to leave the state. Job placement and college costs are the topics covered in the current issue of *The AIR Professional File*.

In the article *Using State Workforce Data to Report Graduate Outcomes*, Matt Bryant shares the process and methodology used to measure employment outcomes of graduates of a public university and compares survey data with state wage records. This article is an excellent source of information for institutions seeking innovative methods for studying graduates' earnings and job placements.

In their article *How Noncredit Enrollments Distort Community College IPEDS Data: An Eight-State Study*, Richard M. Romano and Mark M. D'Amico discuss implications of excluding noncredit enrollments when calculating IPEDS expenditures per student full-time equivalent (FTE). As IR professionals, we are frequently asked to benchmark our institutions against peers, and a commonly used IPEDS metric for benchmarking college costs is expenditures per student FTE. The results of this study help us better understand the limitations of this measure and how excluding noncredit enrollments from expenditures per FTE calculations has differential effects across institution types.

Editorial Transition Announcement

In October 2021, Sharron Ronco retired from her role as editor of *The AIR Professional File*, the association's scholarly journal. We thank Sharron for her years of leadership and service! We are pleased to announce that Iryna Johnson and Inger Bergom now serve as editor and assistant editor, respectively.

Iryna Johnson, Editor

Iryna Johnson currently serves as Assistant Vice Chancellor for System Analytics and Business Intelligence at the University of Alabama System (UAS). She has over 17 years of experience in institutional research and has been a member of AIR since 2004. Iryna's publications and presentations emphasize appropriate statistical methods for institutional research data. She received the AIR Charles F. Elton Best Paper Award on three different occasions. Iryna holds equivalents of Ph.D. and Master's degrees in Sociology from Taras Shevchenko National University of Kyiv, Ukraine.

Inger Bergom, Assistant Editor

Inger Bergom is an institutional researcher in the Boston area and has worked in higher education since 2007. Inger earned a Ph.D. and M.A. from the Center for the Study of Higher and Postsecondary Education at the University of Michigan, specializing in evaluation and assessment, learning and teaching, and faculty work. Her work has been published in peer-reviewed journals including Journal of Higher Education, Review of Higher Education, and Journal of Engineering Education.

ISSN 2155-7535

Table of Contents

Using State Workforce Data to Report Graduate Outcomes

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About the Author

Matt Bryant, MEd, is a higher education consultant who specializes in strategic planning, program assessment, and performance reporting. He lives in Bellingham, Washington, where he currently works in the Enrollment and Student Services division at Western Washington University.

Acknowledgments

This case study describes a process for refining and applying methodology outlined by David Troutman and Jessica Shedd in their 2016 article, "Using State Workforce Data to Examine Postgraduation Outcomes," published in issue 169 of *New Directions for Institutional Research.* Many thanks to the authors for their informative scholarship, to my supervisors at Western Washington University for supporting this work, and to John Krieg, PhD, for his insight and mentoring.

Abstract

Survey methodology is the dominant approach among universities in the United States for reporting employment outcomes for recent graduates. However, past studies have shown that survey methodology may yield upwardly biased results, which can result in overreporting of employment rates and salary outcomes. This case study describes the development and application of an alternative reporting methodology, by which state wage records are analyzed to determine employment and salary outcomes for recent graduates. Findings at Western Washington University suggest the significant sample sizes that can be achieved using wage record methodology may provide a more reliable option than survey methodology for accurately reporting graduate outcomes.

Keywords: graduate outcomes, graduate employment, earnings reporting, wage records data

The AIR Professional File, Fall 2021

Article 154

https://doi.org/10.34315/apf1542021

Introduction: Why Not Survey?

For decades, universities in the United States have relied on survey methodology to report employment outcomes for recent graduates. Survey methodology has been recognized as a best practice for reporting graduate outcomes since the late 1970s (Pace, 1979). More than 360 universities use survey methodology every year to report graduate outcomes to the National Association of Colleges and Employers (NACE), an organization considered to be the national authority on graduate outcomes reporting (NACE, 2019a). Western Washington University (WWU), the sample institution for this case study, has used survey methodology to report graduate outcomes through its annual *Employment Status Report* since 1990.

Despite the history and prevalence of survey methodology, survey results might not accurately reflect graduate outcomes due to nonresponse biases. Meta-analysis of survey research shows that "large nonresponse biases can happen in surveys," and indeed such biases are often present (Groves & Peytcheva, 2008, p. 183). In particular, analysis of graduate follow-up surveys find that successful graduates are more likely to respond, yielding upwardly biased results and thus negatively impacting external validity (Dey, 1997; Grosset, 1994). This sort of bias has been observed across survey elicitation methods; while it can sometimes be corrected through postsurvey weighting techniques, such adjustments require auxiliary variables that are typically beyond the scope of such instruments (Dey, 1997; Groves, 2006; Hudson et al., 2006).

Bafflingly, NACE addresses neither nonresponse biases nor data validity in its standards and protocols for graduate outcomes surveying. NACE does recommend a minimum response rate (using the term "knowledge rate") of 65% (NACE, 2019b). However, while "good survey practices dictate striving for a high response rate as an indicator of the quality of all survey estimates" (Groves, 2006, p. 670), it is also the case that "higher response rates do not necessarily reduce nonresponse bias" (Groves, 2006, p. 663). Nevertheless, "overall response rate is one guide to the representativeness of the sample respondents" and a minimum survey response rate of 50% is considered "adequate for analysis and reporting" (Babbie, 2001, p. 256).

Unfortunately, WWU saw the knowledge rate for its employment status reports gradually decline from more than 60% in the 1990s to around 40% in the 2010s, which is consistent with national trends in survey research (Groves, 2006; WWU 1990, 2016a). Furthermore, the knowledge rate reported throughout the 2010s was not the actual survey response rate, but rather the percent of graduates for whom any data were collected, either by survey *or* by a supplementary process. This supplementary process (which by 2014 was included as a suggestion in the NACE protocols) was to search the LinkedIn website for employment records for graduates, and to include those with employment records on the website in the report sample (NACE, 2019b).

Regrettably, this *modified survey methodology* resulted in a significant percentage of the sample being selected based on the primary outcome variable of the study. Since LinkedIn data can be sampled only for those with recent employment records, those data can capture only positive employment outcomes. This sampling methodology represents a systematic form of selection bias that positively skews results and negatively impacts internal validity (Mare & Winship, 1992). Additionally,

this process provided little information beyond when and where an individual was employed; consequently, other measures in the employment status reports were presented as representative of the population, despite being based on only a very small number of survey responses. For example, the average salary reported for 2015–2016 bachelor's degree graduates (a population of 3,280 individuals with a reported sample of 45%) was based on only 100 survey responses (since salary data are not available on LinkedIn, and the salary item was optional on the survey instrument), and therefore represented only 3% of the overall population (WWU, 2017).

Finally, by 2016 it had become apparent that the employment status reports for WWU were in conflict with data from other sources. Since 2012 the university alumni survey (administered 1 to 2 years after graduation) had yielded employment rates 5%–9% lower than those presented in the employment status reports (administered 9 to 12 months after graduation), and did so with more-robust methodology and higher (actual) response rates (WWU, 2016b). Clearly, WWU needed better methodology in order to report outcomes more accurately[1] for recent graduates. This case study describes the process of identifying, developing, and implementing a new methodology for reporting employment outcomes based on state wage records, and presents initial findings and considerations for further research.

ALTERNATIVES: AVAILABLE DATA SOURCES

When initial efforts began in 2017 to implement new methodology for reporting graduate outcomes at WWU, the author was unable to identify a single public university in the United States that was reporting employment rates using any form of alternative methodology.[2] Without exception, every university in the Pacific Northwest region and every peer institution in the country was reporting graduate outcomes using survey methodology (of various levels of modification) according to the NACE protocols.

Graduate outcomes consist of two primary measures: percentage of graduates employed, and percentage of graduates seeking further education (within 6 months of graduation, according to NACE). For the latter measure, subsequent enrollment records for graduates were already available to WWU through the National Student Clearinghouse; this rate could be calculated with a high degree of accuracy. However, there was no comparable national source for employment records available in 2017, and there is still no such resource available in 2021.

Publicly available employment data exist in three primary forms: as national census data (based on survey responses), as national social security data (based on tax records), and as state wage record data (collected directly from employers). However, the Higher Education Opportunity Act of 2008

1. To be clear, I describe here the former practices at WWU not to call into question the work of the fine professionals who preceded me, but because those professionals were simply observing best practices advocated by a leading national organization, and because similar practices are still in use presently at many other institutions.

2. The University of Texas began providing graduate earnings data based on wage records in 2014; however, these data were not used to determine employment rates and reflected earnings starting only 1 year after graduation, and not during the critical 6-month postgraduation time period typically emphasized in graduate outcomes reporting.

banned the linking of national data to student-level record information, making it impossible to use federal data sources at the institutional level for outcomes reporting. This left wage record data, which were already being used in Washington State to report average earnings for graduates 1 or more years after graduation (Education and Research Data Center [ERDC], 2017).

However, although wage records "account for the vast majority of workers in a state" and are "considered to be one of the most accurate data sources," these records were presumed to provide insufficient data for calculating employment rates (Troutman and Shedd, 2016, p. 89). In fact, in the article that inspired this case study, this argument was presented on the basis that wage data are limited to workers employed in a given state, and therefore "without data on employment out-of-state, institutions would be underestimating, to varying levels of degree, the true employment rate of graduates" (Troutman and Shedd, 2016, p. 89). There was also the limitation that wage data cannot account for all types of employment, because the records exclude federal and self-employed workers, and therefore cannot provide outcomes even for all graduates employed in-state. Nonetheless, while the apparent shortcomings of using wage records to report graduate outcomes proved to be challenges, it was determined these limitations could be accounted for with appropriate methodology (see Methods section, this article).

PROCESS: ACCESSING DATA

In many states, individual-level wage records are available to public institutions for evaluative purposes through state agencies, but these institutions can access the records only once an appropriate data-sharing agreement has been established. The specific agency and process for establishing such an agreement will vary by state, and those interested in obtaining wage records should begin the process by contacting their state labor office.[3] For this case study, a data-sharing agreement was established with the Employment Security Department (ESD) of Washington State, thus providing access to wage records (including wages earned, hours worked, and employer details) for WWU graduates.

Worth noting here is the timeline of this process. Because graduate employment outcomes are measured 6 months after graduation,[4] it is necessary to wait two fiscal quarters after the last members of the cohort have graduated in order to capture outcomes for those graduates who gained employment during the second quarter. Furthermore, it is necessary to wait an additional fiscal quarter to capture a full quarter of earnings for those graduates who gained employment during the second quarter, since records of employment gained during the second quarter will not include a full quarter of wages for estimating annual earnings.

3. The data-sharing agreement for this case study required nearly 6 months to be finalized; those interested in establishing such an agreement may wish to initiate this process as soon as possible to ensure timely access to data.

4. It is also worth noting that wage record methodology provides an advantage over survey methodology in observing this reporting timeline. NACE recommends surveying each graduating class the following December, which results in capturing outcomes 15 months after graduation for those cohort members who graduated in the summer quarter, and outcomes 6 months after graduation for those cohort members who graduated in the spring quarter (for institutions using quarterly scheduling). Wage record methodology allows for effectively analyzing results for an entire cohort exactly 6 months after graduation, regardless of the term of completion for each individual.

In the state of Washington wage records become available approximately 8 weeks after the end of the fiscal quarter. Therefore, for a full analysis of outcomes for an annual class of graduates (by the methodology described in the Methods section), it is necessary to wait three fiscal quarters plus an additional 8 weeks, or approximately 11 months, for data to become available. Likewise, to capture educational outcomes for individuals 6 months after graduation, it is necessary to wait for enrollment records to become available for the third quarter after graduation to capture outcomes for those graduates enrolled in programs that commenced at the end of the 6-month time period. (The preceding is based on the assumption that intent to enroll was established during that time period, and to account for the varying academic calendars and program start dates across the myriad higher education institutions in the United States.)[5] It is worth noting that this timeline does not yield outcomes data by the deadlines set by NACE to be included in its annual First-Destination Survey. This timeline can be considered a limitation of the methodology applied for this case study, or a weakness of the current methodology used by NACE for reporting graduate outcomes, the timeline of which is simply not long enough to allow for using actual employment and enrollment records to verify or report outcomes.

To request wage records, it is necessary to provide identifying data for individuals. To analyze annual graduate employment outcomes, it is necessary to provide identifying data for all individuals in the defined graduating class. For the methodology described in the Methods section, the group of all graduates in a given class represents the study population.

State agencies responsible for processing wage record requests will likely require social security numbers to identify individuals. For the purpose of this case study, student university identification numbers were also provided, allowing for social security numbers to be removed from the returned records, while maintaining the ability to identify individuals. Those university identification numbers were then matched to institutional records for each individual, including degree program, demographic data, and permanent address. Finally, these data were matched with enrollment records for those individuals, requested through the National Student Clearinghouse, to allow for comprehensive analysis of outcomes for the study population.

METHODS: CALCULATING OUTCOMES

Once enrollment and wage records have been obtained for a graduating class, data should be cleaned, matched, and sorted for analysis. Troutman and Shedd provide excellent guidance on data cleaning and preparation for analysis, including a decision tree for processing inconsistencies in wage records, which is a tedious but necessary task "to ensure data are accurate and reliable" (Troutman and Shedd, 2016, p. 23). At a minimum, this process requires removing unidentified and duplicate records, appropriately sorting instances of multiple records (for graduates with multiple employers), and identifying any outlier records to be excluded from the sample dataset.[6] A variety of software programs of varying degrees of sophistication can simplify this process; for the purposes of this case study, the use of Microsoft Access with simple queries to join,

5. At WWU the academic year ends in June. As a result, enrollment records for each annual cohort are requested from the National Student Clearinghouse the following March, and wage records from the ESD the following May. These records are used to calculate outcomes for an annual report of graduates from the previous academic year; the report is published each June.

6. The ERDC of Washington State also provides useful guidance for linking and cleaning data in its *Employment Data Handbook* (ERDC, 2012). Note that part of the data-cleaning process at WWU has included removing from the sample any individual records reflecting less than 1 hour of work at minimum wage in order to avoid skewing aggregate outcomes with isolated earnings unrepresentative of continuing employment.

compare, and filter records proved to be sufficient for data preparation.

Once data have been properly prepared, calculations for graduate employment outcomes are not particularly sophisticated, and primarily depend on accurately defining the measures to be analyzed. As mentioned above, the population for each report consists of all individuals in the graduating class, and definitions are provided in Table 1 for each measure of that population.

Table 1. Measure Definitions

Measures	Definitions
Sample	Population individuals with permanent addresses in the state
Seeking Further Education	Sample individuals with enrollment records within three quarters of graduation
Employed	Sample individuals not enrolled in further education with positive wage records in the second quarter after graduation
Earnings	Annualized earnings based on third quarter wage records for individuals considered "Employed"
Other	Sample individuals who do not meet criteria above for "Seeking Further Education" or "Employed"

Calculating these measures is a fairly straightforward process:

1| The sample is selected based on permanent address. If, at the time of analysis, an individual has an in-state permanent address in the student information system, that individual is included in the sample.[7]

2| National Student Clearinghouse enrollment records are then analyzed for the second and third quarters after graduation for each individual in the sample. Those with enrollment records in the second or third quarter are considered to be "Seeking Further Education," and wage records are not analyzed for those individuals.

3| Wage records are then analyzed for the second quarter after graduation for the remaining individuals in the sample (those not "Seeking Further Education"). Those with positive wage records in the second quarter are considered to be "Employed."

4| Wage records are then analyzed for the third quarter after graduation for each individual considered to be "Employed," with third quarter wages for each individual quadrupled to estimate annual earnings.

7. This is a critical component of the methodology for this study. The permanent address field in the student information system at WWU is updated quarterly based on United States Postal Service records and alumni outreach efforts and is considered to be a reliable indicator of a graduate's current residence. If a high percentage of graduates reside in-state, then limiting the sample to those individuals represents a workaround to the issue of not capturing out-of-state employment. With approximately 90% of WWU graduates residing in-state, sample sizes have provided confidence in assuming outcomes for in-state graduates are also generally representative of graduates who reside out-of-state. This suggestion is supported by the fact that Washington has the second-highest median wage of any state and also has a statistically average employment rate. Even if all graduates who left Washington ended up moving to Massachusetts, which is the state with the highest median wage and among the highest employment rates, employment and average earnings for the population would increase by less than 0.5% overall (StatsAmerica, 2020). However, this methodology may not be effective for institutions with graduates who are more geographically dispersed, although it could be possible to obtain wage records from neighboring states to account for broader geographical dispersion (Troutman and Shedd, 2016).

5| The remaining individuals in the sample (those not "Seeking Further Education" or not "Employed") are considered to be "Other," a category that accounts for graduates who are still seeking employment or who are engaged in other activities (nontraditional employment, parenting, traveling, volunteering, etc.).

Once these calculations have been made, some adjustments are necessary to determine accurate outcomes rates. The issue of wage records capturing only in-state employment is addressed by limiting the sample to graduates living in-state (see footnote 7). In order to address the issue of wage records capturing only certain types of employment, however, it is necessary to adjust the employment rate to reflect unrepresented types.

Wage data "cover approximately 90 percent of the workforce, including private businesses, state and local governments, some nonprofit organizations, and Indian Tribes" (Mullin, 2012, p. 76). This results in two primary unrepresented types of employment: federal employment and self-employment.[8] In order to account for these types of employment, the sample employment rates for this case study have been adjusted based on the federal employment (2.2% [Office of Personnel Management (OPM), 2017]) and self-employment rates (10.5% [Hipple & Hammond, 2016]) for Washington State. Applying these rates as ratios, a total proportional increase of 14.5% was made to the sample employment rate,[9] with corresponding decreases to the rates of students categorized as "Other," to determine the overall employment rate for each cohort.

8. The ESD of Washington State publishes a useful guide on types of nonfederal occupations that are not represented in unemployment insurance wage data. A thorough review reveals a variety of occupations that can be categorized as either nontraditional work (elected, religious, small-scale [less than $1,000/quarter], inmate/patient/student, unpaid) or self-employment work (ESD n.d.). For the purposes of this study, nontraditional employment is assumed to be minimal and to be reflected in the "Other" category; federal and self-employment are accounted for by the adjustment described in footnote 9.

9. For this adjustment, the federal and self-employment rates noted above are used to determine a ratio for federal/self-employed workers to other worker types in the state, a value of .145. That value is then applied to the rate of other worker types observed in the sample, to account for unrepresented types of workers in calculating the overall employment rate.

FINDINGS: ANALYZING OUTCOMES

In 2018 WWU began using the wage records methodology described above to report outcomes for the 2016–2017 graduating cohort. However, WWU also requested records for the 2014–2015 and 2015–2016 graduating cohorts, for whom outcomes were previously reported using modified survey methodology, in order to compare outcomes by methodology for the same cohorts. Cumulative outcomes by methodology type for each of those cohorts are presented in Table 2.

Table 2. Outcome Comparisons

Measures	14–15 Survey	14–15 Records	15–16 Survey	15–16 Records
Population	3,174	3,174	3,308	3,308
Sample	42.7%	93.4%	45.2%	92.3%
Employed	82.7%	75.2%	83.1%	75.6%
Further Education	11.9%	12.0%	13.2%	12.9%
Other	5.4%	12.8%	3.7%	11.5%
Salaries Reported	296	1,945	100	2,011
Average Salary	$38,732	$29,782	$43,570	$30,083

Source: WWU, 2016a, 2017.

Basic analysis comparing the different outcomes sets in Table 2 indicates that, for each cohort, modified survey methodology produced an approximately 10% higher employment rate (for an overall rate increase of 7.5 percentage points) and a 30%–45% higher average salary measure, based on a 50% smaller sample than wage record methodology. These comparisons provide some indication of the extent to which the modified survey methodology used previously may have resulted in overreporting of graduate outcomes. Furthermore, the significant sample sizes that can be achieved using wage record methodology suggest it may be the most reliable option for accurately reporting graduate outcomes. For this case study, differences in sample sizes between modified survey and wage record methodology are especially apparent with regard to the average salary measure. Wage records provided salary data for more than 60% of the population, whereas survey responses previously provided salary data for less than 10% of the population. At WWU, where regional and demographic factors allow for sampling sizes exceeding 90% of the population, wage record methodology has proven to provide more-consistent and more-reliable data for a far greater number of graduates and has consequently become the primary approach used at the university for reporting graduate outcomes.[10]

10. WWU has since implemented a graduate outcomes report dashboard summarizing wage record data for cohorts dating back to 2006–2007 (using a slightly modified version of the methodology described in this article), and no longer publishes past employment status reports. The graduate outcomes report dashboard can be viewed at WWU (2021).

DISCUSSION: CONSIDERING IMPLICATIONS

While the wage record methodology described in this article was designed to minimize confounding factors, it does rely on some imperfect assumptions: that most graduates are working in the state in which they reside, that outcomes for in-state graduates are generalizable to out-of-state graduates, and that graduates acquire federal employment and self-employment at the same rates as the state workforce. There are also some additional limitations to using wage record methodology to report graduate outcomes. As previously mentioned, the timeline for requesting wage records does not allow for the resulting outcomes to be submitted for inclusion in NACE's First-Destination Survey, an annual national publication. More significantly, wage records do not include job titles, a key piece of outcomes information often requested by prospective students, which is critical for determining a rate for field-related employment. While it is not possible to determine whether employment reflected in wage records is field-related, job titles for individual graduates can be reported more reliably using survey methodology. At WWU, sample job titles for recent graduates are reported separately based on responses collected for the university alumni survey. Finally, wage records might not allow for reporting outcomes for very small programs or majors without the risk of aggregate data becoming individually identifiable. At WWU, employment outcomes are suppressed for programs or majors with four or fewer members in the sample for this reason.

This case study presents one possible methodology for using wage records to report graduate outcomes. Depending on the institution, other methodologies for using wage records could be more appropriate. In particular, institutions with graduates who are more geographically dispersed might need to obtain data from neighboring states to accurately report employment outcomes. In 2018 a partnership was announced between the University of Texas System and the United States Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) program to report national aggregated data of graduate earnings by institution and major. This reporting was accomplished through a "powerful but 'imperfect' workaround to the current ban on a federal database that would link student-level educational data to national employment data, which was forbidden by the 2008 Higher Education Act" (Bauer-Wolf, 2018, para. 2). Partnering with the LEHD program might provide public institutions with access to national wage record data, but partnerships must be established at the state level, and only nine states currently provide data for a majority of graduates (United States Census Bureau, 2021).

Additionally, for those institutions without access to wage records data, this case study may provide some best practices in improving survey methodology to report graduate outcomes more accurately. One of these best practices may be to avoid the modified process for data collection advocated by NACE (using LinkedIn profiles), which results in selection bias, positively skews results, and negatively impacts internal validity. Another best practice may be to collect identifying information and auxiliary variables for survey respondents, in order to correct nonresponse bias through postsurvey weighting. It might also be useful to require critical items (e.g., salary) to maintain strength of sample size, as well as to include items beyond economic outcomes (e.g., satisfaction

questions) to encourage engagement from those with less-favorable outcomes.

Finally, it is worth mentioning that there are other potentially unexplored uses for wage records data that could prove meaningful to institutional research efforts. Wage records data, including hours worked, wages earned, and employer industry, can be used to analyze employment outcomes by demographics, to measure the impacts of specific employment support interventions, and even to analyze the impacts of employment for students who are currently enrolled. Ultimately, wage records represent a promising data source for use by higher education administrators to increase accountability and transparency, and to inform efforts to improve graduate outcomes.

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ISSN 2155-7535