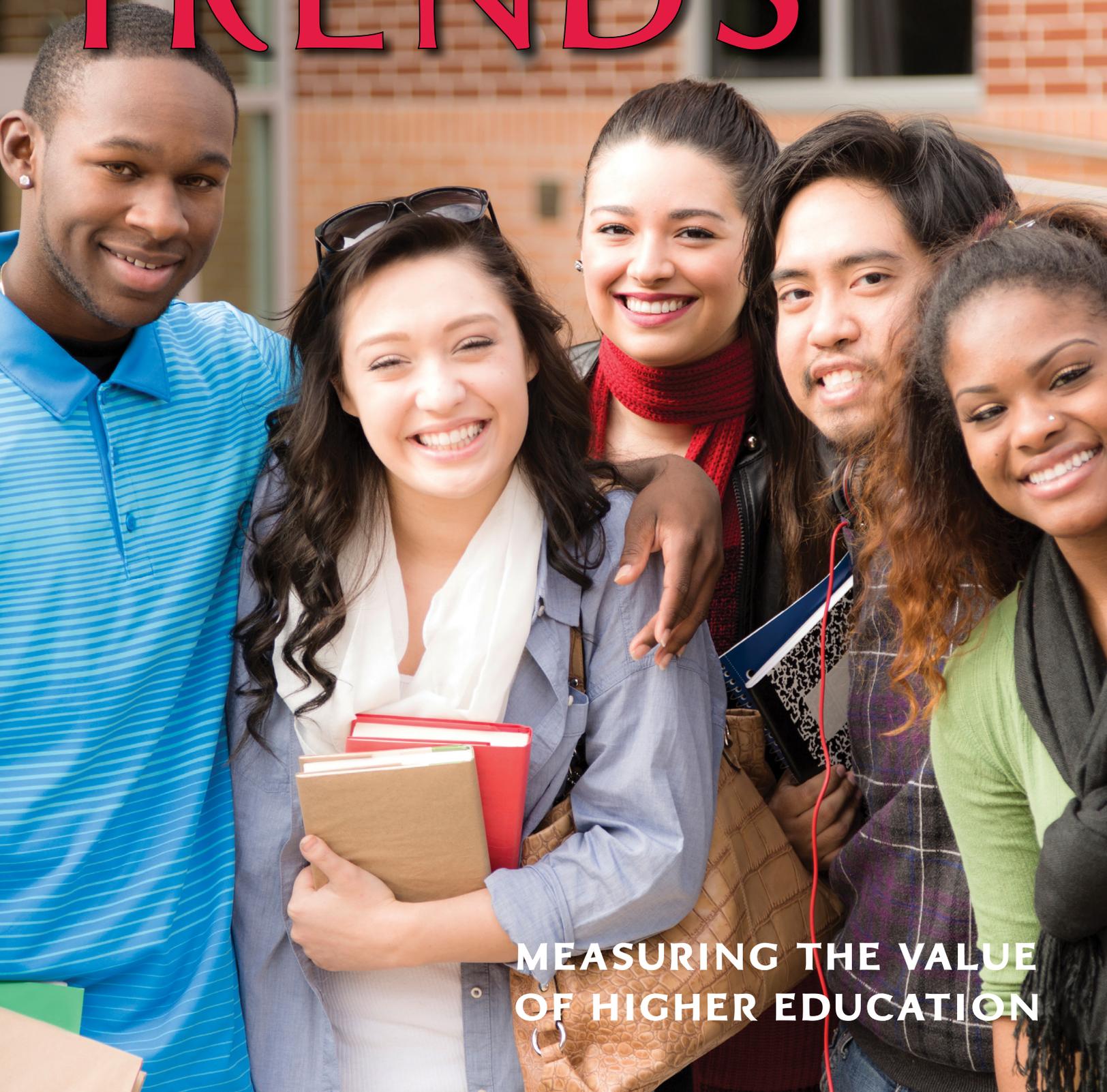


MINNESOTA ECONOMIC

TRENDS



MEASURING THE VALUE
OF HIGHER EDUCATION

MARCH 2018

m EMPLOYMENT AND
ECONOMIC DEVELOPMENT



The College Payoff

While going to college doesn't guarantee career and financial success, higher education generally leads to better wages over the course of a lifetime.

Alessia Leibert's cover story in this issue of Trends documents, among other things, the impact of a postsecondary education on earnings. The longer students stay in school earning college credit, the bigger the wage premium, even if they ultimately don't graduate.

Gender, age, race, type of school attended, enrollment status and placement in remedial courses are all factors that figure into who graduates and who doesn't. And picking the right major also can have an impact on earnings, for both graduates and non-graduates.

Still, a postsecondary education doesn't ensure an equal playing field. Sanjukta Chaudhuri, who has been doing some excellent research recently on the gender pay gap, writes in this issue about the gender gap and education.

She found that men earn more than women at every level of educational attainment. The male-female earnings gap can range from 31 percent when both have a bachelor's degree to 17 percent at the master's degree level and 18 percent when they both have doctorates.

Why men and women with the same education earn unequal pay is the subject of much debate and will need further research. Factors could include choice of college major, occupational decisions, industry, hours worked, marital status, family composition, residence, age and work experience.

Elsewhere in this issue, Dave Senf and Steve Hine look at seasonally adjusting employment figures and why that practice is important for accurately gauging the direction and strength of the economy.

Finally, Rachel Vilsack writes about the Eligible Training Providers List and how it can help people make decisions about training programs and careers. It's an important resource for career counselors and job seekers alike.

A handwritten signature in black ink that reads "Monte Hanson". The signature is fluid and cursive, with the first name being particularly prominent.

Monte Hanson
Editor

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PHOTO: JUDY PARKER

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College Has Value Even for Non-completers

Earning a two- or four-year college degree pays off with higher earnings for most students. Even students who ultimately don't graduate are likely to see a wage premium, depending on how long they stay in school and what they study.



Students who attend postsecondary school bring important skills to the workforce even when they do not achieve a credential. Unfortunately, standard labor market outcome metrics overlook students who do not graduate. The purpose of this study is to look at all students who participated in postsecondary education in Minnesota in order to measure the advantages of attending college and attaining credentials versus stopping after high school.

In particular, we'll examine the following research questions:

- 1. Which student characteristics are more commonly associated with a higher likelihood of completing a credential?** Answering this question can help identify risk factors associated with dropping out of college.
- 2. Among non-completers, is there a measurable difference in earnings between those who left school after attaining a few credits and those further along in their coursework?** Answering this question can help quantify the earnings and career advantages associated with staying in college.
- 3. How does major affect earnings even without finishing a credential?** Answering this question can help identify majors with good payoffs, even for those who accumulate some credits but do not finish.

Comparing Characteristics of Completers and Non-completers

This study is based on the entire population of new undergraduate students enrolled in a postsecondary school in Minnesota from July 2005 to June 2015. Out of 450,623 people, 38.5 percent left school without earning a credential, while the remaining 61.5 percent graduated (Table 1).

This figure is not comparable to official graduation rates, which are generally based on strict time-to-completion criteria, such as six years to finish a bachelor's degree. These conventional criteria tend to treat students who enroll part time or discontinuously as dropouts, when some of them actually finish in the longer term. Our definition gives the 2006 cohort 10 years to graduate (until June 2015¹), the 2007 cohort nine years, and so on.

Table 1: Educational Outcomes by Demographic and College Attendance Characteristics

Student Characteristics	Number	Educational Outcomes, Completers	Educational Outcomes, Non-completers
Total	450,623	61.5%	38.5%
Demographics:			
Female	242,538	62.8%	35.0%
Male	208,001	55.4%	42.9%
Enrolled at Age<=28	388,042	63.0%	37.0%
Enrolled at Age>28	62,581	52.0%	48.0%
White, not Hispanic	351,857	65.3%	34.7%
Black	35,192	38.4%	61.6%
Asian*	21,674	58.9%	41.1%
American Indian	5,999	33.4%	66.6%
Hispanic	15,152	50.9%	49.1%
Mixed race	10,454	54.9%	45.1%
Race not reported	10,295	54.9%	45.1%
College Attendance Characteristics:			
Enrolled From 2006 to 2010	173,186	53.4%	46.6%
Enrolled After 2010 (post-recession)	277,437	66.5%	33.5%
Initially Enrolled in a Two-Year Institution (Public or Private)	278,909	49.9%	50.1%
Not Initially Enrolled in a Two-Year Institution	171,714	80.2%	19.8%
Took Remedial Education Credits	136,489	45.4%	54.6%
Never Enrolled in Remedial Credits	314,134	68.4%	31.6%
Attended Full-Time** on Average in Fall Semester	265,256	70.1%	29.9%
Attended Part-Time on Average in Fall Semester	185,367	49.1%	50.9%

* This group includes 448 Native Hawaiian and Other Pacific islanders.

** Full-time enrollment is defined as enrolled for 12 or more credits per semester during the academic year.

Source: Statewide Longitudinal Education Data System and DEED wage record data. See "About the data" for additional detail.

¹Our dataset includes completion records only through June 2015.



Using this definition of graduation rates, we can compare the characteristics of students who completed with those who did not, with the aim of identifying factors commonly associated with a student's chance of finishing college.

The importance of each characteristic is discussed below.

Gender: Women were more likely to complete than men. This difference is partially attributable to the types of majors pursued by women, as will be explained later in the article.

Age: Overall, only a small minority of students initially enrolled after age 28. Half of them (52 percent) completed a credential versus 63 percent among those who enrolled at a younger age. Delaying college entry is associated with a lower likelihood of completing, for two main reasons. First, earning a formal credential may not be a meaningful milestone for many adult workers, such as midcareer professionals whose main purpose is to upgrade their skills. Second, older laid-off workers in need of retraining might have left school for work as soon as they had a chance.

Cohort of enrollment: The likelihood of not completing was higher for students who first enrolled before 2011, despite the fact that they had more years to complete their studies than those who enrolled after. This result is probably explained by the larger influx of nontraditional students in higher education during the Great Recession (2007 to 2010).

Race: While students of black, Latino and American Indian background account for only 12.5 percent of enrollments, they tend to leave school without a credential at much higher rates than their white and Asian peers. The highest dropout rate is among American Indians (66.6 percent) followed by blacks and Hispanics/Latinos (61.6 and 49.1 percent, respectively). Completion rates have improved since 2011 across racial groups, but racial disparities persist.

School type: Students who started college at two-year institutions were less likely to earn a credential than students who enrolled directly at four-year institutions (49.9 percent versus 80.2 percent). This result is probably driven by the socio-economic characteristics and the educational goals of students who enroll in two-year schools. Community colleges and private career schools are less restrictive in terms of admissions and offer shorter programs that fit the needs of students who are not interested in a four-year degree. Public colleges have the additional advantage of being more affordable² for students of disadvantaged backgrounds who otherwise would be unable to access postsecondary education.

Enrollment status: Only half (49.1 percent) of part-time enrollees graduated compared with 70.1 percent of full-time enrollees. Part-time enrollees typically work while in school and struggle more to keep up with coursework.

²For-profit career schools are not as affordable as public colleges, but their unselective admissions criteria make them also appealing to certain types of students.

³Remedial courses count toward maintaining eligibility for financial aid. Remedial/developmental credits, however, will increase the length of the program when calculating the maximum time limit for a student to receive financial aid.

Placement in remedial courses: Thirty percent (136,489) of students who entered higher education were required to take remedial courses in math, reading or writing. Less than half (45.4 percent) of students who enrolled in any amount of remedial courses completed a credential compared with 68.4 percent among those who never enrolled in remedial education. Having to take remedial courses typically increases the time needed to graduate because remedial credits do not count toward graduation and often use up financial aid.³ The need for remediation, however, is influenced by factors that can develop long before a student enters college, such as academic preparedness and poverty. These factors will be reviewed later in the article. For now it will suffice to point out that placement in remediation is extremely racially unbalanced. Only 26.5 percent of white students enrolled in remedial credits compared with blacks at 54.2 percent, American Indians at 42.1 percent, Hispanics/Latinos at 42.7 percent, and Asians at 40.2 percent.

Demographic characteristics – especially race – are key determinants of educational attainment, but student attendance behavior also matters. Gathering better information on what factors influence attendance can help higher education institutions target services and programs to students at higher risk of dropping out.

Defining “Some College, No Degree”

Official educational statistics place non-completers in the catch-all category of “some college, no degree.” There are, however, considerable differences in skill level among non-completers and a wide variety of reasons for not completing. Some students might have switched programs or schools without being able to apply all their credits toward a credential or might have lost the financial aid

needed to continue attending. Others might have entered postsecondary education to retrain after a job loss, then left school for work once the job market improved. And still other students might have found a job in their fields before completing and chose not to complete.

About the Data

This research relies on two data sources: (1) post-secondary enrollment and graduation records from the Statewide Longitudinal Education Data System (SLEDS), which covers all for-credit public and private programs in Minnesota; merged with (2) wage record data from the Minnesota Department of Employment and Economic Development.

The dataset has 450,623 enrollees from 188 post-secondary institutions in Minnesota, ages 17 to 50 at the time of enrollment who were either residents of Minnesota or had an employment record in the state after leaving college. These selection criteria mitigate the risk of treating as dropouts students who left the state and continued their education elsewhere.

Graduates who earned more than one degree in the same academic year were classified according to the highest degree obtained. Students who first started college after June 2011 (in bachelor’s programs) and after 2012 (in sub-baccalaureate programs) and did not finish were excluded because they may still be working toward a degree.

The dataset used for the wage analysis has fewer than 450,623 records because of a few exclusions. Individuals who went to work for the federal government, owned their own small unincorporated business, or left the state do not have wage records because these workers are not covered by Minnesota’s Unemployment Insurance Program.

Although the specific reasons for leaving are unknown, the earnings outcomes of these students tell us a great deal about whether they benefited from longer persistence in school. To answer this critical question, we first must group students based on the quantity of postsecondary education received, using a more nuanced definition of non-completers as shown in Table 2 below:

- 1. Early dropouts:** students who enrolled in the fall term and then interrupted their studies without re-entering a postsecondary institution in the state;
- 2. Some college, no credential:** students who extended their enrollment beyond one year and left without a credential;
- 3. Certificate completers:** students who completed a certificate from six months to two years in length;
- 4. Associate degree and long-term certificate completers:** students who completed an associate degree or a certificate of equivalent credits;
- 5. Bachelor’s degree completers:** bachelor’s degree holders who did not also complete a graduate-level award.

We find that only a minority of students (14.8 percent) interrupted their studies in the first year. The typical number of credits attempted or completed by this group is considerably lower than other groups, reflecting very little or no exposure to higher education.

Of special interest is the large group of enrollees (23.7 percent) who attended for more than one year, often accumulating enough credits to complete a certificate but failing to do so. Within this category there are several distinct sub-populations. One out of three students interrupted school for one term or more and then re-entered. While gaps in enrollment are not as detrimental as dropping out, they often involve switching school and major, which may cause difficulties transferring previous credits. Other students had to pass remedial courses before being allowed to take regular college-level credits, while still others managed to advance in their studies without interruptions or delays but did not finish. These examples show the variety of circumstances of attendance and exit, which can lead to very different earnings outcomes among non-completers.

Table 2: Non-completer and Completer Categories

Highest Level of Education and Typical Credit Requirements for Each Level	Number of Students Enrolled, July 2005-June 2013	Share	Estimated Regular Credits Taken*
(1) Enrolled only One Year or One Term, did not Complete (Early Dropouts)	66,657	14.8%	From 0 to 20.2
(2) Enrolled More Than One Year, did not Complete	106,976	23.7%	Fewer than 61.6
(3) Completed a Certificate from Six Months to Two Years in Length (Fewer Than 60 Credits)	31,544	7.0%	47.9
(4) Completed an Associate Degree or Long-Term Certificate (60 or More Credits)	90,146	20.0%	79.9
(5) Completed a Bachelor’s Degree (at Least 120 Credits)	155,300	34.5%	121.3
Total	450,623	100%	

* The data capture only fall semester credits and do not distinguish between units attempted and completed. We estimated annual credits in excess by doubling the number of fall credits. Therefore, the figures for non-completers should be interpreted as upper bound estimates rather than averages, because some non-completers might have attempted courses without completing any.

Source: Statewide Longitudinal Education Data System and DEED wage record data

Some College is Better Than None

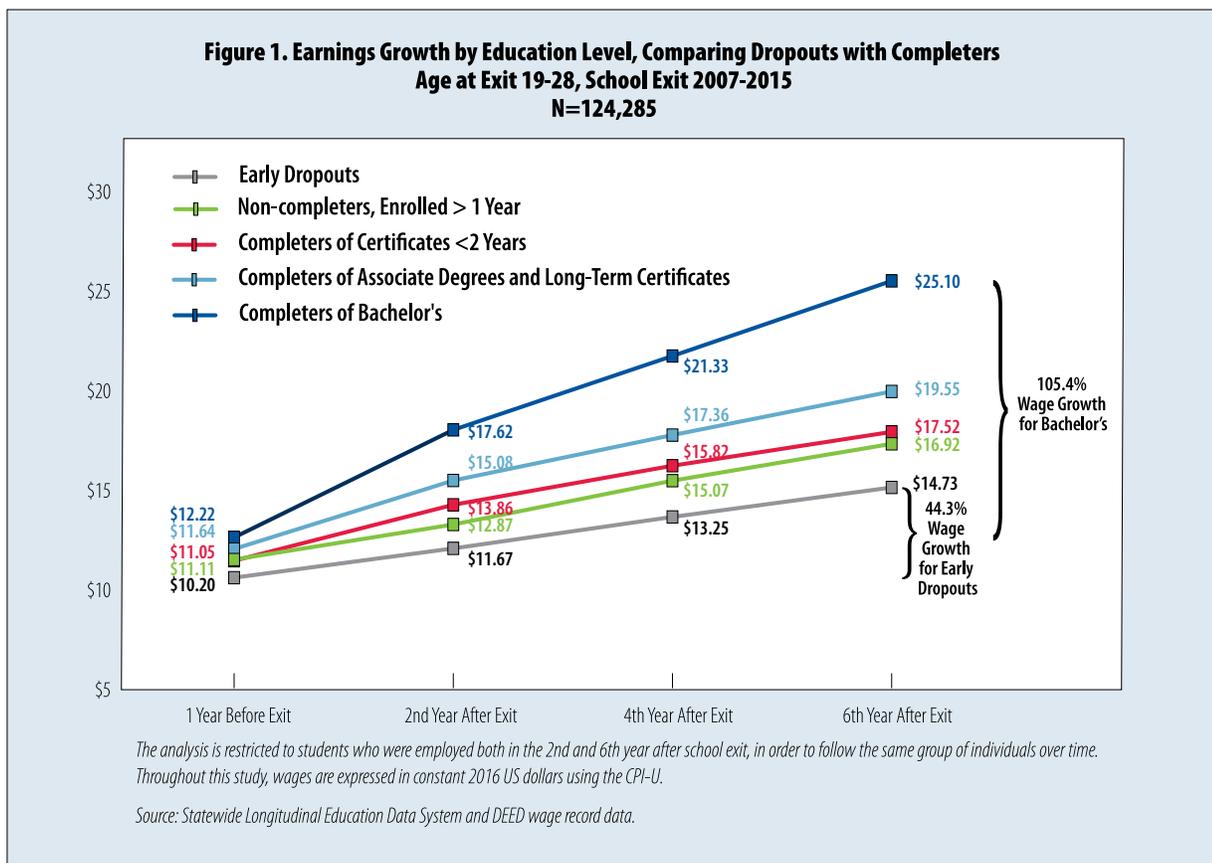
How do non-completers fare in the labor market relative to completers? And among non-completers, do those further along in their coursework experience higher market rewards than those who leave with less education? We'll begin answering these questions by tracking the hourly wages of people who worked in Minnesota after graduation. To determine time of exit for completers we used graduation date.⁴ For non-completers we used the spring of the most recent academic year of enrollment, assuming that the majority left school to seek work at approximately that time.

Figure 1 plots wages for students who were between 19 and 28 at the time of exit and were still

employed in Minnesota six years after graduation. The earnings trajectory of early dropouts is clearly lower than other groups, and the growth of bachelor's earnings far outpaces that of other groups.

After eight years, bachelor's wages were 105.4 percent higher than they were the year before graduation – an average increase of roughly 13 percent per year – while the wages of early dropouts grew only by 44.3 percent (an increase of 5.5 percent per year).

Figure 2 displays the same information in the form of a wage premium relative to the baseline category of early dropouts.



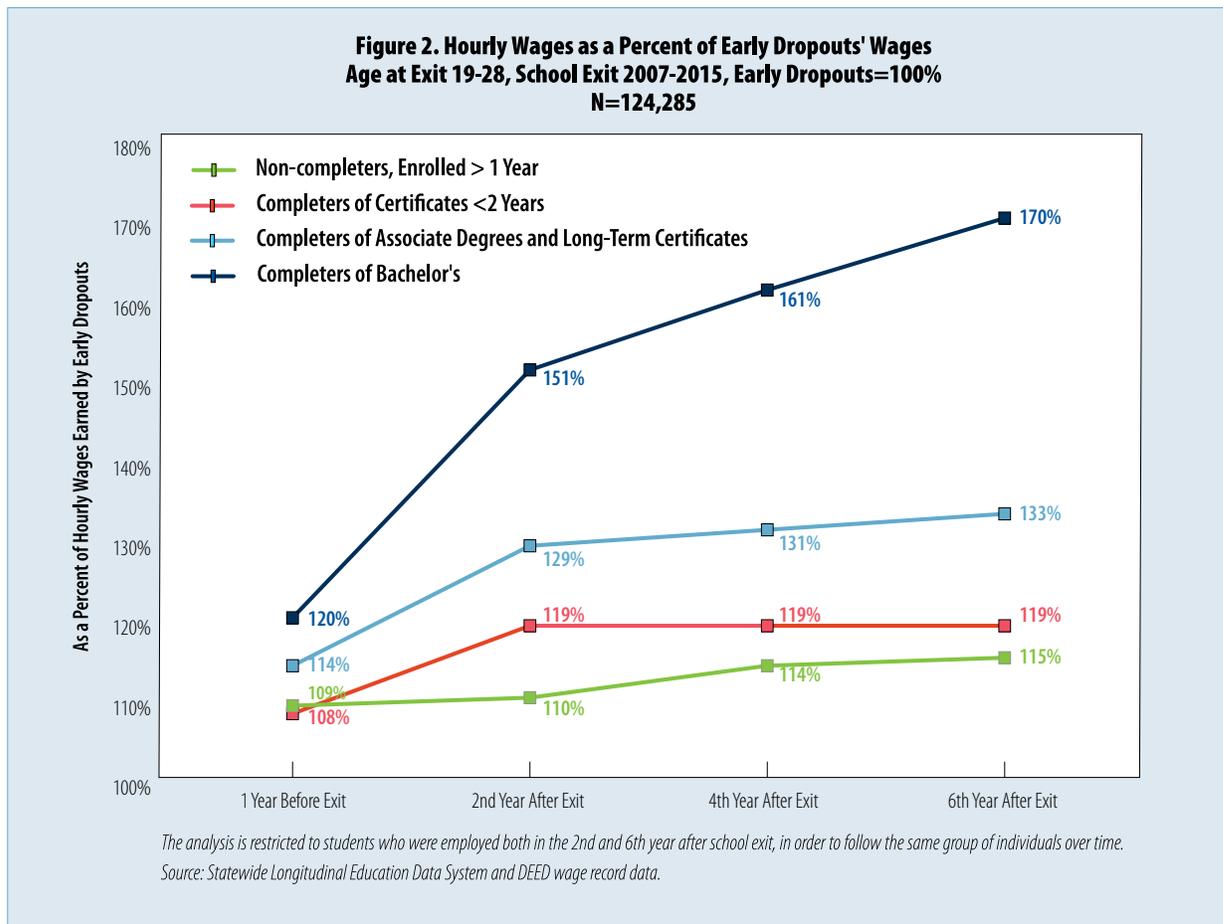
⁴Completers who subsequently re-enrolled in school to pursue a higher credential were included in the analysis. This means that associate degree completers who transferred to a four-year institution and bachelor's degree completers who re-enrolled in graduate school were included.

The premium for earning a four-year degree grew steadily for a few years after graduation, while the premium at lower education levels was realized in the first two years after college and then flattened. These findings suggest higher lifetime earning potential for bachelor's degree recipients. Some people entered graduate school and might be close to earning an advanced degree, which might account for some of this continued growth.

Six years after graduation, bachelor's recipients earned 70 percent more, associate degree recipients earned 33 percent more, and certificate recipients earned 19 percent more compared with early dropouts. The group of non-completers with longer enrollment, which is critical to understanding the benefits of attendance, ended up with earnings that were 15 percent higher, at the median, than early dropouts. This premium is smaller relative to all categories of completers.

Are these premiums biased upwards by compositional differences? For example, bachelor's completers are more likely to be white or Asian, and are typically older at the time of exit because of extra years spent in school. The business cycle has an effect on the wage premium, too. Students who left school during the Great Recession reaped much lower premiums than those who left after 2009. To take these factors into account we estimated the earnings differences as a function of age, gender, race, region of employment, and year of exit. Figure 3 compares the premiums before and after applying the statistical adjustments.

The adjustments cause a reduction in the premiums at every level, mainly because part of the earnings advantage over early dropouts is due to being older at exit and thus accumulating more work experience, rather than to college itself.

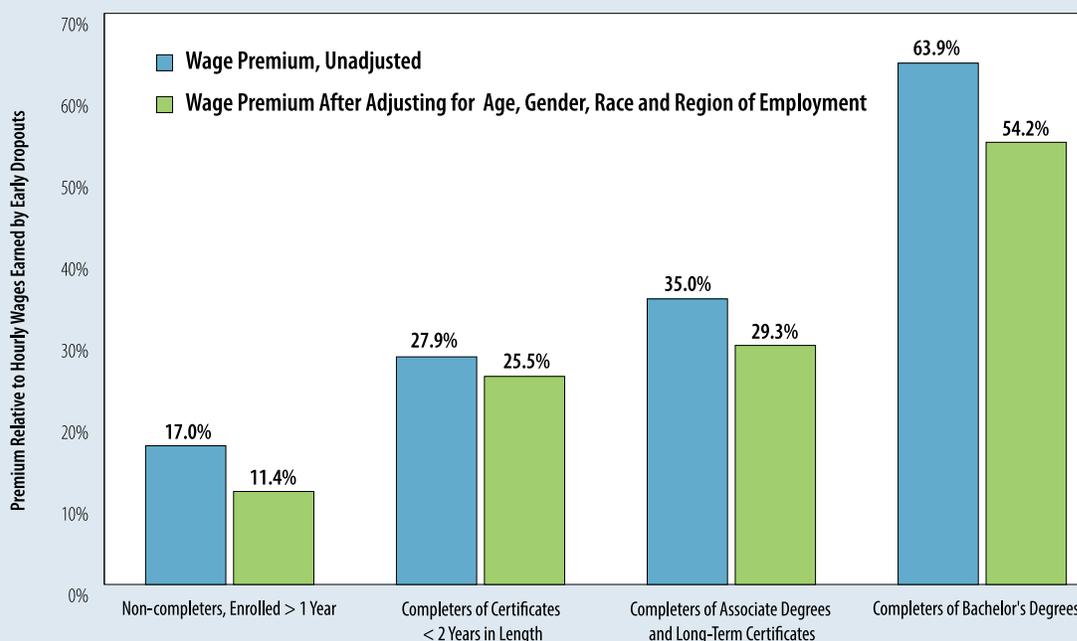


These adjustments do not change the conclusion that there are wage advantages from longer attendance. Non-completers who attended longer than a year earned 11.4 percent more than early dropouts. Meanwhile, the premium for completing is more than twice as much: 25.5 percent for certificates and 29.3 percent for associate degrees and long-term certificates. This shows that potential earnings are lost when students leave short of a credential.

Do these findings hold also for older students? People who left school after age 28 experienced lower premiums in every category except a bachelor's degree, suggesting that investments in higher education later in life are less remunerative except in the case of four-year degrees or higher credentials.

Adjusting for demographic characteristics is not enough to isolate the effects of education on wages. Other relevant factors not measured in this study include income, which affects both the quantity and quality of postsecondary education one can afford; academic achievement and quality of prior schooling, which determine college readiness; and a host of intangible characteristics such as abilities, motivation, social expectations and roles, and discrimination that shape the way students sort into schools, fields of study and eventually careers. We will limit ourselves to a discussion of the role of two factors – participation in remedial courses and choice of major – in shaping both educational and earnings outcomes.

Figure 3. Educational Wage Premium Relative to Early Dropouts in 3rd Year After College Exit
Age at Exit 19-28, School Exit 2010-2015
N=197,317



To estimate the earnings differences by education group we estimated the hourly wages of workers as a function of age, gender, race, region of employment and year of school exit. The chart reports the estimated differences in earnings relative to the average early dropout student, controlling for these factors. All differences are highly statistically significant. This analysis uses more records than previous charts because we do not need to select only individuals who were employed both in the 2nd and 6th year after exit.

Source: Statewide Longitudinal Education Data System and DEED wage record data.

Disparities in College Readiness

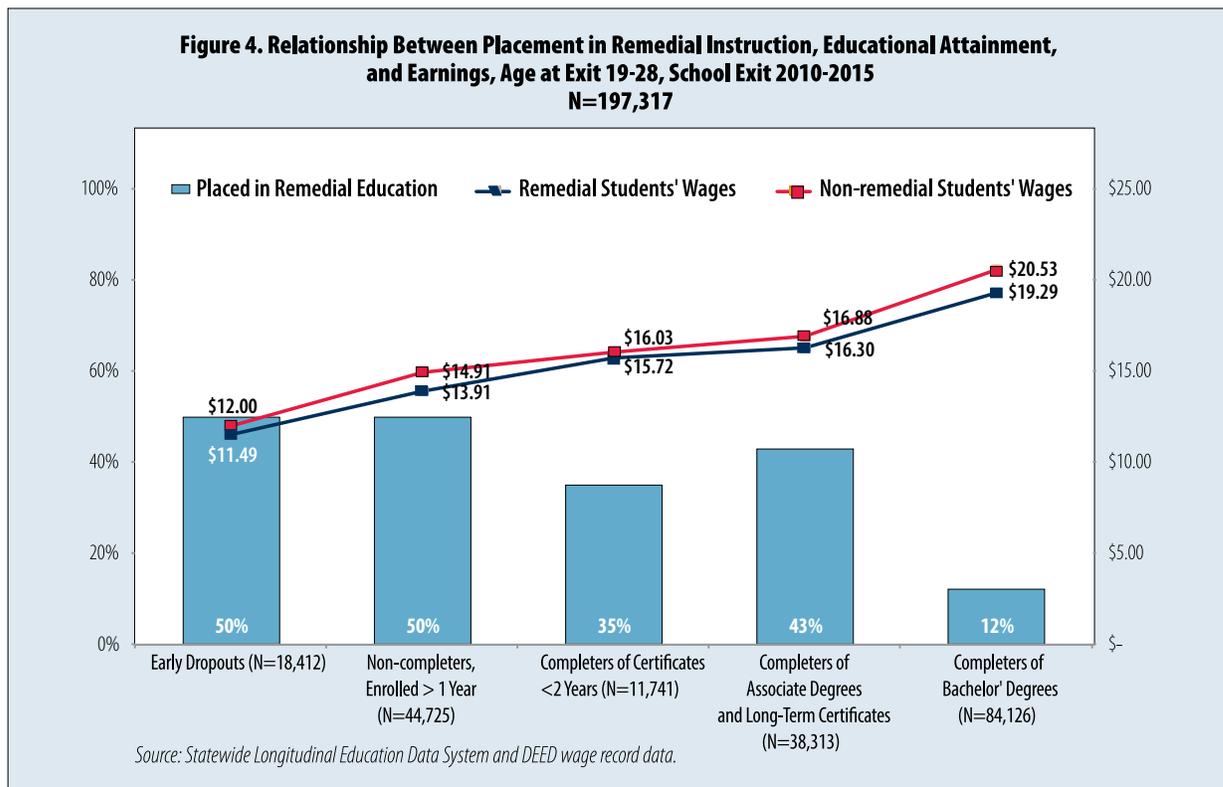
Students are placed in remediation because they need supplementary instruction before being allowed to take college-level courses. It is a well-known risk indicator for dropping out of college, as shown in Table 1. Figure 4 delves deeper into this finding by illustrating how remediation is inversely related to educational achievement. Non-completers were much more likely to need remedial coursework (50 percent) than bachelor's completers (12 percent).

Lower-than-expected rates of remediation (35 percent) among certificate completers probably stem from the fact that short-term certificates do not require being assessed college ready. Underprepared students can obtain a vocational certificate without having to pass remedial courses, and they do better in the labor market than those with no college at all.

These results underscore how challenging it is for

remedial students to access and complete a four-year degree. However, the gaps in educational attainment between less prepared and more prepared students would likely be greater without remediation. Among young remedial students, 48.3 percent graduated, and non-completers with extended stays in college earned on average 28.5 credits including remedial and regular. Without remediation they might not have completed any college-level courses.

Figure 4 also shows that the earnings of remedial students are a bit behind those of non-remedial students with comparable educational attainment. Such a straight comparison might be misleading if low-achieving students are inherently different from high-achieving students. Figure 5 offers a cleaner measure of remedial students' earning outcomes by comparing them to other remedial students who dropped out early, while also showing the corresponding wage premiums for non-remedial students.



Compared with students who dropped out in the first year, remedial students earned about 46.7 percent more if they finished a bachelor's degree, 27.3 percent more if they finished an associate degree, 23.7 percent more if they finished a certificate, and 10.2 percent more if they enrolled for more than a year and did not graduate. The corresponding percentages for students who did not need remediation are 54, 28.8, 25.4 and 12 percent. These premiums are similar except at the bachelor's level where non-remedial students fared decisively better relative to dropouts (54 versus 46.7 percent). In other words, holding key demographic characteristics constant, there is still a measurable benefit from longer college persistence and completion even for underprepared students.

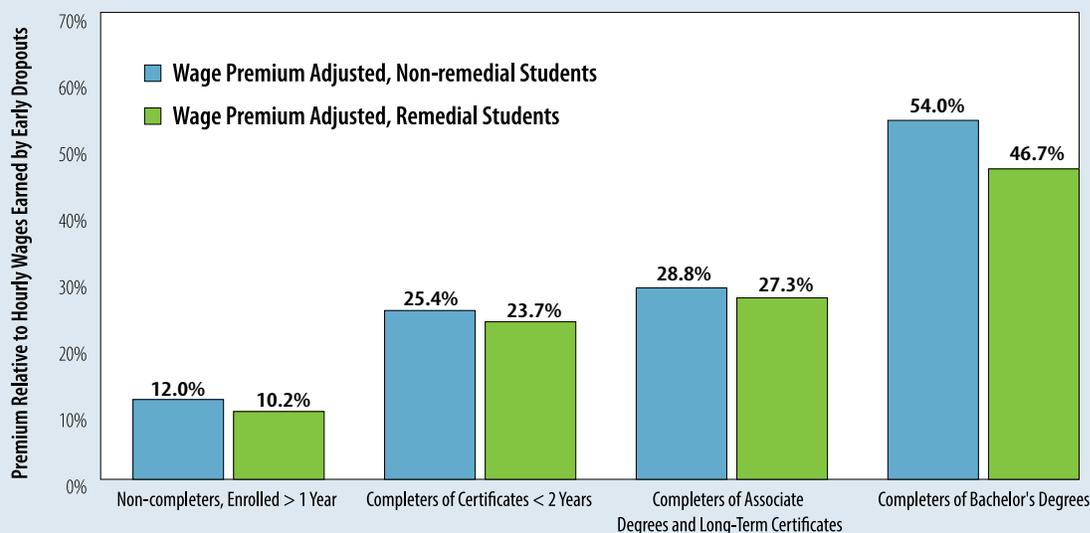
Remedial students are more likely to belong to a racial minority. Interestingly, when we take into account citizenship status at the time of enrollment, recent black immigrants – mainly from Somalia – have almost the same rate of remediation as blacks

who were already citizens (54 percent versus 55 percent). This suggests that the need for English language instruction is not the only reason for the high concentration of black students in remedial education. Other kinds of skills gaps must be driving this result.

We also found a relationship between remediation and poverty. Looking at students who attended a Minnesota public high school, participation in remedial coursework was higher among those who attended a low-income high school (46.7 percent) and lower among individuals from wealthier high schools.⁵

Adjusting for key demographics and remedial status does not change the overall encouraging conclusion that there are consistent benefits from longer attendance even short of a credential. Students who don't complete, however, pay a penalty in the labor market. Smaller earnings relative to completers also mean higher risks of

Figure 5. Educational Wage Premium Relative to Early Dropouts, Remedial Versus Non-remedial Students Adjusted for Differences in Age, Gender, Race and Region of Employment
Age at Exit 19-28, School Exit 2010-2015
N=197,317



This analysis is restricted to students age 19 to 28 at exit and who exited school between 2010 and 2015. The chart reports the estimated differences in earnings relative to the average drop-out students controlling for age, gender, race, and region of employment.

Source: Statewide Longitudinal Education Data System and DEED wage record data.

⁵Low income is defined as having 50 percent of more students eligible to receive free and reduced lunch. Remediation rates were 35 percent among students from schools with 20 to 50 percent low-income students and dropped to 29 percent for schools with less than 20 percent low-income students.

student loan defaults. The evidence suggests that lack of academic preparation, as well as racial and socio-economic disparities, are part of the reason some students struggle to complete. Considering that non-completers represent 38.7 percent of all enrollees, any erosion in their earnings potential represents a loss in human capital and a missed opportunity for Minnesota's economy.

Major Matters

One of the most important factors affecting the financial payoff from college is choice of major, both for completers and non-completers. Figure 6 compares majors that yield a large premium for completing with majors with a lower premium. In all of these fields, people who progressed further in their studies realized a wage premium compared with early dropouts, but for simplicity we are only displaying the premium for completing versus not completing.

Figure 6 shows that the variation in premium for completing can sometimes be as high as the premium for earning a bachelor's degree. For example, three years after exit those who completed a registered nursing associate degree earned 124 percent more than those who enrolled in the same program but did not finish. Comparing this premium with that from programs in culinary services results in a difference of 108 percentage points, which is even more than the premium for a bachelor's degree. Adjusting for age, gender, race and region of employment does not substantially alter these dramatic differences across majors.

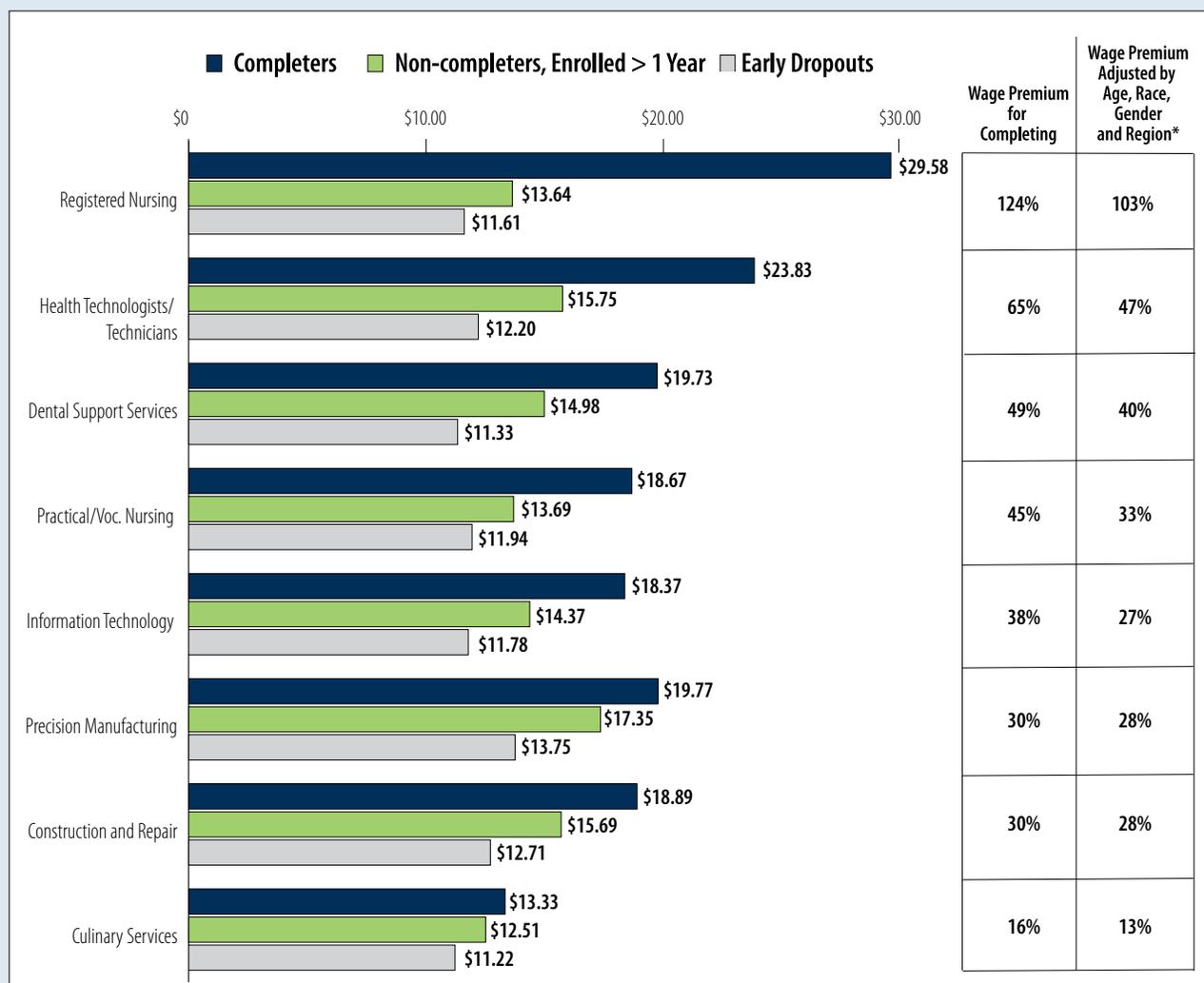
At the sub-baccalaureate level, premiums are higher in health care programs that prepare for an occupational license – such as registered nurses (RNs), dental assistants, physician assistants, licensed practical nurses – or for an occupational certification such as surgical technician. Being further along in coursework in RN programs does not increase earnings by much (\$13.64 versus \$11.61) because non-completers cannot enter these well-paying careers.

The variation in premium by major also depends on employer hiring practices. In the case of skilled trades, for example, employers tend to value work experience and on-the-job training just as much as formal credentials, so partial coursework in these fields can be valuable even without graduating. The premium for completing was 30 percent for precision manufacturing, construction, and repair. A large share of people who enrolled in these programs attended for more than one year, left without a credential, and did better than early dropouts, presumably because partial coursework equipped them with enough skills to get hired or enter an apprenticeship related to their field of study. Non-completers with more than one year of college coursework in precision manufacturing earned median hourly wages of \$17.35, while those in construction and repair earned \$15.69, about \$3 more per hour than early dropouts. High returns for partial coursework stem from the fact that the majority of these students could break into related industries such as manufacturing, wholesale and construction, where they could leverage skills learned in school.

Programs in information technology are also fairly marketable with partial coursework because many IT job openings do not require a college degree as long as candidates can demonstrate knowledge. Thus, a modest premium for completion does not necessarily imply that the program has low market value. But low premiums combined with low wages, like in the case of culinary services, indicate low market value of the program. And partial coursework in this field offers no significant benefits compared with stopping at a high school education.

These findings also shed light on one important reason some students might voluntarily withdraw from college. The motivation to persist to graduation is weakened if students realize that formal credentials will not enhance their chances of getting a job in their career of choice. Students might intentionally drop out if they deem college coursework irrelevant and not worth the cost, or if

Figure 6. Variations in Wage Premium in Selected Sub-baccalaureate Majors
Median Hourly Wages in the 3rd Year After College Exit
Age at Exit 19-26, Exit Years 2010-2015



*Adjusted premiums represent estimated differences in earnings relative to the average non-completer, controlling for age, race, gender, region of employment and year of school exit. Unadjusted premiums are a crude comparison between median wages of completers and median wages of non-completers.

Source: Statewide Longitudinal Education Data System and DEED wage record data.

their coursework short of a credential is relevant enough to help them access jobs related to their field of study. Since the latter phenomenon occurs more frequently in male-dominated fields such as skilled trades and IT, while the opposite is true in female-dominated fields such as health care, women overall might have more incentives to complete than men. This finding contributes to a

better understanding of why women are more likely to complete a credential than men.

Wage differentials also depend on the level of difficulty of coursework and selectivity of program admission. Nursing and other health care programs require completion of 15 general education and science credits and a passing score in the Test

of Essential Academic Skills.⁶ In contrast, open admission programs such as culinary arts do not require students to prove themselves academically able prior to enrollment. Therefore, choice of major is not merely the reflection of personal interests and aspirations but also of aptitudes and learning ability. Those who had a strong academic background before college can choose from a wider variety of subject areas and schools. In contrast, those who start with an academic or socio-economic disadvantage face restricted choices in terms of educational and career paths.

This analysis demonstrates that the college premium is higher for completers, but there are notable wage gains to be made for taking more than one year of coursework in specific academic fields. And in some majors more than in others, failing to graduate can significantly hurt earnings prospects. This finding underscores the importance of providing timely labor market information to students to help them select majors that are well-aligned with employer demand.

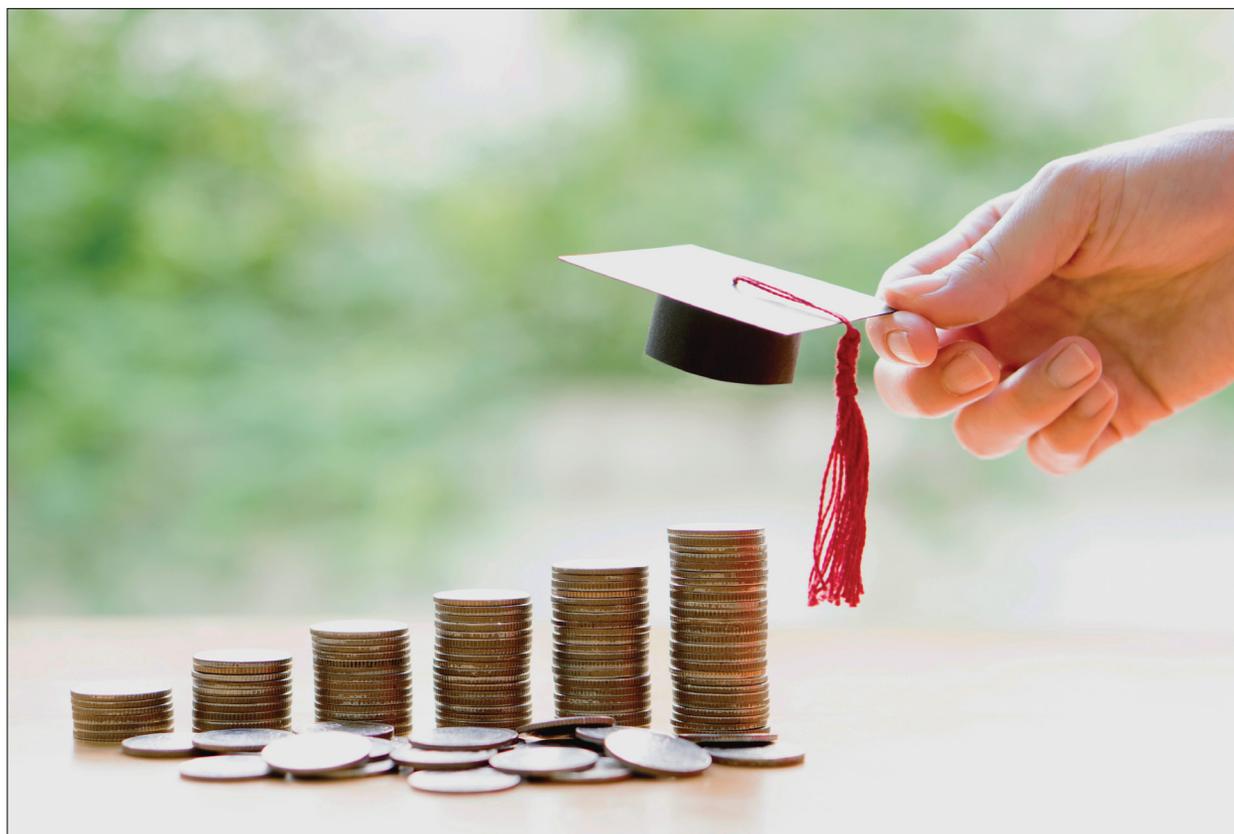
Conclusions

Thousands of students will head off to postsecondary school this year in Minnesota, but many won't make it to graduation. This study examines the labor market outcomes of all students who entered higher education in Minnesota over the last 10 years, including dropouts. The evidence shows that the risk of starting college but not making it all the way to a credential could still be worth the investment of time and tuition, but the size of the wage gain for longer college attendance varies starkly by major.

Here is a summary of findings:

- The risk of dropping out is higher for non-Asian racial minorities, part-time enrollees, students who enter college after age 28, and students needing remedial instruction.
- Completers earn more than non-completers at all levels of educational attainment, including certificates. This finding holds even after accounting for differences in age, gender, race and region of employment.
- Earning a four-year degree generates not only a larger wage premium but also longer lasting wage growth, resulting in higher lifetime earning potential relative to sub-baccalaureate credentials.
- Being further along in college-level coursework results in higher economic payoffs than dropping out early. The full benefits of attendance, however, go to those who eventually complete a program.
- Remedial course-taking is an indicator of weak academic preparation and other non-academic skills gaps. It is also strongly associated with being from a racial minority group. The encouraging finding is that remedial students who attend college for more than a year have higher earnings than similarly weak students who drop out earlier, showing that these investments had some positive impact. Too many remedial students, however, leave halfway through college. This finding suggests that college readiness ought to be strengthened at every level of the educational pipeline, especially among low-income students and students of color.

⁶See program admission requirements at Minnesota State: <https://www.minnesota.edu/nursing/entrance-exam/>.



- Choice of major matters greatly for non-completers. Some well-paying jobs do not need formal postsecondary credentials, especially in vocational fields, so college dropouts can still bring valuable skills to the workforce by taking some coursework geared toward in-demand careers. Non-completers, however, face a higher risk of not getting jobs related to their academic background. Therefore, students must be particularly careful about choosing a major they can realistically complete or that can pave the way for a good job without completing.

These findings show that investments in higher education clearly matter. Initiatives aimed at providing career guidance to students and financial aid to help them complete a degree on time help raise the skill level of Minnesota's labor force. Policies to curb dropping out could have positive equity ripple effects by helping disadvantaged groups acquire credentials. [T](#)

Connecting Careers and Education

The Eligible Training Providers List helps Minnesotans find training programs with credentials that can lead to successful careers.

All states are required under the federal Workforce Innovation and Opportunity Act (WIOA) to maintain a list of institutions, programs and courses known as the Eligible Training Providers List (ETPL). This list ensures that Minnesotans and customers in WIOA programs (i.e., Adult, Dislocated Worker or Youth) can find quality training programs that provide credentials upon completion.

The Department of Employment and Economic Development (DEED) maintains the ETPL, which is available to the public through the interactive Career and Education Explorer tool at mn.gov/deed/careers.

Who's On the List?

In Minnesota, training providers must meet two requirements to have their organizations, courses or programs listed on the ETPL:

1. The institution must be licensed, registered or legally exempted by the Minnesota Office of Higher Education (OHE), with a few exceptions

based on specific occupations.

2. The training provider must request listing on the Training Provider Portal, a secure portal for trainers to provide all required information about the courses and programs they'd like to list.

There are a few occupations where the training is regulated by a Minnesota state agency other than the Office of Higher Education. These occupations include:

- Commercial driving (authorized by the Minnesota Department of Public Safety)
- Cosmetology (Minnesota Board of Barber and Cosmetology Examiners)
- Flight training (Minnesota Department of Transportation)
- Nursing assistant training (Minnesota Department of Health)
- Real estate and insurance (Minnesota Department of Commerce)

DEED verifies that training institutions meet the criteria above – and have a physical

location in Minnesota – before allowing the providers to list their courses and programs to job seekers and prospective students. The only exception is registered apprenticeships, which are authorized by the federal Department of Labor and are welcome to be listed on Minnesota's ETPL regardless of their location, per federal requirements.

The ETPL is not a comprehensive list of all training institutions in Minnesota. No training provider is required to be listed on the ETPL. It is completely voluntary.

Who Can Use the List?

Anyone can use the Eligible Training Provider List. It is most likely to be used, however, by workforce development counselors and the job seekers they assist.

What Can I Find On the List?

Users can find course and program information, including:

- A description of the training
- Length of training
- Credits or contact hours needed for completion
- Tuition and fees
- Award or credential issued after completion of training
- WIOA certification designation, if applicable

Information on the number and percent of students who complete training at the institution is also provided. In 2018, employment outcomes for graduates of the institution by award type and program of study will also be added.

What's WIOA Certification?

Some courses and programs on the ETPL carry a WIOA-certified designation. This acknowledges that a student earns an industry-recognized credential upon successful completion of the training.

A “credential” is defined as the formal recognition of an individual’s attainment of measurable technical or occupational skills necessary to obtain employment or advance within an occupation. These technical or occupational skills are generally based on standards developed or endorsed by employers.

The types of credentials include:

- Educational degrees, certificates and diplomas
- Registered apprenticeship certificates
- Occupational licenses (typically awarded by state government agencies)
- Industry-recognized or professional association certifications
- Other occupational skills certificates

Training institutions must request WIOA-certification for their courses or programs. If DEED determines that the training results in an industry-recognized credential, then WIOA-certification will be granted. It should be noted, however, that WIOA certification isn’t an evaluation of the quality or effectiveness of an institution. It simply marks whether a training program results in an industry-recognized

credential. Minnesota training providers offer many training options that may not result in an industry-recognized credential.

How Often is the List Updated?

WIOA requires training providers to update their information at least every two years. DEED reached out to all training providers in the fall of 2017 to request updates of their course and program data. If a training provider fails to update data every two years, DEED may remove that institution from the ETPL, which will also remove the program from WIOA certification.

Beyond the legal requirements, training providers are welcome to update data as often as they like. Being able to access the most up-to-date and accurate information helps job seekers, counselors and the public make training decisions. 

For More Information

Career and Education Explorer

Find a wide range of occupations, wages, demand, job opportunities and educational opportunities on Minnesota’s Eligible Training Provider List (ETPL). mn.gov/deed/careers

Training Provider Portal

This secure portal allows training institutions to create an account and add, edit or delete program or course listings for display on ETPL. <https://apps.deed.state.mn.us/lmi/Etpl>

ETPL Handbook

Find more information about the ETPL, how to use the Training Provider Portal, and answers to frequently asked questions. mn.gov/deed/programs-services/dislocated-worker/counselors/training

Seasonal Shifts

Seasonal adjustment techniques are applied to employment data to help create a clear picture of jobs in Minnesota.



Last year nonfarm wage and salary employment in Minnesota peaked at an estimated 2,970,000 in June before tailing off to 2,941,500 by December.¹ Can it be right that the state lost 28,500 wage and salary jobs from June to December?

That's what the job estimates show, and it shouldn't surprise anyone because June's employment level has topped December's figures every year since 2005, except for 2016. A quick glance at Figure 1 sheds

some light on the annual June-to-December job decline. As the figure shows, Minnesota's monthly employment level undergoes regular fluctuations over the course of a year due to seasonal weather changes, major holidays, annual opening and closing of schools, and even the State Fair.

These more or less regular seasonal shifts, if not accounted for, will produce confusing signals on the direction and strength of almost every economic gauge, including

employment, unemployment, GDP (gross domestic product), wage income, initial claims for unemployment insurance, unemployment rate, construction starts and wage income.

That is why most economic measures are seasonally adjusted to smooth out regular seasonal shifts. The statistical technique gives a more informative picture of underlying trends in economic data.

Seasonal adjustment of the economic numbers would be relatively easy if the economy grew at a steady rate without any cyclical ups and downs. In the real world, though, recessions interrupt expansions and cyclical forces get mixed up with seasonal forces. Employment changes in recession years aren't shown in Figure 1, since seasonal swings in employment tend to get overwhelmed by declining employment. It's much easier to visually identify Minnesota's employment seasonality by looking at only normal years as in Figure 1. Normal years are when monthly job growth is fairly stable on a year-over-year basis.

¹Seasonally unadjusted employment estimate from Current Employment Statistics (CES), <https://mn.gov/deed/data/data-tools/current-employment-statistics/>.

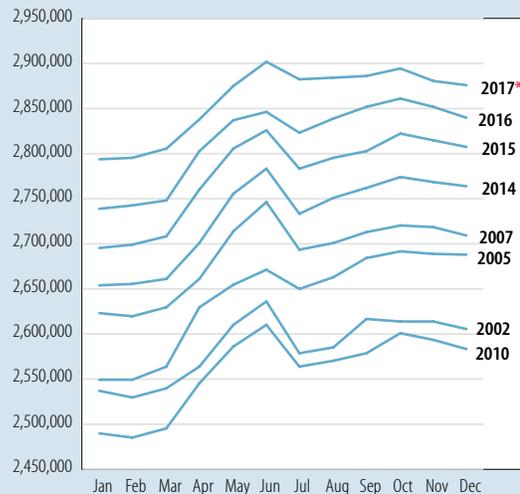
Unadjusted employment in Minnesota has peaked in June in 14 out of the last 16 years. Construction employment has ramped up, school employment doesn't shrink noticeably until summer vacation kicks in fully in July, and summer recreation-related employment hiring has occurred.

October claimed the peak employment month in 2005 and 2016. December, despite the annual hype over Christmas-related retail hiring, usually ranks either fifth or sixth in employment level.

Employment is usually lowest in January, February and March when the construction industry has gone into partial hibernation. Warmer weather recreation, arts and entertainment employment slips (think favorite amusement park, golf course or garden nursery) when the snow begins to fall and is only partly offset by the Bold North winter recreation-related employment uptick (think favorite ski hill or ice fishing-house rental company).

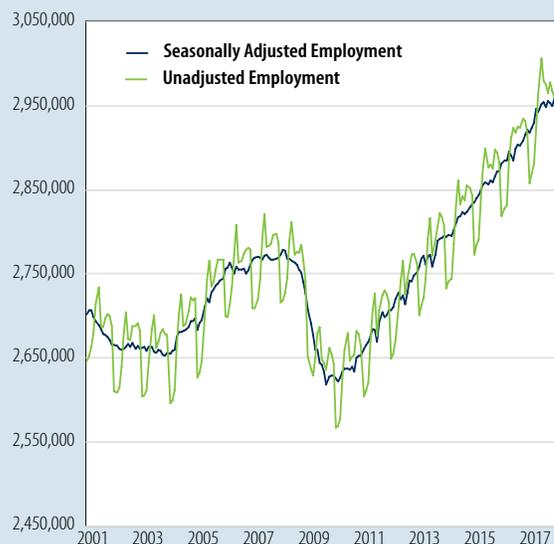
Figure 2 shows how seasonally adjusting employment numbers smooth out seasonal fluctuations by comparing Minnesota's monthly seasonally adjusted total to the unadjusted total since 2001.

Figure 1. Minnesota Employment by Month, Various Years



* July - December 2017 QCEW employment has been estimated based on Current Employment Statistics.
Source: Quarterly Census of Employment and Wages

Figure 2. Minnesota Employment, 2001 - 2017 Seasonally Adjusted and Unadjusted



Source: Current Employment Statistics (CES)

When seasonally adjusted, the employment change between June and December 2016 was an 18,100-job increase, rather than the 28,500-job loss using unadjusted data. The seasonally adjusted takeaway during the second half of 2016 was that job growth slowed compared with the first half of the year, but jobs were still being added. The unadjusted takeaway was that Minnesota employment was declining at a rate usually seen only during recession.

Minnesota and U.S. employment seasonality has been declining over the last six decades as shown in Figure 3. Figure 3 compares the monthly

unadjusted employment total to annual average employment for each year.

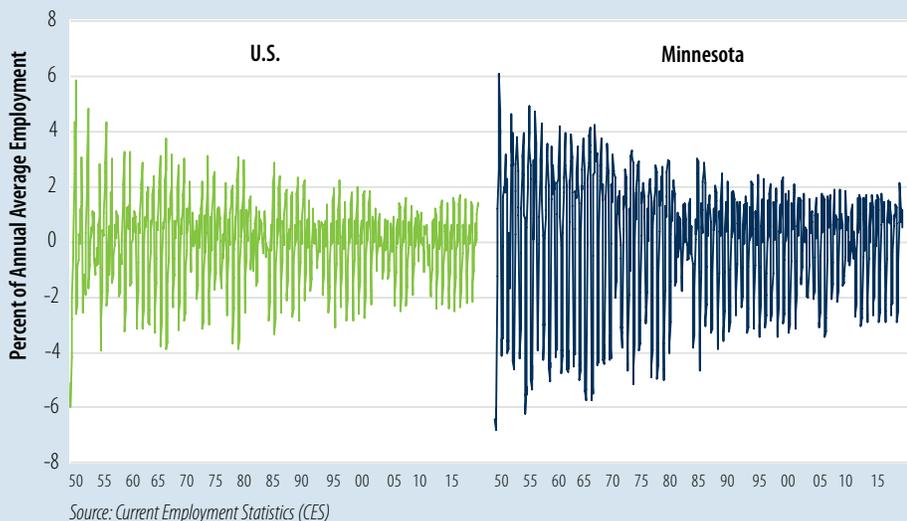
Six decades ago Minnesota's highest employment month exceeded annual average employment by 4 percent or more in most years, while the lowest employment month was 5 or 6 percent below annual average employment. That employment variation has declined through the years, with the highest employment month now 2 percent higher than annual average employment and the lowest employment month roughly 3 percent below annual average employment.

A more sophisticated measure of seasonality is Mean Seasonal Variation (MSV).² The MSV of Minnesota employment in the 1950s averaged 2.6 compared with the average of 1.1 from 2010 to 2017. The MSV decline implies that employment seasonality was more than double in the 1950s compared with today.

Minnesota's employment seasonality always has been higher than U.S. seasonality, as shown in Figure 3, but the state's employment seasonality has declined faster than nationwide over the last six decades. Minnesota employment seasonality in the 1950s was more than twice as high as nationwide. Today the state's employment seasonality is only 80 percent higher than the U.S. as measured by MSV. The historical change in MSV values for both Minnesota and the U.S. supports the visual impressions from Figure 3.

The fall in seasonal employment over the last 60 years can be traced to seasonal employment declining across almost all industries and to shrinking shares of total employment in industries with high seasonal swings in their workforces. Table

Figure 3. Minnesota and U.S. Historical Seasonality, 1950 - 2017



Source: Current Employment Statistics (CES)

²Mean Seasonality Variation for employment for a year is the mean of each month's absolute value of the difference between seasonally adjusted and unadjusted employment divided by the seasonally adjusted employment. See "Labour Market Seasonality in Canada: Trends and Policy Implications," <http://www.csls.ca/reports/csls2005-01.pdf>, for further details.

1 lists the 1990 to 2017 average MSV for Minnesota's industries, along with 2017 average annual industry employment. Health care and social assistance employment has the lowest seasonality. It's good to know that your health care needs can be met year round. Health care and social assistance employment has more than doubled since 1990, boosting the sector's share of Minnesota employment from 9.8 percent in 1990 to 16 percent in 2017.

Construction employment – the most seasonal industry – accounted for 3.7 percent of employment in 1990 and 4.1 percent in 2017, while its seasonality has fallen by 20 percent over the last three decades. Educational services, which includes only private education employment, has increased its share of employment from 1.5 to 2.3 percent since 1990. Over the same period, seasonality in educational services employment has declined by 64 percent. Seasonality has declined in 17 out of the 21 industries listed in Table 1. The only industry with a sizable increase in seasonality over the last few decades is arts, entertainment and recreation.

Table 1. Seasonality by Sector

	1990 - 2017 Mean Seasonal Value (MSV)	2017 Annual Average Employment
Construction	11.1	122,157
Arts, Entertainment, and Recreation	10.5	42,505
Educational Services	9.1	68,772
Leisure and Hospitality	4.5	266,126
Mining and Logging	4.4	6,931
State Government	4.4	100,579
Accommodation and Food Services	3.4	223,621
Administrative/Support and Waste Management	3.4	139,918
Goods-Producing excluding Agriculture	3.2	448,981
Local Government	3.2	294,859
Government	2.9	427,636
Real Estate and Rental and Leasing	1.7	33,221
Retail Trade	1.6	303,001
Non-Durable Goods Mfg.	1.5	118,067
Total Private	1.5	2,516,138
Professional and Business Services	1.4	376,519
Transportation, Warehousing, and Utilities	1.4	102,742
Trade, Transportation, and Utilities	1.1	538,067
Total Nonfarm	1.1	2,943,774
Private Service Providing	1.1	2,067,157
Manufacturing	1.0	319,893
Educational and Health Services	0.9	539,826
Wholesale Trade	0.9	132,324
Service-Providing	0.9	2,494,793
Durable Goods Mfg.	0.8	201,826
Financial Activities	0.6	176,724
Information	0.6	50,637
Other Services (Private Only)	0.6	119,258
Federal Government	0.5	32,199
Management of Companies and Enterprises	0.5	80,336
Professional, Scientific, and Technical Services	0.4	156,265
Finance and Insurance	0.4	143,503
Health Care and Social Assistance	0.3	471,054

Source: Current Employment Statistics (CES)



Minnesota's employment seasonality ranks 15th highest among states, right above Nevada and just below Florida. The major role that weather plays in seasonal hiring patterns is highlighted by these three states. Despite having almost polar extremes in weather patterns, they are ranked right next to each other when it comes to seasonal employment swings. If you snowbird to Nevada or Florida in the winter, you contribute to the seasonality in all three states by reducing your spending in Minnesota during the winter while adding to consumer spending in either Nevada or Florida.

The industrial mix of each state also influences employment seasonality. States more dependent on agricultural employment, all else being the same, will have higher seasonality, as agricultural hiring ramps up during harvest time. Southern states tend to have lower employment seasonality than northern states. Figure 4 shows the five states with the most seasonality and the five states with the lowest seasonality. Alaska's hiring pattern over the year has more than four times the seasonality of Mississippi's.

³Industries with peak summertime employment: amusement parks and arcades, beer and wine wholesale merchants, building material and supplies dealers, child day care services, death care services, museums, historical sites, other motor vehicle dealers, and remediation and other waste management services.

Industries with peak wintertime employment: book, periodical, and music stores, clothing stores, cut and sew apparel manufacturing, private elementary and secondary schools, footwear manufacturing, home furnishings stores, jewelry, luggage and leather goods stores, and logging.

There is higher seasonality in Minnesota employment than measured by the state's MSV. MSV is calculated using total employment which is derived by summing up employment across detailed industries. Some of the detailed industries have differing seasonal hiring and firing patterns that are partially lost when aggregated into total employment. Figure 5 shows this by displaying annual employment swings for two sets of industries – one consisting of eight detailed industries with peak employment during the summer and the other consisting of eight detailed industries with peak employment in the winter.³

Logging companies, one of the peaking industries in winter, increase their workforce as winter sets in. Meanwhile, firms providing death care services – a summer employment peak industry – reduces its workforce when winter sets in. When summer arrives, death care services employment ramps up while logging companies lay off workers.

The same offsetting scenario exists between child day care services and elementary and secondary schools. Payroll

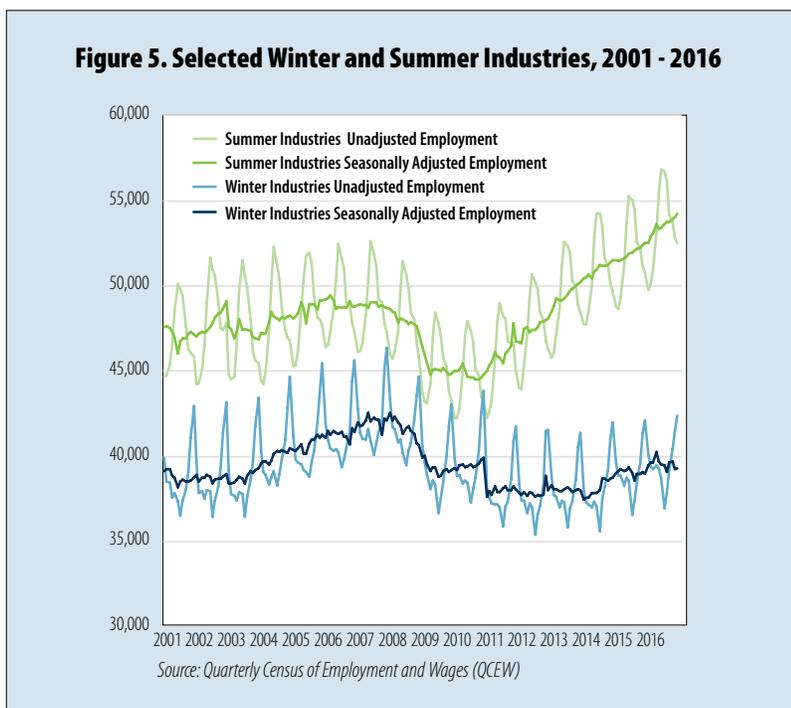
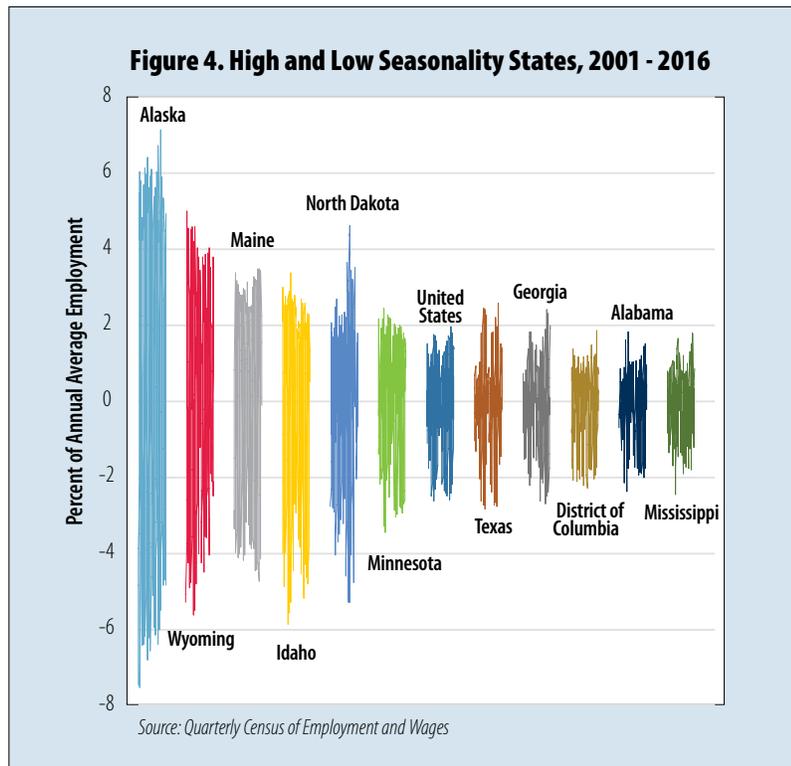
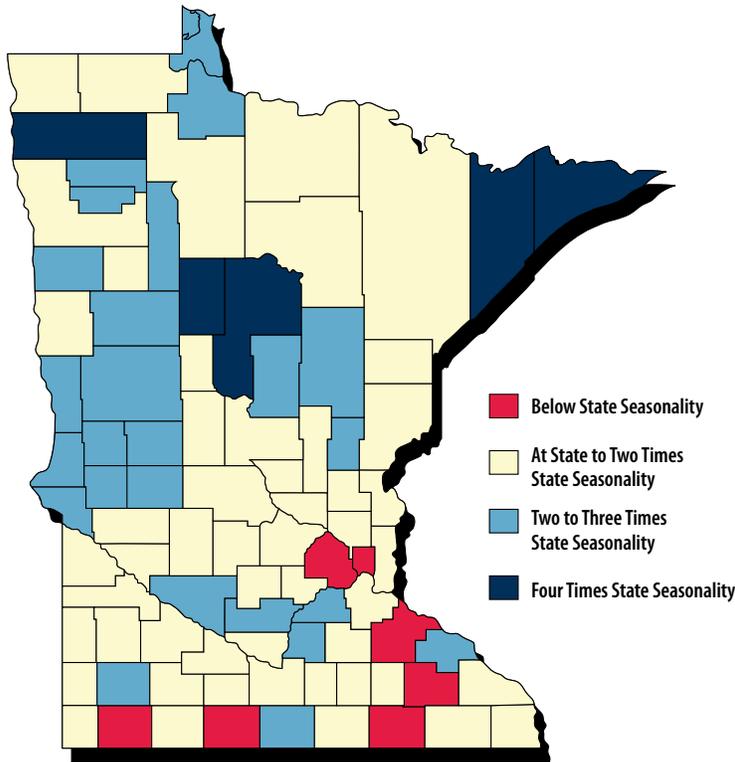


Figure 6. Employment Seasonality in Minnesota Counties



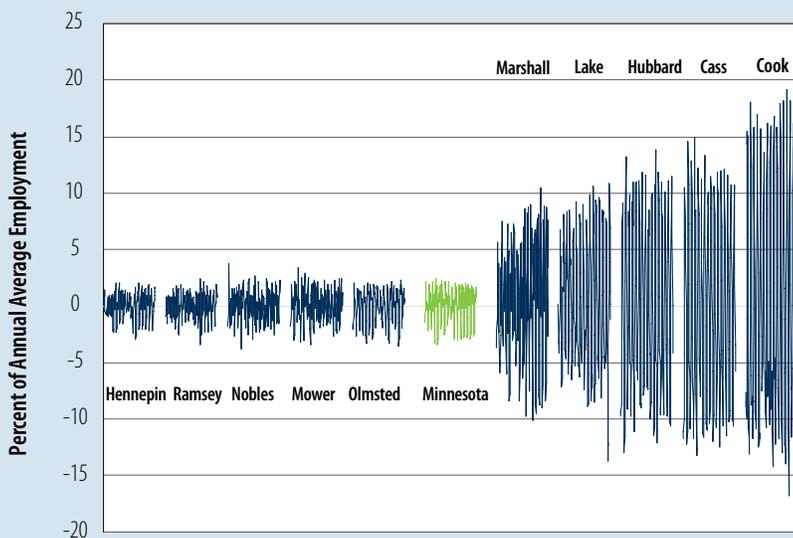
numbers at child day care companies peak in the summer when school is out and then trail off as the school year begins. Elementary and secondary school employment is reduced during the summer and rises when school starts up in the fall.

Employment seasonality varies across Minnesota as shown in Figure 6. Employment in only seven counties was less seasonal than statewide employment between 2001 and 2016. Three of the least-seasonal counties are big in terms of employment: Hennepin, Ramsey and Olmsted. Total employment in the other less-seasonal counties ranges from 20th to 40th largest.

In 51 counties, employment seasonality averaged between just over the statewide level to two times state seasonality. In 29 other counties, employment seasonality was two to four times state seasonality on average between 2001 and 2016. Employment in the remaining five counties experienced more than four times the seasonal swing in employment compared with statewide employment swings.

The counties showing the highest level of seasonality were Cass, Cook, Hubbard and Lake. These counties are ground zero for Minnesotans with cabins,

Figure 7. High and Low Seasonality in Minnesota Counties, 2001 - 2016

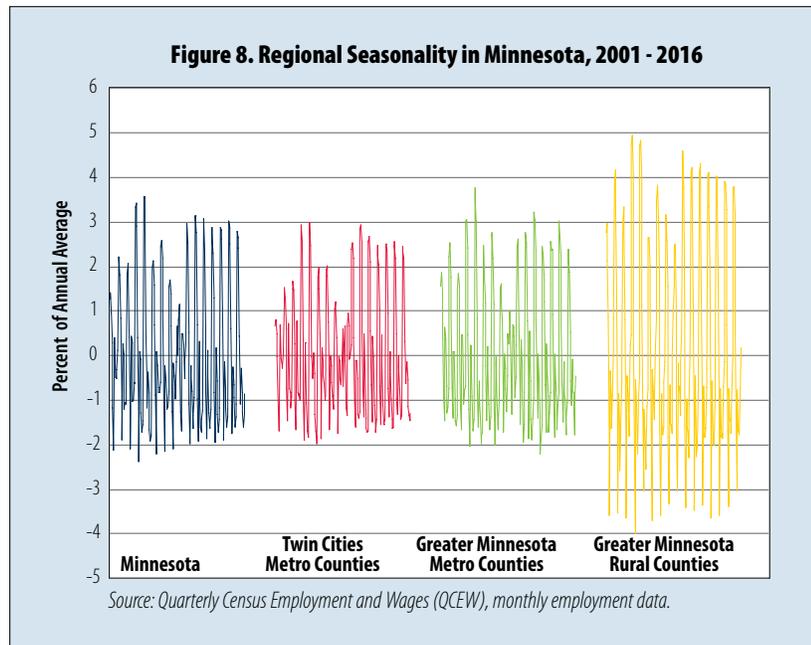


Source: Quarterly Census of Employment and Wages (QCEW)

so employment surges in the summer, only to fall off steeply when the leaves and tourists disappear in the fall.

Figure 7 shows the annual monthly employment swings in counties with the highest and lowest seasonality from 2001 to 2016. Counties with relatively steady employment through the year, such as Ramsey and Nobles, experience employment swings between 2 percent above to 2 percent below the annual average. Employment in Cook County, on the other hand, swings from 15 percent above annual average to 15 percent below in some years.

Urban areas with a more diverse mix of industries tend to have lower employment seasonality as displayed in Figure 8. Employment in the 10-county Twin Cities metro area has slightly less employment variation over the year than the combined employment of 11 Greater Minnesota metro counties. Combined employment in the 66 other counties – all rural counties in Greater Minnesota – is more seasonal than in the urban counterparts. Higher unemployment rates in some rural parts of Minnesota can be partly explained by a higher percentage of jobs being seasonal in nature. Year-round employment not

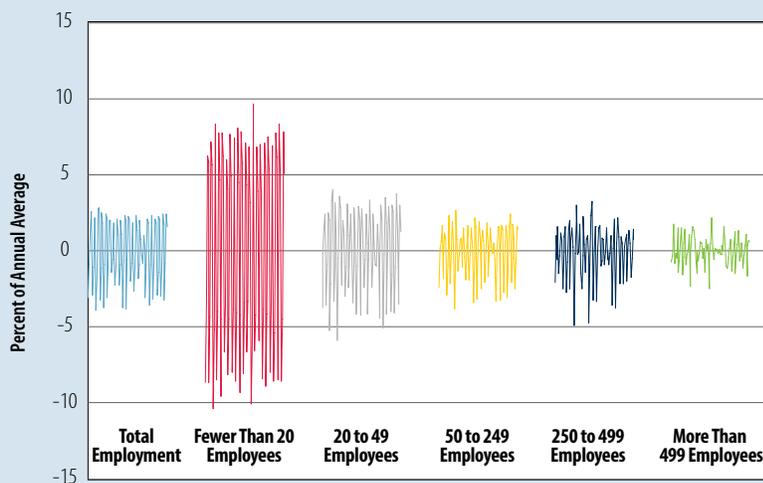




only contributes to lower unemployment rates but also more stable income.

Pay at larger firms tends to be higher than at smaller firms. Part of the reason can be tracked to the higher proportion of seasonal jobs at smaller firms. Jobs at companies with fewer than 20 workers are roughly three times more seasonal than jobs at companies employing 500 or more as shown in Figure 9. Two highly seasonal industries – construction and agriculture – are disproportionately made up of small-sized companies, which helps explain the variation of employment seasonality shown in the figure.

Figure 9. Seasonality by Firm Employment Size in Minnesota, 1995 - 2015



Source: U.S. Census, Longitudinal Employer-Household Dynamics (LEHD) program. <https://ledextract.ces.census.gov/static/data.html>. Quarterly employment data.

While the share of jobs in Minnesota that are seasonal has decreased over the years, recognizing the month-to-month employment swings that regularly occur during a year in Minnesota is a must for accurately gauging Minnesota’s job growth path. Employment seasonality varies across the state and industries, which actually works to hide some of the hiring and separating activity related to regular seasonal employment swings. Seasonal adjustment techniques are applied to employment data to smooth out the seasonality, helping to create a clear picture of jobs in Minnesota. □

Why Seasonal Adjusting is Valuable



Dave Senf’s story illustrates some of the many industries where employment tends to fluctuate in somewhat typical and recurring patterns during the year. These seasonal patterns stem from calendar effects beyond just changing weather, even here in Minnesota. And the patterns shown in one industry may be quite different – in terms of timing, frequency and magnitude – from those of another. Consider construction, retail trade and education as examples. Even within an industry sector we may see components with very different seasonal tendencies – garden supply stores and department stores within retail, or ski areas and golf courses within arts and recreation for example.

Add to these complex seasonal variations the additional complications that come with the timing of events from year to year. The number of shopping days between Thanksgiving and Christmas, for example, or the timing of the start or end of the school year may cause dramatic shifts in the timing of hiring and downsizing in these areas. And overlaid with all these disparate changes is the fact that our economy is ever-evolving. The impact that highly seasonal sectors like farming and construction have on our overall economy is diminishing, while less volatile areas like health care and business services are growing in importance.

Despite the complex nature of seasonal fluctuations in most economic time series, including employment, a clear divining of the

condition of our labor markets requires some method of distinguishing what part of a change is typical “for this time of year” and how much might be atypical and therefore indicative of real change. The widely used method for accomplishing this and adjusting employment data goes by the somewhat unfortunate acronym X-13 ARIMA SEATS. This involves identifying, through application of any number of statistical packages, a purely mathematical relationship between a variable and its past values at various lags, and using these intertemporal relationships between current and past values to estimate and remove changes across time that are common and persistent. The result is then a series that reflects only the “uncommon” changes over time, those that are greater or less than what has been typical over the course of the historical data series used in the exercise.

It’s important to note, if only because this is often asked by those unfamiliar with the process, that seasonally adjusting a time series is a mathematical exercise. It does not involve analysts using their judgment to determine whether some seasonal event like a blizzard has affected the numbers. The past behavior of the data identifies what’s “typical” for a given indicator at a particular time of year. The remaining change is then identified as the “seasonally adjusted” change, or that part of the change that is irregular and perhaps indicative of changes in conditions that are out of the ordinary. These are what trackers of our economy are looking for, and why seasonally adjusting data is so valuable to that effort. ■

Education and the Gender Gap

Women in Minnesota earn less than men, even when they have the same level of education.



PHOTO: REBECCA ZENEFSKI

Conventional wisdom suggests that women who want to rise up the career ladder like men should seek the most education possible. Earnings gaps, however, exist even among women and men with the same amount of education.

Postsecondary education is expensive. Without equal rewards, the rates at which women and men recover these costs will differ, giving women a worse deal than men. Moreover, unequal gender rewards for the same higher education

credential contradicts the very notion of removing barriers to success through postsecondary education.

This article examines educational attainment and returns by gender in Minnesota. The most recent five-year American Community Survey (ACS) micro-data (2012 to 2016) for Minnesota is used for the analysis. The educational levels examined are high school diploma, associate degree, bachelor's degree, master's degree and doctoral degree. The analysis includes all Minnesota workers

who were at least 25 years old and reported being employed.

Education and Labor Market Earnings

Most people consider a postsecondary education credential a powerful equalizer that can catapult anyone onto a successful career path. The sheer force of educational credentials can help overcome other forms of systemic barriers to success.

In fact, higher levels of educational attainment are associated with significantly higher labor market earnings. According to the Minnesota Office of Higher Education, the average annual expense for a resident undergraduate attending a Minnesota college full time in 2016 ranged from \$14,420 to \$49,107. The higher earnings that accrue over one's career and into retirement, however, usually compensate for the high investment cost. Advanced degrees also improve job stability, career mobility and salary progression.

Postsecondary Education in Minnesota

Minnesota is often lauded as one of the most educated states in the country. In 2016, 46 percent of Minnesotans ages 25 and over had at least completed an associate degree, while 34 percent had completed at least a bachelor's degree. The gendered breakdown of educational attainment shows slightly more educational credentials among women than men. As shown in Table 1, 48 percent of women earned at least an associate degree compared with 45 percent of men, while 35 percent of women earned a bachelor's degree compared with 34 percent of men. Slightly higher percentages of women earned educational credentials up to the master's level. Slightly higher percentages of men earned professional and doctoral degrees.

Defining Gross Returns on Education

This article presents gross returns on higher education credentials using data from the 2016 American Community Survey. In 2016, among employed workers ages 25 and over in Minnesota, median annual wage and salary income was \$37,500 for high school graduates. This increased to \$40,000 for those with an associate degree. Therefore, the return from getting an associate

degree over a high school diploma was \$2,500 or 6.7 percent.

The median salary for bachelor's degree holders (\$50,000) was an increase of \$10,000 or 25 percent, over associate degree holders. The median salary for master's degree holders was \$65,000, an increase of \$15,000 or 30 percent over a bachelor's degree. The median salary for doctoral degree holders was \$78,000, an increase of \$13,000 or 20 percent over a master's degree. Note that these estimates are gross returns. In order to get the net returns from higher educational credentials, one

would have to subtract the cost of education.

How the Gender Earnings Gap is Defined

This article uses two standard ways of defining the gender earnings gap. The first is called the gender earnings ratio, which measures women's median annual earnings as a percentage of men's median annual labor market earnings.

The second measure is the gender earnings gap, which shows the gap between men and women's earnings as a percentage of men's earnings.

Table 1. Percent Frequency Distribution of Educational Attainment in Minnesota, 2016

	All (%)	Women (%)	Men (%)
Less than High School	7.1	6.5	7.7
Regular High School Diploma	21.8	21.4	22.2
GED or Alternative Credential	3.2	2.4	4.1
Some College, No Degree	21.5	21.6	21.4
Associate Degree	11.9	13.1	10.8
Bachelor's Degree	22.9	23.3	22.5
Master's Degree	8.2	9.0	7.5
Professional Degree Beyond a Bachelor's Degree	2.0	1.6	2.4
Doctorate Degree	1.3	1.0	1.7
Total	100	100	100
Universe	3,739,904	1,904,539	1,835,365

Source: 2016 one-year American Community Survey

Gender Gap in Earnings by Educational Attainment

Despite statistics clearly demonstrating gender equality in access to postsecondary educational attainment, Minnesota has an earnings gender gap at every level of education (see Figure 1). For both men and women, median earnings increase at every level of educational credential.

For the most part, the gender earnings gap widens as education increases. Men without a high school diploma earn 15 percent more than women without a diploma (an additional \$4,400 a year), while men with a high school diploma earn 28 percent

more than women with a diploma (\$10,300 more a year).

The male-female earnings gap increases to 30 percent (\$15,000 a year) with an associate degree and 31 percent (\$20,000 a year) with a bachelor's degree. The gap then begins to narrow at the master's degree level, with men earning 17 percent more than women with the same degree (\$12,000 a year). At the doctorate level, men earn 18 percent more than women with a doctorate (\$16,000 a year).

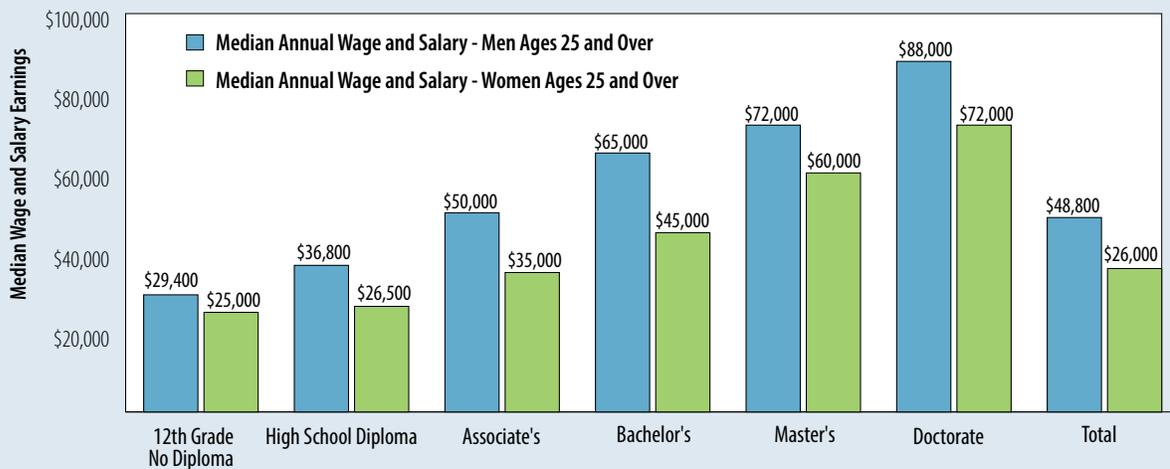
Gender Gap in Returns to Education

The previous discussion reveals that the gender earnings gap does not disappear with higher

educational credentials. Figure 2 shows that men receive higher rewards for completing higher educational credentials at all degree levels except master's degree.

Men increased their annual wage and salary incomes by \$13,200 (36 percent) after gaining an associate degree, while women increased their earnings by \$8,500 (32 percent) for the same degree. The salary growth for bachelor's degree completers over associate degree completers was \$15,000 (30 percent) for men and \$10,000 (29 percent) for women. Only at the master's level do women see higher rewards than men. For women, the salary increase for earning a master's degree was \$15,000 (33

Figure 1. Median Wage and Salary Earnings by Gender and Educational Attainment for Ages 25 and Over, Minnesota, 2016



Source: 2016 one year American Community Survey

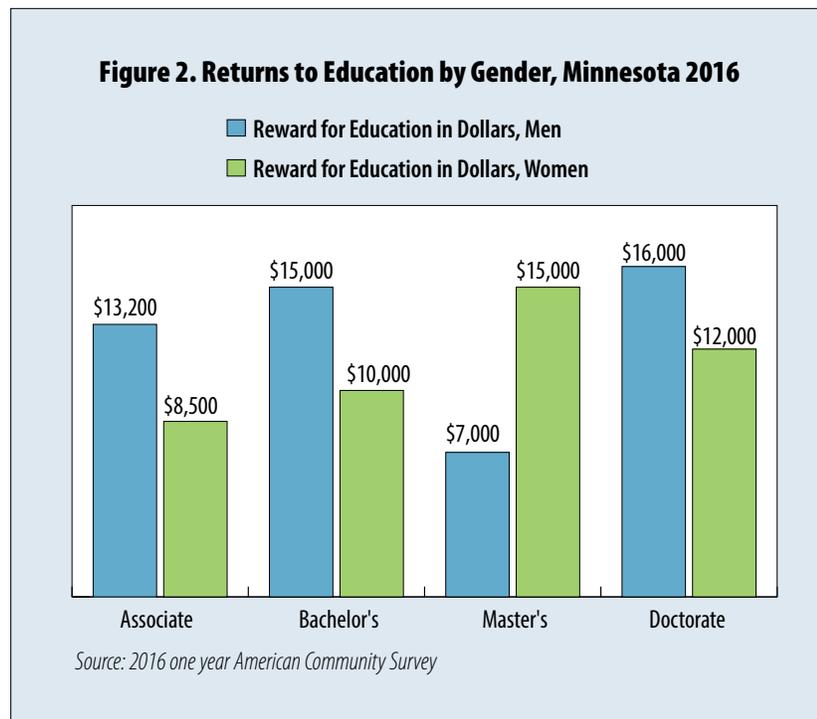
percent) compared with \$7,000 (11 percent) for men. Finally, at the doctoral level, the men's premium is once again higher at \$16,000 (22 percent) compared with \$12,000 (20 percent) for women.

Choice of Field of Study and Gender Gap in Earnings

Choice of college major, or field of study, is a big factor in determining salaries. If women tend to track into majors that lead to lower salaries for the same degree level, then it would be a significant factor in explaining why earnings for women and men with the same degree differ. If women tend to choose fields of study that command lower salaries, this could explain some or all of the gender earnings gaps by education. Table 2 shows the five most popular choices at the bachelor's degree award level. (Note that the ACS has data on field of study only at the bachelor's degree level.)

Gender Similarity in Fields of Study

A good starting point for assessing whether choice of field of study is a potential cause of the gender gap is to investigate whether the top choices differ between women and men.



At the bachelor's level, three fields of study are in the top five list for both men and women. These are business, education administration and teaching, and social sciences. Yet among bachelor's degree holders within each field of study, the median salaries are consistently lower for women than men. For instance, the median salary for women with a business degree is \$45,000 as opposed to \$55,000 for men.

There are also a few fields that are more popular among women and others that are more popular among men. For women this is medical and health sciences and services. For men it is engineering. As shown in Table

2, women with bachelor's degrees in medical and health sciences and services earn less than men with engineering degrees.

Overall, there are some elements of similarity as well as dissimilarity between the fields of study chosen by men and women. For the sake of keeping the analysis manageable, the previous analysis was limited to the top five fields of study. Without more in-depth research, a firm conclusion on the link between choice of field of study and median salaries cannot be reached. What is clear, though, is that even for the same field of study, women earn less than men. This suggests that even

Table 2. Top Five Fields of Study and Median Annual Salary at Bachelor's Degree Level by Gender, Minnesota, 2016

Women, Bachelor Degree Completers			Men, Bachelor Degree Completers		
Field of study at Bachelor's level	Field of Study Graduated With as a Percentage of all Women who are Bachelor's Degree Holders	Median Annual Salary (Women)	Field of Study at Bachelor's Level	Field of Study Graduated With as a Percentage of all Women who are Bachelor's Degree Holders	Median Annual Salary (Men)
Business	20.3	\$45,000	Business	28.5	\$55,000
Education Administration and Teaching	18.3	\$11,000	Engineering	11.5	\$68,000
Medical and Health Sciences and Services	12.1	\$40,000	Social Sciences	7.5	\$50,000
Communications	5.7	\$36,500	Education Administration and Teaching	7.4	\$46,100
Social Sciences	5.4	\$25,000	Computer and Information Sciences	4.9	\$45,000

Source: 2016 one-year American Community Survey

after adjusting for field of study, gender bias in returns on education potentially lingers.

Summing Up

This article provides a preliminary overview of gender gaps after postsecondary education in Minnesota. Further analysis is needed to estimate the adjusted dollar value and percentage returns from higher education. Choice of college major, occupational choice, industry, hours of work, marital status, family composition, residence, age and

work experience all could have significant impacts on labor market earnings. Furthermore, other factors such as soft skills are harder to measure but nonetheless impact work performance, salary and salary growth.

Finally, it is important to drill deeper to the intersection of gender and race and ethnicity by education. For instance, in Minnesota in 2016, at the bachelor's degree level, non-Hispanic white men earned \$67,000 at the median, while non-Hispanic white women

earned \$45,000 and women of minority races earned even less. Black/African-American women earned \$41,000 or 39 percent less than Caucasian men. Hispanic women with a bachelor's degree earned \$33,900, or 49 percent less, while Asian American women earned \$40,000 or 40 percent less than Caucasian men.

Minnesota has work to do to break down racial barriers that linger after a postsecondary education. Future research should look at women of minority race and ethnicity and their labor market outcomes. [T](#)

Meet

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