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# Parental Income and College Outcomes: Evidence from Lottery Wins *

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**Abstract**

While household resources are correlated with children's college-going, a causal link has been difficult to establish. Using the universe of tax and federal financial aid records, we identify more than one million 12-24 year olds whose parents received income from state lotteries between 2000 and 2012 and compare their college outcomes, exploiting variation in the timing and size of the win. For wins less than $100,000, including those that would likely be sufficient to cover the cost of college, we find little evidence of changes in two- or four-year attendance; by contrast, wins greater than $100,000 appear to have substantial effects on four-year college attendance, with the size of the effect increasing in the size of the shock, even within ranges that vastly exceed the typical cost of a college (e.g., wins exceeding one million dollars increase attendance by 10 p.p.). Interestingly, the effects are not larger among households with below median income. We further find that lottery wins reduce federal financial aid among all win sizes, but attendance patterns do not appear to be moderated by this crowd-out. Altogether, our results imply that, in the current policy environment, borrowing constraints may not be binding for a high fraction of households and that marginal households tend to treat college as a consumption good.

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## 1 Introduction

Household conditions and characteristics play an influential role in children's educational attainment and later-life outcomes. And, while we tend to observe increased college-going among children growing up with more resources, in understanding why, it is difficult to disentangle aspects of the household that are effectively immutable from those that can be maneuvered by policy. This uncertainty creates challenges for policymakers. For example, those seeking to increase college-going rates might be tempted to simply transfer additional income to low-resource households in order to increase the average affordability of college. However, if differences in resources reflect innate ability and expectations that parents transmit to children, altering household income may have little effect on attendance.

The crux of the issue is that household incomes are generally not exogenously given, and thus the scope for policy has been difficult to assess. As a result, recent studies have developed creative methods to attempt to isolate the effects of household resources on college-going. Such studies have exploited income and wealth differences generated by, for example, job loss (Coelli, 2011; Pan and Ost, 2014; Hilger, 2014), tax credits (Manoli and Turner, 2014; Michelmore, 2014), union status (Shea, 2002), casino revenue (Akee and Copeland, 2010), historical land grant lotteries (Bleakley and Ferrie, 2013), oil revenue (Loken, 2010), and housing prices (Lovenheim, 2011).[1] The estimates from these studies reflect the responsiveness within the specific populations, levels of income change, and research designs they examine and, perhaps as a result, vary greatly in magnitude.

In this paper, we offer a single setting in which we can examine changes in college-going among children from a wide range of backgrounds, whose households receive shocks to their resources that vary in both timing and size. Specifically, we leverage variation from household income generated by parents' state lottery winnings between 2000 and 2012.[2] Our sample is drawn from the universe of tax records and consists of the more than one million children whose parents won the lottery over this period matched to their corresponding college enrollment and financial aid histories.[3] Ours is the first study to use data on

[1] Prior studies have exploited cross-sectional differences and broader trends in income over time (e.g. Acemoglu and Pischke, 2001; Blanden and Gregg, 2004). Related studies examine the effect of income and job loss on various components of cognitive development (e.g. Blau, 1999; Maurin, 2002; Ananat et al., 2011; Rege, Tella, and Votruba, 2011; Dahl and Lochner, 2012; and Cesarini et al., 2015) and the effects of job loss on the employment outcomes of children (e.g. Bratberg, Nilsen, and Vaage, 2008; and Oreopoulos, Page, and Stevens, 2008).

[2] Gallup Polls indicate that approximately 50 percent of adults in the United States participate in state lotteries each year. As shown in Table 2, in our period of study, more than one million children are affected by parental wins of less than $10,000; about 100,000 students by wins of $10,000-100,000; and 14,000 students by wins exceeding $100,000.

[3] Specifically, lottery winnings are reported on the Form W-2G, claimed dependents are revealed on Form 1040s, and college

the population of lottery winners in the United States and to examine the effect of lottery income on post-secondary investment. Our paper also advances the existing literature on post-secondary enrollment and income by providing a rich picture of the size of income shocks needed to generate significant changes in college outcomes and the upper bounds of these effects. Further, because we generate a range of estimates within a cohesive framework and are able to examine any corresponding changes in financial aid outcomes that occur alongside a lottery win, our results can shed light on the mechanisms that underlie the relationship between household resources and college-going.

Insight into these mechanisms is, of course, what is most critical for policy. Large and small income effects in the context of college enrollment suggest fundamentally different conclusions about whether households face financial constraints to investing in human capital.[4] If borrowing constraints affect a significant fraction of households, then modest changes in income could generate large changes in attendance. In this case, we would expect students from lower- and middle-income households to exhibit the largest responses and income effects to be highly concave (with little or no additional effect for changes that exceed the cost of the typical state college or university). By contrast, if changes in income affect college attendance primarily by altering consumption choices, then we might see income effects for both low- and high-income household, with the size of the effect increasing even in income levels that exceed the cost of college.

Our primary empirical specification exploits two sources of variation. Following the lottery literature, we compare children from households that experience larger and smaller first-time wins (e.g., Imbens, Rubin, and Sacerdote 2001; Hankins, Hoekstra, and Skiba 2011) ).[5] Unobservable differences between large and small winners could also confound the estimates from this comparison, so we propose an augmented design that also levers the timing of the lottery win. For example, in our primary specification we restrict our analysis to postsecondary outcomes that occur within fixed year-windows of high school graduation (e.g., college attendance within the year after graduation), and exploit the fact that there is no scope for children who had graduated already when their parents win occurred to have altered their outcomes. In other words,

enrollment is reported by colleges and universities on the Form 1098-T. We present results for two methods of linking children to lottery winner parents: based on claimed dependents on the Form 1040 in the years prior to the lottery win; and based on Social Security birth records.

[4] A related literature examines borrowing constraints in the context of college outcomes. See, for example, Keane Wolpin (2001), Carneiro and Heckman (2002), Cameron and Taber (2004), Brown, Scholz and Seshadri (2011), and Lochner and Monge-Naranjo (2011).

[5] Comparing larger and smaller wins in this context is complicated by the fact that we cannot observe the exact lottery that the household won in terms of the day or month it was played or the specific type of state lottery played (states offer multiple lottery options). In practice, we find that households that experience larger wins have higher income, are more likely to be married, and have fewer children. Thus it appears that higher income households are more likely to play lotteries for which larger prizes are available.

behaviors observed among such children–whose parents won the lottery too late to affect their attendance decisions–form a natural within-win size counterfactual that abstracts away from any unobservable differences between large and small winning households.[6] To that end, we are able to show that lottery wins in this specification are balanced across predetermined variables.

Within this framework, we examine an array of postsecondary outcomes–two and four-year college attendance within specific year-windows of high school graduation, total years of enrollment within five years of high school graduation, college sector (i.e., public, private, and for-profit), college selectivity, and federal financial aid–and generate several interesting findings that are relevant both for policy and for interpreting the literature to date. For wins of less than $100,000, we estimate a less-than-one percentage point increase in four-year college attendance, and no increase in two-year college enrollment, on the extensive margin. On the intensive margin, there is no systematic pattern of switching from two- to four- year colleges, attending higher quality colleges, or persisting longer in college. These results hold for low- and high-income households, suggesting that borrowing constraints are unlikely to be a primary determinant of college attendance.[7] Thus, in the current environment, plausible policies that alter short-run household income may not be a cost effective method of raising post-secondary investment.

By contrast, wins exceeding $100,000 appear to have substantial effects, with the size of the effect increasing in the size of the shock, even within ranges that vastly exceed the typical cost of a four-year college. The upper bound of income effects is quite large. For example, we observe increases in four-year college enrollment of approximately 10 percentage points for income shocks exceeding $1,000,000. In addition, there is some evidence that very large income shocks may cause students to persist in college, to attend private colleges, and to attend more selective colleges. Interestingly, income effects on college outcomes do not appear to be larger for households with below median income, suggesting that such households: do not face uniquely binding financial constraints, have weaker expected returns (e.g., if the child is not college-ready) or preferences for post-secondary education, have different norms over who is responsible for financing higher education, or have other financial priorities (e.g., purchasing a home, saving for retirement, or supporting relatives). Altogether, our results are consistent with marginal households treating

[6] In contrast to the difference we observe across win sizes, we find that students affected by wins that occur before and after they complete high school come from households that are similar in terms characteristics such as wages, adjusted gross income, marital status, number of children, and citizenship.

[7] A potential concern for identification are colleges that do not submit enrollment data for students whose grants exceed tuition billed. Thus we verify that the results are robust when restricting attention to colleges that report fully. We also note that this data concern would likely overstate the income effects for lower households who are most likely to receive full scholarships.

college attendance primarily as a consumption good.

We also consider the extent to which lottery wins crowd out federal financial aid receipt, by linking the individuals we study to their Department of Education records on grants, loans, and Free Application for Federal Student Aid (FAFSA) filings. We find evidence that the entire range of wins reduces Pell grant and subsidized loan receipt, both unconditionally and conditional on college attendance. We also find that lottery winners are less likely to submit a FAFSA, and have higher expected family contributions (EFC) conditional on submitting a FAFSA. These effects are especially large for wins that occurred in the year before the child graduated high school, a key year on which initial financial aid determinations are based. Interestingly, when we exclude the year before high school graduation from the analysis, while the effect on federal aid is reduced by over one-half, the effect on college attendance is no higher, which suggests that the crowd-out we detect does not explain our attendance results.

Our estimates also appear to be robust to a design that exploits the exact timing of the lottery win. Children who graduate from high school in any of the six years after their parents' win more than $100,000 exhibit significant changes in whether they attend college within one year of graduating, while children who graduate in the six years before their parents' win do not. Notably, income shocks in the year of high school graduation appear to be too late to change college enrollment decisions within that year, suggesting that existing policies that become salient late in the college enrollment process (e.g., student aid offers, education tax credits) may, if timed earlier, lead to larger increases in college-going.

The paper is organized as follows. Section 2 introduces the de-identified administrative data used for analysis. Section 3 details the empirical strategy and the necessary assumptions. Section 4 discusses the results of the analysis. Section 5 concludes.

## 2 Data and Income Shocks

This study is based on de-identified population tax records for the United States. The analysis focuses on more than one million individuals who graduated from high school between 1999 and 2012 and had a parent with lottery winnings.

Household characteristics are used as controls and for heterogeneity analysis. Wages, adjusted gross income, filing status, and number of dependents are observed on the Form 1040. We use pre-win years to estimate average household characteristics because post-win characteristics are likely to be endogenous to

the size of the win.[8] Table 1 indicates that the average student in the sample has household wages of 51,835 dollars (in 2010 dollars), 57 percent have parents filing as married, and average parental age when the child graduates from high school is 47. Relative to parents without lottery wins who have children of the same age, parents with lottery wins have lower average income, are less likely to be married, and have children who are less likely to attend college (though there is significant common support).

Lottery winnings are reported on the Form W-2G for the purposes of tax withholding and income declaration. These forms are first available in 1999. All prizes in excess of six hundred dollars must be reported by third parties and indicate the state and year of the lottery. We classify households on the basis of the size of their first win, as subsequent wins could be endogenous to the size of the initial win. As shown in Table 2, more than a million students who graduate in the observable period are affected by "small" parental wins averaging less than 2,000 dollars. Approximately 100,000 students are affected by parental wins of 10,000 dollars or more, and 14,000 students are affected by wins exceeding 100,000 dollars. Thus we are likely to have ample statistical power to examine the effects of large and small income shocks. We note that a very small fraction of households have total wins exceeding 10,000 dollars in years after their initial win.[9] Thus there is likely to be minimal bias caused by students classified as small winners subsequently experiencing large income shocks or by understating the amounts received by large winners. Some large lottery winners receive payments on a repeated annual basis. We observe a number of these continuing payments for the first time in the first year for which W-2G data is available. Because we do not observe the first year in which these payments were received or the total amount, these households are dropped from the sample. Likewise, we are unable to classify repeated payment wins that continue through the most recent tax year.

We employ two methods of identifying parent-child matches. First, we consider claimed dependents on the Form 1040. A child is linked to a parent if they are claimed prior to the first lottery win and prior to graduating from high school. Children claimed after the win or to attending college could be endogenous if, for example, the child was or was not claimed for the purposes of qualifying for college aid or to reduce tax payments associated with the win. This method will include birth parents, step parents, and adoptive parents who are financially responsible for a child and whose income is likely to be considered for the purposes

[8]The Form 1040 is first available in 1996, and the first cohort of interest is 1999, so we use three pre-win years to determine household average characteristics.

[9]Specifically, only 2-3 percent of households have total wins exceeding 10,000 dollars in the four years after the initial win (and approximately 80 percent never experience another win of any size). Thus, even if a subsequent win of 10,000 dollars or more generates a large change in college outcomes, it affects too small a fraction of the population to significantly alter the estimates.

of financial aid by colleges and federal grants. The resulting population includes more than 1.4 million students linked to parents who experience income shocks. We use this as the primary sample for analysis. As an alternative, we link parents and children using birth records from the Social Security Administration. These records are first available in 1983 and thus results in a smaller sample of about 900,000 affected students. This method ensure that the child-parent link is restricted to birth parents (who may be more likely to use additional resources to invest their children's human capital) but will include absentee parents who may no longer have a relationship with or assume any financial responsibility for the child.

Whether a child's college outcome can be affected by a lottery win is dependent on whether or not that outcome has been realized at the time of the lottery win. In particular, if high school graduation represents a crucial moment for deciding whether or not to attend college then wins that occur after this year will have a limited effect on post-secondary attainment. This is a fundamental aspect of the identification design. Each student's expected high school cohort is determined using their exact date of birth, the state in which they were born, and the corresponding school entry age laws for that state. As shown in Table 1, 44 percent of affected students graduated after the win and thus were treated, while 56 percent graduated before the win and act as controls.

College outcomes are based on the Form 1098-T which is filed by post-secondary institutions and is first available in 1999. Form 1098-T enrollment records are linked to college characteristics maintained by the National Center for Education Statistics Integrated Postsecondary Education Data System. This makes it possible to determine if students attended two- or four-year colleges and whether the college is public, private, or for-profit. The Carnegie Classification is used to classify the college's undergraduate programs as more selective, selective, or inclusive.[10] Approximately 44 percent of children in the sample are observed attending college in the year after high school graduation, with approximately 24 percent attending a four-year college. Data on the 1098-T is reported by calendar (tax) year and not by academic year. Thus we define attendance within a year after high school graduation as being enrolled in either the calendar year during which the student is predicted to graduate from high school or the following calendar year. This will capture enrollment in the academic year of high school graduation if the student graduates when predicted or one year later, which appears to be common in practice.

[10]The classification variable "ugprof" is used to establish the selectivity of college, with approximately 40 percent of four-year colleges classified as more selective, 40 percent as selective, and 20 percent as inclusive.

## 3 Empirical Strategy

Estimating the causal effect of household resources on children's college enrollment is complicated by the strong relationship between resources and other factors that influence enrollment. For example, parental income is likely to be positively correlated with innate ability, parental education levels and familiarity with the college application process, local school quality, access to college counseling, and college-bound peers, all of which promote enrollment. Because many of these factors are likely to be either unobserved or mismeasured in data, a regression of college outcomes on household income may be positively biased (see Appendix Table A1 for average attendance rates by household income).

A growing number of studies attempt to isolate how household income and wealth affect college attendance (Acemoglu and Pischke, 2001; Coelli, 2011; Lovenheim, 2011; Hilger, 2014; Manoli and Turner, 2014; Michelmore, 2014; Pan and Ost, 2014), and educational attainment more broadly (Maurin, 2002; Shea, 2002; Blanden and Gregg, 2004; Akee and Copeland, 2010; Loken, 2010; Dahl and Lochner, 2012; Bleakley and Ferrie, 2013) using variation generated by job loss, tax credits, union status, casinos opening, land grant lotteries, oil revenue, and housing prices. The primary challenge in this literature is generating estimates that are both credible and externally valid, particularly if the results are intended to help shape policy beyond the affected groups and treatment intensities. Per the former, income and wealth are rarely fully exogenously determined, especially given that the landscape of college attendance, cost, and financial aid is constantly changing. Per the latter, income effects identified for one socio-demographic group may not be applicable to others; further, the responsiveness of any one group may vary with the size of the shock.

Relative to this prior work, income shocks generated by lottery income have many desirable characteristics for evaluating the effects of household resources on college outcomes. First, lottery wins vary significantly in size–in our case, from $600 dollars to more than $1,000,000 – and affect a large segment of households that are fairly diverse in terms of income, size, and the propensity of their children to pursue a college education. Thus, we can obtain a range of estimates: both those that can be interpreted quite generally as well as others that are local in terms of the magnitude of the shock and the type of households affected. Because we have scope to compare across magnitudes, we can examine whether income effects appear to be concave and identify their upper bound. Because we have scope to compare across household types, we may be able to pinpoint which households are most sensitive to changes in income. Second, the timing of when households experience the income shock varies. Thus, we can implement a research design

that does not solely rely on comparisons across households with different lottery win sizes, which may be quite different. Further, we can directly test whether there appears to be a crucial window for policy. Third, the one-time income shock is salient to both the household and the researcher in terms of size and duration, so we do not need to make strong assumptions about household expectations. Finally, lottery income shocks are not preceded by other changes that would complicate the interpretation of the effects, such as changes in household structure or employment status.

### 3.1 Within Win Size Design

Households with and without lottery wins are likely to differ in terms of financial resources, education level, attitudes towards saving, and other observable and unobservable characteristics that may affect human capital investment. Restricting attention to households with lottery wins and characterizing them by the size of the first win may correct many of these issues. Still, this restriction would result in valid comparisons only under the assumption that households that experience different-sized wins are identical (or, alternatively, that our choice of controls is sufficient to account for any unobservable differences in the propensity of children to attend college across win sizes, so as to render households essentially identical). Variation in potential payouts can stem from the specific variant of the lottery an individual plays, as states typically offer several options, and changes in prize pools over time due to "rollover" when there is no winner. If households with larger and smaller lottery wins participate in lotteries with different characteristics (e.g., if higher income households are more likely to participate in lotteries with larger potential payouts) resulting estimates may still be biased.[11] In practice, we find that large lottery winners have higher income, are more likely to be married, have fewer children, and are more likely to be U.S. citizens than households that win smaller lotteries.

To abstract from strong assumptions and the need to explicitly account for unobservable differences in households across win sizes that may influence the propensity for children to go to college, we add an additional layer of comparison within win size that exploits differences in the timing of the win. We achieve this by restricting our attention to enrollment outcomes that occur within particular time frames of high school graduation, primarily focusing on enrollment within one year of graduating (i.e., immediate transitions to college). Then we form a counterfactual from children whose parents experience a lottery

[11] Studies examining labor supply, health, and cognitive development have had varying levels of success isolating participation in similar lotteries. For examples, see Imbens, Rubin, and Sacerdote (2001), Lindahl (2005), Apouey and Clark (2010), Hankins, Hoekstra, and Skiba (2011), Powdthavee and Oswald (2014), Cesarini et al. (2015).

win after they graduate, which minimizes–if not, removes–their scope to adjust enrollment within the time frame of interest in response (assuming, of course, that individuals cannot retroactively alter their enrollment paths). For example, if the outcome of interest is four-year college attendance within one year of graduating high school, children of parents who win the lottery two years after they graduate, without perfect foresight, would be unable to begin school one year earlier in response. Thus, at root, our framework compares, among children whose parents win the lottery, how wins of the same size affect the transition to college if they occur before or after a child graduates high school.[12] In practice there is no significant difference in college enrollment rates for children whose parents win smaller amounts before or after they graduate from high school (see Section 4). Thus, the estimates from a difference-in-differences design are determined entirely by the within win size variation for students in households that experience larger wins.

Before we turn to our estimating equation, we first show that in contrast to comparisons we made earlier between large and small lottery winners, comparisons within win size but across children's ages are statistically valid. Households with lottery wins while the child is still in high school are not statistically different than those that win after the child has graduated in terms of income, marital status, number of children, citizenship, and other characteristics (see Table 3). Importantly, there is also no evidence that significant changes in household income precede lottery wins (see Table A2), though the winners of large lotteries exhibit significant reductions in labor market participation in subsequent years.[13]

Our baseline specification is:

$$Outcome_{i,c,s,y} = \delta_{s,y} + \delta_c + \mathbf{X}_i\gamma + \theta Pre_i + \sum_j \alpha_j(Size_h = j) + \sum_j \beta_j Pre_i(Size_h = j) + \varepsilon_{i,c,s,y} \qquad (1)$$

where the unit of observation is a child $i$ in a high school cohort $c$ in state $s$ and win year $y$, and the outcomes we consider are: two and four-year college attendance within specific year-windows of high school graduation, total years of enrollment within five years of high school graduation, college sector (i.e., public, private, and for-profit), and college selectivity. The baseline specification includes state-by-year of win fixed effects and high school cohort fixed effects. $X_i$ is a vector of controls that varies across specifications

[12] An alternative intuition for the design is that it compares the outcomes of students whose parents experience larger or smaller wins and accounts for unobserved differences in the propensity to attend college across these households using older children who could not be affected. Several papers in the literature have exploited the fact that younger and older children may be more or less affected by changes in household income. See, for example, Akee and Copeland (2010), Hilger (2014), and Michelmore (2014).

[13] Households with wins of each size experience gradual increases in earnings as their children age leading up to the win. We note that households with very large wins reduce their earnings after the win. Household that win 300,000 to 1,000,000 dollars have decreased earnings of more than 15 percent and households that win 1,000,000 or more have decreased earnings of more than 40 percent.

and attempts to account for potential differences across winners our fixed effects do not capture.[14] The $\alpha$ coefficients and $\theta$ absorb differences in households by win size and timing of the win, respectively, and thus generate our identifying variation. More specifically, the $\alpha$'s denote fixed effects for, in our preferred specification, one of six win sizes, whereby wins below \$10,000 form the omitted group. (We use bins, so that we may flexibly examine income effects without imposing a functional form.[15]) Thus, they absorb any differences in the propensity to attend college across children from households that experience different-sized wins, so that we are making within win size comparisons. Likewise, our inclusion of $\theta$ accounts for fixed differences between children who graduate before and after their parents experience a win.[16]

Our key parameters of interest are the $\beta$ coefficients, which reflect the differential college outcomes for children who graduate high school after their parents win the lottery for a given lottery win size, relative to the omitted group (i.e., households with wins below \$10,000). The identifying assumption is that the college enrollment paths of children who graduate high school after a win of a particular size would resemble those of children who graduate high school before a win of that same size, save for the timing of the win.[17] At root, our counterfactuals are formed from the outcomes of children whose households would ultimately experience the same size win but who graduated from high school too early for their enrollment path to benefit from it.[18]

In the preferred specification, we categorize households based on the following sizes of income shocks: \$600 to \$9,999, \$10,000 to \$29,999, \$30,000 to \$99,999, \$100,000 to \$299,999, \$300,000 to \$999,999, and \$1,000,000 dollars or more.[19] Using much narrower bins for large wins results in too few

[14]Controls we consider in these additional specifications include state-by-year of win fixed effects, high school cohort fixed effects, and a quintic polynomial of average household wages and adjusted gross income, as well as a rich set of child and household characteristics, including a fixed effect for household filing status, parental age at the time of the child's high school graduation, and a fixed effect for the child's birth order and the number of children in the household.

[15]Issues with imposing a functional form on income effects have been noted by Loken, Mogstad, and Wiswall (2012). We also present linear and log specifications in Section 4.2 when considering the curvature of income effects.

[16]In practice, we find little difference in the rates of attendance for children whose parents win before and after they graduate from high school for the omitted group (i.e., that $\theta \approx 0$), so that our specification ultimately reduces to a within win size comparison.

[17]This assumption is considerably weaker than the one we would need to impose were we to employ a design more consistent with the prior literature that has relied on lottery wins for identifying variation (i.e., children from households with different levels of shock would have had identical enrollment paths, conditional on observables). We will examine in the robustness section whether the single-difference design comparing outcomes of households across shock sizes produces a similar pattern of results.

[18]We exclude individuals for whom the increase in income occurs in the year that they graduate from high school since it is unclear if, and to what extent, they can be affected. We do not observe if an increase in income occurs in the first or the second half of the year. An increase in income late in the year is certainly too late to change a student's decision about whether or not to enroll in a four year college for that year. Further, even if the increase occurs earlier in the year, it may be too late for a student to take the necessary steps to enroll in college (e.g. taking the SAT or ACT and meeting application deadlines) and the student may have made other arrangements (e.g. taking a job or enlisting in the military). Thus it is unclear whether income increases in the year of high school graduation result in the student being treated by the income shock. We examine the effects on a year-by-year basis including the year of high school graduation in Section 4.2.

[19]These pre-tax income increases will face different tax rates based on the size of the win, the year of the win, other sources of

observations to generate precise estimates. Conveniently, the number of individuals affected by each income shock range is inversely related to the expected effect size–e.g., more than one million households win less than $100,000 – which means that we attain the most precise estimates for the smallest income shocks which are likely to generate the smallest effects. To ensure that the results are not due to coarse bin sizes, we rerun the analysis using alternative income ranges.

### 3.2 The Timing of Effects

We also present results amending our specification to examine the sensitivity of our estimates to the year, relative to high school graduation, that the lottery win occurred. We estimate:

$$Outcome_{i,c,s,y} = \delta_{s,y} + \delta_c + \mathbf{X}_i\gamma + \sum_{t=-6}^{t=6} \alpha_t (YrsToShock_i = t) + \sum_{t=-6}^{t=6} \beta_t Shock_h (YrsToShock_{i,h} = t) + \varepsilon_{i,c,s,y} \quad (2)$$

where $YrsToShock_{i,h}$ is the number of years between when a student graduates from high school and when her family experiences an increase in income (i.e. $c - y$). There are too few observations to examine time-varying affects for each income shock bin, so we classify students as either being treated by a large income shock (of $100,000 or more) or a small income shock (of less than $100,000, which averages to about $3,000).[20] Note that this specification is effectively a series of across win size comparisons that are differentiated by the age of the student relative to high school graduation when the win occurs.

We have three goals. One, this by-year specification reduces to an event-study framework and thus helps validate the timing implied by our specification of (1). We expect to see a noticeable jump in the enrollment path for attendance outcomes influenced by lottery wins for wins that occurred prior to graduation, and no change for wins that occurred in later years. Two, we can examine if income effects persist for wins in earlier years of a teen's life, in which case we would expect to see similar (or even larger) increases in enrollment for children who were younger at the time of the win. Three, we can explicitly examine whether wins in the year of graduation affect college outcomes, which could yield insight into the successfulness of policies that reduce (or increase) the cost of college, or the salience of that cost, when children are seniors in high school.[21]

household income in the year of the win, and state tax rates. The highest margin tax rate was 39.6 percent in 1999 and 2000 and fell to 35.0 percent in 2003. The lowest margin tax rate was 10 percent for each year during the period of interest. Overall, lower income households and smaller income shocks should face a lower average tax rate than higher income households.

[20] The effects will be downward biased to the extent that wins of less than $100,000 generate positive gains in enrollment, which appears to be small in practice.

[21] Note that income shocks that occur significantly prior to an individual graduating from high school could affect college atten-

## 4 Income and College Outcomes

The analysis produces several interesting and potentially important results. First, and perhaps most importantly, income shocks of less than $100,000 do not produce effects that are large in magnitude or statistically significant. Second, very large income shocks increase four-year college enrollment significantly, with an upper bound effect of about 10 percentage points. That is, income effects can be very large, but are not highly concave as one would expect to observe if they were driven by binding financial constraints. Third, we find limited evidence that additional resources increase persistence in college or the quality of college attended (except in the case of very large lottery wins). Fourth, the effects of income shocks on college attendance are, if anything, smaller for students from lower income households. This suggests that other factors, such as academic preparation and competing uses for resources, may limit the enrollment gains generated by increasing financial resources for low income households. Fifth, shocks that occur after a student has graduated from high school have little effect on whether they ever attend, as students who have already chosen not to attend do not appear to change this decision. Finally, we find that an across win size design generates estimates that are remarkably similar to those from a within size design.

### 4.1 Average College Attendance Before and After Income Shocks

Table 4 presents the average rates of attendance for students who graduate before and after the lottery win for each of six win sizes. The raw averages reveal several insights about the validity of alternative designs and the approximate magnitude of estimates in the next section.

The averages for unaffected children who graduate before the lottery win reveal that students from large and small win households have differing baseline rates of college attendance. Students from households that experienced larger wins have higher rates of attending both four-year and two-year colleges. This is consistent with these households having higher income which is strongly correlated with college going. Thus a design that makes a simple comparison across win sizes must assume that the controls are sufficient to account for these differences.

In contrast, students who graduate before and after the lottery win have very similar rates of college attendance for the smallest win size. This is consistent with the finding that these households have similar

dance through alternative mechanisms. For example, a student could attend a high school that provides better college preparation (e.g. a private school or a public school in a higher income community).

observable characteristics.[22] Interestingly, the within-size similarity in attendance holds for wins of 10,000 to 30,000 dollars and 30,000 to 100,000 dollars. This provides suggestive evidence that wins of this size are not sufficient to generate large changes in college attendance. By contrast, much larger wins, exceeding 300,000 dollars, are associated with sizable differences in four-year attendance.[23] The relationship with two-year college attendance is less clear. Two-year college attendance is more likely to depend on competing margins: not attending college versus attending a two-year college; and attending a two-year college versus attending a four-year college. Thus the expected effect of additional household resources is ambiguous. This pattern of college attendance has important implications for interpreting a difference-in-differences design in which small winners act as the control group. Because there is little pre-post difference in attendance for this group, the estimates will be determined almost entirely by the pre-post difference for larger win sizes.

### 4.2 Two- and Four-Year College Attendance

The effects of income shocks on four-year and two-year college attendance for all children claimed by winners are presented in Tables 5 and 6. Modest income shocks are estimated to have little effect on college enrollment. Specifically, students from households that experience income shocks between 30,000 and 100,000 dollars (which average 50,000 dollars) do not have statistically significantly higher four-year college enrollment within a year of high school graduation. We can rule out an average effect of even two percentage points on four-year enrollment for these increases in income. Importantly, this result is stable to specifications that add controls for state-by-year fixed effects and household income (column 2), parental filing status and age (column 3), and household size and birth order (column 4). The stability of the estimates as additional controls are introduced is additional evidence that the design produces reliable results.

Larger income shocks reveal the concavity and upper bound of income effects. Students from households with income shocks between 100,000 and 300,000 dollars are about 2 percentage points more likely to attend a four-year college and shocks of 300,000 dollars to one million dollars generate increased four-year college enrollment of about 5 percentage points. Interestingly, income shocks exceeding one million

[22] Note that the raw averages presented in Table 4 do not control a students high school cohort. Thus trends in matriculation over time could generate small differences in college enrollment between students who graduate before and after a lottery win.

[23] For perspective, the differences in attendance for affected and unaffected children presented in this table can be compared with cross-sectional differences in attendance by household income unadjusted for non-financial factors (as presented in Table A1). The difference in four-year college enrollment for a student affected by a win of 100,000 to 300,000 dollars is equivalent to the difference in enrollment for a student whose parents earn 75,000 dollars per year rather 65,000 dollars per year. Likewise, wins of 300,000 to 1,000,000 dollars and 1,000,000 dollars or more appear to result in changes in enrollment equivalent to the differences associated with about 20,000 and 40,000 dollars of annual income, respectively.

dollars result in an increase in four-year college attendance of approximately 10 percentage points. These results are quite interesting because they suggest that income effects are not highly concave. For example, households in the second highest bin receive an income shock averaging 500,000 dollars, which (even after taxes) is more than enough to send multiple children to a four-year college during this period. Yet, the estimated effect on attendance is only half that of the estimated upper bound. Likewise, the third largest income shock increases income by an average of more than 150,000 dollars, which should ease almost any borrowing constraint, but generates only a fraction of the effect of larger wins. This indicates that income changes college outcomes through consumption choice, with many households preferring to use additional income for other priorities.

The results of this paper are not consistent with studies that find large effects for modest income and wealth shocks. More importantly, the results are not consistent with a large fraction of potential students being unable to attend college due to household borrowing constraints. For example, income shocks of 30,000 to 100,000 dollars are likely to ease financial constraints for a significant fraction of constrained households, but they generate little change. Likewise, the effects should diminish greatly when income shocks exceed the typical cost of college, but they do not. The upper bound effects exceed most extensive margin estimates stemming from changes in the price of college. This may be due to the fact that, unlike price changes, income effects are not bounded by tuition levels and can be used to cover living costs and to compensate for lost wages. This result (and those throughout the analysis) are robust to the choice of the range of income changes used as the omitted group.[24]

Table 6 presents analogous results for income shocks on two-year college attendance. The theoretical implications for two-year college attendance are ambiguous due to competing attendance margins. Greater financial resources may cause some students to attend a four-year college instead of a two-year college, which would result in a negative effect. By contrast, some students may be induced to attend a two-year college instead of no college, which would result in positive effects. Further, two-year college attendance may be less sensitive to household resources as tuition costs are quite small and attendees may be more likely to work while in school. Consistent with ambiguous theoretical predictions, the results do not exhibit a clear pattern of increased attendance. The estimates are close to zero for smaller income shocks. We know that these shocks had no effect on four-year college enrollment so the null finding implies that there was no

[24]This is apparent from the estimated effects for wins ranging from 10,000 to 30,000 dollars. Wins of this size do not generate changes in college enrollment relative to the omitted group. Thus when these students are used as the controls, the estimates remain essentially unchanged.

effect on two-year college enrollment (i.e. the null finding is not due to offsetting margins). Interestingly, there is evidence of a positive effects for shocks ranging from 300,000 to one million dollars but this positive effect is not present for the largest shocks. The estimate for the highest income shocks could stem from the additional increases in four-year attendance offsetting any gains in two-year attendance.[25]

We replicate the design for a sample that only includes children for whom the lottery winner is a birth parent. This will correct any downward bias generated by parent-child matches where the parent claimed the child for tax purposes but is not the child's birth parent and may be less likely to dedicate new income to their college enrollment. Using birth matches will, however, result in the inclusion of parent-student matches in which the parent is absentee. Further, the matches are not available for cohorts born prior to 1983 and thus the resulting sample is smaller. As shown in Table 7, using the sample of birth parents produces nearly identical estimates. Smaller wins have no statistically significant effect on four-year college attendance while larger wins result in increases of about 2, 5, and 10 percentage points, respectively. There is no evidence that additional household resources affects two-year college attendance. These results indicate that the pattern of income effects is robust to the method by which students are linked to parents who win the lottery.

The preferred specification abstracts from functional form assumptions about income effects by presenting average effects for ranges of treatment. This flexible specification is made possible by the richness of the population data and produces robust estimates. Two natural alternatives to this approach are to include income shocks linearly or to include the natural log of income. In each of these cases we find that the estimates are sensitive to the range of income changes we include. Specifically, estimates in a specification that includes income linearly are sensitive to the largest income shocks included in the data.[26] Table 8 presents a linear specification while capping the largest win size included in the sample at various levels. Of particular note is that the estimated effect of income on four-year college attendance appears to be close to 1 percentage point per 100,000 dollars when including all wins of less than 2 million, 1 million, or 500,000 dollars. These effect sizes are consistent with the relative lack of concavity observed in the preferred specification.

[25]This pattern of effects, which is based on within win size comparisons, is nearly identical to estimates from an across size design discussed in Section 4.6.

[26]Income effects must become concave at some level (e.g. the marginal effect of an additional 100,000 dollars is unlikely to be large for a household that experiences a shock of several million dollars) and must be bounded since enrollment can not exceed 100 percent. Thus per-dollar income effects are necessarily modest for very large income shocks. Ordinary least squares, by minimizing squared errors, places the greatest weight on very large income shocks. In conjunction, these issues suggest that including very large income shocks in this specification will necessarily result in small estimated income effects. Thus excluding the largest lottery wins will significantly alter the estimates.

Only when much larger wins are included, exceeding 2 million dollars, do the estimates appear to become significantly attenuated due to concavity associated with very large wins. This effect size is consistent with the bin estimates in the preferred specification (e.g. 500,000 dollars generates a 5 percentage point increase in four-year college enrollment). It also explains why income shocks of, for example, 30,000 dollars produce changes in enrollment that are too modest to be statistically significant. The estimates for two-year college attendance confirm that there is no clear effect, ruling out effects larger than 1 percentage point per 100,000 dollars. The linear estimates are essentially unchanged when the sample is limited to households that win 10,000 dollars or more (see Appendix Table A3). Conversely, estimates based on a specification that includes the natural log of income are sensitive to the smallest income shocks that is included but not the largest (see Appendix Table A4 which includes all wins and Table A5 which includes wins exceeding 10,000 dollars).[27] The fact that the estimates are sensitive to the choice of sample suggests that a log functional form is not adequate to capture the true underlying relationship and makes interpreting the estimates difficult (beyond confirming that additional resources generate statistically significant increases in four-year college attendance but not two-year college attendance).

### 4.3 Persistence and College Quality

The net effect on four-year college attendance is presented for the year of high school graduation and each of the four subsequent calendar years in Table 9.[28] There is no evidence of a significant effect for wins of less than 100,000 in any year, while the effects of larger wins appear to persist through the first three to four years after high school graduation. For example, for the first four years after high school graduation there is a 4 to 5 percentage point increase in four-year college enrollment for lottery wins of 300,000 to one million dollars and 10 to 13 percentage points for wins exceeding one million dollars. Interestingly, the persistence of effects appears to be positively correlate with the size of the win – the largest wins have the greatest persistence while the effects fade more quickly for smaller wins.

Of particular interest is the extent to which additional household resources can cause students to persist longer in college and to attend colleges of higher quality. Unfortunately, we cannot directly separate

[27] The vast majority of lottery wins observed in the data are relatively small – more than 90 percent are less than 10,000 dollars. Thus the estimated coefficients using natural logs are determined almost entirely by very small changes in income. This is problematic if we believe that very small income changes (e.g. 1,000 dollars) are unlikely to change students' college enrollment decisions. Thus excluding the smallest lottery wins may significantly alter the estimates.

[28] Note that year 0 refers the calendar year in which a student is expected to graduate from high school based on his or her state and date of birth. Years 1 to 4 correspond to the subsequent calendar years.

the effects experienced by infra-marginal students who attend college regardless of the income shock from those of students induced to attend by the income shock. Students induced to attend a four-year college by greater household resources are likely to be marginal matriculates and thus may be more likely to drop out, which would create negative bias for estimates of persistence. Nonetheless, there two avenues by which we can draw conclusions about persistence on the intensive margin.

First, there was no evidence of changes on the extensive margin of enrollment for students whose parents were affected wins of less than 100,000 dollars. Thus we can estimate if such win sizes promote greater persistence, as the composition of attendees is unlikely to have changed. Table 10 examines the effect of income shocks on total number of years of enrollment and total years of enrollment conditional on attendance. For income shocks of less than 100,000 dollars, there is no change in these outcomes. This can be interpreted as there being no effect of shocks of this magnitude on persistence in college. Thus there is no evidence of extensive or intensive margin effects for such wins. Second, if persistence effects are very large for sizable income shocks, then they are likely to overcome changes in the composition of students. The statistically significant increase in total years of enrollment conditional on attendance for wins of 100,000 to 300,000 dollars and 1,000,000 dollars or more provides suggestive evidence that large increases in household resources reduce college drop out.

We note that an income shock may cause students to attend a private rather than a public university or a more selective university even if it has no effect on the extensive margin of attending any college. However, Table 11 does not reveal a clear shift in the composition of colleges attended for wins of less than 100,000 dollars. For wins of 100,000 to 1,000,000 dollars the gains in enrollment are consistent with the typical composition of colleges attending, suggesting little affect on the intensive margin. The results indicate that only the largest income shocks disproportionately increase enrollment in private and more selective universities. Thus very large increases in resources may induce some students to switch from public to private universities.

### 4.4 Federal Financial Aid

See table 12 for preliminary results examining the effect of lottery wins on Pell grant aid, subsidized loans, FAFSA filing, and expected family contributions. Table 13 presents the aggregate effects of lottery wins on federal financial aid outcomes with and without including the year prior to a student graduating from high school.

### 4.5 Heterogeneity by Household Income

A primary benefit of the research design is that households with varying levels of income are affected by large and small shocks. Thus we estimate if students from lower income households experience larger or smaller responses. The expected sign of heterogeneity is theoretically ambiguous. On one hand, lower income households may be more financially constrained and thus may be more sensitive to income shocks. This would be the case if these students had difficulty acquiring the necessary loans to attend college or if their families relied on them for income. Likewise, a given income shock represents a larger fraction of household wealth for a lower income household (and would be taxed at a lower rate). If this is the case, then the average treatment effects may obscure larger responses for students from lower income households. Conversely, a smaller fraction of students from low income households may be academically prepared, eligible (with a high school degree), or interested in attending college. Higher and lower income parents may also have different priorities for how to use additional income. Thus this heterogeneity analysis is likely to shed some light on whether financial constraints or consumption preferences are the primary determinant of income effects.

Table 14 presents the results for households with incomes above and below the median (about 40,000 dollars) for all affected households. Most importantly, there is no evidence of statistically significant changes in enrollment for students from households with below median income in response to income shocks of less than 100,000 dollars. Further, there is no evidence of statistically significantly higher enrollment for lower income households for any win size. That is, there is no evidence that even very large increases in financial resources will cause four-college enrollment to increase by more than about 5 percentage points for students from lower income households. The results also indicate that the income effects for large wins, if anything, may be larger for households with above median income than for households with below median income. While four-year college attendance does not increase for higher income households for wins of less than 100,000 dollars, large wins result in significantly higher enrollment.[29] Among households that experience increased income of one million dollars or more, four-year enrollment in the year after high school graduation increases by 14 percentage points for higher income households. Likewise, the effect of an income shock between 300,000 dollars and one million dollars is a significant 6.5 percentage points for

[29] We note that this result is not likely to stem from weaker links between parents and children (i.e. absentee parents) in lower income households as these matches were made using dependent tax claims rather than birth records. A specification based on interaction terms confirms that the difference in effects between lower and higher income households are of the correct magnitude but are at best marginally significant due to large standard errors.

higher income households.

These results are not consistent with a high fraction of individuals not attending college due to binding financial constraints. It is, however, consistent with college attendance depending on student and household preferences to consume college. As mentioned, there are several possible reasons why income shocks may have more modest effects for lower income households. A smaller fraction of individuals from lower income households may be college ready due to academic preparation and a higher fraction may wish to enlist in the military or stay close to home, thus reducing the demand for college. Lower income parents may have different priorities for an income shock than higher income households. For example, they may wish to purchase a home or to use the money to smooth consumption in future years.

Additional heterogeneity analysis indicates that the four-year college enrollment effects are slightly stronger for students from households with fewer children and the two-year college enrollment effects are stronger for students from households with more children (see Table A6). The effects also appear to be slightly larger for students with parents who are married and for male students, though the differences are not statistically significant.

### 4.6 Comparisons to Across Win Size Estimates

The results in the paper are based on a research design that is driven almost entirely by variation within win sizes (as shown in Table 4). This is possible because the outcome of interest, college going, has a time-specific compoenent that results in some children being effect and some not. An alternative design compares the outcomes across households, with treated children in households that experience large shocks compared to treated children in households that experience small shocks. This assumes that (after controlling for observable characteristics) these households do not differ in terms of unobservable characteristics that affect college outcomes. This approach is valid if limiting attention to households that win lotteries results in households that are comparable in terms of their underlying propensity to attend college. Comparing the estimates from the single-difference design to those from our difference-in-differences design sheds light on the validity of each approach.

Table 15 presents estimates from an across size design on four-year and two-year college enrollment. The results are quite similar to those in the preferred specification. There is no evidence that income shocks of less than 100,000 dollars generate significant increases in four-year college attendance. Wins of 100,000 to 300,000 dollars increase attendance by about 3 percentage points, wins of 300,000 to 1,000,000 result in

increases of about 5 percentage points, and wins exceeding one million dollars result in enrollment gains of more than 10 percentage points. The positive effects of larger wins appear to persist over the course of the first four years after high school graduation. There is little consistent evidence of changes in two-year college attendance.

Thus the analysis generates nearly identical results using two unique sources of variation: variation between children who were younger or older at the time of the win, and variation across small and large wins. The similarity of the across win size results to the within win size design suggests that individuals from households that experience small and large income shocks have approximately equal propensities to attend college after controlling for observable differences in income and household composition.[30]

The identification design is based on the assumption that enrollment decisions made prior to a household income shock are independent of the shock, while those made after the shock are not. Thus we examine the across win size effects separately for shocks that occur in the six years before and after a student graduates from high school. This allows us to examine if income effects appear to fade if the income shock occurs years before high school graduation and whether shocks that occur in the year of high school graduation or the year after are too late to affect enrollment decisions. This has potentially important implications for policies in which financial aid is revealed late in the enrollment process. We classify a household as having had a large income shock if it experienced an increase of more than 100,000 dollars. Note that this is the range for which we observed income effects in the primary specification and includes a large enough sample of treated housheols to generate precise estimates in a year-by-year specification.

Table 16 reveals that students who graduate in each of the six years after a household has an income shock experience positive and significant four-year enrollment effects. Conversely, there is little evidence of significant effects in the year of high school graduation and subsequent years. This indicates that the year of high school graduation may be too late to take college admissions exams and apply to four-year colleges (especially if the income shock occurs in the second half of the year). That is, there appears to be a sharp division that occurs when a household experienced the income shock before the college application process commences.[31]

[30]Note that a comparison of winners to non-winners indicates that lottery winners have a lower propensity to attend college. Conditional on household characteristics, the children of lottery winners are three to four percentage points less likely to attend a four-year college. Thus the estimates generated by such a comparison are negative for small lottery wins and are attenuated by several percentage points for larger wins.

[31]The sample is slightly larger in this specification because we do not exclude students who graduate in the year of income shock (year 0). These individuals are excluded in other specifications because it is unclear whether or not they are treated by the income shock before or after they graduate from high school.

## 5 Conclusion

This paper estimates income effects generated by one-time increases in income. We observe individuals in each state whose parents experience lottery winnings of varying sizes. To account for unobservable differences across households that win differing amounts, we exploit the fact that older children's college outcomes could not have been affected by the income change. Several important results are revealed: modest income shocks do not significantly affect college enrollment, college persistence, or the quality of the college attended; income effects are not highly concave resulting in a high upper bound change in college enrollment; and students from lower income households do not have stronger responses to changes in household resources. The primary empirical findings are nearly identical when estimated using a within win size and an across win size design. The similarity supports the validity of our main results and lends support to across win size designs that have been used in the literature.

The results have several implications for policy design. The lack of detectable income effects for one-time income changes of less than $100,000 suggest that borrowing constraints are not a primary determinant of college enrollment. Indeed, these wins should be sufficient to cover a significant fraction of tuition at a four-year public university and to ease most financial constraints associated with college attendance. Thus policies intended to increase college enrollment through increased income are likely to be relatively inefficient. While large income effects do occur, they require very large increases in resources that greatly exceed those that could be generated by, for example, changes to tax policy. The finding that income effects are not larger for low income households indicates that targeting polices that affect short-run income toward lower income households will not necessarily generate larger enrollment changes. The timing of income effects is important. Policies that provide benefits to students after they have graduated from high school (and even in the year of graduation) may be too late to generate meaningful changes in college outcomes.

The results provide valuable context for reconciling the findings from existing studies on household resources and college access. Relative to the literature, we generate estimates across a wide range of household incomes and for a wide range of income changes. Importantly, designs that estimate very large income effects for small-sized shocks are not consistent with the effects we detect. Finally, the upper bound effects we detect are likely to be useful when interpreting the magnitude of effects generated in studies of price and income effects in other contexts.

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Table 1: Summary Statistics for Individuals Affected by Parental Income Shocks

| | Mean | Std. Dev. |
|---|---|---|
| *Parental Resources* | | |
| Parent Wage | 51,835 | 60,192 |
| File as Married | 0.566 | .496 |
| File as Single | 0.434 | .496 |
| Parent Age at Child HS Grad | 46.99 | 8.21 |
| *Timing of Income Shock* | | |
| Win Before HS Grad | 0.442 | .497 |
| Win After HS Grad | 0.558 | .497 |
| *Attendance - Fall of Expected HS Graduation* | | |
| Four-Year College | 0.218 | .413 |
| Two-Year College | 0.144 | .351 |
| Any College | 0.379 | .485 |
| *Attendance - Year After HS Graduation* | | |
| Four-Yr College | 0.242 | .429 |
| Two-Yr College | 0.190 | .392 |
| Any College | 0.440 | .496 |
| *Attendance by Sector of Four Year College* | | |
| Private | 0.087 | .281 |
| Public | 0.171 | .377 |
| For-profit | 0.011 | .106 |
| *Attendance by Selectivity of Four Year College* | | |
| More Selective | 0.071 | .256 |
| Selective | 0.124 | .329 |
| Inclusive | 0.064 | .244 |

**Note:** This table presents summary statistics for students whose parents experience an income shock due to lottery winnings. Parental wages and marital status are based on the three years prior to the lottery win. Parent age when the child graduates from high school is based on the year that the student was expected to graduate given his or her date and state of birth. The table also presents the fraction of children who have and have not graduated from high school at the time of the win, the average rate of college attendance in the fall of and year after a student is expected to graduate, and the characteristics of the first college they attend based on NCES IPEDs data.

Table 2: Lottery Wins in First and Subsequent Years

| | (1) Number Students | (2) Median First Win | (3) Mean First Win | (4) Subsequent Win >10k |
|---|---|---|---|---|
| Income Shock 600 to 10,000 | 1,347,526 | 1,000 | 1,854 | 0.02 |
| Income Shock 10,000 to 30,000 | 69,249 | 10,000 | 13,990 | 0.02 |
| Income Shock 30,000 to 100,000 | 18,093 | 50,000 | 49,355 | 0.03 |
| Income Shock 100,000 to 300,000 | 10,590 | 147,059 | 158,270 | 0.02 |
| Income Shock 300,000 to 1,000,000 | 1,994 | 500,000 | 526,968 | 0.03 |
| Income Shock 1,000,000 or more | 1,413 | 1,733,000 | 6,569,941 | 0.02 |

**Note:** This table presents summary statistics for the lottery wins that affect each student in the sample. Column 1 presents the number of students affected by first year wins in each of six size ranges: 600 to 9,999 dollars, 10,000 to 29,999 dollars, 30,000 to 99,999 dollars, 100,000 to 299,999 dollars, 300,000 to 999,999 dollars, and 1,000,000 dollars or more. Columns 2 and 3 present the median and mean of these first year wins. Column 4 presents the fraction of students whose parents experience total wins exceeding 10,000 dollars in the four years after the initial win.

Table 3: Lottery Wins and Covariate Balance

| Outcome | | Mean | Win size (dollars) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 10-30k | 30-100k | 100-300k | 300k-1mil | 1mil or more | F-test p-value |
| Children's characteristics | | | | | | | | |
| Male | (1) | 0.5109 | -0.0013 | 0.0009 | -0.0143 | 0.0467** | -0.0271 | 0.1996 |
| | | | (0.0038) | (0.0072) | (0.0102) | (0.0217) | (0.0243) | |
| Citizen | (2) | 0.9633 | -0.0005 | 0.0013 | -0.0012 | 0.0042 | -0.0080 | 0.8396 |
| | | | (0.0016) | (0.0029) | (0.0034) | (0.0088) | (0.0069) | |
| Winner/parent characteristics | | | | | | | | |
| Birth Parent | (3) | 0.6376 | 0.0045 | -0.0009 | 0.0054 | 0.0087 | 0.0036 | 0.9324 |
| | | | (0.0046) | (0.0078) | (0.0104) | (0.0239) | (0.0283) | |
| Missing 1040 | (4) | 0.0310 | 0.0009 | 0.0003 | -0.0016 | 0.0051 | 0.0005 | 0.398 |
| | | | (0.0006) | (0.0010) | (0.0014) | (0.0032) | (0.0033) | |
| Married | (5) | 0.5656 | -0.0068 | 0.0125 | 0.0193* | 0.0239 | 0.0286 | 0.0969* |
| | | | (0.0043) | (0.0082) | (0.0113) | (0.0224) | (0.0248) | |
| Num Children | (6) | 3.2861 | 0.0354** | 0.0146 | 0.0179 | 0.0126 | -0.0348 | 0.1977 |
| | | | (0.0144) | (0.0233) | (0.0338) | (0.0745) | (0.0795) | |
| AGI | (7) | 61023.4 | -0.0092 | 0.0001 | 0.0364 | -0.0017 | 0.0507 | 0.6412 |
| | | | (0.0120) | (0.0182) | (0.0275) | (0.0572) | (0.0650) | |
| Wages | (8) | 54062.1 | -0.0133 | 0.0002 | 0.0270 | -0.0826* | 0.0473 | 0.1783 |
| | | | (0.0102) | (0.0173) | (0.0235) | (0.0479) | (0.0633) | |
| Self Emp Inc | (9) | 0.2037 | -0.0007 | 0.0066 | 0.0167 | 0.0135 | 0.0370 | 0.2765 |
| | | | (0.0037) | (0.0061) | (0.0103) | (0.0211) | (0.0248) | |
| SSA Inc (w/ DI) | (10) | 0.0716 | 0.0025 | -0.0013 | -0.0092* | 0.0141 | -0.0031 | 0.3220 |
| | | | (0.0023) | (0.0040) | (0.0054) | (0.0108) | (0.0118) | |
| F-test p-value | | | 0.1066 | 0.8923 | 0.2946 | 0.1694 | 0.6536 | 0.1595 |

**Note:** This table applies the difference-in-difference design to household characteristics. The specification includes state by year of win and student cohort fixed effects. Household characteristics are based on the three years prior to the lottery win. Whether an individual is married is derived from filing status and number of children is derived from children ever claimed as a dependent. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table 4: Average Attendance in Year After HS Graduation: Before and After the Income Shock

| | *Four-Year College* | | *Two-Year College* | |
|---|---|---|---|---|
| | Income Shock Post HS Grad | Income Shock Pre HS Grad | Income Shock Post HS Grad | Income Shock Pre HS Grad |
| Income Shock 600 to 9,999 | .266 | .271 | .226 | .237 |
| | (.001) | (.001) | (.000) | (.001) |
| Income Shock 10,000 to 29,999 | .277 | .280 | .242 | .246 |
| | (.002) | (.003) | (.002) | (.003) |
| Income Shock 30,000 to 99,999 | .264 | .265 | .252 | .256 |
| | (.004) | (.005) | (.004) | (.005) |
| Income Shock 100,000 to 299,999 | .305 | .336 | .260 | .252 |
| | (.006) | (.007) | (.006) | (.007) |
| Income Shock 300,000 to 999,999 | .283 | .341 | .267 | .315 |
| | (.013) | (.017) | (.013) | (.016) |
| Income Shock 1,000,000 or more | .304 | .437 | .307 | .321 |
| | (.015) | (.022) | (.015) | (.021) |

**Note:** This table presents average attendance rates within one year of expected high school graduation for individuals whose parent has an income shock after they graduated from high school (untreated) and before they graduated from high school (treated). Average attendance is presented for both four-year and two-year colleges. Averages are not adjusted for differences in household income, parent filing status, household size, parental age, graduating cohort, or the birth order of the individual of interest.

Table 5: Four-Year College Attendance in Year After HS Graduation

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Grad After X Win 10-30k | -0.0018 | -0.0018 | -0.0011 | -0.0006 |
| | (0.0042) | (0.0037) | (0.0037) | (0.0037) |
| Grad After X Win 30-100k | -0.0040 | 0.0013 | 0.0021 | 0.0024 |
| | (0.0083) | (0.0073) | (0.0072) | (0.0070) |
| Grad After X Win 100-300k | 0.0264*** | 0.0193** | 0.0190** | 0.0194** |
| | (0.0101) | (0.0094) | (0.0093) | (0.0092) |
| Grad After X Win 300k-1.0m | 0.0530** | 0.0501** | 0.0486** | 0.0516** |
| | (0.0232) | (0.0211) | (0.0207) | (0.0203) |
| Grad After X Win 1.0m or more | 0.1283*** | 0.1129*** | 0.1142*** | 0.1113*** |
| | (0.0283) | (0.0257) | (0.0253) | (0.0252) |
| Win 10-30k | 0.0104*** | 0.0065** | 0.0046* | 0.0030 |
| | (0.0032) | (0.0027) | (0.0027) | (0.0026) |
| Win 30-100k | -0.0027 | 0.0083 | 0.0038 | 0.0023 |
| | (0.0063) | (0.0051) | (0.0051) | (0.0051) |
| Win 100-300k | 0.0386*** | 0.0288*** | 0.0231*** | 0.0185*** |
| | (0.0069) | (0.0060) | (0.0060) | (0.0058) |
| Win 300k-1.0m | 0.0169 | 0.0022 | -0.0040 | -0.0109 |
| | (0.0161) | (0.0132) | (0.0133) | (0.0133) |
| Win 1.0m or more | 0.0374** | 0.0062 | 0.0005 | -0.0040 |
| | (0.0189) | (0.0174) | (0.0170) | (0.0167) |
| Child Order and Number | | | | X |
| Parent Status and Age | | | X | X |
| State by Year and Income | | X | X | X |
| Observations | 1,448,865 | 1,448,865 | 1,448,865 | 1,448,865 |
| Mean Dep | .269 | .269 | .269 | .269 |

**Note:** Estimates show the percentage point effect of income shocks on four-year college enrollment within one year of high school graduation. Students who graduate from high school after the income shock (Grad After) are potentially affected. Column 1 has no additional controls. Columns 2 adds state by year of win fixed effects, cohort fixed effects, and a quintic polynomial in household wages and income. Columns 3 adds a fixed effect for parent filing status (e.g. joint or single) and a cubic in parental age in the year the child is expected to graduate from high school. Column 4 adds controls for child birth order and the number of children in the household. Six win sizes are considered: 600 to 9,999 dollars, 10,000 to 29,999 dollars, 30,000 to 99,999 dollars, 100,000 to 299,999 dollars, 300,000 to 999,999 dollars, and 1,000,000 dollars or more. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table 6: Two-Year College Attendance in Year After HS Graduation

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Grad After X Win 10-30k | -0.0080** | -0.0017 | -0.0017 | -0.0010 |
| | (0.0040) | (0.0036) | (0.0035) | (0.0035) |
| Grad After X Win 30-100k | -0.0077 | -0.0068 | -0.0069 | -0.0065 |
| | (0.0074) | (0.0063) | (0.0064) | (0.0063) |
| Grad After X Win 100-300k | -0.0197** | -0.0156 | -0.0161* | -0.0153 |
| | (0.0099) | (0.0095) | (0.0094) | (0.0094) |
| Grad After X Win 300k-1.0m | 0.0361* | 0.0435** | 0.0427** | 0.0442** |
| | (0.0194) | (0.0184) | (0.0183) | (0.0184) |
| Grad After X Win 1.0m or more | 0.0029 | -0.0062 | -0.0067 | -0.0084 |
| | (0.0269) | (0.0268) | (0.0266) | (0.0262) |
| Win 10-30k | 0.0166*** | 0.0041* | 0.0021 | 0.0009 |
| | (0.0030) | (0.0024) | (0.0024) | (0.0024) |
| Win 30-100k | 0.0264*** | 0.0051 | 0.0017 | 0.0006 |
| | (0.0056) | (0.0043) | (0.0043) | (0.0043) |
| Win 100-300k | 0.0339*** | 0.0187*** | 0.0151** | 0.0117* |
| | (0.0071) | (0.0064) | (0.0064) | (0.0063) |
| Win 300k-1.0m | 0.0414*** | 0.0169 | 0.0126 | 0.0080 |
| | (0.0142) | (0.0132) | (0.0130) | (0.0129) |
| Win 1.0m or more | 0.0811*** | 0.0396** | 0.0367** | 0.0331** |
| | (0.0172) | (0.0165) | (0.0166) | (0.0166) |
| Child Order and Number | | | | X |
| Parent Status and Age | | | X | X |
| State by Year and Income | | X | X | X |
| Observations | 1,448,865 | 1,448,865 | 1,448,865 | 1,448,865 |
| Mean Dep | .232 | .232 | .232 | .232 |

**Note:** Estimates show the percentage point effect of income shocks on two-year college enrollment within one year of high school graduation. Students who graduate from high school after the income shock (Grad After) are potentially affected. Column 1 has no additional controls. Columns 2 adds state by year of win fixed effects, cohort fixed effects, and a quintic polynomial in household wages and income. Columns 3 adds a fixed effect for parent filing status (e.g. joint or single) and a cubic in parental age in the year the child is expected to graduate from high school. Column 4 adds controls for child birth order and the number of children in the household. Six win sizes are considered: 600 to 9,999 dollars, 10,000 to 29,999 dollars, 30,000 to 99,999 dollars, 100,000 to 299,999 dollars, 300,000 to 999,999 dollars, and 1,000,000 dollars or more.Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table 7: Two and Four-Year College Attendance: Birth Parent Match

| *Four-Year College* | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Grad After X Win 10-30k | -0.0083 | -0.0086* | -0.0086* | -0.0076 |
| | (0.0055) | (0.0048) | (0.0048) | (0.0048) |
| Grad After X Win 30-100k | -0.0032 | 0.0032 | 0.0028 | 0.0047 |
| | (0.0108) | (0.0093) | (0.0092) | (0.0090) |
| Grad After X Win 100-300k | 0.0345*** | 0.0261** | 0.0243** | 0.0239** |
| | (0.0124) | (0.0118) | (0.0117) | (0.0116) |
| Grad After X Win 300k-1.0m | 0.0718** | 0.0593** | 0.0598** | 0.0533* |
| | (0.0324) | (0.0294) | (0.0293) | (0.0287) |
| Grad After X Win 1.0m or more | 0.1215*** | 0.1085*** | 0.1068*** | 0.1052*** |
| | (0.0350) | (0.0325) | (0.0322) | (0.0321) |
| Observations | 903,116 | 903,116 | 903,116 | 903,116 |
| Mean Dep | .310 | .310 | .310 | .310 |
| *Two-Year College* | (5) | (6) | (7) | (8) |
| Grad After X Win 10-30k | -0.0134*** | -0.0066 | -0.0064 | -0.0062 |
| | (0.0049) | (0.0043) | (0.0043) | (0.0042) |
| Grad After X Win 30-100k | -0.0092 | -0.0082 | -0.0085 | -0.0081 |
| | (0.0107) | (0.0090) | (0.0090) | (0.0090) |
| Grad After X Win 100-300k | -0.0174 | -0.0088 | -0.0105 | -0.0104 |
| | (0.0123) | (0.0117) | (0.0117) | (0.0117) |
| Grad After X Win 300k-1.0m | -0.0046 | 0.0086 | 0.0093 | 0.0089 |
| | (0.0281) | (0.0263) | (0.0262) | (0.0262) |
| Grad After X Win 1.0m or more | -0.0035 | -0.0041 | -0.0054 | -0.0055 |
| | (0.0343) | (0.0338) | (0.0339) | (0.0338) |
| Observations | 903,116 | 903,116 | 903,116 | 903,116 |
| Mean Dep | .259 | .259 | .259 | .259 |
| Child Order and Number | | | | X |
| Parent Status and Age | | | X | X |
| State by Year and Income | | X | X | X |

**Note:** Estimates show the percentage point effect of income shocks on four-year and two-year college enrollment within one year of high school graduation for students linked to parents based on Social Security birth records. These records are first available in 1983, resulting in a smaller sample. Students who graduate from high school after the income shock (Grad After) are potentially affected. Column 1 has no additional controls. Columns 2 adds state by year of win fixed effects, cohort fixed effects, and a quintic polynomial in household wages and income. Columns 3 adds a fixed effect for parent filing status (e.g. joint or single) and a cubic in parental age in the year the child is expected to graduate from high school. Column 4 adds controls for child birth order and the number of children in the household. Six win sizes are considered: 600 to 9,999 dollars, 10,000 to 29,999 dollars, 30,000 to 99,999 dollars, 100,000 to 299,999 dollars, 300,000 to 999,999 dollars, and 1,000,000 dollars or more.Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table 8: College Attendance: Linear Specification

| *Four-Year College* | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Maximum Shock | 10 million | 2 million | 1 million | 500k |
| Grad After * Win Amount ($000) | 0.0040*** | 0.0080*** | 0.0075*** | 0.0106*** |
| | (0.0008) | (0.0021) | (0.0024) | (0.0040) |
| Win Amount ($000) | -0.0002 | 0.0013 | 0.0028* | 0.0057** |
| | (0.0005) | (0.0015) | (0.0016) | (0.0027) |
| Grad After | 0.0008 | 0.0006 | 0.0006 | 0.0005 |
| | (0.0018) | (0.0018) | (0.0018) | (0.0018) |
| Observations | 1,448,678 | 1,448,246 | 1,447,944 | 1,446,604 |
| Mean Dep | .269 | .269 | .269 | .269 |
| *Two-Year College* | (1) | (2) | (3) | (4) |
| Maximum Shock | 10 million | 2 million | 1 million | 500k |
| Grad After * Win Amount ($000) | -0.0004 | 0.0017 | 0.0018 | 0.0011 |
| | (0.0009) | (0.0020) | (0.0025) | (0.0041) |
| Win Amount ($000) | 0.0014** | 0.0017 | 0.0021 | 0.0027 |
| | (0.0006) | (0.0013) | (0.0016) | (0.0027) |
| Grad After | 0.0001 | 0.0000 | 0.0001 | 0.0001 |
| | (0.0023) | (0.0023) | (0.0023) | (0.0023) |
| Observations | 1,448,678 | 1,448,246 | 1,447,944 | 1,446,604 |
| Mean Dep | .232 | .232 | .232 | .232 |

**Note:** Estimates show the percentage point effect of income shocks (per 100,000 dollars) on four-year and two-year college enrollment within one year after high school graduation. Students who graduate from high school after the income shock (Grad After) are potentially affected. The results are presented for alternate samples based on the largest income shock that is included. The specifications include controls for the state and year of the win, high school cohort, household wages and income, parent filing status and age, and child birth order and household size. All student and parent controls are based on pre-win measures. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table 9: Persistence of College Attendance: By Calendar Year

| *Four-Year College* | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 |
| Grad After X Win 10-30k | -0.0025 | -0.0034 | -0.0042 | -0.0037 | -0.0052 |
| | (0.0039) | (0.0039) | (0.0035) | (0.0036) | (0.0034) |
| Grad After X Win 30-100k | -0.0031 | 0.0036 | 0.0091 | 0.0074 | 0.0109 |
| | (0.0070) | (0.0075) | (0.0073) | (0.0072) | (0.0069) |
| Grad After X Win 100-300k | 0.0209** | 0.0206** | 0.0193** | 0.0070 | 0.0124 |
| | (0.0093) | (0.0095) | (0.0097) | (0.0100) | (0.0096) |
| Grad After X Win 300k-1.0m | 0.0572** | 0.0444** | 0.0458** | 0.0418** | 0.0184 |
| | (0.0227) | (0.0214) | (0.0209) | (0.0213) | (0.0231) |
| Grad After X Win 1.0m or more | 0.1060*** | 0.1175*** | 0.1342*** | 0.1243*** | 0.0954*** |
| | (0.0273) | (0.0271) | (0.0260) | (0.0269) | (0.0269) |
| Observations | 1,259,629 | 1,259,629 | 1,259,629 | 1,259,629 | 1,259,629 |
| Mean Dep | .217 | .242 | .238 | .235 | .215 |
| *Two-Year College* | (5) | (6) | (7) | (8) | (9) |
| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 |
| Grad After X Win 10-30k | -0.0035 | -0.0026 | -0.0028 | -0.0098*** | -0.0079*** |
| | (0.0032) | (0.0034) | (0.0032) | (0.0032) | (0.0027) |
| Grad After X Win 30-100k | 0.0028 | -0.0020 | -0.0021 | -0.0112* | 0.0026 |
| | (0.0058) | (0.0066) | (0.0064) | (0.0060) | (0.0060) |
| Grad After X Win 100-300k | -0.0109 | -0.0123 | -0.0123 | -0.0074 | -0.0069 |
| | (0.0080) | (0.0086) | (0.0075) | (0.0074) | (0.0070) |
| Grad After X Win 300k-1.0m | 0.0062 | 0.0288 | 0.0480** | 0.0135 | 0.0081 |
| | (0.0163) | (0.0199) | (0.0207) | (0.0182) | (0.0166) |
| Grad After X Win 1.0m or more | 0.0030 | 0.0021 | -0.0261 | -0.0130 | -0.0425** |
| | (0.0256) | (0.0277) | (0.0245) | (0.0245) | (0.0212) |
| Observations | 1,259,629 | 1,259,629 | 1,259,629 | 1,259,629 | 1,259,629 |
| Mean Dep | .144 | .19 | .174 | .139 | .11 |

**Note:** Estimates show the percentage point effect of income shocks on four-year and two-year college enrollment in the years after high school graduation (where year 0 is the calendar year of graduation). Students who graduate from high school after the income shock (Grad After) are potentially affected. The specifications include controls for the state and year of the win, high school cohort, household wages and income, parent filing status and age, and child birth order and household size. All student and parent controls are based on pre-win measures. Six win sizes are considered: 600 to 9,999 dollars, 10,000 to 29,999 dollars, 30,000 to 99,999 dollars, 100,000 to 299,999 dollars, 300,000 to 999,999 dollars, and 1,000,000 dollars or more. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table 10: Total Years Enrolled: Unconditional and Conditional on Attendance

| *Four-Year College* | (1) Ever Enrolled | (2) Years Enrolled | (3) Years (if enrolled) |
|---|---|---|---|
| Grad After X Win 10-30k | -0.0031 | -0.0189 | -0.0212 |
| | (0.0042) | (0.0156) | (0.0207) |
| Grad After X Win 30-100k | 0.0042 | 0.0279 | 0.0244 |
| | (0.0079) | (0.0317) | (0.0431) |
| Grad After X Win 100-300k | 0.0040 | 0.0802* | 0.1492*** |
| | (0.0105) | (0.0417) | (0.0483) |
| Grad After X Win 300k-1.0m | 0.0699*** | 0.2076** | -0.1031 |
| | (0.0245) | (0.0923) | (0.1064) |
| Grad After X Win 1.0m or more | 0.1200*** | 0.5773*** | 0.3468*** |
| | (0.0284) | (0.1131) | (0.1157) |
| Observations | 1,259,629 | 1,259,629 | 434,503 |
| Mean Dep | .345 | 1.147 | 3.325 |
| *Two-Year College* | (4) Ever Enrolled | (5) Years Enrolled | (6) Years (if enrolled) |
| Grad After X Win 10-30k | -0.0086** | -0.0266** | -0.0193 |
| | (0.0040) | (0.0111) | (0.0197) |
| Grad After X Win 30-100k | -0.0094 | -0.0100 | 0.0219 |
| | (0.0079) | (0.0224) | (0.0330) |
| Grad After X Win 100-300k | -0.0228** | -0.0497* | 0.0082 |
| | (0.0107) | (0.0278) | (0.0455) |
| Grad After X Win 300k-1.0m | 0.0386* | 0.1047* | 0.0432 |
| | (0.0211) | (0.0627) | (0.1023) |
| Grad After X Win 1.0m or more | -0.0423 | -0.0765 | 0.0232 |
| | (0.0298) | (0.0861) | (0.1125) |
| Observations | 1,259,629 | 1,259,629 | 422,136 |
| Mean Dep | .335 | .757 | 2.258 |

**Note:** Estimates show the percentage point effect of income shocks on a student attending two or four-year college within four years of high school graduation, the number of years the student is observed enrolling, and the number of years the student is observed enrolling conditional on attendance. Students who graduate from high school after the income shock (Grad After) are potentially affected. The specifications include controls for the state and year of the win, high school cohort, household wages and income, parent filing status and age, and child birth order and household size. All student and parent controls are based on pre-win measures. Six win sizes are considered: 600 to 9,999 dollars, 10,000 to 29,999 dollars, 30,000 to 99,999 dollars, 100,000 to 299,999 dollars, 300,000 to 999,999 dollars, and 1,000,000 dollars or more. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table 11: Four-Year Attendance by College Type

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | | | | More | | Not |
| | Private | Public | For-Profit | Selective | Selective | Selective |
| Grad After X Win 10-30k | 0.0043** | -0.0056* | 0.0007 | -0.0058** | 0.0017 | 0.0034* |
| | (0.0022) | (0.0031) | (0.0008) | (0.0023) | (0.0027) | (0.0021) |
| Grad After X Win 30-100k | -0.0042 | 0.0075 | -0.0010 | 0.0046 | -0.0005 | -0.0014 |
| | (0.0040) | (0.0065) | (0.0015) | (0.0046) | (0.0048) | (0.0041) |
| Grad After X Win 100-300k | 0.0031 | 0.0195** | -0.0033* | 0.0126** | 0.0084 | 0.0014 |
| | (0.0059) | (0.0083) | (0.0019) | (0.0062) | (0.0072) | (0.0048) |
| Grad After X Win 300k-1.0m | 0.0168 | 0.0307* | 0.0040 | 0.0013 | 0.0275* | 0.0072 |
| | (0.0141) | (0.0170) | (0.0049) | (0.0139) | (0.0155) | (0.0120) |
| Grad After X Win 1.0m or more | 0.0528*** | 0.0515** | 0.0070 | 0.0579*** | 0.0467** | 0.0061 |
| | (0.0188) | (0.0237) | (0.0073) | (0.0169) | (0.0227) | (0.0128) |
| Observations | 1,448,865 | 1,448,865 | 1,448,865 | 1,448,865 | 1,448,865 | 1,448,865 |
| Mean Dep | .087 | .171 | .011 | .071 | .124 | .064 |

**Note:** Estimates show the percentage point effect of income shocks on four-year college enrollment by sector and selectivity of college within one the year after high school graduation. College sector and selectivity are based on the Carnegie Classification. Students who graduate from high school after the income shock (Grad After) are potentially affected. The specifications include controls for the state and year of the win, high school cohort, household wages and income, parent filing status and age, and child birth order and household size. All student and parent controls are based on pre-win measures. Six win sizes are considered: 600 to 9,999 dollars, 10,000 to 29,999 dollars, 30,000 to 99,999 dollars, 100,000 to 299,999 dollars, 300,000 to 999,999 dollars, and 1,000,000 dollars or more. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table 12: Lottery Wins and Federal Financial Aid

| *Unconditional on College Attendance* | (1) Pell Grants | (2) Subsidized Loans | (3) Filed FAFSA | (4) EFC (FAFSA=1) |
|---|---|---|---|---|
| Grad After X Win 10-30k | -37.16*** | 6.29 | -0.0046 | 32.56 |
| | (13.13) | (11.81) | (0.0041) | (192.10) |
| Grad After X Win 30-100k | -91.97*** | -58.05*** | -0.0185** | 1,435.05*** |
| | (21.13) | (19.64) | (0.0073) | (365.76) |
| Grad After X Win 100-300k | -80.51 | -83.99*** | -0.0107 | 3,878.04*** |
| | (33.27) | (26.18) | (0.0105) | (589.90) |
| Grad After X Win 300k-1.0m | 5.03 | -49.63 | -0.0085 | 5,310.58*** |
| | (64.14) | (56.45) | (0.0207) | (1,780.04) |
| Grad After X Win 1.0m or more | -169.35** | -249.71*** | -0.1140*** | 3,766.84 |
| | (70.76) | (62.15) | (0.0232) | (2,657.85) |
| Mean Dep | 673.16 | 570.19 | 0.3193 | 7,455.21 |
| *Conditional on College Attendance* | (5) Pell Grants | (6) Subsidized Loans | (7) Filed FAFSA | (8) EFC (FAFSA=1) |
| Grad After X Win 10-30k | -61.03 | 24.39 | 0.0009 | -62.22 |
| | (37.96) | (33.04) | (0.0079) | (297.31) |
| Grad After X Win 30-100k | -121.67* | -95.29* | -0.0067 | 2,028.34*** |
| | (66.64) | (57.39) | (0.0151) | (578.29) |
| Grad After X Win 100-300k | -345.32*** | -286.83*** | -0.0324* | 4,951.00*** |
| | (76.19) | (71.93) | (0.0191) | (887.63) |
| Grad After X Win 300k-1.0m | -87.92 | -298.60** | -0.0968*** | 7,017.16*** |
| | (147.86) | (150.22) | (0.0369) | (2,349.22) |
| Grad After X Win 1.0m or more | -425.09** | -1,024.39*** | -0.3579*** | 5,418.36 |
| | (177.15) | (145.54) | (0.0439) | (3,900.81) |
| Mean Dep | 1,417.33 | 1,769.78 | 0.7508 | 10,523.56 |

**Note:** Estimates show changes in grants, loans, FAFSA filing, and expected family contribution. The specifications include controls for the state and year of the win, high school cohort, household wages and income, parent filing status and age, and child birth order and household size. All student and parent controls are based on pre-win measures. Six win sizes are considered: 600 to 9,999 dollars, 10,000 to 29,999 dollars, 30,000 to 99,999 dollars, 100,000 to 299,999 dollars, 300,000 to 999,999 dollars, and 1,000,000 dollars or more. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table 13: Comparing Federal Aid Effects Including and Excluding Wins the Year Before HS Graduation

| Outcome | | Total Across Win Categories All Years Point Estimate | Total Across Win Categories All Years - Total Across Win Categories Excluding FAFSA Year |
|---|---|---|---|
| Pell Grants | (1) | -373.95 | -252.56*** |
| | | | (39.01) |
| Subsidized Loans | (2) | -435.09 | -222.76*** |
| | | | (33.08) |
| FAFSA | (3) | -0.1563 | -0.0416*** |
| | | | (0.0122) |
| EFC (FAFSA=1) | (4) | 14,423.07 | 13,105.06*** |
| | | | (2236.39) |
| Four-Year Attendance | (5) | 0.1891 | 0.0128 |
| | | | (0.0138) |

**Note:** Specification as described in Table 11, including and excluding wins the year before high school graduation, then totaled across win categories. The second column represents the difference between the cumulated effects over win categories. Standard errors constructed using the delta method. The symbols*, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table 14: College Attendance by Household Income

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Below Median Income | | Above Median Income | |
| | Four-Year | Two-Year | Four-Year | Two-Year |
| Grad After X Win 10-30k | 0.0001 | -0.0073 | -0.0009 | 0.0041 |
| | (0.0047) | (0.0047) | (0.0056) | (0.0050) |
| Grad After X Win 30-100k | -0.0075 | -0.0131 | 0.0081 | 0.0001 |
| | (0.0089) | (0.0088) | (0.0107) | (0.0089) |
| Grad After X Win 100-300k | 0.0066 | -0.0227* | 0.0241* | -0.0088 |
| | (0.0126) | (0.0118) | (0.0131) | (0.0123) |
| Grad After X Win 300k-1.0m | 0.0143 | 0.0522* | 0.0649** | 0.0432* |
| | (0.0292) | (0.0293) | (0.0268) | (0.0242) |
| Grad After X Win 1.0m or more | 0.0518 | 0.0037 | 0.1371*** | -0.0114 |
| | (0.0349) | (0.0448) | (0.0326) | (0.0330) |
| Observations | 724,434 | 724,434 | 724,431 | 724,431 |
| Mean Dep | .191 | .182 | .348 | .282 |

**Note:** Estimates show the percentage point effect of income shocks on two and four-year college enrollment in the year after high school graduation for students from households with above and below median income in the sample. Students who graduate from high school after the income shock (Grad After) are potentially affected. The specifications include controls for the state and year of the win, high school cohort, household wages and income, parent filing status and age, and child birth order and household size. All student and parent controls are based on pre-win measures. Six win sizes are considered: 600 to 9,999 dollars, 10,000 to 29,999 dollars, 30,000 to 99,999 dollars, 100,000 to 299,999 dollars, 300,000 to 999,999 dollars, and 1,000,000 dollars or more. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table 15: College Attendance: Across Size Design

| *Four-Year College* | (1) Year 0 | (2) Year 1 | (3) Year 2 | (4) Year 3 | (5) Year 4 |
|---|---|---|---|---|---|
| Win 10-30k | -0.0009 | -0.0021 | -0.0010 | -0.0002 | -0.0010 |
| | (0.0032) | (0.0031) | (0.0031) | (0.0030) | (0.0028) |
| Win 30-100k | 0.0023 | 0.0050 | 0.0100* | 0.0052 | 0.0094* |
| | (0.0058) | (0.0062) | (0.0061) | (0.0058) | (0.0054) |
| Win 100-300k | 0.0335*** | 0.0360*** | 0.0349*** | 0.0232*** | 0.0321*** |
| | (0.0075) | (0.0075) | (0.0079) | (0.0084) | (0.0080) |
| Win 300k-1.0m | 0.0446** | 0.0372** | 0.0511*** | 0.0533*** | 0.0369* |
| | (0.0210) | (0.0186) | (0.0189) | (0.0195) | (0.0203) |
| Win 1.0m or more | 0.0936*** | 0.1212*** | 0.1295*** | 0.1232*** | 0.0935*** |
| | (0.0221) | (0.0207) | (0.0209) | (0.0221) | (0.0223) |
| Observations | 489,616 | 489,616 | 489,616 | 489,616 | 489,616 |
| Mean Dep | .214 | .24 | .237 | .234 | .214 |
| *Two-Year College* | (5) Year 0 | (6) Year 1 | (7) Year 2 | (8) Year 3 | Year 4 |
| Win 10-30k | -0.0038 | -0.0020 | -0.0004 | -0.0048* | -0.0061*** |
| | (0.0028) | (0.0029) | (0.0026) | (0.0027) | (0.0022) |
| Win 30-100k | 0.0049 | -0.0019 | -0.0001 | -0.0073 | 0.0025 |
| | (0.0050) | (0.0051) | (0.0048) | (0.0045) | (0.0046) |
| Win 100-300k | -0.0061 | -0.0032 | -0.0045 | -0.0043 | -0.0074 |
| | (0.0069) | (0.0067) | (0.0062) | (0.0060) | (0.0057) |
| Win 300k-1.0m | 0.0166 | 0.0336* | 0.0522*** | 0.0187 | 0.0168 |
| | (0.0145) | (0.0174) | (0.0174) | (0.0152) | (0.0127) |
| Win 1.0m or more | 0.0236 | 0.0268 | -0.0003 | 0.0181 | -0.0159 |
| | (0.0216) | (0.0221) | (0.0203) | (0.0214) | (0.0164) |
| Observations | 489,616 | 489,616 | 489,616 | 489,616 | 489,616 |
| Mean Dep | .139 | .185 | .171 | .137 | .109 |

**Note:** Estimates show the percentage point effect of income shocks on four-year college enrollment in the four years after high school graduation (where year 0 is the year of graduation). The sample is restricted to children who graduate after the income shock and thus who may be affected. The specifications include controls for the state and year of the win, high school cohort, household wages and income, parent filing status and age, and child birth order and household size. All student and parent controls are based on pre-win measures. Six win sizes are considered: 600 to 9,999 dollars, 10,000 to 29,999 dollars, 30,000 to 99,999 dollars, 100,000 to 299,999 dollars, 300,000 to 999,999 dollars, and 1,000,000 dollars or more. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table 16: College Attendance by Timing of Income Shock: Across Size Design

| | (1) | (2) |
|---|---|---|
| | Four-Year College | Two-Year College |
| Grad 6 Yrs After | 0.0823*** | 0.0015 |
| | (0.0213) | (0.0193) |
| Grad 5 Yrs After | 0.0463*** | 0.0472** |
| | (0.0176) | (0.0198) |
| Grad 4 Yrs After | 0.0526*** | 0.0174 |
| | (0.0173) | (0.0197) |
| Grad 3 Yrs After | 0.0478*** | 0.0060 |
| | (0.0163) | (0.0156) |
| Grad 2 Yrs After | 0.0272* | 0.0149 |
| | (0.0155) | (0.0152) |
| Grad 1 Yrs After | 0.0544*** | 0.0262* |
| | (0.0144) | (0.0144) |
| Grad Yr of Win | 0.0085 | 0.0207 |
| | (0.0126) | (0.0141) |
| Grad 1 Yr Before | 0.0058 | 0.0204* |
| | (0.0125) | (0.0122) |
| Grad 2 Yrs Before | 0.0001 | 0.0258** |
| | (0.0134) | (0.0131) |
| Grad 3 Yrs Before | 0.0299** | 0.0065 |
| | (0.0136) | (0.0127) |
| Grad 4 Yrs Before | 0.0183 | 0.0183 |
| | (0.0148) | (0.0139) |
| Grad 5 Yrs Before | 0.0066 | 0.0064 |
| | (0.0131) | (0.0144) |
| Grad 6 Yrs Before | 0.0256* | 0.0049 |
| | (0.0148) | (0.0140) |
| Observations | 1,603,743 | 1,603,743 |
| Mean Dep | .269 | .232 |

**Note:** Estimates show the percentage point effect of income shocks on two and four-year college enrollment within one year of high school graduation. The results are separated by the timing of the shock relative to the timing of high school graduation. Students who graduate after the shock are treated while those who graduate before are not. A student is considered to be treated if the household had an income shock of at least 100,000 dollars. The specification includes controls for the state and year of the win, high school cohort, household wages and income, parent filing status and age, and child birth order and household size. All student and parent controls are based on pre-win measures. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

# Appendix Tables

Table A1: Average College Attendance by Adjusted Gross Income: Sample of Population

| Household Income (in 2010 dollars) | (1) Four-Year College | (2) Two-Year College | (3) Any 1098T College |
|---|---|---|---|
| 0-10,000 | 0.099 | 0.105 | 0.217 |
| 10,000-20,000 | 0.125 | 0.127 | 0.265 |
| 20,000-30,000 | 0.148 | 0.151 | 0.311 |
| 30,000-40,000 | 0.192 | 0.179 | 0.378 |
| 40,000-50,000 | 0.220 | 0.201 | 0.423 |
| 50,000-60,000 | 0.255 | 0.227 | 0.477 |
| 60,000-70,000 | 0.294 | 0.247 | 0.535 |
| 70,000-80,000 | 0.337 | 0.269 | 0.596 |
| 80,000-90,000 | 0.373 | 0.275 | 0.631 |
| 90,000-100,000 | 0.417 | 0.285 | 0.682 |
| 100,000-110,000 | 0.448 | 0.294 | 0.712 |
| 110,000-120,000 | 0.483 | 0.301 | 0.751 |
| 120,000-130,000 | 0.527 | 0.289 | 0.772 |
| 130,000-140,000 | 0.547 | 0.281 | 0.783 |
| 140,000-150,000 | 0.577 | 0.280 | 0.806 |
| 150,000-160,000 | 0.587 | 0.262 | 0.805 |
| 160,000-170,000 | 0.627 | 0.247 | 0.833 |
| 170,000-180,000 | 0.620 | 0.275 | 0.846 |
| 180,000-190,000 | 0.653 | 0.252 | 0.840 |
| 190,000-200,000 | 0.686 | 0.247 | 0.855 |
| 200,000 or more | 0.739 | 0.199 | 0.877 |
| Average | 0.307 | 0.212 | 0.509 |

**Note:** This table presents average attendance rates the year after high school graduation for a random sample of the population of students who graduated between 1999 and 2010. Attendance is presented for 10,000 dollar bins of household adjusted gross income. Column Averages are not adjusted for differences in household income, parent filing status, household size, parental age, or the birth order of the individual of interest. Average attendance is presented for both four-year and two-year colleges.

Table A2: Household Wages Before and After Lottery Win

| | (1) <10k | (2) 10k-30k | (3) 30k-100k | (4) 100k-300k | (5) 300k-1mil | (6) 1mil or more |
|---|---|---|---|---|---|---|
| Years Before Win: 7 | 39,915 | 44,152 | 41,759 | 47,822 | 47,568 | 56,239 |
| Years Before Win: 6 | 41,025 | 45,647 | 43,226 | 48,652 | 48,385 | 57,556 |
| Years Before Win: 5 | 42,168 | 46,986 | 44,215 | 50,364 | 49,419 | 59,170 |
| Years Before Win: 4 | 42,946 | 47,721 | 44,690 | 51,116 | 51,198 | 60,751 |
| Years Before Win: 3 | 44,198 | 48,820 | 45,873 | 52,105 | 51,904 | 62,113 |
| Years Before Win: 2 | 45,027 | 49,676 | 46,592 | 53,554 | 52,997 | 61,708 |
| Years Before Win: 1 | 45,473 | 49,902 | 47,215 | 53,253 | 53,422 | 64,973 |
| Year of Win | 45,312 | 49,478 | 46,849 | 51,911 | 52,013 | 54,656 |
| Years After Win: 1 | 44,946 | 48,923 | 45,760 | 50,005 | 44,786 | 39,515 |
| Years After Win: 2 | 44,396 | 48,258 | 44,651 | 50,280 | 44,007 | 35,481 |
| Years After Win: 3 | 43,854 | 47,228 | 44,235 | 49,364 | 43,761 | 34,138 |
| Years After Win: 4 | 43,305 | 46,177 | 42,794 | 49,026 | 43,952 | 34,078 |

**Note:** This table presents household wages in the seven years before and four years after experiencing a first lottery win. Six win sizes are considered: 600 to 9,999 dollars, 10,000 to 29,999 dollars, 30,000 to 99,999 dollars, 100,000 to 299,999 dollars, 300,000 to 999,999 dollars, and 1,000,000 dollars or more.

Table A3: College Attendance: Linear Specification With 10,000 Dollar Minimum

| *Four-Year College* | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Maximum Shock | 10 million | 2 million | 1 million | 500k |
| Grad After * Win Amount ($000) | 0.0040*** | 0.0080*** | 0.0072*** | 0.0107** |
| | (0.0008) | (0.0022) | (0.0025) | (0.0048) |
| Win Amount ($000) | -0.0004 | 0.0002 | 0.0015 | 0.0032 |
| | (0.0006) | (0.0015) | (0.0017) | (0.0031) |
| Grad After | -0.0009 | -0.0029 | -0.0029 | -0.0049 |
| | (0.0057) | (0.0057) | (0.0057) | (0.0061) |
| Observations | 101,152 | 100,720 | 100,418 | 99,078 |
| Mean Dep | .281 | .281 | .28 | .28 |
| *Two-Year College* | (1) | (2) | (3) | (4) |
| Maximum Shock | 10 million | 2 million | 1 million | 500k |
| Grad After * Win Amount ($000) | -0.0003 | 0.0025 | 0.0031 | 0.0028 |
| | (0.0009) | (0.0022) | (0.0028) | (0.0047) |
| Win Amount ($000) | 0.0014** | 0.0015 | 0.0020 | 0.0024 |
| | (0.0006) | (0.0013) | (0.0017) | (0.0029) |
| Grad After | -0.0044 | -0.0056 | -0.0054 | -0.0054 |
| | (0.0058) | (0.0058) | (0.0059) | (0.0060) |
| Observations | 101,152 | 100,720 | 100,418 | 99,078 |
| Mean Dep | .249 | .248 | .248 | .248 |

**Note:** Estimates show the percentage point effect of income shocks on four-year and two-year college enrollment within one year after high school graduation. The sample is limited to wins exceeding 10,000 dollars. Students who graduate from high school after the income shock (Grad After) are potentially affected. The results are presented for alternate samples based on the largest income shock that is included. The specifications include controls for the state and year of the win, high school cohort, household wages and income, parent filing status and age, and child birth order and household size. All student and parent controls are based on pre-win measures. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table A4: College Attendance: Natural Log Specification

| *Four-Year College* | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Maximum Shock | 10 million | 2 million | 1 million | 500k |
| Grad After * Win Amount | 0.0031*** | 0.0026*** | 0.0025*** | 0.0024*** |
| | (0.0008) | (0.0009) | (0.0009) | (0.0009) |
| Win Amount | 0.0012** | 0.0014** | 0.0014** | 0.0014** |
| | (0.0006) | (0.0006) | (0.0006) | (0.0006) |
| Grad After | -0.0219*** | -0.0187*** | -0.0176*** | -0.0170** |
| | (0.0065) | (0.0066) | (0.0066) | (0.0066) |
| Observations | 1,448,678 | 1,448,246 | 1,447,944 | 1,446,604 |
| Mean Dep | .269 | .269 | .269 | .269 |
| *Two-Year College* | (1) | (2) | (3) | (4) |
| Maximum Shock | 10 million | 2 million | 1 million | 500k |
| Grad After * Win Amount | 0.0010 | 0.0011 | 0.0010 | 0.0011 |
| | (0.0008) | (0.0008) | (0.0009) | (0.0009) |
| Win Amount | -0.0018** | -0.0020*** | -0.0020*** | -0.0022*** |
| | (0.0007) | (0.0007) | (0.0007) | (0.0007) |
| Grad After | -0.0074 | -0.0080 | -0.0076 | -0.0078 |
| | (0.0069) | (0.0069) | (0.0070) | (0.0071) |
| Observations | 1,448,678 | 1,448,246 | 1,447,944 | 1,446,604 |
| Mean Dep | .232 | .232 | .232 | .232 |

**Note:** Estimates show the percentage point effect of income shocks on four-year and two-year college enrollment within one year after high school graduation. The sample is limited to wins exceeding 10,000 dollars. Students who graduate from high school after the income shock (Grad After) are potentially affected. The results are presented for alternate samples based on the largest income shock that is included. The specifications include controls for the state and year of the win, high school cohort, household wages and income, parent filing status and age, and child birth order and household size. All student and parent controls are based on pre-win measures. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table A5: College Attendance: Natural Log Specification With 10,000 Dollar Minimum

| *Four-Year College* | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Maximum Shock | 10 million | 2 million | 1 million | 500k |
| Grad After * Win Amount | 0.0104*** | 0.0073*** | 0.0062** | 0.0056* |
| | (0.0027) | (0.0028) | (0.0028) | (0.0031) |
| Win Amount | 0.0007 | 0.0016 | 0.0019 | 0.0019 |
| | (0.0018) | (0.0019) | (0.0019) | (0.0021) |
| Grad After | -0.1026*** | -0.0718** | -0.0616** | -0.0562* |
| | (0.0274) | (0.0280) | (0.0284) | (0.0320) |
| Observations | 101,152 | 100,720 | 100,418 | 99,078 |
| Mean Dep | .281 | .281 | .28 | .28 |
| *Two-Year College* | (1) | (2) | (3) | (4) |
| Maximum Shock | 10 million | 2 million | 1 million | 500k |
| Grad After * Win Amount | -0.0003 | -0.0000 | -0.0006 | -0.0016 |
| | (0.0027) | (0.0028) | (0.0030) | (0.0032) |
| Win Amount | 0.0026 | 0.0014 | 0.0014 | 0.0010 |
| | (0.0017) | (0.0017) | (0.0018) | (0.0020) |
| Grad After | -0.0011 | -0.0039 | 0.0016 | 0.0115 |
| | (0.0272) | (0.0286) | (0.0301) | (0.0323) |
| Observations | 101,152 | 100,720 | 100,418 | 99,078 |
| Mean Dep | .249 | .248 | .248 | .248 |

**Note:** Estimates show the percentage point effect of income shocks on four-year and two-year college enrollment within one year after high school graduation. The sample is limited to wins exceeding 10,000 dollars. Students who graduate from high school after the income shock (Grad After) are potentially affected. The results are presented for alternate samples based on the largest income shock that is included. The specifications include controls for the state and year of the win, high school cohort, household wages and income, parent filing status and age, and child birth order and household size. All student and parent controls are based on pre-win measures. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.

Table A6: Heterogeneity By Household Size, Marital Status, Gender

| *Four-Year College* | (1) Three or fewer Children | (2) Four or more Children | (3) Parents Married | (4) Parents Not Married | (5) Student Male | (6) Student Female |
|---|---|---|---|---|---|---|
| Grad After X Win 10-30k | -0.0003 | 0.0006 | -0.0016 | 0.0001 | -0.0080* | 0.0078 |
| | (0.0051) | (0.0050) | (0.0047) | (0.0053) | (0.0046) | (0.0050) |
| Grad After X Win 30-100k | 0.0069 | -0.0034 | 0.0069 | -0.0076 | 0.0002 | 0.0041 |
| | (0.0095) | (0.0096) | (0.0095) | (0.0100) | (0.0087) | (0.0098) |
| Grad After X Win 100-300k | 0.0371*** | -0.0178 | 0.0337*** | -0.0136 | 0.0342*** | 0.0026 |
| | (0.0120) | (0.0154) | (0.0129) | (0.0141) | (0.0118) | (0.0131) |
| Grad After X Win 300k-1.0m | 0.0522* | 0.0376 | 0.0579** | 0.0314 | 0.0604** | 0.0494 |
| | (0.0273) | (0.0304) | (0.0263) | (0.0310) | (0.0258) | (0.0323) |
| Grad After X Win 1.0m or more | 0.1083*** | 0.1114** | 0.0974*** | 0.1392*** | 0.0933*** | 0.1254*** |
| | (0.0308) | (0.0439) | (0.0324) | (0.0398) | (0.0335) | (0.0372) |
| Observations | 879,945 | 568,920 | 819,463 | 629,402 | 740,209 | 708,656 |
| Mean Dep | .322 | .188 | .331 | .189 | .23 | .311 |
| *Two-Year College* | (1) Three or fewer Children | (2) Four or more Children | (3) Parents Married | (4) Parents Not Married | (5) Student Male | (6) Student Female |
| Grad After X Win 10-30k | -0.0001 | -0.0026 | 0.0010 | -0.0043 | -0.0044 | 0.0025 |
| | (0.0046) | (0.0053) | (0.0045) | (0.0049) | (0.0048) | (0.0048) |
| Grad After X Win 30-100k | -0.0036 | -0.0117 | -0.0082 | -0.0026 | -0.0075 | -0.0040 |
| | (0.0083) | (0.0098) | (0.0092) | (0.0086) | (0.0083) | (0.0097) |
| Grad After X Win 100-300k | -0.0137 | -0.0194 | -0.0078 | -0.0295** | -0.0178 | -0.0127 |
| | (0.0120) | (0.0134) | (0.0122) | (0.0139) | (0.0119) | (0.0131) |
| Grad After X Win 300k-1.0m | 0.0274 | 0.0835** | 0.0553** | 0.0250 | 0.0813*** | 0.0095 |
| | (0.0245) | (0.0377) | (0.0241) | (0.0339) | (0.0252) | (0.0298) |
| Grad After X Win 1.0m or more | -0.0011 | -0.0180 | 0.0061 | -0.0310 | -0.0206 | 0.0083 |
| | (0.0331) | (0.0457) | (0.0318) | (0.0488) | (0.0369) | (0.0393) |
| Observations | 879,945 | 568,920 | 819,463 | 629,402 | 740,209 | 708,656 |
| Mean Dep | .261 | .187 | .274 | .178 | .207 | .258 |

**Note:** Estimates show the percentage point effect of income shocks on two and four-year college enrollment in the year after high school graduation. The results are differentiated based on the number of children in the household (ever claimed by the parent), the marital status of the household, and the gender of the student. Students who graduate from high school after the income shock (Grad After) are potentially affected. The specifications include controls for the state and year of the win, high school cohort, household wages and income, parent filing status and age, and child birth order and household size. All student and parent controls are based on pre-win measures. Six win sizes are considered: 600 to 9,999 dollars, 10,000 to 29,999 dollars, 30,000 to 99,999 dollars, 100,000 to 299,999 dollars, 300,000 to 999,999 dollars, and 1,000,000 dollars or more. Errors are clustered at the state by year of win level. The symbols *, **, and *** represent statistical significance at 10, 5, and 1 percent respectively.