

## **Internet Appendix for Suboptimal Investment and Local Preferences: Evidence from 529 College Savings Plans**

This Internet Appendix contains accompanying analysis for the paper, “Suboptimal Investment and Local Preferences: Evidence from 529 College Savings Plans.” The appendix is organized as follows: Section IA-1 shows the assumptions used by states to compare investment options for investors; Section IA-II shows the impact of state and plan characteristics on the expected terminal payoff (ETP) of a 529 investment; Section IA-III describes our data sources in additional detail; and Section IA-IV presents correlations of variables used in the hypothesis tests.

## IA-1: Representative Household Assumptions

The following exhibits show the assumptions used in 529 plan documents. Exhibit 1 presents an excerpt from the Nevada Vanguard 529 College Savings Plan's 2011 disclosure document. Exhibit 2 presents an excerpt from the California ScholarShare College Savings Plan's 2014 disclosure document. Plans' assumptions remain consistent across states and throughout time.

*Exhibit 1: 2011 Nevada Vanguard 529 College Savings Plan*<sup>35</sup>

### Investment Cost Example

The following example is intended to help you compare the cost of investing in the Portfolios over different time periods. It illustrates the hypothetical expenses that you would incur over various periods if you invest \$10,000 in a Portfolio. This example assumes that a Portfolio provides a return of 5% a year, and that the Portfolio's expense ratio remains the same as shown in the table on page 17. The results apply whether or not the investment is redeemed at the end of the period, but they do not take into account any redemptions that are Nonqualified Withdrawals (defined in **Part 7. Other Information About Your Account—Withdrawals**) or withdrawals otherwise subject to state or federal income taxes or any penalties.

*Exhibit 2: 2014 California ScholarShare College Savings Plan*<sup>36</sup>

**Investment Cost Example.** The example in the following table is intended to help you compare the cost of investing in the different Investment Portfolios over various periods of time. This example assumes that:

- You invest \$10,000 in an Investment Portfolio for the time periods shown below.
- Your investment has a 5% compounded return each year.
- You withdraw your entire investment from the Investment Portfolio at the end of the specified periods for Qualified Higher Education Expenses.
- Total Annual Asset-Based Fees remain the same as those shown in the Fee Table above.

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<sup>35</sup> Vanguard 529 College Savings Plan, 2011, Program Description, *State of Nevada*.

<sup>36</sup> ScholarShare College Savings Plan, 2014, Plan Disclosure Booklet and Participation Agreement, *ScholarShare Investment Board*.

## IA-2: Impact of State and Plan Characteristics on a 529 Plan's Terminal Payoff

Several state and plan characteristics impact the expected terminal payoff (ETP) of a pre-state tax contribution to a 529 plan. Key state characteristics affecting a plan's ETP include the state's income tax rate, its tax deduction benefits for 529 plan contributions, and its matching grants for contributions. Key plan characteristics shaping a plan's ETP include the plan's underlying portfolios, management fee, and account maintenance fee. As described in Section 1.2, these characteristics impact the *Contribution<sup>s,p</sup>*, *Return<sup>s,p</sup>*, and *Distribution<sup>s,p</sup>* components of a plan's terminal payoff.

By presenting the intermediate values of the model's calculations, this table reports the extent to which each of the characteristics affects the ETP. We assess the impact of a single state or plan characteristic by comparing the average ETP with and without that characteristic. Assumptions follow those in Section 1.2. The average expected terminal payoff (ETP) is \$20,655, representing an 107% cumulative growth over the account lifetime from the pre-tax contribution of \$10,000. The average ETP for minimum fees, defined as charging the minimum total asset-based fees across all plans in a year and no account maintenance fees, is \$23,707, or 14.77% higher than the average ETP with fees. The average ETP without state tax deduction benefits is \$20,498, or 0.76% lower. The average ETP without state income taxes (and thus with no need for tax deduction benefits), then the average ETP is \$21,169, or 2.49% higher. Lastly, the average ETP without matching grants for 529 plan contributions is \$20,595, or 0.29% lower. Therefore, among all state and plan characteristics, fees have the largest impact on the expected growth of a 529 plan contribution.

	Amount (\$)	ETP Difference (%)
Expected Terminal Payoff (ETP) of \$10,000 pre-tax contribution	20,655	
<b>ETP with:</b>		
Minimum Fees	23,707	14.77
No State Tax Benefits	20,498	-0.76
No State Taxes	21,169	2.49
No State Matching Grants	20,595	-0.29

### **IA-3: Data Sources**

#### *Plan Data Sources*

We obtain information about plan characteristics from several data sources. The College Savings Plan Network (CSPN) reports data on assets under management and number of accounts by plan. We gather assets and accounts for each year-end between 2009 and 2021. The Municipal Securities Review Board (MSRB) reports plan disclosure documents for nearly all plans. We download all plan disclosure documents since 2009. For plans without disclosures in the MSRB database, we manually gather their historical disclosures from plan websites and internet searches. From each disclosure, we extract information on each plan portfolio's underlying management fees, program fees, and total asset-based fees as well as plan-level account maintenance fees. Morningstar Direct collects data on plan characteristics (direct- vs. advisor-sold, residency restrictions, matching grants, program manager, inception and obsolete dates) and portfolio characteristics (monthly returns, assets under management, and asset management company). We search asset management company websites to verify their headquarters to determine in-state vs. out-of-state status relative to each plan. Lastly, we use Saving For College data and plan websites as independent checks to verify the accuracy of our data. After cleaning the plan names, we merge the CSPN, MSRB, and Morningstar data sets by plan name.

#### *State Data Sources*

We obtain state characteristics from multiple data sources. The National Bureau of Economic Research (NBER) TAXSIM program provides annual historical tax rates for representative taxpayers for each state. The Census Bureau's American Community Survey (ACS) provides annual historical data on the size, age, college attainment, and income distribution of each state's population. The Census Bureau's Annual Survey of State and Local Government Finances (ASSLGF) provides historical data on states' total revenue and expenditures as well as education-specific revenue and expenditures each year. Lastly, the Financial Industry Regulatory Authority's (FINRA) National Financial Capability Survey (NFCS) reports both objective and subjective indices of households' financial literacy in each state every three years. We merge the NBER, ACS, ASSLGF, and NFCS data sets by state and year.

### IA-4: Correlation Table

This table presents the Pearson correlations between variables measured at the state-year level. Variable names appended with “(proportion)” refer to the value of the state’s optimal 529 plan relative to the state total. Variable names appended with “(ratio)” refer to the ratio of the value for the optimal home-state plan to the value for the state’s suboptimal plan(s). All variables are defined in Table 1A. Statistical significance at the 10%, 5%, and 1% levels are indicated by \*, \*\*, and \*\*\*, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Assets Under Management (proportion)	1.000								
(2) Optimal Accounts (proportion)	0.973***	1.000							
(3) Disclosure Complexity 1 (ratio)	-0.316***	-0.244**	1.000						
(4) Disclosure Complexity 2 (ratio)	-0.514***	-0.469***	0.525***	1.000					
(5) Literacy: Test Questions Correct	0.127	0.036	-0.004	0.035	1.000				
(6) Literacy: Self Assessed High	0.059	0.056	-0.010	-0.168	0.065	1.000			
(7) Total Asset-Based Fee (ratio)	-0.342***	-0.374***	0.138	0.293**	0.413***	0.063	1.000		
(8) Expected 529 Participation	0.371***	0.395***	0.087	0.134	0.174***	0.099*	-0.029	1.000	
(9) Married Household Income	0.298**	0.352***	0.018	0.127	-0.216***	0.011	-0.184*	0.623***	1.000