

Assessing the College Financial Aid Work Penalty

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ABSTRACT

Working has become commonplace among college students in the United States; however, this activity can have unexpected financial consequences. Federal formulas implicitly tax the amount of financial aid some students are eligible to receive by as much as 50 cents for each marginal dollar of income. In this article, I document this college financial aid “work penalty” and discuss the related incentives for some college students to reduce their income. Using data from a national sample of financially independent college students in the United States, I did not find evidence to suggest that students meaningfully reduce earnings because of implicit taxes. Lack of knowledge, abstruse formulas, and the timing of aid receipt likely limit responses. The reduction in aid has the potential to burden low-income students who need to both work and receive financial aid to afford college expenses.

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Though increasingly common, working while in college can have adverse consequences for students’ finances. These consequences are a result of implicit taxes in U.S. financial aid formulas that can reduce the amount of need-based aid students receive as their earnings increase. This “work penalty” creates an incentive for some students to work less immediately before or while in college. However, the timing of aid application and students’ lack of familiarity with complex needs analysis formulas likely mute responses. Students who do not adjust their earnings in response to the taxes may lose critical financial resources on which they rely. Therefore, because students’ ability to pay affects whether they attend and persist in college (Heller, 1997; St. John, Paulson, & Starkey, 1996), implicit income taxes can impede success for students who need to both work and receive aid to afford college.

In this article, I present an analysis of the working disincentives created by a tax on income that is embedded in federal financial aid formulas. The focus in this article is on students who are considered financially independent. Independent students are at the center of prominent public policy initiatives to increase college achievement in the United States, but the aid system is not

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well structured to serve this population (Advisory Committee on Student Financial Assistance [ACCSFA], 2012; Kane, 1997).¹ Though relatively understudied, nearly half of all undergraduate students (about 9 million students annually) are considered independent.² These students are not expected to receive financial support from parents and have relatively fewer resources on average. Therefore, they are the most reliant on both their own earnings and aid to pay for college expenses and also are at greater risk for not completing studies (Manski & Wise, 1983; Walpole, 2003).

There have been few studies of the earnings disincentives in the aid system, as extant research on financial aid implicit taxes has focused primarily on the savings behavior of dependent students' parents (e.g., Feldstein, 1995; Hossler & Vesper, 1993; Long, 2004). This gap in the literature is notable because of the increasingly prominent role of working among college students. More than 75% of undergraduate students work while in college, with recent student cohorts more likely to not only work, but work more hours than in the past (Perna, 2010; Scott-Clayton, 2012). Furthermore, income is the largest component of expected personal contribution to college expenses in federal aid formulas for most students (Monks, 2004).³

I first document implicit taxes in college financial aid formulas and discuss the related incentives for some college students to reduce their income. Next, I present an analysis of the evidence of students' responses to the working disincentives using data from a national sample of financially independent undergraduate students in the United States. I did not find that independent students strategically attempt to avoid the tax by manipulating their earnings near thresholds where taxes start to be assessed. Additionally, I did not observe evidence that implicit income taxes predict lower earnings in a manner that suggests that students meaningfully reduce earnings in response to the tax. Therefore, the work penalty in the aid system likely adds extra financial burden to resource-constrained students and puts students' ability to persist in college at risk.

Related literature

There is limited research that has directly examined implicit income taxes in aid formulas. The exception is a study by Dick and Edlin (1997) who estimated the magnitude of realized taxes faced by financially dependent students from the 1980s, though these authors did not examine potential responses to taxes. Previous studies have instead focused on the effect of the asset tax in college aid programs on the savings behavior of dependent students' families. Hossler and Vesper (1993) concluded that parents with knowledge about costs, but not necessarily aid programs, were more likely to save for college. Edlin (1993) and Feldstein (1995) find substantial savings disincentives from college financial aid taxes, with the latter author finding

that married parents who are paying for children's college reduce savings by as much as 50% in response to the asset-tested rules in aid formulas.

In later work, Monks (2004) and Reyes (2008), also examining the savings responses of parents of dependent students, concluded that earlier estimates overstated the response of families, while Long (2004) did not find evidence of a strong family response to implicit asset taxes. In addition to scrutinizing some of the assumptions of earlier analyses, the newer studies also analyzed a period during which home equity was no longer considered in aid formulas because of amendments to the Higher Education Act in 1992. The lack of response supports the graphical analysis in Kane (1998), who found little evidence of adjustments to families' savings behavior just below asset protection amounts.

Though studies of financial aid income taxes are sparse, researchers have studied other aspects of the intersection between earnings and aid. Ziskin, Fischer, Torres, Pellicciotti, and Player-Sanders (2014) used an ethnographic approach and found that misunderstandings and uncertainty about aid are common among working students, especially low-income working students. Focus-group evidence gathered by Matus-Grossman and Gooden (2002) highlighted the difficulty that lost wages present to working students as they attempt to afford college and further emphasized the inability for current aid programs to address this shortfall.

A more common focus for studies on working students is to analyze the effect of working while in college. Time spent working can negatively affect academic performance because of less available study time (Stinebrickner & Stinebrickner, 2008), fewer opportunities to seek academic assistance that can be important to student success (Umbach & Wawrzynski, 2005), and hindered opportunities for students to integrate themselves in the academic and social communities (Berger & Milem, 1999). On the other hand, working can complement academic lessons by providing applied context, and it can promote the development of soft skills that have value in both academic and vocational settings, such as communication, responsibility, and organization (Light, 2001).

Empirical studies have yielded mixed findings about the effect of working on academic success. Pascarella, Edison, Nora, Hagedorn, and Terenzini (1998) found that work was related to modest inhibited cognitive development among advanced students if work was intensive. Researchers have also generally found modestly negative (Ehrenberg & Sherman, 1987; Scott-Clayton, 2011; Stinebrickner & Stinebrickner, 2003) or neutral (Darolia, 2014) relationships between a marginal increase in work and grades. The type and place of work appear to matter, with reviews of the literature revealing that working off campus has generally negative effects on persistence, while on-campus work may actually aid completion (Pascarella & Terenzini, 2005; Perna, 2010). Ehrenberg and Sherman (1987) found a

more general relationship between lower persistence and those who work longer hours, while Darolia (2014) found lower annual credit completion as work hours increased.

Financial nexus theory provides important implications for this study as it relates to the interaction of income and aid. Under this framework, parallel financial factors influence students' persistence: perceptions of financial factors that affect initial college choices and the realized financial experiences of students as they decide whether to persist in college (e.g., Paulsen & St. John, 1997; St. John et al., 1996). Thus, students potentially make sequential decisions about whether to continue with college as their realized financial situation conforms or varies with their precollege perceptions. DesJardins, Ahlburg, and McCall (1999, 2002) also emphasized the sequential decision making of students and found that variation in different types of financial resources can have distinct and time-varying effects on persistence. It follows that as working students learn more about available financial aid (or lack thereof) and also how their income affects aid receipt, they are likely to reconsider their decisions about how much to work and whether to persist in college.

Finally, employment income is just one component of the array of financial resources that can affect students' college success. Following human capital theory, raising the cost of college because of less aid will result in a decreased likelihood that postsecondary education will be undertaken. Numerous studies have shown that students, and particularly low-income students, are responsive to lower prices and access to aid when making college enrollment decisions (e.g., Dynarski, 2002; Heller, 1997; Leslie & Brinkman, 1987). Other studies have also established that increasing access to financial resources can aid in persistence (Bettinger, 2004; DesJardins, Ahlburg, & McCall, 2002).

Implicit taxes in the federal financial aid system

Federal aid is a sizable source of public money used by students to pay for college in the United States, with about \$170 billion disbursed to students in recent years (Baum & Payea, 2013).⁴ Federal college aid formulas calculate the amount of aid provided to the student by comparing the cost of educational attendance (including direct costs such as tuition, fees, and books, as well as indirect costs such as housing, food, and personal expenses) to the amount the government expects students and their families to contribute, formally called the expected family contribution (EFC).

The EFC for an independent student is calculated as the sum of the student's expected contribution from two primary components: income and assets.⁵ The EFC for independent students without dependents is calculated as:

$$EFC = [(I - P_I)\Omega_I + A]/S \quad (1)$$

Contribution from income is calculated as the total income of the student (net of taxes), I , less a protected income allowance level, P_I . The income allowance varies by marital status, number of dependents, spousal college attendance pattern, and student and spouse income. The tax on income contribution is Ω_I . Asset contribution, A , is a function of available assets, an asset protection amount, and an asset tax. However, assets are not counted in federal aid formulas for many students, including those who have an income below thresholds (\$50,000 in recent years) and who qualify for means-tested federal social programs. Therefore, most low-income and many moderate-income students are only subject to the income tax in aid formulas but do not need to be concerned about embedded asset taxes. The sum of the income and asset contributions is divided by the number of household members in college, S , to yield the EFC. The EFC is considered to be 0 if the calculated EFC is less than 0.⁶

Students are responsible for the calculated EFC amount out of pocket. As income rises, the EFC increases, and consequently, out-of-pocket expenses correspondingly grow. Funds to cover out-of-pocket expenses include savings (assets), transfers from family members, private loans, and income. Assuming all financial need is met by aid,⁷ the following schedule describes students' out-of-pocket expenses, OPE , which depend on the EFC and cost of attendance, C :

$$OPE = \begin{cases} 0, & EFC = 0 \\ [(I - P_I)\Omega_I + A]/S, & 0 < EFC < C \\ C, & EFC \geq C \end{cases} \quad (2)$$

The income allowance protects a limited amount of students' income without a loss to aid because the EFC will be 0 when income is less than the income allowance (i.e., $I \leq P_I$) and with few counted assets. Thus, students with very low incomes are not likely to face reductions in aid if they reduce earnings marginally.

In the 2011–2012 EFC calculation, the after-tax income allowance ranged from \$8,550 to \$16,670 for independent students without dependents and from \$29,600 to \$36,800 for independent students with two children. Students whose income is sufficiently high that their EFC exceeds costs of attendance are expected to finance all of their education from private sources (i.e., they receive no federal need-based aid), and therefore, earnings increases do not reduce aid receipt.

It follows that as income increases, out-of-pocket expenses grow by a rate of Ω_I/S when there is a positive EFC that does not exceed the cost of attendance and 0 otherwise:

$$\frac{\partial OPE}{\partial I} = \begin{cases} 0, & EFC = 0 \\ \Omega_I/S, & 0 < EFC < C \\ C, & EFC \geq C \end{cases} \quad (3)$$

Ω_I/S is the implicit marginal tax rate (MTR) on income in the aid formula. In other words, for each additional dollar the student earns in this range, her expected aid declines by $\$1 \times \Omega_I/S$. The income assessment (Ω_I) for independent students without dependents has been 50% in recent years. Therefore, a student who lives in a household without any other college goers ($S = 1$) has a $MTR = 0.5/1$; therefore, this student is liable to lose 50 cents of aid for every marginal dollar she earns within relevant ranges.

The MTR calculation differs for independent students with dependents, as the implicit tax is assessed based on the total amount of net income and assets. Holding all else equal, however, out-of-pocket expenses similarly increase by the tax as earnings increase. Federal aid receipt declines at a rate of Ω_j/S for students with dependents, based on adjusted available income tier j . Further detail is included in online Appendix A.

Panel (a) in [Figure 1](#) provides a schedule of the relationship between the EFC and income earned for four exemplar independent student households using the 2011–2012 EFC formula. The horizontal lines are the average total price of attendance for public 2-year, public 4-year, private nonprofit 4-year, and for-profit colleges in the 2011–2012 school year (U.S. Department of Education, 2014). All students have EFCs equal to 0 when earnings are less than the income allowance, and when the EFC exceeds educational costs, students will not receive need-based federal aid. Panel (b) in [Figure 1](#) more directly illustrates the relationship between federal aid receipt and income for the same four students based on the average cost of college at a public 2-year institution. If all need is fully met, then aid receipt is equal to the cost of education when income is less than the income allowance (this is when the EFC is equal to 0), and then it decreases linearly at a rate of Ω_I/S for the two students without dependents. The income tax rate for independent students without dependents has been 50% in recent years, which yields an MTR of 50% for the single student and 25% for the married student with a spouse in college in this range. At higher levels of income when the EFC exceeds the cost of education, aid receipt is equal to 0.

[Figure 2](#) displays the corresponding implicit marginal and average tax rates faced by these students as scheduled in the EFC formula. MTRs are calculated as the percentage change in marginal aid for each dollar earnings increase ($\partial AID/\partial I$). Panel (a) demonstrates that single students without dependents face a relatively high MTR when compared with married students who have a spouse in college in a specified income range, while the MTRs of students with dependents follow a tiered schedule. Panel (b) displays average tax rates for all students, which are calculated as the proportion of total forgone aid at each

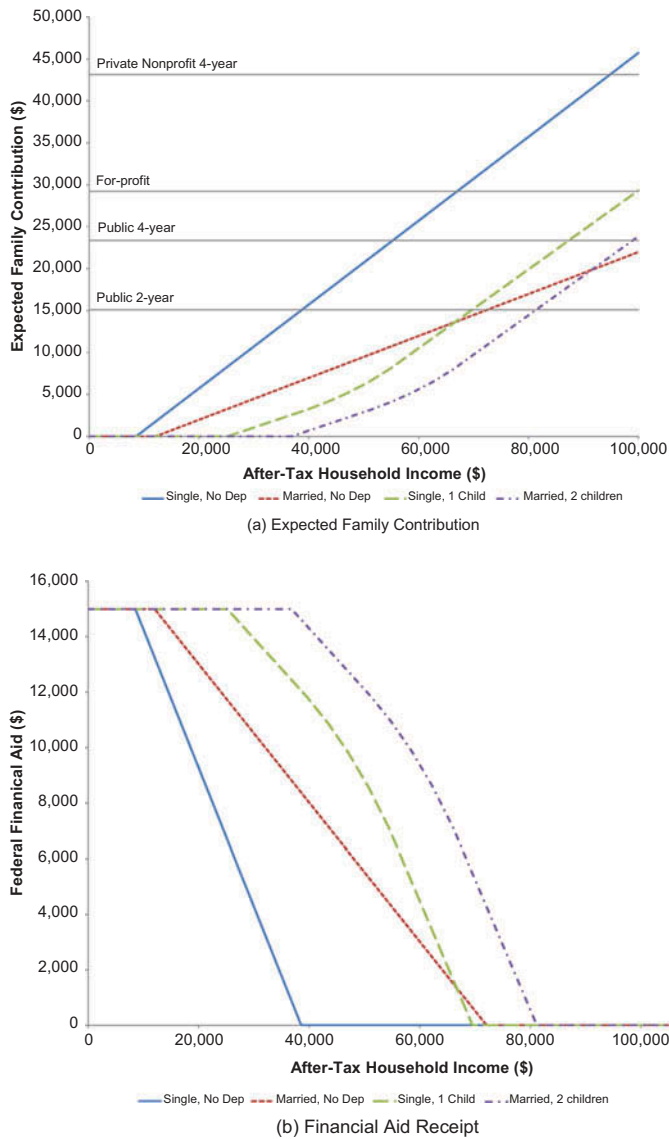


Figure 1. Example expected family contribution (EFC) and financial aid receipt.

Note. Schedules are based on four exemplar students using the 2011–2012 EFC formula: a single student with no dependents, a single working parent with one child, a married couple who both work and attend college with no dependents, and a married student with a working spouse and two children. Students are assumed to not qualify for the automatic 0 EFC calculation and assets are assumed to be 0. All working members of the household are assumed to earn at least \$10,000. Educational cost in Panel (b) is assumed to be \$15,000, the average cost of a public 2-year college (U.S. Department of Education, 2014). Panel (b) assumes that all need is fully met by federal aid, which can include grants, loans, and work study.

income level, $(Aid_{I=X} - Aid_{I=0})/I$. While MTRs provide a measure of forgone aid for each additional dollar earned, average tax rates are a measure of how much aid the student forgoes overall for the amount that they earn.

Theoretical framework

A large body of literature has studied how taxes affect individuals' financial decisions (see Saez, Slemrod, & Giertz, 2012, for a review related to income), with a general consensus that as taxes increase, the incentive to undertake the activity declines. This framework that predicts that taxes on assets will reduce families' incentive to save for college is the basis for the studies that have examined asset taxes in financial aid formulas (e.g., Feldstein, 1995; Long, 2004). The prior section established that because of implicit income taxes, earnings can reduce aid receipt for some students. Therefore, in the context of working students, financial aid income taxes decrease the monetary value of each marginal hour worked, which creates a disincentive to work for students who want to maximize their aid. I provide further discussion of students' responses to implicit taxes using a student labor supply decision model in online Appendix B.

To test for responses to aid income taxes, I took advantage of discontinuities in the tax schedule, such as those displayed in Figures 1 and 2. Taxes are only relevant to students within certain income ranges (i.e., those with income above the protected income allowance level and below the cost of education with few assets; when $I \in (P_I, C)$ from Equation 2). Therefore, these taxes should theoretically only affect the behavior of students with incomes within or near those levels.⁸ This provides the opportunity to study the particularly interesting case of students who have incomes close to the income allowance level. Strategic students could choose to reduce their income to stay just below the income allowance if they wanted to avoid the tax. If such behavior was widespread, we would observe a mass of students with incomes just below the cutoff. I therefore tested for evidence of this bunching behavior. Bunching around kink points has been a common focus for researchers examining responses to means-tested social programs (e.g., Friedburg, 2000).

I extended this bunching analysis to also take into account that the composition of aid packages may affect if, and at what levels of income, students respond to income taxes. This was motivated by research that has documented that different forms of aid can have distinct value to students (DesJardins et al., 1999). Federal aid can come in many forms. Pell Grants are the largest grant program and are most valuable to students because they do not need to be repaid. Financial aid offices typically first assign Pell Grants to students and students can obtain Pell Grants if their EFC does not exceed a threshold.⁹ If student need exceeds the maximum Pell Grant award (the maximum Pell Grant award was \$5,550 in the 2011–2012 school year), then institutions will add federal loans and work study to the aid package.¹⁰ Loans and work study likely do not have the same value as grants to the student. Researchers studying implicit taxes in financial aid have previously valued loans at 50 cents to 60 cents for each dollar of grant aid (Dick & Edlin, 1997; Feldstein, 1995; Long, 2004). Baum (2010) suggested that work study

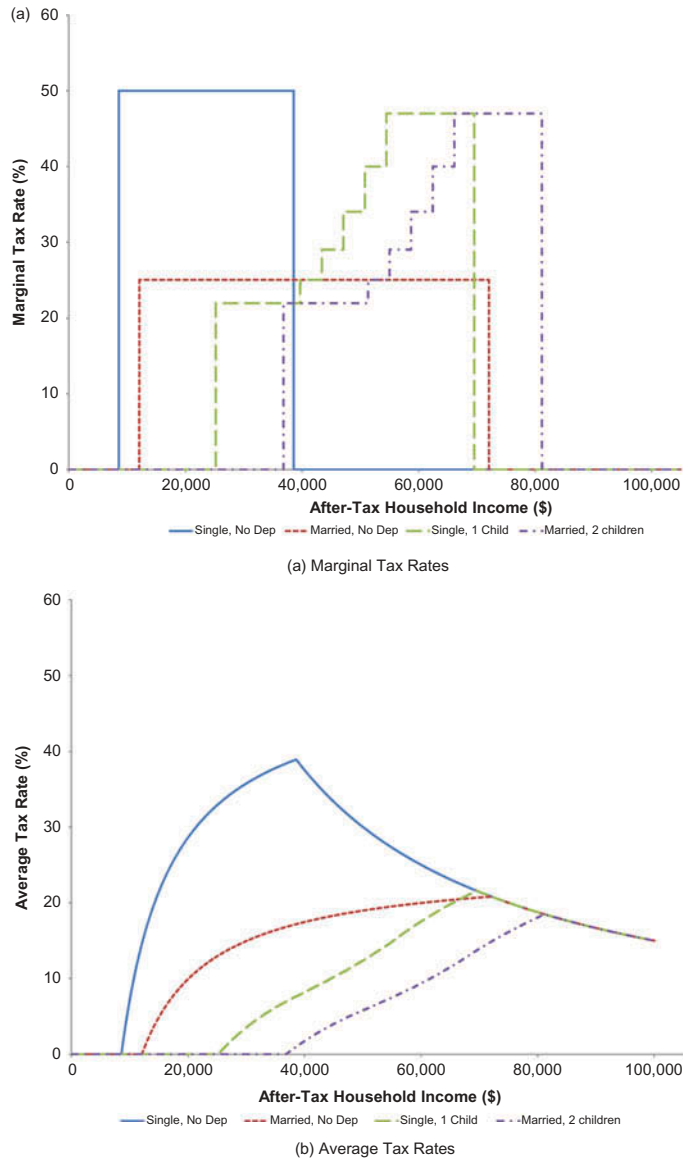


Figure 2. Example marginal and average tax rates.

Note. Schedules are based on four exemplar students using the 2011–2012 expected family contribution (EFC) formula: a single student with no dependents, a single working parent with one child, a married couple who both work and attend college with no dependents, and a married student with a working spouse and two children. Students are assumed to not qualify for the 0 EFC calculation and assets are assumed to be 0. All working members of the household are assumed to earn at least \$10,000. Educational cost is assumed to be \$15,000, the average cost of a public 2-year college (U.S. Department of Education, 2014). Marginal tax rates are calculated as $\partial Aid / \partial Income$ and average tax rates are calculated as $(Aid_{Income=x} - Aid_{Income=0}) / Income$.

has a relatively limited value to students because the student is expending a similar level of effort as in a non-work-study job and the benefits are mostly accrued by the college.

As a result, students with need that exceeds the maximum grant award and who discount the value of loans and work study may be more likely to respond to taxes that reduce grant aid. For students with few assets, grant aid can be reduced when earnings are less than the income allowance level plus the maximum grant amount, G , and below college costs (i.e., $I \in (P_I + G, C)$). Therefore, instead of responding to taxes on total aid, some strategic students might reduce their incomes to be just below the level at which earnings begin to reduce grant aid. A graphical depiction is provided in online Appendix Figure B2.

Even with these embedded incentives, there are a number of reasons to believe that student responses will be limited. Many resource-constrained students will not have flexibility to alter their earnings in response to the tax because of their difficulty with affording educational costs as well as meeting family or other obligations. In some cases, students may even feel the need to increase their work intensity to make up for aid shortfalls. The constraints are particularly relevant for students who are independent, because they are less likely to expect assistance from parents.

Additionally, lack of knowledge about complex aid formulas and the timing of information about aid receipt likely hinder students' understanding of the aid system. Students may be unable or unwilling to change their working behavior if they are unaware of implicit taxes, unfamiliar with aid formulas, or unsure of their expected aid receipt. Students commonly lack understanding about how much college costs and how much aid they obtain (Akers & Chingos, 2014; Ziskin et al., 2014). This lack of understanding is at least in part because to obtain federal aid, students must provide detailed family financial information through the Free Application for Federal Student Aid (FAFSA) form that has been criticized as confusing and opaque (Dynarski & Scott-Clayton, 2006). Researchers have documented that many students who could have benefited from filing FAFSA forms do not do so (e.g., McKinney & Novak, 2015). Bettinger, Long, Oreopoulos, and Sanbonmatsu (2012) provided experimental evidence that the complicated application process and students' lack of knowledge deter some potential students from simply applying for aid; therefore, it is reasonable to believe that many students will also not accurately compute tax rates associated with their work behavior.

The timing of the aid process further impedes students' ability to respond to earnings taxes. Consider students who were newly enrolling in college in the fall of 2011. These students typically filled out the FAFSA form starting in early 2011. The EFC was determined by inputs from tax returns in the prior year, 2010.¹¹ Students typically found out to which colleges they were accepted in the spring of 2011 and received financial aid award letters, which likely varied by college because of different costs of attendance and available aid, in late spring or summer of 2011. Therefore, unless they knew

the colleges to which they would be admitted, independently calculated their EFC, and accurately estimated the amount of expected aid receipt, students typically did not find out about the implication of their 2010 working decisions until the late spring of 2011 at the earliest.

By the time students get to college, however, this experience with the aid system can provide important feedback on the relationship between working and aid. Therefore, although new students are unlikely to adjust their working behavior prior to coming to college, they could respond to financial aid income taxes as early as their 1st year in college. Returning students are also more likely to have knowledge of the implications of working on aid receipt because they are more likely to have experience with the aid system in a previous year. For this reason, I analyzed heterogeneity between new-student and returning-student responses in the empirical analysis.

Data and methods

Data

Student-level data used in the study came from the 2007–2008 and 2011–2012 academic year waves of the National Postsecondary Student Aid Study (NPSAS) data available from the National Center of Education Statistics. The NPSAS is a repeated cross-section of nationally representative student-level records, including information on financial aid received, working and borrowing behavior, demographics, and enrollment patterns. These data are especially useful for this study because they include detailed data regarding components of federal aid formulas. All sample members were undergraduate students; therefore, all results were conditional on an individual enrolling in college, and I could not observe whether a student decided to enroll or drop out because of the tax. I restricted the sample to only students who applied for aid. The unweighted sample size was 74,340 student records. Here and throughout the article, all observation counts are rounded to the nearest 10 per the data use agreement.

The focal group in the analysis was financially independent undergraduate students, an understudied but prominent group. Of the approximately 18 million undergraduate students in the United States annually, the number of those who are independent is about equal to the number who are financially dependent on parents or guardians (U.S. Department of Education, 2013). This distribution is partially a function of the increasing average age of undergraduate college students during the past 40 years (U.S. Department of Education, 2013), as the EFC calculation automatically classifies students older than 24 years old as independent. Other factors that determine independent status in aid formulas include being married, serving or having served in the military, having a dependent or supporting a child, or having

reached the age of majority in one's state of residence (often age 18) while no longer being under the legal control of parents or guardians.

Independent students are less likely to receive financial support from parents and are therefore expected to be more personally responsible for financing their higher education (there is no formal requirement that they do not receive transfers from parents or family). Because they personally control their incomes, they conceivably have more power to adjust earnings if needed. On the other hand, because they are less likely to be able to enjoy contributions from parents, they may not have the flexibility to decrease their income given educational and noneducational financial responsibilities. These constraints also put them at greater risk for not completing studies given evidence of a strong positive association between family finances and educational attainment (Manski & Wise, 1983; Walpole, 2003).

Empirical strategy

I first examined the potential responses to MTRs at the point where students become subject to the reductions in aid with increased earnings by testing for bunching around students' income allowance level (Point D on online Appendix Figure B1) and also at the point where grant aid is potentially reduced because of increased earnings (Point G from online Appendix Figure B2). First, I followed Kane (1998) who presented histograms in his study of financial aid formula savings incentives to indicate lack of evidence of this behavior. I applied a similar strategy to this study of working incentives. If students are strategically responding to income thresholds, we would expect to see a mass of students with incomes just below the income allowance, indicating that students are adjusting their working behavior in an effort to avoid the income tax.

In addition to examining graphical discontinuities, I more formally tested for discontinuities around the income allowance cutoff. To test for level discontinuities, I used the McCrary (2008) test that is commonly used to assess whether individuals manipulate their behavior in response to thresholds in means-tested benefit programs. The test involves first categorizing data into bins, then separately estimating local regressions on either side of the cutoff, with the number of observations in income bins as the outcome and the distance from the cutoff as covariates. The densities above the cutoff are compared to densities below the cutoff, $\hat{\theta} = \ln \hat{f}^+ - \ln \hat{f}^-$, where \hat{f}^+ is the estimated density above the cutoff and \hat{f}^- is the estimated density below. A positive value indicates a higher density on the right of the income allowance, while a negative value indicates a higher density to the left of that threshold.

I also tested for slope discontinuities at the threshold based on Card, Lee, Pei, and Weber (2012) by estimating:

$$Y_b = \alpha + \pi_1 U_b + \pi_2 (\tilde{I}_b \times U_b) + \pi_3 f(\tilde{I}_b) + \epsilon_b \quad (4)$$

where Y is the number of students in bin b , U is an indicator for having an income less than the threshold, \tilde{I} is the distance from the income bin to the threshold ($\tilde{I} = I - P_I$, i.e., income less the income allowance) and $f(\tilde{I})$ is a quadratic function of the distance from each bin to the threshold. Here, I tested for whether the coefficient on the interaction term $\pi_2 = 0$, which is a test for whether the slope changes at the income allowance cutoff.

The previously described tests examine earnings around a specific point; however, I was also interested in the more general relationship between students' earnings and MTRs. To analyze this relationship, I estimated the following equation to estimate income for each student i in year t :

$$I_{it} = \alpha + \delta MTR_{i,t-1} + \gamma I_{i,t-1} + X_i \beta + u_{it} \quad (5)$$

Because all students who worked in the prior year did not also work in the current year, I estimated Equation 5 using a Tobit specification with a lower limit equal to 0 and display marginal effects.¹² From this regression, δ is an estimate of the conditional relationship between student earnings and a unit change in the prior-year MTR. The rationale for including prior-year rather than current-year MTR can perhaps be best illustrated using an example student who enrolls in college for the first time in the fall of 2011. In making decisions on how much to work in the 2011–2012 academic year, the information on which she is most likely to rely is information on implicit taxes that she most recently gained from her aid offer that was based on her prior-year earnings and MTR. Another advantage of using prior-year MTR is that it mitigates the concern that parameter estimates simply reflect mechanical nonlinearities in the aid formula.

In a similar vein, in addition to estimates on the full pool of students, I estimated results for all students and for first-year and returning students separately. As previously discussed, students are most likely to adjust work behavior in their 1st year because it is expected to be the first time they would know about and be able to respond to the penalty for working. Whether returning students respond will depend on whether they are still incorporating feedback into their working decisions (in which case we might observe a relationship between income and MTR) or if they have already settled into a pattern of working and aid (in which case we would not expect to observe a relationship).

I controlled for the students' income from the prior year to account for a baseline level of student earnings.¹³ I also controlled for a number of factors included in the X -vector. The first set of factors can mechanically affect aid receipt in aid formulas: number of dependents, marital status, number in the household in college, asset contribution, asset contribution squared, college cost, and college cost squared. I also included controls for observable factors

that could affect earnings, the information the student may have about financial resources, and general measures of their community: age and age squared, race/ethnicity, first- or second-generation immigrant status, school sector (public, private nonprofit, for-profit), school type (4-year, 2-year), and locale (small city, midsize city, large city, suburb, town, rural). These controls were motivated by studies that revealed differences in college financial aid effects based on students' financial standing, race, ethnicity, and habitus (Alon, 2007; Chen & DesJardins, 2010; Heller, 1997; Paulsen & St. John, 2002). Finally, I included vectors of indicators for state and year to account for variation across states and over time, such as local economic conditions, college going rates, and differences in the survey.

Limitations

Although the data provide a rich source of information, particularly related to inputs and components of financial aid formulas, the data also have important limitations. First, all sample members were enrolled students; therefore, I could not observe whether implicit taxes affect the extensive margin of college (i.e., enrollment or persistence). To analyze this response, a researcher would need access to longitudinal data that contain not only the robust set of financial and educational factors such as those included in NPSAS, but also patterns of attendance and measures of educational attainment. Similarly, to be able to use detailed information related to aid formulas, I had to restrict the sample to only students who applied for aid. Therefore, I also could not observe if students did not apply for aid because they thought their working would be penalized. Additionally, I restricted the focus in the article to independent students because these students were those who are most likely to depend on their own income to afford school. Future research should also analyze the effect of income taxes on dependent students.

There are also important limitations of the empirical strategy. Although bunching analyses have been used frequently to analyze responses to means-tested public programs, they only yield inference around a narrow set of income levels. The bunching analysis, therefore, cannot necessarily inform us on whether there would be similar behavior if kink points were placed at considerably different places in the aid schedule. Additionally, to provide broader evidence on the relationship between earnings and MTRs at other income levels, I estimated Equation 5 with a robust set of observable controls, as previously described. I also included prior-year income in the model, which can control for potential bias to the extent that unobserved confounding factors, such as professionalism and time management, are correlated with prior-year earnings. Nonetheless, the threat of omitted variable bias remained. For example, a potential confounder to the observed relationships

was the hard-to-measure concept of work ethic. Work ethic was likely positively correlated to earnings but was ambiguously related to students' MTR, making it difficult to assess bias that could arise from this factor not being measured. Evaluation of the direction and magnitude of potential bias because of other omitted factors was similarly hard to predict because of the varied factors that affect MTRs and the complex interrelationships between financial resources, family background, working decisions, and factors that determine implicit income taxes. With these caveats in mind, I maintain that the methodological approaches employed in the article, although imperfect, provide important new information about how students respond to implicit taxes in aid formulas.

Results

Summary statistics

Table 1 lists summary statistics for the sample. Independent students were an average age of 31 years and predominantly attended public (62%) and for-profit (27%) colleges. They were about equally likely to attend 2-year or 4-year

Table 1. Analysis data summary statistics.

	Mean	Standard Deviation
Public	62%	48%
Private Nonprofit	10%	30%
For-Profit	27%	45%
4-Year Institution	48%	50%
2-Year Institution	52%	50%
African American/Black	27%	44%
Asian	5%	22%
White	65%	48%
Other race	7%	25%
Hispanic/Latino	16%	37%
Age	31.0	9.0
Married	30%	46%
# Dependents	1.2	1.4
Household # in College	1.1	0.4
EFC	\$2,942	\$6,404
Prior-Year Income	\$24,379	\$26,142
Current-Year Income	\$11,058	\$15,673
Asset Contribution	\$1,188	\$6,133
Asset Contribution > 0	31%	46%
Total Educational Cost	\$15,047	\$9,418
Total Aid	\$8,107	\$7,348
Total Grants	\$2,998	\$3,695
Total Loans	\$4,579	\$5,118
Total Work Study	\$110	\$667
Observations (unweighted)	74,340	

Note. EFC = expected family contribution. Sample is from National Postsecondary Student Aid Study 2008 and 2012. All dollars are in 2012 dollars. Survey weights were used. Unweighted observation count is rounded to the nearest 10.

institutions. The percentages of students identifying as African American or Black, Asian, and Hispanic or Latino were 27%, 5%, and 16%, respectively. Nearly a third of students were married, with just over one dependent and one household member in college, on average. Average student EFC was \$2,942, and the average annual prior-year and current-year academic term incomes were \$24,379 and \$11,058, respectively.¹⁴ Asset contribution (which is calculated as the total EFC less income contribution) was \$1,188 on average, though about 70% of students had no asset contribution expected to defray college costs. Average total cost of attendance to the student was \$15,047, while average total aid equaled \$8,107. Therefore, aid did not fill the full gap between average EFC and cost of attendance on average in these data. Aid was predominantly composed of grants and loan aid, with average loan aid receipt being about 50% higher than average grant aid. Average work-study receipt was only \$110.

Bunching

I begin with a discussion of findings related to bunching around students' income allowance levels. I calculated the income allowance available to each student based on her marital status, whether her spouse worked and went to school, the number of dependents the student had, the amount of work income, taxes paid or expected to be paid, and other considerations in aid formulas. [Figure 3](#) presents histograms of the number of students according to the distance from their relevant income allowance level using \$100 bins plotted on the x axis. Positive distances indicate that the student earned more than her income allowance, while negative distances indicate that income allowance exceeded earned income. If students were systematically avoiding implicit income taxes, we would expect to see bunching just to the left of 0. Visual inspection of all graph panels indicates that more students have incomes less than the income allowance within the \$5,000 bandwidth. However, there does not appear to be distinct bunching close to the threshold nor right below the threshold where students can avoid the tax.

To examine bunching more formally, [Table 2](#) displays results from the level and slope discontinuity tests using \$100 income bin sizes (results are robust to bin sizes twice as large and half as much). Following Lee and Lemieux (2010), I display results from a variety of bandwidths. These tests confirm the visual inspection of the graphs and provide little evidence of bunching near the income allowance, with none of the estimates of density and slope discontinuities reaching statistical significance. In [Table 3](#), I similarly test for bunching around thresholds where grant aid is reduced because of increased earnings. This value is equal to students' maximum income allowance plus the maximum Pell Grant (\$4,310 in 2007–2008 and \$5,500 in 2011–2012), as long as this total is less than the cost of attendance and the

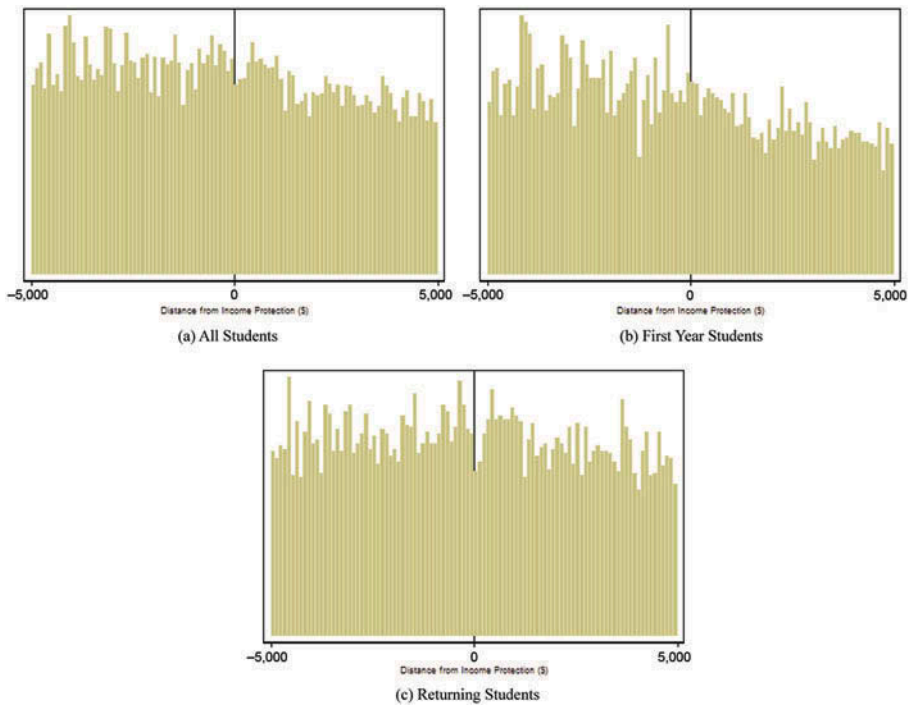


Figure 3. Density of students around income protection.

Note. Sample is financially independent undergraduate students from National Postsecondary Student Aid Study (NPSAS) 2008 and NPSAS 2012. All dollars are in 2012 dollars. Histogram bin sizes are equal to \$100.

Table 2. Density and slope discontinuity tests near income protection threshold.

	Bandwidth		
	\$2,000	\$3,000	\$4,000
A. Estimated Density Change			
All Students	-.050 (.050)	-.032 (.041)	-.025 (.036)
1st-Year Students	-.007 (.075)	-.004 (.062)	-.010 (.054)
Returning Students	-.093 (.068)	-.056 (.055)	-.036 (.048)
B. Estimated Slope Change			
All Students	-.022 (.095)	.061 (.047)	.061 (.047)
1st-Year Students	.016 (.068)	.052 (.034)	.052 (.034)
Returning Students	-.016 (.062)	-.025 (.031)	-.025 (.031)

Note. Estimated density change is based on McCrary (2008). Estimated slope change is based on Equation 4 from the text. Both tests used \$100 income bins. Standard errors are included in parentheses. Sample is from National Postsecondary Student Aid Study 2008 and 2012.

Table 3. Density and slope discontinuity tests near grants threshold.

	Bandwidth		
	\$2,000	\$3,000	\$4,000
A. Estimated Density Change			
All Students	-.074 (.057)	-.061 (.046)	-.049 (.040)
1st-Year Students	-.047 (.093)	-.054 (.074)	-.049 (.064)
Returning Students	-.072 (.073)	-.049 (.060)	-.032 (.052)
B. Estimated Slope Change			
All Students	.007 (.118)	-.047 (.055)	-.025 (.034)
1st-Year Students	-.049 (.074)	.048 (.039)	-.018 (.023)
Returning Students	.040 (.074)	.005 (.036)	.004 (.023)

Note. Estimated density change is based on McCrary (2008). Estimated slope change is based on Equation 4 from the text. Both tests used \$100 income bins. Standard errors are included in parentheses. Sample is from National Postsecondary Student Aid Study 2008 and 2012.

student has Pell-eligible EFC. Here again, none of the estimates of density and slope discontinuities were statistically significant.

In summary, bunching near thresholds at which implicit income taxes affect aid receipt would suggest that students are systematically adjusting their earnings to avoid implicit taxes. Figure 3 and tests of level and slope discontinuities in Tables 2 and 3 do not provide evidence of such behavior. This finding could be because they are either unfamiliar with the consequences of earnings in the aid formulas or they cannot reduce their work efforts near these thresholds because of budget constraints.

Estimates of the relationship between earnings and MTR

Turning next to estimates of the relationship between MTR and earnings, I present results based on Equation 5 in Table 4. For brevity, I display only marginal effects for the primary variables of interest, and full output for selected subgroups is available upon request. I present separate estimates from income ranges, based on prior-year income, in \$10,000 increments up until \$50,000 to roughly correspond to thresholds in the aid formulas, and I group together students with incomes for \$50,000 to \$100,000 due to sample size considerations. Average current-year earnings for students in each range are provided for context. Overall, results from the lowest income category indicate a negative relationship between MTRs and earnings, as would be predicted if students work less because of decreasing returns to work. I note, however, that there is less variation in MTRs among students in this lowest income category because many students face a 0 MTR based on income allowance levels in aid formulas, which somewhat complicates interpretation.

MTRs are in percentage points, such that a 1 percentage point MTR increase is associated with average earnings decreases of about \$6 for students with incomes in the lowest income range in the first row and first column of the table. This is about 0.1% lower average earnings for students in this income range. Separate estimates by 1st-year and returning students indicate that this overall effect is largely driven by returning students, where the magnitude of the effect rises to 0.2% of the average current-year earnings for students in that group.

Turning to results in the next higher income category in the second column, I observed that an increase of 1 percentage point in MTR based on prior-year income predicted about a \$6 increase in current-year earnings overall (about 0.1% of the average earnings in the category). This coefficient increased to almost \$12 among 1st-year students (a magnitude of about 0.2%), while the point estimate for returning students was small (about \$2) and statistically insignificant. Findings from the next income category in Column 3 are similar, with magnitudes of coefficients staying relatively small, at about 0.1% of average earnings and with the returning students' coefficient only on the margin of statistical significance.

Results from these two modest income ranges (students with incomes in the \$10,000–\$30,000 range) are consistent with what we would expect if resource-constrained students cannot afford to reduce earnings in response to the tax so they increase work efforts to offset the loss of aid. The stronger effect for 1st-year students relative to returning students suggests that students might learn about the aid system immediately after they gain feedback from it. Results are not statistically significant in the relatively higher income ranges, and I could rule out responses of greater than 0.2% of average earnings with 95% confidence in all of the highest three income groups.

Inference was similar when using income ranges of other sizes, with the following general exceptions. When using larger income groupings (e.g., range of \$20,000), the relationship between earnings and MTRs was generally positive for 1st-year students in the lowest income category, and I found some evidence of a negative relationship between income and MTRs in middle income ranges. Estimates using other income ranges are available upon request.

On the whole, I interpreted the observed relationships between current-year earnings and MTRs from [Table 4](#) as evidence that rules out large-scale responses to implicit taxes. I observed relationships between MTRs and earnings among students with relatively low prior-year incomes and particularly among 1st-year students. Estimated magnitudes were arguably small, as in most cases a unit change in MTR was related to less than 0.5 percent change in total earnings. This finding suggests that even if students are trying to respond to incentives in aid formulas, most have limited ability to do so.

Table 4. Marginal tax rate and earnings.

	Prior-Year Income Category					
	\$0 < Inc ≤ \$10 K	\$10 K < Inc ≤ \$20 K	\$20 K < Inc ≤ \$30 K	\$30 K < Inc ≤ \$40 K	\$40 K < Inc ≤ \$50 K	\$50 K < Inc ≤ \$100 K
All Students	−6.21*** (3.07)	5.94** (2.68)	11.36*** (3.40)	3.54 (6.35)	−15.65 (18.41)	10.31 (10.67)
1st-Year Students	−0.84 (4.99)	11.71*** (4.12)	10.24** (5.18)	7.03 (9.95)	16.85 (27.76)	20.21 (17.81)
Returning Students	−10.22*** (3.87)	1.83 (3.60)	8.80* (4.57)	−4.33 (8.59)	−25.92 (25.21)	9.54 (13.54)
Average Current-Year Earnings (\$)						
All Students	5,206	8,382	12,485	15,902	21,040	22,648
1st-Year Students	4,929	7,848	11,185	14,059	20,477	20,197
Returning Students	5,431	8,870	13,587	17,180	21,389	23,883

Note. Standard errors in parentheses. Marginal effects are from Tobit estimates based on Equation 5, with controls suppressed (full output is available upon request). Sample is from National Postsecondary Student Aid Study 2008 and 2012. All dollars are in 2012 dollars. Survey weights were used.

*** $p < .01$. ** $p < .05$. * $p < .1$.

Discussion

Implicit income taxes in the college financial aid system are a prominent example of one of the barriers faced by working college students and particularly financially independent students. Independent college students are a relatively understudied group in the United States, even though they comprise about half of the undergraduate population. Financially independent and dependent students have many distinct characteristics.¹⁵ Independent students are 11 years older on average, with a much larger variation in age. About a third of independent students are married and more than half have dependents; dependent students by definition are not married and do not have dependents. Independent students are more likely to attend public 2-year and for-profit institutions and are less likely to attend school full time. They work almost 10 hr more on average but come from households with substantially lower income levels and EFCs. Average total incomes and EFCs in independent households are about a third and a quarter of the level of dependent student households, respectively. This finding in part reflects dependent students' relatively high parental incomes and assets, and about 80% of dependent students expect to receive financial help from parents for college expenses.

Taken together, these metrics demonstrate the challenge faced by many independent students. They have relatively low incomes, yet more than half have dependents for whom they must care. They are less able to rely on financial support from family than are their dependent peers. They are more

likely to be enrolled in sub-baccalaureate programs and attend part time. Because they have relatively low EFCs, they are more likely to be more dependent on aid. These challenges underscore the importance of understanding independent students' college financing decisions and tradeoffs and their interactions with the financial aid system.

The prevalence of independent students is expected to grow, as policy initiatives that focus on increasing national college completion rates need to engage older, nontraditional, and working students. However, many financial aid programs are not designed to serve independent, working, and nontraditional students. Kane (1997) described how rules and formulas that evaluate need are based on a model where students may make some summer income but predominantly depend on parental resources. This leads to a treatment of income in aid formulas for many independent students that does not capture their ability to pay well. Consider, for example, students who go to college at night while working full time during the day or students who return to college to change careers after being a full-time worker. These students' incomes can be taxed at the same rate as dependent students, even though the latter group is expected to receive financial support from parents and the former is not. Moreover, while the income of the presumed primary earnings generator in an independent household (the student herself) is taxed in aid formulas, there is not a corollary tax on the earnings of dependent students' parents.

Because they can reduce the amount of aid working students receive, implicit financial aid income taxes have the potential to influence decisions about whether to and how much to work while in or immediately before college. The ACSFA also has noted that these taxes have the potential to impede some students' ability to afford and succeed in college:

the most egregious example is the exceptionally harsh treatment of student earnings from work ... [Students] work longer hours in order to limit borrowing, only to find higher expenses the following year, but lower grant aid to meet them—a Catch-22 that can force them to work even longer hours at the expense of academic pursuits, enroll part time, or drop out all together (ACSFA, 2005, p. 2).

Using data from a large national survey of students, I did not find evidence that students are bunching below relevant earnings thresholds in an effort to avoid the tax on total aid or on grants. The lack of response is consistent with recent prior work on implicit taxes in aid formulas that focused on the effect of taxes on the savings behavior of dependent students' families (e.g., Long, 2004; Monks, 2004). One interpretation for the lack of bunching is that the amount of income allowance offered students is too low for many to reasonably adjust their work behavior and still be able to afford educational expenses. The relatively small magnitude of estimates from examination of the more general relationship between implicit taxes and students' earnings

leads to a similar conclusion that students are not meaningfully reducing work in response to implicit income taxes.

Informational deficiencies are likely an important contributor to students' lack of response to the income tax in college aid formulas, and these deficiencies are compounded by the complex nature of aid formulas and the timing of aid application and receipt. This explanation corresponds with research documenting students' lack of understanding about aid (e.g., Akers & Chingos, 2014; Ziskin et al., 2014) and would suggest that students are not making fully informed financial decisions related to college.¹⁶

The apparent lack of response to implicit aid income taxes does not mean that they do not have an impact on students. The taxes appear to burden resource-constrained students as they can lower aid receipt among the students who likely need it most. A salient concern is that the work penalty could lead to lower persistence. The aid penalty can reduce students' expected financial resources, and therefore, students may decide to leave college if their financial situation is not what they perceived at time of college entry (Heller, 1997; St. John et al., 1996). The data used in this study do not allow me to directly observe this behavior, but future research would be well served to directly understand how implicit earnings taxes affect persistence and other student behaviors.

Notes

1. For example, the higher education goals of the Obama Administration include increasing college completion among nontraditional working students (The White House, n.d. <http://www.whitehouse.gov/issues/education/higher-education>).
2. Additionally, all graduate students (nearly 3 million students annually) are considered independent (U.S. Department of Education, 2013).
3. This finding is particularly true since home equity was removed from consideration in aid formulas as part of amendments to the Higher Education Act in 1992.
4. States also heavily subsidize higher education costs at public institutions, but students do not need to apply for the majority of this aid because it is reflected in subsidized tuition prices.
5. The EFC calculation guide is available at <http://ifap.ed.gov/ifap/byAwardYear.jsp?type=efcformulaguide>. Income is based on adjusted gross income from the prior-year tax filing, plus untaxed income and benefits.
6. Independent students with dependents other than a spouse can qualify for an "automatic zero" EFC if they satisfy various conditions. See <http://ifap.ed.gov/ifap/byAwardYear.jsp?type=efcformulaguide>.
7. If not all need is met by financial aid, then the amount of out-of-pocket expenses that would vary with aid would decline. As a result, we would expect less of a response to implicit taxes because there would be less forgone aid with each marginal dollar of earnings. Additionally, for ease of exposition in this section, I assume that institutions determine need in a manner generally similar to the federal needs analysis formula. This simplifying assumption is needed because it would be extremely difficult to individually describe how each of the thousands of schools in the sample

idiosyncratically assign aid. Nonetheless, it is likely that students will respond to incentives in all relevant aid formulas, if they respond at all. Students' ability to respond also likely weakens in situations where they need to navigate multiple complex needs formulas, as discussed in the following section.

8. Because of informational and computational issues described later, it is possible that some students with incomes outside of these ranges may also respond to implicit taxes if they reduce their work effort in response to the general concern that they could lose some financial aid. I cannot formally analyze such general behavior using the data in this study.
9. The minimum Pell Grant award amount is typically 10% of the maximum award amount for that year. Thus, the maximum EFC a Pell-eligible student can have is typically the maximum Pell Grant amount for that year minus the minimum Pell Grant award amount. However, in the 2011–2012 school year, students who were eligible for at least 5% of the total maximum were eligible for the minimum award, such that the maximum Pell-eligible EFC was \$5,273.
10. Aid packages vary by student and by institution. Federal loan programs have annual and/or aggregate limits and the generosity of some federal programs such as work study depends on school-level fund availability. Work-study funds are also contingent on a student's ability to obtain an applicable job. There are also state and institution aid programs available to some students.
11. Needs analysis based on prior prior-year tax returns will add further separation between students' working behavior and their ability to respond to implicit taxes.
12. Estimates using ordinary least squares estimates and Cragg's hurdle models led to qualitatively similar conclusions and are available upon request.
13. First-year students' prior-year incomes were from a period prior to the students entering college, whereas returning students' prior-year incomes were from a period when the students were enrolled in college and therefore could already incorporate learning about the financial aid system.
14. Current-year income data were self-reported and do not include earnings from summer employment or from the student's spouse. Prior-year earnings in the data were based on total household earnings from official FAFSA filings.
15. All figures in this paragraph come from the author's calculations using NPSAS 2008 and 2012 data.
16. Another contributing factor to the lack of response is that incentives relevant to other social programs or the income tax system may have more pronounced effects. Results from studies of federal education tax credits have revealed little effect of these credits on students' enrollment decisions; rather, they predominantly subsidize costs for students who would have otherwise enrolled (e.g., Turner, 2012).

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