

ACTUARIAL VALUATION  
OF  
Prepaid529  
AS OF JUNE 30, 2020

By:

ALAN H. PERRY, FSA, CFA  
GLENN D. BOWEN, FSA, EA  
JILL M. STANULIS, EA



1550 Liberty Ridge Drive  
Suite 200  
Wayne, PA 19087-5572

Tel +1 610.687.5644  
Fax +1 610.687.4236

[www.milliman.com](http://www.milliman.com)

October 30, 2020

Board of the Virginia College Savings Plan  
Commonwealth of Virginia  
Virginia College Savings Plan  
9001 Arboretum Parkway  
N. Chesterfield, VA 23236

Ladies & Gentlemen:

This report presents the results of the actuarial valuation of the Prepaid529 Program as of June 30, 2020.

### Purpose

The main purposes of this report are:

- to calculate the actuarial present value of the obligations under Prepaid529 contracts purchased through June 30, 2020 and compare the value of those obligations with the assets in Prepaid529 as of that date;
- to review the experience and changes in the actuarial assumptions during the last year and indicate their effects on the results; and
- to set forth the basis for the actuarial assumptions and methods utilized in those calculations.

The results contained in this report are based on contract data and preliminary financial statements provided by the Virginia College Savings Plan. We have relied on this data in preparing this report.

### Background

In 1994, the Virginia General Assembly established the Virginia Higher Education Tuition Trust Fund (subsequently renamed the Virginia College Savings Plan) to enhance the accessibility and affordability of higher education for all citizens of the Commonwealth. The Prepaid529 fund consists of payments received pursuant to prepaid tuition contracts, bequests, endowments or grants from the United States government, its agencies and instrumentalities, and any other available sources of funds, public or private. Any moneys remaining in Prepaid529 at the end of a biennium shall remain in Prepaid529. Interest and income earned from the investment of such funds shall remain in Prepaid529.

This work product was prepared solely for the Virginia College Savings Plan for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

In 1998, the Virginia General Assembly passed legislation that requires the Governor to include in each year's state budget an amount to cover the Plan's obligations, which include Prepaid529, in the event "the Plan is unable to meet its current obligations." The Governor has included the provision in subsequent budget submissions to meet the Prepaid529 obligations, and the General Assembly has included the provision in subsequent Appropriation Acts, including Chapter 1289 of the 2020 Virginia Acts of the Assembly (2020 Appropriation Act).

### Program Design

Prepaid529 is one of three Section 529 options currently offered by the Virginia College Savings Plan. Under Prepaid529, participants purchase tuition contracts that provide coverage of tuition and mandatory fees at a public university and/or community college in Virginia. At redemption, the contract pays the current tuition and mandatory fees at the Virginia public university or community college that the beneficiary attends. The benefits vary if the beneficiary does not attend a Virginia public university or community college. With the establishment of Invest529 and other savings programs, contract holders have the option of rolling over the value of their Prepaid529 contract into a savings account. The value of the Prepaid529 contract for such rollovers is the accumulated contributions at the reasonable rate of interest set by Virginia529. This option to roll over the contract has effectively added a minimum benefit to the Program.

In 2019, The Virginia General Assembly passed legislation that included provisions for Prepaid529 contracts entered into prior to July 1, 2019. These provisions allow for the "Minimum Benefit" payout directly from Prepaid529 to qualified higher education institutions when the accumulated contributions at the reasonable rate of interest set by Virginia529 exceeds the normal payout from the program.

Due to the significant increase in the cost of higher education since Prepaid 529 opened in 1996 and other factors, the Board decided to permanently close Prepaid529 to new enrollments as of May 1, 2019. The Board anticipates opening a new, similar program in 2021.

### Statutory Requirements

The Code of Virginia, Title 23.1, Subtitle II, Chapter 7 provides limited guidance for establishing the actuarial basis to evaluate Prepaid529. The Code requires an annual audit of Prepaid529 and states in part that if the annual accounting and audit reveal that there are insufficient funds to ensure the "actuarial soundness" of Prepaid529, the "Board may adjust the terms of subsequent prepaid tuition contracts, arrange refunds for current purchasers to ensure actuarial soundness, or take such other action the Board deems appropriate."

“Actuarial soundness” is not a precise concept and there is no generally accepted understanding of the meaning of this phrase within the actuarial profession, especially with respect to prepaid tuition plans. For purposes of this report, we have assumed that the phrase “actuarially sound,” when applied to Prepaid529, means that the Fund has sufficient assets (including the value of future installment payments due under current contracts) to cover the actuarially estimated value of the tuition obligations under those contracts (including any administrative costs associated with those contracts).

We have also interpreted these Sections to require that the actuarial liabilities be evaluated using sound actuarial principles that are generally consistent with the practices and principles widely used for retirement programs. Reference to other programs is necessary because of the innovative nature of a prepaid tuition program. No generally accepted standard of practice has evolved within the actuarial profession specifically addressing prepaid tuition programs. We chose the standards applicable to retirement programs because these programs generally provide for payments at some future date where that payment has a high probability of payment at, or close to, some specific age.

#### Valuation Basis

The assumptions selected for this report are intended to be "best estimates".

The method for determining the “best estimate” liability for the Program reflects the possible variability of inflation, tuition, and investment returns and the correlation between each of these variables. The methodology is described in the section below, Variability of Results and Valuation Basis.

#### Prepaid Investment Policy

On August 27, 2020, the Board of the Virginia College Savings Plan adopted a new target asset allocation strategy for Prepaid529. The new asset allocation targets are reflected in this valuation report.

The investment strategy is important because it sets forth acceptable investment allocations among asset classes. The asset allocation affects the magnitude and variability of expected investment returns and therefore the financial structure of the plan. For the valuation, we have assumed that Prepaid529 investments will be allocated as shown below, based on the investment policy target allocations:

#### Asset Category

Equities	22.0%
Fixed Income	52.5%
Alternative Investments	25.5%

Actuarial Assumptions

The actuarial assumptions used to prepare this report are summarized in Appendix C. The two most significant of those assumptions are the rates of investment return and tuition growth in the future. The Virginia College Savings Plan selected both of these assumptions. They are:

- the investment return assumption of 5.75% per year, net of investment related expenses (this is the same as the assumption used to prepare the prior year’s report); and,
- the annual tuition growth rate assumptions summarized in the following table.

	<u>Universities</u>	<u>Community Colleges</u>
Fall 2021	4.0%	2.0%
Fall 2022	4.0%	2.0%
Fall 2023 and thereafter	6.0%	6.0%

In the prior year’s valuation the tuition growth assumption for universities and community colleges was 4.0% for fall 2021 and 6.0% thereafter.

Summary of Results

The actuarial value of the obligations of Prepaid529 as of June 30, 2020 is summarized below and compared with the total assets of Prepaid529.

	<u>Present Value of Obligations For Future Payments</u>	<u>Value of Total Prepaid529 Assets</u>	<u>Actuarial Reserve/ (Deficit)</u>
<i>(Amounts in Millions)</i>			
Prepaid529:			
Tuition Obligations	\$1,807.5	n/a	n/a
Administrative Expenses	<u>23.5</u>	<u>n/a</u>	<u>n/a</u>
Grand Total	\$1,831.0	\$2,881.2	\$1,050.2

As indicated above, Prepaid529 has assets that exceed the “best estimate” of the obligations by roughly \$1,050.2 million or 57.4%. Unfavorable future experience would adversely affect this position. It would be desirable to maintain the actuarial reserve over time to protect this position.

This work product was prepared solely for the Virginia College Savings Plan for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

The present value of future obligations for Administrative Expenses reflects the expected costs of maintaining each contract in place (as of June 30, 2020) until all tuition benefits have been paid and the expenses associated with making those payments. It does not include the future expenses of Prepaid529 associated with general overhead and marketing attributable to future contracts. The \$23.5 million administrative expense obligation is equivalent to about \$406 per contract.

### Actuarial Gain/Loss Analysis

During the 2020 fiscal year, the actuarial reserve position of Prepaid529 increased from a surplus of \$1,029.4 million to a surplus of \$1,050.2 million or 57.4% of obligations. Actuarial gains add to the reserve while actuarial losses decrease the reserve. Each of the factors affecting the change in the actuarial reserve/(deficit) is discussed below.

The actuarial surplus was expected to grow during the year by about \$59.2 million due to the passage of time. (The obligations are calculated as present values which grow with interest with the passage of time.)

The rate of return on Prepaid529 investments (net of investment management fees) for the fiscal year was 1.64% on a time-weighted basis and 1.50% on a dollar-weighted basis. For the previous valuation, a 5.75% rate of return was assumed. This produced a net actuarial loss of approximately \$116.3 million.

The enrollment-weighted average university tuition and mandatory fee amount for the 2020-2021 school year increased by 1.8%, a smaller increase than the 4.0% rate assumed in the prior valuation. Enrollment-weighted tuition and mandatory fees at community colleges decreased by about 0.7%, compared to the 4.0% increase assumed in the prior valuation. These differences from the assumptions resulted in an actuarial gain of \$24.9 million.

Payouts for some of the contract holders are based on the account balance brought forward at the reasonable rate or the account balance brought forward at the actual rate of return on the portfolio. See Appendices C and F for an explanation of the assumptions and the payouts. During the past year the actual rate of return on the portfolio was 1.64% (4.11% lower than the 5.75% assumption). The lower than expected actual account balances resulted in an actuarial gain of approximately \$7.5 million.

Prepaid529 operating expenses were \$4.0 million, which is \$0.4 million less than the \$4.4 million that was expected to be drawn from the expense reserve. The \$0.4 million is an increase to the reserve.

The assumption for the reasonable rate was changed from 3.00% each year to a fixed 0.16% for the current fiscal year and 2.50% thereafter. The volatility and correlation assumptions for the investment returns and tuition increases were updated. The combined impact of these changes was a \$34.9 million increase to the reserve.

The tuition growth assumption for universities was changed from 4.0% for fall 2021 and 6.0% thereafter to 4.0% for fall 2021 and fall 2022 and then 6.0% thereafter. The tuition growth assumption for community colleges was changed from 4.0% for fall 2021 and 6.0% thereafter to 2.0% for fall 2021 and fall 2022 and then 6.0% thereafter. These changes increased the reserve by \$14.3 million.

Other experience reduced the reserve by about \$4.1 million. This includes fewer contracts redeeming their units during the year than expected as well as rollover, cancellation, and forfeiture levels different than assumed in last year's valuation and other variations from the actuarial assumptions.

In summary, the effect of experience and assumption changes on the actuarial reserve/ (deficit) can be summarized as follows:

*(Amounts in Millions)*

Actuarial Reserve / (Deficit) as of June 30, 2019	\$ 1,029.4
Interest on the reserve at 5.75%	59.2
Investment gain / (loss)	(116.3)
Tuition gain / (loss)	24.9
Lower than expected actual account balances	7.5
Administrative expenses less than expected	0.4
Change to reasonable rate and volatility assumptions	34.9
Change to tuition growth assumptions	14.3
Other experience	<u>(4.1)</u>
Actuarial Reserve / (Deficit) as of June 30, 2020	\$ 1,050.2

### Valuation Basis

The present values of the obligations shown above were based on assumptions which represent an estimate of anticipated experience under the Fund that are reasonably related to past educational cost and investment data. Differences between those projections and actual amounts will depend on the extent to which future experience conforms to the assumptions made for this analysis.

A prime source of variation will be normal fluctuations that occur in the rate of increase in tuition, investment returns, and expense inflation. One way of estimating the range of possible outcomes is to stochastically model the financial operation of Prepaid529 using "Monte Carlo" techniques. This approach involves preparing 1,000 projections of financial results under randomly derived scenarios of tuition growth, investment returns, and expense inflation. Each of these scenarios is based on statistical factors such as standard deviation and correlation that were established by reviewing historical results adjusted where appropriate to reflect current conditions. By tabulating the results under all of these projections we estimated the probability that current assets, along with all anticipated contract payments plus investment returns, will be sufficient to cover the obligations of Prepaid529.

This work product was prepared solely for the Virginia College Savings Plan for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

We have summarized in the table below the results of this process. It is important to understand that these results are only illustrative of the range of results that are possible and are dependent on the assumptions utilized. The assumptions are presented in Appendix C.

*(Amounts in Millions)*

<u>Percentage of "Best Estimate" Reserve</u>	<u>Total Prepaid529 Fund Value at June 30, 2020</u>	<u>Probability of Prepaid529 Funds Exceeding Obligation</u>
80%	\$1,464.9	4%
90%	1,648.0	21%
100%	1,831.0	50%
105%	1,922.6	64%
110%	2,014.2	77%
120%	2,197.3	91%
130%	2,380.4	97%
140%	2,563.5	99%
150%	2,746.6	99%
157%	2,881.2	99%*

\*actual Fund position.

The present value of obligations for future payments shown previously is the amount of assets necessary to have a 50% probability of meeting all program obligations, including administrative costs, associated with current contracts. The actual Prepaid529 fund balance at June 30, 2020 of \$2,881.2 million is 157.4% of the actuarially determined "Best Estimate" Reserve amount of \$1,831.0 million. As indicated in the above table, this Prepaid529 fund balance is estimated to have a 99% probability of being adequate to satisfy all Prepaid529 obligations using current assumptions.

### Cash Flow Projection

The table in Appendix E shows a cash flow projection based on a set of deterministic assumptions that produce the same Present Value of Obligations for Future Payments as the "best estimate" actuarial assumptions used in the Monte Carlo simulations. The deterministic cash flow projection assumes that University tuition increases 4.0% for fall 2021 and 2022 and 6.0% per year thereafter, Community College tuition increases of 2.0% for fall 2021 and 2022 and 6.0% per year, thereafter, and Prepaid529 assets earn 5.46% each year. The starting Market Value of Invested Assets as of July 1, 2020 is \$2,717.0 million. At the end of the 2044 Fiscal Year all tuition obligations associated with contracts already purchased are expected to have been paid resulting in a final cumulative surplus of \$3,765.1 million. Since the actuarial assumptions are intended to

represent “best estimates” of future expenses, there is a 50% chance that actual results will be better than this projection and a 50% chance that actual results will be worse.

### Variability of Results

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: future experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; and increases or decreases expected as part of the natural operation of the methodology used for these measurements. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements.

### Data Reliance

In performing this analysis, we relied on data and other information (some oral and some in writing) provided by the staff of the Virginia College Savings Plan. This information includes, but is not limited to, contractual provisions, contract holder data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete our results may be different and our calculations may need to be revised.

### Actuarial Assumptions

All costs, liabilities, and other factors for Prepaid529 have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of Prepaid529 and reasonable expectations). Further, the actuarial assumptions in the aggregate are reasonable and are related to the experience of Prepaid529 and to reasonable expectations. The following actuarial assumptions were set by the Virginia College Savings Plan:

- 1) the investment return assumption of 5.75% per year, and;
- 2) the tuition growth assumption for universities of 4.0% for fall of 2021 and 2022 and 6.0% per year thereafter and the tuition growth assumption for community colleges of 2.0% for fall of 2021 and 2022 and 6.0% per year thereafter.

### Certification

Based on the foregoing assumptions, Prepaid529 has sufficient assets, including the value of future installment payments, to cover the actuarially estimated value of the tuition obligations under all contracts outstanding as of the valuation date (including any administrative costs associated with those contracts). This determination has been based on reasonable actuarial assumptions that represent the Virginia College Savings Plan’s best estimate of anticipated experience under Prepaid529 taking into account past experience and future expectations.

This work product was prepared solely for the Virginia College Savings Plan for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices.

### Third Party Distribution

This report was prepared exclusively for the Virginia College Savings Plan for a specific and limited purpose. It is a complex, technical analysis that assumes a high level of knowledge concerning the Virginia College Savings Plan's operations, and uses the Virginia College Savings Plan's data, which Milliman has not audited. It is not for the use or benefit of any third party for any purpose. Any third party recipient of Milliman's work product who desires professional guidance should not rely upon Milliman's work product, but should engage qualified professionals for advice appropriate to its own specific needs.

### Qualifications

We are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

The consultants who worked on this assignment are actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

We look forward to reviewing the results of our analyses with you at your earliest convenience.

Respectfully submitted,



Alan H. Perry, FSA, CFA  
Member American Academy of Actuaries



Glenn D. Bowen, FSA, EA  
Member American Academy of Actuaries



Jill M. Stanulis, EA  
Member American Academy of Actuaries

AHP:JMS:GDB:VPP10 g:\corr\vpp\Prepaid529 2020 Valuation.docx

## Prepaid529

### I. Statement of Assets as of June 30, 2020

<u>Investments</u>	<u>Market Value</u>
1) Equities	\$ 1,186,928,726
2) Fixed Income including Accrued Interest	1,422,251,536
3) Futures, REIT Fund, and Real Estate	55,914,002
4) Cash & Cash Equivalents	66,438,238
5) Pending Trade Receivables	3,093,646
6) Accounts Receivable	919,326
7) Other Receivables	5,125,255
8) Accounts Payable	(23,244,644)
9) Other Payables	(470,871)
Total Market Value of Investments	\$ 2,716,955,472
Present Value of Installment Contract Receivables	<u>164,263,818</u>
Value of Total Fund Assets	\$ 2,881,219,290

### II. Reconciliation of Investments

1) Market Value of Investments at June 30, 2019	\$ 2,811,228,601
2) Contract Purchase Payments	50,063,084
3) Application Fees	41,738
4) Interest and Dividends	89,969,853
5) Realized and Unrealized Gains/(Losses)	(36,313,967)
6) Tuition Benefits Paid	(146,755,550)
7) Refunds Paid	(12,577,064)
8) Net Rollovers	(22,054,558)
9) Prepaid Administrative Expenses	(4,036,724)
10) Investment Management Fees	(9,962,018)
11) Net Effect of Changes in Accruals of Assets and Liabilities	<u>(2,647,923)</u>
12) Market Value of Investments at June 30, 2020	\$ 2,716,955,472
Time-weighted rate of return	1.64%
Dollar-weighted rate of return	1.50%

## Appendix A

This work product was prepared solely for the Virginia College Savings Plan for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

**Prepaid529**  
**Contract Data as of June 30, 2020 – Contracts Purchasing Tier I Units Only - Number of Contracts**

Matriculation Year	Total Years of Community College Purchased Total Years of University Purchased										Total by Payout Year	Percent of Total
	0	0	0	0	0	0	0	0	0	0		
	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5		
2000-2001	0	0	0	2	0	1	0	18	0	1	22	0.0%
2001-2002	0	3	0	2	0	0	0	30	0	0	35	0.1%
2002-2003	0	8	0	2	0	0	0	37	0	5	52	0.1%
2003-2004	0	2	0	7	0	1	0	50	0	1	61	0.1%
2004-2005	0	6	0	8	0	1	0	76	0	4	95	0.2%
2005-2006	0	12	0	16	0	1	0	126	0	6	161	0.3%
2006-2007	0	11	0	25	0	11	0	145	0	14	206	0.4%
2007-2008	0	23	0	31	0	5	0	172	0	17	248	0.5%
2008-2009	0	25	0	32	0	9	0	244	0	26	336	0.6%
2009-2010	0	33	0	28	0	11	0	327	0	27	426	0.8%
2010-2011	0	40	0	61	0	17	0	364	0	40	522	1.0%
2011-2012	0	38	0	52	0	16	0	448	0	40	594	1.1%
2012-2013	1	69	1	80	0	22	0	527	0	61	761	1.4%
2013-2014	0	70	0	92	0	25	1	643	0	61	892	1.7%
2014-2015	0	99	1	101	0	28	0	717	0	74	1,020	1.9%
2015-2016	0	93	0	123	2	27	4	795	0	84	1,128	2.1%
2016-2017	3	126	3	171	1	52	2	1,207	0	107	1,672	3.1%
2017-2018	20	217	4	297	5	90	8	2,363	1	131	3,136	5.8%
2018-2019	43	323	16	364	6	113	4	2,419	1	156	3,445	6.4%
2019-2020	109	425	29	539	9	134	3	2,264	1	131	3,644	6.8%
2020-2021	189	614	32	523	18	129	8	1,995	0	113	3,621	6.7%
2021-2022	299	741	63	596	32	174	8	2,098	2	135	4,148	7.7%
2022-2023	433	716	66	668	31	149	6	1,588	2	58	3,717	6.9%
2023-2024	454	738	58	519	25	127	11	1,458	2	66	3,458	6.4%
2024-2025	443	620	68	477	20	115	3	1,204	4	74	3,028	5.6%
2025-2026	481	610	49	467	25	79	11	1,025	1	63	2,811	5.2%
2026-2027	454	529	52	348	15	76	5	815	3	42	2,339	4.3%
2027-2028	421	487	51	367	15	74	7	744	3	39	2,208	4.1%
2028-2029	405	406	53	303	20	57	8	619	1	30	1,902	3.5%
2029-2030	420	362	44	250	7	36	3	509	1	28	1,660	3.1%
2030-2031	390	292	42	233	13	44	3	358	1	18	1,394	2.6%
2031-2032	418	286	30	159	13	25	4	308	2	15	1,260	2.3%
2032-2033	348	214	27	154	6	28	7	241	1	21	1,047	1.9%
2033-2034	280	182	28	109	11	21	3	182	1	13	830	1.5%
2034-2035	234	158	19	114	8	18	2	155	0	9	717	1.3%
2035-2036	192	143	20	105	12	29	5	151	1	12	670	1.2%
2036-2037	80	88	10	57	1	14	2	106	0	11	369	0.7%
2037-2038	33	35	4	46	2	6	0	40	0	6	172	0.3%
2038-2039	0	1	0	0	0	0	0	4	0	0	5	0.0%
<b>Total</b>	6,150	8,845	770	7,528	297	1,765	118	26,572	28	1,739	53,812	
<b>Percent of Total</b>	11.4%	16.4%	1.4%	14.0%	0.6%	3.3%	0.2%	49.4%	0.1%	3.2%		

Prepaid529

Contract Data as of June 30, 2020 – Contracts Purchasing Tier II Units Only - Number of Contracts

Matriculation Year	Total Years of Community College Purchased														Total by Payout Year	Percent of Total
	Total Years of University Purchased															
	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	8	10		
2000-2001	0	1	0	4	0	0	0	0	0	0	0	0	0	0	5	0.2%
2001-2002	0	0	0	14	0	0	0	0	0	0	0	0	0	0	14	0.6%
2002-2003	0	2	0	7	0	0	0	0	0	0	0	0	0	0	9	0.4%
2003-2004	0	1	0	4	0	1	0	0	0	0	0	0	0	0	6	0.3%
2004-2005	0	2	0	15	0	1	0	0	0	0	0	0	0	0	18	0.8%
2005-2006	0	1	0	20	0	1	0	0	0	0	0	0	0	0	22	1.0%
2006-2007	0	1	0	19	0	1	0	0	0	0	0	0	0	0	21	1.0%
2007-2008	0	2	0	30	0	2	0	0	0	0	0	0	0	0	34	1.5%
2008-2009	0	1	0	24	0	1	0	0	0	0	0	0	0	0	26	1.2%
2009-2010	0	2	0	32	0	5	0	0	0	0	0	0	0	0	39	1.8%
2010-2011	0	11	0	36	0	1	0	0	0	0	0	0	0	0	48	2.2%
2011-2012	0	5	0	43	0	7	0	0	0	0	0	0	0	0	55	2.5%
2012-2013	1	9	0	42	0	8	0	0	0	0	0	0	0	0	60	2.7%
2013-2014	0	8	0	39	0	2	0	0	0	0	0	0	0	0	49	2.2%
2014-2015	0	18	0	55	0	8	0	0	0	0	0	0	0	0	81	3.7%
2015-2016	0	12	0	65	0	2	0	0	0	0	0	0	0	0	79	3.6%
2016-2017	0	14	0	57	0	1	0	0	0	0	0	0	0	0	72	3.3%
2017-2018	2	18	0	68	0	7	0	0	0	0	0	0	0	0	95	4.3%
2018-2019	4	15	0	73	2	8	0	0	0	0	0	0	0	1	103	4.7%
2019-2020	9	30	0	93	0	16	0	2	0	0	0	0	0	2	152	6.9%
2020-2021	8	38	1	96	1	10	0	0	0	0	0	0	0	0	154	7.0%
2021-2022	6	40	1	85	1	9	0	0	0	0	0	0	0	0	142	6.4%
2022-2023	11	36	0	82	1	1	0	1	0	0	0	0	0	0	132	6.0%
2023-2024	8	40	1	71	2	7	0	2	0	0	0	0	0	1	132	6.0%
2024-2025	9	39	1	53	1	4	0	1	0	0	0	0	0	0	108	4.9%
2025-2026	10	28	1	39	0	2	0	1	0	1	0	0	0	2	84	3.8%
2026-2027	8	12	0	41	0	8	0	1	1	0	0	0	0	0	71	3.2%
2027-2028	10	18	0	34	0	3	0	0	0	2	0	0	0	1	68	3.1%
2028-2029	11	19	1	38	1	2	0	1	0	0	0	0	0	0	73	3.3%
2029-2030	10	11	0	40	0	3	0	1	1	0	0	0	0	0	66	3.0%
2030-2031	20	11	0	22	1	1	1	3	0	0	0	0	0	1	60	2.7%
2031-2032	18	7	2	17	0	2	0	0	0	0	0	0	0	0	46	2.1%
2032-2033	12	10	0	14	0	2	0	0	0	0	0	0	0	0	38	1.7%
2033-2034	11	4	1	8	0	1	0	3	0	0	0	0	0	0	28	1.3%
2034-2035	4	4	0	4	0	0	0	0	0	0	0	0	0	0	12	0.5%
2035-2036	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.0%
2036-2037	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
2037-2038	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
2038-2039	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
<b>Total</b>	172	470	9	1,385	10	127	1	16	2	3	0	0	0	8	2,203	
<b>Percent of Total</b>	7.8%	21.3%	0.4%	62.9%	0.5%	5.8%	0.0%	0.7%	0.1%	0.1%	0.0%	0.0%	0.0%	0.4%		



Prepaid529

Participant Data as of June 30, 2020 – Remaining Years of Tuition

<u>Expected Payout Year</u>	<u>University Years</u>	<u>Community College Years</u>
2020-2021	20,038	1,061
2021-2022	15,091	773
2022-2023	13,508	591
2023-2024	12,436	569
2024-2025	9,979	441
2025-2026	8,768	392
2026-2027	7,645	327
2027-2028	6,417	258
2028-2029	5,521	225
2029-2030	4,683	195
2030-2031	3,942	169
2031-2032	3,275	135
2032-2033	2,671	109
2033-2034	2,148	86
2034-2035	1,755	61
2035-2036	1,480	39
2036-2037	1,172	25
2037-2038	876	13
2038-2039	585	6
2039-2040	340	3
2040-2041	172	1
2041-2042	73	0
2042-2043	27	0
2043-2044	<u>7</u>	<u>0</u>
Total	122,609	5,479

## Prepaid529

### Summary of Actuarial Assumptions

#### Investment / Economic Assumptions for Stochastic Simulation Model:

The standard deviation and correlation assumptions are based on actual historical returns and tuition growth. Expected return assumptions are based on Milliman's investment assumptions, but are adjusted so that the expected annualized return on the portfolio is 5.75%, which is the assumption set by the Board.

	<u>Inflation</u>	<u>Reasonable Rate</u>	<u>Equity</u>	<u>Fixed Income</u>	<u>Alternative Investments</u>	<u>University Tuition</u>	<u>Community College Tuition</u>
Expected Arithmetic Mean Annual Return	2.50%	2.50%	8.30%	4.15%	8.50%	6.06%	6.11%
Standard Deviation	1.60%	1.25%	18.15%	5.60%	17.40%	4.15%	6.65%
Correlation:							
Inflation	1.00	0.62	0.41	0.29	0.28	0.21	0.04
Reasonable Rate		1.00	0.13	0.26	0.11	-0.14	-0.16
Equity			1.00	0.46	0.80	0.06	-0.07
Fixed Income				1.00	0.48	0.38	0.12
Alternative Investments					1.00	0.01	-0.19
University Tuition						1.00	0.62
CC Tuition							1.00

Based on the economic assumptions above, the expected long-term annualized compound rate of return on investments is 5.75%. The expected annualized compound rate of tuition growth for universities is 4.00% for the next two years and then 6.00% thereafter. The expected annualized compound rate of tuition growth for community colleges is 2.00% for the next two years and then 6.00% thereafter. The Reasonable Rate was fixed at 0.16% for the first year with a mean yield of 2.50% thereafter.

#### Matriculation and Bias:

Starting in the year of matriculation, it is assumed that 76% of beneficiaries will attend a public university in Virginia, 7.6% will attend a private university in Virginia, 11.4% will attend a university in another state, and 5.0% will request a cancellation, transfer, or rollover to a savings plan. Weighted average tuition for four-year public universities in Virginia was adjusted with an 8.0% load to add a bias for matriculation at more expensive schools. Weighted average tuition for two-year community colleges in Virginia was adjusted with a 1.0% load to add a bias for matriculation at more expensive schools. The highest tuition for a public university in Virginia was assumed to be 173% of weighted average tuition (\$23,628/\$13,636) as shown in Appendix D). Out-of-state students and contracts requesting a rollover are assumed to receive a benefit equal to the payments made on the contract plus interest at the composite reasonable rate of return.

Appendix C  
(Page 1 of 3)

Prepaid529

Summary of Actuarial Assumptions  
(continued)

Combination Contracts:

For combination contracts a portion of the remaining university and community college years are assumed to be paid each year. For combination contracts currently in payout with only university years or community college years remaining, the applicable remaining years are assumed to be paid.

Utilization:

It is assumed that participants will begin utilizing their contract at the following rates, and then redeem up to two semesters of tuition per year until the contract is depleted:

Years since Matriculation	Number of Semesters of Tuition Purchased							
	<u>Year</u>	<u>1 - 2</u>	<u>3 - 4</u>	<u>5 - 6</u>	<u>7 - 8</u>	<u>9 - 10</u>	<u>11-12</u>	<u>13+</u>
0		50%	60%	60%	80%	85%	85%	100%
1		15%	10%	20%	10%	8%	15%	
2		10%	15%	10%	5%	7%		
3		10%	5%	5%	5%			
4		5%	5%	5%				
5		5%	5%					
6		5%						

Forfeiture: It is assumed that contracts will be forfeited prior to the year of matriculation at a rate of 0.5% per year.

Expenses: The expenses included in the present value of future obligations are those relating to:

Annual Maintenance Expense per Contract = \$64.44

Annual Distribution Cost per Contract in Payment Status = \$28.53

The expense assumptions were developed from a cost analysis by Virginia College Savings Plan staff with adjustments for anticipated increases since the analysis was performed in 2013.

These expenses are assumed to increase annually at the rate of inflation plus 0.5%.

Prepaid529

Summary of Actuarial Assumptions  
(continued)

Contracts behind in their monthly payments: The monthly scheduled payment amount is increased by an amount that allows for the full payment under the contract by June of the year of expected matriculation.

Rationale for Assumptions:

All of the actuarial assumptions with the exception of the investment return, the tuition growth rate, and the reasonable rate, were based on the results of an experience study performed in 2014 (see the Experience Study report dated September 22, 2014).

The reasonable rate assumption was based on the current money market yield used to set the rate and forecasts of future short-term interest rates from a survey of economists published in the *June 2020 Blue Chip Financial Forecasts*.

The investment return assumption is set by the Board based on recommendations from Virginia529's investment consultant.

The tuition growth assumptions are also set by the Board. Milliman assisted Virginia529 staff in 2015 with a historical analysis of long-term tuition growth at public colleges in Virginia.

Prepaid529

Derivation of Enrollment-Weighted Average Tuition  
and Mandatory Fees at Four Year Universities  
Based on Fall 2019 Full-Time Equivalent Enrollment

<u>School</u>	<u>Tuition and Fees 2020-2021</u>	<u>Fall 2019 FTE for In-State Undergraduates*</u>	<u>Percent Distribution</u>
Christopher Newport	\$14,924	4,448	3.41%
George Mason	13,014	19,549	14.97%
James Madison 2018, 2019, & 2020 Students	12,330	10,916	8.36%
James Madison Returning Students	11,700	3,639	2.79%
Longwood	13,910	3,254	2.49%
Mary Washington	13,634	3,486	2.67%
Norfolk State	9,622	3,566	2.73%
Old Dominion	11,160	14,223	10.89%
Radford	11,416	7,187	5.50%
University of Virginia	17,304	11,349	8.69%
UVA - Wise	10,912	1,222	0.94%
Virginia Commonwealth	14,710	18,895	14.47%
Virginia Military Institute	19,210	1,173	0.90%
Virginia Tech	13,749	20,850	15.97%
Virginia State	9,154	2,932	2.25%
William & Mary 2018, 2019, & 2020 Students	23,628	2,928	2.24%
William & Mary Returning Students	22,564	<u>976</u>	<u>0.75%</u>
<b>Weighted Average Tuition and Fees</b>	<b>\$13,636</b>	130,592	100.00%

\*Assumes that 2018, 2019, and 2020 students are 75% of total FTE for James Madison. Assumes that 2018, 2019, and 2020 students are 75% of total FTE for William & Mary.

## Prepaid529

### Derivation of Enrollment-Weighted Average Tuition and Mandatory Fees at Community Colleges Based on Fall 2019 Full-Time Equivalent Enrollment

<u>School</u>	<u>Tuition and Fees 2020-2021</u>	<u>Fall 2019 FTE for In-State Undergraduates</u>	<u>Percent Distribution</u>
Blue Ridge	\$5,722	2,102	2.47%
Central Virginia	\$5,160	2,114	2.49%
Dabney S. Lancaster	\$5,040	586	0.69%
Danville	\$5,024	1,694	1.99%
Eastern Shore	\$5,120	321	0.38%
Germanna	\$5,240	3,902	4.59%
J Sargeant Reynolds	\$5,331	4,717	5.55%
John Tyler	\$5,120	5,043	5.93%
Lord Fairfax	\$5,051	3,750	4.41%
Mountain Empire	\$5,024	1,443	1.70%
New River	\$5,010	2,505	2.95%
Northern Virginia	\$5,936	25,339	29.79%
Patrick Henry	\$5,035	1,571	1.85%
Paul D. Camp	\$5,045	669	0.79%
Piedmont Virginia	\$5,109	2,589	3.04%
Rappahannock	\$5,141	1,596	1.88%
Richard Bland	\$8,100	1,231	1.45%
Southside Virginia	\$5,008	1,906	2.24%
Southwest Virginia	\$5,016	1,518	1.78%
Thomas Nelson	\$5,126	3,918	4.61%
Tidewater	\$5,931	10,326	12.14%
Virginia Highlands	\$5,024	1,394	1.64%
Virginia Western	\$5,443	3,369	3.96%
Wytheville	\$5,040	1,446	1.70%
<b>Weighted Average Tuition and Fees</b>	<b>\$5,531</b>	<b>85,049</b>	<b>100.00%</b>

Appendix D  
(Page 2 of 3)

This work product was prepared solely for the Virginia College Savings Plan for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

Prepaid529

History of Enrollment-Weighted Average Tuition and Mandatory Fees  
at Four Year Universities and Community Colleges in Virginia

<u>Academic Year</u>	<u>University Tuition and Fees</u>	<u>% Increase</u>	<u>Community College Tuition and Fees</u>	<u>% Increase</u>
1988-1989	\$2,377		\$778	
1989-1990	2,544	7.0%	798	2.5%
1990-1991	2,702	6.2%	894	12.0%
1991-1992	2,985	10.5%	1,050	17.4%
1992-1993	3,357	12.5%	1,230	17.1%
1993-1994	3,659	9.0%	1,320	7.3%
1994-1995	3,789	3.6%	1,359	3.0%
1995-1996	3,949	4.2%	1,445	6.3%
1996-1997	4,002	1.3%	1,445	0.0%
1997-1998	4,095	2.3%	1,445	0.0%
1998-1999	4,217	3.0%	1,445	0.0%
1999-2000	3,721	(11.8%)	1,159	(19.8%)
2000-2001	3,793	1.9%	1,159	0.0%
2001-2002	3,843	1.3%	1,159	0.0%
2002-2003	4,122	7.3%	1,671	44.3%
2003-2004	5,033	22.1%	1,882	12.6%
2004-2005	5,559	10.5%	2,006	6.5%
2005-2006	5,990	7.8%	2,135	6.4%
2006-2007	6,529	9.0%	2,269	6.3%
2007-2008	6,966	6.7%	2,404	5.9%
2008-2009	7,562	8.6%	2,584	7.5%
2009-2010	7,912	4.6%	2,781	7.6%
2010-2011	8,803	11.3%	3,285	18.1%
2011-2012	9,507	8.0%	4,179*	27.2%*
2012-2013	9,856	3.7%	4,426	5.9%
2013-2014	10,225	3.7%	4,619	4.4%
2014-2015	10,797	5.6%	4,835	4.7%
2015-2016	11,409	5.7%	5,101	5.5%
2016-2017	11,961	4.8%	5,263	3.2%
2017-2018	12,494	4.5%	5,439	3.3%
2018-2019	13,210	5.7%	5,569	2.4%
2019-2020	13,395	1.4%	5,572	0.1%
2020-2021	13,636	1.8%	5,531	(0.7%)

\* Starting with the 2011-2012 year, Community College Tuition and Fees is measured as an enrollment-weighted average. Prior to that, a non-enrollment-weighted average was used. Enrollment numbers taken from SCHEV's website.

Compounded Increase in Average Tuition

Over last 5 years:	3.6%	1.6%
Over last 10 years:	4.5%	5.3%
Over last 15 years:	5.6%	6.6%
Over last 20 years:	6.6%	8.1%
Over last 25 years:	5.1%	5.5%
Over last 30 years:	5.5%	6.3%

Appendix D  
(Page 3 of 3)

This work product was prepared solely for the Virginia College Savings Plan for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

Prepaid529

Cash Flow Projection  
(amounts in millions)

<u>Fiscal Year</u>	<u>Beginning Balance</u>	<u>Installment Payments*</u>	<u>Tuition Benefits</u>	<u>Expenses</u>	<u>Investment Income</u>	<u>Ending Balance</u>
2021	\$2,717.0	\$41.4	\$287.7	\$4.2	\$137.8	\$2,604.3
2022	2,604.3	32.1	229.7	3.8	133.7	2,536.6
2023	2,536.6	26.8	217.0	3.5	130.4	2,473.3
2024	2,473.3	21.8	213.9	3.2	126.9	2,404.9
2025	2,404.9	17.4	184.9	2.6	124.4	2,359.2
2026	2,359.2	14.3	173.7	2.3	122.1	2,319.6
2027	2,319.6	11.7	160.9	2.0	120.4	2,288.8
2028	2,288.8	9.4	143.8	1.7	119.4	2,272.1
2029	2,272.1	7.3	131.6	1.5	119.0	2,265.3
2030	2,265.3	5.6	118.4	1.3	119.1	2,270.3
2031	2,270.3	4.4	105.6	1.1	119.7	2,287.7
2032	2,287.7	3.3	92.8	0.9	121.3	2,318.6
2033	2,318.6	2.5	80.0	0.7	123.5	2,363.9
2034	2,363.9	1.8	67.9	0.6	126.3	2,423.5
2035	2,423.5	1.2	58.5	0.5	130.1	2,495.8
2036	2,495.8	0.5	51.9	0.4	134.4	2,578.4
2037	2,578.4	0.1	43.2	0.3	139.3	2,674.3
2038	2,674.3	0.0	33.9	0.2	144.7	2,784.9
2039	2,784.9	0.0	23.9	0.1	151.2	2,912.1
2040	2,912.1	0.0	14.6	0.1	158.6	3,056.0
2041	3,056.0	0.0	7.8	0.0	166.6	3,214.8
2042	3,214.8	0.0	3.5	0.0	175.5	3,386.8
2043	3,386.8	0.0	1.4	0.0	185.1	3,570.5
2044	3,570.5	0.0	0.4	0.0	195.0	3,765.1

\* Future installment payments for contracts as of June 30, 2020.

Appendix E

This work product was prepared solely for the Virginia College Savings Plan for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.

## Prepaid529

### Prepaid Tuition Benefits

For beneficiaries attending a Virginia public college, university, or community college, Prepaid529 will pay the full amount of in-state undergraduate tuition and all mandatory fees for a normal full-time course load for a general course of study on a semester-by-semester basis for the type of school and number of years purchased. Prepaid529 payments to in-state public schools will not exceed the actual cost of the in-state undergraduate tuition and mandatory fees. In 2019, the Virginia General Assembly passed legislation that included provisions for Prepaid529 contracts entered into prior to July 1, 2019. These provisions allow for payment of the “Minimum Benefit” (contract payments, accumulated at the reasonable rate of return), on a semester by semester basis, directly from Prepaid529 to qualified higher education institutions when it exceeds the normal payout from the program. The contract-holder also has the option to transfer the total amount of all payments, accumulated at the reasonable rate of return, to a Virginia529 savings program, and request a distribution from the respective program to pay for qualified higher education expenses.

For beneficiaries attending a Virginia independent (private) college or university, Prepaid529 will pay to the Virginia private school, including certain private career schools, the lesser of 1) the payments made on the contract plus the actual rate of return earned on the Fund or 2) the highest in-state undergraduate tuition and mandatory fees at a Virginia public school in the same academic year the benefits are used. All payments will be made directly to the school on a semester-by-semester basis following the school’s add-drop period. The student or his or her family is responsible for any additional expenses not covered by Prepaid529. The contract-holder has the option to transfer the total amount of all payments, accumulated at the reasonable rate of return, to a Virginia529 savings program and request a distribution from the respective program to pay for qualified higher education expenses.

For beneficiaries attending an out-of-state public or private college or university, Prepaid529 will pay the lesser of 1) the payments made on the contract plus interest at the composite reasonable rate of return or 2) the average in-state undergraduate tuition and mandatory fees at Virginia public schools for the same academic year the benefits are used. Payments will be made on a semester-by-semester basis by depositing the amount of the benefit to an Invest529 account. The student or his or her family is responsible for any additional expenses not covered by Prepaid529. The contract-holder has the option to transfer the total amount of all payments, accumulated at the reasonable rate of return, to a Virginia529 savings program and request a distribution from the respective program to pay for qualified higher education expenses.

The reasonable rate of return tracks the quarterly performance of the Institutional Money Funds Index as reported in the Money Fund Monitor by iMoneyNet.

### Appendix F

This work product was prepared solely for the Virginia College Savings Plan for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work.