Returns to Later-Aged College Activity

David Copeland, Alex Hathaway, Thomas Mroz, Lakshmi Pandey, and Sally Wallace¹

Andrew Young School of Policy Studies

Georgia State University

September 2019

¹Wallace is also Extraordinary Professor of the African Tax Institute, University of Pretoria, RSA. We thank the Alfred P. Sloan Foundation for financial support.
Introduction

The benefits of a college education are well documented. However, the majority of existing research focuses on students who matriculate soon after high school graduation. Little empirical evidence illustrates whether a college degree is similarly beneficial to those already in the workforce, particularly individuals over the age of 50, which represents our treatment group in this research. Nonetheless, the coming years will see the dramatic growth of older individuals, many of whom will continue to be active in the labor force, and policymakers would benefit from effective strategies to improve the labor market outcomes of older individuals.

This research evaluates the labor market outcomes of individuals in the state of Georgia who engage in college activity (including attainment of degrees) at age 50 or older by merging state-level labor force data with educational data from the University System of Georgia (USG). Specifically, we explore whether later-age college activity results in employment opportunities with higher wages and increased retention in the labor force beyond the traditional retirement age of 65 compared to comparable individuals who do not attain a bachelor’s degree. The results will provide policymakers across the United States with information to make informed decisions regarding higher education incentives and policies for older students.

The American Community Survey shows that nationally the labor force participation rate for those 50 and older was 26 percent in 2004, but this share is expected to grow to nearly 39 percent by 2024. At the same time, employers continue to demand more educated workers with more sophisticated skill sets. Long-term outsourcing, declines in blue-collar employment, and the effects of the Great Recession on retirement savings, among other things, have contributed to more older workers enrolling in higher education programs. Understanding the impact of higher education and skill adaptation for older individuals is critical, and later-age college activity may prove to be a viable path to remaining in the workforce longer and to building better retirement prospects.

Individuals enter or return to college at later ages for a variety of reasons: to upskill or reskill their human capital to better compete in the labor market; to increase their job options; to

---

2 We use the term college to represent any institution of higher education in the University System of Georgia.
3 Throughout this document, “later-age” refers to individuals who are age 50 and older.
4 From the American Community Survey (ACS) data, 2000-2015 Public Use Microdata Sample (PUMS).
5 AARP. (2011). “Will workers have the education needed for the available jobs?”
7 Ibid.
increase their wages; to capture its affordability; and to satiate their desire for intellectual stimulation, among others. No matter the motivation for the degree, our interest is in the market response: Does a later age college degree (or some college) offer a wage premium? Is it similar in scale to a college activity earned at a younger age? If a wage premium for older degrees exists, does attainment of coursework or a degree affect income stability in retirement? These are all questions we pose in this paper using uniquely identified micro data from the University System of Georgia (USG) and the Georgia Department of Labor (DOL) from 2002 to 2017. Among the challenges of this research are the following: identification of a treatment group of first-time later-age college students, identification of a defensible control group, and matching two very large administrative data sets. These challenges will be discussed in detail below. This is a work in progress and many of these questions are not fully answered at this stage.

The paper proceeds as follows. The next section discusses the prior literature on later-age degrees, followed by the research methodology. The methodology provides a detailed overview of the data sources and identification strategies, as well as a discussion of data challenges the research team faced. Results are presented in the following section. The final section concludes.

Literature

There is a documented wage premium associated with college degrees (versus no college degree)\(^8\); however, most of this literature addresses degrees of the average-aged graduate, or even younger-aged graduates. There is scant research on the existence of a premium (or not) for individuals who return to college after age 50 or for those attaining “some college” at various ages. For later-aged students, it is possible that previous labor market experiences up to college re-entry trumps the market value of the degree or skill development via college courses, which may result in little or no wage premium.

As the baby boomer population ages and more mature workers remain in the labor force, higher education for this group becomes potentially more important. The literature on “older,” “adult,” or “mature” college students does not standardize an age range, and the authors use ages stretching from 25 to above 70 to analyze returns from higher education on labor. When looking at middle-age and older graduates, the research shows they have greater difficulty gaining new

---

employment compared to their younger counterparts.\textsuperscript{9} Employers may be more reluctant to hire older workers because of the associated higher health care costs and a perception that they are less productive and more inflexible than younger workers.\textsuperscript{10}

Several studies suggest that the return on investment for older-age degree attainment is minimal and often does not offset the total costs.\textsuperscript{11,12,13,14} Some authors note that there may be a break-even point, an age at which higher education would no longer benefit wages in the long-run. Monks (1997) determined this point to be near 32 years of age—after 32, workers do not see an initial bump in their wages.\textsuperscript{15} Stenberg and Westerlund (2016) also found a point at which the returns to higher education are not positive, but their study focused on years of work after graduation.\textsuperscript{16} The authors discovered that after 10 years of work, higher education had good returns for their study population, ages 29–55, favoring a lower age of degree completion.

Very few studies investigate the relationship between later-age degree attainment and retirement behavior or finance. The most prominent example, Stenberg and Westerlund (2013), noted that a sample who attended higher education institutions in Sweden between the ages of 42 and 55 saw a 5-percentage-point increase in those remaining in the labor force between the ages 61 and 66 compared to a control.\textsuperscript{17} Butrica, Schaner, and Zedlewski (2006) reported that workers older than 65 with some college education are almost twice as likely to be employed compared to similar workers without a high school diploma.\textsuperscript{18} This study does not impose a timeframe for degree attainment, but the study supports delayed retirement behavior with increased education.

A sizable portion of the adult education literature deals with barriers to enrollment and degree completion.\textsuperscript{19,20,21} Age, ability, and opportunity costs have been found to influence higher

\textsuperscript{9} Purcell et al. (2007). “Hard lessons for lifelong learners: Age and experience in the graduate labor market.”
\textsuperscript{11} Ibid.
\textsuperscript{12} Stenberg, de Luna, & Westerlund. (2011). “Does formal education for older workers increase earnings?”
\textsuperscript{13} Monks. (1997). “The impact of college timing on earnings.”
\textsuperscript{16} Stenberg & Westerlund. (2016). “Flexibility at a cost-should government stimulate tertiary education for adults.”
\textsuperscript{17} Ibid.
\textsuperscript{19} Osam, Bergman, & Cumberland. (2017). “An integrative literature review on the barriers impacting adult learners’ return to college.”
\textsuperscript{20} Bergman et al. (2014). “If life happened by a degree didn’t.”
\textsuperscript{21} American Council on Education. (2007). “Older adults and higher education.”
Many studies observe that older workers play many roles in life—parent, spouse, employee—and that the time constraints from these roles may affect their ability to enroll in, or to complete, a degree.\textsuperscript{25,26,27} Furthermore, Goetz and Rupasingha (2005) and Jepsen and Montgomery (2011) investigated how geography affects higher education attainment.\textsuperscript{28} Although online education has made great strides, those living in more rural areas have less access to higher education institutions and may not be able to commute for a degree program. Intangible barriers also have notable effects on graduation. Bergman et al. (2014) found that strong social and family ties help older students graduate from college and that having clear educational goals and institutional contacts who are responsive to the unique situation of older students also improve enrollment and graduation rates.\textsuperscript{29}

Overall, our research addresses several holes in the literature. First, although some of the literature suggests that the returns to later-aged degrees may not cover the costs of attaining a degree, certain subgroups may have positive outcomes. Additionally, none of the literature is able to break down racial differences in labor market outcomes in this respect and there is little focus on the intensity of college experience (BA versus and associates degree, certificate, or a particular number of credit hours). The diversity of USG students may shed some light on returns for demographic subgroups and the large data set holds promise for categorizing impacts by the intensity of the college experience.

Second, the most relevant research to date has been done in Sweden, and results from the U.S. would prove significantly different for several reasons. The U.S. has a wider dispersion of skills, a wider wage gap, a less robust safety net, and job polarization that may favor skill upgrades. In contrast, Sweden has an institutional framework that encourages low-skilled worker education, the returns to which may be lower than expected in the U.S. workforce. Researchers note that pension systems are changing in Europe and later-age earnings are more important than in previous years, a situation that more closely mirrors the U.S. workforce, but this is not fully

\textsuperscript{23} Nybom. (2014). “The distribution of lifetime earnings returns to college.”
\textsuperscript{24} Taniguchi & Kaufman. (2005). “Degree completion among nontraditional college students.”
\textsuperscript{25} Osam, Bergman, & Cumberland. (2017). “An integrative literature review on the barriers impacting adult learners’ return to college.”
\textsuperscript{26} American Council on Education. (2007). “Older adults and higher education.”
\textsuperscript{27} Taniguchi & Kaufman. (2005). “Degree completion among nontraditional college students.”
\textsuperscript{29} Bergman et al. (2014). “If life happened but a degree didn’t.”
represented in the research populations to date. Finally, many parts of the U.S. economy have changed following the Great Recession, and even highly robust studies in Europe would not properly reflect the labor market in the U.S. as our study of USG students would. In addition, the use of administrative data for Georgia increases the size of the treatment population (and variants in that population) that are not possible in many of the survey based studies.

**Research Methodology**

To assess the effects of older individuals returning to college in Georgia on their employment and wages, we use two primary data sources. The first dataset contains administrative records from the University System of Georgia (USG), detailing demographic and school-related information for individuals who were enrolled in USG institutions any time between 2002 and 2017, regardless of matriculation date. The second primary data source comes from the Georgia Department of Labor’s Quarterly Census of Employment and Wages (QCEW). These data provide quarterly information on all workers in the state covered by the unemployment system and contain information on wages paid in the quarter, as well as the employer’s name, workplace location and NAICS code. We can match the QCEW data to the USG enrollment and outcomes data using individuals’ social security numbers.

To determine whether the college experience has an impact on employment and wages of later age students, it is crucial to develop a comparison group as much like the treatment group as possible other than the decision to enter college at a later age. Identification of the causal impact of later age college on labor outcomes is challenging. There is not a readily identifiable control group—or even a treatment group—as it turns out. Our aim is to analyze the returns to college education for later aged “freshmen”—those who begin their college education after a defined later age. More detail is provided below, but among the complications, we find the following issues in the data and in the treatment/control definition:

- There is no neat age cut-off to identify the treatment group and therefore the control group. We use a somewhat arbitrary age of 50 and older as the treatment group.
- Motivations for entering at 50+ can vary, which means outcomes will likely vary. We work very hard to identify individuals who ex ante enroll with a goal of a BA/BS degree to study the return to a late age-degree. A large number of those

---

30 To make this research tractable we focus on students who are new at age 50 or older.
age 50+ return for associates degrees, certificates, or a few courses and these are analyzed separately.\textsuperscript{31}

- Many the 50+ enrolled population “touched” the USG system at an earlier age, such as those who briefly took courses after graduating high school. Dropping those observations substantially reduces the population of interest. If an individual had 30 or fewer credit hours, which were taken no sooner than 10 years before returning at age 50+, we consider them part of the treatment group. This means that we do not see them in the USG data for 10 years or more after they earned 30 credit hours or less.

The process of identifying later age entrants, classifying “freshmen” and following students through their academic process has been a very time consuming and illuminating process. There is much to learn about the path of students at any age. The data-dive has provided us with a very detailed description of these experiences and complications, which we believe is a contribution itself. We present the descriptive analysis in a following section.

Identification Strategies

We have investigated several empirical approaches as we seek to isolate the causal impact of later age college activity--some of which have been ruled out because of the relatively small number of later age degree seekers and/or consistent co-variates.\textsuperscript{32} The principle identification strategy is to match similar individuals—one who is a later age USG enrollee with one who is not a USG enrollee but a “twin” in other ways—using QCEW labor market information such as quarters worked, wages, industry, and county of workplace for several years prior to the date each USG attendee enrolled at a USG institution. Because the QCEW data contains limited demographic information for workers (e.g., we do not know workers’ ages in the QCEW data files), we use a number of matching variables to mitigate biases due to our inability to control for extensive sets of demographic characteristics for the non-USG attendees that we identify in the QCEW data. Once the matching is complete, we can compare labor market outcomes such as wages and employment histories for these two groups of individuals.

\textsuperscript{31} Georgia provides a full tuition waiver for individuals age 62 and older to attend USG institutions. This program began in 1987 and highlights another policy interest in this research.

\textsuperscript{32} For these reasons, an IV approach and structural estimation were abandoned due to population size and a lack of consistent covariates. Box 1 summarizes the abandoned empirical approaches.
after the USG attendees complete school (at various levels), as a measure of the impact of attending a USG institution on these labor market outcomes.

The matching process is currently a work in progress and is occurring as follows. The treatment group is “freshmen” from the University System of Georgia (USG) dataset who matriculate at age 50 or greater and subsequently enrolled in a USG institution and the control group is similar individuals who are not USG freshmen at any age (no college exposure). For each person in the USG dataset, we need to evaluate all individuals in the Department of Labor (DOL) data and construct a measure of “similarity” out of the 10+ million observations in the DOL data set. The similarity measure is developed from coincident variables, which are listed in Table 1, and the first round of test results are presented in a subsequent section.

<table>
<thead>
<tr>
<th>Table 1: Variables used for matching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable name</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Nq</td>
</tr>
<tr>
<td>TotalWage</td>
</tr>
<tr>
<td>CountyDistance</td>
</tr>
<tr>
<td>bdecile1</td>
</tr>
<tr>
<td>bnaics1</td>
</tr>
</tbody>
</table>

While this is our principle empirical strategy, we are in the process of additional analysis that will help us gain confidence in our results. Therefore, we also plan to conduct another match of the set of later age USG enrollees found in the QCEW (so we have college information as well as labor information) files with individuals in Georgia from datasets such as the Current Population Survey (CPS) and the American Community Survey (ACS). An advantage of this approach is that we would have detailed demographic information for both our treatment and control groups. We could, for example, match on age, sex, race, education (pre-enrollment), and

33 Degree status is identified in the USG data.
some geographic details. We could also match on industry, and we could construct propensity scores to use in the matching process. It will likely be important that any industry and geographic matches be done on the USG student’s pre-attendance industry and geography, as industry and job changes will likely be key pathways through which degree attainment at later ages would operate.

Our final identification strategy compares, within the set of older college attendees from matched USG and QCEW files, those who successfully obtained a degree to those who did not. With the USG data we match on majors, grades, and course loads (during the first year or two back in college) as well as on the geographic detail described above. Matching on these measures of early academic achievement make it much more likely that the conditional independence assumption could be approximately satisfied. In that sense, it might be the best identification strategy we have for this analysis. The drawback to this approach is that the size of the matched samples is small. We also investigate the outcomes of graduates of slightly younger age cohort shed light on whether there is a smooth or kinked impact of a college degree on labor outcomes.

In all cases, we will categorize the results by race and gender if we have sufficient observations in the matched data.
An instrumental variables approach was considered out of concern over the standard conditional independence assumption for matching estimators. We planned to use detailed geographic-level information on employment conditions and school programs to model the decision to enroll in a USG institution. In particular, we have access to county-level unemployment rates and construct geographically specific measures of USG school programs using the USG data. Variations in these measures across time, and to a smaller extent across counties, provide exogenous variations in USG enrollments that serve as instrumental variables (IVs) from college attendance. Fees at USG institutions have increased considerably over the study period and differentially across USG schools, and this time-series/geographic variation provides an additional source of identification. The instrumental variables approach has the potential to eliminate some of the biases in a more conventional matching estimator. It is important to recognize that the matching and IV approaches identify different types of program effects.

We had also hoped to explore a structural modeling approach to evaluate the impacts of college attendance for older adults on their future employment and wage outcomes. To do this, we would construct a matched sample for the USG enrollees based on characteristics in the QCEW files using data from three to five years before their enrollment to three to six years after their enrollment. Using these matched individuals, we would model their subsequent labor market and college enrollment decisions using semi-parametric heterogeneity control estimators to help control for non-ignorable selection into college attendance. As in the instrumental variables approach, we would jointly model the attendance and labor market outcomes as they evolve over time. This approach more directly controls for unobservable factors that could bias the estimates of the effects of later-age college attendance on wages. In this approach, identification depends upon the same sets of variables used in the IV approach as determinants of college attendance. It differs from the standard IV approach by modeling how the decisions to enroll (or not) across years are influenced by unobserved factors that also affect the evolution of wages over time. This approach is quite similar to limited information maximum likelihood estimation, which is known to provide more accurate estimators than IV. Versions of these types of factor models have been used extensively in formal structural estimation approaches (sometimes referred to as “types”) and in less formal panel data settings. Because they explicitly model the dynamic decisions and outcomes, they can more effectively exploit how interactions of the IVs across time impact college attendance decisions.
Data Sources

This research uses de-identified data from the Georgia Department of Labor (DOL) and educational data from the University System of Georgia (USG). The DOL data provide quarterly wages of individuals and includes their employer and North American Industry Classification Code (NAICS) employer industry code. The DOL data allow us to follow individuals in and out of the labor force in Georgia and identify changes in employment for those who are employed in a job that is covered by the unemployment insurance system. For individuals who are 50 in 2002, we can follow them until they are 65; individuals who are 59 in 2002 can be followed until they are 74. We will cut the data several ways in terms of age, race, ethnicity, degree program, and industry, and we report our analyses by demographic groups when the estimation is robust under those identifiers.

Because the datasets are merged by social security number, we have a panel of all individuals in the USG system and the DOL system. The USG data contain detailed socioeconomic and demographic data while the DOL data contain detailed employment, unemployment, and wage information.

Data Story

We faced significant obstacles in identifying our treatment group. Initially, we received a USG data base that contained only students who had ever started in the USG system in 2002 or after. This severely limited our sample size and the treatment group we could create from it. Subsequently, we increased our sample size by including students who were enrolled during our target period (2002+) but may have had interactions with the USG system before 2002. It is from this larger sample that our ultimate treatment group was selected.

We classify the later age freshmen as those who have 30 credits or fewer at the first observed point in the data. This credit measure is a cumulative measure that includes the number of credit hours earned at the current institution plus the total number of credit hours accepted from transfer colleges and external programs including, but not limited to, the College Level Examination Program (CLEP), Advanced Placement (AP), International Baccalaureate (IB), and Dual Enrollment.

34 Other researchers wishing to use the USG data may need prior approval.
A large number of the 50+ enrolled population “touched” the USG system at an earlier age, such as those who briefly took courses after graduating high school. Dropping those observations substantially reduces the population of interest. If an individual had 30 or fewer credit hours, which were taken no sooner than 10 years before returning at age 50+, we consider them part of the treatment group.

The following provides detail on the resulting treatment group of older USG student.

*Some Descriptive Statistics of USG later age Population*

According to our definition of later age freshmen, we have a population of approximately 33,000 (2002-2017). The current steady state of annual later age freshmen enrollment (by our definition) is approximately 1,000 later-age students among the 28 USG institutions of higher education (four of which are well-regarded research institutes: Georgia Institute of Technology, the University of Georgia, Augusta University, and Georgia State University). This information is presented in Table 2 and compares size of the group of later age freshmen with the total number of later age students. For example, in 2017, the enrollment of later age freshmen is 1,012 and the enrollment of all later age students (50+) is 10,072. In our data, once you enroll as a freshman you enter the ranks of total pThe other institutions are comprehensive universities, state universities, and state colleges. In 2016, USG conferred 38,514 bachelor’s degrees and enrolled a total of 321,551. The percent of later age freshmen that are conferred some credential (certificate, associates degree, BA, etc.) is very small. Due to inconsistencies between graduation data and enrollment data we are still working on identifying the graduation credentials of later age freshmen but early analysis suggests that less than 25 percent of these students complete a credential.\(^{35}\)

\[^{35}\text{We are working with our USG colleagues to hone this estimate.}\]
Table 2: Later Age Freshmen an Later Age Total Student Population USG

Freshmen and Total Population: 2002 - 2017

<table>
<thead>
<tr>
<th>Year</th>
<th>Freshmen</th>
<th>Total Population</th>
<th>Freshmen as Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>5,159</td>
<td>9,671</td>
<td>53.35%</td>
</tr>
<tr>
<td>2003</td>
<td>2,982</td>
<td>12,096</td>
<td>24.65%</td>
</tr>
<tr>
<td>2004</td>
<td>2,531</td>
<td>13,482</td>
<td>18.77%</td>
</tr>
<tr>
<td>2005</td>
<td>2,204</td>
<td>13,348</td>
<td>16.51%</td>
</tr>
<tr>
<td>2006</td>
<td>2,155</td>
<td>13,500</td>
<td>15.96%</td>
</tr>
<tr>
<td>2007</td>
<td>2,057</td>
<td>13,714</td>
<td>15.00%</td>
</tr>
<tr>
<td>2008</td>
<td>2,006</td>
<td>13,861</td>
<td>14.47%</td>
</tr>
<tr>
<td>2009</td>
<td>2,065</td>
<td>14,281</td>
<td>14.46%</td>
</tr>
<tr>
<td>2010</td>
<td>2,230</td>
<td>14,948</td>
<td>14.92%</td>
</tr>
<tr>
<td>2011</td>
<td>1,806</td>
<td>14,728</td>
<td>12.26%</td>
</tr>
<tr>
<td>2012</td>
<td>1,701</td>
<td>14,750</td>
<td>11.53%</td>
</tr>
<tr>
<td>2013</td>
<td>1,395</td>
<td>13,560</td>
<td>10.29%</td>
</tr>
<tr>
<td>2014</td>
<td>1,280</td>
<td>12,355</td>
<td>10.36%</td>
</tr>
<tr>
<td>2015</td>
<td>1,235</td>
<td>11,182</td>
<td>11.04%</td>
</tr>
<tr>
<td>2016</td>
<td>1,075</td>
<td>10,709</td>
<td>10.04%</td>
</tr>
<tr>
<td>2017</td>
<td>1,012</td>
<td>10,072</td>
<td>10.05%</td>
</tr>
<tr>
<td>Total</td>
<td>32,893</td>
<td>206,257</td>
<td>15.95%</td>
</tr>
</tbody>
</table>

The vast majority of the aged 50 and older student population attend Comprehensive Universities and State Universities, nearly 50 percent in any given year (Figure 1, all later age students). The remaining half of the student population are split between State Colleges and Two-Year State Colleges (about 2/3 of the remaining half) and Research Universities. The share of this population attending research universities has expanded over time, reaching the highest levels in the last three years (2015-2017) of the data.
Figure 1: Institution Breakdown Later Age Students

The gender distribution of later-age college students (all later age students) has changed in Georgia over the period studied (Figure 2). The vast majority of the aged 50 and older student population is female, ranging from between 50 percent and 75 percent of the total population. Over time it is evident that male students are occupying an increasingly large share of the student population, as they account for over 40 percent of the total in the last four years (2013 – 2017) of the data compared with approximately 30 percent in the earliest years of the data.
The majority of the aged 50 and older student population (all students) is white, with the next largest share accounted for by black students (Figure 3). Marginal percent of Hispanic and Latino, American Indian, Asian, and other students of different racial backgrounds occupy shares of the group in any given year. One notable change in the racial breakdown of the population is the increased number of Hispanic and Latino students over time, growing from less than 1 percent in the beginning of the data set to nearly 10 percent in the final year (2017).
Figure 3: Race Composition

We are still working on identifying the credentials earned by the later age freshmen, but we have preliminary statistics on the awards given to all later age students in the USG system. The majority of awards are given to bachelors and masters students, and smaller shares to associates and certificates (Figure 4).
Simple comparisons between wages pre-and post award for the later-age freshmen for those we can identify with a credential is not causal evidence but provides some indication of the direction of impact. Figure 5 reports wages pre and post award (any award) for the later-age USG students (not simply our later age freshmen). As seen there, there is evidence of some form of wage premium (an average real value of $4,700) however we are not controlling for other important factors at this point in time nor are we identifying returns to later age freshmen. If we take a mean completion age of 55, this could mean an additional $56,400 (pre-tax) that could buy-down debt, add to retirement savings, or expand social security earnings in retirement. It may be the case that later age freshmen have a different premium and completion date. Hypotheses run on both sides of those differences (later age freshmen may be more determined to get a degree or they may unprepared to finish, for example).
Figure 5: Wages Pre-and Post Award

These descriptive statistics help to illuminate the richness of the data we are working with and also the complications of the analysis. The final section of this draft highlights a sample of our matching analysis.

Early Results and Remaining Work

As noted above, we seek to identify the causal impact of a later-age college activity on wages, employment and retirement income. Comparing wages for later age college students and non-college students will not identify the cause of the anticipated wage differential. By finding “like” individuals before the later age freshmen begin their 50+ college career, we should be able to provide one estimate of the causal effect of later age college.

Given the difficulty with identifying awards, we are focusing our matching technique on later-age freshmen who enroll at all (we will subset by award at a later date, as well as type of award, and race, and gender if possible). We start with a random sample of our treatment group (later age enrollees) and create a similarity measure that is a function of the difference in the total
number of quarters worked from 1990 first quarter to eight quarters before the later age student is “seen” in the USG data. We do the same for the DOL quarterly wage data to include the difference in the wage over the same period. For each later age enrollee, we have multiple time periods over which to match (up until 8 quarters before their enrollment starting from 1990 which is the base year of the DOL data). Setting a tolerance level for the similarity measure at 5% and 10% (0 would be a perfect match on quarters worked and wages), we find a small number of matches:

<table>
<thead>
<tr>
<th>Base Term of enrollment</th>
<th>USG Later Age Freshmen (sample)</th>
<th>Tolerance level</th>
<th>USG matched observations</th>
<th>Control observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>1,900</td>
<td>5%</td>
<td>243</td>
<td>14,141</td>
</tr>
<tr>
<td>2004</td>
<td>1,900</td>
<td>10%</td>
<td>517</td>
<td>60,400</td>
</tr>
<tr>
<td>2009</td>
<td>1,900</td>
<td>5%</td>
<td>75</td>
<td>3,878</td>
</tr>
<tr>
<td>2009</td>
<td>1,900</td>
<td>10%</td>
<td>273</td>
<td>37,559</td>
</tr>
</tbody>
</table>

It is obvious that one should not put much stock in the matched analysis at this point, but the figures below demonstrate where the analysis can provide insights. As seen in these graphs, there is some bump in the percent of these like individuals being employed if they are a later age freshman (until they retire). On the wage side of the story, even at this stage, there is less consistency in what we see regarding a wage premium.
USG matched: 243
Controlled: 14,141

USG matched: 517
Controlled: 60,400
With the empirical analysis still underway, there are several lessons or take-aways from the data we have developed on later-age university students. First, the number of these individuals is small relative to the total population of Georgia (which stands at over 10 million), the total number of USG students (over 325,000), and the number of Georgians over 50 (2.9
million). Second, many of the later age students appear for a few semesters versus investing in full credentials. Third, the proportion of these students who are female has declined since the Great Recession and fourth, while white students are the largest percentage, this concentration has declined.

We believe that our matching technique can be honed to produce reliable matches that allow us to statistically test for differences in wages and the length of employment after age 50. Based on those results, we can simulate various retirement scenarios that will demonstrate whether or not later age freshmen succeed in terms of increasing the financial status of their retirement years.

Finally, we want to acknowledge that while this research is specific to Georgia, we believe that there is some (limited) generalizability of the forthcoming results. Georgia is a large public system—only four other public higher education systems are larger by enrollment than the USG: 36 The University System of Ohio, the City University of New York, California State University, and the State University of New York. While the New York and California systems have larger student populations, they are not ideal for this kind of analysis because the state economies are significantly more robust by GDP and GDP per capita than the national average. 37 Linking workforce returns to later-age degrees in these states would not be easily generalizable to most other states. Ohio and Georgia are more economically similar to the nation in terms of GDP and GDP per capita. In addition, Georgia offers a significantly more diverse population in terms of race than Ohio. 38

Our analysis would allow for feasible generalizations because of the size and diversity of USG institutions and their students, as well as Georgia’s varied economy and labor force. The labor force in Georgia is diverse, with jobs ranging from rural agriculture to textile and automotive manufacturing to tourism and the film industry. Metropolitan Atlanta, a global city home to numerous Fortune 1000 companies, is the economic center of the Southeast and an important node in the global economy.

37 Based on 2016 data from the Bureau of Economic Analysis
However, there are potential limitations to the full generalizability of the results based on Georgia data. While Georgia is a good approximation of many state economies, some are quite different. States heavily dependent on energy, for example, may find different labor market outcomes for older workers who complete college degrees. In theory, however, individuals would obtain degrees that coincide with the strengths of their state economies, but the difference is worth noting. Additionally, the diversity of higher educational institutions in Georgia (in terms of location, degree offerings, and modes of delivery) may provide older Georgians more options and, therefore, different outcomes than in another state.

A final caveat is important—we are able to track workers and students in Georgia, but we cannot track them if they leave the state. These complications potentially bias the results against the efficacy of later-age college degrees.