Appendix

A.1 Changes Resulting from Tax Aid

The United States tax code gives special treatment to dependent children. Children can be claimed as dependents as long as they are younger than 19 at the end of the year. If a child is a full-time student, that child may be claimed as a dependent if she is younger than 24 at the end of the year and meets certain conditions.[1] If students are dependent for tax purposes, parents may claim their student children as dependents and receive exemptions and tax credits that reduce taxable income. Additionally, dependent students may qualify the taxpayer for tax credits such as the American Opportunity Credit, the Lifetime Learning Credit, and the Earned Income Tax Credit. During the time period studied in this paper, the Hope Tax Credit and Tuition Deduction could also be used.[2]

For some students, changes in tax aid occur at the same January 1 threshold. Ultimately, this paper will be able to identify the reduced-form effect of changes in tax aid and financial aid resulting from financial independence. However, I argue that the changes in federal financial aid are likely to dominate changes in tax aid.

There are several reasons that the effects found in this paper are likely driven by financial aid rather than tax aid. The first is that tax aid is disbursed for the prior financial tax year no earlier than February. This date falls after students have made extensive and intensive margin enrollment decisions for both semesters, which likely limits the extent to which tax aid can influence student outcomes. Furthermore, a student's tax liability is likely to decrease as a result of the change, whereas family tax liability is likely to increase, making the effect on student finances ambiguous.

Dependent status for tax purposes changes for a minority of students. In particular, students must live at home for at least six months and provide less than half of their own support. An upper bound on the number of students experiencing a change in dependency status for tax purposes can

be gleaned from the 2007–2008 National Postsecondary Student Aid Study. The NPSAS contains information about students' residence with parents while they are enrolled. Students at four-year schools in Texas who are from 23.5 to 24.5 years old on January 1 live with their parents 15 percent of the time (U.S. Department of Education 2013a). This number is an upper bound on the number of students affected by the change in tax status, because some of those who live at home may receive less than half of their support from their parents.

If a student is declared independent, all else being equal, the parents' tax liability will increase, as they no longer can claim a dependent exemption or any of the education tax credits. If parents are eligible for the Earned Income Tax Credit (EITC), they are likely to see EITC benefits decrease because the number of eligible children will be reduced. The students will have their personal tax liability decrease because they will be able to use the education tax credits on their tax return instead of their parents using the education tax credits. In general, the family's total tax liability will weakly increase as credits or deductions are shifted from parents with relatively high marginal tax rates to students with relatively low marginal tax rates.[3]

Financial independence is associated with (weakly) reduced family tax aid but increased student tax aid. How this affects total resources toward college depends on how parents and older students split changes in wealth from marginal tax changes. I am not aware of any studies that examine how families split such tax changes, and data on within-family transfers would be required to answer the question. Tax aid is never "disbursed" per se, and households may differ in the timing of realizing tax benefits.

One test for the impact of tax credits for college is to consider the time before the large expansion of tax credits that occurred in 2009. Tax expenditures increased by 140 percent in 2009. Results from 2002–2003 to 2007–2008 are presented in Table A1 and do not vary substantially from the results presented for all years, except for the expected loss for precision. While imperfect, this

test shows that more than doubling the generosity of the tax credits for college does not substantially effect the interpretation of the results.

For these reasons, the results of this study will largely be interpreted as the effects of financial aid rather than the effects of tax aid.

A.2 Birth Retiming

LaLumia, Sallee, and Turner (2015) and Schulkind and Shapiro (2014) find that there is a small amount of manipulation in response to tax incentives that is less than half the amount of retiming of births typically seen on a weekend. A $1,000 change in taxes leads to about 1 percent of births being retimed.[4] This may be a concern for identification if children of parents who retime their births in response to tax incentives produce children who systematically respond differently to financial independence 24 years later. It is not obvious how these students would differ systematically, but it is a possibility.

To explore the amount of retiming of births or differential reenrollment that occurs, Figure 2 plots the number of students with each birthday among students turning 24 in a given school year for university seniors. The panels on the left include all students. The panels on the right remove students who were born within three days of January 1, and the distribution is much smoother through the cutoff. There is some retiming of births evident, but the distribution appears to be smooth after removing the three days surrounding January 1.[5]

A.3 Student Characteristics

If either differential (re)enrollment or birth retiming were an issue, observed and unobserved student characteristics may discretely vary across the threshold.[6] I test for observable differences by looking for discontinuities in predetermined characteristics like race, gender, grant aid received in the previous year, and EFC for students who had filed a FAFSA in the previous year. Results from these checks for balance of the covariates are found in Table A3. In these regressions,

there are thirteen discontinuities considered; one is statistically significant at the 5-percent level, and the estimated discontinuities are small.

Data on student performance prior to college is also considered when available. This data was obtained through college applications after 2000. Of the analysis sample, 76 percent have some information via application data. This includes indicators for students being in the top 10 percent of their high school class and for students being in the top 11 to 25 percent of their high school class. Some students did not provide testing information such as SAT or ACT scores, which explains the smaller sample size for those outcomes. Similarly, prior Adjusted Gross Income (AGI) for students and parents have a smaller sample because that data began being collected in 2007–2008 and is only available for students who were enrolled and filed a FAFSA in the previous year.

A joint test for significance reveals that the discontinuities in characteristics available for all students are not jointly different from zero. Overall, the lack of discontinuities in predetermined covariates suggests that students on either side of the age discontinuity are similar in observable characteristics.

A.4 On-Campus Employment

Work-study is a need-based federal program in which wage subsidies are offered to universities to employ students, typically on campus (Scott-Clayton and Minaya 2014). Financial independence increases a student's eligibility for work-study because parents' income and assets are excluded from need calculations. However, the earnings measure in this study includes student earnings from work-study, which eliminates this as a concern.[7] There is still the issue of non-work-study employment at universities and colleges. Employment on campus is a small fraction of employment for students ages 23.5 to 24.5. In fact, only 8.1 percent of students at public four-year universities work on campus or both on and off campus.[8]

If financial aid displaces non-work-study employment at colleges and universities in the same way that it does for employment observed in the UI data, then the UI earnings will understate the true effect of financial aid on earnings. This is because there are additional reductions in earnings for students who turn 24 that are not captured by UI and work-study data. If non-work-study employment by universities is insensitive to financial aid, then the estimates using UI data will be accurate. For the estimates presented to overestimate the effect of financial aid on earnings, an unusual result is required in which students respond to additional financial aid from turning 24 by reducing hours worked off campus and increasing non-work-study hours worked on campus. However, this unusual situation seems less plausible, since work-study earnings are accounted for and there is no other clear mechanism that would drive student behavior in this way.

A.5 Placebo—21, 22, and 23 years old

One concern is that students born before and after January 1 are unobservably different and have different outcomes as a result of unobserved differences rather than differences in financial aid. I perform a placebo test with students turning 21, 22, and 23. The analysis is nearly the same as before but instead uses students who are turning 21, 22, and 23 in a school year. These students do not experience any differential change in financial aid if they are 21, 22, or 23 by January 1. Hence, students should have the same outcomes irrespective of where their birthday falls relative to January 1 unless there are some unobserved underlying differences. Table A4 examines 18 different placebo outcomes and finds two to be significant at the 5-percent level earnings for 22- and 23-year-olds. These discontinuities and issues in interpretation are discussed in the main body of the text.

Table A1
Results Pre 08

	Total Grants	Unsub. Loans	Sub. Loans	
Discontinuity	837.3***	274.7***	614.0***	
	(47.88)	(37.00)	(39.13)	
Mean | Ineligible	1445.3	940.2	1485.7	
Observations	57,613	57,613	57,613	
	Att. Hours 4yr	Grad 4yr in 0y	Grad 4yr in 1y	Reenroll 4yr
Discontinuity	0.210	0.0156*	-0.00747	-0.0155*
	(0.137)	(0.00869)	(0.00780)	(0.00881)
Mean | Ineligible	22.27	0.44	0.704	0.459
Observations	114,819	57,613	57,613	57,613
	Earnings	Positive Earnings	Borrow > Unsub. Max	
Discontinuity	-492.6**	-0.00960	0.139***	
	(243.4)	(0.00729)	(0.00651)	
Mean | Ineligible	13199.9	0.815	0.1	
Observations	57,613	57,613	57,613	

Observations

Note: Each column has an estimate of the discontinuity for a student outcome for students born before January 1. The sample includes only students in 2003–2004 to 2006–2007 in order to focus on a time with smaller available tax aid. The estimates arise from estimating Equation 1. The regressions include controls for gender, race, linear effects of recentered age in days allowed to vary on either side of the cutoff, and year fixed effects. Students born December 29 through January 3 are excluded, as discussed in the text. Each discontinuity is estimated using a window of birth dates of 100 days from January 1. except in the case of attempted hours, where a bandwidth of 200 days is used. These bandwidths corresponds to the IK bandwidth. The data are administrative records of the THECB and TWC and include the 2002–2003 to 2007–2008 school years. "Mean | Ineligible" is the estimated value of the dependent variable at the discontinuity for ineligible students. Standard errors are clustered on recentered birth date and are in parentheses, with *p < 0.1 **p < 0.05 ***p < 0.01.

Table A2
Estimated Discontinuities, no donut

	Grants	Pell	Unsub	Sub
Discontinuity	964.1***	798.8***	305.5***	558.5***
	(43.90)	(30.31)	(37.99)	(31.37)
Mean | Ineligible	1804.8	1568.4	1303.3	1568.4
Observations	115,871	115,871	115,871	115,871

	Hours Attempted	Reenroll	Grad in Current Year	GPA	Grad Next Year
Discontinuity	0.386***	0.0140**	0.0146**	-0.000978	-0.00298
	(0.0859)	(0.00549)	(0.00596)	(0.0112)	(0.00560)
Mean | Ineligible	21.9	0.464	0.436	2.7	0.701
Observations	227,848	115,871	115,871	115,871	115,871

	Earnings	Positive Earnings	Borrow > Unsub Max
Discontinuity	472.3***	-0.00208	0.146***
	(160.9)	(0.00500)	(0.00699)
Mean | Ineligible	12340.4	0.786	0.102
Observations	115,871	115,871	115,871

Note: Each column has an estimate of the discontinuity in student outcomes for students born before January 1. The estimates arise from estimating Equation 1. The regressions include controls for gender, race, linear effects of recentered age in days allowed to vary on either side of the cutoff, and year fixed effects. Each discontinuity is estimated using a window of birth dates of 100 days from January 1. which corresponds to the IK bandwidth except in the case of attempted hours, which uses a bandwidth of 200 days. The data are administrative records of the THECB and TWC and include the 2003–2004 to 2013–2014 school years. "Mean | Ineligible" is the estimated value of the dependent variable at the discontinuity for ineligible students. Standard errors are clustered on recentered birth date and are in parentheses, with *p < 0.1 **p < 0.05 ***p < 0.01.

Table A3
Covariate Balance

	Male	White	Black	Hispanic	Asian	Previous Grants	
Discontinuity	-0.00104	-0.00154	0.000446	0.00938	0.00552**	16.80	
	(0.00667)	(0.00706)	(0.00384)	(0.00613)	(0.00280)	36.04	
Mean | Ineligible	0.484	0.483	0.107	0.3	0.0494	1828.8	
Observations	111,795	111,795	111,795	111,795	111,795	111,795	
	SAT	ACT	Top 10	Top 11-25	Previous EFC	Previous Student AGI	Previous Parent AGI
Discontinuity	1.242	-0.0572	0.00609	-0.00492	-51.13	-15.70	-62.62
	(5.259)	(0.173)	(0.00423)	(0.00412)	(194.5)	(247.1)	(3694.1)
Mean | Ineligible	1005.9	20.45	0.0926	0.0935	7095.5	7841.8	66088.5
Observations	21,017	10,332	85,413	85,413	64,134	34,892	35,614

Note: This tests for discontinuities in covariates for students who were born before January 1. The regressions include controls for gender, race, linear effects of recentered age in days allowed to vary on either side of the cutoff, and year fixed effects. Each discontinuity is estimated using a window of birth dates of 100 days from January 1, which corresponds to the IK bandwidth. Students born December 29 through January 3 are excluded, as discussed in the text. The data are administrative records of the THECB and include the 2002–2003 to 2013–2014 school years. "Mean |Ineligible" is the estimated value of the dependent variable at the discontinuity for ineligible students. Standard errors are clustered on birth date and are in parentheses, with *p < 0.1 **p < 0.05 ***p < 0.01.

Table A4
Placebo Check

Age 23, All Classifications	Total Grants	Hours Attempted	Loans	Enroll University Next Year	Grad this year	Earnings
Discontinuity	-10.18	0.0707	70.29*	0.00286	0.000337	-220.4**
	(25.27)	(0.0819)	(38.48)	(0.00382)	(0.00367)	(95.50)
Mean | Ineligible	1912.6	22.28	3746	0.499	0.377	10789.7
Observations	257,723	257,723	257,723	257,723	257,723	257,723

Age 22, All Classifications	Total Grants	Hours Attempted	Loans	Enroll University Next Year	Grad this year	Earnings
Discontinuity	-0.113	0.0569	50.13	-0.000712	0.00426	-161.9**
	(26.19)	(0.0636)	(39.45)	(0.00325)	(0.00303)	(65.62)
Mean | Ineligible	2349.7	25.83	3787.7	0.625	0.263	8047.3
Observations	358,409	358,409	358,409	358,409	358,409	358,409

Age 21, All Classifications	Total Grants	Hours Attempted	Loans	Enroll University Next Year	Grad this year	Earnings
Discontinuity	7.948	0.0534	-32.46	0.00126	0.00172	-54.28
	(28.69)	(0.0612)	(44.92)	(0.00246)	(0.00133)	(50.52)
Mean | Ineligible	2646.1	26.78	3630.7	0.844	0.0335	6041.6
	371,100	371,100	371,100	371,100	371,100	371,100

Note: This placebo exercise tests for discontinuities in outcomes for students who were born before January 1, using students who turn 21, 22, and 23 years old during the school year. Each discontinuity is estimated using a modified version of Equation 1 in a window of birth dates of 100 days from January 1, which corresponds to the IK bandwidth. The regressions include controls for gender, race, linear effects of recentered age in days allowed to vary on either side of the cutoff, and year fixed effects. Students born December 29 through

January 3 are excluded, as discussed in the text. The data are administrative records of the THECB and include the 2002–2003 to 2013–2014 school years. "Mean | Ineligible" is the estimated value of the dependent variable at the discontinuity for ineligible students. Standard errors are clustered on birth date and are in parentheses, with *p < 0.1 **p < 0.05 ***p < 0.01

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[1] Those conditions are that the child must be a full-time student for at least five months in a year, must live with her parents for at least six months of the year, and must receive more than half of her financial support from her parents.

[2] See Dynarski and Scott-Clayton (2015) for a discussion of tax benefits for college. Tax benefits have generally been found to not affect student college enrollment (Long 2004; LaLumia 2012; Bulman and Hoxby 2015; Hoxby and Bulman 2015). Notably, Turner (2011) finds an increase in enrollment with tax aid generosity.

[3] For very high-income families who are not eligible for education tax credits, the total tax burden may decrease when students become eligible for tax credits.

[4] Schulkind and Shapiro (2014) find that the manipulation is due to increased cesarean rates before January 1.

[5] There appears to be a decrease in births associated with Christmas, though that is unlikely to be problematic for the identification strategy.

[6] There may also be unobserved variables that differ on each side of the age cutoff. One example that may be relevant is insurance coverage. In the state of Texas during this time frame, employers were required to cover dependent children with health insurance until age 25, so insurance status is not likely to vary discretely at this threshold (Dillender 2014). Starting in 2011, the Affordable Care Act mandated that all children under the age of 26 be eligible for inclusion on their parents' plans, which does not affect the identification strategy of this paper.

[7] There is a very small, positive estimated discontinuity in student earnings from work-study.

[8] The author's calculations are based on the 2012 NPSAS. Additionally, 5.4 percent of students work exclusively on campus, and 2.7 percent work both on and off campus.