Risky College Savings and College Attendance

ALEXEY VASILENKO *

Click here for the most recent version
February 22, 2024

ABSTRACT

This paper evaluates the effect of investing college savings in risky assets on college attendance. My empirical setting exploits plausibly exogenous variation in the portfolio allocation of investment options offered by asset management firms in 529 college savings plans. I find that a 1 percentage point higher share of risky assets in 529 accounts increases the four-year college attendance of high school graduates with these accounts by 2.7 percentage points (4.4%) over the period 2013-2021. This effect is driven by larger college savings as a result of higher ex-post investment returns and increased household contributions to 529 accounts after experiencing such returns. Over the sample period, the variation in the portfolio allocation of investment options offered in 529 college savings plans across asset management firms results in between-state variation in accumulated college savings of up to half the tuition costs of a four-year, in-state college degree. My results suggest that college savings investment decisions and the portfolio allocation of investment options offered in 529 college savings plans substantially affect investments in human capital.

JEL classification: D14, G50, I22, I23

Keywords: college savings, portfolio choice, college attendance

*Northeastern University, 370 Huntington Ave, Boston, MA 02115, U.S.A, a.vasilenko@northeastern.edu. I greatly thank Claire Célérier, Boris Vallée, Mike Simutin, Sebastien Betermier, Lisa Kramer, Alexandre Corhay, David Goldreich, Jincheng Tong, Yoshio Nozawa, Camille Hebert, Pat Akey, Ting Xu, Seongjin Park (discussant), Kimberly Cornaggia (discussant), Jordan Nickerson, Michael Boutros (discussant), Anna Rozhkova, Noémie Bucourt, Alison Taylor, Kane Bae, Zohair Alam, Maria Tiurina, seminar participants at Rotman School of Management, and conference participants at the Trans-Atlantic Doctoral Conference 2021, the NFA 2021 conference, the AEA 2022 annual meeting, the EEA 2023 conference, and the FMA 2023 annual meeting for comments and suggestions. I gratefully acknowledge financial support from the Canadian Securities Institute Research Foundation. This paper was previously a part of another paper circulated under the title "The Investment Side of College Savings".

I. Introduction

Saving for children's post-secondary education is a major concern for many families around the world, including the US, where roughly half of families with children save for college.[1] Over 85% of families that save for college invest college savings in risky assets, for example, through special tax-advantaged investment accounts, 529 college savings plans.[2] In 2021, the average balance in 529 accounts for children aged 16 to 17 was $46,620, which was equivalent to 109% of the tuition costs of a four-year, in-state college degree or 31% of the tuition costs of a four-year, private college degree.[3] In these accounts, investing college savings in risky assets can more than double the contribution amount, depending on the savings period and ex-post investment returns.[4]

Despite the fact that many families accumulate substantial college savings by investing in risky assets, there is limited evidence on how college savings investment decisions and the design of education savings plans affect children's college enrollment. To shed light on these questions, this paper evaluates the effect of investing college savings in risky assets on college attendance using an empirical setting based on the plausibly exogenous variation in the portfolio allocation of investment options offered by asset management firms within 529 college savings plans.

I find that a 1 percentage point higher share of risky assets in 529 accounts increases the four-year college attendance of high school graduates with these accounts by 2.7 percentage points (4.4%) over the period 2013-2021. This effect is driven by larger college savings as a result of higher ex-post investment returns and increased household contributions to 529 accounts after experiencing such returns. The effect depends on the ex-post market performance during the saving period and may even be opposite if ex-post returns are negative over a long period. I provide evidence that this effect is also partially explained by the commitment of funds to be used for qualified expenses, as investing college savings in risky assets outside of 529 accounts without penalties for not using funds for qualified expenses is associated with a lower effect on four-year college attendance. In addition, I demonstrate

[1] According to the High School Longitudinal Study of 2009, parents of 46.2% of 9th grade students and 50.5% of 11th grade students report a positive amount of college savings.

[2] Panel A in Figure 3

[3] The average balance in 529 college savings accounts is from the Ascensus platform, as of December 31, 2021. Data on college tuition are from the College Board's Trends in College Pricing and Student Aid 2021 report.

[4] For example, Panel B of Figure 9 demonstrates that households that invested college savings in target-date investment options with medium risk in 529 accounts doubled their lump-sum contribution amount in 2021. The positive effect of investing on accumulated college savings was even greater for households investing in target-date investment options with high risk or stock-only investment options, as well as households saving for a longer period than the average saving period.

that the variation in the portfolio allocation of investment options offered in 529 college savings plans across asset management firms has important implications for four-year college attendance rates at the state level, as it results in between-state variation in accumulated college savings of up to half the tuition costs of a four-year, in-state college degree over the period 2013-2021.

For my analysis, I combine data on 529 college savings plans, household portfolios, and student outcomes. The main sample is made up of two datasets: individual-level data from the Survey of Income and Program Participation (SIPP) and data on investment options offered in 529 college savings plans from Morningstar.[5] The individual-level SIPP data are drawn from several panels covering the 2013-2021 period that provide monthly data on educational outcomes and household sociodemographics, as well as annual data on personal and household assets and liabilities. Beginning with the 2014 Panel, the SIPP has included information on educational savings accounts. I show that around 95% of educational savings accounts reported in the SIPP are 529 college savings plans, which enable households to invest in a limited menu of investment options. Morningstar data on 529 college savings plans provide historical information on net assets, returns, and asset allocation for these investment options. I use the Morningstar data for the 2002-2021 period and merge it with the individual-level SIPP data. My main sample includes over 79,000 children/young adults observed up to 4 years depending on the panel, among whom around 7,700 individuals have 529 college savings accounts or their household members have these account. In addition to the main sample, I also employ student-level longitudinal data from the Education Longitudinal Study of 2002 (ELS:2002) that provide information on how families of high school students allocate college savings outside of 529 college savings accounts, as well as on the post-secondary educational outcomes of these students.

My main empirical analysis exploits plausibly exogenous variation in the portfolio allocation of investment options offered by asset management firms in 529 college savings plans. Most investment options available through 529 college savings plans are managed by well-known asset management firms such as Fidelity, Vanguard, BlackRock, TIAA, and Ascensus. I find that there are significant time-variant differences in the portfolio allocation of 529 investment options offered by different asset management firms. I provide evidence that these differences are likely to be exogenous to individual- and state-level factors affecting college attendance, as an asset management firm often offers identical 529 investment options in

[5]Three contemporaneous papers, Curtis (2020), Balthrop and Cici (2022), Li et al. (2023) also use data on 529 college savings plans from Morningstar, but do not employ information on the asset allocation of individual investment options. This paper is also the first one to link data on 529 college savings plans with individual- and household-level data.

multiple states. For each asset management firm, I calculate the risky share measure, which shows how riskier target-date investment options offered by this asset management firm are in comparison to target-date investment options offered by other asset management firms. Employing the fact that most households open 529 accounts for their children in in-state 529 plans, I match the risky share measure of an asset management firm offering target-date investment options in an in-state 529 plan with the individual-level SIPP data using information on the state of residency. This approach is based on the assumption that the risky share measure of an asset management firm offering target-date investment options in an in-state 529 plan represents the riskiness of investments in individual 529 accounts in a state, which is not observable in the individual-level SIPP data. One limitation of this approach is that some individuals may have 529 accounts in out-of-state 529 plans. To overcome this limitation, I divide the main sample into two parts: states where historically a relatively high state-level percentage of individuals with 529 accounts have accounts in in-state 529 plans, and states where this percentage is relatively low. Individuals with 529 accounts in the first group of states will have a higher exposure to the risky share of the asset management firm offering investment options in an in-state 529 plan than individuals with 529 accounts in the second group of states. This difference in exposure is used as an additional variation in my analysis.

My main empirical analysis is based on a linear probability regression model estimated using repeated longitudinal data from 2013 to 2021, which includes asset management firm, state, and year fixed effects, as well as a large set of control variables and fixed effects for household and student characteristics. I find that a 1 percentage point higher share of risky assets in 529 accounts increases the four-year college attendance of high school graduates with these accounts by 2.7 percentage points (4.4%) over the period 2013-2021. A higher share of risky assets in 529 accounts also has no significant effect on the probability of attending any (two- or four-year) college, as higher four-year college attendance is compensated by lower two-year college attendance. In addition, investing college savings in risky assets is associated with a higher probability of attending a highly selective four-year college.

Exploring the mechanism underlying the main results, I find that the effect on four-year college attendance is driven by larger college savings as a result of the mechanical effect of a higher share of risky assets on higher ex-post investment returns, as well as the fact that households increase their contributions to 529 accounts after experiencing such returns. The latter is likely due to behavioral factors rather than the wealth effect, as households only increase their contributions to 529 accounts and do not invest more in risky assets outside of 529 accounts. Investing college savings in stocks yields no different results than investing

in other risky assets during the sample period. The effect on four-year college attendance depends on the ex-post market performance during the saving period and may even be opposite if ex-post returns are negative over a long period. However, this effect was positive even after the financial crisis of 2008, when ex-post returns were negative. The evidence suggests that the effect is also partially explained by the commitment of funds to be used for qualified expenses, as investing college savings in risky assets outside of 529 accounts without the commitment is associated with a lower effect on four-year college attendance. Larger college savings in turn increase four-year college attendance from 5.8 pp to 14.1 pp per \$10,000 depending on the form of commitment related to specific college savings options. I also show that an increase in four-year college attendance is unlikely to be driven by students' academic performance before college, as larger accumulated college savings due to a higher share of risky assets in 529 accounts do not affect K-12 school grade retention or dropout rates. In addition, I demonstrate that the positive effect on four-year college attendance is accompanied by a negative effect on student debt participation and the total amount of student debt at the extensive margin. Finally, I show that these results are not driven by a potential positive spillover effect on the amount of available financial aid that may occur when many students at the same college have 529 accounts and accumulate larger college savings by investing a higher share of funds in risky assets in their accounts.

To test the robustness of the main results, I estimate regression models with alternative specifications of the risky share measure, a different set of fixed effects, and a different clustering of standard errors, as well as consider an alternative sample of high school graduates, for whom high school graduation is defined as expected high school graduation based on students' month and year of birth and state-level school entry age laws. The main results are consistent across all alternative specifications. I also exploit additional variation in exposure to the risky share across states and show that the main results are almost not present in states where a relatively low percentage of individuals with 529 accounts have accounts in in-state 529 plans. This result is in line with the fact that individuals with 529 accounts in such states have low exposure to the risky share of the asset management firm offering investment options in an *in-state* 529 plan because many of them have 529 accounts in *out-of-state* 529 plans. Finally, I conduct a placebo test in which I randomly assign the risky share of the asset management firm offering target-date investment options in an in-state 529 plan to the risky share of other asset management firms offering 529 investment options in other states. The estimated effect of a higher risky share on four-year college attendance from the main specification differs significantly from the empirical distribution of placebo coefficients obtained with 1,000 placebo samples.

My results suggest that college savings investment decisions and the portfolio allocation of investment options offered in 529 college savings plans substantially affect investments in human capital. In addition to influencing individual college enrollment decisions, variation in the portfolio allocation of 529 investment options across asset management firms has important implications for four-year college attendance rates at the state level, as it results in between-state variation in accumulated college savings of up to half the tuition costs of a four-year, in-state college degree over the period 2013-2021.

The remainder of the paper is structured as follows. Section II presents the literature review. Section III provides empirical facts on the importance of college savings for financing college education and how households invest college savings, as well as discusses institutional details on 529 college savings plans. Section IV describes the data. Section V explains the source of plausibly exogenous variation in the portfolio allocation of investment options in 529 college savings plans and how I calculate the risky share measure of the asset management firm offering investment options in an in-state 529 plan. Section VI studies how investing college savings in risky assets affects college attendance. Section VII explores the mechanism underlying the main results for college attendance. Section VIII provides evidence on the external validity of the main results for the portfolio allocation of college saving outside of 529 accounts. Section IX discusses policy implications. Finally, Section X concludes.

II. Related Literature

This paper relates to several strands of the literature. First, it contributes to the household finance literature. Despite extensive research in the household finance literature on student debt and various types of savings (e.g., retirement savings), little is known about college savings investment decisions. Bogan (2015) investigates the portfolio decisions of "Sandwich Generation" households, which support ageing relatives financially and have children approaching college age, and demonstrates that these households anticipating future college expenses are more likely to participate in the stock market and to have tax-advantaged education savings accounts.[6] Li et al. (2023) provide evidence that most 529 accounts are opened suboptimally in 529 plans that do not generate the highest expected payoff, which

[6]Several papers also examine the effect of implicit taxation induced by financial aid programs on household portfolios (e.g., Dick and Edlin (1997), Long (2004), Reyes (2008), Babiarz and Yilmazer (2009)) and find that households adjust their portfolios to increase the amount of future financial aid. A few papers (Long (2004), Chyi and Wu (2011), and Jerphanion (2020)) additionally demonstrate that the Higher Education Act of 1992's expansion of the student loan supply led to changes in household portfolios as well. All of these papers provide evidence that college savings motives are likely to play a role in household portfolios but do not identify a part of household portfolios related to college savings.

can be attributed to a lack of financial literacy and plan disclosure complexity. The lack of research on investment decisions related to college savings can be explained by the absence of data on the college savings-related part of household portfolios. Using newly available data from SIPP and Morningstar, this paper studies the consequences of college savings investment decisions for children's future lives focusing on college attendance.

Second, this paper adds to the literature that studies how family financial resources affect college enrollment. This literature employs various sources of quasi-exogenous variation to estimate the impact of family financial resources: housing wealth (e.g., Lovenheim (2011), Lovenheim and Reynolds (2013), Cooper and Luengo-Prado (2015), Hotz et al. (2018)), job loss (e.g., Coelli (2011), Pan and Ost (2014), Hilger (2016)), oil revenue (e.g. Løken (2010)), income transfer (e.g. Akee et al. (2010)), tax credits (e.g., Manoli and Turner (2018), Bastian and Michelmore (2018)), and lottery wins (Bulman et al. (2021)).[7,8] The existing literature provides mixed evidence on the impact of family financial resources on college enrollment, most of which being less than a 1 percentage point (pp) increase in college enrollment for every $100,000 in additional financial resources for middle- and high-income households.[9] Two exceptions are Lovenheim (2011) and Coelli (2011). Lovenheim (2011) finds a 0.7 pp increase in college enrollment per $10,000 in additional home equity, while Coelli (2011) estimates a 1 pp increase in post-secondary education enrollment per $1,000 in parental income using Canadian data. In contrast to middle- and high-income households, a few papers find a much greater effect for low-income households: 5.7 pp per $10,000 in Lovenheim (2011) and 1.3 pp per $1,000 in Manoli and Turner (2018). In contrast to the previous literature, this paper focuses on the effect of family financial resources committed to be spent on college, or in other words college savings. I provide evidence that the effect of college savings on four-year college attendance ranges from 5.8 pp to 14.1 pp per $10,000 depending on the form of commitment related to specific college savings options. It is the highest for college savings in 529 plans, where the commitment takes two forms: penalties for not using funds for qualified expenses and mental accounting. College savings accumulated through other savings options rather than 529 accounts have the lowest

[7] A large literature also explores whether households face financial frictions borrowing for college (e.g., Cameron and Heckman (1998), Cameron and Heckman (2001), Keane and Wolpin (2001), Belley and Lochner (2007), Lochner and Monge-Naranjo (2011)) or derive consumption value from college (e.g., Alstadsæter (2010) , Jacob et al. (2018), Gong et al. (2019)). Both mechanisms can explain the effect of family financial resources on college attendance decisions.

[8] In addition, Charles et al. (2018) show that the housing boom during the 2000s negatively affected college attendance and educational attainment through the effect on labor market opportunities. The subsequent housing bust had the opposite effect on college enrollment, except for birth cohorts who were of college-going age during the boom.

[9] Bulman et al. (2021) provide a review of the existing estimates.

effect from this range, as the commitment is based solely on mental accounting and not financial penalties. This magnitude is greater than the previous estimates of the effect of family financial resources on four-year college attendance for students from middle- and high-income households that represent the majority of households saving for college. It is also comparable to the impact of financial resources on four-year college attendance for low-income students, as well as to the impact of many financial aid programs.[10] In addition, my results also indicate that financial resources committed to be spent on college have no significant effect on the probability of attending any (two- or four-year) college, as higher four-year college attendance is compensated by lower two-year college attendance, whereas the previous literature finds a positive effect of financial resource on any college attendance.

Third, this paper relates to the literature that explores the consequences of participation in education savings accounts. A few papers provide non-causal evidence for a effect of having an education savings account on student outcomes (e.g., Elliott and Beverly (2011), Elliott et al. (2014), Nam and Ansong (2015)). Long and Bettinger (2017) and Martini et al. (2020) show that incentivizing college savings in education savings accounts improves postsecondary outcomes. This paper adds to this literature by studying how the portfolio allocation of investment options offered in 529 college savings plans affects college attendance and demonstrating that changing the design of 529 plans can have a impact on college savings sufficient to cover a substantial portion of the tuition costs of a four-year, in-state college degree.

Finally, my paper relates to a small literature on 529 plans. Bogan (2014) finds a positive relationship between state tax benefits and 529 plan fees. Balthrop and Cici (2022) document that 529 college savings plans in states exhibiting a greater tendency to extract revenue offer investment menus with higher fees, weaker performance, and limited options. Curtis (2020) evaluates the quality of menus offered by 529 plans. Li et al. (2023) provide evidence that most 529 accounts are opened suboptimally in 529 plans that do not generate the highest expected payoff, which can be attributed to a lack of financial literacy and plan disclosure complexity. Rozhkova and Vasilenko (2023) show that adjusting the menu design of 529 college savings plans can enhance college savings. This paper documents a large heterogeneity in the portfolio allocation of 529 investment options related to the same strategy across asset management firms.

[10]The review of the financial aid literature can be found in Deming and Dynarski (2010)

III. College Savings and Investment Decisions: Empirical Facts and Institutional Details

A. Role of College Savings in Financing College Education

This section presents empirical evidence supporting the importance of college savings in financing college education. Panel A of Figure 1 shows the percentages of annual college expenses covered by various funding sources at US colleges for associate and undergraduate degrees.[11] College savings cover 22.2% of college expenses, which is slightly higher than the percentage of college expenses covered by student debt (19.7%). Panel B compares the percentage of high school students whose families have college savings to the percentage of high school students who have student debt later in life using data from the High School Longitudinal Study of 2009. The results indicate that 50.5% of high school students' families have college savings, which is higher than the 44.4% of high school students who have student debt later in life.

INSERT FIGURE 1

In addition to college savings covering a large share of college expenses, most families that accumulate college savings do not have the highest college attendance rates. Figure 2 demonstrates the immediate four-year college attendance rate by household income decile for the sample of high school graduates from the Survey of Income and Program Participation from 2013 to 2021. Students from the bottom household income deciles have higher four-year college attendance rates than other students. However, almost all families saving for college are not in the bottom household income decile as shown in Figure A.1, and a four-year college attendance rate for students from such families is lower than it could be if these students were from the bottom household income decile. Chetty et al. (2023) find a similar pattern in college attendance rates by household income at Ivy-Plus colleges. After controlling for test scores, only students in the top 3% of parental income have a higher college attendance rate at Ivy-Plus colleges than students in the bottom 20%.

[11] Data come from Table 2a from "How America Pays for College 2023" by Sallie Mae. The "Grants/scholarships" category is the sum of "Scholarships (received from the school, outside organizations, or businesses)" and "Grants (Federal, state, or school based)"; the "Income" category is the sum of "Parent current income", "Student current income", and "Federal work-study"; the "Savings" category is the sum of "College savings fund, such as a 529 plan", "Other parent savings or investments", "Retirement savings withdrawal (including 401k, Roth IRA, or other IRA)", Student savings", and "Other student savings or investments"; the "Debt" category is the sum of all funding sources related to borrowing; the "Other" category is "Relatives or friends (money that doesn't have to be repaid)". Values for all categories are divided by "Total Paid". The values for all categories are divided by the "Total Paid".

INSERT FIGURE 2

Thus, college savings not only cover a large share of college expenses, but are also accumulated by the families of students, for whom college attendance rates can potentially be improved. Surprisingly, the existing literature on the effect of family financial resources on college enrollment often documents a modest effect of less than a 1 pp increase in four-year college attendance for every $100,000 in additional financial resources for students from middle- and high-income households.[12]

B. College Savings and Risky Assets

Investing in risky assets is very widespread among families saving for children's college. The families of around 85% of high school students invest in risky assets to save for college as shown in Panel A of Figure 3, which displays the percentages of high school students whose parents invested in specific risky savings options to save for college in 2002.[13] Stocks are a particularly popular asset class for investing college savings. In 2002, the families of 44.9% and 13.4% of high school students invested in stocks and mutual funds directly and indirectly through education savings accounts, respectively.

Despite the percentage of high school students whose parents invested in education savings accounts to save for college was small in 2002, it has greatly increased over time. Panel B of Figure 3 compares the percentages of high school students whose parents invested in education savings accounts to save for college in 2002 and 2009, and shows that this percentage increased to around 50% in 2009.[14] This trend has continued after 2009, due to the growing popularity of 529 college savings plans, the most popular type of education savings account today.

INSERT FIGURE 3

C. Education Savings Accounts: History and Institutional Details

In the United States, there are three main types of tax-advantaged education savings accounts: a 529 college savings plan, a 529 prepaid tuition plan, and a Coverdell account

[12]Bulman et al. (2021) provide a review of the existing estimates. In contrast to middle- and high-income households, a few papers find a much greater effect for low-income households: 5.7 pp per $10,000 in Lovenheim (2011) and 1.3 pp per $1,000 in Manoli and Turner (2018)

[13]Data are based on the sample of 10th grade school students whose parents save for college from the Education Longitudinal Study of 2002.

[14]Data for 2002 are based on the sample of 10th grade school students whose parents save for college from the Education Longitudinal Study of 2002. Data for 2009 are based on the sample of 9th grade school students whose parents save for college from the High School Longitudinal Study of 2009.

(also known as an education IRA).[15] 529 college savings plans are tax-advantaged investment accounts, in which college savings grow tax-free. 529 prepaid tuition plans allow to purchase credits for future education at participating colleges and universities at current prices. Coverdell accounts, like 529 college savings plans, are tax-advantaged investment accounts with tax-free growth, but with a lower contribution limit.[16]

All three types of education savings accounts first appeared less than 30 years ago. The Small Business Job Protection Act of 1996 legalized 529 college savings and prepaid tuition plans, allowing state governments to establish their own 529 plans later on.[17] The Taxpayer Relief Act of 1997 introduced Coverdell accounts. Coverdell accounts are regulated at the federal level as opposed to 529 college savings and prepaid tuition plans, which are regulated at the state level. Although all three types of accounts have existed for roughly the same amount of time, their popularity today varies greatly. Appendix C provides data on the popularity of three account types, demonstrating that 529 college savings plans are by far the most popular type of education savings accounts. This account type represents more than 90% of all assets and individual accounts. In addition, this percentage will be even higher in the majority of states, as only 14 states had 529 prepaid tuition plans in the fourth quarter of 2021, the second most popular type of education savings accounts. Most states have one or two 529 college savings plans.[18] If a state has two 529 college savings plans, one is usually sold directly and the other through financial advisors.

Households typically open 529 college savings accounts for their children in in-state 529 college savings plans, because of two reasons. First, most states provide tax benefits and/or matching grants to in-state residents for contributions to in-state 529 plans in addition to tax-free earning growth available to both, in-state and out-of-state, residents.[19] Second, Li et al. (2023) show that even if out-of-state 529 college savings plans provide a higher expected payoff after controlling for tax benefits and/or matching grants, most households still invest

[15] Although UGMA/UTMA accounts can also be used to save for college, they are not designed to be used primarily for college savings, and earnings in these accounts are not tax-free.

[16] In 2022, the annual contribution limit for Coverdell accounts was $2,000. Although there is no annual contribution limit for 529 college savings plans, annual contributions in excess of $16,000 per contributor may be subject to the gift tax.

[17] Michigan launched a prepaid tuition plan in 1986, which later evolved into Michigan's 529 prepaid plan.

[18] In 2021 Q4, Wyoming did not have a 529 college savings plan, Alaska had 3 529 college savings plans, Indiana - 3, Kansas - 4, Nebraska - 4, Nevada - 5, and West Virginia - 3. Arizona had 3 college savings plans, but one of them offered only FDIC-insured bank deposits. Colorado had 4 college savings plans, but one of them offered only FDIC-insured bank deposits, while the other offered only structured products.

[19] At the end of 2022, only 10 states did not provide tax benefits and/or matching grants for 529 plan contributions: Alaska, Delaware, Florida, Hawaii, Kentucky, Nevada, North Carolina, South Dakota, Texas, and Washington. Some of these states do not provide tax benefits for 529 plan contributions, because of the zero state income tax.

in in-state 529 college savings plans due to the lack of household financial literacy and a high complexity of plan disclosure documents. As a result, 60% of accounts in 529 college savings plans are invested suboptimally.

When households open 529 college savings accounts for their children, they choose one or a few investment options from a limited menu.[20] Each investment option is then invested in mutual funds or ETFs and can be one of two types: static or target-date. The portfolio allocation of static investment options remains constant over time, whereas the portfolio allocation of target-date investment options is automatically rebalanced over time. Target-date investment options can be either age-based or enrollment-based. The allocation of age-based portfolios is adjusted with *student's age*. The share of stocks in age-based portfolios goes down with age, while the share of less risky assets (e.g., government bonds or cash) increases. The portfolio allocation of enrollment-based investment options is adjusted with *the number of years before the expected year of college enrollment*. A lower share of stocks and a lower share of less risky assets in target-enrollment investment options corresponds to a smaller number of years until college enrollment.

IV. Data

A. Main Sample

A.1. Individual-Level SIPP Data

To create the main sample, I employ two datasets, one of which is the Survey of Income and Program Participation (SIPP). The individual-level SIPP data come from several panels covering from one to several years each from 2013 to 2021. Specifically, I use the following six panels: SIPP 2014 (2013-2016), SIPP 2018 (2017-2020), SIPP 2019 (2018 year), SIPP 2020 (2019-2021, ongoing), SIPP 2021 (2020-2021, ongoing), and SIPP 2022 (2021 year, ongoing). The individual-level data from these panels include monthly data on educational outcomes and household sociodemographics, as well as annual data on personal and household assets and liabilities.

Beginning with the 2014 Panel, the SIPP has included a new topic section on education savings accounts. It provides information on the number of education savings accounts in a household, as well as on the account balance, beneficiary and owner for up to three education savings accounts. Because 529 college savings plans correspond to the majority of

[20]Five 529 college savings plans do not provide a diversified menu of investment options and instead offer only bank deposits or structured products.

all education savings accounts, as shown in SectionIII.C, most education savings accounts in the SIPP will also be 529 college savings plans.

Table I reports summary statistics for the individual-level SIPP data. The sample includes children and young adults aged 26 and under. Continuous variables are winsorized at 1% and 99%. Columns (1), (2), (3), and (4) show the mean, median, minimum, and maximum statistics, respectively.

INSERT TABLE I

A.2. Data on 529 College Savings Plans from Morningstar

In addition to the individual-level SIPP data, the main sample is also based on data on 529 investment options from Morningstar covering the period from 2002 to 2021. These data include historical information on net assets, returns, the shares of stocks and risky assets (stocks and other risky assets combined), a investment option type, and an asset management firm managing each option.

Morningstar data on 529 investment options covered nearly all 529 college savings plans in 2021, with the exception of six very small plans, net assets and total accounts in which corresponded to 0.27% and 0.15% of net assets and total accounts in all 529 college savings plans, respectively. Five out of these six 529 college savings plans offer only bank deposits or structured products instead of a diversified menu of investment options.

Panel A of Table II presents summary statistics for the Morningstar data on 529 investment options. Continuous variables are winsorized at 1% and 99%.

INSERT TABLE II

A.3. Linking Individual-Level SIPP and Morningstar Data

I link the individual-level SIPP and Morningstar data by the state of residence and year. This approach is based on two assumptions supported by the empirical facts discussed previously. First, I assume that education savings accounts in the individual-level SIPP data are 529 college savings plans. As discussed in Section III.C, this assumption is indeed very close to reality. Second, linking the individual-level SIPP and Morningstar data based on a state variable is supported by the fact that households typically open 529 accounts for their children using in-state 529 college savings plans, as discussed in Section III.C.

One limitation of this approach is that some individuals may have 529 accounts in out-of-state 529 college savings plans. To overcome this limitation, I divide the main sample into

two parts: states where historically a relatively high state-level percentage of individuals with 529 accounts have accounts in in-state 529 college savings plans, and states where this percentage is relatively low. Appendix D explains how this percentage is calculated. Individuals with 529 accounts in the first group of states will have a higher exposure to the risky share of the asset management firm offering investment options in an in-state 529 plan than individuals with 529 accounts in the second group of states.

B. Additional Data: Education Longitudinal Study of 2002

In addition to the main sample, I also employ student-level data from the Education Longitudinal Study of 2002 (ELS:2002). This longitudinal study is a nationally representative survey that follows youths as they progress from high school to postsecondary education and beyond. It includes data on the allocation of college savings, student and family characteristics, college enrollment, and student debt.

Data on the allocation of college savings include a categorical variable for the amount of college savings and a set of dummy variables, each of which corresponds to a specific investment option used by families to save for college. This information was collected in 2002 for a sample of 10th grade school students. Data on college enrollment and student debt were collected in 2006, 2 years after students graduated from high school. Table B.2 in Appendix reports summary statistics for the sample of students, who did not repeat any grades and whose parents reported a positive amount of college savings.

V. Plausibly Exogenous Variation in the Portfolio Allocation of 529 Investment Options

A. Asset Management Firms and 529 Investment Options

My main empirical analysis exploits plausibly exogenous variation in the portfolio allocation of menu options offered by different asset management firms within 529 college savings plans. State authorities regulate 529 college savings plans and appoint an asset management firm as a 529 program manager. As a result, a number of well-known asset management firms, including TIAA, Fidelity, Ascensus, and T. Rowe Price, manage the majority of 529 college savings plans.[21] A few 529 college savings plans are managed directly by state au-

[21] 81 out of 91 529 college savings plans were managed by large asset management firms in 2022

thorities or by state affiliated entities specifically created to act as 529 program managers.[22] A 529 program manager offers its own 529 investment options within a 529 plan (if it is an asset management firm) or 529 investment options managed by an outside asset management firm. As a consequences, the vast majority of 529 investment options are managed by a few large asset management firms, which frequently offer the same 529 investment options in different states. In 2020, 85% of 529 investment options were managed by asset management firms, each of which managed 529 investment options in at least 2 states.

Across asset management firms, the allocation of 529 investment options related to the same investment strategy can differ by the shares of risky assets and stocks. A difference in the allocation of 529 investment options with the same investment strategy between asset management firms can also vary over time. Figure 4 provides an example of 529 target-date investment options offered by large asset management firms to children/young adults of ages 7 and 18. To combine data on 529 age-based and target-enrollment portfolios, I assume that 529 target-enrollment portfolios with a target enrollment year in y years from now include college savings of children aged $19 - y$. Each of the three large asset management firms - Fidelity, TIAA, and Vanguard in cooperation with Ascensus - offers identical 529 investment options in multiple states for children/young adults of ages 7 and 18, but the allocation of 529 investment options varies by an asset management firm. Vanguard/Ascensus offer 529 target-date investment options with the lowest risk (the smallest share of stocks and the largest share of cash) of the three asset management firms, while TIAA offers 529 target-date investment options with the highest risk (the largest share of stocks and the smallest share of cash).

INSERT FIGURE 4

To explore variation in the allocation of 529 investment options managed by different asset management firms, I first calculate the shares of risky assets and stocks in 529 target-date investment options at the asset management firm level. Because asset management firms typically offer one or three investment options with low, median, and high risk for each age, I calculate the shares of risky assets and stocks as the median shares of risky assets and stocks for each age offered by this asset management firm.

Panel A of Figure 5 plots the minimum, median, and maximum shares of risky assets and stocks in 2021 for 529 target-date investment options across all asset management firms for each age. With age, the difference between the maximum and minimum shares of risky assets and stocks widened. A disparity in the allocation of 529 target-date investment options

[22] 10 out of 91 529 college savings plans were managed directly by state authorities or by state affiliated entities specifically created to act as 529 program managers

between asset management firms and, as a result, between states could be explained by two factors. First, an asset management firm may hold a higher or lower "default" share of all its portfolios in cash in comparison to other asset management firms. A similar phenomenon was documented for mutual fund managers (e.g., Wermers (2000), Simutin (2013)). Second, asset management firms may have different rebalancing strategies - views on how target-date portfolios should rebalance with age. This phenomenon is akin to heterogeneity in the portfolio allocation of financial advisors' clients driven by advisors' beliefs (e.g., Foerster et al. (2017), Linnainmaa et al. (2021)) or the portfolio allocation of target-date pension funds (e.g. Balduzzi and Reuter (2018)). As a result, the variation in the allocation of 529 target-date investment options can be split into two parts: the variation in the "default" share of cash and the variation in the rebalancing strategy.

INSERT FIGURE 5

Aside from significant differences in the allocation of 529 target-date investment options across asset management firms, there are some differences in the allocation of 529 static investment options as well. Because 529 static investment options are not rebalanced with age, there is no variation in the age-related rebalancing strategy for these portfolios. For 529 static investment options, only the variation in the "default" share of cash can be observed. To demonstrate this variation, I consider 529 static equity-only portfolios, which are the most common type of 529 static portfolios available in all states with 529 plans. Panel B of Figure A.4 plots the minimum, median, and maximum values of the median state-level shares of risky assets in 529 static equity portfolios across states.

The variation in the allocation of 529 static investment options is significantly smaller than the variation in the allocation of 529 target-date investment options. Furthermore, the variation in the allocation of 529 static investment options should be nested within the variation in the allocation of 529 target-date investment options. The former includes the variation in the "default" share of cash, whereas the latter includes both variations, the variation in the "default" share of cash and the variation in the rebalancing strategy. For these reasons, my empirical analysis will focus primarily on the variation in the allocation of 529 target-date investment options.

B. 529 Portfolio Allocation Measures

To study the effect of portfolio allocation in 529 accounts on children's college attendance and student debt, I introduce two 529 portfolio allocation measures at the asset management firm level showing whether 529 target-date investment options offered by the asset manage-

ment firm, on average, have higher or lower risky asset and stock shares than comparable investment options offered by other asset management firms:

$$\Delta Risky_{m,t} = \sum_{j=0}^{J} b_j \sum_{age=18-n+1}^{18} \frac{w_{risky,age,m,t-j} - \overline{w_{risky,age,t-j}}}{n} \tag{1}$$

$$\Delta Stocks_{m,t} = \sum_{j=0}^{J} b_j \sum_{age=18-n+1}^{18} \frac{w_{stocks,age,m,t-j} - \overline{w_{stocks,age,t-j}}}{n} \tag{2}$$

where $w_{risky,age,m,t}$ and $w_{stocks,age,m,t}$ denote the median risky asset and stock shares, respectively, of target-date investment options for age age offered by the asset management firm m at time t. $\overline{w_{risky,age,t}}$ and $\overline{w_{stocks,age,t}}$ are the country average risky asset and stock shares, respectively, for each age across all asset management firms at time t. $\sum_{age=18-n+1}^{18} \frac{w_{risky,age,m,t} - \overline{w_{risky,age,t}}}{n}$ and $\sum_{age=18-n+1}^{18} \frac{w_{stocks,age,m,t} - \overline{w_{stocks,age,t}}}{n}$ represent the average deviations of risky asset and stock shares, respectively, for target-date investment options offered by the asset management firm m from the corresponding country average shares over n years, from age 18-n+1 to age 18, when high school graduates are likely to make college enrollment decisions. The coefficients $\sum_{j=0}^{J} b_j = 1$ represent the historical weighted average accounting for historical exposure to portfolio allocation measures, as 64% of households with 529 accounts contribute annually to 529 accounts.[23]

Due to data availability, $n = 6$ and $J = 6$ in the baseline specification. The focus of my analysis is on high school graduates who make college enrollment decisions when they are around the age of 18. High school graduates are observed for the first time in individual-level SIPP data in 2013, while portfolio allocation measures are calculated using Morningstar data, which are of good quality only since 2008. So, for high school graduates observed in 2013, portfolio allocation measures are calculated using data from 2008 to 2013 ($J = 6$), when these students were 13-18 years old ($n = 6$ and $18 - n + 1 = 13$). As a robustness check, I also consider an alternative specification with different values of n . According to the theoretical foundations of the portfolio allocation measures presented in the Appendix E, for equal annual contributions over a period of six years: $b_5 = \frac{1}{21}$, $b_4 = \frac{2}{21}$, $b_3 = \frac{3}{21}$, $b_2 = \frac{4}{21}$, $b_1 = \frac{5}{21}$, and $b_0 = \frac{6}{21}$.

In equations (1) and (2), I use the average of deviations rather than the average of absolute values because, as will be demonstrated later, the deviations of risky and stock shares from the country average shares only slightly change with student age. While the absolute

[23]Source: Vanguard Research, 2019.

values of risky asset and stock shares change dramatically with student age. Consequently, it is not possible to calculate portfolio allocation measures based on the absolute values of risky and stock shares that would be informative for students of all ages, and such measures cannot be used as independent variables in the regression for the sample of students with different ages. I also use average deviation values that are the same for all ages rather than calculating deviations for each age, because merging the individual-level SIPP data with 529 portfolio allocation measures based on age would be imprecise due to several reasons.

First, I assume that 529 target-enrollment investment options (one type of target-date investment options) with a target enrollment year in y years from now include college savings of children aged $19-y$. Because the target enrollment year is not observed in the SIPP data, this assumption would result in imprecise merging based age for some students who take a gap year after high school before attending college, as well as those who skip or repeat school grades.

Second, 529 college savings plans in several states do not provide 529 target-enrollment portfolios for all target enrollment years. If there is no 529 target-enrollment portfolio with a target enrollment year that matches a child's target enrollment year, the child's college savings may be invested in either a 529 target-enrollment portfolio with an earlier target enrollment year in some states or a 529 target-enrollment portfolio with a later target enrollment year in other states. For instance, there can be 529 target-enrollment portfolios with target enrollment years y and $y+3$ but not with $y+1$ and $y+2$, and a child may expect to start college in year $y+1$. In some states, her college savings will be invested in a 529 target-enrollment portfolio with a target enrollment year y, while in others, they will be invested in a 529 target-enrollment portfolio with a target enrollment year $y+3$. Because there is no information in the data regarding the rule regulating the selection of 529 target-enrollment portfolios in such cases, merging based on age would be imprecise.

In addition to the data limitations associated with 529 target-enrollment portfolios that hinders merging based on child age, there is also a limitation associated with 529 age-based portfolios. For these portfolios, 529 program managers adjust the portfolio allocation of 529 accounts with age, but not necessarily on the child's birthday. In some states, 529 program managers actually change the portfolio allocation of 529 accounts on the child's birthday, whereas in others, portfolio allocation can be changed only once during a specified period (e.g., month, quarter). In such states, even if a child is a years old, her college savings can still be invested in the 529 age-based portfolio for $a-1$ age; therefore, a precise merging based on age is not possible for all students in these states, as information on the date of a change in the portfolio allocation of 529 accounts, when students become older, is unavailable.

Due to the aforementioned data limitations, I use the portfolio allocation measures calculated (in equations (1) and (2)) at the asset management firm level rather than at the asset management firm times age level. It is worth noting that the portfolio allocation measures from equations (1) and (2) will only be representative of 529 target-date investment options for different ages if the deviations of risky share and stock shares from their respective country averages are similar for different ages:

$$w_{risky,age,s,t} - \overline{w_{risky,age,t}} \approx w_{risky,age-j,s,t} - \overline{w_{risky,age-j,t}} \tag{3}$$

$$w_{stocks,age,s,t} - \overline{w_{stocks,age,t}} \approx w_{stocks,age-j,s,t} - \overline{w_{stocks,age-j,t}} \tag{4}$$

According to the data, the correlation between $w_{risky,age,m,t} - \overline{w_{risky,age,t}}$ and $w_{risky,age-1,m,t} - \overline{w_{risky,age-1,t}}$, as well as between $w_{stocks,age,m,t} - \overline{w_{stocks,age,t}}$ and $w_{stocks,age-1,s,t} - \overline{w_{stocks,age-1,t}}$ are higher than 0.75. Such extremely high correlations imply that if an asset management firm offers 529 target-date investment options with a riskier portfolio allocation for one age than other asset management firms, they will most likely offer a riskier portfolio allocation for other ages as well. Thus, equations (3) and (4) approximately hold on actual data, and the portfolio allocation measures from equations (1) and (2) are representative of 529 target-date investment options for different ages.

C. Exogeneity of 529 Portfolio Allocation Measures

An important question regarding the 529 portfolio allocation measures from equations (1) and (2) is whether these measures are exogenous to individual- and state-level factors, which may potentially affect savings behavior, college attendance, and student debt. As previously mentioned, the 529 portfolio allocation measures are likely to be mainly driven by institutional details associated with specific asset management firms, given that the majority of 529 investment options are managed by a handful of large asset management firms, each of which often offers identical 529 investment options in multiple states. Individual- and state-level factors are unlikely to affect the allocation of 529 investment options offered simultaneously in multiple states.

However, state authorities may choose asset management firms endogenously for their 529 college savings plans, and a small share of 529 investment options is offered only in one state. To provide additional evidence on the exogeneity of 529 portfolio allocation measures, Table B.3 in Appendix reports the results of the regression model, in which these portfolio allocation measures are regressed on the following annual state-level variables over the period 2008-2021: unemployment rate, log(real per capita personal income), log(population), real

GDP growth, and the share of adults with at least a bachelor degree. The standard errors are double clustered at the state and year levels. The results indicate that there is no significant relationship between state-level variables and 529 portfolio allocation measures.

VI. Effect of the Risky Share on College Attendance

A. Potential Effects for High School Graduates

Investing college savings in risky assets may affect college attendance in a number of ways. First, if family financial resources matter for college attendance decisions and markets generate positive returns, then having a higher share of risky assets in a 529 account will likely increase college attendance as a result of at least a mechanical effect on larger college savings. If the use of a 529 account indicates a student's willingness to attend at least any (two- or four-year) college, a higher share of risky assets in the 529 account may increase the probability of attending a more expensive, four-year college while decreasing the probability of attending a less expensive, two-year college. If the use of a 529 account does not indicate a student's willingness to attend at least any college, a higher share of risky assets in the 529 account should simultaneously increase the probabilities of attending two- and four-year colleges.

In addition, the aforementioned effects of a higher share of risky assets in the 529 account on college attendance may be mitigated for students who receive financial aid for two reasons. First, for these students, college savings cover only a portion of college expenses, with the remainder covered by financial aid. A smaller proportion of college costs financed by college savings suggests that a higher share of risky assets in the 529 account will have a lower impact on college attendance. Second, financial aid imposes an implicit tax on accumulated college savings in 529 accounts, thereby reducing the additional investment returns from a higher share of risky assets in these accounts. According to the rules for financial aid:

$$\frac{\partial(\text{Financial Aid})}{\partial(\text{529 Balance})} = -\alpha_{529} \tag{5}$$

where α529 is an asset conversion rate equals to 0.20 or 0.12, depending on whether the 529 account belongs to a student or parents. Financial aid is not available to all students because it is contingent on many variables, including household income and savings. For students who do not receive financial aid, such as those from households with a high income

or substantial savings:

$$\frac{\partial(\text{Funds for College})}{\partial(529 \text{ Balance})} = \frac{\partial(\text{College Savings})}{\partial(529 \text{ Balance})} = 1 \tag{6}$$

However, for students receiving financial aid:

$$\frac{\partial(\text{Funds for College})}{\partial(529 \text{ Balance})} = \frac{\partial(\text{College Savings+Financial Aid})}{\partial(529 \text{ Balance})} = 1 - \alpha_{529} \tag{7}$$

Therefore, the effect of a higher share of risky assets in 529 accounts on the amount of funds available for college should be lower for students receiving financial aid. Consequently, the effect of a higher share of risky assets in 529 accounts on college attendance should also be lower.

In addition to having direct effects on college attendance through 529 accounts, a higher share of risky assets in 529 accounts can have an indirect effect on college attendance through the amount of available finance aid. If many students at the same college have 529 accounts and accumulate larger college savings by investing a higher share of funds in risky assets in their accounts, it may reduce the amount of financial aid available for some of these students, resulting in more financial aid available for other students at this college.

B. Empirical Design

To study the effect of a higher risky share in 529 accounts on college attendance, I employ the following linear probability model:

$$Y_{i,m,s,t} = \sum_{g \in \{\text{with 529,without 529}\}} \beta_g \Delta Risky_{m,t} \mathbb{1}_g + \gamma X_{i,s,t} + \theta StateControls_{s,t} + \alpha_m + \alpha_{s,529} + \alpha_t + \epsilon_{i,m,s,t} \tag{8}$$

where $Y_{i,j,t}$ is four-year college attendance or any (two- or four-year) college attendance. $\Delta Risky_{m,t}$ denotes the risky share measure calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm m in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. The sample includes two groups of 12 grade school students in the spring semester who are expected to graduate from high school by the following fall semester (expected high school graduates): those with 529 accounts and those without 529 accounts. Dummy variables $\mathbb{1}_{\text{with 529}}$ and $\mathbb{1}_{\text{without 529}}$ equal 1 for high school graduates with and without a 529 account, respectively. $X_{i,s,gr,t}$ represent a vector of student and family characteristics, including parent's age and the number of chil-

dren in a household, as well as fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race. $StateControls_{s,t}$ is the list of time-varying state characteristics, including unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. α_m, $\alpha_{s,529}$, and α_t are asset management firm, state*529 account, and year fixed effects. Standard errors are clustered at the asset management firm level.

C. Results

Figure 6 plots the estimated effects of a 1% higher risky share in 529 accounts on four-year college and any (two- or four-year) college attendance in Panels A and B, respectively, for high school graduates with and without a 529 account. The results indicate that a 1% higher risky share in 529 accounts increases the probability of attending four-year college by 2.5 pp for high school graduates with 529 accounts. It also does not affect the probability of attending four-year college for high school graduates without 529 accounts indicating that the positive effect for high school graduates with 529 accounts is not driven by the indirect effect through the amount of available of financial aid. A 1% higher risky share does not affect the probability of attending any (two- or four-year) college for all high school graduates.

INSERT FIGURE 6

Figure 7 additionally plots the estimated effects of a 1% higher risky share in 529 accounts on college attendance by household income. The results indicate that the positive effect on four-year college attendance is concentrated at students with 529 accounts from households with income in the second and third tertiles.

INSERT FIGURE 7

Table III additionally compares the results for states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 college savings plans and for states where this percentage is relatively low. The results indicate that the effect of a higher risky share in in-state 529 accounts on four-year college attendance almost disappears for states where a low percentage of individuals with 529 accounts have 529 accounts in in-state 529 college savings plans.

INSERT TABLE III

D. Robustness

To provide evidence on the robustness of the main results, I conduct a placebo test, consider an alternative sample of high school graduates, and estimate regression models with alternative specifications of the risky share measure, a different set of fixed effects, and a different clustering of standard errors.

D.1. Placebo Test

I conduct a placebo test, in which the risky share of the asset management firm offering investment options in an in-state 529 plan is randomly assigned to the risky share of other asset management firms offering 529 investment options in other states. I generate 1,000 placebo samples, each with a different mapping between students and the risky share measure. Estimating the main regression on placebo samples allows to assess the likelihood of obtaining the main results purely by chance.

Figure 8 plots the empirical distribution of the placebo coefficients from all placebo samples for college attendance. The blue line additionally displays the actual point estimate from the main results. The observed effect on four-year college attendance from the main results differs significantly from the empirical distribution in Figure 8, indicating that the main results are unlikely to be driven by unaccounted structures of the data.

INSERT FIGURE 8

D.2. Alternative Sample of High School Graduates

Another robustness check is based on an alternative sample of high school graduates. This includes individuals who have not repeated any K-12 school grade and are one year after their expected high school graduation date based on their month and year of birth and state-level school entry age laws. Table B.4 in Appendix reports the estimated effect of a 1% higher risky share in the in-state 529 plan's menu on four-year college attendance and any college attendance for the alternative sample. The results are very similar to the results based on the initial sample.

D.3. Alternative Specifications of the Risky Share Measure

I also estimate the regression model for college attendance using alternative specifications of the risky share measure. Tables B.6 and B.5 in Appendix provide the results obtained using the risky share measure calculated similarly to equation (1), but based on the average values for ages 7 to 18 ($n = 12$) and ages 10 to 18 ($n = 9$), respectively.

The estimated effects of the alternative risky share measures on college attendance have a slightly larger magnitude than the estimated effects from the main results. This is caused by the fact that the alternative risky share measures based on ages 7 to 18 and ages 10 to 18 are mechanically slightly lower than the risky share measure based on ages 13 to 18, as variation in the risky share across asset management firms tends to slightly increase with age.

D.4. Alternative Clustering and a Different Set of Fixed Effects

A series of additional tables in the Appendix report the results using different regression specifications and clustering. Tables B.7 and B.8 present the estimated effects of the risky share on college attendance using standard errors clustered at the state and asset management firms times year levels, respectively. Table B.9 presents the estimated effect of the risky share on college attendance using a different set of fixed effect without the asset management firm fixed effect.

VII. Mechanism

A. 529 Account Balance

A higher risky share in 529 college savings accounts should lead to a larger 529 account balance over a long enough period due a mechanical effect on higher investment returns. To understand what the potential magnitude of this effect could be for the main sample and how this magnitude varies depending on market performance, I compare hypothetical investment results of three 529 target-date investment options based on Figure 5 using historical simulations over the 2010-2021 period: 529 target-date investment option with the minimum risky and stocks shares for each age, 529 target-date investment option with the median risky and stock shares for each age, and 529 target-date investment option with the maximum risky and stock shares for each age.

The results of these simulations are presented in Figure 9. In these simulations, I assume that households open a 529 account for their child when she is 5 years old and save for 13 full years until she is 18 years old, as the median child's age at which households open 529 accounts is less than 6 years.[24] I consider two scenarios: when households make annual contributions that increase with the inflation rate in Panel A, and when they make a lump-sum investment at the beginning in Panel B. 529 investment options are allocated to the

[24] Ascensus platform, as of 12/31/2022

S&P500 index, Baa corporate bonds, and cash. The stock share equals the share of 529 investment options allocated to the S&P500 index, the risky asset share minus the stock share equals the share of 529 portfolios allocated to Baa corporate bonds, and 1 minus the risky asset share is the share of 529 portfolios allocated to cash.

Figure 9 demonstrates the final account balance of the three 529 target-date investment options depending on school graduation year. The hypothetical amount that households would accumulate if they only saved for college through a savings account is normalised to 1. Except for the post-2009 period, the 529 target-date investment option with the highest shares of risky assets and stocks had the highest accumulated balance. The difference in balances between 529 target-date investment options with the highest and lowest shares of risky assets and stocks depended on market performance and was slightly negative after the global financial crisis of 2009. The final balances of all three 529 target-date investment options were significantly higher than the hypothetical amount that would be accumulated by households in any school graduation year if they saved for college solely through a savings account.

INSERT FIGURE 9

The exact effect of the risky share in 529 accounts on 529 account balance will significantly depend on the length of a saving period and the contribution schedule during this period, both of which are not observed. As a result, simulations cannot be used to calculate the average impact of a higher risky share in 529 accounts on the amount of college savings for the population of 529 account beneficiaries with varying account opening dates and contribution schedules during the saving period. A higher risky share may also affect participation in 529 college savings plan if households are more likely to participation after experiencing higher or lower investment returns in these plans.

To examine the effect of the risky share on 529 account balance and participation in 529 accounts, I employ the following empirical model estimated using the sample of school students in 9-12 grades:

$$Y_{i,m,s,t} = \sum_{g \in \{\text{HighInState,LowInState}\}} \beta_g \Delta Risky_{m,t} \mathbb{1}_g + \gamma X_{i,gr,s,t} + \theta StateControls_{s,t} + \alpha_m + \alpha_{gr,s} + \alpha_t + \epsilon_{i,gr,m,s,t} \quad (9)$$

where $Y_{i,gr,m,s,t}$ is the log of (1+529 account balance) or the dummy variable for participation in 529 accounts. $\Delta Risky$ denotes the risky share calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by

other asset management firms in the menus of 529 plans in other states. Dummy variables $\mathbb{1}_{\text{HighInState}}$ and $\mathbb{1}_{\text{LowInState}}$ equal 1 for students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 plans and states where this percentage is relatively low, respectively. $X_{i,s,gr,t}$ represent a vector of student and family characteristics, including parent's age and the number of children in a household, as well as fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race. $StateControls_{s,t}$ is the list of time-varying state characteristics, including unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. α_m, $\alpha_{gr,s}$, and α_t are asset management firm, grade*state, and year fixed affects. Standard errors are clustered at the state times year level.

Table IV reports the estimated effect of the risky share in 529 accounts on 529 account balance and participation in 529 accounts. The dependent variables are Log(529 Account Balance) in Columns (1)-(2) and participation in 529 accounts in Column (3). The results indicate that a higher risky share positively affects 529 account balance but not participation in 529 accounts. A 1% higher risky share leads to 4.6% higher 529 account balance for 9-12 grade high school students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 college savings plans over the sample period 2013-2021.

INSERT TABLE IV

In addition to the mechanical effect on the 529 account balance, there could be other channels explaining the main results for college attendance and student debt.

B. Other Components of Household Portfolios

A higher risky share can affect college attendance and student debt not only through 529 account balance, but through other components of household portfolios. For example, accumulating college savings in 529 accounts may have a spillover effect on investment in stocks outside 529 accounts through personal experience related to stocks. Higher or lower investment in stocks outside 529 accounts may subsequently affect college attendance and student debt. Contributing larger amounts to 529 accounts may also reduce liquid wealth outside these accounts affecting college attendance and student debt. To examine the effect of the risky share on other components of household portfolios, I employ a similar empirical

model as the regression model (9):

$$Y_{i,m,s,t} = \sum_{g \in \{\text{HighInState,LowInState}\}} \beta_g \Delta Risky_{m,t} \mathbb{1}_g + \gamma X_{i,gr,s,t} + \theta StateControls_{s,t} + \alpha_m + \alpha_{gr,s} + \alpha_t + \epsilon_{i,gr,m,s,t} \quad (10)$$

Table V reports the estimated effect of the risky share in 529 accounts on other components of household portfolios. The sample is limited to high school students from grades 9-12 with 529 accounts. The dependent variables are stock market participation in Column (1), log(1+Stocks/Mutual Funds) in Columns (2), bank account participation in Column (3), and log(1+Bank Account) in Column (4). The results indicate that a higher risky share does not affect other components of household portfolios.

INSERT TABLE V

Despite the fact that the risky share in 529 accounts significantly affects only the 529 balance and not other components of household portfolios, it is not possible to completely rule out the effect on other components of household portfolios, which may be too small to identify using the considered empirical design. However, my findings suggest that the effect on other parts of household portfolios is unlikely to be a first order channel explaining the main results for college attendance and student debt.

C. Contributions to 529 College Savings Accounts

Households may adjust contributions to 529 accounts based on prior personal investment experience, similar to the behavior observed outside of 529 accounts (Malmendier and Nagel (2011)).In this case, a higher risky share will result in larger contributions if previous investment returns were positive, and smaller contributions if previous investment returns were negative. The individual-level SIPP data do not include information on contributions to 529 accounts. However, the Morningstar data on 529 investment options allow to calculate flows to these options as a proxy for household contributions to 529 accounts. Specifically, I calculate quarterly flows to individual 529 investment options following Sialm et al. (2015) and Christoffersen and Simutin (2017):

$$\text{Flow}_{i,t} = \frac{TNA_{i,t} - (1 + r_{i,t})TNA_{i,t-1}}{(1 + r_{i,t})TNA_{i,t-1}} \quad (11)$$

where $TNA_{i,t}$ denotes total net assets for investment option i at time t, and $r_{i,t}$ is the investment option's quarterly return over the period t.

I investigate the effect of the lagged risky share on flows to 529 target-date investment

options using the following panel regression model:

$$\text{Flow}_{i,age,t} = \beta S_{i,age,t-1} \sum_{i=0}^{3} Return_{age,t-1-i} + \gamma \sum_{i=0}^{3} Return_{age,t-1-i} + \theta S_{i,age,t} + \alpha_{age} + \alpha_{year} + \alpha_q + \alpha_i + \epsilon_{i,age,t} \quad (12)$$

where $S_{i,age,t-1}$ is the lagged risky share for investment option i related to age age at time $t-1$. $\sum_{i=0}^{3} Return_{age,t-1-i}$ denotes the sum of the past four quarterly returns average across all investment options related to age age at time $t-1$. α_{age}, α_{year}, α_q, and α_i are age, year, quarter, and investment option fixed effects, respectively. Standard errors are double clustered at the investment option and time levels.

Table VI reports the estimated effect of the lagged risky share on flows to 529 target-date investment options. Flows in Columns (3) and (4) are normalized by the average flow across all target-date investment options for each age. Regression specifications in Columns (2) and (4) additionally include the intersection of the lagged risky share times the lagged average annual return with dummy variables for the three age groups: 7-10, 11-14, and 15-18.

According to the findings, a higher lagged risky share leads to larger flows after previous positive returns and smaller flows after previous negative returns. This effect increases with student age. Thus, increased household contributions following higher investment returns as a result of a higher risky share are another channel leading to a larger 529 account balance and explaining the effect on college attendance and student debt.

INSERT TABLE VI

D. Student Debt

Table VII reports the effect of a higher risky share in 529 accounts on student debt for students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 plans. The dependent variables are student debt participation in Columns (1) and (2) and the log of (1+student debt) in Columns (3), (4), and (5). The sample in Column (5) is additionally restricted to students with student debt only. The results indicate that a higher share of risky assets in 529 accounts leads to a -3.1 pp decrease in student debt participation and -27.9% decrease in the amount of student debt at the extensive margin. There is also no effect of a higher risky share in 529 accounts on student debt at the intensive margin in Column (5).

INSERT TABLE VII

E. K-12 School

A higher risky share may affect college attendance decisions not only through directly covering college expenses but also by improving K-12 school completion and performance. Having larger college savings may affect K-12 school completion and performance through expectations regarding future college, as well as through covering K-12 tuition expenses up to \$10,000 per year since 2018.[25] To study the effect of the risky share in 529 college savings accounts on K-12 school, I employ the following empirical model:

$$Y_{i,m,s,t+1} = \beta \Delta Risky_{m,t} + \gamma X_{i,s,t} + \theta StateControls_{s,t} + \alpha_m + \alpha_{s,age} + \alpha_t + \epsilon_{i,m,s,t} \quad (13)$$

where $Y_{i,m,s,t+1}$ is one of the following student outcomes: grade retention probability and dropout probability. $\Delta Risky$ denotes the risky share calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. $X_{i,s,t}$ represents a vector of student and family characteristics, which includes parent's age, the number of children, as well as fixed effects for the following student and family characteristics: parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race. $StateControls_{s,t}$ denotes the set of time-varying state characteristics, which includes unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. α_m, $\alpha_{s,age}$, and α_t are asset management firm, state*age, and year fixed effects. Standard errors are clustered at the state times year level.

INSERT TABLE VIII

Table VIII reports the estimated effect of the risky share in 529 accounts on K-12 school retention and dropout probabilities. The results indicate that the effect on four-year college attendance is unlikely to be driven by students' academic performance before college, as larger accumulated college savings due to a higher share of risky assets do not affect K-12 school grade retention or dropout rates.

[25]The Tax Cuts and Jobs Act of 2017 added K-12 tuition expenses at public, private, or religious schools to the list of qualified expenses for 529 college savings plans.

VIII. External Validity: the Allocation of College Savings Outside of 529 Accounts and Student Outcomes

A. Empirical Design

Despite the documented effect of the portfolio allocation of 529 accounts on college attendance, it not clear whether these results will be applicable to college savings outside of 529 accounts. However, households that save for college outside 529 accounts may invest in assets very different from assets related to the same asset class in 529 accounts. Households with 529 accounts do not have significant investment outside 529 accounts, as the median household with 529 accounts holds 92.4% of its stock and bond investment in these accounts, so the portfolio allocation of 529 accounts with be representative for the portfolio allocation of total college savings for these households.

To study how the portfolio allocation of college savings affects college attendance and student debt for households without 529 accounts, I employ the student-level data from the Education Longitudinal Study of 2002 (ELS:2002). I first provide stylized facts on the probabilities of college enrollment and having student debt associated with different savings options used by households to save for college. Figure A.6 plots the probabilities of four-year college enrollment (Panel A) and having student debt (Panel B) conditional on the use of specific saving options for the sample of 10th grade students from the ELS:2002.

INSERT FIGURE A.6

The observed probabilities indicate that the use of risky savings options, especially mutual funds, for college savings is associated with a higher probability of college enrollment and a lower probability of having student debt than the use of risk-free savings options, such as savings accounts or government bonds. However, the choice of savings options is endogenously determined by factors that most likely simultaneously affect college enrollment and student debt, for example, family income or parents' college education. Because of this reason, I explore a relation between the use of specific savings options (e.g., mutual funds, individual stocks, real estate, government bonds, alternative investment) to save for college and children's college enrollment and student loan participation controlling for family and student characteristics using the following linear probability model:

$$P(Y_{i,g,s}) = \sum_j \beta_j D_{j,i} + \gamma \text{Controls}_i + \alpha_{\text{St.FEs}} + \alpha_S + \epsilon_{i,g,s} \tag{14}$$

where $P(Y_{i,g,s})$ is the probability of a student outcome, $D_{j,i}$ denotes a dummy for savings option j. Controls_i is the set of control variables that includes parents' age and the number of dependants. $\alpha_{\text{St.FEs}}$ denotes the set of fixed effects for the following student and family characteristics: student's race, parent's income group, student's ability quartile, parent's marital status, student's gender, parent's level of education, and student being born in the US. α_S is the school fixed effect. Standard errors are clustered at the school level.

B. Results

Columns (1) and (2) in Table IX report the results where explanatory variables are the probability of enrollment at two- and four-year colleges, respectively. The use of neither savings options significantly differs from the use of a savings account by enrollment probability except for mutual funds. The allocation of college savings to mutual funds is associated with a 3% lower probability of attending a two-year college and with a 4% higher probability of attending a four-year college. So, the use of mutual funds to save for college is first of all associated with a better quality college. Column (3) shows that the use of mutual funds is not associated with a significantly different probability of attending any (two- or four-year) college, as higher four-year college attendance is compensated by lower two-year college attendance. Column (4) demonstrates that the use of stocks and real estate for sale is associated with a 4% higher probability of attending a four-year highly selective college (the top fifth of baccalaureate institutions based on students' test scores).

Column (5) shows the relation between the use of different savings options and the probability of having student debt. The use of both, mutual funds and individual stocks, leads to 4% and 5% lower probabilities of having student debt, respectively. Thus, only savings options related to stock market participation have a negative relation with student loan participation and a positive relation with the quality of college chosen.

One channel that can explain this result is higher returns from investing in stocks that lead to a greater amount of accumulated college savings. Columns (6) and (7) in Table IX demonstrate the relation between the use of specific savings options and the probability of having more than $5,000$ and more than $20,000$ in college savings, respectively. The use of mutual funds and individual stocks is associated with 13% and 16% greater probabilities of having $> \$5,000$ in college savings, respectively, and with 9% and 14% greater probabilities of having $> \$20,000$ in college savings, respectively, than the use of savings accounts. The savings option labelled "Another Form" in Table IX denotes the allocation of college savings to alternative asset classes, as gold, private equity, art, or antique. The allocation of college savings to these asset classes is also associated with a greater probability of having a sizeable

amount in college savings than the use of savings accounts. However, the effect is smaller than in the case of mutual funds and individual stocks: the allocation of college savings to alternative asset classes is associated with 7% and 8% higher probabilities of having $> \$5,000$ and $> \$20,000$ in college savings, respectively. Thus, my results based on variation in the portfolio allocation of 529 accounts are also applicable to the portfolio allocation of college savings outside of 529 accounts.

INSERT TABLE IX

Table B.10 in Appendix reports the relationship between the choice of college savings investment options and the probability of having a specific amount in college savings. Using the reported coefficients, I calculated that the use of mutual funds associated with a 4% higher probability of attending a four-year college (from Table IX) is also associated with a $4,445 increase in college savings in 2002 dollars or with a $6,850.61 increase in 2021 dollars.[26]

IX. Policy Implications

A. Effect of College Savings on College Attendance

The plausibly exogenous variation in the share of risky assets in 529 accounts employed in my main empirical analysis can also be used to obtain new evidence on the effect of 529 account balance on college attendance. However, due to a few limitations, it cannot be applied directly as an instrumental variable for the 529 account balance.

The SIPP collects information on 529 account balances in December, when students are still in 12 school grade or have already started college. The 529 account balance in December during the 12 grade will likely be lower from the 529 account balance used to make college attendance decisions in Spring or Summer because of additional investment returns and additional contributions during this time. The 529 account balance in December after finishing high school will also likely be lower from the 529 account balance used to make college attendance decisions, because some student may start attending college and spend a part of funds in a 529 account. In addition, some parents have covered K-12 private school tuition using funds from 529 college savings accounts since 2019, so 529 account balances for the high school students of those parents will underestimate the amount of college savings affecting college attendance decisions. Finally, making college attendance decisions, households may consider the fact that 529 account balances will continue to grow

[26]Converted using the Consumer Price Index for All Urban Consumers

while students attend college, so the 529 account balance at any given point in time around college admission will differ from the 529 account balance used to make college attendance decisions.

To overcome these limitations, I consider a simple portfolio model showing how the effect on the risky share on 529 account balance from Table IV should be modified to match with the effect of the risky share on four-year college attendance from Table III to obtain the effect of 529 account balance on four-year college attendance. After matching both effects, I find that a $10,000 increase in college savings is associated with from 10.3 pp to 14.1 pp higher four-year college attendance. This estimate is much higher than the existing estimates for middle- and higher-income households from the prior literature. Bastian and Michelmore (2018) find no significant effect on initial college attendance; Hilger (2016) - 0.5 pp per $100,000; Bulman et al. (2021) - 0.6 pp per $100,000; Lovenheim (2011) - 0.7 pp per $10,000 on average. However, this estimate is in line with the existing estimates for lower-income households: Lovenheim (2011) - 5.7 pp per $10,000 for lower-resource families; Manoli and Turner (2018) - 1.3 pp per $1,000 for students from very low-income families.

A difference in magnitudes can be explained by two key distinctions between my empirical design and the empirical designs from the previous literature. First, in contrast to the previous literature, I work with an amount saved solely for college instead of family financial resources in general, as general financial resources may be accumulated for other reasons than financing college education. For instance, a family with $100,000 in total savings may only have $10,000 saved for college. In this case, the previous literature would calculate the effect per $100,000 in total savings, whereas I calculate the same effect per $10,000 in college savings. Consequently, the same effect would result in a significantly higher estimate based on my empirical design.

Second, I employ the sample of children and young adults, whose families save for college. This sample likely differs from the total population of children and young adults, as only half of families save for children's college.[27] The effect of family financial resources on college attendance is likely to be greater for students from families with college savings than for students from families without college savings, as college savings may indicate a student's and family's decision to attend college. Furthermore, my results actually in line with the fact that college savings may be an indicator of future college attendance. If families or students decide to attend at least any college, then larger college savings will enable them to pay for a more expensive, four-year college. As a result, larger college savings will have no effect on

[27]According to the High School Longitudinal Study of 2009, parents of 46.2% 9th grade students and of 50.5% 11th grade students report a positive amount of college savings.

the probability of attending any college but will have a positive effect on the probability of attending a four-year college. These are exactly the results I obtain in my empirical analysis.

B. Financial Aid Policy Design

The results suggest that college savings are likely more important than other family financial resources. However, the calculation of expected family contribution based on FAFSA in the US does not account for a difference in the importance of assets specifically saved for college and other assets. Some families may have large assets but not transfer these asset to their children to pay for college. For example, step-parents are less likely to transfer financial resources to children who are not their offspring (Fagereng et al. (2023)). The current financial aid rules may be not socially optimal due to not distinguishing assets specifically saved for college and other assets.

C. Parental Financial Literacy Promotion

The positive effect of investing college savings in risky assets on four-year college attendance suggests that investment decisions related to college savings will be a channel through which such factors as parental risk aversion and financial literacy will also affect four-year college attendance. Parental financial literacy promotion can be an effective strategy for increasing children's four-year college attendance through this channel.

D. 529 College Savings Plans Design

My results also suggest that the design of 529 college savings plans has potential for improvement. I find that the effect of portfolio allocation in 529 accounts on college attendance differs significantly between students from lower- and higher-income households likely because of a different level of available financial aid. Nonetheless, 529 program managers offer the same 529 investment options to families of both student groups. Many households have low financial literacy, as a result, they may not optimize portfolio allocation within 529 accounts.[28] These households likely select 529 portfolios without taking into account the effect of financial aid rules on their investment returns.

Another potential area for improvement in the design of 529 college savings plans is the rebalancing strategy in 529 target-date investment options. Many households only invest in target-date investment options, and the same rebalancing strategy may not be optimal

[28]Multiple studies show that the US population's financial literacy is quite low; a review of this literature can be found in Lusardi and Mitchell (2014).

for different households. Most asset management firms offer a single rebalancing strategy or three rebalancing strategies - with low, median, and high risk; however, such a limited selection of target-date investment options may be insufficient.

In addition, the rebalancing strategy in 529 target-date investment options follows the same logic as in target-date pension funds, with the portfolio allocation becoming less risky as age increases. Nevertheless, there is no guarantee that the rebalancing strategy of target-date pension funds can be applied to college savings. A less risky allocation of pension savings nearer to retirement can be explained by life-cycle models with undiversifiable labour income risk (e.g., Cocco et al. (2005), Gomes and Michaelides (2005), Polkovnichenko (2006)). However, according to these models, households should allocate a large share of their portfolios to stocks between the ages of 40 and 50, when their children are in the pre-college years. In contrast, the share of stocks in 529 target-date investment options for pre-college-aged children is typically low or even zero in certain 529 plans. In addition, as previously mentioned, the majority of households with 529 accounts hold almost all of their investments in stocks and bonds in these accounts, so a low share of 529 accounts invested in stocks indicates that these households also have a low share of stocks in their overall portfolios. Incorporating the existence of children in life-cycle models (Love (2009) and Hubener et al. (2015)) also does not allow for an explanation of the low share of college savings invested in stocks for families with pre-college-aged children.

X. Conclusion

This paper evaluates the effect of investing college savings in risky assets on college attendance. My empirical setting exploits plausibly exogenous variation in the portfolio allocation of investment options offered by asset management firms within 529 college savings plans. I find that a 1 percentage point higher share of risky assets in 529 accounts increases the four-year college attendance of high school graduates with these accounts by 2.7 percentage points (4.4%) over the period 2013-2021. A higher share of risky assets in 529 accounts has no significant effect on the probability of attending any (two- or four-year) college, as higher four-year college attendance is compensated by lower two-year college attendance. In addition, investing college savings in risky assets is also associated with a higher probability of attending a highly selective four-year college.

Exploring the mechanism underlying the main results, I find that the effect on four-year college attendance is driven by larger college savings as a result of higher ex-post investment returns and increased household contributions to 529 accounts after experiencing

such returns. The effect depends on the ex-post market performance during the saving period and may even be opposite if ex-post returns are negative over a long period. The evidence suggests that this effect is also partially explained by the commitment of funds to be used for qualified expenses, as investing college savings in risky assets outside of 529 accounts without the commitment is associated with a lower effect on four-year college attendance.

Overall, my results suggest that college savings investment decisions and the portfolio allocation of investment options offered in 529 college savings plans substantially affect investments in human capital. In addition to influencing individual college enrollment decisions, variation in the portfolio allocation of 529 investment options across asset management firms has important implications for four-year college attendance rates at the state level, as it results in between-state variation in accumulated college savings of up to half the tuition costs of a four-year, in-state college degree over the period 2013-2021.

REFERENCES

Akee, Randall K. Q., William E. Copeland, Gordon Keeler, Adrian Angold, and E. Jane Costello, 2010, Parents' incomes and children's outcomes: A quasi-experiment using transfer payments from casino profits, *American Economic Journal: Applied Economics* 2, 86–115.

Alstadsæter, Annette, 2010, Measuring the Consumption Value of Higher Education, *CESifo Economic Studies* 57, 458–479.

Babiarz, Patryk, and Tansel Yilmazer, 2009, The impact of college financial aid rules on household portfolio choice, *National Tax Journal* 62, 635.

Balduzzi, Pierluigi, and Jonathan Reuter, 2018, Heterogeneity in Target Date Funds: Strategic Risk-taking or Risk Matching?, *The Review of Financial Studies* 32, 300–337.

Balthrop, Justin, and Gjergji Cici, 2022, Conflicting incentives in the management of 529 plans .

Bastian, Jacob, and Katherine Michelmore, 2018, The long-term impact of the earned income tax credit on children's education and employment outcomes, *Journal of Labor Economics* 36, 1127–1163.

Belley, Philippe, and Lance Lochner, 2007, The changing role of family income and ability in determining educational achievement, *Journal of Human Capital* 1, 37–89.

Bogan, Vicki L, 2014, Savings incentives and investment management fees: A study of the 529 college savings plan market, *Contemporary Economic Policy* 32, 826–842.

Bogan, Vicki L., 2015, Household asset allocation, offspring education, and the sandwich generation, *American Economic Review* 105, 611–15.

Bulman, George, Robert Fairlie, Sarena Goodman, and Adam Isen, 2021, Parental resources and college attendance: Evidence from lottery wins, *American Economic Review* 111, 1201–40.

Cameron, Stephen V., and James J. Heckman, 1998, Life cycle schooling and dynamic selection bias: Models and evidence for five cohorts of american males, *Journal of Political Economy* 106, 262–333.

Cameron, Stephen V., and James J. Heckman, 2001, The dynamics of educational attainment for black, hispanic, and white males, *Journal of Political Economy* 109, 455–499.

Charles, Kerwin Kofi, Erik Hurst, and Matthew J. Notowidigdo, 2018, Housing booms and busts, labor market opportunities, and college attendance, *American Economic Review* 108, 2947–94.

Chetty, Raj, David J Deming, and John N Friedman, 2023, Diversifying society's leaders? the determinants and causal effects of admission to highly selective private colleges .

Christoffersen, Susan E. K., and Mikhail Simutin, 2017, On the Demand for High-Beta Stocks: Evidence from Mutual Funds, *The Review of Financial Studies* 30, 2596–2620.

Chyi, Hau, and Binzhen Wu, 2011, The effects of college financial aid on household savings and portfolios-evidence from the 1992 amendments to the higher education act .

Cocco, João F., Francisco J. Gomes, and Pascal J. Maenhout, 2005, Consumption and Portfolio Choice over the Life Cycle, *The Review of Financial Studies* 18, 491–533.

Coelli, Michael B., 2011, Parental job loss and the education enrollment of youth, *Labour Economics* 18, 25–35.

Cooper, Daniel, and María José Luengo-Prado, 2015, House price growth when children are teenagers: A path to higher earnings?, *Journal of Urban Economics* 86, 54–72.

Crandall-Hollick, Margot L, 2021, Higher education tax benefits: Brief overview and budgetary effects. crs report r41967, version 51. updated., *Congressional Research Service* .

Curtis, Quinn, 2020, Costs, conflicts, and college savings: Evaluating section 529 savings plans, *Yale Journal on Regulation* 37, 116.

Deming, David, and Susan Dynarski, 2010, College aid, in *Targeting investments in children: Fighting poverty when resources are limited*, 283–302 (University of Chicago Press).

Dick, Andrew W., and Aaron S. Edlin, 1997, The implicit taxes from college financial aid, *Journal of Public Economics* 65, 295 – 322.

Elliott, William, and Sondra G. Beverly, 2011, The role of savings and wealth in reducing" wilt" between expectations and college attendance, *Journal of Children and Poverty* 17, 165–185.

Elliott, William, Melinda Lewis, Michal Grinstein-Weiss, and IlSung Nam, 2014, Student loan debt: Can parental college savings help?, *Federal Reserve Bank of St. Louis Review* 96, 331–357.

Fagereng, Andreas, Luigi Guiso, Luigi Pistaferri, and Marius AK Ring, 2023, Insuring labor income shocks: The role of the dynasty .

Foerster, Stephen, Juhani T. Linnainmaa, Brian T. Melzer, and Alessandro Previtero, 2017, Retail financial advice: Does one size fit all?, *Journal of Finance* 72, 1441–1482.

Gomes, Francisco, and Alexander Michaelides, 2005, Optimal life-cycle asset allocation: Understanding the empirical evidence, *The Journal of Finance* 60, 869–904.

Gong, Yifan, Lance Lochner, Ralph Stinebrickner, and Todd R Stinebrickner, 2019, The consumption value of college, Working Paper 26335, National Bureau of Economic Research.

Hilger, Nathaniel G., 2016, Parental job loss and children's long-term outcomes: Evidence from 7 million fathers' layoffs, *American Economic Journal: Applied Economics* 8, 247–83.

Hotz, V. Joseph, Emily E Wiemers, Joshua Rasmussen, and Kate Maxwell Koegel, 2018, The role of parental wealth and income in financing children's college attendance and its consequences, Working Paper 25144, National Bureau of Economic Research.

Hubener, Andreas, Raimond Maurer, and Olivia S. Mitchell, 2015, How Family Status and Social Security Claiming Options Shape Optimal Life Cycle Portfolios, *Review of Financial Studies* 29, 937–978.

Jacob, Brian, Brian McCall, and Kevin Stange, 2018, College as country club: Do colleges cater to students' preferences for consumption?, *Journal of Labor Economics* 36, 309–348.

Jerphanion, Emiel, 2020, Student loan supply, parental saving & portfolio allocation .

Keane, Michael P., and Kenneth I. Wolpin, 2001, The effect of parental transfers and borrowing constraints on educational attainment, *International Economic Review* 42, 1051–1103.

Li, James J, Olivia S Mitchell, and Christina Zhu, 2023, Household investment in 529 college savings plans and information processing frictions .

Linnainmaa, Juhani T., Brian T. Melzer, and Alessandro Previtero, 2021, The misguided beliefs of financial advisors, *Journal of Finance* 76, 587–621.

Lochner, Lance J., and Alexander Monge-Naranjo, 2011, The nature of credit constraints and human capital, *American Economic Review* 101, 2487–2529.

Long, Bridget Terry, and Eric Bettinger, 2017, Simplification, assistance, and incentives: A randomized experiment to increase college savings .

Long, Mark, 2004, The impact of asset-tested college financial aid on household savings, *Journal of Public Economics* 88, 63 – 88.

Love, David A., 2009, The Effects of Marital Status and Children on Savings and Portfolio Choice, *Review of Financial Studies* 23, 385–432.

Lovenheim, Michael F., 2011, The effect of liquid housing wealth on college enrollment, *Journal of Labor Economics* 29, 741–771.

Lovenheim, Michael F., and C. Lockwood Reynolds, 2013, The effect of housing wealth on college choice: Evidence from the housing boom, *Journal of Human Resources* 48, 1–35.

Lusardi, Annamaria, and Olivia S. Mitchell, 2014, The economic importance of financial literacy: Theory and evidence, *Journal of Economic Literature* 52, 5–44.

Løken, Katrine V., 2010, Family income and children's education: Using the norwegian oil boom as a natural experiment, *Labour Economics* 17, 118–129.

Malmendier, Ulrike, and Stefan Nagel, 2011, Depression Babies: Do Macroeconomic Experiences Affect Risk Taking?, *Quarterly Journal of Economics* 126, 373–416.

Manoli, Day, and Nicholas Turner, 2018, Cash-on-hand and college enrollment: Evidence from population tax data and the earned income tax credit, *American Economic Journal: Economic Policy* 10, 242–71.

Martini, Alberto, Davide Azzolini, Barbara Romano, and Loris Vergolini, 2020, Increasing college going by incentivizing savings: Evidence from a randomized controlled trial in italy, *Journal of Policy Analysis and Management* .

Nam, Jaehyun, and David Ansong, 2015, The effects of a dedicated education savings account on children's college graduation, *Economics of Education Review* 48, 198–207.

Pan, Weixiang, and Ben Ost, 2014, The impact of parental layoff on higher education investment, *Economics of Education Review* 42, 53–63.

Polkovnichenko, Valery, 2006, Life-Cycle Portfolio Choice with Additive Habit Formation Preferences and Uninsurable Labor Income Risk, *The Review of Financial Studies* 20, 83–124.

Reyes, Jessica Wolpaw, 2008, College financial aid rules and the allocation of savings, *Education Economics* 16, 167–189.

Rozhkova, Anna, and Alexey Vasilenko, 2023, How does menu design affect college savings plans' attractiveness? .

Sialm, Clemens, Laura T Starks, and Hanjiang Zhang, 2015, Defined contribution pension plans: Sticky or discerning money?, *The Journal of Finance* 70, 805–838.

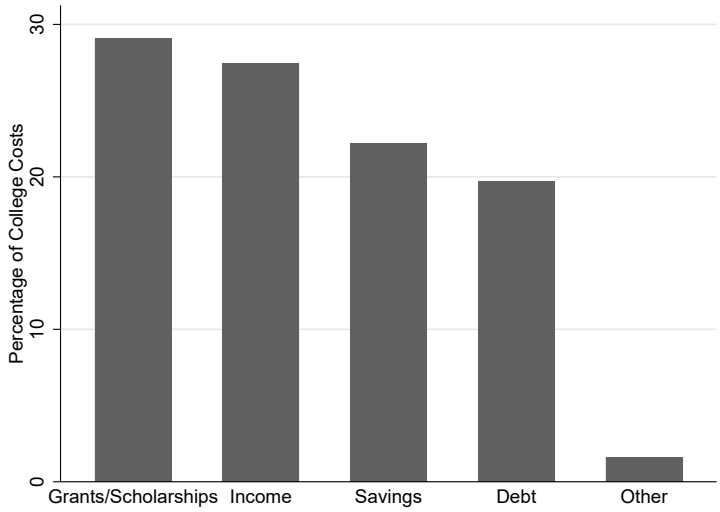
Simutin, Mikhail, 2013, Cash Holdings and Mutual Fund Performance*, *Review of Finance* 18, 1425–1464.

Wermers, Russ, 2000, Mutual fund performance: An empirical decomposition into stock-picking talent, style, transactions costs, and expenses, *The Journal of Finance* 55, 1655–1695.

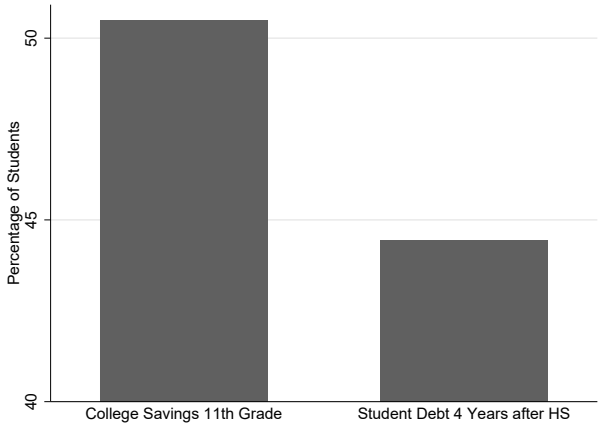
Figures

Figure 1. Role of College Savings in Financing College Education

Panel A. Percentage of College Expenses Covered by Funding Source

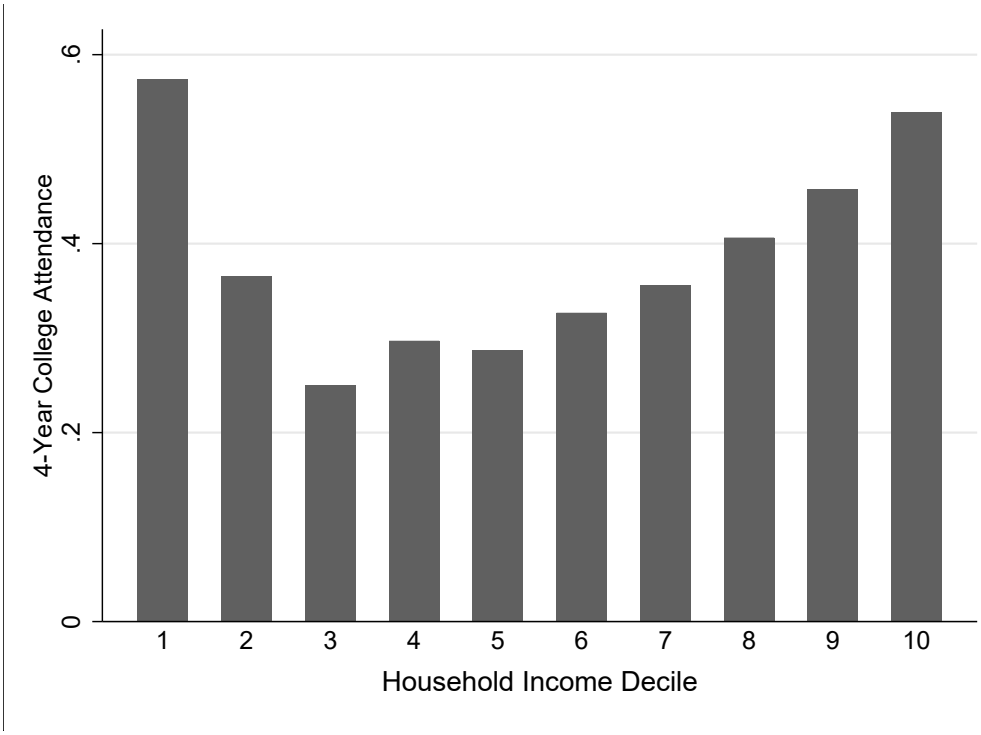


Panel B. Percentages of High School Students with College Savings and Student Debt Later in Life



Notes: This figure demonstrates the role of college savings in financing college education. Panel A shows the percentages of college expenses covered by different funding sources using data from the Sallie Mae's study "How America Pays for College 2023." Panel B displays the percentages of high school students with college savings and student debt later in life using data from the High School Longitudinal Study of 2009. The sample consists of high school students who were in the 9th grade in the fall of 2009. The data on college savings are for the spring of 2012, when most students were in the 11th grade. The data on student debt are for 2017, four years after the expected high school graduation date.

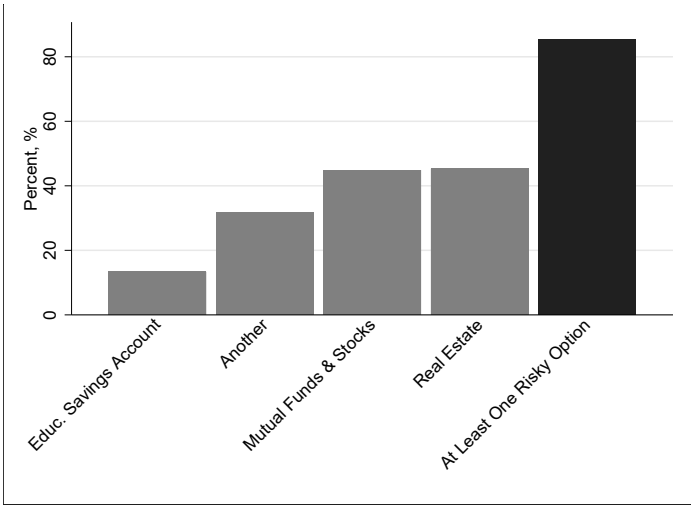
Figure 2. Immediate Four-Year College Attendance by Household Income Decile



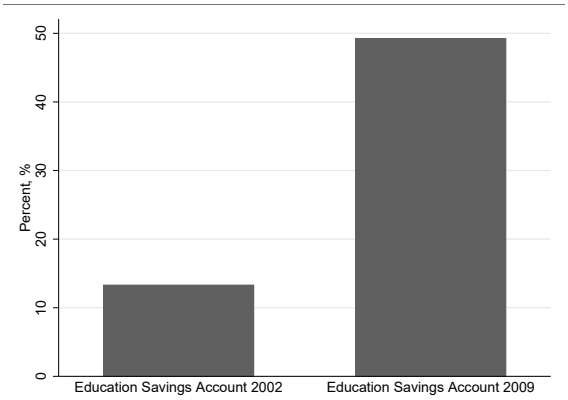
Notes: This figure demonstrates the immediate four-year college attendance rate by household income decile. The immediate four-year college attendance rate is the percentage of high school graduates who finish high school by the fall semester and immediately attend a four-year college during the fall semester. The sample consists of high school graduates from the Survey of Income and Program Participation and covers the period 2013-2021.

Figure 3. Percentages of Families That Save for College Using Specific Risky Savings Options

Panel A. Percentages of Families That Save for College Using Specific Risky Savings Options in 2002

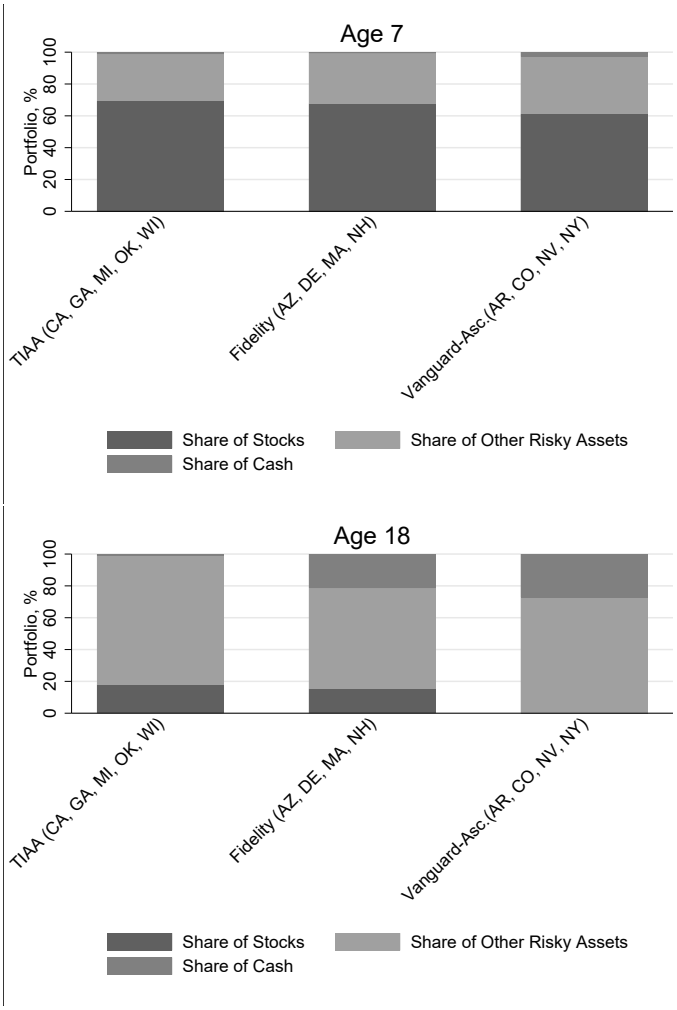


Panel B. Percentages of Families That Save for College Using Education Savings Accounts in 2002 and 2009



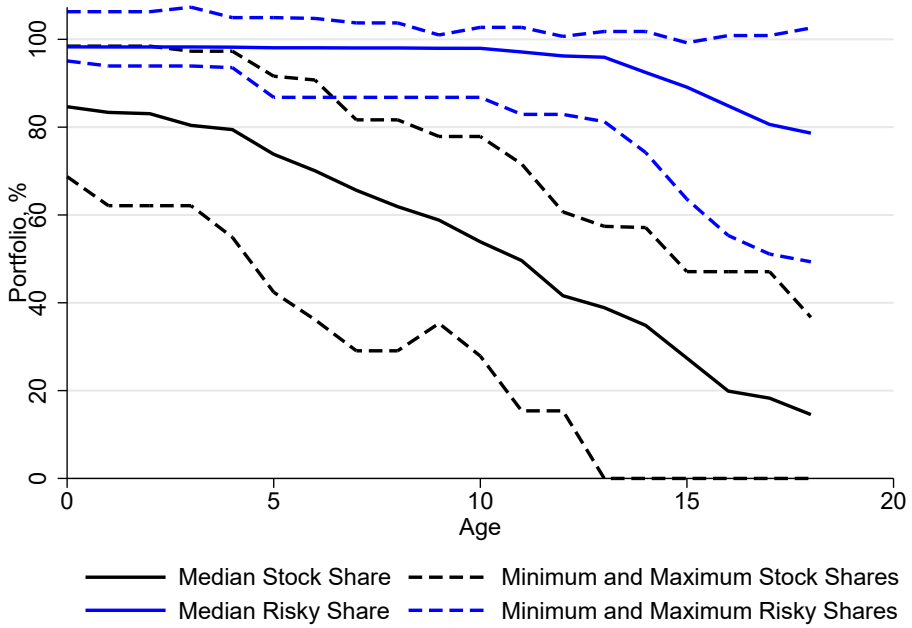
Notes: This figure demonstrates the percentages of families that save for college using specific risky college savings options. Panel A demonstrates the percentages of high school students whose parents invested in specific risky savings options to save for college in 2002. Panel B compares the percentages of high school students whose parents invested in education savings accounts to save for college in 2002 and 2009. Data for 2002 are based on the sample of 10th grade school students whose parents save for college from the Education Longitudinal Study of 2002. Data for 2009 are based on the sample of 9th grade school students whose parents save for college from the High School Longitudinal Study of 2009.

Figure 4. 529 Target-Date Investment Options for Ages 7 and 18 Offered by Three Asset Management Firms in 2021 (Example)



Notes: This figure illustrates an example of 529 target-date investment options offered by three large 529 program managers to children/young adults of ages 7 and 18 in 2021. Each of three large asset management firms - Fidelity, TIAA, and Vanguard in cooperation with Ascensus - offers identical 529 investment options in multiple states for children/young adults of ages 7 and 18, but the allocation of 529 investment options varies by asset management firm. Data on 529 investment options are from Morningstar.

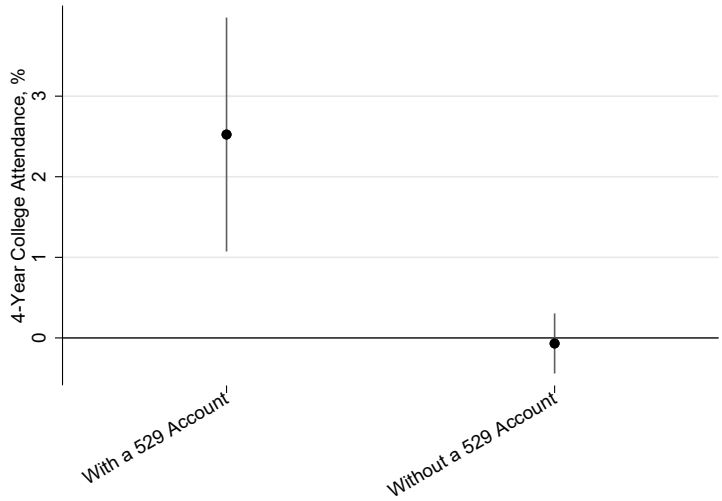
Figure 5. Variation in the Allocation of 529 Target-Date Investment Options across Ages and Asset Management Firms in 2021



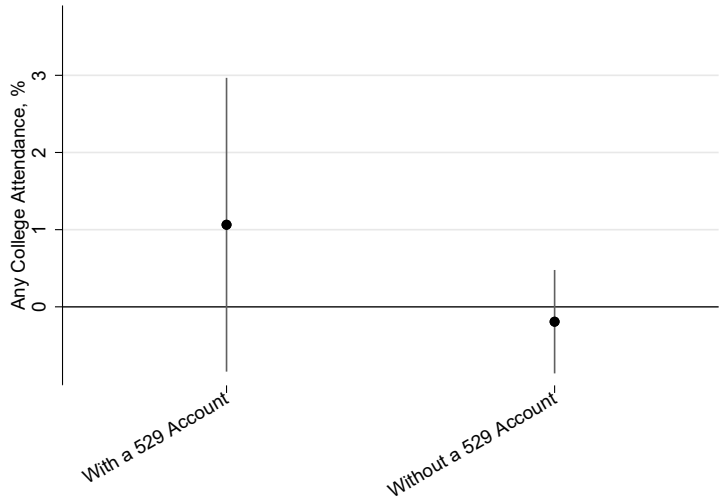
Notes: This figure demonstrates variation in the portfolio allocation of 529 target-date investment options in 2021 and plots the minimum, median, and maximum risky asset and stock shares for these options at the asset management firm level across ages. Data on 529 investment options are from Morningstar.

Figure 6. Effect of a 1% Higher Risky Share in the In-State 529 Plan's Menu on College Attendance for High School Graduates with and without a 529 Account

Panel A. Four-Year College Attendance



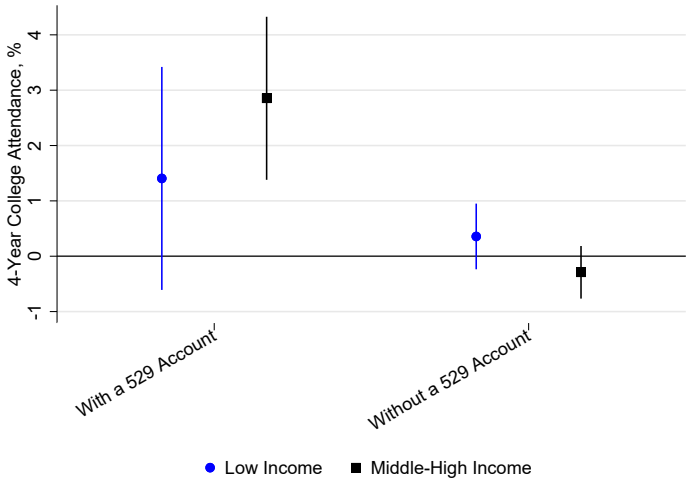
Panel B. Any (Two- or Four-Year) College Attendance



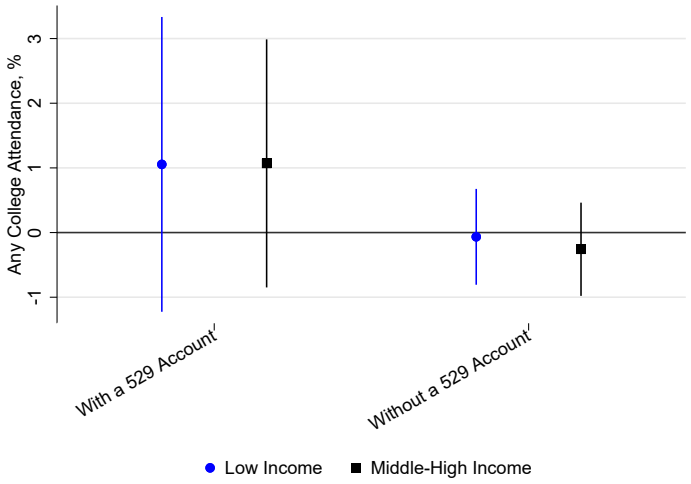
Notes: This figure demonstrates the estimated effect of a 1% higher risky share in the in-state 529 plan's menu on *four-year college attendance* in Panel A and on *any (two- or four-year) college attendance* in Panel B from the OLS regression (8) for high school graduates with and without a 529 account. The sample comes from the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options and includes two groups of 12 grade school students in the spring semester who are expected to graduate from high school by the following fall semester (expected high school graduates): those with 529 accounts and those without 529 accounts. The dependent variables are dummy variables that equal 1 if a high school graduate attends a four-year college (Panel A) or any college (Panel B) during the following fall semester. The risky share is calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. The regression specification includes asset management firm, state times 529 account dummy, and year fixed effects, the set of student and family fixed effects and controls, as well as state controls. The bars indicate 95% confidence intervals based on standard errors clustered at the asset management company level.

Figure 7. Effect of a 1% Higher Risky Share in the In-State 529 Plan's Menu on College Attendance for High School Graduates with and without a 529 Account by Household Income

Panel A. Four-Year College Attendance

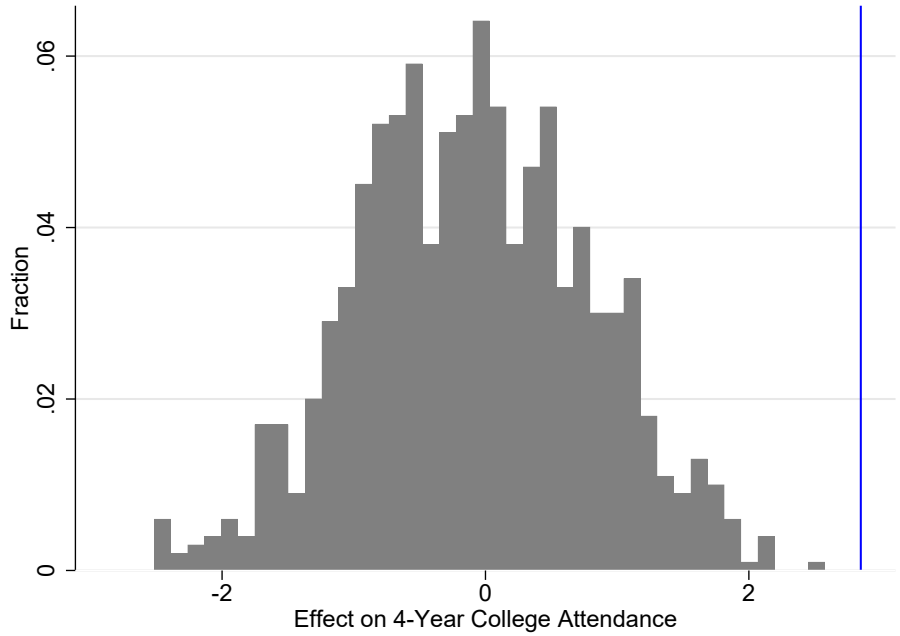


Panel B. Any (Two- or Four-Year) College Attendance



Notes: This figure demonstrates the estimated effect of a 1% higher risky share in the in-state 529 plan's menu on *four-year college attendance* in Panel A and on *any (two- or four-year) college attendance* in Panel B from the regression (8) for high school graduates with and without a 529 account. The sample comes from the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options and includes two groups of 12 grade school students in the spring semester who are expected to graduate from high school by the following fall semester (expected high school graduates): those with 529 accounts and those without 529 accounts. Each group is further subdivided into 12 grade school students from the first tertile of household income (low income, blue bars) and from the second and third tertiles of household income (middle-high income, black bars). The dependent variables are dummy variables that equal 1 if a high school graduate attends a four-year college (Panel A) or any college (Panel B) during the following fall semester. The risky share is calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. The regression specification includes asset management firm, state times 529 account dummy, and year fixed effects, the set of student and family fixed effects and controls, as well as state controls. The bars indicate 95% confidence intervals based on standard errors clustered at the asset management company level.

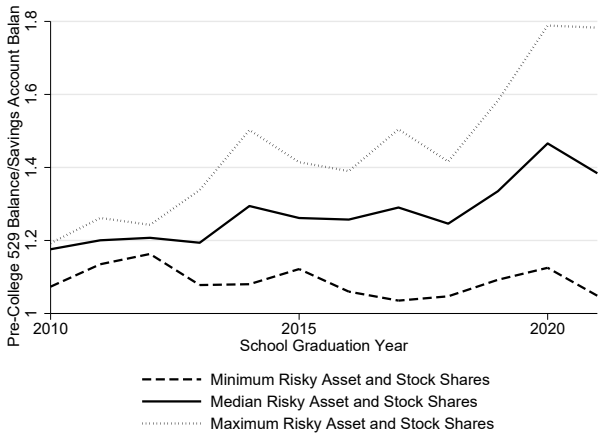
Figure 8. Placebo Test (Random Permutations) for the Effect of a 1% Higher Risky Share in In-State 529 Plan's Menu on Four-Year College Attendance for High School Graduates with 529 Accounts



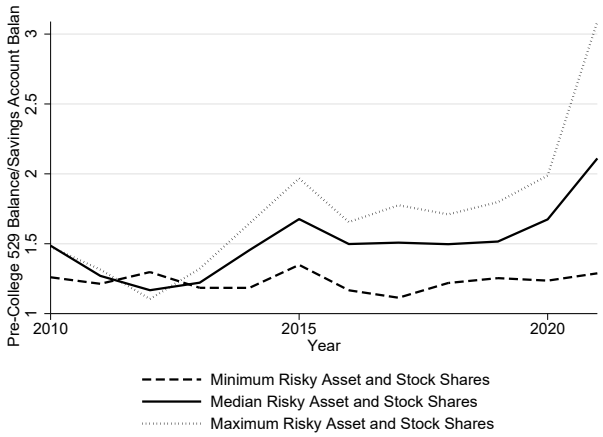
Notes: This figure plots the histogram of the estimated coefficients from 1,000 placebo regressions for the effect of a 1% higher risky share in the in-state 529 plan's menu on four-year college attendance for high school graduates with 529 accounts. Each placebo sample is generated by randomly assigning the risky share of the asset management firm offering 529 target-date investment options in the in-state 529 plan to the risky share of other asset management firms offering 529 target-date investment options in the menus of 529 plans in other states. The blue line additionally displays the actual point estimate from the main results.

Figure 9. Historical Simulations: Investing in 529 Account vs Using Saving Account over a 13-Year Period

Panel A. Annual Contributions



Panel B. Lump-Sum Investment



Notes: This figure demonstrates the results of historical simulations for the final account balance of three 529 target-date investment options with the minimum (dashed line), median (solid line), and maximum (dotted line) risky asset and stock shares for each age from Figure 5 depending on high school graduation year. The hypothetical amount that households would accumulate if they only saved for college through a savings account is normalised to 1. These simulations are based on the assumption that households save for 13 years between the ages of 6 and 18. In Panel A, households make annual contributions that increase with the inflation rate, while in Panel B, they make a lump-sum investment at the start. 529 investment options are allocated to the S&P500 index, Baa corporate bonds, and cash. The stock share equals the share of 529 investment options allocated to the S&P500 index, the risky asset share minus the stock share equals the share of 529 investment options allocated to Baa corporate bonds, and 1 minus the risky asset share equals the share of 529 investment options allocated to cash.

Tables

Table I. Summary Statistics: Individual-Level Panel Data from the Survey of Income and Program Participation

	Mean	Median	SD	Min	Max	# Obs.
Sociodemographics						
Age (Years)	13.25	13	7	0	26	152,589
Female	0.49	0	0	0	1	152,589
White	0.74	1	0	0	1	152,589
Black	0.14	0	0	0	1	152,589
Asian	0.05	0	0	0	1	152,589
Parent's College Education	0.31	0	0	0	1	152,589
Parent's Marital Status	0.57	1	0	0	1	152,589
Number of Children in a Household	1.87	2	1	0	11	152,589
Monthly Household Income	7,823.19	5,477	8,133	0	47,572	152,589
Household Metropolitan Status	0.79	1	0	0	1	152,589
Education and Student Debt						
K-12 School Grade	6.47	6	3	1	12	68,104
Enrolled in Any (Two- or Four-Year) College	0.39	0	0	0	1	43,791
Enrolled in Four-Year College	0.24	0	0	0	1	43,791
Student Debt Participation	0.23	0	0	0	1	43,791
Student Debt	4,440.78	0	11,868	0	70,000	43,784
Assets at the Individual Level						
529 Plan Participation - Individual	0.07	0	0	0	1	152,589
529 Account Balance	26,296.99	10,000	41,979	1	239,000	9,102
Assets at the Household Level						
529 Plan Participation - Household	0.10	0	0	0	1	152,589
Have a Bank Account	0.87	1	0	0	1	152,589
Bank Accounts	19,769.10	2,500	54,902	0	467,505	152,589
Stock Market Participation	0.16	0	0	0	1	152,589
Stocks & Mutual Funds	19,161.79	0	105,060	0	1,090,000	152,589

Notes: This table presents summary statistics for the individual-level data from the Survey of Income and Program Participation. The sample includes children and young adults aged 26 and under. Data cover the period 2013-2021 and come from the following six panels: SIPP 2014 (2013-2016), SIPP 2018 (2017-2020), SIPP 2019 (2018 year), SIPP 2020 (2019-2021, ongoing), SIPP 2021 (2020-2021, ongoing), and SIPP 2022 (2021 year, ongoing). Continuous variables are winsorized at the 1% and 99% levels.

Table II. Summary Statistics: Data on 529 Investment Options from Morningstar

Panel A. Summary Statistics for 529 Investment Options at the Investment Option-Year Level

	Mean	Median	SD	Min	Max	# Obs.
Share of Risky Assets, %	89.75	96.76	20.05	0.00	122.89	302,052
Share of Stocks, %	50.94	53.36	37.94	0.00	99.94	302,052
Net Assets, million USD	42.18	6.12	100.95	0.00	673.95	249,758
Return, %	1.63	1.52	6.02	-20.39	18.24	310,351
$\mathbb{1}$ Age-Based	0.35	0.00	0.48	0.00	1.00	336,560
$\mathbb{1}$ Target-Enrollment	0.07	0.00	0.25	0.00	1.00	336,560
$\mathbb{1}$ Static	0.48	0.00	0.50	0.00	1.00	336,560

Panel B. Summary Statistics for the Risky and Stock Shares at the State-Year Level

	Mean	SD	Median	Min	Max	# Obs.
ΔRisky Target-Date	0.53	7.18	0.81	-17.86	18.98	803
ΔStocks Target-Date	-0.49	7.05	0.31	-17.57	17.07	803

Panel C. Correlation between 529 Portfolio Allocation Measures

	ΔRisky Target-Date	ΔStocks Target-Date	ΔRisky Static
ΔRisky Target-Date	1.00		
ΔStocks Target-Date	0.21	1.00	
ΔRisky Static	0.21	-0.16	1.00

Notes: This table reports summary statistics for data on 529 investment options from Morningstar covering the period from 2002 to 2021. Panel A presents summary statistics for variables at the investment option-quarter level. Panel B presents summary statistics for the risky and stock shares calculated using data on 529 investment options according to equations (1) and (2). Panel C displays the correlation between these portfolio allocation measures. All variables in Panels A and B are winsorized at the 1% and 99% levels.

Table III. Effect of a 1% Higher Risky Share in the In-State 529 Plan's Menu on College Attendance

	4-Year College			Any College		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Risky*$\mathbb{1}_{529}$	2.52***			1.06		
	(0.72)			(0.94)		
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{HighInState}}$		2.72***			1.00	
		(0.83)			(0.99)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInState}}$		1.84**			1.30	
		(0.85)			(1.08)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{MidHighInc}}$			2.85***			1.07
			(0.73)			(0.95)
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInc}}$			1.41			1.05
			(1.00)			(1.13)
Δ Risky*$\mathbb{1}_{\text{No529}}$	-0.07	-0.07		-0.19	-0.19	
	(0.18)	(0.18)		(0.33)	(0.33)	
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{MidHighInc}}$			-0.29			-0.26
			(0.23)			(0.36)
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{LowInc}}$			0.36			-0.07
			(0.29)			(0.37)
Management Company FE	Yes	Yes	Yes	Yes	Yes	Yes
Student/Family FEs & Cont.	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes	Yes
State*529 Account FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,308	4,308	4,308	4,308	4,308	4,308
R^2	0.16	0.16	0.16	0.13	0.13	0.13

Notes: This table reports the results of the OLS regression (8) that examines the effect of a 1% higher risky share in the in-state 529 plan's menu on college attendance using the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options. The sample includes two groups of 12 grade school students in the spring semester who are expected to graduate from high school by the following fall semester (expected high school graduates): those with 529 accounts and those without 529 accounts. Dummy variables $\mathbb{1}_{529}$ and $\mathbb{1}_{\text{No529}}$ equal 1 for high school graduates with and without a 529 account, respectively. The dependent variables are dummy variables that equal 1 if a high school graduate attends a *four-year college* in Columns (1)-(3) or *any (two- or four-year) college* in Columns (4)-(6) during the following fall semester. The risky share, $\Delta Risky$, is calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. In Columns (2) and (5), the model specification additionally includes dummy variables that equal 1 for students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 plans ($\mathbb{1}_{\text{HighInState}}$=1) and states where this percentage is relatively low ($\mathbb{1}_{\text{LowInState}}$=1). In Columns (3) and (6), the model specification additionally includes dummy variables that equal 1 for students from households with income in the bottom tertile ($\mathbb{1}_{\text{LowInc}}$=1) and the combined middle and top tertiles ($\mathbb{1}_{\text{MidHighInc}}$=1). The fixed effects and control variables used in each specification are noted in the table. The set of student and family fixed effects and controls consists of fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race, as well as parent's age and the number of children in a household. State controls are unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. Standard errors are clustered at the asset management firm level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table IV. Effect of a 1% Higher Risky Share in the In-State 529 Plan's Menu on 529 Account Balance and Participation for 9-12 Grade School Students

	Have 529 Account		All Students
	(1)	(2)	(3)
	Log(529 Balance)	**Log(529 Balance)**	**529 Account Part.**
Δ Risky*$\mathbb{1}_{\text{HighInState}}$	4.58**	4.55**	0.15
	(2.18)	(2.19)	(0.11)
Δ Risky*$\mathbb{1}_{\text{LowInState}}$	-0.80	-0.82	0.22
	(2.98)	(2.96)	(0.16)
Δ Stock*$\mathbb{1}_{\text{HighInState}}$		0.29	
		(2.86)	
Δ Stock*$\mathbb{1}_{\text{LowInState}}$		0.45	
		(2.80)	
Management Company FE	Yes	Yes	Yes
Student/Family FEs & Cont.	Yes	Yes	Yes
State Controls	Yes	Yes	Yes
State*Grade FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	1,682	1,682	20,234
R^2	0.22	0.22	0.17

Notes: This table reports the results of the OLS regression (9) that examines the effect of a 1% higher risky share in the in-state 529 plan's menu on 529 account balance and participation in 529 accounts using the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options. The sample consists of 9-12 grade school students with 529 accounts in Columns (1)-(2) and of all 9-12 grade school students in Column (3). The dependent variables are *log(529 Account Balance)* in Columns (1)-(2) and *participation in 529 accounts* in Column (3). The risky share, $\Delta Risky$, is calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. The model specification also includes dummy variables that equal 1 for students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 plans ($\mathbb{1}_{\text{HighInState}}$=1) and states where this percentage is relatively low ($\mathbb{1}_{\text{LowInState}}$=1). In Column (2), the model specification additionally includes the stock share, $\Delta Stocks$, which is is calculated according to equation (2) and shows how higher the share of stocks for 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu is in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. The fixed effects and control variables used in each specification are noted in the table. The set of student and family fixed effects and controls consists of fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race, as well as parent's age and the number of children in a household. State controls are unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. Standard errors are clustered at the state-year level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table V. Effect of a 1% Higher Risky Share in the In-State 529 Plan's Menu on Other Components of Household Portfolios for 9-12 Grade School Students

	(1)	(2)	(3)	(4)
	Stock Market Part.	**Log(1+Stocks/Mutual Funds)**	**Bank Account Part.**	**Log(1+Bank Account)**
Δ Risky*$\mathbb{1}_{\text{HighInState}}$	0.03	0.04	0.13	2.79
	(0.71)	(7.78)	(0.09)	(1.97)
Δ Risky*$\mathbb{1}_{\text{LowInState}}$	0.43	1.24	0.09	-0.52
	(0.94)	(10.50)	(0.08)	(3.02)
Management Company FE	Yes	Yes	Yes	Yes
Student/Family FEs & Cont.	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes
State*Grade FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	1,682	1,682	1,682	1,682
R^2	0.22	0.24	0.21	0.32

Notes: his table reports the results of the OLS regression (10) that examines the effect of a 1% higher risky share in the in-state 529 plan's menu on other components of household portfolios using the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options. The sample consists of 9-12 grade school students with 529 accounts. The dependent variables are *stock market participation* in Column (1), *log(1+Stocks/Mutual Funds)* in Columns (2), *bank account participation* in Column (3), and *log(1+Bank Account)* in Column (4). The risky share, $\Delta Risky$, is calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. The model specification also includes dummy variables that equal 1 for students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 plans ($\mathbb{1}_{\text{HighInState}}$=1) and states where this percentage is relatively low ($\mathbb{1}_{\text{LowInState}}$=1). The fixed effects and control variables used in each specification are noted in the table. The set of student and family fixed effects and controls consists of fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race, as well as parent's age and the number of children in a household. State controls are unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. Standard errors are clustered at the state-year level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table VI. Effect of the Lagged Risky Share in 529 Investment Options on Flows as a Proxy for Household Contributions

	Flows		Flows/Average Flows for Each Age	
	(1)	(2)	(3)	(4)
$Risky_{t-1} * \sum_{i=0}^{3} Return_{age,t-1-i}$	0.13**		2.56**	
	(0.06)		(1.25)	
$Risky_{t-1} * \sum_{i=0}^{3} Return_{age,t-1-i} * \mathbb{1}_{\text{Age7-10}}$		0.14**		2.84**
		(0.06)		(1.19)
$Risky_{t-1} * \sum_{i=0}^{3} Return_{age,t-1-i} * \mathbb{1}_{\text{Age11-14}}$		0.16**		3.30**
		(0.06)		(1.29)
$Risky_{t-1} * \sum_{i=0}^{3} Return_{age,t-1-i} * \mathbb{1}_{\text{Age15-18}}$		0.21***		4.88***
		(0.07)		(1.40)
$\sum_{i=0}^{3} Return_{age,t-1-i}$	-0.08	-0.10*	-1.65	-2.12*
	(0.06)	(0.06)	(1.20)	(1.17)
$Risky_t$	-0.00	-0.00	0.17	0.12
	(0.01)	(0.01)	(0.22)	(0.20)
Investment Option FE	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Observations	7,153	7,153	7,153	7,153
R^2	0.55	0.55	0.60	0.60

Notes: This table reports the results of the OLS regression (12) that examines the effect of the lagged risky share in 529 investment options on flows to these options as a proxy for household contributions using the Morningstar data for the period 2002-2021. The sample is limited to 529 target-date investment options for ages 7-18 only. Flows in Columns (3) and (4) are additionally normalized by the average flow across all target-date investment options for each age. Regression specifications in Columns (2) and (4) additionally include the intersection of the lagged risky share times the lagged average annual return with dummy variables for the three age groups: 7-10, 11-14, and 15-18. The fixed effects used in each specification are noted in the table. Standard errors are double clustered at the investment option and time levels and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table VII. Effect of a 1% Higher Risky Share in the In-State 529 Plan's Menu on Student Debt

	College Students				College Students with Debt
	(1)	(2)	(3)	(4)	(5)
	Debt Part.	**Debt Part.**	**Log(1+Debt)**	**Log(1+Debt)**	**Log(1+Debt)**
Δ Risky*$\mathbb{1}_{529}$	-3.12***		-27.90***		-11.46
	(1.03)		(9.22)		(14.90)
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{MidHighInc}}$		-3.19***		-28.12***	
		(1.07)		(9.57)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInc}}$		-2.84**		-26.82**	
		(1.37)		(12.23)	
Δ Risky*$\mathbb{1}_{\text{No529}}$	0.16		0.92		5.20
	(0.47)		(4.31)		(7.67)
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{MidHighInc}}$		0.05		-0.34	
		(0.49)		(4.48)	
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{LowInc}}$		0.37		3.42	
		(0.60)		(5.45)	
Management Company FE	Yes	Yes	Yes	Yes	Yes
Student/Family FEs & Cont.	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes
State*Past 529 Account FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	1,999	1,999	1,999	1,999	614
R^2	0.10	0.10	0.10	0.10	0.23

Notes: This table reports the results of the OLS regression (8) that examines the effect of a 1% higher risky share in the in-state 529 plan's menu on student debt using the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options. The sample includes two groups of individuals who started college immediately after graduating from high school and may or may not be in college during the sample period: those with 529 accounts at the start of their studies and those without 529 accounts at the start of their studies. Dummy variables $\mathbb{1}_{529}$ and $\mathbb{1}_{\text{No529}}$ equal 1 for individuals from the first and second groups, respectively. The sample is also limited to students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 plans. The dependent variables are *student debt participation* in Columns (1)-(2) and *log(1+student debt)* in Columns (3)-(5). The risky share, $\Delta Risky$, is calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. In Columns (2) and (4), the model specification additionally includes dummy variables that equal 1 for students from households with income in the bottom tertile ($\mathbb{1}_{\text{LowInc}}$=1) and the combined middle and top tertiles ($\mathbb{1}_{\text{MidHighInc}}$=1). The fixed effects and control variables used in each specification are noted in the table. The set of student and family fixed effects and controls includes fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race, as well as parent's age and the number of children in a household. State controls are unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. Standard errors are clustered at the asset management firm-year level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table VIII. Effect of 1% Higher Risky Share in the In-State 529 Plan's Menu on K-12 Grade Retention and School Dropout

	Grade Retention Probability			Dropout Probability		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Risky	-0.49	-0.75		0.01	0.13	
	(0.48)	(0.63)		(0.43)	(0.50)	
Δ Risky*$\mathbb{1}_{\text{Year<2018}}$		0.28			-0.13	
		(0.37)			(0.26)	
Δ Risky*$\mathbb{1}_{\text{Gr10-12}}$			0.04			-0.24
			(0.78)			(0.58)
Δ Risky*$\mathbb{1}_{\text{Gr7-9}}$			-1.00*			-0.42
			(0.57)			(0.56)
Δ Risky*$\mathbb{1}_{\text{Gr4-6}}$			-0.59			0.76*
			(0.57)			(0.42)
Management Company FE	Yes	Yes	Yes	Yes	Yes	Yes
Student/Family FEs & Cont.	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes	Yes
State*Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,011	2,011	2,011	2,011	2,011	2,011
R^2	0.20	0.20	0.21	0.18	0.18	0.18

Notes: This table reports the results of the OLS regression (13) that examines the effect of a 1% higher risky share in the in-state 529 plan's menu on grade retention and school dropout using the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options. The sample consists of K-12 school students in grades 4-12. The dependent variables are *grade retention probability* in Columns (1-3) and *dropout probability* in Columns (4-6). The risky share, $\Delta Risky$, is calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. In Columns (2) and (5), the model specification additionally includes a dummy variables that equal 1 for the period prior to 2018, when K-12 school tuition was added to the list of qualified expenses for 529 college savings plans. In Columns (3) and (6), the model specification additionally includes dummy variables that equal 1 for the three subgroups of K-12 school students: those in grades 4-6 ($\mathbb{1}_{\text{Gr4-6}}$=1), those in grades 7-9 ($\mathbb{1}_{\text{Gr7-9}}$=1), and those in grades 10-12 ($\mathbb{1}_{\text{Gr10-12}}$=1). The fixed effects and control variables used in each specification are noted in the table. The set of student and family fixed effects and controls consists of fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race, as well as parent's age and the number of children in a household. State controls are unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. Standard errors are clustered at the state-year level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

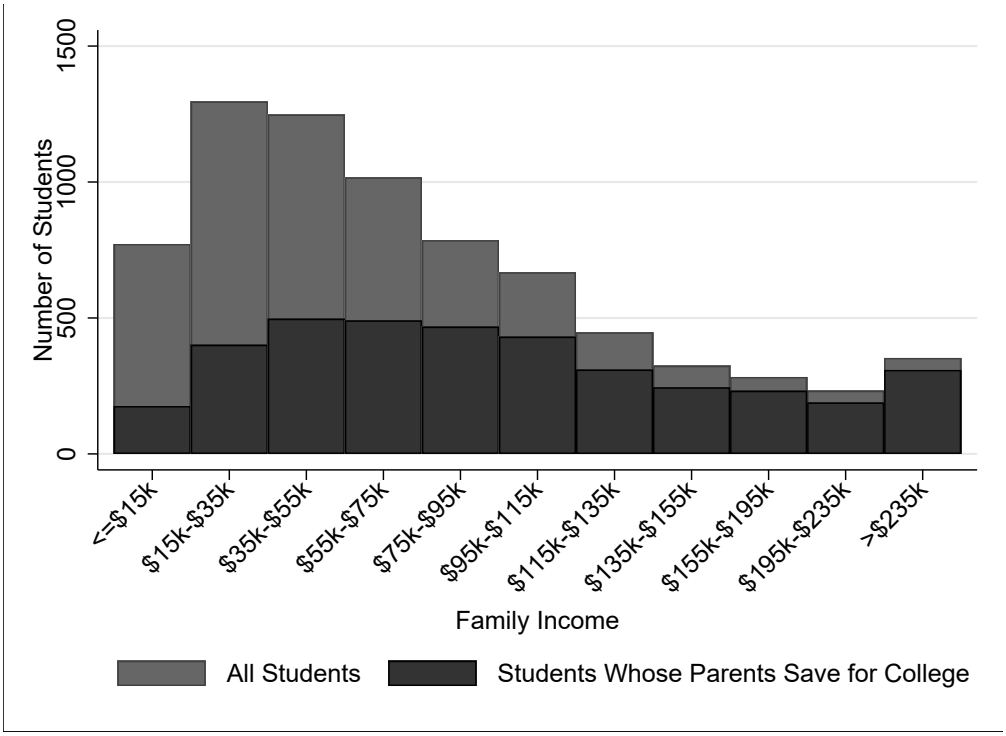
Table IX. Relationship Between The Choice of Investment Options for College Savings and Student Outcomes

	2-Year Col.	**4-Year Col.**	**2 or 4-Year Col.**	**Highly Sel. 4-Year**	**Student Loan Part.**	**Col. Savings**$> 5,000$	**Col. Savings**$> 20,000$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mutual Funds	-0.03**	0.04***	0.01	0.01	-0.04**	0.13***	0.09***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)
Individual Stocks & Real Estate for Sale	-0.00	0.01	0.01	0.04**	-0.04*	0.16***	0.14***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
Real Estate: Remortgage/Home-Equity Loan	-0.00	0.00	-0.00	-0.02	0.06***	-0.03	-0.08***
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)
U.S. Savings Bonds	0.01	0.01	0.02	0.02	0.00	0.04***	-0.02*
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
Another Form	0.00	0.01	0.01	0.03*	-0.00	0.07***	0.08***
	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
Student & Family Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,830	3,830	3,830	3,013	3,392	4,153	4,153
R^2	0.241	0.392	0.264	0.383	0.213	0.317	0.339

Notes: This table reports the results of the OLS regression (14) that examines the relationship between the choice of investment options for college savings, college attendance, student debt, and the accumulated amount of college savings using data from the Education Longitudinal Study of 2002. The sample includes students, who were in the 10th grade in 2002 and whose parents saved for college. The list of dependent variables comprises 2-year college attendance in Column (1), 4-year college attendance in Column (2), any college attendance (2- or 4-year) in Column (3), college attendance at a 4-year highly selective college (the top fifth of baccalaureate institutions based on students' test scores) in Column (4), student loan participation in Column (5), and the probabilities of having more than \$5,000 in Column (6) and more than \$20,000 in Column (7) in college savings. The list of independent variables consists of dummy variables that equal 1 if student's parents use one of the following savings options to save for college: educational savings accounts, individual stocks, mutual funds, real estate, U.S. savings bonds, or another form. Each specification includes the school fixed effect, as well as fixed effects for the following student and family characteristics: family income group, parent's level of education, student's ability quartile, parent's marital status, student's gender, student being born in the US, and student's race. Control variables used in each specification are the number of dependents and parent's age. Standard errors are clustered at the school level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Appendix A. Figures

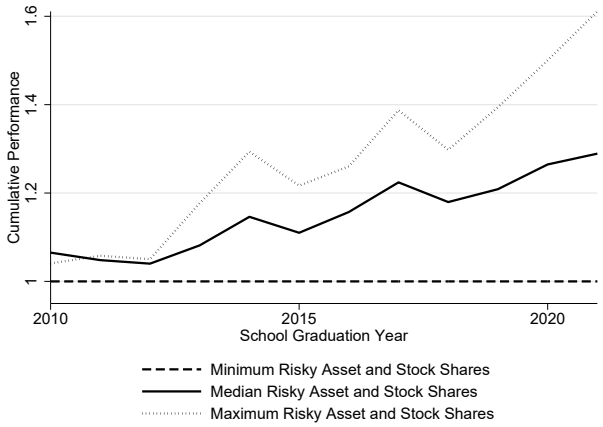
Figure A.1. Distributions of Family Incomes for All High-School Students and High-School Students Whose Parents Save for College



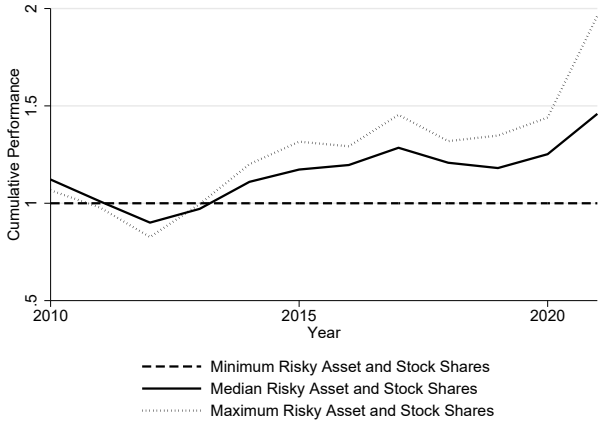
Notes: This figure compares the distribution of all high-school students with the distribution of high-school students whose parents save for college. Data come from the High School Longitudinal Study of 2009. The sample consists of high school students in the ninth grade in the fall of 2009 with non-missing data on college savings. The data on college savings are for the spring of 2012, when most students were in the eleventh grade. Data on family income are for 2011.

Figure A.2. Historical Simulations: Performance of 529 Target-Date Investment Options with Different Portfolio Allocations over a 13-Year Period

Panel A. Annual Contributions



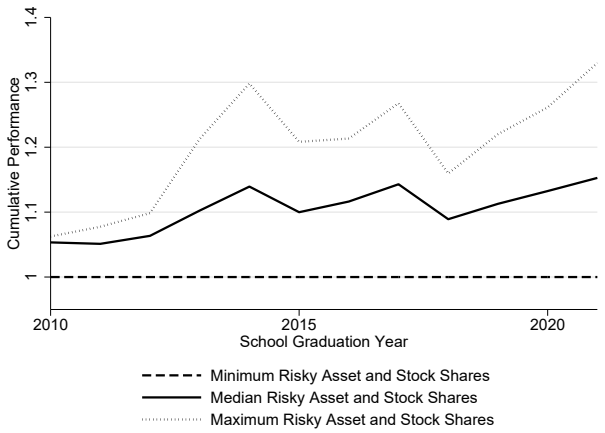
Panel B. Lump-Sum Investment



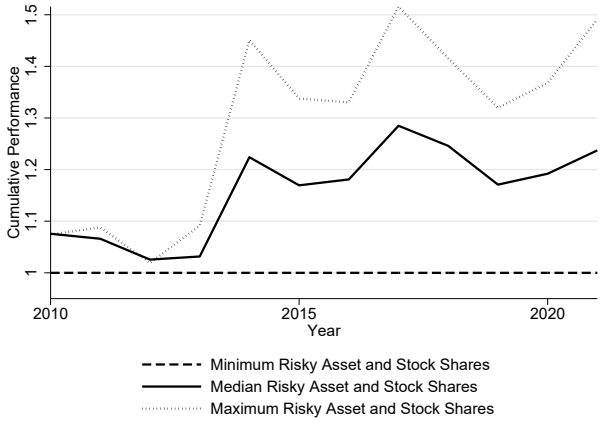
Notes: This figure demonstrates the results of historical simulations for the final account balance of three 529 target-data investment options with the minimum (dashed line), median (solid line), and maximum (dotted line) risky asset and stock shares for each age from Panel A of Figure 5 depending on school graduation year. The final account balance of the 529 target-data investment option with the lowest risky asset and stock shares is normalized to 1. These simulations are based on the assumption that households save for 13 years between the ages of 5 and 18. In Panel A, households make annual contributions that increase with the inflation rate, while in Panel B, they make a lump-sum investment at the start. 529 investment options are allocated to the S&P500 index, Baa corporate bonds, and cash. The stock share denotes the share of 529 investment options allocated to the S&P500 index, the risky asset share minus the stock share equals the share of 529 investment options allocated to Baa corporate bonds, and 1 minus the risky asset share represents the share of 529 investment options allocated to cash.

Figure A.3. Historical Simulations: Performance of 529 Target-Date Investment Options with Different Portfolio Allocations over a 6-Year Period

Panel A. Annual Contributions

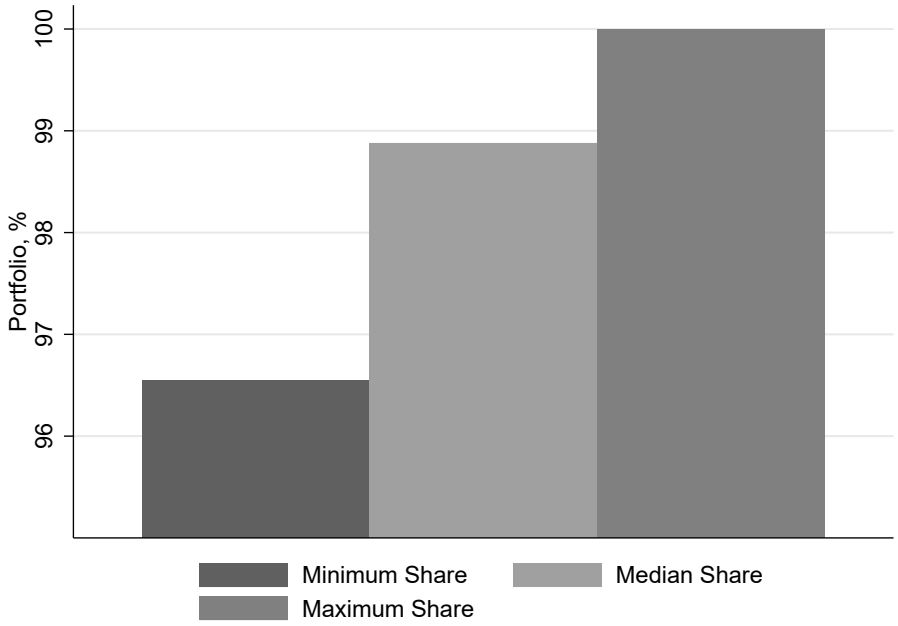


Panel B. Lump-Sum Investment



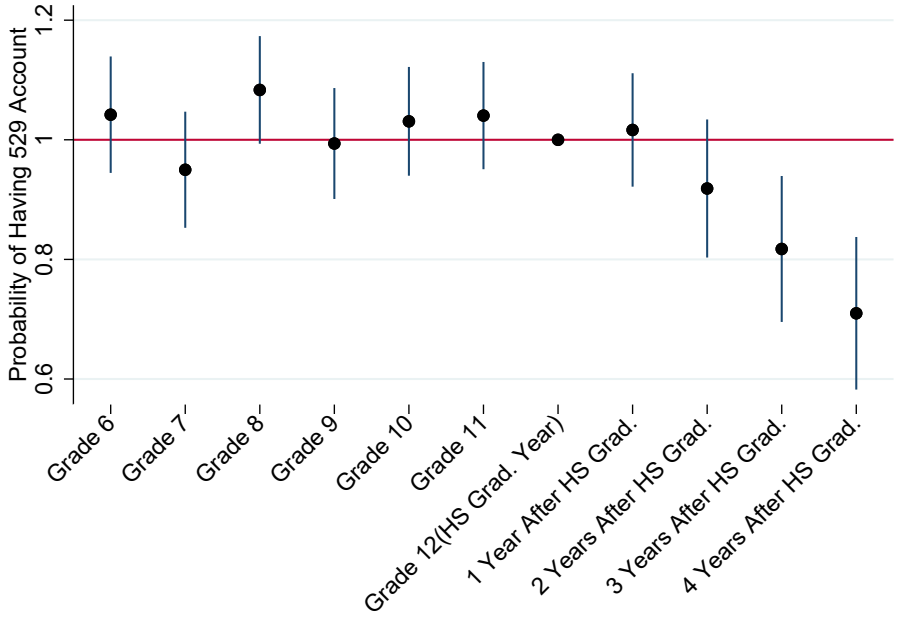
Notes: This figure demonstrates the results of historical simulations for the final account balance of three 529 target-date investment options with the minimum (dashed line), median (solid line), and maximum (dotted line) risky asset and stock shares for each age from Panel A in Figure 5 depending on school graduation year. The final account balance of the 529 target-date investment option with the lowest risky asset and stock shares is normalized to 1. These simulations are based on the assumption that households save for 6 years between the ages of 12 and 18. In Panel A, households make annual contributions that increase with the inflation rate, while in Panel B, they make a lump-sum investment at the start. 529 investment options are allocated to the S&P500 index, Baa corporate bonds, and cash. The stock share denotes the share of 529 investment options allocated to the S&P500 index, the risky asset share minus the stock share equals the share of 529 investment options allocated to Baa corporate bonds, and 1 minus the risky asset share represents the share of 529 investment options allocated to cash.

Figure A.4. Share of Risky Assets in 529 Equity Static Investment Options across States in 2021



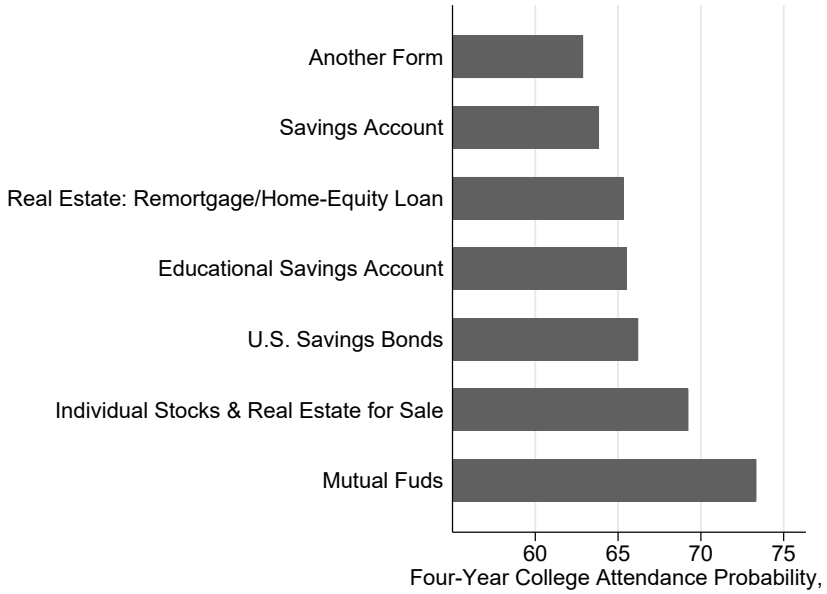
Notes: This figure demonstrates variation in the share of risky assets in 529 equity static investment options in 2021 and plots the minimum, median, and maximum values of the state-level median share of risky assets in 529 static equity investment options. Data on 529 investment options are from Morningstar.

Figure A.5. Probability of Having a 529 Account Before and After High School Graduation



Notes: This figure demonstrates the probability of having a 529 account depending on K-12 school grade and years after high school graduation. The sample is based on the individual-level SIPP data for the period 2013-2021. The bars indicate 95% confidence intervals based on standard errors clustered at the state times year level.

Figure A.6. College Enrollment Probability for Different Savings Options



Notes: This figure plots the probability of four-year college enrollment conditional on the use of specific saving options to save for college for the sample of 10th grade students from the Education Longitudinal Study of 2002.

Appendix B. Tables

Table B.1. Assets and Total Accounts in 529 Plans by Plan Type

	529 College Savings	529 Prepaid Tuition
Assets under management, in million $	453,170.24 (94.34%)	27,190.04 (5.66%)
Total accounts	14,759,716 (94.18%)	911,606(5.82%)

Notes: This table reports net assets and total accounts for the two types of 529 plans in Q4:2021: 529 college savings plans and 529 prepaid tuition plans. Numbers in parenthesis indicate the percentage out of both 529 plan types combined. Data are from the College Savings Plans Network.

Table B.2. Summary Statistics: Education Longitudinal Study of 2002

Panel A. Dummy and Continuous Variables

	Mean	Median	Min	Max
Allocation of College Savings				
Educational Savings Accounts	0.13	0.00	0	1
Mutual Funds	0.40	0.00	0	1
Individual Stocks & Real Estate for Sale	0.56	1.00	0	1
Real Estate: Remortgage/Home-Equity Loan	0.21	0.00	0	1
U.S. Savings Bonds	0.40	0.00	0	1
Another Form	0.32	0.00	0	1
Savings Account	0.79	1.00	0	1
Student & Family Characteristics				
Male	0.49	0.00	0	1
Born in US	0.93	1.00	0	1
Number of Dependents	2.50	2.00	0	8
White	0.68	1.00	0	1
Hispanic	0.09	0.00	0	1
Asian	0.09	0.00	0	1
African American	0.09	0.00	0	1
Parent's Marital Status	0.85	1.00	0	1
Parent's Age	45.21	45.00	32	72
Parent's College Education	0.47	0.00	0	1
Student Debt				
Student Loan Participation	0.37	0.00	0	1
College Attendance				
2-Year College	0.24	0.00	0	1
4-Year College	0.64	1.00	0	1
Observations	4723			

Panel B. Categorical Variables

Total Household Income	\$1,000 or less (0.46%), \$1,001-\$5,000 (0.51%), \$5,001-\$10,000 (0.46%), \$10,001-\$15,000 (1.16%), \$15,001-\$20,000 (1.73%), \$20,001-\$25,000 (2.99%), \$25,001-\$35,000 (7.20%),\$35,001-\$50,000 (14.60%), \$50,001-\$75,000 (22.90%), \$75,001-\$100,000 (19.85%), \$100,001-\$200,000 (21.01%), \$200,001 or more (7.11%)
College Savings	\$2,000 or less (12.89%), \$2,001-\$5,000 (17.83%), \$5,001-\$10,000 (20.71%), \$10,001-\$20,000 (18.53%), \$20,001-\$30,000 (10.44%), \$30,001-\$50,000 (9.25%), More than \$50,000 (10.35%)

Notes: This table reports summary statistics for variables from the Education Longitudinal Study of 2002 (ELS:2002). The sample includes students, who did not repeat any grades and whose parents reported a positive amount of college savings. Data the allocation of college savings, student and family characteristics were collected in 2002, when students were in the 10th grade. Information on college enrollment and student debt was collected 2 years after students graduated from high-school. Panel A reports summary statistics for dummy and continuous variables, while Panel B presents the distributions of categorical variables. Nominal values are in 2002 dollars.

Table B.3. Relationship between State Variables and 529 Portfolio Allocation Measures

	ΔRisky		**ΔStocks**	
	(1)	(2)	(3)	(4)
Unemployment Rate	-0.58	-0.02	-0.58	0.53
	(0.65)	(0.43)	(0.98)	(0.34)
Log(Real Per Capita Personal Income)	0.41	-1.02	-1.59	21.99
	(10.89)	(10.73)	(15.66)	(13.95)
Log(Population)	-0.27	-11.79	-1.10	-6.24
	(0.77)	(20.32)	(1.72)	(19.02)
Real GDP Growth	0.08	0.06	-0.24	-0.08
	(0.13)	(0.07)	(0.23)	(0.10)
Share of Adults with at Least Bachelor Degree	-0.22	0.32	0.05	-0.37
	(0.22)	(0.64)	(0.29)	(0.46)
Year FE	Yes	Yes	Yes	Yes
State FE	No	Yes	No	Yes
Observations	686	686	686	686
R^2	0.05	0.68	0.03	0.87

Notes: This table reports the results of OLS regression that examines the relationship between state variables and the 529 portfolio allocation measures calculated in equations (1) and (2). These measures show whether 529 investment options offered by the asset management firm in the in-state 529 plan's menu have higher shares of risky assets (Columns (1) and (2)) and stocks (Columns (3) and (4)), respectively, in comparison to 529 investment options offered by other asset management firms. The list of independent variables contains unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. The 529 portfolio allocation measures are calculated using Mornigstar data on 529 investment options, while data on state variables are obtained from FRED of the Federal Reserve Bank of St. Louis. The time period spans the years 2008 to 2020. Year fixed effects are included in each specification, and state fixed effects are additionally included in specifications in Columns (2) and (4). Standard errors are double clustered at the state and year levels and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table B.4. Effect of a 1% Higher Risky Share in the In-State 529 Plan's Menu on College Attendance: Alternative High School Graduation Assignment

	4-Year College		Any College	
	(1)	(2)	(3)	(4)
Δ Risky*$\mathbb{1}_{529}$	3.70**		0.50	
	(1.85)		(2.16)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{HighInState}}$		4.00**		0.81
		(1.82)		(2.08)
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInState}}$		1.53		-1.74
		(2.78)		(2.53)
Δ Risky*$\mathbb{1}_{\text{No529}}$	-0.08	-0.09	0.31	0.31
	(0.41)	(0.41)	(0.52)	(0.52)
Management Company FE	Yes	Yes	Yes	Yes
Student/Family FEs & Cont.	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes
State*529 Account FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	3,279	3,279	3,279	3,279
R^2	0.19	0.19	0.16	0.16

Notes: This table reports the results of the OLS regression (8) that examines the effect of a 1% higher risky share in the in-state 529 plan's menu on college attendance using the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options. The sample includes two groups of individuals who have not repeated any K-12 school grade and are one year after their expected high school graduation date based on their month and year of birth and state-level school entry age laws: those with 529 accounts and those without 529 accounts. Dummy variables $\mathbb{1}_{529}$ and $\mathbb{1}_{\text{No529}}$ equal 1 for high school graduates with and without a 529 account, respectively. The dependent variables are dummy variables that equal 1 if a high school graduate attends a *four-year college* in Columns (1)-(3) or *any (two- or four-year) college* in Columns (4)-(6) during the following fall semester. The risky share, $\Delta Risky$, is calculated similarly to equation (1) using data for ages 7-18 and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. In Columns (2) and (5), the model specification additionally includes dummy variables that equal 1 for students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 plans ($\mathbb{1}_{\text{HighInState}}$=1) and states where this percentage is relatively low ($\mathbb{1}_{\text{LowInState}}$=1). In Columns (3) and (6), the model specification additionally includes dummy variables that equal 1 for students from households with income in the bottom tertile ($\mathbb{1}_{\text{LowInc}}$=1) and the combined middle and top tertiles ($\mathbb{1}_{\text{MidHighInc}}$=1). The fixed effects and control variables used in each specification are noted in the table. The set of student and family fixed effects and controls consists of fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race, as well as parent's age and the number of children in a household. State controls are unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. Standard errors are clustered at the asset management firm level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table B.5. Effect of a 1% Higher Risky Share in In-State 529 Plan's Menu on College Attendance: Alternative Risky Share Measure Based on Data for Ages 10-18

	4-Year College			Any College		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Risky*$\mathbb{1}_{529}$	3.30***			1.43		
	(0.94)			(1.10)		
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{HighInState}}$		3.54***			1.39	
		(1.04)			(1.17)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInState}}$		2.36**			1.61	
		(1.13)			(1.32)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{MidHighInc}}$			3.74***			1.39
			(0.97)			(1.10)
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInc}}$			2.09*			1.56
			(1.19)			(1.35)
Δ Risky*$\mathbb{1}_{\text{No529}}$	-0.05	-0.05		-0.17	-0.17	
	(0.27)	(0.27)		(0.43)	(0.43)	
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{MidHighInc}}$			-0.29			-0.25
			(0.32)			(0.47)
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{LowInc}}$			0.41			0.00
			(0.38)			(0.45)
Management Company FE	Yes	Yes	Yes	Yes	Yes	Yes
Student/Family FEs & Cont.	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes	Yes
State*529 Account FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,308	4,308	4,308	4,308	4,308	4,308
R^2	0.16	0.16	0.16	0.13	0.13	0.13

Notes: This table reports the results of the OLS regression (8) that examines the effect of a 1% higher risky share in the in-state 529 plan's menu on college attendance using the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options. The sample includes two groups of 12 grade school students in the spring semester who are expected to graduate from high school by the following fall semester (expected high school graduates): those with 529 accounts and those without 529 accounts. Dummy variables $\mathbb{1}_{529}$ and $\mathbb{1}_{\text{No529}}$ equal 1 for high school graduates with and without a 529 account, respectively. The dependent variables are dummy variables that equal 1 if a high school graduate attends a *four-year college* in Columns (1)-(3) or *any (two- or four-year) college* in Columns (4)-(6) during the following fall semester. The risky share, $\Delta Risky$, is calculated similarly to equation (1) using data for ages 10-18 ($n = 9$) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. In Columns (2) and (5), the model specification additionally includes dummy variables that equal 1 for students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 plans ($\mathbb{1}_{\text{HighInState}}$=1) and states where this percentage is relatively low ($\mathbb{1}_{\text{LowInState}}$=1). In Columns (3) and (6), the model specification additionally includes dummy variables that equal 1 for students from households with income in the bottom tertile ($\mathbb{1}_{\text{LowInc}}$=1) and the combined middle and top tertiles ($\mathbb{1}_{\text{MidHighInc}}$=1). The fixed effects and control variables used in each specification are noted in the table. The set of student and family fixed effects and controls consists of fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race, as well as parent's age and the number of children in a household. State controls are unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. Standard errors are clustered at the asset management firm level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table B.6. Effect of a 1% Higher Risky Share in In-State 529 Plan's Menu on College Attendance: Alternative Risky Share Measure Based on Data for Ages 7-18

	4-Year College			Any College		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Risky*$\mathbb{1}_{529}$	3.97***			1.75		
	(1.13)			(1.22)		
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{HighInState}}$		4.26***			1.72	
		(1.24)			(1.32)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInState}}$		2.81**			1.87	
		(1.38)			(1.51)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{MidHighInc}}$			4.47***			1.66
			(1.18)			(1.23)
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInc}}$			2.65*			2.01
			(1.39)			(1.55)
Δ Risky*$\mathbb{1}_{\text{No529}}$	-0.02	-0.02		-0.15	-0.15	
	(0.34)	(0.34)		(0.52)	(0.52)	
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{MidHighInc}}$			-0.28			-0.26
			(0.39)			(0.56)
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{LowInc}}$			0.48			0.06
			(0.46)			(0.54)
Management Company FE	Yes	Yes	Yes	Yes	Yes	Yes
Student/Family FEs & Cont.	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes	Yes
State*529 Account FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,308	4,308	4,308	4,308	4,308	4,308
R^2	0.16	0.16	0.16	0.13	0.13	0.13

Notes: This table reports the results of the OLS regression (8) that examines the effect of a 1% higher risky share in the in-state 529 plan's menu on college attendance using the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options. The sample includes two groups of 12 grade school students in the spring semester who are expected to graduate from high school by the following fall semester (expected high school graduates): those with 529 accounts and those without 529 accounts. Dummy variables $\mathbb{1}_{529}$ and $\mathbb{1}_{\text{No529}}$ equal 1 for high school graduates with and without a 529 account, respectively. The dependent variables are dummy variables that equal 1 if a high school graduate attends a *four-year college* in Columns (1)-(3) or *any (two- or four-year) college* in Columns (4)-(6) during the following fall semester. The risky share, $\Delta Risky$, is calculated similarly to equation (1) using data for ages 7-18 ($n = 12$) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. In Columns (2) and (5), the model specification additionally includes dummy variables that equal 1 for students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 plans ($\mathbb{1}_{\text{HighInState}}$=1) and states where this percentage is relatively low ($\mathbb{1}_{\text{LowInState}}$=1). In Columns (3) and (6), the model specification additionally includes dummy variables that equal 1 for students from households with income in the bottom tertile ($\mathbb{1}_{\text{LowInc}}$=1) and the combined middle and top tertiles ($\mathbb{1}_{\text{MidHighInc}}$=1). The fixed effects and control variables used in each specification are noted in the table. The set of student and family fixed effects and controls consists of fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race, as well as parent's age and the number of children in a household. State controls are unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. Standard errors are clustered at the asset management firm level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table B.7. Effect of a 1% Higher Risky Share in the In-State 529 Plan's Menu on College Attendance: Clustering at the State Level

	4-Year College			Any College		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Risky*$\mathbb{1}_{529}$	2.52***			1.06		
	(0.88)			(0.92)		
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{HighInState}}$		2.72***			1.00	
		(0.95)			(1.01)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInState}}$		1.84**			1.30	
		(0.91)			(1.05)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{MidHighInc}}$			2.85***			1.07
			(0.87)			(0.92)
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInc}}$			1.41			1.05
			(1.12)			(1.14)
Δ Risky*$\mathbb{1}_{\text{No529}}$	-0.07	-0.07		-0.19	-0.19	
	(0.19)	(0.19)		(0.31)	(0.31)	
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{MidHighInc}}$			-0.29			-0.26
			(0.25)			(0.33)
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{LowInc}}$			0.36			-0.07
			(0.29)			(0.36)
Management Company FE	Yes	Yes	Yes	Yes	Yes	Yes
Student/Family FEs & Cont.	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes	Yes
State*529 Account FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,308	4,308	4,308	4,308	4,308	4,308
R^2	0.16	0.16	0.16	0.13	0.13	0.13

Notes: This table reports the results of the OLS regression (8) that examines the effect of a 1% higher risky share in the in-state 529 plan's menu on college attendance using the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options. The sample includes two groups of 12 grade school students in the spring semester who are expected to graduate from high school by the following fall semester (expected high school graduates): those with 529 accounts and those without 529 accounts. Dummy variables $\mathbb{1}_{529}$ and $\mathbb{1}_{\text{No529}}$ equal 1 for high school graduates with and without a 529 account, respectively. The dependent variables are dummy variables that equal 1 if a high school graduate attends a *four-year college* in Columns (1)-(3) or *any (two- or four-year) college* in Columns (4)-(6) during the following fall semester. The risky share, $\Delta Risky$, is calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. In Columns (2) and (5), the model specification additionally includes dummy variables that equal 1 for students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 plans ($\mathbb{1}_{\text{HighInState}}$=1) and states where this percentage is relatively low ($\mathbb{1}_{\text{LowInState}}$=1). In Columns (3) and (6), the model specification additionally includes dummy variables that equal 1 for students from households with income in the bottom tertile ($\mathbb{1}_{\text{LowInc}}$=1) and the combined middle and top tertiles ($\mathbb{1}_{\text{MidHighInc}}$=1). The fixed effects and control variables used in each specification are noted in the table. The set of student and family fixed effects and controls consists of fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race, as well as parent's age and the number of children in a household. State controls are unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. Standard errors are clustered at the state level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table B.8. Effect of a 1% Higher Risky Share in the In-State 529 Plan's Menu on College Attendance: Clustering the Asset Management Firm Times Year Level

	4-Year College			Any College		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Risky*$\mathbb{1}_{529}$	2.52***			1.06		
	(0.86)			(0.89)		
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{HighInState}}$		2.72***			1.00	
		(0.98)			(0.98)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInState}}$		1.84			1.30	
		(1.43)			(1.33)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{MidHighInc}}$			2.85***			1.07
			(0.93)			(0.94)
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInc}}$			1.41			1.05
			(1.02)			(1.08)
Δ Risky*$\mathbb{1}_{\text{No529}}$	-0.07	-0.07		-0.19	-0.19	
	(0.30)	(0.30)		(0.32)	(0.32)	
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{MidHighInc}}$			-0.29			-0.26
			(0.32)			(0.34)
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{LowInc}}$			0.36			-0.07
			(0.36)			(0.41)
Management Company FE	Yes	Yes	Yes	Yes	Yes	Yes
Student/Family FEs & Cont.	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes	Yes
State*529 Account FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,308	4,308	4,308	4,308	4,308	4,308
R^2	0.16	0.16	0.16	0.13	0.13	0.13

Notes: This table reports the results of the OLS regression (8) that examines the effect of a 1% higher risky share in the in-state 529 plan's menu on college attendance using the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options. The sample includes two groups of 12 grade school students in the spring semester who are expected to graduate from high school by the following fall semester (expected high school graduates): those with 529 accounts and those without 529 accounts. Dummy variables $\mathbb{1}_{529}$ and $\mathbb{1}_{\text{No529}}$ equal 1 for high school graduates with and without a 529 account, respectively. The dependent variables are dummy variables that equal 1 if a high school graduate attends a *four-year college* in Columns (1)-(3) or *any (two- or four-year) college* in Columns (4)-(6) during the following fall semester. The risky share, $\Delta Risky$, is calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. In Columns (2) and (5), the model specification additionally includes dummy variables that equal 1 for students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 plans ($\mathbb{1}_{\text{HighInState}}$=1) and states where this percentage is relatively low ($\mathbb{1}_{\text{LowInState}}$=1). In Columns (3) and (6), the model specification additionally includes dummy variables that equal 1 for students from households with income in the bottom tertile ($\mathbb{1}_{\text{LowInc}}$=1) and the combined middle and top tertiles ($\mathbb{1}_{\text{MidHighInc}}$=1). The fixed effects and control variables used in each specification are noted in the table. The set of student and family fixed effects and controls consists of fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race, as well as parent's age and the number of children in a household. State controls are unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. Standard errors are clustered at the asset management firm times year level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table B.9. Effect of a 1% Higher Risky Share in the In-State 529 Plan's Menu on College Attendance: Alternative Fixed Effects

	4-Year College			Any College		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Risky*$\mathbb{1}_{529}$	2.53***			1.17		
	(0.71)			(0.92)		
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{HighInState}}$		2.71***			1.11	
		(0.81)			(0.98)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInState}}$		1.87**			1.39	
		(0.85)			(1.06)	
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{MidHighInc}}$			2.84***			1.15
			(0.72)			(0.92)
Δ Risky*$\mathbb{1}_{529}$*$\mathbb{1}_{\text{LowInc}}$			1.48			1.25
			(0.98)			(1.13)
Δ Risky*$\mathbb{1}_{\text{No529}}$	-0.06	-0.06		-0.17	-0.17	
	(0.19)	(0.19)		(0.32)	(0.32)	
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{MidHighInc}}$			-0.28			-0.23
			(0.24)			(0.34)
Δ Risky*$\mathbb{1}_{\text{No529}}$*$\mathbb{1}_{\text{LowInc}}$			0.37			-0.04
			(0.29)			(0.35)
Management Company FE	No	No	No	No	No	No
Student/Family FEs & Cont.	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes	Yes	Yes
State*529 Account FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,310	4,310	4,310	4,310	4,310	4,310
R^2	0.16	0.16	0.16	0.13	0.13	0.13

Notes: This table reports the results of the OLS regression (8) that examines the effect of a 1% higher risky share in the in-state 529 plan's menu on college attendance using the individual-level SIPP data from 2013 to 2021 merged with the Morningstar data on 529 investment options. The sample includes two groups of 12 grade school students in the spring semester who are expected to graduate from high school by the following fall semester (expected high school graduates): those with 529 accounts and those without 529 accounts. Dummy variables $\mathbb{1}_{529}$ and $\mathbb{1}_{\text{No529}}$ equal 1 for high school graduates with and without a 529 account, respectively. The dependent variables are dummy variables that equal 1 if a high school graduate attends a *four-year college* in Columns (1)-(3) or *any (two- or four-year) college* in Columns (4)-(6) during the following fall semester. The risky share, $\Delta Risky$, is calculated according to equation (1) and shows how riskier 529 target-date investment options offered by the asset management firm in the in-state 529 plan's menu are in comparison to similar investment options offered by other asset management firms in the menus of 529 plans in other states. In Columns (2) and (5), the model specification additionally includes dummy variables that equal 1 for students from states where a relatively high percentage of individuals with 529 accounts have 529 accounts in in-state 529 plans ($\mathbb{1}_{\text{HighInState}}$=1) and states where this percentage is relatively low ($\mathbb{1}_{\text{LowInState}}$=1). In Columns (3) and (6), the model specification additionally includes dummy variables that equal 1 for students from households with income in the bottom tertile ($\mathbb{1}_{\text{LowInc}}$=1) and the combined middle and top tertiles ($\mathbb{1}_{\text{MidHighInc}}$=1). The fixed effects and control variables used in each specification are noted in the table. The set of student and family fixed effects and controls consists of fixed effects for parent's college education, parent's marital status, household income deciles, household metropolitan status, student gender, student race, as well as parent's age and the number of children in a household. State controls are unemployment rate, log(real per capita personal income), log(population), real GDP growth, and the share of adults with a bachelor's degree or higher. Standard errors are clustered at the asset management firm level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table B.10. Relationship Between The Choice of Investment Options and College Savings Accumulation

	Col.Sav. $1-2,000$	**Col.Sav.** $2,001-5,000$	**Col.Sav.** $5,001-10,000$	**Col.Sav.** $10,001-20,000$	**Col.Sav.** $20,001-30,000$	**Col.Sav.** $30,001-50,000$	**Col.Sav.** $>50,000$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mutual Funds	-0.08***	-0.05***	-0.00	0.04***	0.02**	0.03**	0.04***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
Individual Stocks & Real Estate for Sale	-0.08***	-0.08***	-0.01	0.03**	0.05***	0.04***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Real Estate: Remortgage/Home-Equity Loan	0.02	0.01	0.05***	-0.00	-0.00	-0.03***	-0.04***
	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
U.S. Savings Bonds	-0.03***	-0.01	0.03**	0.02*	0.00	-0.02**	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Another Form	-0.04***	-0.03**	-0.02	0.01	0.00	0.02**	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Student & Family Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,153	4,153	4,153	4,153	4,153	4,153	4,153
R^2	0.220	0.170	0.136	0.114	0.111	0.138	0.264

Notes: This table reports the results of the OLS regression (14) that examines the relationship between the choice of investment options for college savings and the probability of having a specific amount in college savings using data from the Education Longitudinal Study of 2002. The sample includes students, who were in the 10th grade in 2002 and whose parents saved for college. The list of dependent variables comprises the probabilities of having college savings from \$1 to \$2,000 in Column (1), from \$2,001 to \$5,000 in Column (2), from \$5,001 to \$10,000 in Column (3), from \$10,001 to \$20,000 in Column (4), from \$20,001 to \$30,000 in Column (5), from \$30,001 to \$50,000 in Column (6), and larger than \$50,000 in Column (7). The list of independent variables consists of dummy variables that equal 1 if student's parents use one of the following savings options to save for college: educational savings accounts, individual stocks, mutual funds, real estate, U.S. savings bonds, or another form. Each specification includes the school fixed effect, as well as fixed effects for the following student and family characteristics: family income group, parent's level of education, student's ability quartile, parent's marital status, student's gender, student being born in the US, and student's race. Control variables used in each specification are the number of dependents and parent's age. Standard errors are clustered at the school level and are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Appendix C. The Popularity of Different Education Savings Accounts

Table B.1 in Appendix B reports total assets and total accounts in the two types of 529 plans (college savings and prepaid tuition). Total assets in 529 college savings plans and 529 prepaid tuition plans were $453.2 billion and $27.2 billion, respectively, in 2021. At the same time, 529 college savings plans had 14.8 million accounts opened, while 529 prepaid tuition plans had only 0.9 million accounts. So, 529 college savings plans accounted for more than 94% of total assets and accounts in both types of 529 plans combined. The popularity of 529 college savings plans can be partially explained by the fact that they are more convenient than 529 prepaid tuition plans. Funds in 529 college savings accounts can be used to pay for qualified education expenses at post-secondary institutions in the US and some foreign universities.[29] The list of qualified education expenses includes not only tuition and fees, but also room and board, books and computers, internet access, etc. 529 prepaid tuition plans, on the other hand, can only be used to cover tuition at a much smaller number of participating post-secondary institutions. In addition to 529 college savings plans being more convenient than 529 prepaid tuition plans, the popularity of the former plans can also be driven by the fact that only 14 states had 529 prepaid tuition plans in 2021 Q4, while 49 states and DC had 529 college savings plans.[30]

The recent data on total assets and total accounts for Coverdell accounts are not available. However, Crandall-Hollick (2021) reports that estimated tax benefits associated with the exclusion of earnings from Coverdell education savings accounts amount to 0.3 billion, which are approximately 24.3 times lower than estimated tax benefits related to the exclusion of earnings from 529 college savings plans (7.3 billion) for the period 2020-2024. As a result,

[29]Since 2018, 529 college savings accounts can also be used to cover up to $10,000 in tuition expenses at elementary or secondary schools.

[30]The following states had 529 prepaid tuition plans in 2021 Q4: Alabama, Florida, Illinois, Kentucky, Maryland, Massachusetts, Michigan, Mississippi, Nevada, Pennsylvania, South Carolina, Texas, Virginia, and Washington. Only WY does not have a 529 college savings plan, as its 529 college savings plan was terminated in 2006.

the share of Coverdell accounts in education savings accounts is likely to be very small (as well as the share of 529 prepaid tuition plans), in contrast to the share of 529 college savings plans. Thus, 529 college savings plans are by far the most popular type of education savings accounts.

Appendix D. The State-Level Relative Percentage of Individuals with 529 Accounts Who Have Accounts in In-State 529 College Savings Plans

A limitation of the individual-level SIPP data on education savings accounts is the absence of information on whether individuals have 529 accounts in in-state or in out-of-state 529 college savings plans. To overcome this limitation, I compute the state-level measure showing whether a state has a relatively high percentage of individuals with 529 accounts who have accounts in in-state 529 college savings plans. To calculate this measure, I combine the individual-level SIPP data on education savings accounts and data on 529 college savings plans from the College Savings Plans Network.

$$\text{State-Level Relative Percentage}_s = \frac{\text{Percentage}_{s,\text{College Savings Plans Network}}}{\text{Percentage}_{s,\text{SIPP}}}$$

This measure is relatively high for states, in which most individuals with 529 accounts have accounts in in-state 529 college savings plans, and is relatively low for state, in which most individuals with 529 accounts have accounts in out-of-state 529 college savings plans. It is unlikely affected by the risky share, because the risky share does not affect 529 participation as shown in Table IV

Appendix E. Theoretical Foundations of 529 Portfolio Allocation Measures

As previously stated (equations (3) and (4)):

$$w_{risky,age,m,t} - \overline{w_{risky,age,t}} \approx w_{risky,age-j,m,t} - \overline{w_{risky,age-j,t}}$$

$$w_{stocks,age,m,t} - \overline{w_{stocks,age,t}} \approx w_{stocks,age-j,m,t} - \overline{w_{stocks,age-j,t}}$$

As a result, I assume:

$$w_{risky,age,m,t} = \overline{w_{risky,age,t}} + \Delta_{risky,m,t}$$

$$w_{stocks,age,m,t} = \overline{w_{stocks,age,t}} + \Delta_{stocks,m,t}$$

If a household contributes 1 per period, the total investment over N periods $Z_{s,t}$ will be:

$$Z_t = \sum_{n=1}^{N} \prod_{age=18-n+1}^{18} (1 + r_{age,t+age-18})$$

Using a Taylor approximation, I obtain:

$$log(Z_t) \approx log(N) + \frac{1}{N} * r_{18-N+1,t-N+1} + \frac{2}{N} * r_{18-N+2,t-N+2} + ... + \frac{N}{N} * r_{18,t}$$

The return for each child's age *age* in state s at time t will be as follows:

$$\begin{aligned} r_{age,t} &= w_{stocks,age,t}(r_{stocks,t} - r_{risky,t}) + w_{risky,age,t} r_{risky,t} = \\ = (\overline{w_{stocks,age,t}} &+ \Delta_{stocks,t})(r_{stocks,t} - r_{risky,t}) + (\overline{w_{risky,age,t}} + \Delta_{risky,t}) r_{risky,t} \end{aligned}$$

Therefore, the log of the total investment will be as follows:

$$
\begin{aligned}
log(Z_t) \approx log(N) \quad &+ \quad \sum_{j=1}^{N} \frac{j}{N} \overline{w_{stocks,18-N+j,t-N+j}} (r_{stocks,t-N+j} - r_{risky,t-N+j}) + \\
&+ \quad \sum_{j=1}^{N} \frac{j}{N} \overline{w_{risky,18-N+j,t-N+j}} r_{risky,t-N+j} + \\
&+ \quad \sum_{j=1}^{N} \frac{j}{N} \Delta_{stocks,s,t-N+j} (r_{stocks,t-N+j} - r_{risky,t-N+j}) + \\
&+ \quad \sum_{j=1}^{N} \frac{j}{N} \Delta_{risky,s,t-N+j} r_{risky,t-N+j}
\end{aligned}
$$

If households invest for the same number of periods, the last two terms are identical for all child ages. The first three terms are independent of state and can be explained by the intersection of the year and child age (or school grade) fixed effects.