

Commonwealth of Virginia
Joint Legislative Audit and
Review Commission

2021 Quadrennial Actuarial Audit of the Virginia529
Prepaid Tuition Program



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TRANSMITTAL LETTER



May 26, 2021

Mr. Hal Greer
Director
Joint Legislative Audit and Review Commission
919 East Main Street, Suite 2101
Richmond, Virginia 23219

Re: 2021 Quadrennial Actuarial Audit of the Virginia529 Prepaid529 Program

Dear Mr. Greer:

Presented in this report are the results of the 2021 Quadrennial Actuarial Audit of the Virginia529 Prepaid529 Program ("Prepaid529"). This audit was conducted in accordance with the Virginia College Savings Plan Oversight Act (§30-330 - §30-335 of the *Code of Virginia*) to provide the General Assembly with a comprehensive overview of the actuarial soundness of the Prepaid529. This audit consisted of a non-replication actuarial audit of the June 30, 2020 actuarial valuation of the Prepaid529 as performed by the retained actuary, Milliman.

The results of the audit are presented in the following format:

- A. Executive Summary
- B. General Audit Approach
- C. Reasonableness of Actuarial Report Conclusions
- D. Contract Data
- E. Plan Assets
- F. Weighted Average Tuition and Fees Calculation
- G. Economic Actuarial Assumptions
- H. Demographic Actuarial Assumptions
- I. Actuarial Valuation Methods
- J. Actuarial Liability Test Life Review
- K. Actuarial Report Content, Detail, Format and Clarity
- L. Actuarial Principles and Practices Employed by Actuary
- M. Considerations Regarding the New TTP Program
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Joint Legislative Audit and Review Commission
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Please note that GRS commented on the reasonableness of pricing for actuarially sound funding in the prior 2017 actuarial audit of Prepaid529. We did not address pricing in this audit report because Prepaid529 was closed to new enrollments as of May 1, 2019.

This study was performed at the request of the Commonwealth of Virginia Joint Legislative Audit and Review Commission ("JLARC"). It may be shared with other interested parties only with the permission of the JLARC. If shared with other parties, it should be shared in its entirety.

This study was performed by actuaries experienced with prepaid tuition programs as well as public sector retirement systems.

We would like to acknowledge the cooperation of the staff of the Virginia College Savings Plan ("Virginia529") as well as Milliman. Their full and willing cooperation was critical to the successful completion of this report.

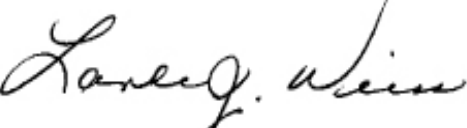
It is important to remember that actuarial calculations are based on assumptions regarding future events. Future actuarial measurements may differ significantly from the current measurements due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

The actuaries signing this report, Lance J. Weiss and Amy Williams, 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.

GRS is independent of the Virginia529, Prepaid529, JLARC and Milliman.

If you have any questions on this report or need additional information, please feel free to contact us.

Respectfully submitted,


Lance J. Weiss, EA, MAAA, FCA
Senior Consultant and Team Leader


Amy Williams, ASA, MAAA, FCA
Senior Consultant



SECTION A

EXECUTIVE SUMMARY

Executive Summary

In accordance with the Virginia College Savings Plan Oversight Act (§30-330 – §30-335 of the *Code of Virginia*), Gabriel, Roeder, Smith & Company (“GRS”) was hired to conduct the 2021 Quadrennial Actuarial Audit of the Virginia529 Prepaid529 Program (“Prepaid529”).

The purpose of this audit is to provide the General Assembly with a comprehensive overview of the actuarial soundness of the Prepaid529. This audit consisted of a non-replication actuarial audit of the actuarial policy and practices of the Prepaid529.

Based on the results of our audit, we believe that:

- **Prepaid529 is actuarially sound** (i.e., the Fund **has more than 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)).
 - Based on the results of the June 30, 2020, Milliman Actuarial Valuation, as of June 30, 2020, the Prepaid529 fund balance was \$2,881.2 million, the “best estimate” of the obligation was \$1,831.0 million, resulting in a fund surplus of roughly \$1,050.2 million and a funded ratio of 157.4 percent.
 - Based on Milliman’s cash flow projection, Prepaid529 is projected to have a surplus of \$3,765.1 million at the end of fiscal Year 2044 after all tuition obligations have been paid.
- **The primary actuarial assumptions** (including the investment return assumption of 5.75 percent and the tuition increase assumption of 4.00 percent for the first two years for University, 2.00 percent for the first two years for Community College and 6.00 percent thereafter) **are reasonable**. (Note, however, the ultimate 6.00 percent tuition increase assumption is on the high end of assumptions used by other prepaid tuition plans around the country.)

Although this audit report contains a number of recommendations which we believe will improve the measurement and communication of the actuarial valuation results, we do not expect that any of these recommendations would have a material impact on the actuarial valuation results.

Following is a high-level summary of the areas addressed in the audit and our associated findings:

1. Reasonableness of the funding results and conclusions of the June 30, 2020 actuarial valuation of the Prepaid529 as produced by Milliman, the Virginia529 actuary. This assessment includes a validation of the reasonableness of the liabilities by investigating individual test cases and using actuarial estimation techniques to approximate aggregate results that are used to compare the liabilities documented in the report.
 - GRS was able to independently replicate the present value of future obligations payable from the Prepaid529 and the present value of future installment contract payments due to the Prepaid529 within 2 percent for the majority of the revised test lives provided by Milliman. The differences in the present value of future obligations and present value of future installment contract payments that were larger than 2 percent are attributable to lower frequency situations. Although we have recommended changes in the actuarial valuation methodology for these situations,

Executive Summary

these changes would not be expected to have a material change on the overall actuarial valuation results.

2. The degree to which the beneficiary data is sufficient to support the conclusions of the June 30, 2020 actuarial valuation and the use and appropriateness of any assumptions made by Milliman regarding the data.
 - We performed consistency checks between the original data produced by the Virginia529 and the retained actuary's "scrubbed" data file. We found the "scrubbed" data to be consistent with the original data and therefore, we concluded that the retained actuary's "scrubbed" data file is a reasonable representation of the original data provided by the Virginia529. Overall, we also found the data used in the actuarial valuation to be reasonable and appropriate.
3. Whether the June 30, 2020 actuarial valuation performed by Milliman was conducted in accordance with generally accepted best practices for actuaries, as well as the principles and practices prescribed by the Actuarial Standards Board.
 - In general, we find that Milliman followed the appropriate Actuarial Standards of Practice ("ASOPS") that are the most applicable for a prepaid tuition program.
4. The content, detail, format, clarity and scope of the June 30, 2020 actuarial valuation report prepared by Milliman.
 - We reviewed the June 30, 2020 actuarial valuation report prepared by Milliman and find that the report is generally complete and contains the appropriate information.
5. The reasonableness and appropriateness of the actuarial assumptions and methods used by Milliman in the June 30, 2020 actuarial valuation.
 - In general, we find that the economic and demographic actuarial assumptions employed by Milliman in their June 30, 2020 actuarial valuation are reasonable.
6. Whether Prepaid529 is presently being funded on an actuarially sound basis and will likely be in the future based on the results of the June 30, 2020 actuarial valuation.
 - Milliman concluded that Prepaid529 was actuarially sound because 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 agree with this conclusion.
 - Because Prepaid529 was closed for new enrollments as of May 1, 2019, there is no longer any funding of Prepaid529 other than future installment payments from current contracts and investment earnings. (Also, Virginia529 did not assign any of its net agency operating revenue to Prepaid529 during fiscal 2020.) Based on Milliman's conclusion that Prepaid529 is projected to have a surplus of \$3,765.1 million at the end of fiscal Year 2044 after all tuition obligations have been paid, we agree that the Prepaid529 is more than likely to be funded on an actuarially sound basis in the future.

Executive Summary

7. Considerations regarding Virginia's new defined benefit savings program, the Tuition Track Portfolio ("TTP"), which opened in early 2021.
 - All of the issues that GRS has addressed in previous quadrennial actuarial audits of the Prepaid529, as well as the comments in this 2021 Quadrennial actuarial audit of the Prepaid529 will certainly be valid issues to look for in any future audit of the new TTP.
 - In particular, we suggest that attention be given in the first audit of the TTP to the funded ratio, actuarial assumption for future tuition increases as well as the pricing reserve formula, if a pricing reserve is used in the future.
8. Comment on whether Virginia529 has satisfactorily addressed considerations and recommendations offered by GRS in the 2017 Quadrennial Actuarial Audit of the Virginia529 Prepaid529 program.
 - Changes in economic assumptions were made since the 2016 actuarial valuation and reflected in the 2020 actuarial valuation that were consistent with the recommendations that GRS made as part of the 2017 Quadrennial Actuarial Audit of Prepaid529.
 - There has not been an experience study performed since the 2017 Quadrennial Actuarial Audit of Prepaid529 and therefore the non-economic assumptions have not yet been reviewed in accordance with the GRS recommendation.

This report also contains a series of relatively **minor recommendations** for the Virginia529 and Milliman. A summary of these recommendations follows:

Contract Data

- There are a large number of contract beneficiary records with fewer than 0.25 remaining semesters of tuition (and no remaining contract installment payments for unpurchased tuition benefits) who are included in the contract counts and data exhibits.
 - Since it is likely these beneficiaries are through using their contracts, we suggest that Milliman consider excluding contracts that have a very low amount of tuition units remaining. This approach may increase the usefulness of the data exhibits. (This is something that GRS does with our other prepaid tuition plan clients.) Appendix B of the Milliman actuarial valuation report illustrates the remaining years of tuition.
 - Virginia529 may want to review these contracts and make updates to the contract data or follow up with contract holders, as needed. (This is basically a data cleanup issue.)
- There are contracts that currently have or are projected to have remaining contract installment payments at the projected matriculation date (which is the expected date that the beneficiary enters college). All contract payments should be made prior to enrollment.
 - We recommend that Virginia529 and Milliman discuss whether changes will be made to the underlying raw data or if assumptions should be made in the actuarial valuation to address this issue.
- We recommend that Virginia529 and Milliman review contracts with a status of cancelled, pending cancellation and 10-year time limit reached and consider valuing the liabilities in a manner consistent with the expected administration of contracts with those statuses by Virginia529.

Executive Summary

Plan Assets

- We recommend that Milliman review their calculation of (1) the present value of future installment payments in the assets and (2) the present value of future tuition benefits for contract beneficiaries with college entrance years of 2014 and earlier and remaining installment payments for consistency to ensure that the tuition benefits assumed to be paid out have assumed installment payments to fully cover the tuition benefits. If any remaining installment payments are excluded, the valuation of the liabilities should reflect only the fully paid for tuition benefits (and not the full contracted tuition benefits).

Economic Actuarial Assumptions

- We recommend that the inflation assumption be reviewed, and adjusted as appropriate, as it is at the high end of the reasonable range of assumptions for inflation.
- We recommend that the assumption for tuition increases continue to be reviewed annually, and adjusted as appropriate, as the ultimate 6.00 percent assumption is at the high end of tuition increase assumptions used by other prepaid tuition plans around the country.
- We recommend that the reasonable rate assumption be reviewed in conjunction with the review of the inflation assumption, and adjusted as appropriate.

Demographic Actuarial Assumptions

- We recommend conducting another experience study to review the demographic experience of the plan compared to the current actuarial assumptions within the next 12 months.

Test Life Review

- We recommend that Milliman review the annual maintenance expense that is assumed for all contracts in the last year that tuition benefits are assumed to be paid and either include or exclude it for all test lives.
- We recommend that more disclosure be added to the actuarial assumptions section of the actuarial valuation report with respect to a couple of assumptions.

Actuarial Report Content, Detail, Format and Clarity

- We recommend that Milliman provide more disclosure regarding the amount of net operating agency revenue assigned (contributed) to Prepaid529 during the most recent five fiscal years.
- We have other minor recommendations for modifications to the report which in our opinion would allow it to adhere more closely with ASOP No. 4 and 41.

SECTION

GENERAL AUDIT APPROACH

General Audit Approach

In accordance with the Virginia College Savings Plan Oversight Act (§30-330 – §30-335 of the *Code of Virginia*), Gabriel, Roeder, Smith & Company (“GRS”) was hired to conduct the 2021 Quadrennial Actuarial Audit of the Virginia529 Prepaid529 Program (“Prepaid529”).

This purpose of this audit is to provide the General Assembly with a comprehensive overview of the actuarial soundness of Prepaid529. This audit consisted of a non-replication actuarial audit of the actuarial policies and practices of Prepaid529.

This audit addresses the following areas:

1. Reasonableness of the funding results and conclusions of the June 30, 2020 actuarial valuation of Prepaid529 as produced by Milliman, the Virginia529 actuary. This assessment includes a validation of the reasonableness of the liabilities by investigating individual test cases and using actuarial estimation techniques to approximate aggregate results that are used to compare the liabilities documented in the report.
2. The degree to which the beneficiary data is sufficient to support the conclusions of the June 30, 2020 actuarial valuation and the use and appropriateness of any assumptions made by Milliman regarding the data.
3. Whether the June 30, 2020 actuarial valuation performed by Milliman was conducted in accordance with generally accepted best practices for actuaries, as well as the principles and practices prescribed by the Actuarial Standards Board.
4. The content, detail, format, clarity and scope of the June 30, 2020 actuarial valuation report prepared by Milliman.
5. The reasonableness and appropriateness of the actuarial assumptions and methods used by Milliman in the June 30, 2020 actuarial valuation.
6. Whether Prepaid529 is presently being funded on an actuarially sound basis and will likely be in the future based on the results of the June 30, 2020 actuarial valuation.
7. Comment on whether Virginia529 has satisfactorily addressed considerations and recommendations offered by GRS in the 2017 Quadrennial Actuarial Audit of the Virginia529 Prepaid529 program.

The table on the following page presents a summary of the approach and steps GRS completed on behalf of the 2021 Quadrennial Actuarial Audit of the Prepaid529.

General Audit Approach

TASK DESCRIPTION	
PROJECT PLANNING	1 Project Planning with Client and Team
	<ul style="list-style-type: none"> a.) Confirm Statement of Needs with JLARC b.) Send Final Statement of Needs c.) Prepare and send Work Plan and Fee Agreement to JLARC
DATA	2 Census Data
	<ul style="list-style-type: none"> a.) Prepare and send data request b.) Conference call with JLARC, VA529 and Milliman to confirm data request c.) Submit data (Raw data and valuation ready data) d.) Submit soundness report for Prepaid529, experience studies, assumption tables, pricing report for TTP if available, etc. e.) Compare valuation data and raw data f.) Review data assumptions utilized by Milliman
	3 Weighted Average Tuition (WAT) Data
	<ul style="list-style-type: none"> a.) Submit tuition, fee and headcount source data b.) Review WAT calculation
	4 Financial Data
	<ul style="list-style-type: none"> a.) Submit VA529 financial statements b.) Review VA529 financial statements
ASSUMPTIONS AND METHODS	5 Actuarial Assumptions and Methods
	<ul style="list-style-type: none"> a.) Review demographic actuarial assumptions b.) Review actuarial soundness valuation methods c.) Review economic actuarial assumptions d.) Scheduled status call with GRS and JLARC
ACTUARIAL LIABILITIES	6 Actuarial Liabilities
	<ul style="list-style-type: none"> a.) Request test lives data b.) Submit test lives data c.) Review test lives
ACTUARIAL VALUATION AND REPORT	7 Actuarial Soundness Valuation and Report
	<ul style="list-style-type: none"> a.) Review content, detail, format and clarity of Milliman actuarial report b.) Review Milliman pricing reports c.) Review Tuition Track Program (TTP) descriptions and any analyses d.) Review conclusions reached in Milliman report e.) Review actuarial principles and practices used by Milliman f.) Scheduled status call with GRS and JLARC
REPORT AND BRIEFINGS	8 Deliverable Schedule
	<ul style="list-style-type: none"> a.) Draft report to JLARC b.) First Exit Conference between JLARC and GRS c.) Report comments from JLARC d.) Second Draft Report to JLARC e.) Second Exit Conference between JLARC, GRS, VA529 and Milliman f.) Report comments from VA529 and Milliman g.) Final report copies to JLARC h.) Send copies of briefing packets i.) Briefing to JLARC

SECTION C

REASONABLENESS OF ACTUARIAL REPORT CONCLUSIONS

Reasonableness of Actuarial Report Conclusions

The basic conclusions presented in the June 30, 2020 actuarial valuation report prepared by Milliman for the Program include the following:

- Milliman indicates that the main purposes of the June 30, 2020 actuarial valuation of the Program are:
 1. to calculate the actuarial present value of the obligations under the prepaid tuition contracts purchased through June 30, 2020 and compare the value of those obligations with the assets of the Program as of that date;
 2. to review the experience and changes in the actuarial assumptions during the last year and indicate their effects on the results; and
 3. to set forth the basis for the actuarial assumptions and methods utilized in those calculations.

We find that these are the appropriate main purposes of the actuarial valuation.

- Milliman indicates that “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. Although the term “Actuarial soundness” is used in the Code of Virginia regarding Prepaid529, it is not specifically defined. When applied to the Prepaid529, however, Milliman assumes that the phrase “actuarially sound,” 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 agree with this assumption.

- Milliman also interpreted “actuarial soundness” as defined in the Code of Virginia to require that actuarial liabilities of the program be evaluated using sound actuarial principles that are generally consistent with the practices and principles widely used for retirement programs. They based this conclusion on the fact that no generally accepted standards of practice have evolved within the actuarial profession specifically addressing prepaid tuition programs and they chose the standards applicable to retirement programs because such 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.

We agree with this conclusion.

- Milliman concluded that based on the results of the June 30, 2020 actuarial valuation, the Program had assets that exceed the “best estimate” of the obligations by roughly \$1,050.2 million or 57.4 percent.

Based on our review and analysis, we believe this conclusion is reasonable.

Reasonableness of Actuarial Report Conclusions

- Milliman concluded that the amount of assets necessary to have a 50 percent probability of meeting all program obligations, including administrative expenses, associated with contracts issued as of June 30, 2020 is \$1,831.0 million. The actual Prepaid529 fund balance as of June 30, 2020 was \$2,881.2 million, which results in the Prepaid529 being 157.4 percent funded as of June 30, 2020.

Based on our analysis, we believe this conclusion is reasonable.

- Milliman prepared 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 their Monte Carlo simulations. They concluded that, at the end of the 2044 Fiscal Year, all tuition obligations associated with contracts already purchased are expected to be paid, resulting in a final cumulative surplus of \$3,765.1 million.

Based on our analysis, we believe this conclusion is reasonable.

Based on our review, we find that the conclusions included in the Milliman June 30, 2020 actuarial valuation report are generally reasonable, and that Milliman used reasonable assumptions, and complied with actuarial standards and guidelines.

SECTION D

CONTRACT DATA

Contract Data

We have reviewed the original data provided by the Virginia529 to the retained actuary, Milliman, for accuracy, reasonableness and appropriateness. In addition, we reviewed the data that was directly used by Milliman in the valuation. This data would commonly be referred to as “scrubbed” data. Overall, we found the data used in the valuation to be reasonable and appropriate.

The original data file from Virginia529 contained 57,960 data records and the scrubbed data contained 57,952 data records. There was a follow up file from Virginia529 with a list of eight records that had canceled or transferred and should be excluded as an active record in the actuarial valuation. Six additional records from the original data file were excluded from the number of contracts shown in the exhibits in Appendix B of the actuarial valuation report. (Appendix B shows a summary of contract data by Plan Type [University, Community College or a combination of the two], Matriculation Date and Years of tuition benefits purchased.) These six records did not have any remaining tuition benefits. Taking these records into account, we were able to closely match the data exhibits. There was a small discrepancy in the Tier 1 and Tier 2 (Both University and Community College Contract) exhibit. In addition, we noted that the number of remaining payments for installment contracts was rounded in the “scrubbed” data file.

We performed consistency checks between the original data and Milliman’s “scrubbed” data file. We found the “scrubbed” data to be consistent with the original data and therefore, we concluded that the “scrubbed” data file is a reasonable representation of the original data originally provided by the Virginia529.

In the raw data, we identified approximately 900 University contract beneficiary records with fewer than 0.25 remaining semesters of tuition (and no remaining contract installment payments for unpurchased tuition benefits). There are approximately 110 remaining semesters in total for the approximately 900 records, with 100 of the remaining semesters for contract beneficiaries with projected college enrollment dates in 2016 or prior. We recommend that Virginia529 review this issue and make updates to the contract data or follow up with contract holders, as needed.

There are a large number of contract beneficiary records with fewer than 0.25 remaining semesters of tuition (and no remaining contract installment payments for unpurchased tuition benefits) who are included in the contract counts and data exhibits. Since it is likely these beneficiaries are through using their contracts, excluding contracts that have a very low amount of tuition units remaining may increase the usefulness of the data exhibits. This is something that GRS does with our other prepaid tuition plan clients. Appendix B of the Milliman actuarial valuation report illustrates the remaining years of tuition.

There are about 20 records with remaining payments and a projected college enrollment year prior to the valuation year (2020). In addition, there are records where, based on the remaining number of payments, payments are projected to be made after the projected college enrollment year.

Contract Data

Because all payments should be completed before college enrollment, following are some adjustments that could be considered by Milliman and Virginia529:

1. Assume that contract beneficiaries past their projected college enrollment year will not make any additional contract payments and they will be entitled to only the tuition benefits purchased to date;
2. Assume that contract holders will accelerate the remaining contract payments such that all payments are assumed to be made prior to the projected college enrollment year; and
3. Assume that contract beneficiaries will delay matriculation until all remaining contract payments have been made.

Based on our review of the test lives, we believe that Milliman is using option 2 above in most cases (Assume that contract holders will accelerate the remaining contract payments such that all payments are assumed to be made prior to the projected college enrollment year). However, for contract beneficiaries with college enrollment years of 2014 and earlier, it does not appear that Milliman is assuming remaining contract payments will be made. Therefore, for these individuals it would be appropriate to only reflect the tuition benefits purchased to date in the liabilities (and not the total contracted benefits).

We do not expect that changes or additional assumptions made to the data would have a material impact on the actuarial valuation results.

Following is a summary of the number of contracts and the remaining contract units by contract status.

Contract Status	Number of Contracts	Remaining Contract Units
A – Active	8,107	23,287
AA - Accepted (Reinstated)	37	142
NX - Cancelled/Not Refunded	550	567
PC - Pending Cancellation	6	23
PF - Paid in Full	47,162	199,957
R – Reinstated	156	535
TN - 10 Year Time Limit Reached	1,934	5,387
Total	57,952	229,898

Based on our review of a test life with a contract status of NX and a contract status of TN, it appears that canceled/not refunded contracts are valued the same as active contracts and contracts that have reached the 10-year time limit are valued with all remaining tuition benefits being paid out in the upcoming year after the valuation.

Contract Data

Recommendations

- There are a large number of contract beneficiary records with fewer than 0.25 remaining semesters of tuition (and no remaining contract installment payments for unpurchased tuition benefits) who are included in the contract counts and data exhibits.
 - Since it is likely these beneficiaries are through using their contracts, we suggest that Milliman consider excluding contracts that have a very low amount of tuition units remaining. This approach may increase the usefulness of the data exhibits. (This is something that GRS does with our other prepaid tuition plan clients.) Appendix B of the Milliman actuarial valuation report illustrates the remaining years of tuition.
 - Virginia529 may want to review these contracts and make updates to the contract data or follow up with contract holders, as needed. (This is basically a data cleanup issue.)
- There are contracts that currently have or are projected to have remaining contract installment payments at the projected matriculation date (which is the expected date that the beneficiary enters college). All contract payments should be made prior to enrollment.
 - We recommend that Virginia529 and Milliman discuss whether changes will be made to the underlying raw data or if assumptions should be made in the actuarial valuation to address this.
- We recommend that Virginia529 and Milliman review the contracts with a status of canceled, pending cancellation and 10-year time limit reached and consider valuing the liabilities in a manner consistent with the expected administration of contracts with those statuses.

SECTION E

PLAN ASSETS

Plan Assets

One of the primary purposes of an actuarial valuation of a prepaid tuition program is to determine the present value of the obligations for prepaid tuition contracts purchased through the actuarial valuation date (June 30, 2020) and compare such liabilities with the value of the assets associated with the program as of that same date. Accordingly, it is very important to make sure that the assets reported by the actuary are accurate and complete.

We reviewed the value of the Prepaid529 assets as reported by Milliman in the June 30, 2020 actuarial valuation report. As of June 30, 2020, Milliman reported program investments of \$2,716,955,472 on a market value basis. In addition, Milliman calculated the present value of installment contract receivables to equal \$164,263,818 for a total value of fund assets of \$2,881,219,290. Please note that it is customary and accepted practice to include the present value of installment contract receivables in the total value of fund assets for the purpose of determining the deficit/surplus of a prepaid tuition program as of a particular point in time.

We also reviewed the Annual Financial report of the Virginia529 for the fiscal year ended June 30, 2020 (dated November 15, 2020) and the financial information sent to Milliman by Prepaid529 for the actuarial valuation. We were able to reconcile the asset value as reported by Milliman in the June 30, 2020, actuarial valuation report with the assets of the Prepaid529 as reported in the Annual Report.

We reasonably replicated the present value of installment contract receivables within 1.0 percent assuming 1) a discount rate of 5.75 percent, 2) using the fractional remaining payments as provided in the original data and 3) subtracting \$1 from each payment to account for purchase expenses.

Based on Milliman's assumptions for accelerating installment payments to be made before the contract beneficiaries projected college entrance years, we were able to closely match the projected installment payments for years 2022 and after. The difference in 2021 appears to be attributable to Milliman's assumption to exclude installment payments for contract beneficiaries with college entrance years of 2014 and earlier. This is a reasonable approach assuming that the valuation of the liabilities only includes fully paid for tuition benefits.

Plan Assets

Following is a comparison of the projected amounts for current contracts as of June 30, 2020.

Fiscal Year	Milliman	Projected Installment Payments (\$ in Millions)	
		GRS with Accelerated Payments	GRS without Accelerated Payments
2021	\$41.4	\$43.3	\$37.9
2022	32.1	32.1	32.1
2023	26.8	26.8	27.1
2024	21.8	21.8	22.3
2025	17.4	17.4	18.0
2026	14.3	14.3	14.8
2027	11.7	11.6	12.2
2028	9.4	9.4	9.9
2029	7.3	7.3	7.7
2030	5.6	5.6	6.0
2031	4.4	4.4	4.8
2032	3.3	3.3	3.7
2033	2.5	2.5	2.7
2034	1.8	1.8	1.9
2035	1.2	1.2	1.3
2036	0.5	0.5	0.6
2037	0.1	0.1	0.2
2038	0.0	0.0	0.0
Present Value	\$164.3	\$165.9	\$164.1

Recommendations

We recommend that Milliman review their calculation of (1) the present value of future installment payments in the assets and (2) the present value of future tuition benefits for contract beneficiaries with college entrance years of 2014 and earlier and remaining installment payments for consistency to ensure that the tuition benefits assumed to be paid out have assumed installment payments to fully cover the tuition benefits. If any remaining installment payments are excluded, the valuation of the liabilities should reflect only the fully paid for tuition benefits (and not the full contracted tuition benefits).



SECTION F

WEIGHTED AVERAGE TUITION AND FEES CALCULATION

Weight Average Tuition and Fee Calculation

We have reproduced the Weighted Average Tuition and Fees (WAT) development shown in Appendix D of the actuarial valuation report and have verified the tuition and fee and full-time enrollment counts by school used in the calculation. We find the WAT development for both the four-year Universities and the two-year community colleges to be reasonable. The WAT is based on 2020-2021 tuition and fees and is weighted by 2019-2020 academic enrollments. Using lagged enrollment is typical for a prepaid tuition plan as more current data is not usually available at the time of the actuarial valuation. Provided there are no major shifts in enrollment from year to year, this method will produce consistent results over time.

We also calculated the WAT using enrollment data specific to the Prepaid529 at the actuarial valuation date. This check serves as a basis for the Bias Load of 8 percent applied to University contracts and 1 percent applied to Community College contracts. The Bias Load is included in the actuarial valuation to recognize the propensity for beneficiaries to attend higher priced Colleges and Universities. As shown below, the University WAT specific to Prepaid529 tuition units used (provided as part of the actuarial valuation data) is approximately 9.6 percent greater than the overall WAT calculated using Undergraduate Headcount for 2019-2020. The Community College WAT specific to Prepaid529 enrollment is approximately 0.4 percent lower than the overall WAT calculated using Undergraduate Headcount for 2019-2020.

	<u>University</u>	<u>Community College</u>
<u>WAT from June 30, 2020 Actuarial Valuation</u>		
WAT Using Fall Undergraduate Headcount for 2019-2020	\$ 13,636	\$ 5,531
WAT Using prePAID Enrollment as of the Valuation Date	\$ 14,939	\$ 5,507
Percent Different	9.56%	-0.44%
<u>WAT from June 30, 2016 Actuarial Valuation</u>		
WAT Using Fall Undergraduate Headcount for 2015-2016	\$ 11,961	\$ 5,263
WAT Using prePAID Enrollment as of the Valuation Date	\$ 12,852	\$ 5,325
Percent Different	7.45%	1.18%

Based on these relationships, the current bias loads of 8 percent applied to University contracts and 1 percent applied to Community College contracts are not unreasonable. However, there has not been an experience study performed to review the bias loads since the last quadrennial audit completed in 2017.

Recommendations

We have no recommendations regarding the calculation of the Weighted Average Tuition and Fees (WAT).

We recommend the bias loads be reviewed during the next experience study to determine whether the current bias loads of 8 percent for University and 1 percent for Community College should be changed.

SECTION G

ECONOMIC ACTUARIAL ASSUMPTIONS

Economic Actuarial Assumptions

Actuarial Assumptions

The actuarial valuation report prepared by Milliman contains a description of the actuarial assumptions which were used in the actuarial valuation of the Prepaid529 as of June 30, 2020. Additionally, Virginia529 provided us with supplemental material and documents that provide more details on the development of the economic actuarial assumptions. We have reviewed this detail, and performed additional procedures, in order to assess the reasonableness of the assumptions used in the actuarial valuation.

The set of actuarial assumptions is one of the foundations upon which an actuarial valuation is based. An actuarial valuation of a prepaid tuition program is, essentially, a statistical projection of the amount and timing of future tuition payments to be paid under the plan. In any statistical projection, assumptions as to future events will drive the process. Actuarial valuations are no exception.

It is important to understand the nature of the prepaid tuition program plan and the plan sponsor when assessing the reasonableness of the actuarial assumptions. No projection of future events can be labeled as “correct” or “incorrect.” However, there is a “range of reasonableness” for each assumption. We evaluate individual elements as follows:

- Whether or not they fall within the range of reasonableness; and
- If they fall within that range, whether they are reasonable for the actuarial valuation of the plan.

Actuarial assumptions for the valuation of prepaid tuition plans generally fall into two categories:

- Economic assumptions; and
- Demographic assumptions.

We have assessed the reasonableness of both categories of actuarial assumptions as part of this actuarial audit.

Economic Actuarial Assumptions

Economic assumptions reflect the effects of economic forces on the projections of tuition payments payable from the plan and in the discounting of those payments to a present value.

Economic assumptions are based, at their core, on the assumed level of price inflation. Each economic assumption is then developed from expected spreads over price inflation. Since price inflation is relatively volatile and is subject to a number of influences not based on recent history, these assumptions are less reliably based on recent past experience than are the demographic assumptions.

Economic Actuarial Assumptions

The key economic assumptions used by Milliman in their June 30, 2020 actuarial valuation of Prepaid529 are:

1. Assumed Rate of Inflation – The rate of price inflation (as measured by the Consumer Price Index for all Urban consumers) which underlies the remainder of the economic assumptions. The current assumption is 2.5 percent.
2. Assumed Rate of Investment Return – The rate at which projected future tuition payments under the system are reduced to present value. The current assumption is 5.75 percent.
3. Assumed Rate of Tuition Increase – The annual rate at which tuition payments at Universities and Communities Colleges are expected to increase for contract holders. The current assumption for Universities is 4.0 percent for 2021 and 2022 and 6.0 percent for 2023 and thereafter. The current assumption for Communities Colleges is 2.0 percent for 2021 and 2022 and 6.0 percent for 2023 and thereafter.
4. Reasonable Rate of Interest – The rate at which contract payments are credited interest. The current assumption is 0.16 percent for 2020-2021 and 2.50 percent thereafter.

Actuarial Standards of Practice

The Actuarial Standards Board (ASB) promulgates actuarial standards of practice (ASOPs) for use by actuaries when rendering actuarial services in the United States. The ASB is vested by the U.S.-based actuarial organizations with the responsibility for promulgating ASOPs for actuaries rendering actuarial services in the United States. Each of these organizations requires its members, through its Code of Professional Conduct, to satisfy applicable ASOPs when rendering actuarial services in the United States.

Because no generally accepted standards of practice have evolved within the actuarial profession that specifically address prepaid tuition programs, we (as well as Milliman) have referenced the ASOPs that are applicable to retirement systems. We chose such standards because prepaid tuition programs, like retirement plans, generally provide for the payment of a benefit at a future date.

Although the Board of Virginia529 is the ultimate decision-making body with regard to approval of the actuarial assumptions used in the annual actuarial valuations, Milliman must still comply with the Actuarial Standards of Practice when providing advice or recommendations to the Board on the selection of actuarial assumptions.

Pension actuaries are required to comply with Actuarial Standard of Practice No. 27 (ASOP No. 27) in setting or recommending economic assumptions, including the assumed investment return rate. According to ASOP No. 27, each economic assumption selected (or recommended) by the actuary should be reasonable. For this purpose, an assumption is reasonable if it has the following characteristics:

- It is appropriate for the purpose of the measurement;
- It reflects the actuary's professional judgment;
- It takes into account historical and current economic data that is relevant as of the measurement date;
- It reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof; and
- It has no significant bias (i.e., it is not significantly optimistic or pessimistic).

Economic Actuarial Assumptions

Also, according to ASOP No. 27, the actuary should recognize the uncertain nature of the items for which assumptions are selected and, as a result, may consider several different assumptions reasonable for a given measurement. The actuary should also recognize that different actuaries will apply different professional judgment and may choose different reasonable assumptions. As a result, a narrow range of reasonable assumptions may develop both for an individual actuary and across actuarial practice.

Inflation

By “inflation,” we mean price inflation, as measured by annual increases in the Consumer Price Index (CPI). This inflation assumption underlies all of the other economic assumptions we employ. The current annual inflation assumption is 2.50 percent.

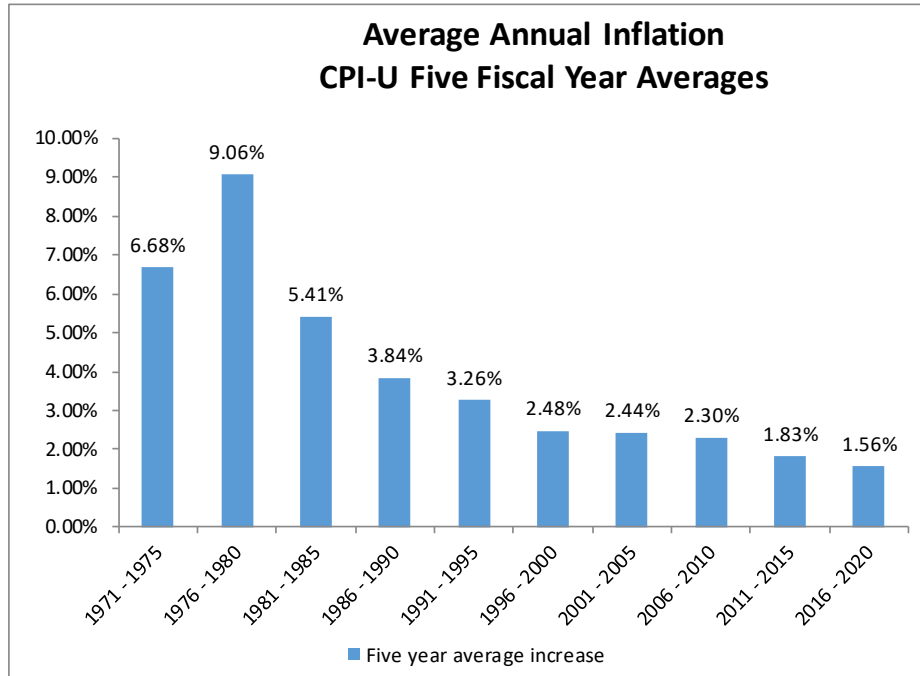
Over the five-year period from June 2015 through June 2020, the CPI-U has increased at an average rate of 1.56 percent. However, please remember that the assumed inflation rate is only weakly tied to past results.

The following table shows the average inflation over various periods, ending June 2020.

Fiscal Year	Annual Increase in CPI-U
2015-16	1.00%
2016-17	1.63%
2017-18	2.87%
2018-19	1.65%
2019-20	0.65%
3-Year Average	1.72%
5-Year Average	1.56%
10-Year Average	1.69%
20-Year Average	2.03%
25-Year Average	2.12%
30-Year Average	2.31%
40-Year Average	2.88%
50-Year Average	3.86%

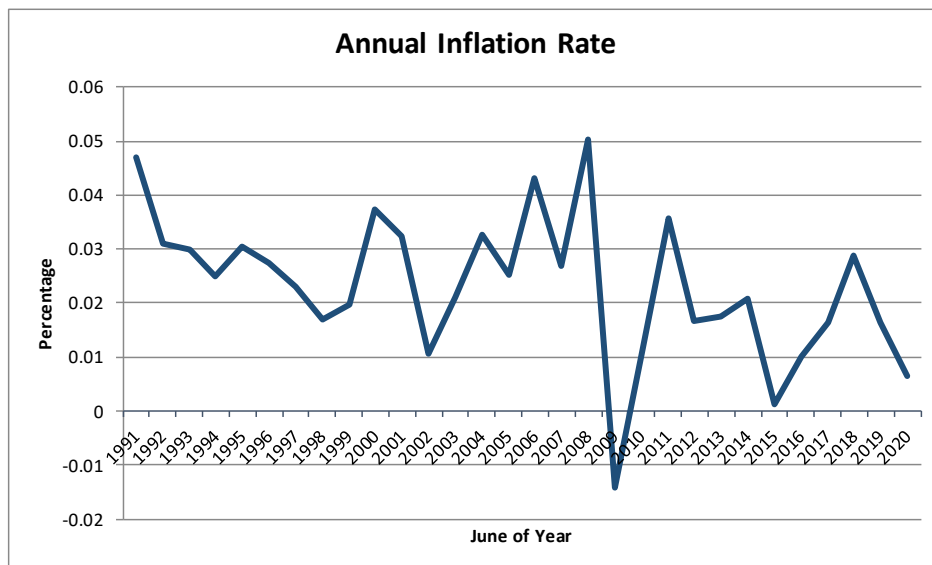
The following graph shows the average annual inflation, as measured by the increase in CPI-U, in each of the 10 consecutive five-year periods over the last 50 years.

Economic Actuarial Assumptions



As the above chart illustrates, the high inflation of the 1970s and early 1980s is well in the past. The geometric average annual increase in price inflation was 2.31 percent per year over the last 30 years from June 1990 to June 2020, 2.03 percent over the last 20 years and 1.69 percent over the last 10 years.

The following graph illustrates the rate of inflation on a year by year basis over the last 30 years.



Since price inflation is relatively volatile and is subject to a number of influences not based on recent history, economic assumptions are less reliably based on recent past experience than are the demographic assumptions. Therefore, it is important not to give undue weight to recent experience. We must also consider future expectations as well.

Economic Actuarial Assumptions

We surveyed the inflation assumption used by nationally recognized financial firms (investment consultants, asset managers and insurance companies) across the country. In our sample of these firms, the inflation assumption ranged from 1.75 percent to 2.30 percent, with an average of 2.09 percent.

Another point of reference is the Social Security Administration's (SSA) 2020 Trustees Report, in which the Office of the Chief Actuary is projecting a long-term average ultimate annual inflation rate of 1.80 percent in the high cost projection scenario, 2.40 percent under the intermediate cost projection scenario and 3.00 percent in the low cost projection scenario. The Social Security Trustees report uses the ultimate rates for their 75-year projections, much longer than the longest horizon we can discern from Treasuries and TIPS.

The table on the following page presents a summary of inflation rate forecasts as of the end of the second quarter, 2020 from various professional experts.

Economic Actuarial Assumptions

Forward-Looking Annual Inflation Forecasts ^a (From Professional Experts in the Field of Forecasting Inflation)	
Congressional Budget Office^b	
5-Year Annual Average	2.46%
10-Year Annual Average	2.38%
Federal Reserve Bank of Philadelphia^c	
5-Year Annual Average	2.00%
10-Year Annual Average	2.14%
Federal Reserve Bank of Cleveland^d	
10-Year Expectation	1.23%
20-Year Expectation	1.58%
30-Year Expectation	1.81%
Federal Reserve Bank of St. Louis^e	
10-Year Breakeven Inflation	1.18%
20-Year Breakeven Inflation	1.55%
30-Year Breakeven Inflation	1.55%
U.S. Department of the Treasury^f	
10-Year Breakeven Inflation	1.24%
20-Year Breakeven Inflation	1.41%
30-Year Breakeven Inflation	1.71%
50-Year Breakeven Inflation	1.84%
100-Year Breakeven Inflation	1.93%
Social Security Trustees^g	
Ultimate Intermediate Assumption	2.40%

^aEnd of the Second Quarter, 2020. Version 2020-07-23 by Gabriel, Roeder, Smith & Company.

^bThe Budget and Economic Outlook: 2020 to 2030, Release Date: January 2020, Consumer Price Index (CPI-U), Percentage Change from Year to Year, 5-Year Annual Average (2020 - 2024), 10-Year Annual Average (2020 - 2029).

^cSurvey of Professional Forecasters, Second Quarter 2020, Release Date: May 15, 2020, Headline CPI, Annualized Percentage Points, 5-Year Annual Average (2020 - 2024), 10-Year Annual Average (2020 - 2029).

^dInflation Expectations, Model output date: June 1, 2020.

^eThe breakeven inflation rate represents a measure of expected inflation derived from X-Year Treasury Constant Maturity Securities and X-Year Treasury Inflation-Indexed Constant Maturity Securities. Observation date: June 1, 2020.

^fThe Treasury Breakeven Inflation (TBI) Curve, Monthly Average Rates, June, 2020.

^gThe 2020 Annual Report of The Board of Trustees of The Federal Old-Age And Survivors Insurance and Federal Disability Insurance Trust Funds, April 22, 2020, Long-range (75-year) assumptions, Intermediate, Consumer Price Index (CPI-W), for 2024 and later.

Economic Actuarial Assumptions

Based on this information and more recent expectations for inflation which continue to be low, we believe a reasonable long-term inflation assumption will likely fall in the range of 1.50 percent to 2.50 percent.

The inflation assumption used by Milliman in the June 30, 2020 actuarial valuation of Prepaid529 was 2.5 percent which is at the high end of the range of reasonable rates. The inflation assumption of 2.5 percent is unchanged from the inflation assumption used by Milliman in their June 30, 2016 actuarial valuation of Prepaid529.

We recommend that the inflation assumption be reviewed prior to the June 30, 2021 actuarial valuation, and adjusted as appropriate, as it is at the high end of the reasonable range of assumptions for inflation.

Investment Return Assumption

The assumed rate of investment return is the rate that assets are expected to earn in the future. The assumed rate of investment return is also used to reduce the projected future tuition payments under the program to a present value.

It is important to note that an actuarial investment return assumption based on expected future experience is a single estimate for all years and therefore implicitly assumes that returns above and below expectations will “average out” over time. In other words, the expected risk premium is reflected in the assumed rate of investment return in advance of being earned, while the investment risk is not reflected until actual experience emerges with each actuarial valuation.

First effective with the June 30, 2018 actuarial valuation of Prepaid529 conducted by Milliman, the investment return assumption was decreased from 6.25 percent to the current rate of 5.75 percent.

Asset Allocation

The allocation of assets within the universe of investment options will significantly impact the overall performance. Therefore, it is meaningful to identify the range of expected returns based on Prepaid529 fund’s targeted allocation of investments and the overall set of capital market assumptions provided to us by the various investment advisors.

Based on information from the Virginia College Savings Plan Statement of Investment Policy and Guidelines For Prepaid529 dated August 27, 2020, and provided to us by Virginia529, the following table illustrates the Prepaid529 current target asset allocation.

Economic Actuarial Assumptions

Asset Category	Target	Allowable Range
Equities		
U.S. Large Cap Equity 5.0%	5.0%	
U.S. SMID Cap Equity	5.0%	
U.S. Small Cap Equity	2.0%	
Non-U.S. Developed Markets	5.0%	
Emerging Markets	5.0%	
Total Equities	22%	14.5% - 29.5%
Fixed Income		
U.S. Senior Leverage Loans	5.5%	
High Yield	7.5%	
EM Govt FI - Hard Currency	2.5%	
Convertibles	5.0%	
Multi-Asset Credit	10.0%	
Private Debt	5.0%	
U.S. Aggregate FI	7.0%	
U.S. Intermediate Credit	10.0%	
Total Fixed Income	52.5%	47.5% - 57.5%
Alternatives		
Hedge Funds	5.0%	
Real Estate - Core	7.5%	
Private Equity	13.0%	
Total Alternatives	25.5%	17.5% - 33.5%
Total All Assets		
	100%	

Approach

The review of the investment return assumption in this report considers forward-looking measures of likely investment return outcomes for the asset classes in the current Prepaid529 investment policy.

Because GRS is an actuarial and benefits consulting firm, we do not develop or maintain our own capital market expectations. Instead, we annually request forward-looking expectations developed by nationally recognized firms who develop capital market assumptions (investment consultants, asset managers and insurance companies). Such firms periodically issue reports that describe their capital market assumptions; that is, their estimates of expected returns, volatility, and correlations among the different asset classes.

Our analysis of the investment return assumptions is performed using the GRS Capital Market Assumption Modeler (CMAM) tool. We update the CMAM tool each year. The capital market assumptions in the 2020 CMAM are from the following 13 firms (in alphabetical order): Aon Hewitt, BlackRock, BNY Mellon, Callan, Cambridge, JPMorgan, Meketa, Mercer, NEPC, RVK, Verus, Voya and Wilshire. The benefit of using



Economic Actuarial Assumptions

capital market expectations from multiple firms is that we can identify the uncertain nature of the items affecting the selection of the investment return assumption. While there may be differences in asset classes, investment horizons, inflation assumptions, treatment of investment expenses, excess manager performance (i.e., alpha), etc., we align the various capital market assumption sets from the 13 different firms to best fit the Fund's investment policy (i.e., target asset allocation) as consistently as possible.

Each investment advisory firm provided capital market assumptions over an investment horizon of approximately 10 years. We refer to these as short-term expectations. In general, our understanding is that the methodology for developing these capital market expectations is forward-looking, not purely backward-looking. Over the years, we have observed a general decreasing trend in capital market expectations. However, we have also observed that some of the investment advisors' assumption sets are dependent on the market conditions at the time they are developed and consequently may be sensitive to short-term market fluctuations. Some expectations are contrarian – meaning that when the market is high, future expectations are lowered and when the market is low, future expectations are raised. The amount of these fluctuations as they appear in the year-to-year capital market assumptions varies between the various investment advisors.

Most of these capital market expectations were based on information through the end of 2019 or the beginning of 2020 (prior to the fluctuations in markets coincident with the outbreak of COVID-19).

In the charts on the following pages, all returns are net of investment expenses and do not consider excess manager performance (alpha). Importantly, the information in this report is not intended to be construed as investment advice.

Calculation of Return Assumption

Given the Prepaid529 fund's current target asset allocation and the capital market assumptions from the firms in our survey, the development of the average nominal return, net of investment expenses, is developed in the following manner and shown in the tables on the following pages.

Based on each firm's capital market assumptions, we estimated the expected nominal return of the Prepaid529 fund's portfolio (column 2). We then took out each firm's price inflation assumption (column 3) to arrive at the real return (column 4). We then incorporated the current inflation assumption used by Milliman of 2.50 percent (column 5) to get the nominal return or the one-year arithmetic return (column 6). We have shown the standard deviation of returns as the investment risk in column 7. As the following table shows, the average one-year nominal return (net of expenses) is 6.62 percent for the 13 firms included in our 2020 CMAM tool.

Economic Actuarial Assumptions

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)-(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	4.79%	2.20%	2.59%	2.50%	5.09%	10.17%
2	5.79%	2.21%	3.58%	2.50%	6.08%	9.94%
3	5.62%	2.10%	3.52%	2.50%	6.02%	7.37%
4	5.97%	2.20%	3.77%	2.50%	6.27%	9.66%
5	6.02%	2.25%	3.77%	2.50%	6.27%	8.02%
6	5.93%	1.90%	4.03%	2.50%	6.53%	9.21%
7	6.56%	2.26%	4.30%	2.50%	6.80%	10.02%
8	6.64%	2.18%	4.46%	2.50%	6.96%	10.50%
9	6.20%	1.80%	4.40%	2.50%	6.90%	8.42%
10	6.34%	1.75%	4.59%	2.50%	7.09%	10.29%
11	7.12%	2.30%	4.82%	2.50%	7.32%	12.45%
12	6.67%	2.01%	4.66%	2.50%	7.16%	8.92%
13	7.06%	2.00%	5.06%	2.50%	7.56%	11.15%
Average	6.21%	2.09%	4.12%	2.50%	6.62%	9.70%

Note that the arithmetic rates of return represent the average future expected return which is higher than the median future expected return. Setting the actuarial valuation assumption at the arithmetic expected return ignores the downward effect of volatility on the accumulation of assets. Consequently, the probability of actually achieving the actuarial assumption compounded over time is less than 50 percent if it is set at the arithmetic expectation.

Therefore, in addition to examining the expected one-year arithmetic return, it is important to review anticipated volatility of the investment portfolio and understand the range of long-term net returns that could be expected to be produced by the investment portfolio.

The next step in our analysis is to compare the probabilities of achieving returns over a 10-year horizon. The following table illustrates the 40th, 50th and 60th percentiles of returns as well as the probability of achieving the current assumption of 5.75 percent, based on a price inflation assumption of 2.50 percent over a 10-year horizon. Note that the investment horizon for the capital market assumption sets used in this analysis is between 5 and 10 years (the average is 9.7 or roughly 10 years).

Economic Actuarial Assumptions

Investment Consultant	Distribution of 10-Year Average Geometric Net Nominal Return			Probability of Exceeding
	40 th	50 th	60 th	5.75%
(1)	(2)	(3)	(4)	(5)
1	3.80%	4.60%	5.41%	36.04%
2	4.83%	5.61%	6.41%	48.28%
3	5.18%	5.77%	6.36%	50.30%
4	5.07%	5.83%	6.60%	51.07%
5	5.33%	5.97%	6.61%	53.47%
6	5.40%	6.13%	6.87%	55.23%
7	5.54%	6.34%	7.14%	57.43%
8	5.62%	6.45%	7.29%	58.45%
9	5.90%	6.57%	7.24%	62.17%
10	5.78%	6.60%	7.42%	60.36%
11	5.62%	6.60%	7.60%	58.69%
12	6.08%	6.79%	7.50%	64.49%
13	6.11%	6.99%	7.88%	63.93%
Average	5.40%	6.17%	6.95%	55.38%

The 50th percentile return is also related to the geometric average return. The geometric average of a sequence of returns over a number of years is the compound average of those returns over the number of years compounded. As the number of years in the geometric average increase and if the distributions of returns each year are independent and identically distributed, then the geometric average will converge to the median return. The median return is also a reasonable rate of return for purposes of the actuarial valuation. The average of 50th percentile returns (based on the current inflation assumption of 2.50 percent) is 6.17 percent.

Column 5 of the preceding table shows the estimated probability of achieving the current assumed rate of return of 5.75 percent over a 10-year period (based on the current inflation assumption of 2.50 percent and the capital market assumptions from the firms in our survey, with a time horizon of about 10 years). The average probability of achieving 5.75 percent over 10 years based on these assumptions is about 55.4 percent.

Based on information in a memo from Mercer dated August 27, 2020 and provided to us by Virginia529, Mercer indicates that, in any given 10-year period, there is a 50 percent probability that the Prepaid529 target allocation will earn an expected return of 6.1 percent (annualized) or better, based on a long-term inflation assumption of 2.2 percent.

Economic Actuarial Assumptions

Completing a similar analysis, but using Mercer’s lower inflation assumption of 2.20 percent (and the capital market assumptions from the 13 firms in our survey, with a time horizon of about 10 years) the estimated average probability of achieving the current assumed rate of return of 5.75 percent over a 10-year period is about 51.4 percent as shown below.

Investment Consultant	Distribution of 10-Year Average Geometric Net Nominal Return			Probability of Exceeding
	40 th	50 th	60 th	5.75%
Average	5.10%	5.87%	6.65%	51.44%

In summary, our analysis shows that the average probability of achieving the 5.75 percent investment return assumption over 10 years based on the current inflation assumption of 2.5 percent is 55.4 percent.

Even with Mercer’s lower inflation assumption of 2.2 percent, our analysis shows that the average probability of achieving 5.75 percent over 10 years is 51.4 percent. (This implies that Virginia529 could lower the inflation assumption to 2.2 percent and the 5.75 percent investment return assumption would still be reasonable.)

Therefore, we believe the 5.75 percent investment return assumption is reasonable.

Review of Tuition Increase Assumption

The annual tuition increase assumption used by Milliman in their current June 30, 2020 actuarial valuation of Prepaid529 is 4.0 percent for Universities and 2.0 percent for Community Colleges for the next two years (Fall 2021 and Fall 2022) and 6.0 percent each year thereafter for both Universities and Community Colleges.

The annual tuition increase assumption used by Milliman in their previous June 30, 2019 actuarial valuation of Prepaid529 was 4.0 percent for both Universities and Community Colleges for the next two years (Fall 2020 and Fall 2021) and 6.0 percent each year thereafter for both Universities and Community Colleges.

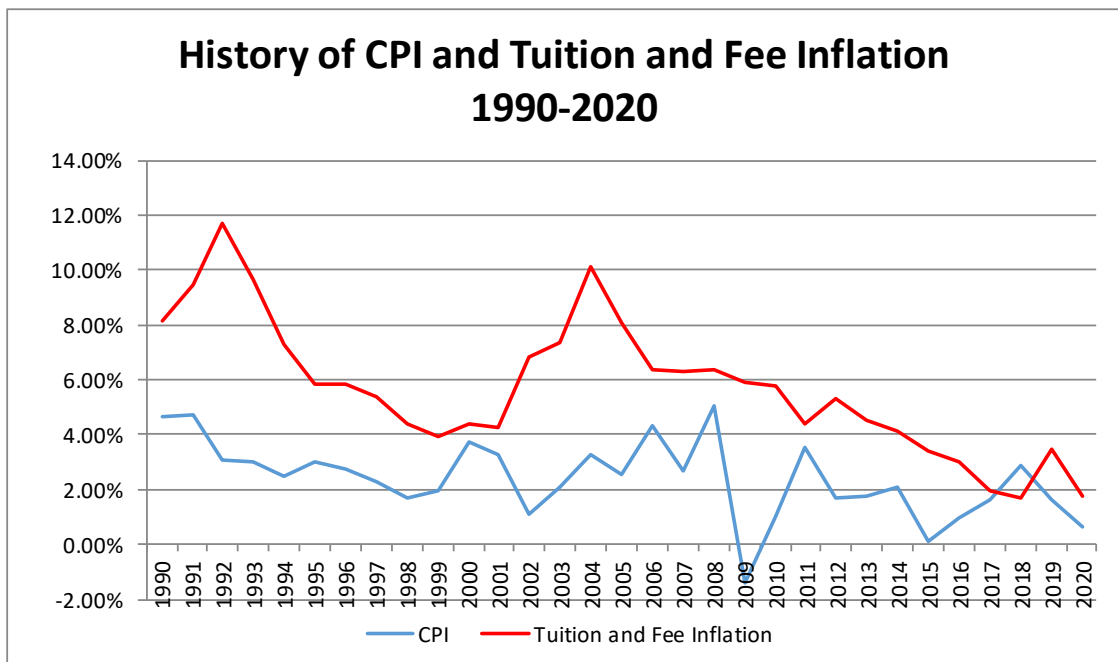
The historical compounded annual increase in average tuition reported in the Milliman report follows:

Period	University	Community College
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%

Economic Actuarial Assumptions

One point to note is that beginning 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. This resulted in a one-year 27 percent increase, thus raising the average annual tuition increases for Community Colleges for the averaging periods of 10 years or longer. The University Tuition and Fees was always measured as an enrollment weighted annual average so there is some difference in the statistics between the two different categories of schools.

The Bureau of Labor Statistics publishes a tuition and fee price index (College tuition and fees in U.S. city average, all urban consumers, not seasonally adjusted). Increases in tuitions and fees have typically exceeded increases in the Consumer Price Index ("CPI"). The graph below shows the relationship between the annual CPI and Tuition and Fee Increases.



Tuition inflation reflects changes in annual consumer expenditures for undergraduate and post-graduate studies at 2-year colleges, 4-year colleges, major universities and professional schools (law, dental, medical, etc.).

Over the last 30 years, tuition and fee increases have exceeded CPI in all years except 2018. The annual averages over that period are 5.60 percent for tuition and fees and 2.31 percent for CPI resulting in a 3.29 percent spread.

Economic Actuarial Assumptions

Fiscal Year	Annual Increase in CPI-U	Annual Increase in Tuition and Fees (National)	Difference Between Tuition and Fee and CPI Increases
2010-2011	3.56%	4.41%	0.85%
2011-2012	1.66%	5.31%	3.65%
2012-2013	1.75%	4.54%	2.79%
2013-2014	2.07%	4.14%	2.07%
2014-2015	0.12%	3.40%	3.28%
2015-2016	1.00%	2.99%	1.99%
2016-2017	1.63%	1.94%	0.31%
2017-2018	2.87%	1.72%	-1.15%
2018-2019	1.65%	3.45%	1.80%
2019-2020	0.65%	1.74%	1.09%
3-Year Average	1.72%	2.30%	0.58%
5-Year Average	1.56%	2.37%	0.81%
10-Year Average	1.69%	3.36%	1.67%
15-Year Average	1.90%	4.28%	2.38%
20-Year Average	2.03%	5.03%	3.00%
25-Year Average	2.12%	4.98%	2.86%
30-Year Average	2.31%	5.60%	3.29%

Based on the historical statistics on CPI and tuition and fee inflation, we believe that annual tuition and fees increases will likely exceed CPI increases on average by 1.00 to 3.00 percentage points. Based on the current inflation assumption of 2.50 percent, this would result in a tuition and fee increase assumption of 3.50 percent to 5.50 percent. Based on low increases in tuition and fees over the past couple of years, it is reasonable to assume lower increases in the short term.

Therefore, we find the current assumption of 4.0 percent for Universities and 2.0 percent for Community Colleges for the next two years (Fall 2021 and Fall 2022) reasonable and the current ultimate assumption of 6.0 percent each year after the first two years reasonable (but on the high side) for both Universities and Community Colleges. Tuition and fee increases were last higher than the current ultimate assumption of 6.0 percent for the 2011-2012 academic year for both Universities and Community Colleges.

An important consideration, however, is whether the ultimate annual 6.0 percent tuition increase assumption is really sustainable over the long term. With an annual 6.0 percent increase in tuition each year going forward, the cost of college may become unaffordable to future generations of students. For example, if over a 12- to 18-year period, tuition increases at an annual rate of 6.0 percent and wages increase at a rate closer to 3.0 percent, then the cost of tuition may not be reasonable nor sustainable in relation to wages (tuition would have increased by about 185 percent over an 18-year period compared to increased wages of only 70 percent). Further, Virginia's governance structure for higher education is decentralized, which makes it difficult to predict future tuition increases.

Economic Actuarial Assumptions

Because contracts are no longer being sold under Prepaid529, the tuition increase assumption is not currently affecting contract pricing.

Based on a survey that GRS conducted of prepaid tuition plans sponsored by states around the country, we found that the ultimate 6.00 percent tuition increase assumption is at the high end of tuition increase assumptions used by other prepaid tuition plans.

We recommend that the assumption for tuition increases continue to be reviewed annually, and adjusted as appropriate.

Reasonable Rate of Return

At redemption, each 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 or does not attend a Virginia public university or community college. (For beneficiaries attending an out-of-state public or private college or university, Prepaid529 will pay the lesser of 1) contract payments made plus a reasonable rate of return or 2) the average in-state undergraduate tuition and mandatory fees at Virginia public institutions in the semester in which benefits are used.) Contract holders have the option of rolling over the value of their prepaid contract into an Invest529 account. The value of the prepaid contract for such rollovers is the accumulated contributions at the reasonable rate of return set by the Board.

The actual reasonable rate of return tracks the quarterly performance of the Institutional Money Funds Index as reported in the Money Fund Monitor™ by iMoneyNet and is reported on the Virginia529 website. The actual reasonable rate was less than 0.25 percent between the third quarter of 2009 and the first quarter of 2017. The actual reasonable rate was higher than 1.00 percent between the second quarter of 2018 and second quarter of 2020. The actual reasonable rate since the third quarter of 2020 through the second quarter of 2021 has been less than 0.25 percent.

The current actuarial assumption for the reasonable rate used by Milliman in the June 30, 2020 actuarial report is 0.16 percent for 2020-2021 and 2.50 percent thereafter. The actuarial assumption for the reasonable rate used in the previous June 30, 2019 actuarial valuation conducted by Milliman was 2.15 percent for 2019-2020 and 3.0 percent thereafter.

Milliman based the current actuarial assumption for the reasonable rate 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*.

We believe the ultimate assumption for the reasonable rate being set to the inflation assumption is probably reasonable. However, as we previously noted, the current inflation assumption of 2.50 percent is on the high end of the range of assumptions. Also, the actual reasonable rate has not been higher than 2.50 percent since the second quarter of 2008 (and was lower than 0.25 percent for almost eight years).

Economic Actuarial Assumptions

Recommendations

- We recommend that the inflation assumption be reviewed, and adjusted as appropriate, as it is at the high end of the reasonable range of assumptions for inflation.
- We recommend that the assumption for tuition increases continue to be reviewed annually, and adjusted as appropriate.
- We recommend that the reasonable rate assumption be reviewed in conjunction with the review of the inflation assumption, and adjusted as appropriate.

SECTION H

DEMOGRAPHIC ACTUARIAL ASSUMPTIONS

Demographic Actuarial Assumptions

During the last quadrennial audit, we reviewed the 2014 experience study report of the Prepaid529 prepared by Milliman covering the 10-year period from July 1, 2003 through June 30, 2013. To the best of our knowledge, there has not been an experience study completed since then. The 2014 experience study report examined experience for the following assumptions:

1. The year, relative to the expected matriculation year, in which contract units will first be redeemed (Matriculation);
2. The proportion of tuition payouts going to Virginia public schools, Virginia private schools and out of state schools (Utilization of Tuition Years);
3. The cost of tuition payouts to Virginia four-year universities and community colleges relative to enrollment-weighted average tuition (Bias); and
4. Rates of contract cancellations and rollovers (Forfeiture).

In the last 2017 quadrennial audit, we noted the following based on the 2014 experience study:

- The matriculation and utilization of tuition years assumptions are reasonable and contain some degree of conservatism.
- The bias loads are reasonable and the classification of members attending a Virginia public university, a Virginia private university, an out of state university or a cancellation, transfer or rollover to a savings plan should be consistent when reviewing the contract experience to develop the benefit utilization assumptions and to develop the bias load.
- The forfeiture assumption is reasonable and slightly conservative for the year prior to matriculation.
- Administrative expense assumptions are based on a cost analysis performed by the Virginia529 staff with adjustments for anticipated increases since the analysis was performed in 2013.

Following is an illustration of the actuarial gain/(loss) attributable to demographic assumptions that is found in each of the last four actuarial valuation reports. The gains and losses due to demographic experience are relatively small and therefore are a good indication that actual experience has not deviated too much from the demographic actuarial assumptions.

Plan Year Ending	\$ in Millions				Total	% of 2020 Reserve
	2017	2018	2019	2020		
Demographic experience gains (losses)	23.4	0.7	41.2	(3.7)	61.6	5.9%

Actuarial Reserve / (Deficit) as of end of plan year \$ 786.8 \$ 784.6 \$1,029.4 \$1,050.2

Recommendations

- We recommend conducting another experience study to review the demographic experience of the plan compared to the current actuarial assumptions within the next 12 months.

SECTION I

ACTUARIAL VALUATION METHODS

Actuarial Valuation Methods

The common practice by actuaries who conduct actuarial valuations of prepaid tuition programs is to determine the present value of obligations for future tuition payments and administrative expenses under a “deterministic” valuation approach. Under a deterministic approach, the liabilities are projected based on a specific set of variables and assumptions. In effect, the purpose of a deterministic valuation is to develop expected results. However, only if actual future experience duplicates the underlying variables will the liabilities of the plan be exactly as determined.

Because the probability of one set of assumptions being exactly realized is rather low, Milliman utilized a “stochastic” projection (sometimes called a Monte Carlo simulation) in order to simulate multiple sequences of outcomes so that a range of results was obtained. This method resulted in a distribution of possible outcomes, which reflects the uncertainty and volatility of the real world. Instead of using assumptions that specifically represent future outcomes, stochastic projections use parameters that characterize the conditions underlying future events.

Based on Milliman’s stochastic analysis, they determined that the amount of assets necessary to have a 50 percent probability of meeting all program obligations, including administrative expenses, associated with contracts issued as of June 30, 2020, is \$1,831.0 million. The actual Prepaid529 fund balance as of June 30, 2020, was \$2,881.2 million, which results in an actuarial reserve of \$1,050.2 and the Prepaid529 being 157.4 percent funded as of June 30, 2020.

We find the use of a stochastic valuation approach by Milliman to determine the present value of obligations for future tuition payments and administrative expenses, as compared to a deterministic valuation approach, to be an appropriate valuation methodology for the purpose for which it is used. In fact, it is a robust methodology and has the potential to provide more information than a deterministic approach.

Milliman also prepared 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 their Monte Carlo simulations. The assumptions include a 5.46 percent return on the Prepaid529 assets and a tuition and fee increase assumption of 4.0 percent for the first two years and 6.0 percent thereafter for University tuition and 2.0 percent for the first two years and 6.0 percent thereafter for Community College tuition. They concluded that “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.” However, Milliman also clarifies that “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.” What this means is if no new contracts are sold and all actuarial assumptions were exactly realized, at the end of fiscal year 2044 there would be program assets of \$3,765.1 million and no additional tuition benefits to be made. We find the deterministic approach to the cash flow projections found in the June 30, 2020 actuarial valuation report to be reasonable.

Recommendations

We have no recommendations regarding the actuarial valuation methods.

SECTION J

ACTUARIAL LIABILITY TEST LIFE REVIEW

Actuarial Liability Test Review

GRS reviewed and replicated the liabilities for 16 test lives in order to assess that the liabilities were being calculated consistently with the contract beneficiary census data provided and with the actuarial assumptions and methods as disclosed in the June 30, 2020 actuarial valuation report, including a deterministic investment return assumption of 5.75 percent.

A summary of the replication results and key contract beneficiary census data may be found on the page following the commentary on the test life review.

Application of Actuarial Assumptions and Methods

GRS found that the actuarial assumptions and methods applied in the test cases were generally consistent with those disclosed in the June 30, 2020 actuarial valuation report. (Milliman initially sent results for the test cases that were not consistent with the assumptions disclosed in the June 30, 2020 actuarial valuation report. However, after GRS followed up with Milliman on this issue, Milliman indicated that the test cases sent were not based on the final valuation assumptions and sent a revised file with updated test case results.) GRS selected 16 contract beneficiary records for testing who had projected enrollment years before, equal to and after the valuation year of 2020. We also selected beneficiaries who had already used tuition benefits and those who had not yet used benefits.

Although not explicitly stated in the actuarial report, contract beneficiaries with projected enrollment dates prior to the actuarial valuation year (2020) who had not yet used tuition benefits were assumed to have a matriculation year (i.e., the year of college entrance) equal to the actuarial valuation year and therefore the matriculation rates in the report were applied (Test Lives 2, 4, 6, 8). Beneficiaries who had begun using tuition benefits with a matriculation year equal to or prior to the actuarial valuation year were assumed to redeem two semesters of benefits each year until all benefits were depleted (Test Lives 1, 3, 5, 7). Beneficiaries who had begun using tuition benefits with a matriculation year after the actuarial valuation year were assumed to defer the use of their remaining benefits until their projected enrollment year and therefore the matriculation rates in the report were applied (Test Life 15).

Beneficiaries with university contracts who had begun using tuition benefits also had the assumptions applied for attendance at different types of schools (76% attend a public university in Virginia, 7.6% attend a private university in Virginia, 11.4% attend a university in another state and 5% request a cancellation or a rollover) (Test Life 3). Beneficiaries with community college contracts are assumed to have community college tuition benefits paid beginning in the matriculation year (there is no assumption applied for cancellation or rollover).

Future installment payments were projected with rates applied for the percentage of contract beneficiaries remaining in the Prepaid529 with a future benefit payable. For beneficiaries who were not scheduled to have completed payment of their contract installment payments prior to their projected matriculation year, (1) tuition benefits were assumed to begin and (2) contract installment payments were accelerated to be fully paid as of the valuation date) (Test Lives 2, 8, 9).

For beneficiaries who were scheduled to complete their installment payments prior to their projected matriculation year, the installment payments projected by GRS were slightly lower than those projected by Milliman (Test Lives 11, 12, 13, 14, 16), but within 0.2% of the Milliman results.

Actuarial Liability Test Review

Replication of the Present Value of Obligations

GRS was able to independently replicate the present value of future obligations payable from the Prepaid529 for 10 of the 16 test lives within about 0.5 percent. GRS replicated five of the remaining six test lives (Test Lives 1, 2, 3, 8 and 15) within 3.0 percent and all of the remaining six test lives within 4.0 percent. For the six remaining test lives, two were university contracts with no benefits used, two were university contracts in which some tuition benefits had been used and two were combination contracts that included both community college and university years. We consider the replication of 15 of the 16 test lives within 3.0 percent and all 16 within 4.0 percent as reasonable.

For Test Life 1, Milliman assumed that all remaining tuition benefits (about 1.6 years) were paid out in the first year and the annual maintenance expense did not apply, whereas GRS calculated the present value of obligations by assuming the remaining tuition benefits were paid over the next two years and annual maintenance expenses applied (consistently like they do for other contracts). (This is why there is a 206 percent difference in the present value of obligations – expenses for Test Life 1.)

Similarly, Milliman did not assume an annual maintenance expense for Test Life 3, which accounts for the difference between the GRS and Milliman results. (This is why there is a 226 percent difference in the present value of obligations – expenses for Test Life 3.) For all other test lives, annual maintenance costs are assumed in each year, including the last year in which tuition benefits are assumed to be paid.

Replication of the Present Value of Future Installment Contract Payments

Nine of the 16 test lives had remaining contract installment payments to be made. For all nine test lives, GRS was able to replicate the present value of future installment contract payments within 0.5 percent (and within 0.2 percent for eight of the nine). As noted in the previous audit, Milliman bases the present value of future installment payments on the rounded number of remaining payments. For example, for test life 16, there were 151.05 remaining installment contract payments, which Milliman rounded down to 151. The projected future installment payments amounts exclude a \$1 expense amount per payment. This is consistent with the \$1 processing expense amount per payment not being included in the maintenance expense of \$64.44 (or any other expenses) included in the present value of future obligations.

Actuarial Liability Test Review

Recommendation

We recommend that Milliman review the annual maintenance expense that is assumed for all contracts in the last year that tuition benefits are assumed to be paid for consistency and that it is either included or excluded for all test lives.

We recommend that more disclosure be added to the actuarial assumptions section of the actuarial valuation report with respect to:

- 1) The assumption for cancellation, transfer or rollover to a savings plan for community college and combination contracts starting in the year of projected matriculation (the assumption is 5 percent for university contracts and 0 percent for community college and
- 2) Projected utilization of benefits for contract beneficiaries with projected college entrance years prior to the actuarial valuation year

Actuarial Liability Test Review

Test Life Number	Contract Type	Contract Status	Projected Enrollment Year	(Community College/ University)		Present Value of Obligations - Tuition			Present Value of Obligations - Expenses			Present Value of Obligations - Total		
				Contracted Years	Years Used	Milliman	GRS	Difference	Milliman	GRS	Difference	Milliman	GRS	Difference
1	BOTH	TN - 10 Year Time Limit Reached	2005	2/2	2/0.3188	\$21,827.77	\$21,243.64	-2.7%	\$55.49	\$169.85	206.1%	\$21,883.26	\$21,413.49	-2.1%
2	UNIV	NX - Cancelled/Not Refunded	2015	0/4	0/0	56,611.85	55,932.29	-1.2%	366.26	366.26	0.0%	56,978.11	56,298.54	-1.2%
3	UNIV	PF - Paid in Full	2017	0/4	0/3	12,718.98	12,478.13	-1.9%	27.74	90.41	225.9%	12,746.72	12,568.54	-1.4%
4	UNIV	PF - Paid in Full	2018	0/4	0/0	50,212.18	50,268.98	0.1%	366.26	366.26	0.0%	50,578.44	50,635.24	0.1%
5	COMM	PF - Paid in Full	2018	3/0	1.188/0	9,823.15	9,812.65	-0.1%	178.54	178.46	0.0%	10,001.69	9,991.11	-0.1%
6	UNIV	A - Active	2018	0/2	0/0	33,243.38	33,278.21	0.1%	234.86	234.86	0.0%	33,478.23	33,513.07	0.1%
7	COMM	PF - Paid in Full	2019	3/0	0.594/0	12,902.91	12,923.45	0.2%	251.15	248.70	-1.0%	13,154.06	13,172.16	0.1%
8	UNIV	AA - Accepted (Reinstated)	2019	0/1	0/0	17,208.81	16,771.12	-2.5%	171.86	171.86	0.0%	17,380.67	16,942.98	-2.5%
9	UNIV	A - Active	2020	0/1	0/0	14,847.41	14,844.75	0.0%	171.86	171.86	0.0%	15,019.27	15,016.61	0.0%
10	COMM	A - Active	2022	1/0	0/0	5,133.87	5,133.88	0.0%	285.16	284.80	-0.1%	5,419.04	5,418.68	0.0%
11	COMM	A - Active	2024	2/0	0/0	10,321.36	10,320.66	0.0%	446.88	446.45	-0.1%	10,768.24	10,767.11	0.0%
12	UNIV	A - Active	2027	0/5	0/0	75,833.60	75,938.99	0.1%	753.98	753.61	0.0%	76,587.58	76,692.60	0.1%
13	BOTH	A - Active	2030	2/2	0/0	47,409.90	45,652.98	-3.7%	814.11	814.03	0.0%	48,224.02	46,467.01	-3.6%
14	BOTH	A - Active	2032	0.5/2	0/0	32,707.19	32,732.77	0.1%	836.97	837.22	0.0%	33,544.16	33,569.99	0.1%
15	UNIV	PF - Paid in Full	2034	0/4	0/0.3469	43,418.57	43,105.17	-0.7%	957.49	957.34	0.0%	44,376.06	44,062.51	-0.7%
16	UNIV	A - Active	2037	0/3	0/0	44,057.45	44,003.13	-0.1%	1,017.74	1,017.85	0.0%	45,075.19	45,020.98	-0.1%

Test Life Number	Contract Type	Contract Status	Projected Enrollment Year	Payments Remaining		Present Value of Future Installment Payments		
				Number	Years	Milliman	GRS	Difference
1	BOTH	TN - 10 Year Time Limit Reached	2005	0	0	\$0.00	\$0.00	0.0%
2	UNIV	NX - Cancelled/Not Refunded	2015	36.76	3.063333333	\$13,296.78	\$13,298.03	0.0%
3	UNIV	PF - Paid in Full	2017	0	0	0.00	0.00	0.0%
4	UNIV	PF - Paid in Full	2018	0	0	0.00	0.00	0.0%
5	COMM	PF - Paid in Full	2018	0	0	0.00	0.00	0.0%
6	UNIV	A - Active	2018	0	0	0.00	0.00	0.0%
7	COMM	PF - Paid in Full	2019	0	0	0.00	0.00	0.0%
8	UNIV	AA - Accepted (Reinstated)	2019	5.85	0.4875	1,148.15	1,143.58	-0.4%
9	UNIV	A - Active	2020	1	0.083333333	70.99	70.99	0.0%
10	COMM	A - Active	2022	24	2	451.27	451.27	0.0%
11	COMM	A - Active	2024	47	3.916666667	2,462.27	2,458.26	-0.2%
12	UNIV	A - Active	2027	83	6.916666667	28,940.59	28,903.93	-0.1%
13	BOTH	A - Active	2030	119	9.916666667	31,480.34	31,440.31	-0.1%
14	BOTH	A - Active	2032	142	11.833333333	18,486.37	18,462.57	-0.1%
15	UNIV	PF - Paid in Full	2034	0	0	0.00	0.00	0.0%
16	UNIV	A - Active	2037	151.05	12.5875	45,689.84	45,641.06	-0.1%

Test Life 1: Milliman assumed that all remaining tuition benefits were paid out in the first year and the annual maintenance expense did not apply, whereas GRS calculated the present value of obligations by assuming the remaining tuition benefits were paid over the next two years and annual maintenance expenses applied.

Test Life 3: Milliman did not assume an annual maintenance expense and GRS did assume an annual maintenance expense.



SECTION K

ACTUARIAL REPORT CONTENT, DETAIL, FORMAT AND CLARITY

Actuarial Report Content, Detail, Format and Clarity

Actuarial Standards of Practice

Because no generally accepted actuarial standards of practice (“ASOP”) have evolved within the actuarial profession that specifically address prepaid tuition programs, we have referenced the ASOPs that are used for retirement systems. We chose such standards because prepaid tuition programs, like retirement plans, generally provide for the payment of a well defined benefit at a future date.

ASOP No. 4

ASOP No. 4, Measuring Pension Obligations and Determining Pension Plan Costs, provides guidance for measuring pension obligations and communicating the results. The Standard lists specific elements to be included, either directly or by references to prior communication, in pension actuarial communications. The pertinent items that should be included in an actuarial valuation report for a pension plan should include:

- The purposes of the measurement and a statement that the measurement may not be applicable for other purposes.
- The measurement date (the effective date of the calculations, the date as of which the participant and financial information were compiled and the sources and adequacy of such information).
- A description of adjustments made for events after the measurement date (if applicable).
- An outline of the benefits being discussed or valued, a description of known changes from the most recent valuation and any significant plan provisions not included in the actuarial valuation, along with the rationale for not including the provisions.
- A summary of the participant information and description of hypothetical data (if used).
- A description of any accounting policies or funding elections made by the principal that are pertinent to the measurement.
- A description of the actuarial assumptions, cost method and the asset valuation method used such that another actuary qualified in the same practice area could determine whether the results in the actuarial valuation report are reasonable.
- Information regarding the contribution allocation procedure.
- Disclosures on funded status that are not prescribed by federal law or regulation:
 - Whether the funded status measure is appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan’s benefit obligations;
 - Whether the funded status measure is appropriate for assessing the need for or the amount of future contributions; and
 - If applicable, a statement that the funded status measure would be different if the measure reflected the market value of assets rather than the actuarial value of assets.
- A statement, appropriate for the intended users, indicating that future measurements (for example, funded status) may differ significantly from the current measurement.
- A description of known changes in assumptions and methods from the most recent valuation and an explanation of the information and analysis that led to the changes (if the changes were not the result of a prescribed assumption).
- A description of cost allocation or contribution allocation procedures (if the changes were not the result of a prescribed assumption).
- A statement, if applicable, that the actuary’s use of approximations and estimates could differ materially from results based on detailed calculations.

Actuarial Report Content, Detail, Format and Clarity

ASOP No. 41

ASOP No. 41, Actuarial Communications, provides guidance to actuaries with respect to actuarial communications.

The requirements for actuarial communications are as follows:

- Form and content of each actuarial communication are appropriate for the circumstances, taking into account the intended users.
- Actuarial communications are clear and use language appropriate for the circumstances, taking into account the intended users.
- Actuarial communications should be issued within a reasonable time period, taking into account the needs of the intended users.
- Actuarial communications should clearly identify the actuary responsible and the extent to which the actuary is available to provide supplementary information and information, unless the actuary judges it inappropriate.

Findings and Recommendations

We have reviewed the June 30, 2020 actuarial valuation report prepared by Milliman and generally find that the report is complete and contains the appropriate information. However, we have the following recommendations for modifications to the report which in our opinion would allow it to adhere more closely with ASOP No. 4 and 41.

- The date as of which the participant and financial information were compiled could be identified more clearly in the text of the certification letter. The current language is as follows:
 - The results contained in this report are based on contract data and preliminary financial statements provided by the Virginia529. We have relied on this data in preparing this report.
- Disclosure of whether the funded status measure is appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.
- The summary/outline of the benefits being discussed or valued could be expanded to be more robust, and an explicit statement regarding whether there are (or are not) any significant benefits not included in the actuarial determinations could be added.
- There is a line item in the actuarial gain/loss analysis included in the Milliman June 30, 2019 actuarial valuation report for administrative fee revenue from Virginia529 in the amount of \$24.5 million. There is no such line item in the Milliman June 30, 2020 actuarial valuation report. Therefore, more disclosure regarding the amount of net operating agency revenue assigned (contributed) to Prepaid529 during the most recent five fiscal years is needed.

With the exception of the fourth main bullet above, these are the exact same minor recommendations that we made in our 2017 Quadrennial Actuarial Audit of Virginia529 Prepaid529 Program Report.

As previously stated, Milliman utilized a "stochastic" projection (sometimes called a Monte Carlo simulation) in order to simulate multiple sequences of outcomes so that a range of results was obtained. This method resulted in a distribution of possible outcomes, which reflects the uncertainty and volatility

Actuarial Report Content, Detail, Format and Clarity

of the real world. Instead of using assumptions that specifically represent future outcomes, stochastic projections use parameters that characterize the conditions underlying future events.

Based on Milliman's stochastic analysis, they determined and illustrated in their report the amount of assets necessary to have different percentage probabilities of meeting all program obligations, including administrative expenses, based on capital market assumptions, adjusted to result in a median return of 5.75 percent, as set by Virginia529. For example, Milliman indicates that the amount of assets necessary to have a 50 percent probability of meeting all program obligations, including administrative expenses, associated with contracts issued as of June 30, 2020, is \$1,831.0 million. In a similar manner, they indicate that the amount of assets necessary to have a 99 percent probability of meeting all program obligations, including administrative expenses, associated with contracts issued as of June 30, 2020, is \$2,881.2 million, which is the actual Prepaid529 fund balance as of June 30, 2020.

The Board may consider also reviewing results based on the unadjusted capital market assumptions in order to assess the probability of the current assets meeting all program obligations.

SECTION L

ACTUARIAL PRINCIPLES AND PRACTICES EMPLOYED BY ACTUARY

Actuarial Principles And Practices Employed by Actuary

Actuarial Standards of Practice

Because no generally accepted standards of practice have evolved within the actuarial profession that specifically address prepaid tuition programs, we have referenced the ASOPs that are used for retirement systems for purposes of conducting this 2021 Quadrennial Actuarial Audit of the Prepaid529. We chose such standards because prepaid tuition programs, like retirement plans, generally provide for the payment of a benefit at a future date. These include the following Actuarial Standards of Practice:

- ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*;
- ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*;
- ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*;
- ASOP No. 44, *Selection and Use of Asset Valuation Methods for Pension Valuations*;
- ASOP No. 51, *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions*; and
- ASOP No. 56, *Modeling*.

ASOP No. 51 and ASOP No. 56 were effective November 1, 2018 and October 1, 2020, respectively, and are new ASOPs since the 2017 quadrennial audit.

In general, we find that Milliman followed the appropriate ASOPs that are the most applicable for a prepaid tuition program.

Recommendations

We have no recommendations regarding the actuarial principles and practices employed by the actuary.

SECTION M

CONSIDERATIONS REGARDING THE NEW TTP PROGRAM

Considerations Regarding the New TTP Program

Prepaid529 Closed

The Virginia529 Prepaid529 program was closed for new enrollments as of May 1, 2019.

Prepaid529 was closed to new enrollments primarily because Virginia529 felt that the rising cost of tuition at Virginia public universities caused the cost of a Prepaid529 contract to move out of the financial reach of many Virginia families. Existing Prepaid529 contracts are NOT impacted by this change. Prepaid529 contracts retain the same terms, benefits, costs and payments in effect at the time of purchase.

New Tuition Track Portfolio

Effective February 2021, Virginia529 launched the Tuition Track Portfolio (TTP) as the replacement for Prepaid529. The Tuition Track Portfolio represents a program that is more affordable, flexible, simple and certain for all Virginia families while preserving the defined benefit feature similar to that provided by Prepaid529.

Beneficiaries with existing Prepaid529 accounts may move the value of those accounts to TTP accounts in the same manner currently available to move funds to an Invest529 account.

Features of TTP

The purchase price and account value of the new TTP is tied to the then current Average Tuition at Virginia's public universities. Average Tuition is determined using a formula that considers the annual full-time equivalent weighted average Tuition (as defined in program materials) at Virginia public universities.

Every year, the average tuition at Virginia public colleges and universities will be calculated. The Average Tuition is divided into 100 units to determine the cost of an individual unit. A unit equals 1/100th of an academic year. The cost to purchase a unit and the maturity value of the units already purchased will shift annually to match Average Tuition costs. Account owners choose how many units to purchase and how often to buy them. As with other Invest529 portfolios, account owners can make a one-time contribution, or set up automated monthly contributions. The cost to purchase a Tuition Track unit changes annually on or about July 1.

When it is time to use units, the student will receive one year of the current Average Tuition for every 100 units previously purchased, regardless of how much tuition rates have grown. (Currently, Tuition at more than half of Virginia's colleges costs less than 100 units a year. To cover the costs of attending a higher-than-average priced college, or to cover costs beyond tuition, students should consider purchasing more than 100 units for each year.)

As with all other Invest529 portfolios, no contracts or minimum purchase amounts will be required.

Units may be purchased through June 30 preceding the Expected Usage Date, typically the year of high school graduation.

Units are eligible for use at any time. However, units must reach maturity to receive the full benefit value upon withdrawal (have been held for three or more years and the Beneficiary reaches the Expected Usage Date or begins taking eligible post-secondary courses).



Considerations Regarding the New TTP Program

At the time of opening a Tuition Track Portfolio Account, either the Account Owner or the Beneficiary must be a Virginia resident.

Applicability of 2021 Quadrennial Actuarial Audit of Prepaid529 to New TTP

Virginia529 informed us that:

- The two programs (TTP and Prepaid529) will be combined and referred to as the Defined Benefit 529 Programs. As such, the two programs will be commingled for investment purposes with the same investment policy.
- Separate accounting of the two programs will be maintained for transparency.
- There will be one actuarial valuation and a single actuarial valuation report prepared for the combined assets and programs.
- The impact, positive or negative, on the actuarial funded status of the Defined Benefit 529 Programs from the inclusion of the TTP will be ascertainable for reporting and assessment purposes.

In terms of the applicability of the results of the 2021 Quadrennial Actuarial Audit of Prepaid529 to the new TTP, it is very premature to speculate. For example, we do not know:

- The demographics of the beneficiaries participating in the TTP.
- The number of units they are purchasing.
- The pricing reserve formula, if any.

Further, the Prepaid529 program is currently 157 percent funded, whereas the TTP is brand new.

Therefore, even if (1) the actuary uses the same actuarial assumptions and actuarial methods in their actuarial valuations of Prepaid529 and TTP and (2) the investment policies of Prepaid529 and TTP are the same, it is difficult to assess whether the results will be similar.

Of course, all of the issues that we have addressed in previous quadrennial actuarial audits of the Prepaid529, as well as the comments in this 2021 Quadrennial actuarial audit of the Prepaid529 will certainly be valid issues to look for in any future audit of the new Defined Benefit 529 Programs.

In particular, we suggest that attention be given in the next audit to the actuarial assumption for future tuition increases, the pricing reserve formula, if any, and the impact on the funded status of the combined program from the inclusion of the TTP.

SECTION N

COMMENTS AND CONSIDERATIONS FROM GRS FROM 2017 AUDIT

Comments and Considerations from GRS from 2017 Audit

Comments from GRS from 2017 Audit Report

The 2017 audit report contained a series of relatively minor recommendations for the Virginia529 and Milliman. A summary of these recommendations follows along with a comment from GRS in *italics*:

- Although the footnote on the exhibit in Appendix B indicates “Table only includes contracts with at least one semester of tuition remaining,” the counts appear to include all contracts with remaining tuition benefits (including contracts currently with unpurchased tuition benefits if there are installment contract payments remaining).
 - We recommend that the footnotes in the report exhibits be reviewed to ensure consistency with the information that is shown. We agree that excluding contracts which have a very small amount of tuition units remaining increases the usefulness of the exhibit and it is something that GRS does with our prepaid tuition plan clients.
 - *There is no longer a footnote stating “Table only includes contracts with at least one semester of tuition remaining”*
 - Virginia529 may want to review these contracts and make updates to the contract data or follow up with contract holders, as needed.
- There are contracts that currently have or are projected to have remaining contract installment payments at the projected matriculated date.
 - We recommend that Virginia529 and Milliman discuss whether changes will be made to the underlying raw data or if assumptions should be made in the actuarial valuation to address this.
 - *An assumption was made in the actuarial valuation report to accelerate contract installment payments to be completed prior to the projected matriculation date.*
- We recommend that the assumption for tuition increases continue to be reviewed annually to confirm that the ultimate assumption of 6.5 percent continues to be reasonable, and that the assumption be adjusted as appropriate.
 - *The ultimate tuition increase assumption was decreased to 6.0 percent.*
- We recommend that more disclosure be added to the actuarial assumptions section of the actuarial valuation report with respect to certain assumptions.
- We recommend reviewing the assumption that once contract beneficiaries begin utilizing their contract benefits (first matriculate), they will redeem two semesters each year until benefits are fully used.
 - *An experience study has not been performed since the 2017 audit to review this assumption.*
- We recommend that Milliman and Virginia529 review (1) the data underlying the 5 percent assumption for rollovers/cancellations beginning in the year of assumed matriculation and (2) the application of this assumption in the actuarial valuation to ensure that the assumption is consistent with the actual experience of the Prepaid529.
 - *An experience study has not been performed since the 2017 audit to review this assumption.*
- We recommend reviewing the consistency of how contract payments were classified for purposes of developing both the cancellation/rollover assumption beginning in the year of assumed matriculation and the bias load assumption (in particular for contract beneficiaries for whom their account balance was higher than the tuition at their school).
 - *An experience study has not been performed since the 2017 audit to review this assumption.*

SECTION O

VIRGINIA529 PREPAID529 PROGRAM RESPONSE



Mary G. Morris
Chief Executive Officer
Direct: 804-786-0832

June 10, 2021

Mr. Hal Greer
Director,
Joint Legislative Audit and Review Commission Sent via email to hgreer@jlarc.virginia.gov
919 East Main Street
Suite 2101
Richmond, Virginia 23219

RE: 2021 Quadrennial Actuarial Audit of the Prepaid529 Program

Dear Mr. Greer:

Thank you for the opportunity to review and comment on the exposure draft of the 2021 *Quadrennial Actuarial Audit of the Virginia529 Prepaid Tuition Program* (the Audit) recently completed by Gabriel, Roeder, Smith and Company (GRS). The audit was conducted to comply with the provisions of the Virginia College Savings Plan Oversight Act (§30-330-335 of the *Code of Virginia*) to provide the Commission a comprehensive review of the actuarial soundness of the Prepaid529 program. Virginia529 is pleased with the conclusions of GRS that the conclusions in the Prepaid529 Valuation Report generally are reasonable, that the primary actuarial assumptions used by Virginia529 and its actuary, Milliman, Incorporated (Milliman), all are reasonable, and that the Prepaid529 program (Prepaid529 or the Program) is actuarially sound.

The Report contains what GRS characterizes as “relatively minor recommendations” and, in general Virginia529 agrees with the recommendations. In most instances, Virginia529 has completed addressing them or is in the process of addressing the recommendations. Virginia529 agrees with GRS that none of the recommendations has a material impact on the conclusions or funded status of the Program.

We very briefly address each recommendation and comment below, in the order addressed in the Report:

Contract Data: Virginia529 agrees with the three minor recommendations regarding the contract data related to cancelled or unused contracts and will address those comments in the upcoming Valuation Report for the year ending June 30, 2021.

Plan Assets: Virginia529 agrees with the recommendation related to present value calculations related to future installment payments and future tuition benefits and those comments will be reflected in the upcoming Valuation Report for the year ending June 30, 2021.

Weighted Average Tuition and Fees Calculation: The Report contains no recommendations regarding the methodology for determining Average Tuition. The comment regarding a bias load is noted but it is not applicable as the pricing for the currently open Tuition Track Portfolio does not include a bias load.

Economic Actuarial Assumptions: The Report considers four key economic actuarial assumptions: Assumed Rate of Inflation, Assumed Rate of Investment Return, Assumed Rate of Tuition Inflation, and Assumed Reasonable Rate of Return. After lengthy discussions of each assumption, the Report concludes that each assumption is reasonable, noting that the assumption for inflation and tuition inflation may be at the high end of the reasonable range. The Report had no comment on the assumed long-term rate of return on the portfolio and with respect to the assumed reasonable return noted it should be considered in conjunction with the inflation assumption. With respect to the tuition inflation assumption, the Report recommended that Virginia529 continue its practice of 25 years of annually reviewing this assumption.

Virginia529 will review the assumptions regarding inflation and a reasonable return for the upcoming Valuation Report for the period ending June 30, 2021. Virginia529 is in the process of reviewing its investment return assumption and tuition inflation assumption. That work commences with the Investment Advisory Committee (IAC) and Audit and Actuarial Committee (AAC), respectively, and ultimately will be adopted or modified by the Board at its meeting in August 2021.

With respect to the tuition valuation assumption, Virginia529 currently maintains both a short-term and long-term assumption (4% for FY2021 and FY2022 and 6% thereafter for universities; 2% for FY2021 and FY2022 and 6% thereafter for community colleges). In times of moderate tuition increases, as has been the case in recent years, the short term assumption may be extended or modified and/or the long term assumption may be affirmed or modified, up or down, based on input received from the State Council of Higher Education (SCHEV) and Virginia's public universities. The composition of the AAC includes all four of the *ex officio* Board members including the Executive Director of SCHEV and the Chancellor of the Virginia Community College System (or designee).

Demographic Actuarial Assumptions: With respect to the demographic actuarial assumptions, the Report recommends conducting another experience study. Virginia529 agrees with this recommendation. This study is underway and will form the basis for the upcoming Valuation Report for the period ending June 20, 2021.

Actuarial Valuation Methods: The Report contains no recommendations regarding the actuarial valuation methods.

Actuarial Liability Test Life Review: Virginia529 agrees with the recommendations regarding the actuarial liability test life review and will include these considerations in the upcoming Valuation Report for the period ending June 30, 2021.

Actuarial Report Content, Detail, Format and Clarity: In reviewing these matters, recognizing that no generally accepted actuarial standards of practice (ASOP) exist for tuition prepaid programs, the Report utilizes the relevant ASOPs for retirement plans. The Report concludes that the Prepaid529 Valuation Report for the period ending June 30, 2020 generally is complete and contains the appropriate information. Virginia529

understands the first three recommendations in this section for greater clarity and to adhere more closely to ASOP No. 4 and 41 and will include them in the upcoming Valuation Report for the period ending June 30, 2021.

The fourth recommendation in this section relates to disclosure and assumptions related to the inclusion, if any, of administrative fee revenue (net operating revenue) from Virginia529. The Report notes that the Valuation Report for the period ending June 30, 2019 included a line item for administrative fee revenue and that the Valuation Report for the period ending June 30, 2020 did not include that line item. According to discussions with Virginia529's actuary, Milliman, this is appropriate, and no additional disclosure is required because there is no assumption in their valuation methodology with respect to administrative fee revenue. It may exist in some years and not in others and is included or omitted accordingly.

No administrative fee revenue existed in the early years of the Prepaid529 program and as all Virginia529s programs grew and generated net operating revenues in some years, in recent years those revenues have been allocated to the Prepaid529 program. Given (i) the funded status of the Program at the end of the last fiscal year, (ii) the closure of the Prepaid529 program and planned opening of the Tuition Track Portfolio and (iii) the commitment of the Board to expand its mission and work in making post-secondary education more accessible and affordable to all Virginians, particularly those who historically have been under-represented by reason of race, ethnicity, geography, household income or other circumstances, net operating revenues for the period ending June 30, 2020 were not allocated to the Prepaid529 program. This was not discussed in the Valuation Report as there were no assumptions with respect to any such funds; however, the retention of net operating revenue in the operating and administration fund was discussed in the Financial Statements for the period ending June 30, 2020. See Management's Discussion and Analysis section of the [Fiscal 2020 Annual Report](#).

Actuarial Principles and Practices: The Report contains no recommendations regarding the actuarial principle and practices employed by Milliman.

Considerations Regarding the New TTP Program: The Report contains a brief section on the Tuition Track Portfolio (TTP) within the Invest529 Program which opened on February 1, 2021 and some of the considerations relevant to this new offering for the next quadrennial audit. The Report generally is accurate in its description of the TTP and Virginia529 agrees with the considerations for the future. We note two clarifications in this section. First, at the bottom of page 41, the Report states that units are eligible for use once they have been held for three years and the Expected Usage Date has been reached or the beneficiary begins taking eligible post-secondary courses. This is accurate; however, units may be redeemed prior to meeting these criteria, but the value of the units will be limited to contributions made (for units held less than three years) or contributions plus Tuition Track Interest (for units held more than three years but not yet at the Expected Usage Date). Second, page 42 of the Report states that Virginia529 informed GRS that the investment policies for the Prepaid529 program and TTP would be the same, that the assets from both programs would be commingled for investment purposes but that separate accounting would be maintained and that separate actuarial valuations would be conducted for the two programs. The two programs will be combined and referred to as the Defined Benefit 529 Programs and so will in fact have the same investment policies and will be commingled for investment and separate accounting of the two programs will be maintained for transparency; however, only one valuation will be conducted with a single valuation report for the combined assets and programs. The impact, positive or negative, on the actuarial funded status of the Defined Benefit 529 Programs from the inclusion of the TTP will be ascertainable for reporting and assessment purposes.

We express our appreciation to the team at GRS and to JLARC staff for the professional and cooperative way in which this audit was conducted and we are pleased with the outcome of the review. Attached to this letter is an annotated copy of the Report with some staff comments – they are consistent with what is in the letter but may provide some additional context for your information. Please do not hesitate to let me know if you have any questions about this response. We look forward to the upcoming briefing to the Commission on July 6, 2021.

Sincerely,

A handwritten signature in black ink, appearing to read 'Mary G. Morris', with a long horizontal line extending to the right.

Mary G. Morris

Attachment – Annotated GRS Report

pc: Members, Virginia529 Board
Alan Perry, Milliman
Kimberly Sarte, JLARC (ksarte@jlarc.virginia.gov)
Jamie Bitz, JLARC (jbitz@jlarc.virginia.gov)