Visualizing the demand and supply of financial aid for college

Drew M. Anderson, RAND Corporation

February 2019

Abstract

Colleges and universities play a major role in generating human capital for the workforce, and also represent a setting where government intervention responds to correct market failures, though imperfectly. This study looks at these topics through the lens of financial aid. Improvements in the delivery of aid have led to better access among poor students, while limited funding of aid has restricted access. The paper discusses how demographics, finances, and policy in this area are likely to evolve in the coming decades.

This working paper was made possible by the US 2050 project, supported by the Peter G. Peterson Foundation and the Ford Foundation. The statements made and the views expressed are solely the responsibility of the author.

1. Overview

One area of the U.S. economy that has recently seen massive developments in terms of demographics, finances, and policy is that of college education. Today's college student looks very different from that of a few decades ago: they are older, more likely to work, and more likely to borrow (Lumina Foundation 2019). The last few decades have seen increases in enrollment overall, and more recently the late 2000s recession brought large increases in enrollments at two-year institutions, by adults, and from students from lower socioeconomic backgrounds (U.S. Department of Education 2016; NCES 2018). As these trends taper off and levels of college enrollment have plateaued, the level of college completions will have potentially large effects on the economy in decades to come. Gaps in completion across demographic groups are persistent (NCES 2012; Shapiro et al. 2017).

For many students, a key barrier between starting and completing college is the cost in terms of tuition, foregone earnings, and living expenses. After adjusting for inflation over the past decade, tuition and fees at public two- and four-year institutions have risen by approximately 35%, and at private non-profit colleges the increase was 26% from a much higher starting point (College Board 2018). The federal government and nearly all state governments make significant investments in lowering these costs, increasingly by delivering financial aid directly to students. In the 2017-18 school year, the federal government delivered $123 million in grant, loan, and work-study aid to 12.7 million student recipients (FSA 2018a). A growing base of evidence shows that both grant and loan aid help recipients stay enrolled and complete college degrees (Page and Scott-Clayton 2016; Marx and Turner 2017; Denning, Marx, and Turner forthcoming).

The effectiveness of voucher-style financial aid is dependent on individuals' capability and effort to complete application steps to access the aid. The FAFSA, or Free Application for Federal Student Aid, is the key to federal aid, and for many students the FAFSA is also the only way to access financial aid from state and institutional sources. However, the FAFSA has its problems. The form is notoriously long and complicated, requiring detailed information about household finances. Studies have demonstrated that the complexity of the FAFSA system impedes access to aid (Dynarski and Scott-Clayton 2006; Bahr et al. 2018; Bettinger et al. 2012; Kofoed 2017; Martorell and Friedmann 2018). When students are delayed in completing the form, information about the resulting aid may be communicated too late to inform students'

decisions about investing in their future. Some state and institutional policies raise the stakes on timely completion by allocating grant aid first-come first-served or imposing deadlines (Cannon and Goldrick-Rab 2016). Furthermore, some states and institutions extend the process and raise the complexity by requiring additional questions and steps.

There have been several federal reforms to reduce these timing-related issues: making the FAFSA shorter, allowing users to import tax information directly from IRS databases, and allowing the form to be completed farther in advance of the school year, using existing tax information (FSA 2018b). Research has not shown which students take advantage of these reforms: the already-advantaged or the students in greatest need of financial aid.

This study tracks a decade of FAFSA applications using a new administrative database, uses the data to examine policies and reforms in this area, and describes current trends in demographics, finances, and policy that are provide information about the coming decades and the business cycle. The database includes the date of filing the FAFSA, which allows for analysis of state funding shortages and analysis of timing-based reforms to the filing process. The study will consider whether the financial aid system is structured in a way that is effective for students of today and of the future.

The paper begins by briefly describing the FAFSA system, and how it is used by the federal government and by state governments to deliver financial aid. It then refers to national data tracing trends in the demographics of college students, how college-going responds to the business cycle, and how state and federal policy have handled these changes. Next the paper introduces the panel data set used for two case studies: the demand and supply of state-funded financial aid in Wisconsin, and the impacts of a major shift in federal FAFSA policy.

A few key trends emerged. High school graduates are declining in number overall, while Hispanic students and students from southern states are growing in number. Both of these groups have historically low levels of college enrollment, but when they do enroll are likely to be eligible for financial aid due to higher levels of poverty. However, recent high school graduates are only part of the picture. Surges in college enrollment and demand for financial aid have come largely from older adults, whose application behavior is more responsive to down labor markets and housing busts.

When surges in enrollment occur, federal spending on need-based aid automatically increases, and tends to outpace static state spending. In Wisconsin, the students who filed too late to receive aid during the late 2000s recession tended to come from more disadvantaged groups, and from technical college applicants as opposed to four-year applicants.

This paper is the first study the effects of the shift to the so-called "prior-prior" year FAFSA application process, using a large and granular database of FAFSAs after the implementation of the shift. Prior-prior was an important development in the world of financial aid, intended to simplify the process and deliver information earlier. However, it may be the case that efforts at simplification could differentially help already-advantaged students. This paper provides evidence that by a few months into the filing cycle, simplification had helped close gaps by family income, differentially helping disadvantaged students file earlier. The opposite was true for gaps by test scores, where better-prepared students were more likely to take advantage of early filing. This policy change serves as an example to other domains where delivery of social benefits relies on timely application, reapplication, and income verification.

The paper concludes by discussing what we can learn from the FAFSA as the nation moves toward 2050. Aid via the FAFSA is similar to other social benefits in that it creates countercyclical spending, involves tradeoffs between reaching a target population and burdening that population with complicated screening, and is politically contentious in times of scarce resources. All of these trends make it possible that other funding models such as free college, promise programs, and income share agreements will continue to grow in importance and potentially supplant some of the work of the FAFSA.

It is important to track trends in financial aid and college enrollment, as at least for now, postsecondary education remains a key engine of human capital development and a place where social inequality can be decreased or increased. The benefits of college degrees are large and growing, and they include higher employment and earnings, lower use of social benefits, and better health and well-being (Oreopoulos and Petronijevic 2013; Buckles et al. 2016; Ma, Pender, and Welch 2016; Aspen Institute 2018). A growing base of evidence supports that the returns to college completion are highest for marginal students (Zimmerman 2014; Andrews, Li, and Lovenheim 2016; Goodman, Hurwitz, and Smith 2017; Ost, Pan, and Webber 2018b). Elite colleges with the most resources have not always devoted them to raising the welfare of the least

advantaged students (Chetty et al. 2017). This leaves a significant role for the government to intervene and close achievement gaps, often using imperfect tools such as the FAFSA.

2. Background on financial aid for college

The genesis of federal financial aid was Title IV of the landmark Higher Education Act of 1965, part of President Lyndon B. Johnson's Great Society agenda of domestic policies. As it presently exists, Title IV provides for grant, loan, and work-study aid to students. The largest programs are the Pell Grant (spending an average of $30 billion per year over the past five years) and Direct Loans (disbursing $100 billion each year on average over the past five years, FSA 2018a). The vast majority of federal aid, including these two large programs, is allocated to students via the FAFSA, or Free Application for Federal Student Aid. The FAFSA system has been described in detail in several reliable sources. Besides the scholarly research discussed below, Federal Student Aid (FSA) explains the details of the process and its formula to users on its website.

Stepping back from the details, the key policy decision driving the FAFSA is the decision to allocate financial aid primarily based on current family income. This choice has several implications. First, income must be measured each year in order to stay current. Students are required to either input the information or, much simpler for tax filers, authorize the IRS to auto-fill the form. A portion of students are required to verify their income through added screening, which can slow down the process without adding much accuracy (NASFAA 2018a).

A second implication of focusing on current family income is that the student's family must be identified. Students under 24, who have not married, had children, or served in the military are considered to be "dependent" on their parents. This means their parents' finances will be included. Whether a student is dependent or independent, the number of other household members who are in college is also a major factor in aid eligibility.

Third, the formula is primarily student-focused, not institution-focused. The only way college prices directly affect aid eligibility is that a student can only receive aid up to the cost of tuition and fees, books and supplies, plus living expenses. Only in rare cases and at lower-priced colleges does the cost of attendance limit the amount of federal aid. This was the case for 14% of

federal borrowers in 2007-08, according to NCES (2011). The fact that aid is student-focused makes the FAFSA worthwhile for students attending all types of institutions.

Another factor leading to broad importance of the FAFSA is the generosity of student loans, with their low interest rates and multiple options for repayment. The Direct Loan program does offer small interest rate subsidies based on current family income, but eligibility for Direct Loans is based mainly on the student's age and year in college and not their creditworthiness or finances. At least in part because of the subsidies, the loan application is combined with the grant application. Thus, the FAFSA gathers information from a broad swath of the college student population who borrow, not just the poorest students who are eligible for grants.

The vast amount of data generated by FAFSA filings is tapped from outside of federal aid programs. There is an automated central processing system that sends information from the FAFSA to agencies in a student's home state and to colleges where a student applies. States and colleges use to the data to administer aid programs. They can also analyze retrospective data to predict coming trends, or to undertake research and analysis to improve their aid programs.

These implications of FAFSA policy have played out over several decades. Dynarski and Scott-Clayton (2006) and Dynarski and Wiederspan (2012) published seminal articles in the *National Tax Journal*, each of which provided an overview of the key topics in federal aid eligibility, application, and spending. The articles describe the trend toward more generous grant aid, that has nonetheless been outpaced by increases in tuition. Section 3 and Section 5 below discuss how state funding for financial aid has not responded to the business cycle, while federal funding has automatic countercyclical spending when family incomes fall, in addition to enacting reforms to increase spending during the late 2000s recession. Within broader trends, the two *NTJ* articles highlight the importance of seemingly minor program design choices in the FAFSA system. This paper updates the analysis of these two earlier articles in Section 6 below, directly observing a key reform that was proposed but not implemented at the time of the 2012 article: the prior-prior year FAFSA.

Ultimately, the effects of any change to eligibility formulas in the FAFSA depend on who applies, under what economic conditions, and how policymakers fund grant programs for the eligible population. The next section discusses each of these domains.

3. Demographic and economic trends in college applications, and policy responses

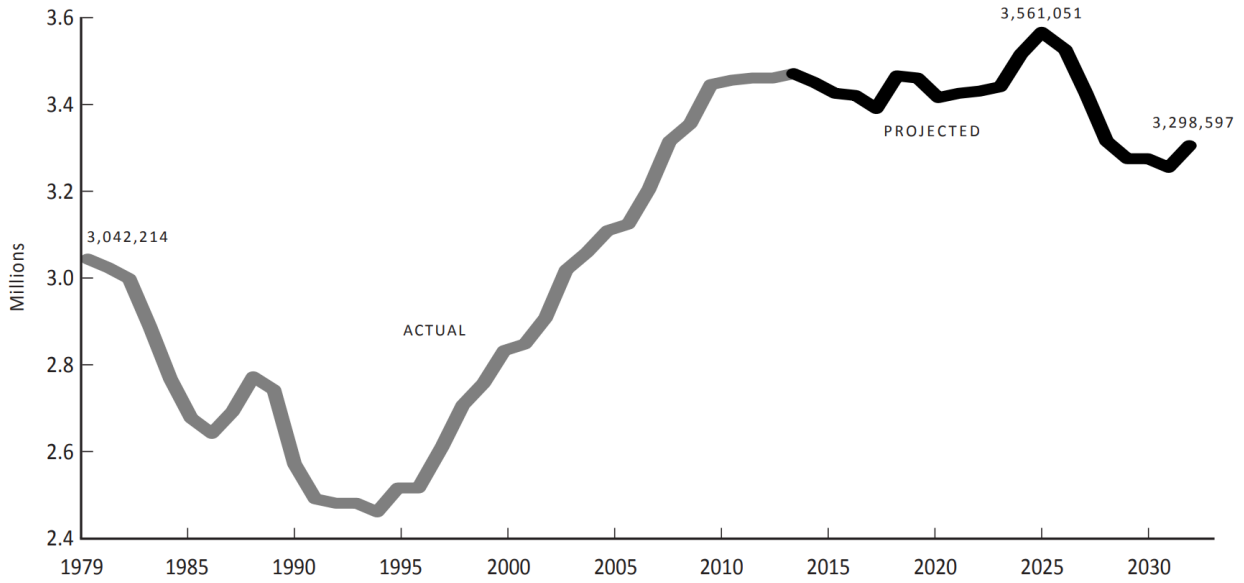
3.1 Demographic trends

This subsection describes overall demographic trends in college students, first focusing on the flow of students out of high school, and then on older adults returning to school. Students moving directly from high school to college now make up a minority of first-time undergraduate college students: just 37% percent of first-year students were 19 years old or younger in the 2015-16 school year (author's calculations, U.S. Department of Education 2018a).

For many years, the standard reference for flows of students out of high school has been the Western Interstate Commission for Higher Education (WICHE). WICHE aggregates data from the National Center for Education Statistics on the proportion of students who progress at each grade level, then applies the estimated progression rates to births data from the National Center for Health Statistics to project sizes of graduating classes 18 years in the future. Figures 1, 2, and 3 are show estimates from the most recent report by Bransberger and Michelau (2016).

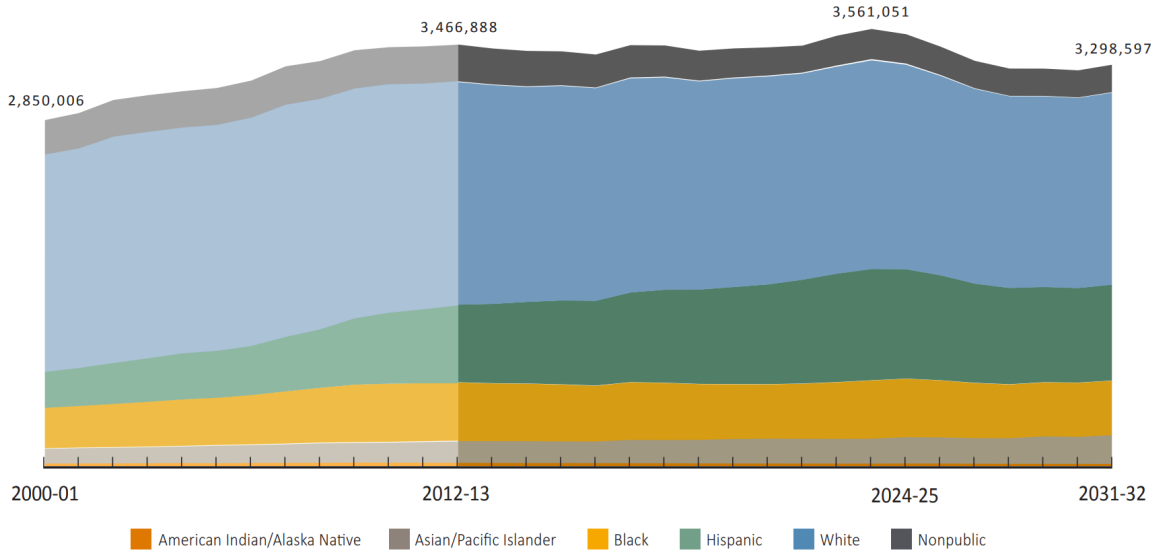
Figure 1 shows a 15-year period of increasing numbers of graduates beginning in 1995, which plateaued in 2010 and is then projected to begin a bumpy decline. The decline will come primarily from white students, who as Figure 2 shows, are the largest group and are projected to lose 14% over the next two decades. At the same time, black students will lose 7%. Hispanic and Asian students, meanwhile, are projected to gain 24% and 31% over two decades. American Indian/Alaska Native public high school graduates represent the smallest group and are projected to decline by 28% over two decades.

Figure 1. Total US public and private high school graduates



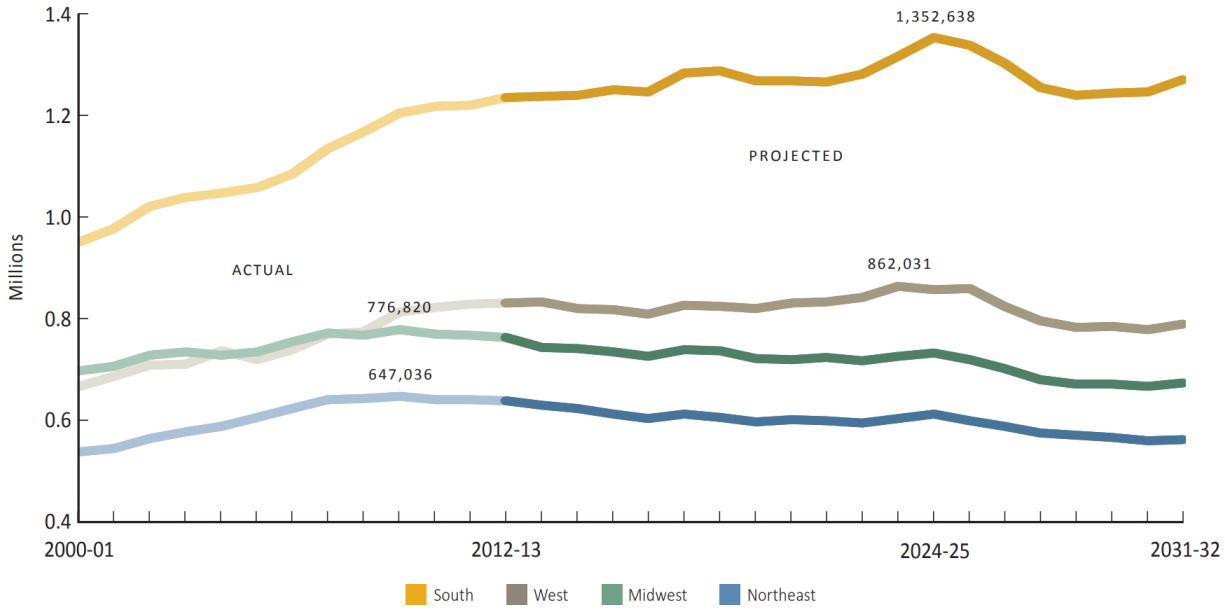
Source: Bransberger and Michelau (2016). Projections begin in the 2013-14 school year.

Figure 2. Total US public and private high school graduates, by race/ethnicity



Source: Bransberger and Michelau (2016). Projections begin in the 2013-14 school year. Race/ethnicity is not measured for nonpublic high school graduates.

Figure 3. Total US public and private high school graduates, by region



Source: Bransberger and Michelau (2016). Projections begin in the2013-14 school year.

The implications for financial aid and college-going are less clear from these figures. Grawe (2018) recently introduced the Higher Education Demand Index (HEDI), an effort to add nuance to the WICHE numbers and focus in on college enrollment. HEDI projects the number of college students not only by region and race/ethnicity, but also by the type of college attended and whether or not the student is likely to qualify for financial aid. HEDI uses the 2002 Education Longitudinal Study to estimate the propensity among different types of high school sophomore students to later enroll in college, then applies those probabilities to the number of adults in later years who fit the same types, using data from the American Community Survey. Growth among these types is projected into the future, based on aging, to generate predictions. The model makes adjustments for mortality, migration, immigration, and parental divorce.

Grawe (2018) finds that the decrease in births during the late 2000s recession is likely to lead to an overall decrease in college students, particularly from the northeast region. Like the WICHE estimates, he predicts shifts toward Hispanic and Asian American students. In the HEDI model, the increase in Asian American high school graduates signals a proportionally greater increase in college students than does the increase in Hispanic high school graduates, since Asian

Americans have an overall higher probability of enrolling in college in the data used to estimate the model.

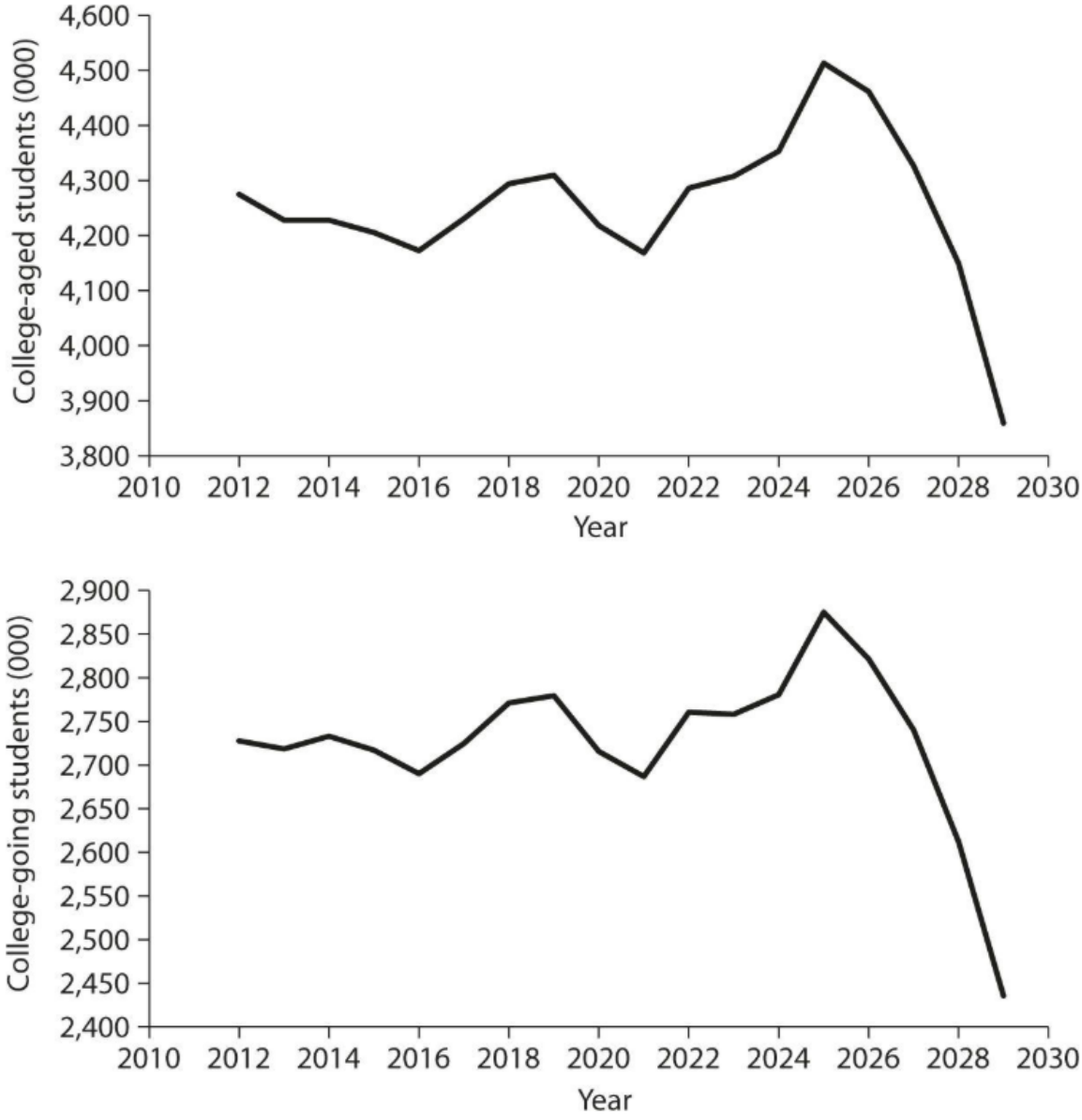
Figure 4, similar to the WICHE estimates of high school graduates in Figure 1, shows a modest increase in college-aged students peaking around 2025 before falling off precipitously. Figure 4 includes a second panel tracking the number of students who will actually go to college. Throughout the 20-year period displayed, the proportion of college-aged students going to college hovers around 60%, and thus the trends in overall demographics are largely representative of the trends in college going. The U.S. will lose 450,000 college students between 2025 and 2030, roughly a sixth of the total student population in 2025.

Overall, the number of students taking some financial aid will fall by the end of the 2020s, driven primarily by the overall drop in birth rates. The proportion of students taking financial aid will also slightly fall, even with the influx of births from lower-income backgrounds. This prediction is based on the traditionally low rates of college enrollment from these families, including in the 2000s.

Figure 5 incorporates student family finances, and it restricts the analysis to so-called "full-pay" students who are predicted to attend college without any financial aid. Together Figure 4 and Figure 5 show that the proportion of postsecondary students who come from higher-income families will slightly increase, from 9.3% in 2012 to 11.3% in 2029. Full-pay students are a relatively small minority of all students but are particularly important to national and elite universities and will lessen the estimated decrease in enrollment at these types of institutions.

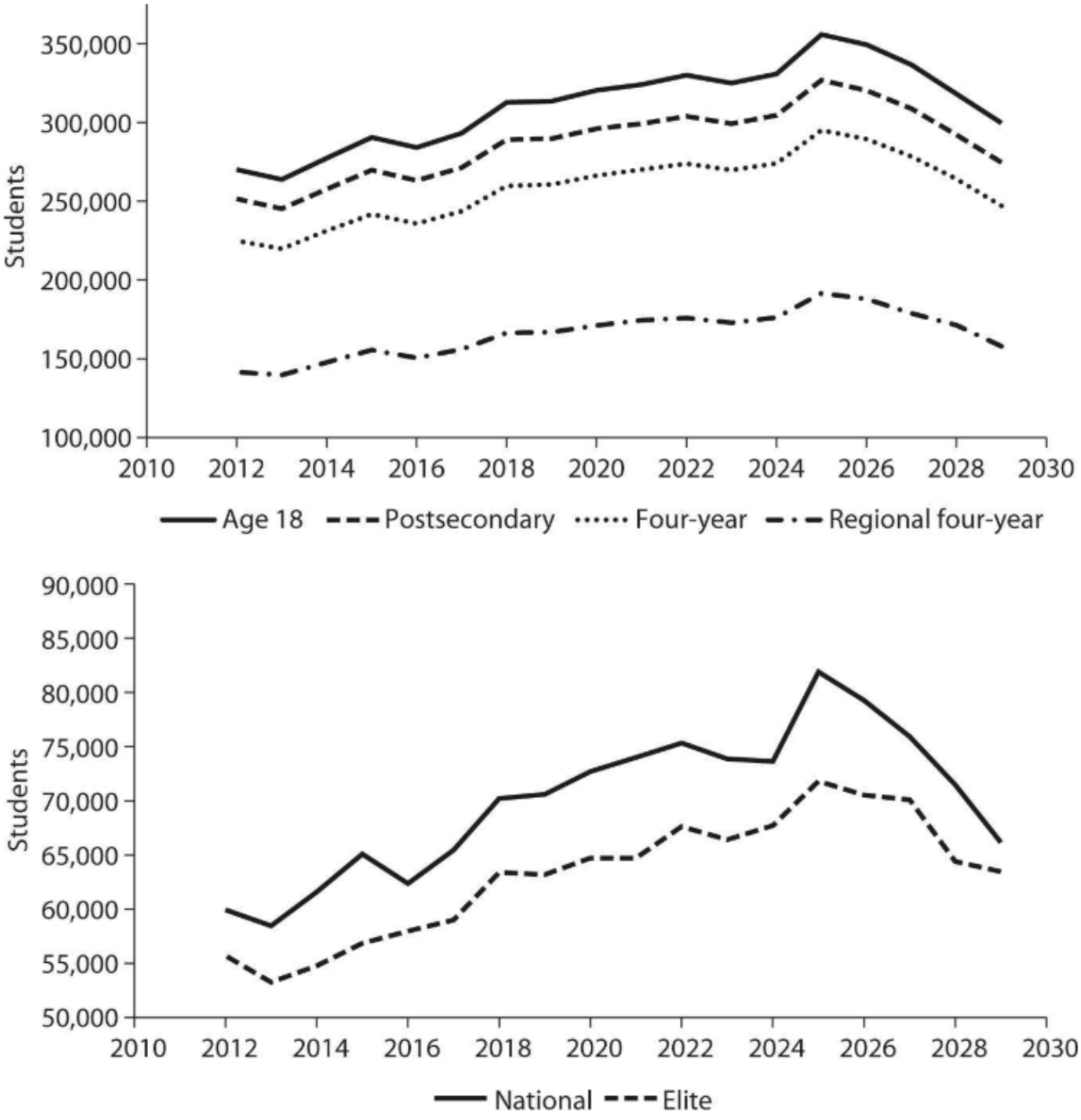
These predictions could be incorrect if the relationships between family background and college enrollment fundamentally shift. These shifts can be brought about by major changes in the economy, which can be related to funding for financial aid. The next subsection addresses the business cycle as well as longer secular changes in the returns to college.

Figure 4. Total US predicted student counts, by year of high school graduation



Source: Grawe (2018).

Figure 5. Total US predicted number of full-pay students by context



Source: Grawe (2018).

3.2 Economic trends and the reaction of financial aid

There has been a long trend of increasing demand for college-educated workers, which partly fuels increased enrollments. An extensive economic literature deals with the role of colleges in training students for the workforce, see for example Goldin and Katz (2008).

Within this broader trend, there are also cyclical changes with labor demand. A large portion of the price of college is the opportunity cost of time spent studying. It follows that when the opportunity cost falls with the labor market, the demand for college will increase. Several studies have measured to what extent enrollment decisions of potential college students react to the business cycle, for example Betts and McFarland (1995), Long (2014), Barr and Turner (2013), Charles, Hurst, and Notowodigdo (2018), and Ost, Pan, and Webber (2018a).

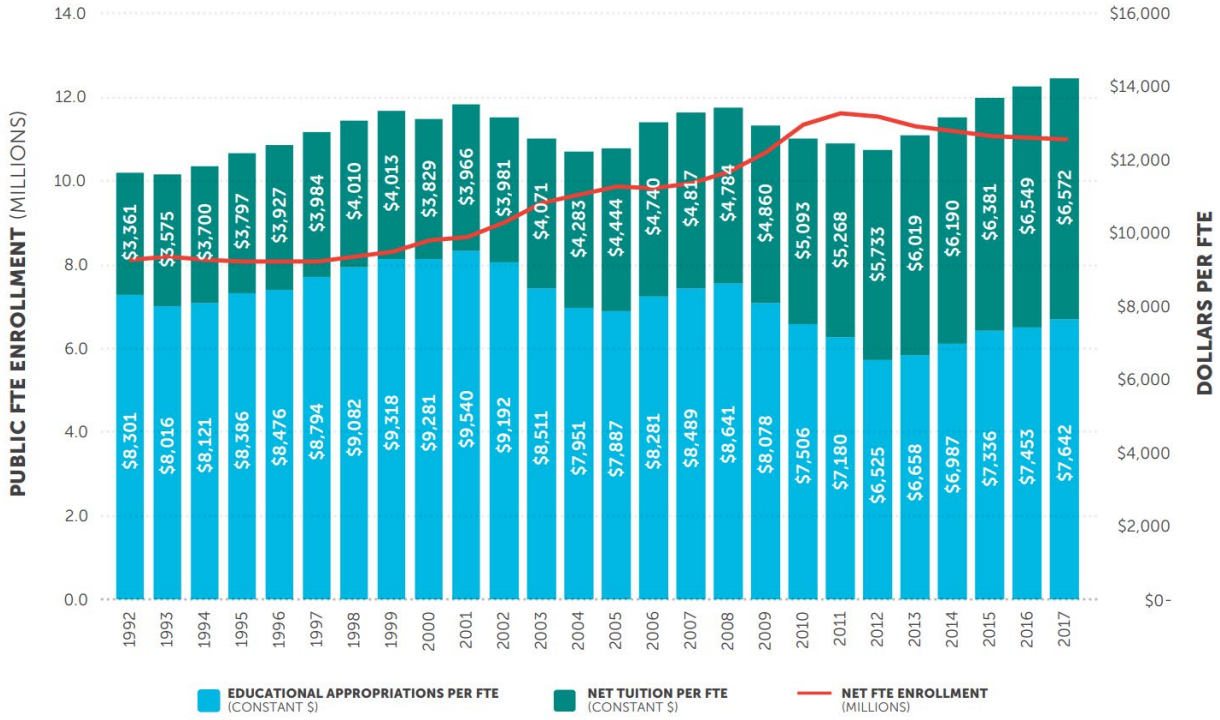
Downturns in the labor market doubly increase demand for need-based financial aid, as families will have lower incomes and higher demand for college. Considerably less has been written about this phenomenon and its distributional effects. The answers depend on how providers of financial aid react.

The annual State Higher Education Finance report tracks aggregate revenues and expenses in public higher education. Figure 6, in constant dollar terms, shows up-and-down movements in the total dollars of revenue per full-time equivalent student enrolled. The proportion of revenues per student coming from tuition have grown overall but increased most sharply after recessions when state appropriations decrease. The shifts toward tuition financing during recessions are made even more clear in Figure 7. The reductions in state spending have come disproportionately from reducing direct appropriations, not from reducing financial aid programs. NASSGAP (2017) reported a 34% increase in spending on need-based aid from 2006-07 to 2016-17, in real dollar terms, and Figure 8 shows an increase in state spending on aid programs, as a percent of all higher education appropriations, from 3.9% in 2000 to 8.8% in 2017.

A few studies have attempted to isolate and measure the effects of the business cycle on the provision of financial aid. Over a long panel from 1969 to 1994, Humphreys (2000) found that decreases in per-capita income at the state level were associated with decreases in funding to colleges and universities on a per-student basis. The effects of lowered state spending during recessions are typically passed on to students, as shown in Figure 7, via higher tuition. Thus, the

increases in aid can be offset by increases in tuition. Webber (2017) used state-level shifts as an instrument for individual colleges' shifts in funding, and estimated that a decrease of $1,000 per student in funding to a particular college led students at that college to pay $257 more in tuition and fees. Clelan and Kofoed (2017) compiled a data set of freshman year financial aid packages and linked them to state-level business cycle information. The makeup of aid packages shifted away from state-funded aid when state tax revenues declined. Thus, declines in the economy appear to decrease college affordability from multiple angles, including lowered state aid, and lowered state support which is passed on in the form of higher tuition.

Figure 6. Public college and university finances and enrollment over time



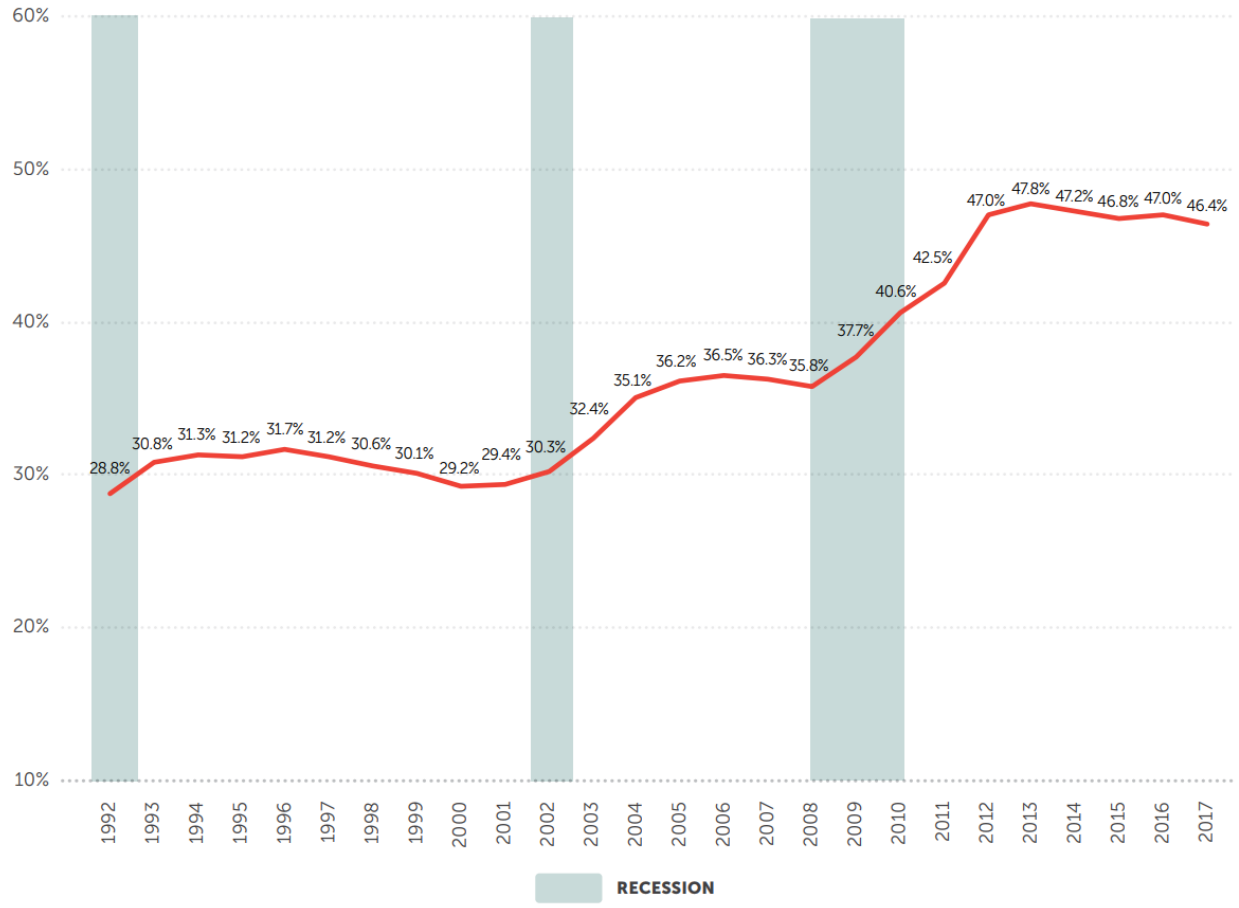
Source: SHEEO (2018) Figure 1. Dollars are adjusted to 2017 values using the Higher Education Cost Adjustment. FTE denotes full-time equivalent student enrolled.

Federal spending has followed a different pattern from state appropriations, being relatively countercyclical to follow enrollments from low-income families. Figure 9 shows a steep increase in spending following the financial crisis and recession of the late 2000s. The increase came not

only from higher demand but higher supply. The Pell Grant maximum award was increased from $4,310 in 2007-08, to $4,731 in 2008-09, to $5,350 in 2009-10. Increases in the maximum award also expand the range of incomes eligible for the program (FSA 2018b).

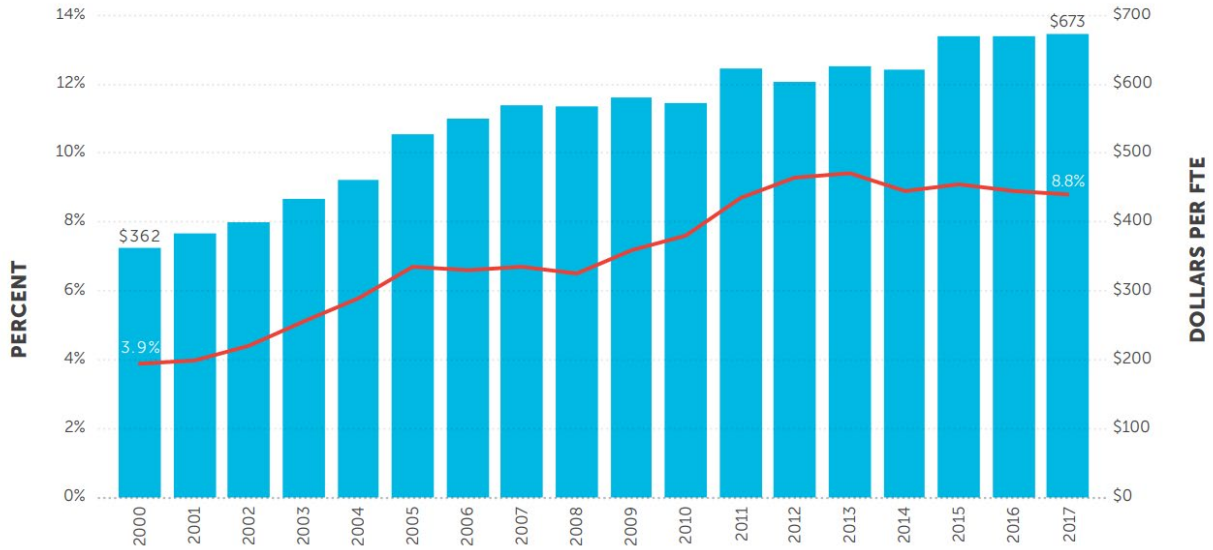
The next section introduces administrative data to study state and federal delivery of financial aid over this period in the context of Wisconsin.

Figure 7. Percent of revenues coming from tuition



Source: SHEEO (2018) Figure 3. Percentage is net tuition revenue divided by sum of net tuition revenue and state appropriations.

Figure 8. State public aid as a percent of educational appropriations



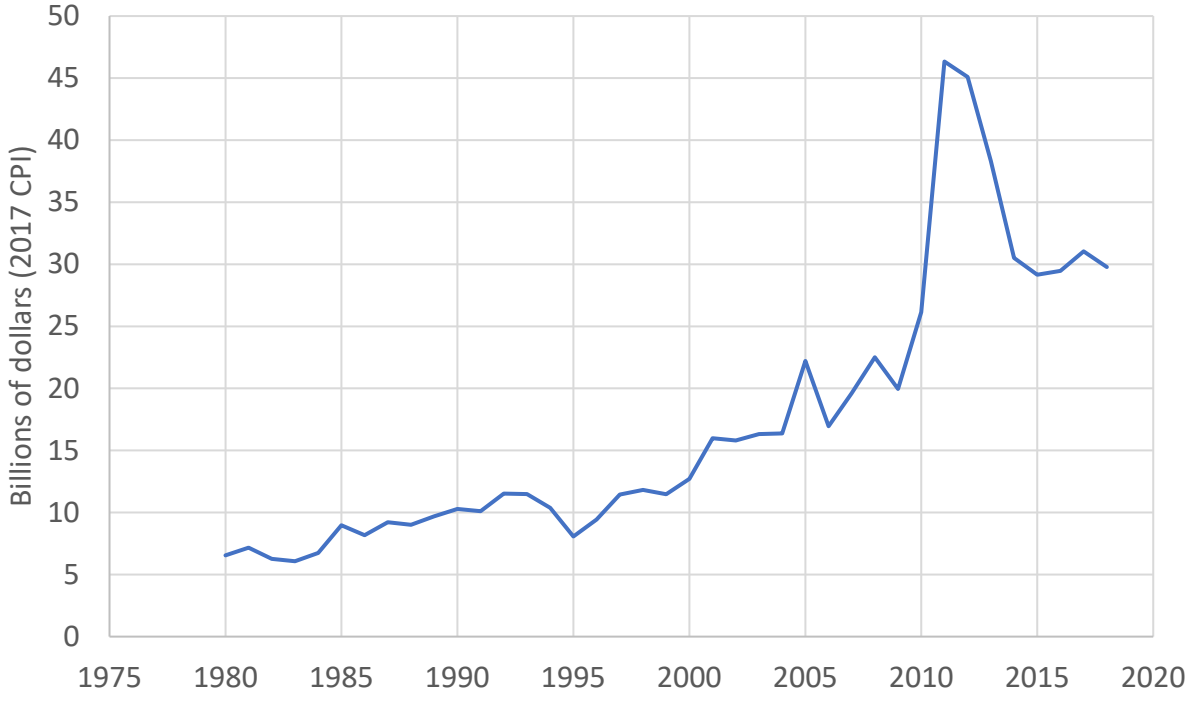
Source: SHEEO (2018) Figure 2. Dollars are adjusted to 2017 values using the Higher Education Cost Adjustment. FTE denotes full-time equivalent student enrolled. Public student aid is state appropriated student financial aid for public institution tuition and fees. Five states were excluded from this chart. Alaska, Mississippi, and Nevada are revising their public student aid data and will be included in the future. New Hampshire does not have a public student aid program. Nebraska could not separate aid for tuition and fees from aid for other expenses.

4. Data

4.1 Administrative FAFSA data

To draw conclusions about the demand and supply of financial aid for college, the ideal data would cover the universe of students eligible for aid, so that application volumes of demand can be compared with budgeted supply. The ideal data would also cover multiple years, so that policy changes and funding over the business cycle can be analyzed. Finally, the ideal data would include specific values from the FAFSA, identifying student characteristics as well as meta-data about FAFSA filing such as the date filed. The National Center for Education Statistics has several data products that include information from the FAFSA, none of which fit all of the above requirements.

Figure 9. Pell Grant spending by year



Source: Author's calculations from US Department of Education (2018b). Dollars are adjusted to 2017 values using the Consumer Price Index (CPI).

This paper uses administrative data from Wisconsin that satisfy all of these features. For application cycles of 2007-08 through 2017-18, the data contain all FAFSA filings by Wisconsin residents who applied to undergraduate programs at Wisconsin colleges and universities, except students who applied only to for-profit institutions. This frame matches the universe of students eligible for the Wisconsin Grant, a program that offers need-based financial aid to resident undergraduate students attending four college sectors: public universities and branch campuses of the university system, private non-profit colleges and universities, two-year public technical colleges, and tribal colleges. The data span an 11-year period of economic and policy changes, when the demand and supply of financial aid were shifting. These data are provided for this research without student identifiers, under a data sharing agreement with the Wisconsin Higher Educational Aids Board, which administers financial aid programs for the state. Individual student data can be linked across years using a generated project identifier, making the data a panel. Before de-identification, the FAFSA data were linked to public high school records from

the Wisconsin Department of Public Instruction, for students who completed high school from 2006 through 2017.

The data include most of the items a student lists on the FAFSA, but they leave out a few that are not used in Wisconsin policy and therefore not stored in the system (e.g. parents' education). Many individuals appear multiple times, since the applications come from beginning and continuing students. All together the data include around 235,000 FAFSAs per year, with around 120,000 listing public universities, 45,000 listing private non-profit institutions, 85,000 listing technical colleges, and around 1,000 listing tribal colleges. Some aid award data are missing in school year 2009-10, and this year is left out of some of the figures below.

The data allow for identification of the key groups discussed in earlier sections whose college enrollment is likely to be supported by financial aid and who face disadvantages in completing college. We divide the sample by family income, by prior education (whether a recent high school graduate, new adult student, or continuing college student), by race/ethnicity, and by academic preparation.

The FAFSA's measure of family income is the Expected Family Contribution (EFC), which determines eligibility for the Pell Grant. For about one third of the FAFSA filers in the Wisconsin sample, the value is zero. Zero EFC students all get the maximum Pell Grant, but the group is large enough to contain some diversity. For a finer measure of economic disadvantage, the analysis breaks this group up into those with a calculated zero EFC, and those with an automatic zero, triggered by very low family income or participation in social benefit programs. Other filers are identified by Pell Grant eligibility versus non-eligibility. The EFC cutoff for Pell eligibility ranged from roughly an annual income of $50,000 to $60,000 for a family of four (FSA 2018b).

The FAFSA also has a measure of grade in college. It is self-reported, not necessarily linked to the accumulation of credits. However, it tracks closely with the number of years a student files the FAFSA in the panel data, and it is used in this paper to identify new college students. Finally, the date of filing the FAFSA captures the date the form was initially submitted online in each year. This initial date is the key date for Wisconsin financial aid, even though modifications and verifications will often take place later.

The linked high school data identify students who recently graduated high school based on their existence in both data sets. The high school data also allow for observation of race/ethnicity and ACT score.

4.2 Descriptive statistics

Figure 10 shows the overall volume of FAFSA applications filed during the period of the sample. It demonstrates a much larger percent increase among older and continuing students during the aftermath of the Great Recession, relative to students coming immediately out of public high schools. U.S. Department of Education (2018c) shows similar trends, extending to earlier years and including FAFSAs from Wisconsin that included only out-of-state or for-profit colleges.

Focusing in on the most recent year of 2017-18, Table 1 describes the data in terms of the focal groups, first overall and then dividing students by the sector of the colleges they listed on the FAFSA. A majority of the students in the sample were Pell-eligible, or maximum Pell-eligible through a zero EFC. Six out of ten FAFSAs came from continuing college students, with the initial applicants more than twice as likely to be older adults than coming directly out of public high schools. The makeup of the initial students coming directly from high school was skewed significantly higher in terms of family income. The recent high school graduates in Wisconsin were 80.5% white, 6.8% Hispanic, 5.8% black, 4.3% Asian, and 2.6% multiple or other race/ethnicity. Regarding ACT scores, Wisconsin uses cutoff values to define below basic (12.7% of this sample), basic (33.9%), proficient (37.9%), and advanced (15.5%).

The makeup of student applicants is clearly different across the University of Wisconsin System (UW), the Wisconsin Technical College System (WTCS), private non-profit colleges and universities (PNP), and students who applied to multiple sectors, the four groups highlighted here. There are also students who apply to only tribal colleges, but these constitute a very small portion of the sample.

UW is a system of 13 four-year universities and a set of two-year branch campuses. The plurality of students in the sample listed only UW institutions on their FAFSA. These students had higher incomes, were more likely to enter just out of public high school, had higher test scores, and were more likely to be white. There are 23 private non-profit colleges and universities where students can use the Wisconsin Grant, and are thus part of this data set. They

are a diverse group of institutions, but on the measures displayed in Table 1 they look overall similar to UW.

Figure 10. Demand for financial aid over the business cycle

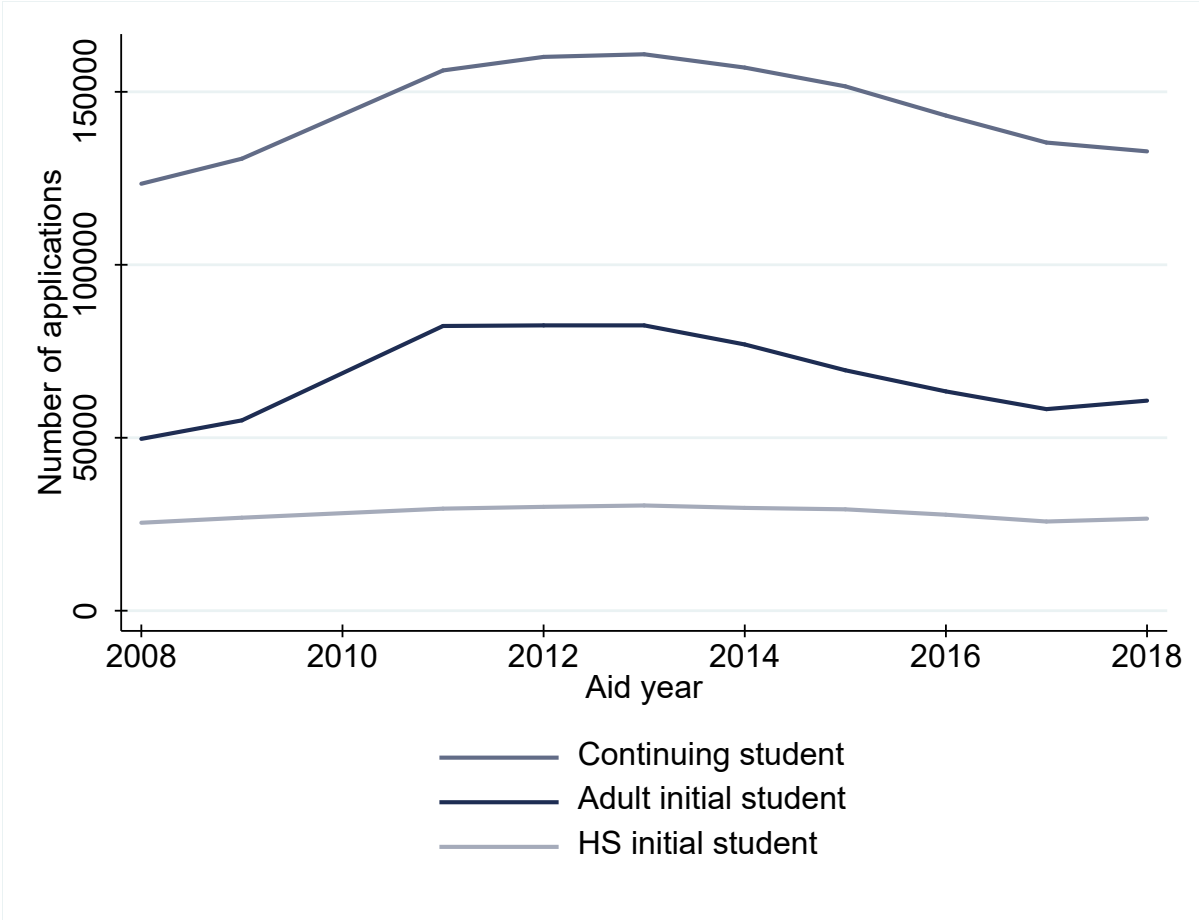


Table 1. Description of Wisconsin FAFSA filers in school year 2017-18

	Overall	UW only	PNP only	WTCS only	Multiple
All students					
Frequency in column	*100*	*42.2*	*12.6*	*31.5*	*13.5*
Family income					
Automatic zero EFC	16.4	9.0	10.4	27.1	19.9
Other zero EFC	17.5	13.3	16.6	23.3	16.7
Pell-eligible	23.6	23.8	23.1	23.8	22.8
Not Pell-eligible	42.6	53.9	49.9	25.8	40.6
Prior education					
Continuing student	60.3	77.0	83.6	40.2	33.6
Initial student not from HS	27.6	10.4	11.5	53.1	36.3
Initial student from HS	12.1	12.6	4.9	6.7	30.1
Among initial from HS					
Frequency in column	*100*	*43.9*	*5.1*	*17.4*	*33.6*
Family income					
Automatic zero EFC	12.4	8.0	8.4	21.3	14.1
Other zero EFC	6.4	4.0	4.0	10.8	7.7
Pell-eligible	21.2	18.6	19.5	26.8	21.9
Not Pell-eligible	60.0	69.4	68.1	41.1	56.3
Race/ethnicity					
White	80.5	86.5	85.1	78.0	73.5
Hispanic	6.8	4.3	4.6	8.7	9.4
Black	5.8	2.8	4.5	7.0	9.2
Asian	4.3	3.9	3.1	3.5	5.3
Multiple or other	2.6	2.5	2.7	2.8	2.6
ACT score					
Below basic (0-16)	12.7	3.7	4.1	38.2	12.5
Basic (17-21)	33.9	28.7	28.3	45.8	35.6
Proficient (22-27)	37.9	46.5	45.6	15.2	37.2
Advanced (28-36)	15.5	21.2	22.0	0.8	14.7

Source: Linked data from the Wisconsin Higher Educational Aids Board and the Wisconsin Department of Public Instruction.

Note: UW denotes the University of Wisconsin System, PNP denotes private non-profit colleges and universities, and WTCS denotes the Wisconsin Technical College System. Values are the percent with the row characteristic, conditional on the column.

WTCS is a system of 16 two-year technical colleges with 49 campuses located across the state. A majority of the students in this sector had a zero EFC, and most of the zeros were automatic, not calculated, signifying the highest levels of financial disadvantage. Just 6.7% of the FAFSAs listing only WTCS institutions came from graduating high school seniors, half the rate in the overall sample. Of those students, test scores were lower than the overall average.

Students most commonly list one college on the FAFSA. Some list multiple from a single sector. Another 13.5% listed more than one college and covered multiple sectors within Wisconsin. These students unsurprisingly represented a mix of the other sectors, and they were heavily skewed toward beginning students making choices about where to enroll.

4.3 Wisconsin context

Relative to national trends from SHEEO (2018), Wisconsin spends less than average in state funding to higher education while it has been experiencing similar to the average growth in student enrollment. State appropriations in Wisconsin are currently 62% of the national average ($6,449 to $10,381 per full-time equivalent in the most recent year, with adjustments for the cost of living differences across states). While two-year tuition in Wisconsin is slightly above the national average, university tuition in Wisconsin is ten percent below the national average. Wisconsin has seen an overall decline in spending, plateauing over 2007 to 2017.

Wisconsin and the nation followed very similar trends in student aid as percent of all educational appropriations, with growth from 5.7% in 2007 to 9.0% in 2017 (the nation went from 6.7% to 8.9%). Regarding private colleges and universities, Wisconsin gives 24% of its need-based aid to private school students, compared to a US average of 20%. The next section takes up Wisconsin's demand for financial aid relative to its supply.

5. Case study: Demand and supply of the Wisconsin Grant

The Wisconsin Grant is a state-level supplement to the Pell Grant with very similar eligibility criteria. It delivers financial aid to over 60,000 students per year based on their family incomes reported in the FAFSA. One key difference is that the Wisconsin Grant can only be used by state residents at in-state institutions, and it differs in generosity by the type of college. There are four sectors (UW, PNP, WTCS, and tribal, discussed above), each with its own budget and eligibility formula.

The program allocates its budget first-come first-served. So unlike the Pell Grant, it only goes to relatively early filers of the FAFSA. The program was particularly strained after the financial crisis and recession of 2008 and 2009, and the relatively slow recovery of jobs in the state (COWS 2016). The data in this section show how the trend of increased applications outpaced funding, particularly in the public university system and technical college system, leading to major shortages in Wisconsin Grant aid. More analysis of the shortage and its effects will be available in a forthcoming report.

Figure 11 and Figure 12 plot calculations from the universe of FAFSA and Wisconsin Grant disbursement data. The supply of aid is the aggregate payout to students at UW institutions (Figure 11) and at WTCS institutions (Figure 12). The analysis focuses on these two sectors, as they demonstrate contrasts in the demand for aid. Also, the data in these two sectors allow for ready calculation of demand, because of large populations and a simple formula applying to all students regardless of tuition. The demand for aid is an aggregate of the grants that students qualify for, adjusted for their probability of enrollment in that sector after listing it on the FAFSA. The grant amount is calculated based on the year and EFC, and the probability of enrollment is an overall average during all years. This probability adjustment scales down the eligible amount to capture a static estimate of the amount that might be paid to students who might potentially enroll without receiving Wisconsin Grant aid.

Figure 11 shows a limited uptick in eligibility for aid in the UW System, reaching a maximum shortage of roughly $30,000, or 50% of the program budget. The shortage almost completely disappeared by 2017, using the adjustments made in this figure. In contrast, Figure 12 shows a much larger uptick in eligibility, likely due to the higher responsiveness of the community college sector to fluctuations in the labor market. The shortage there is nearly 200% of the program budget at its peak, and it remains relatively high in 2018.

To complete the description of who is affected by the shortage, the next analysis reports student characteristics associated with the timing of FAFSA filing. Table 2 reports results from a regression of the date of filing, re-centered around January 1 of the filing year, on a set of student characteristics. Results are similar to McKinney and Novak (2015) and NCAN (2018), where students from groups with lower rates of college enrollment and completion tended to also file the FAFSA later.

Figure 11. Demand and supply of Wisconsin Grant aid at University of Wisconsin System, adjusted for probability of enrollment

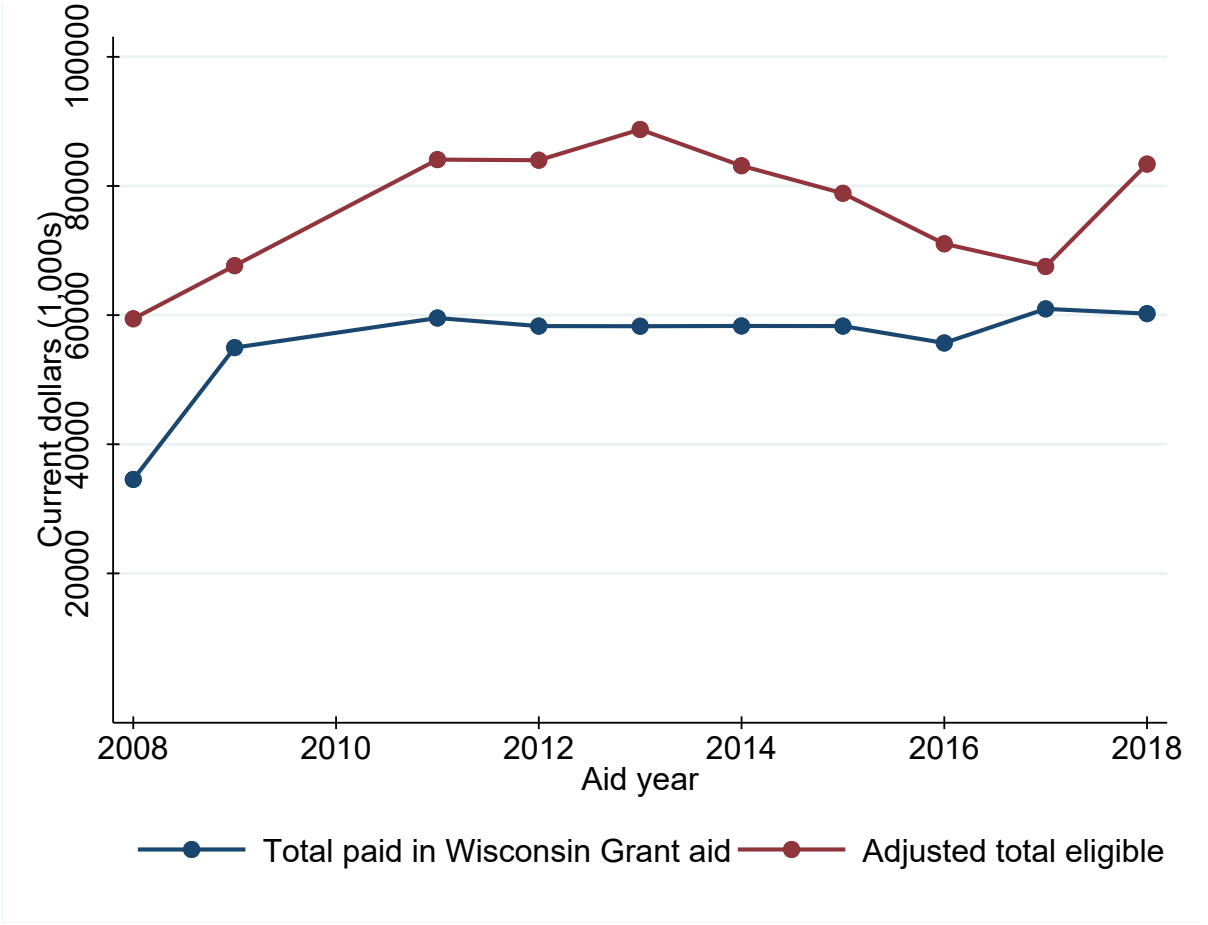


Figure 12. Demand and supply of Wisconsin Grant aid at Wisconsin Technical College System, adjusted for probability of enrollment

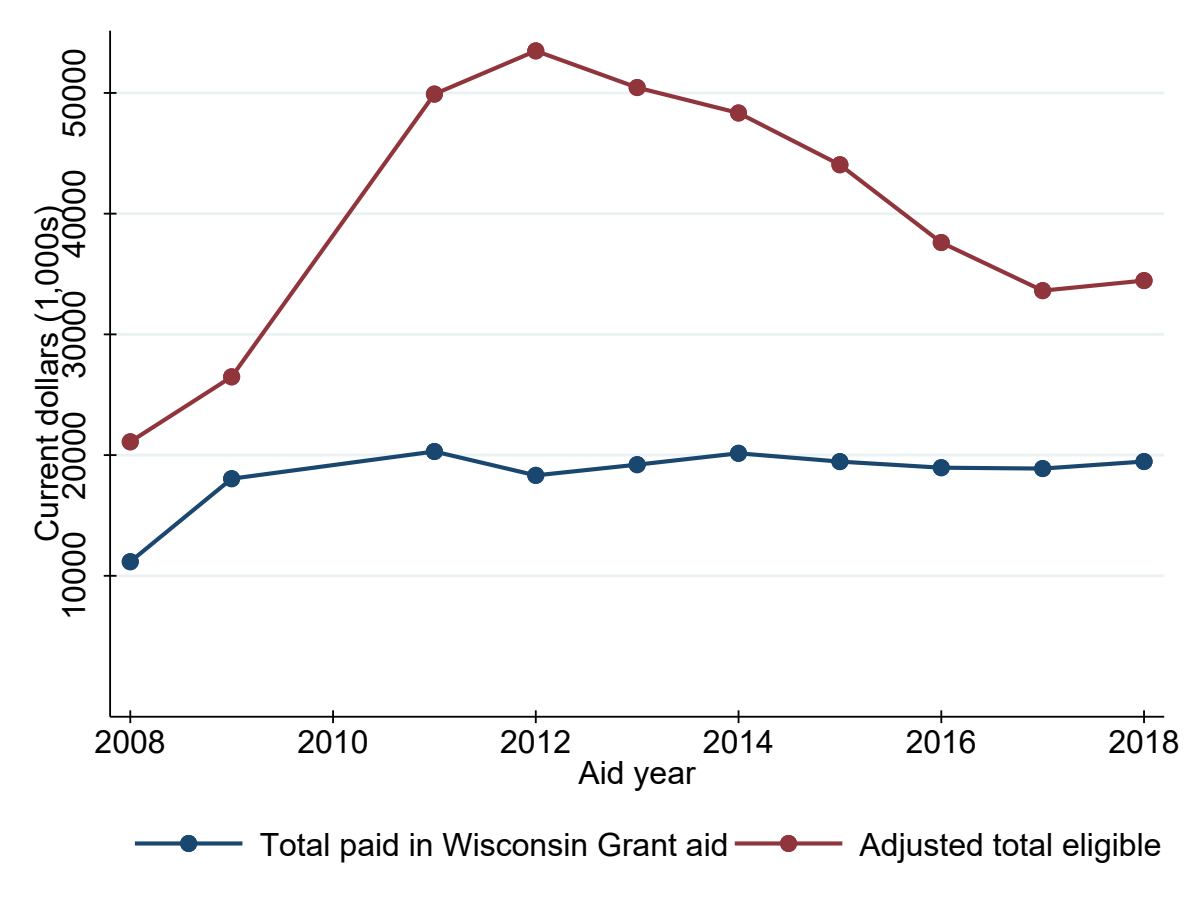


Table 2. Multiple regression predicting date of FAFSA filing within the filing year, based on individual characteristics

	All applicants		Initial HS applicants	
	Coef.	SE	Coef.	SE
Listed UW	–24.7	0.20	–30.3	0.36
Listed PNP	–29.9	0.19	–38.4	0.25
Listed WTCS	0.4	0.21	9.4	0.38
Listed tribal	32.6	0.97	33.3	4.04
Automatic zero EFC	–11.0	0.20	4.6	0.46
Zero EFC	–14.7	0.22	0.8	0.73
Pell-eligible	–8.5	0.16	0.8	0.32
Men	9.1	0.13	5.7	0.25
Dependent	–30.9	0.16	–14.9	1.18
HS senior	–55.1	0.22		
Initial student	27.7	0.18		
Hispanic			8.0	0.69
Black			6.3	0.65
Asian			–6.1	0.61
Multiple or other race/ethnicity			9.3	1.04
Below basic			–9.7	0.76
Basic			–20.8	0.61
Proficient			–29.8	0.62
Advanced			–41.6	0.66
Indicators for aid year included	Yes		Yes	

For example, students applying to private colleges and universities, women, younger students, and students with higher test scores all applied earlier. Each of these characteristics had a substantial effect of at least one week and as many as seven to eight weeks, conditional on all the other factors included. The indicator for high school senior had the coefficient with the largest magnitude (55.1 days earlier) in the regression including all observations. Within high school seniors, race/ethnicity differences were relatively small, with black and Hispanic students filing slightly later than white students, and Asian students filing slightly earlier than white students.

In this case the consequences of later filing are that the student potentially misses Wisconsin Grant aid for which they are financially eligible. The next subsection discusses a federal policy

change that did not alleviate the problem of limited state funding, but potentially differentially changed students' abilities to react and file the FAFSA on time, ensuring access to state aid.

6. Case Study: Prior-prior year FAFSA

6.1 Policy change and potential effects

Before it shifted for the 2017-18 school year, the FAFSA drew information about the tax year that ended prior to the school year starting in the fall. This meant that the FAFSA could not be completed until sometime in the spring, after tax information had been collected. Students would then receive their financial aid package after government and institutional sources of aid had been granted, and their college had put together a financial aid package. The clock for first-come-first-served aid started on January 1, the first day the FAFSA could be filed. With an executive action, President Barack Obama instructed Federal Student Aid to start allowing earlier filing using earlier tax information (White House 2015).

So-called "prior-prior" year filing made two major changes that were interrelated. First, instead of a January 1 start date, students could file on October 1, a full 9 months before the official start of the aid year on July 1 and about 11 months before the start of the fall semester at a typical college. The second change was to the base year of income for filing. Tax information from the prior-prior-year, e.g. calendar year 2015 for the 2017-18 school year, would now determine financial need. Without the second change, the ability to file on October 1 would be useless as the requisite tax information would not be available. But with both changes in place, students could potentially learn their aid eligibility nearly a year in advance of enrolling in college.

The success of the policy change would depend on how aid providers reacted (Baworowsky 2016). In one survey a large majority of colleges expected to be able to provide aid packages earlier under prior-prior (KelmscottEDU 2017). More importantly, the effects depend on which students took advantage and filed earlier.

Prior-prior achieves a benefit, earlier delivery of information, by paying a cost in terms of lost accuracy in measurement of current family income. Dynarski and Wiederspan (2012) simulated the effects of prior-prior using available data, and some simplifying assumptions, in a national sample of students enrolled in 2007-08. They found that 77% of students stayed within a

tight band of measured eligibility whether income was measured in the prior year or prior-prior year. Kelchen and Jones (2015) undertook a more nuanced simulation using detailed data from financial aid applications at nine colleges and universities during the period from 2008 to 2012. They estimated an increase of four percent in Pell Grant spending for the transition year, coming from students having on average lower incomes under the prior-prior approach.

While they focused on the costs to the government, neither of these analyses explicitly addressed the intra-year timing effects of prior-prior or who might take advantage of earlier filing. It is unclear and difficult to predict who prior-prior should help most. Prior-prior serves to enable easier and faster filing among students equipped and motivated to file early. On one hand, the students most in need of aid with the lowest incomes have the most to gain from earlier filing and have to answer the fewest questions about their income (including skipping many questions if they are not tax filers). They could therefore easily take advantage of earlier filing allowed by prior-prior. On the other hand, the poorest students may be ones for whom the process, while potentially shorter, is most unfamiliar and frictional. They may not decide to go to college until closer to the start of the school year, meaning the advance from January to October is not useful.

In a different context surrounding provision of information for educational decisions, Bergman and Hill (2018) found that when teacher quality was reported publicly, only the more advantaged students responded, by sorting into better classrooms. If advantaged students are more responsive to prior-prior, then this signals the need for even simpler and more automatic applications, or potentially for holdout budgets at the state level, for subgroups of students who tend to file the FAFSA later. Removing application steps through defaults increased participation in beneficial programs in the context of retirement savings and prescription drugs (e.g. Beshears et al. 2016; Beshears et al. 2019).

Disadvantaged students applying to college could come from other groups besides those with low levels of financial resources: racial/ethnic minorities, students with lower test scores, adults returning to college without the supports provided by high school counseling, and other students with lower rates of enrollment and college attainment. The remainder of this section displays differences in responses to prior-prior across subgroups of students.

6.2 Cross-sectional shifts in filing timing

The following figures plot cumulative distribution functions. The figures break FAFSA filers into subgroups and display the proportion of that subgroup's applications sent on or before a particular day in the filing cycle. The overall number of applications in each group is obscured in these figures, but the number was nearly equal before and after prior-prior was implemented: there were 219,393 applications in 2016-17 (here denoted 2017) and 220,138 applications in 2017-18 (here denoted 2018). National data also showed only a small increase in the number of FAFSAs filed under prior-prior (NCAN 2018). The normalization within groups allows for clearer comparisons within years across different sized groups. Vertical spread in the lines at a given date indicates differences in the speed with which filings accumulated, relative to the total number who would file from that group.

Figure 13 shows how prior-prior shifted the demand for financial aid. The figure aligns two years of FAFSA filings along a continuum of dates relative to January 1. The horizontal axis denotes the days relative to January 1 in the first year of the school year, i.e. January 1, 2016 for school year 2016-17 aid and January 1, 2017 for 2017-18 aid. There are differences in timing within each year across the EFC groups in Figure 17. The automatic zero EFC students and the other zero EFC students were slower to file than the Pell-eligible and non-eligible groups. Looking at the horizontal distance, the automatic zero group took nearly four weeks longer to reach half of its filings than the non-Pell group.

The shift to prior-prior widened the vertical gaps between non-Pell-eligible and Pell-eligible students at the earliest dates, but by 7 weeks into the filing cycle, the Pell group was filing faster, and at a rate closer to higher income peers in 2017-18 relative to in 2016-17. This means that by the dates when the Wisconsin Grant funds were exhausted at technical colleges, the gaps between lower and higher income filing rates were smaller under prior-prior.

Figure 13. Conditional cumulative density of applications by date, by family finances (EFC) and prior-prior filing status in 2017-18

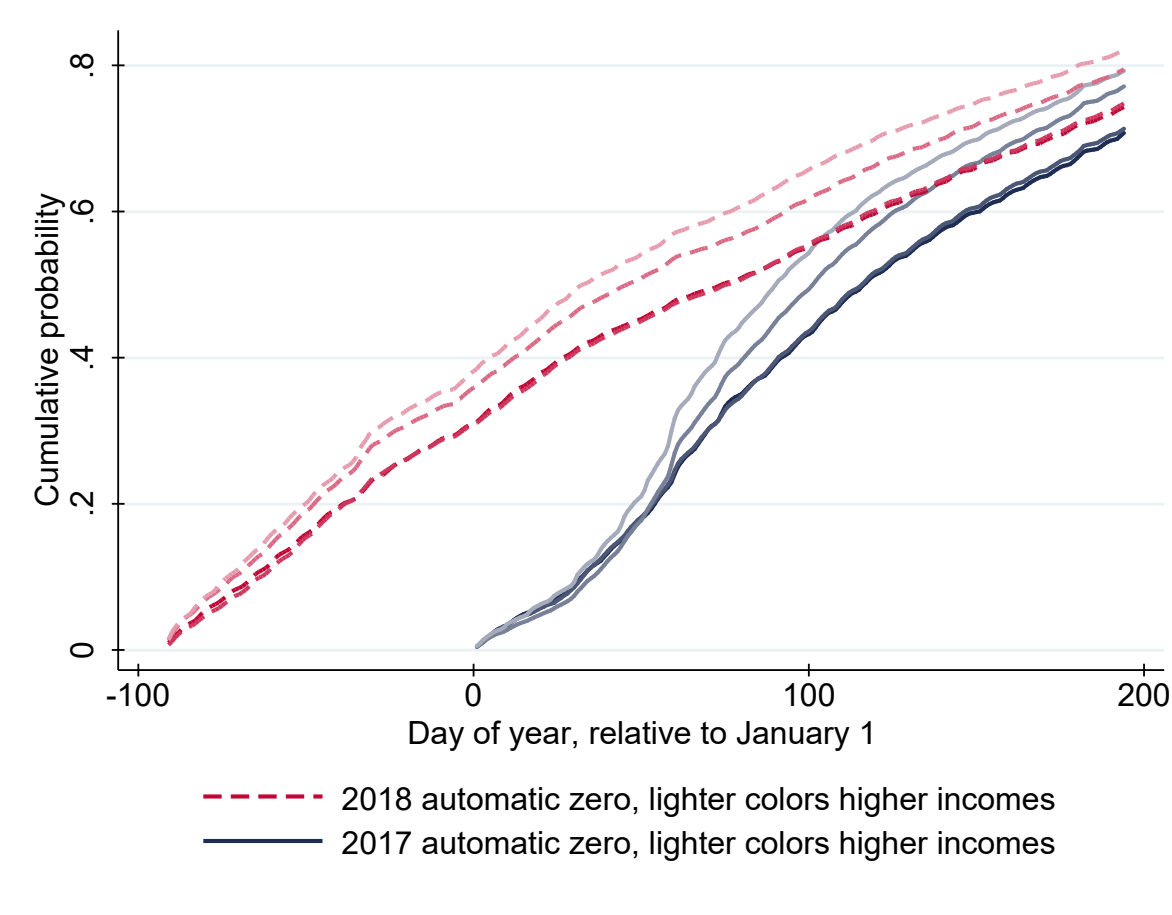
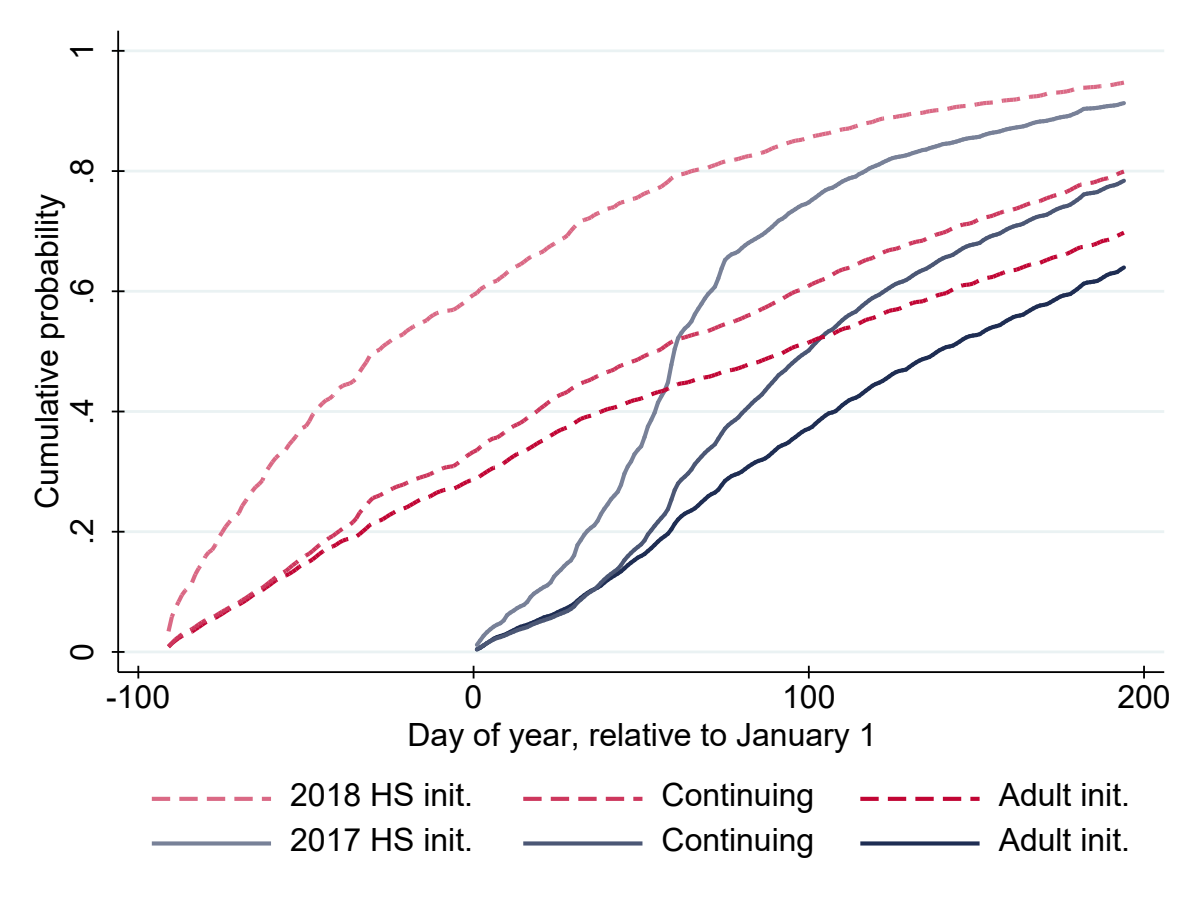


Figure 13. Conditional cumulative density of applications by date, by prior education and prior-prior filing status in 2017-18



Regarding education groups, there were large gaps between adults and high schoolers in rates of filing, that were not changed substantially by the move to prior-prior. This is shown in Figure 14. Figure 15 and Figure 16 examine test score groups and race/ethnicity groups within the high school seniors submitting their FAFSA. Figure 15 uses the ACT categories from Table 1. It is clear that the filing rates were ordered from the highest scoring to the lowest scoring group. Faster filing indicates perhaps a greater attachment to enrolling in college and an earlier decision to file the FAFSA, but faster filing could also indicate relatively more ability to fill out the forms or use of support from family and school resources. In the case of ACT scores, the vertical distance was expanded under prior-prior, with the most advanced scorers opening an early lead that they maintained throughout the longer filing cycle.

Figure 15. Conditional cumulative density of applications by date, by ACT score (among high school seniors) and prior-prior filing status in 2017-18

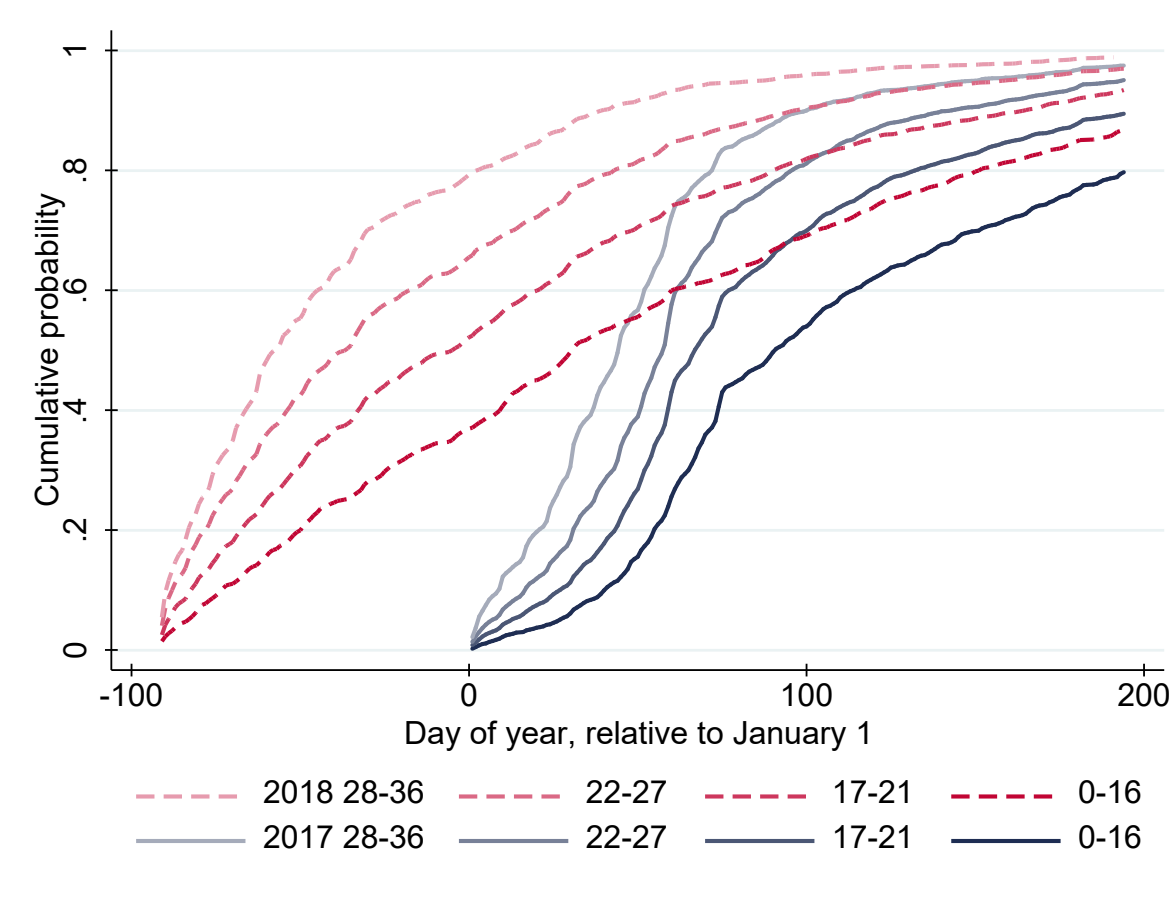


Figure 16 shows qualitatively that race/ethnicity groups were more similar in terms of FAFSA filing timing than were ACT score groups. Focusing on the race/ethnicity groups from Table 1, Asian and white students tended to file at faster rates than black and Hispanic students. All of the race/ethnic groups experienced similar shifts under prior-prior, maintaining the overall ordering of filing. To a small degree, the gaps between white and black students and between white and Hispanic students both closed under prior-prior.

The final figure in this subsection shows differences by college sector. Figure 17 shows the four sectors eligible for Wisconsin Grant funds. Like with family income, the vertical distance was closed under prior-prior, meaning the slower and potentially disadvantaged groups applying to two-year colleges differentially took advantage of the opportunity to file earlier and caught up.

Figure 17. Conditional cumulative density of applications by date, by race/ethnicity (among high school seniors) and prior-prior filing status in 2017-18

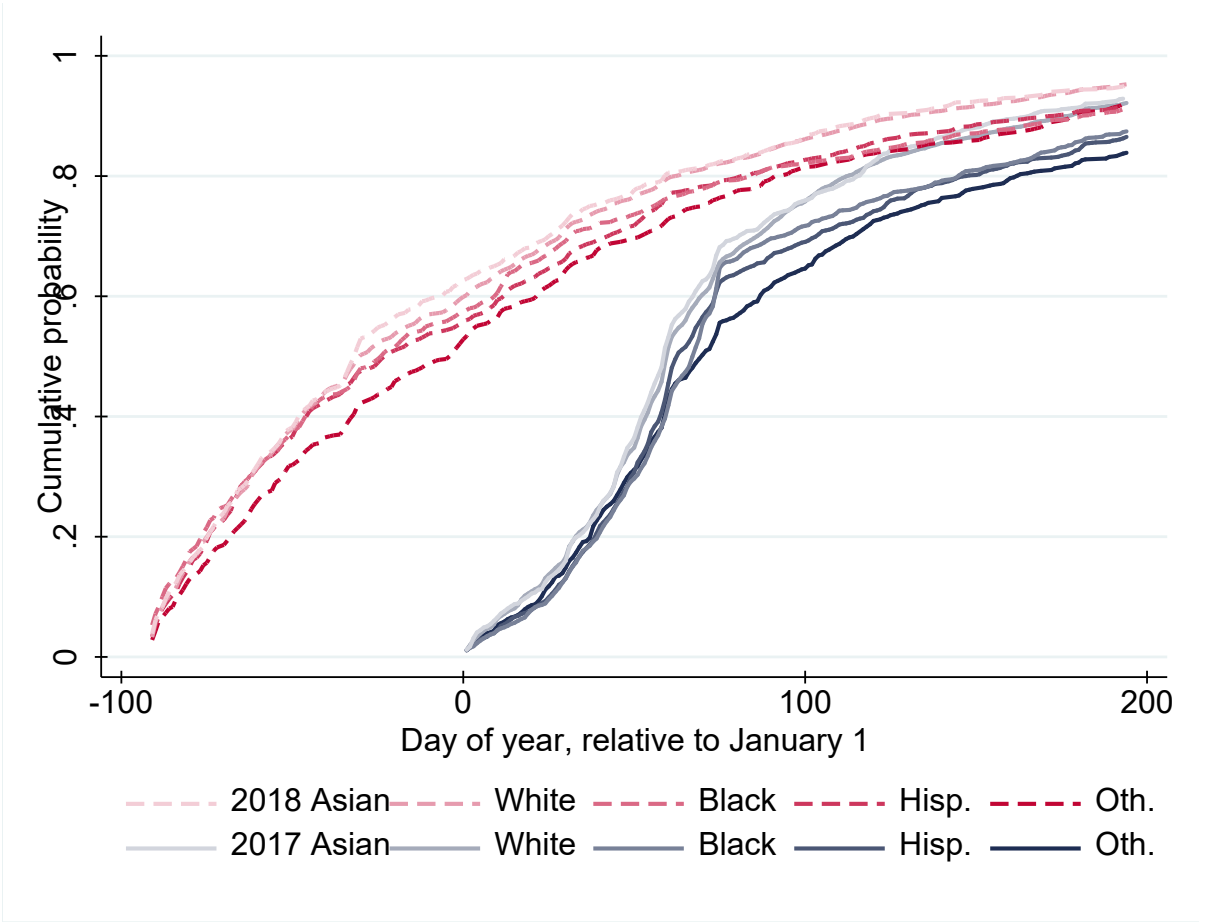
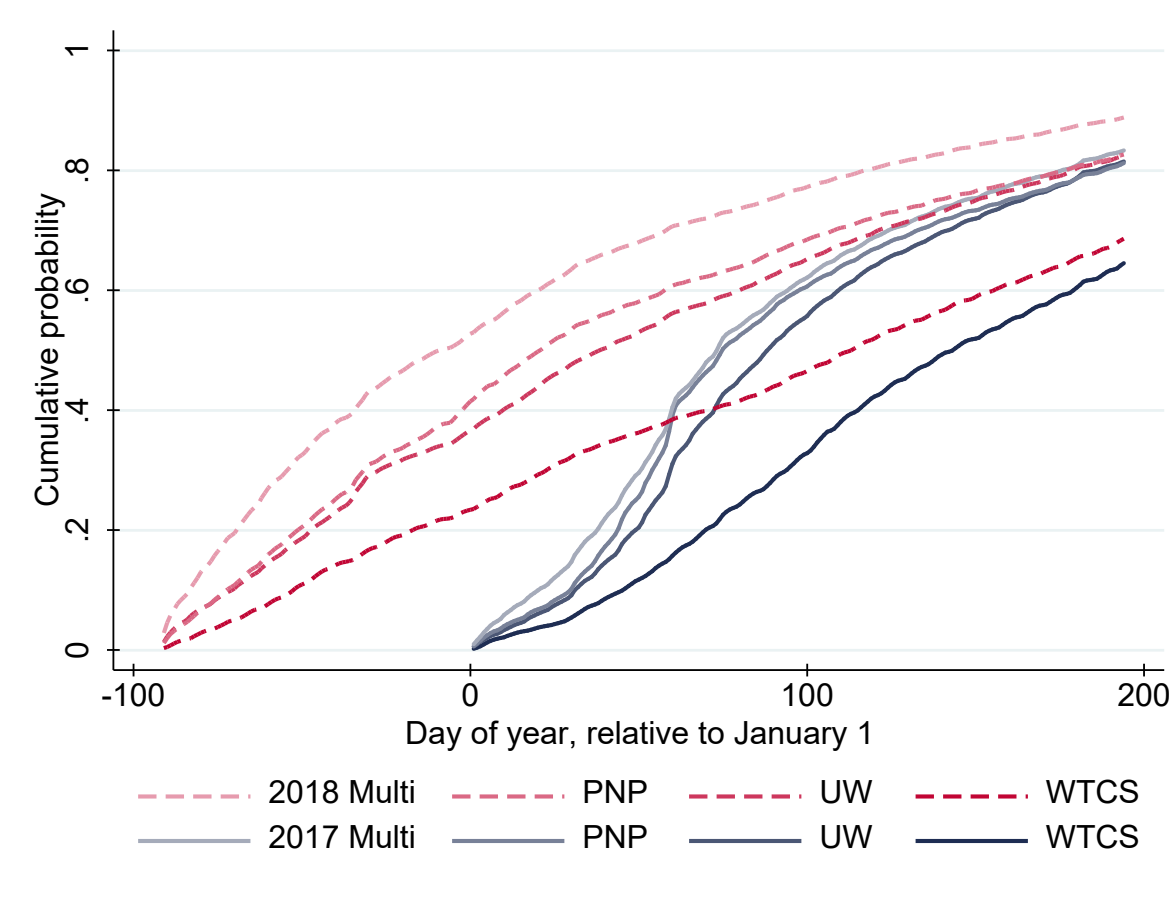


Figure 17. Conditional cumulative density of applications by date, by college sector and prior-prior filing status in 2017-18



6.3 Within-student shifts in filing timing relative to earlier years

The switch to prior-prior introduced an interesting circumstance, where the FAFSA calculations for each individual student were based on the same income tax information for two years in a row. Each student's aid eligibility was potentially shifted by changes in household composition, advancing age (determining dependent status) and year in college (for loans), as well as changes to the aid programs themselves in terms of their EFC schedules. But the main component of income remained constant. Indeed, among students with EFCs calculated in both 2016-17 and 2017-18 in the FAFSA data, the vast majority did not have a large change in EFC: six in ten were within $500 above or below their 2016-17 EFC in 2017-18. Of those outside that range, one in ten had changed dependency status. About three in ten overall had exactly the same EFC, and these were about equally split between automatic zero and calculated zeros. The analysis conditions on students who filed in both 2016-17 and 2017-18, losing 38% of the FAFSA observations from 2016-17 years and leaving 130,471 pairs of student filings.

Figure 18. Histogram of differences in date of filing in 2017-18 relative to 2016-17

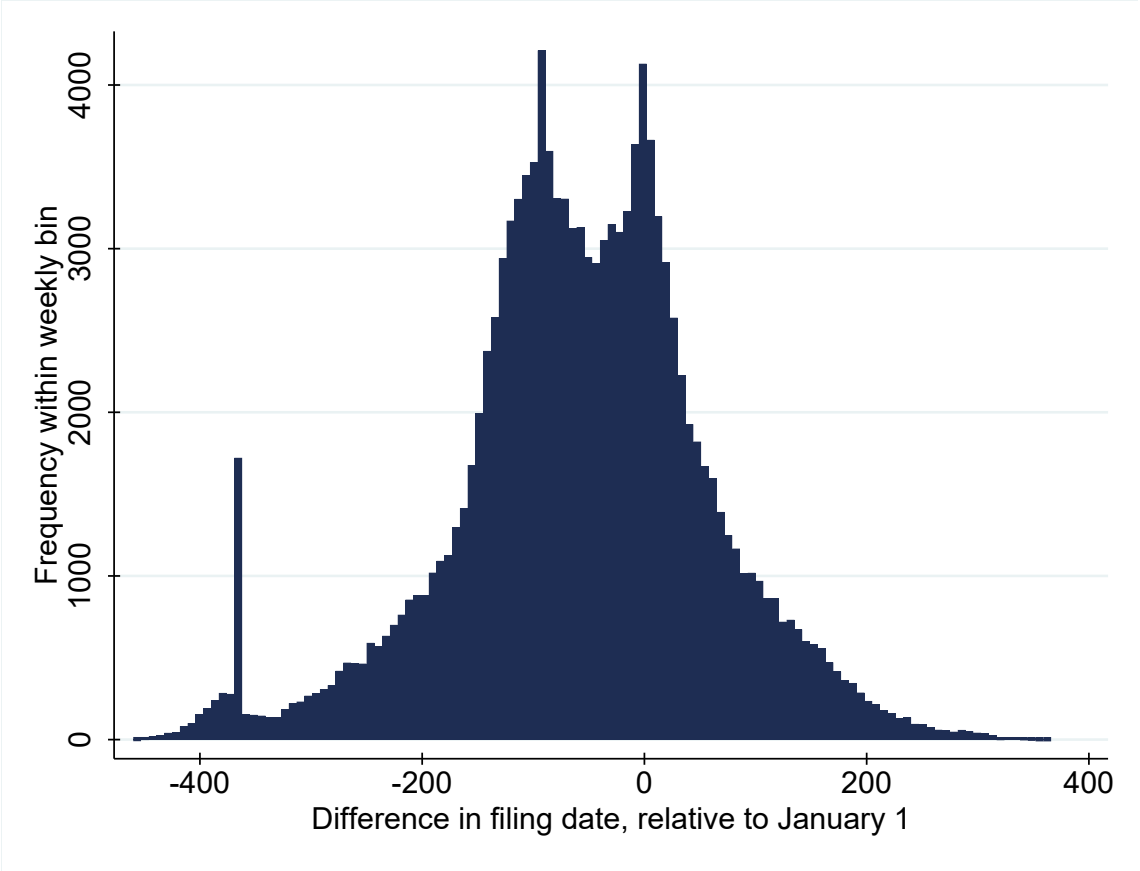


Figure 18 shows the density of year-over-year differences in filing date within a student. The density is bimodal around no difference in filing date, and a difference of about 90 days earlier, with declining numbers of students as the graph moves away from these points. A difference of 0 corresponds to filing on the same calendar day in both years, and a difference of 90 days corresponds to filing on the same day relative to the first day of filing, typically right away. There is a third spike at negative 366 days, representing students who filed the FAFSA for both aid years on the very same day. A student could file for 2016-17 as late as June 30, 2017, and file for 2017-18 as early as October 1, 2016.

Table 3 shows a distribution of five bands of differences in filing date, a coarser distribution than the histogram in Figure 18, for each of the student groups from Table 1. The cut points on column headings are the top end of the range in difference in filing, e.g. –135 denotes filing between 136 days earlier and 360 days earlier in 2017-18 relative to 2016-17. The distribution within a row category across these cut points represent shifts in filing from much earlier on the left to somewhat later on the right.

Refiling rates, and thus inclusion in this table, differed across students by family income, prior education, and within high school seniors by test scores. Non-high school seniors were much more likely to refile if they were already continuing students, showing that a significant amount of dropout happens after the first year. This analysis also mixes together two- and four-year college enrollees, and four-year enrollment is likely to make up most of the continuing enrollment and have higher rates of refiling to continue in school. There were not substantial differences by race/ethnicity among the three largest groups (white, Hispanic, and black) while Asian students refiled at slightly higher rates.

Within students who refiled, there were also trends by student characteristics in how their timing of filing shifted under prior-prior. As demonstrated in the figures in subsection 6.2, the lowest-income students were differentially likely to move filing earlier, with higher proportions in the farther left side columns than their higher-income counterparts. This is further evidence that prior-prior potentially helped improve grant aid access for the lowest-income families.

Among non-high school seniors, students who were already continuing in 2016-17 were less apt to shift filing up by a few months and more apt to file slightly later, around the calendar date they had filed in 2016-17. Initial students from high school in 2016-17 did the least shifting up of

filing timing between 2016-17 and 2017-18. Within the high school senior group, the low-income and low-scoring students had a dispersion of outcomes. They were more likely to make large shifts to file earlier, including on the same exact day, but were as likely or more likely to delay the filing time relative to the higher-income groups. Table 3 is consistent with subsection 6.2 where overall higher ACT scores were associated with taking advantage of prior-prior and filing earlier.

Table 3. Prior-prior (2017-18) filing among 2016-17 applicants by 2016-17 characteristics

	Filed	Among filers				
		–360	–135	–45	45	Over
All students						
All	61.7	2.5	17.8	32.4	30.1	17.2
Family income						
Automatic zero EFC	59.5	3.8	20.5	29.5	27.1	19.1
Other zero EFC	56.2	4.0	22.1	30.8	26.3	16.8
Pell-eligible	64.8	2.2	19.0	33.2	28.7	16.9
Not Pell-eligible	62.9	1.7	14.8	33.5	33.1	16.9
Prior education						
Continuing student	62.4	1.5	16.8	33.3	32.1	16.3
Initial student not from HS	55.2	6.5	25.7	26.5	24.2	17.1
Initial student from HS	71.6	0.4	9.5	38.2	30.5	21.4
Among initial from HS						
Family income						
Automatic zero EFC	72.1	0.9	12.9	36.6	25.6	24.0
Other zero EFC	72.8	0.7	12.4	38.1	27.4	21.3
Pell-eligible	78.8	0.4	11.3	39.7	27.7	20.9
Not Pell-eligible	68.7	0.3	7.7	37.9	33.1	21.0
Race/ethnicity						
White	71.7	0.4	9.0	38.4	31.5	20.8
Hispanic	70.6	0.6	11.7	38.8	26.0	22.9
Black	69.2	0.7	11.9	34.2	24.4	28.8
Asian	76.5	0.4	10.9	41.2	29.8	17.7
Multiple or other	67.6	0.4	10.5	37.2	25.0	26.9
ACT score						
Below basic (0-16)	59.5	1.8	15.1	29.2	26.6	27.3
Basic (17-21)	73.3	0.3	10.8	34.9	30.3	23.7
Proficient (22-27)	76.6	0.3	7.8	41.1	31.2	19.6
Advanced (28-36)	65.7	0.0	6.4	45.6	31.9	16.1

Note: Values are the percent with the column characteristic, conditional on the row. The leftmost 5 columns add to 100%. Cut points on column headings are the top end of the range in difference in filing, e.g. –135 denotes filing more than 135 days earlier and up to 360 days earlier in 2017-18 relative to 2015-16.

7. Looking ahead to 2050

This paper studied the flow of college students, with a focus on students from disadvantaged backgrounds who are in need of government aid, and how various levels of government responded to that need in different ways. Further developments in financial aid could come from changing definitions of college enrollment, developments in financing beyond the FAFSA, and changes to the FAFSA itself.

In one of his earliest speeches in office, President Barack Obama set a goal that the US regain its standing as the world's leader in rate of college-educated citizens, and an analysis of OECD data by the Pew Research Center shows that near the end of his term the US was still ranked tenth (Fry 2017). During his term from 2009 to 2015, the proportion of adults with at least an associate's degree climbed from 41% to 48%, still lagging Korea (69%), Canada (59%), Ireland (52%), and Australia (48%) the leaders of their respective continents. The US therefore has a long way to go internationally.

Furthermore, degree completion continues to be uneven within the US: by geography, by race/ethnicity, and by socioeconomic background. Even conditional on test scores coming out of high school, students from lower-income and lower-educated family backgrounds remain less likely to enroll in and complete college (NCES 2012).

Affordability of useful degrees could be helped by making programs shorter, delivering instruction in more ways, and linking topics to demand from employers. Books by Selingo (2013) and Carey (2015) and policy reports by Carnevale et al. (2012) and Lumina (2015) have described the increasing demand for these types of credentials, driven by growth in the types of training needed by workers and employers, as well as growth in the space of training programs (e.g. badges and short certifications) and training providers (e.g. boot camps and open online resources). At the same time, employers still report shortages of workers trained in the skills they demand. Much of this development is occurring around jobs in STEM (science, technology, engineering, mathematics, and related quantitative disciplines) where skills can decay quickly, inducing more demand for training (Deming and Noray 2018). It is unclear how traditional financial aid will adapt to these new offerings.

The next potential changes to the FAFSA process were signaled in the Faster Access to Federal Student Aid Act of 2018, passed with bipartisan support in the US Senate in December

2018 (U.S Congress 2018; NASFAA 2018b). The act allowed for direct data sharing of elements of tax returns and filing status between the IRS and Federal Student Aid. IRS data can be used both for aid eligibility and for repayment: verifying income for applicants to income-based repayment plans, and for total and permanent disability discharge of student loans. This proposal would automate several steps that trip up students at various stages in the process.

A competing trend is to make college free up front. Tuition-free college is being implemented in several states, localities, and college systems in different formats (Mishory 2018; Upjohn Institute 2019). The example of Tennessee touches on many of the key trends (THEC 2018). A local place-based program was expanded into a statewide program which is promoted as free college. However, it interacts with the FAFSA system in that it is a last-dollar scholarship. It remains to be seen whether states will follow the model of some localities and provide a first-dollar scholarship, one that does not top-up federal aid but stands alone in supporting students. Both kinds of aid provide the student with college funding, and the message that college is affordable for all, but these structures may face different challenges in funding and political support.

The FAFSA, while important because currently tens of millions of Americans and hundreds of billions of government dollars are affected, is also worth examining as an example of a larger trend that will be important into the next few decades: disadvantage may be exacerbated by bureaucracy. The most efficient policies target precisely based on need, but measuring need can be onerous. A salient example is the process for Social Security Disability Insurance determination, where applicants typically go through a lengthy ordeal to show they are unable to work, during which they typically cannot earn income or receive benefits (SSA 2019). This aspect of the program could impose a hardship, and even prevent participation, among the most needy applicants who have no savings or other income to draw on during the determination process. The analogous situation for the FAFSA applies to students who could benefit most from aid, but who are the least well-equipped to navigate the bureaucracy.

This paper added to our knowledge about the workings of the financial aid system and how well it may be prepared to handle new developments in the future, but the analysis had some key limitations. This analysis did not employ forecasting models to predict developments over the next three decades, opting instead to draw lessons from recent trends over a relatively long

period including a business cycle and some important reforms. The data were both an asset and a limitation. A panel of the universe of FAFSA filings within a single state is an uncommon data set, but it is necessarily limited in geography and limited to the recent past.

The paper showed for the first time that simplification of the application and award process appears to have helped lower-income students as much or more than their peers. This result should encourage further simplification of the aid system, with the intent to effectively deliver resources to make college affordable.

References

Anderson, Drew M. and Sara Goldrick-Rab. 2016. The Wisconsin Grant: Overview and Recommendations for Evaluation. Wisconsin HOPE Lab working paper.

Aspen Institute. 2018. *From College to Jobs: Making Sense of Labor Market Returns to Higher Education*. The Aspen Institute College Excellence Program.

Baworowsky, John M. 2016. Future, future! *Strategic Enrollment Management Quarterly* 4 (3).

Bahr, Steven, Dinah Sparks, and Kathleen Mulvaney Hoyer. 2018. *Why didn't students complete a Free Application for Federal Student Aid (FAFSA)? A detailed look*. Stats in Brief, U.S. Department of Education, NCES 2018-061.

Barr, Andrew, and Sarah Turner. 2013. Expanding enrollments and contracting state budgets: The effect of the Great Recession on higher education. *The Annals of the American Academy of Political and Social Science 650*: 168–93.

Bergman, Peter, and Matthew J. Hill. 2018. The effects of making performance information public: Regression discontinuity evidence from Los Angeles teachers. *Economics of Education Review 66*: 104–113.

Beshears, John, James J. Choi, David Laibson, Brigitte C. Madrian, and William L. Skimmyhorn. 2016. Does borrowing undo automatic enrollment's effect on savings? NBER Retirement Research Center Paper No. NB 16-03.

Beshears, John, James J. Choi, David Laibson, and Brigitte C. Madrian. 2019. Active choice, implicit defaults, and the incentive to choose. NBER Working Paper No. 25473.

Bettinger, Eric, Bridget Terry Long, Philip Oreopoulos, and Lisa Sanbonmatsu. 2012. The role of application assistance and information in college decisions: Results from the H&R Block FAFSA experiment. *Quarterly Journal of Economics 127*(3).

Betts, Julian R. and Laurel L. McFarland. 1995. Safe port in a storm: The impacts of labor market conditions on community college enrollments. *Journal of Human Resources 30* (4): 741–765.

Bransberger, Peace, and Demarée K. Michelau. 2016. *Knocking at the College Door: Projections of High School Graduates*. Western Interstate Commission for Higher Education.

Buckles, Kasey, Andreas Hagemann, Ofer Malamud, Melinda Morrill, and Abigail Wozniak. The effect of college education on mortality. *Journal of Health Economics 50*: 99–114.

Cannon, Russell, and Sara Goldrick-Rab. 2016. Too late? Too little. The timing of financial aid applications. Wisconsin HOPE Lab working paper. Accessed online at https://www.luminafoundation.org/resources/aid-deadlines-and-low-income-students.

Carey, Kevin. 2015. *The End of College: Creating the Future of Learning and the University of Everywhere*. Riverhead Books.

Carnevale, Anthony P., Stephen J. Rose, and Andrew R. Hanson. 2012. *Certificates: Gateway to Gainful Employment and College Degrees.* Georgetown University Center on Education and the Workforce.

Charles, Kerwin Kofi, Erik Hurst, and Matthew J. Notowodigdo. 2018. Housing Booms and Busts, Labor Market Opportunities, and College Attendance. *American Economic Review 108* (10): 2,947–2,994.

Chetty, Raj, John N. Friedman, Emmanuel Saez, Nicholas Turner, and Danny Yagan. 2017. Mobility report cards: The role of colleges in intergenerational mobility. Working paper. Accessed online at http://www.equality-of-opportunity.org/papers/coll_mrc_paper.pdf.

Clelan, Elizabeth B. and Michael S. Kofoed. 2017. The Effect of the Business Cycle on Freshman Financial Aid. *Contemporary Economic Policy* 35 (2): 253–268.

Deming, David. J. and Kadeem L. Noray. 2018. STEM careers and technological change. National Bureau of Economic Research Working paper 25065.

Denning, Jeffrey T., Benjamin M. Marx, and Lesley J. Turner. Forthcoming. ProPelled: The effects of grants on graduation, earnings, and welfare. *American Economic Journal: Applied Economics*.

Dynarski, Susan M. and Judith Scott-Clayton. 2006. The Cost of Complexity in Federal Student Aid: Lessons from Optimal Tax Theory and Behavioral Economics. *National Tax Journal* 59 (2): 319–356.

Dynarski, Susan M. and Mark Wiederspan. 2012. Student Aid Simplification: Looking back and looking ahead. *National Tax Journal 65* (1): 211–234.

Federal Student Aid (FSA). 2018a. *Fiscal Year 2018 Annual Report*.

Federal Student Aid (FSA). 2018b. iLibrary – Federal Student Aid Handbook. Accessed online at ifap.ed.gov/ifap/byAwardYear.jsp?type=fsahandbook.

Fry, Richard. 2017. U.S. still has a ways to go in meeting Obama's goal of producing more college grads. Pew Research Center. FACTANK: News in the Numbers.

Goldin, Claudia, and Lawrence F. Katz. 2008. The race between education and technology. In *Inequality in the 21st Century*, ed. David Grusky.

Goodman, Joshua, Michael Hurwitz, and Jonathan Smith. 2017. Access to 4-year public colleges and degree completion. *Journal of Labor Economics 35*(3): 829–867.

Grawe, Nathan D. 2018. *Demographics and the Demand for Higher Education*. Johns Hopkins University Press.

Humphreys, Brad R. 2000. Do business cycles affect state appropriations to higher education? *Southern Economic Journal 67* (2): 398–413.

Kelchen, Robert, and Gigi Jones. A simulation of Pell Grant awards and costs using prior-prior year financial data. *Journal of Education Finance 40* (3): 253–272.

KelmscottEDU. 2017. Making cents of PPY. Accessed online at http://kelmscottedu.com/ppy.

Kofoed, Michael S. 2017. To apply or not to apply: FAFSA completion and financial aid gaps. *Research in Higher Education 58* (1): 1–39.

Long, Bridget Terry. 2014. The Financial Crisis and College Enrollment: How Have Students and Their Families Responded? In *How the Financial Crisis and Great Recession Affected Higher Education,* Caroline Hoxby and Jeffrey Brown, eds. University of Chicago Press.

Lumina Foundation. 2015. *Connecting Credentials: Making the Case for Reforming the US Credentialing System.*

Lumina Foundation. 2019. *Today's College Students*. Infographic. Accessed online at https://www.luminafoundation.org/todays-student.

Ma, Jennifer, Matea Pender, and Meredith Welch. 2016. *Education Pays*. Trends in Higher Education Series, The College Board.

Martorell, Paco, and Elizabeth Friedmann. 2018. *Money Left on the Table: An Analysis of Pell Grant Receipt Among Financially-Eligible Community College Students in California*. Wheelhouse, the Center for Community College Leadership and Research. Research Brief 3 (3).

Marx, Benjamin, and Lesley J. Turner. 2017. Student loan nudges: Experimental evidence on borrowing and educational attainment. National Bureau of Economic Research Working Paper 24060.

McKinney, Lyle, and Heather Novak. 2015. FAFSA filing among first-year college students: Who files on time, who doesn't, and why does it matter? *Research in Higher Education 56* (1): 1–28.

Mishory, Jen. 2018. The future of statewide college promise programs. The Century Foundation.

National Association of Student Financial Aid Administrators (NASFAA). 2018a. Improving the verification process. Accessed online at https://www.nasfaa.org/verification.

National Association of Student Financial Aid Administrators (NASFAA). 2018b. Senators introduce bipartisan bill to simplify FAFSA and reduce verification through ED-IRS data sharing. Accessed online at http://www.nasfaa.org/news-item/16761/Senators_Introduce_Bipartisan_Bill_to_Simplify_FAFSA_and_Reduce_Verification_through_ED-IRS_Data_Sharing.

National Association of State Student Grant & Aid Programs (NASSGAP). 2017. *47th Annual Survey Report on State-Sponsored Student Financial Aid*. 2015-2016 Academic Year.

National Center for Education Statistics (NCES). 2012. *Higher Education: Gaps in Access and Persistence Study*. NCES 2012-046.

National Center for Education Statistics (NCES). 2018. *The Condition of Education 2018*.

National Center for Education Statistics (NCES). 2011. *Borrowing at the Maximum: Undergraduate Stafford Loan Borrowers in 2007-08*. U.S. Department of Education Stats in Brief, NCES 2012-161.

National College Access Network (NCAN). 2018. *An Analysis of the Relationship Between School District Poverty and FAFSA Completion in June 2016-2018*.

Oreopoulos, Philip, and Uros Petronijevic. 2013. Making college worth it: A review of the returns to higher education. *The Future of Children 23*(1): 41–65.

Ost, Ben, Weixiang Pan, and Douglas Webber. 2018a. The impact of mass layoffs on the educational investments of working college students. *Economics of Education Review 51*: 1–12.

Ost, Ben, Weixiang Pan, and Douglas Webber. 2018b. The returns to college persistence for marginal students: Regression discontinuity evidence from university dismissal policies. *Journal of Labor Economics 36* (3): 779–805.

Page, Lindsay C., Danielle J. Lowry, and Aizat Nurshatayeva. 2017. An Examination of the Relationship between School District FAFSA Completion Rates and District Poverty Levels. National College Access Network.

Selingo, Jeffrey. 2017. *Moving the Needle on FAFSA Completion*. National College Access Network.

Selingo, Jeffrey J. 2013. *College (Un)Bound: The Future of Higher Education and What It Means for Students.* Amazon Publishing.

Shapiro, D., Dundar, A., Huie, F., Wakhungu, P., Yuan, X., Nathan, A & Hwang, Y., A. 2017. *A National View of Student Attainment Rates by Race and Ethnicity – Fall 2010 Cohort*. Signature Report No. 12b. National Student Clearinghouse Research Center.

Social Security Administration (SSA). 2019. Disability determination process. Accessed online at https://www.ssa.gov/disability/determination.htm.

State Higher Education Executive Officers Association (SHEEO). 2018. SHEF: FY 2017. State Higher Education Finance.

Tennessee Higher Education Commission (THEC). 2018. *Tennessee Promise Annual Report 2018.* Tennessee Higher Education Commission and Tennessee Student Assistance Corporation.

U.S. Congress. 2018. Faster Access to Federal Student Aid. S. 3611, 115th Congress. Accessed online at https://www.congress.gov/bill/115th-congress/senate-bill/3611/titles.

U.S. Department of Education. 2016. *Changes in Pell Grant Participation and Median Income of Recipients*. Data Point, NCES 2016-407. Accessed online at https://nces.ed.gov/pubs2016/2016407.pdf.

U.S. Department of Education. 2018a. 2015-16 National Postsecondary Student Aid Study (NPSAS:16), National Center for Education Statistics.

U.S. Department of Education. 2018b. *Education Department Budget History Table*. Accessed online at https://www2.ed.gov/about/overview/budget/history/index.html.

U.S. Department of Education. 2018c. *Trends in Free Application for Federal Student Aid (FAFSA) Submissions*. NCES 2018-418, National Center for Education Statistics.

Upjohn Institute. 2019. *Promise Database*. W.E. Upjohn Institute for Employment Research. Accessed online at https://www.upjohn.org/promise/database/.

Webber, Douglas A. 2017. State divestment and tuition at public institutions. *Economics of Education Review 60*: 1–4.

The White House. 2015. Fact sheet: The President's plan for early financial aid: Improving college choice and helping more Americans pay for college. Accessed online at https://obamawhitehouse.archives.gov/the-press-office/2015/09/14/fact-sheet-president%E2%80%99s-plan-early-financial-aid-improving-college-choice.

Zimmerman, Seth D. 2014. The returns to college admission for academically marginal students. *Journal of Labor Economics 32* (4): 711–754.