North Dakota Legacy Fund

Asset Allocation Study

June 2023

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Summary of Objectives

"The Legacy Fund was created, in part, due to the recognition that state revenue from the oil and gas industry will be derived over a finite timeframe. The Legacy Fund defers the recognition of 30 percent of this revenue for the benefit of future generations. The primary mission of the legacy fund is to preserve the ***real inflation-adjusted purchasing power*** *of the money deposited into the fund while maximizing total return for a prudent level of risk."* [1]

- This policy excerpt introduces two key concepts used in our analysis:
  - Focus on building a corpus for future generations.
  - Focus on preserving purchasing power.

- **Asset allocation mission with regard to the Legacy Fund**
  1. Preserve the real inflation-adjusted purchasing power of the deposited money while maximizing total returns.
  2. Invest the assets at prudent levels of risk (in accordance with Prudent Investor Rule).
  3. Align investment objectives with any spending policy the state might adopt.

1. Source: North Dakota Legacy Fund Investment Policy Statement, adopted in October 2022.

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Preserving Real Return

- Preservation of real, inflation-adjusted purchasing power implies the need for assets to grow by a rate that exceeds the combination of the rate of inflation, the spending rate, and expenses.
- Required Rate of Return = Expected Rate of Inflation + Expected Rate of Spending + Expenses.
- *Simple Example:*
  - 2.5% Inflation
  - 3.5% Spending
  - 0.6% Expenses
    - 2.5% + 3.5% + 0.6% = **6.6%** or higher Required Rate of Return, or in this example, 4.1% real returns or higher
- The actual return need will have more variability than this simple example as the distribution % is based on trailing smoothed market values.
  - While the fund is growing, this smoothing of trailing market values to calculate current distributions will result in a lower effective distribution rate.
  - If the fund values are falling, the effective distribution rate could be higher.

Impact of House Bills 1425 and 2330

- **House Bill 1425** (HB1425) and **House Bill 2330** (HB2330) were enacted to direct a portion of the Legacy Fund assets to be invested in the state of North Dakota[1].
- The Board's Mission became more complex post HB 1425 passing as it directed 20% of the fund to be invested in the State of North Dakota.
- HB 2330 amended HB 1425, replacing the required percentage for investment in North Dakota in favor of targeted dollar amounts for various categories of in-state investment, as well as defining the distribution policy as a % of assets rather than "income."

	HB 1425	HB 2330
In-state **fixed income**	Target of 10%	Target of $700M
Infrastructure revolving loan	Up to 40%	Up to $150M
BND CD match program	Up to 60%; minimum of $400M	Minimum of $400M
In-state **equity**	Target of 10%	Target of $600M
"Earnings" definition	No change	7% of the 5-year average fund value; using the value at the end of each FY for the 5-year period ending with the recent even-numbered fiscal year

[1] Please refer to the Appendix for the summary of the HB 1425 and HB2330.

Revenue Forecasts – Background and Assumptions

Revenue Forecast Details

- To forecast incoming cash flows/distributions into the Legacy Fund, RVK utilized the following information:
  - A detailed data spreadsheet from the North Dakota Office of State Tax Commissioner outlining forecasted monthly cash flow in North Dakota from oil taxes for fiscal years 2023 – 2025.
  - For oil price forecasts beyond FY 2025, RVK utilized third party forecast data provided in our work with the North Dakota Land Commissioners Office. For the purpose of this analysis, a static oil price level is assumed starting from FY 2028.
- RVK created a monthly forecast model for our asset allocation modeling purposes using the following methodology.

Average Barrels Produced per Day × **Days per Month** × **Assumed Oil Spot Price** × **9.8% Effective Tax Rate**

Total Monthly Revenue from Current Production

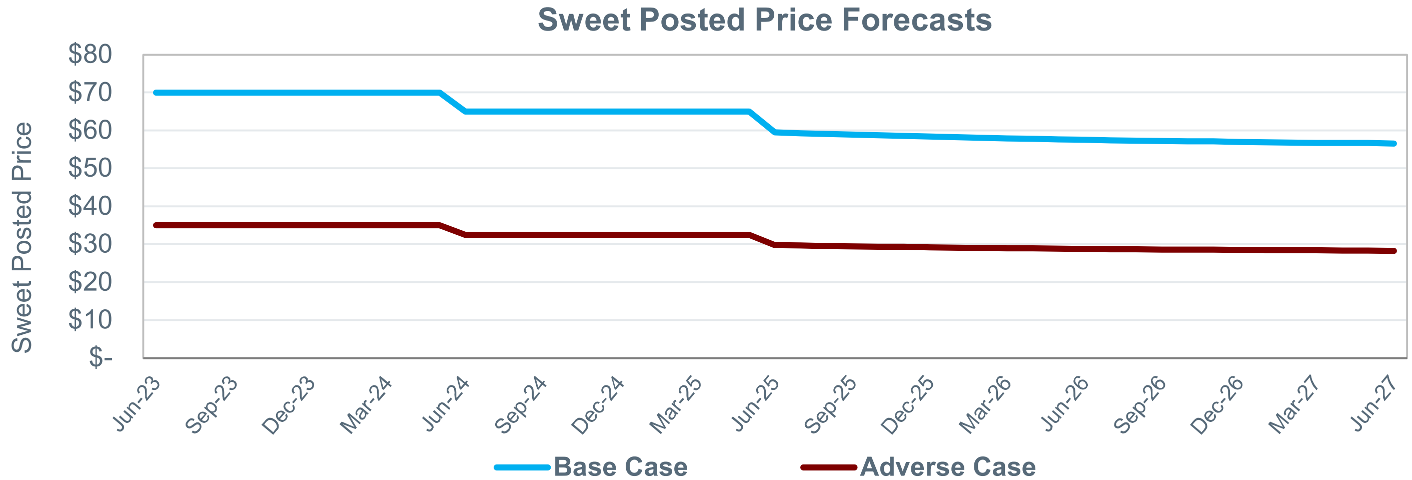
(**Total Monthly Revenue from Current Production** – **Tribal Monthly Distribution**) × **30% Legacy Fund Share**

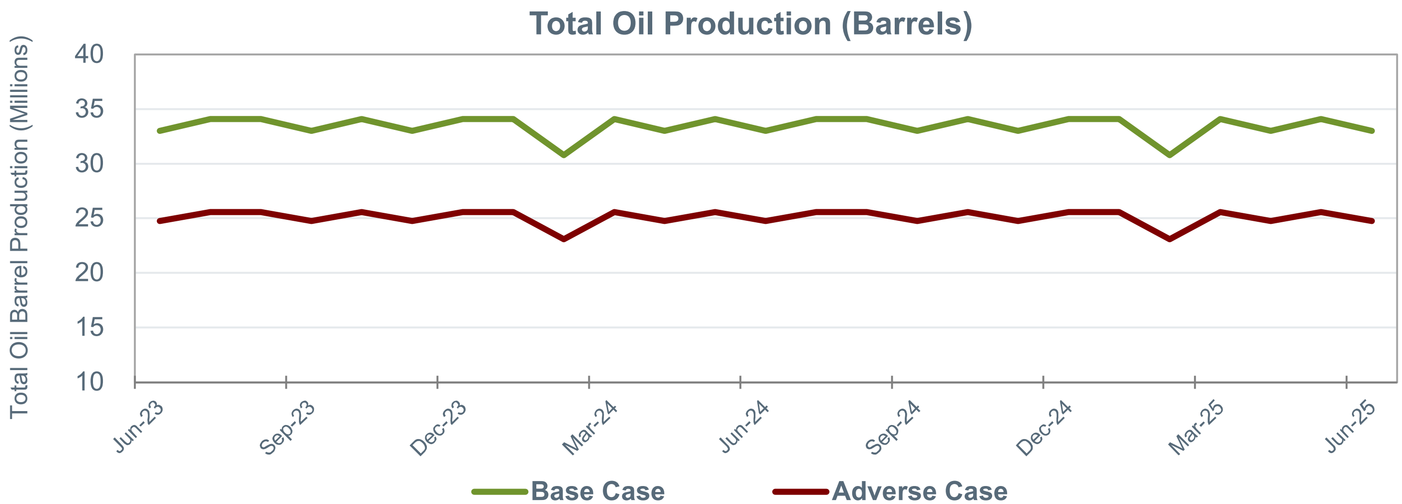
Total Monthly Distribution to Legacy Fund

- **From this formula, RVK created 2 cash flow scenarios for the Legacy Fund: a <u>base</u> case scenario and an <u>adverse</u> case scenario (as outlined in the next slides).**

Forecast: Oil Price and Total Barrel Production

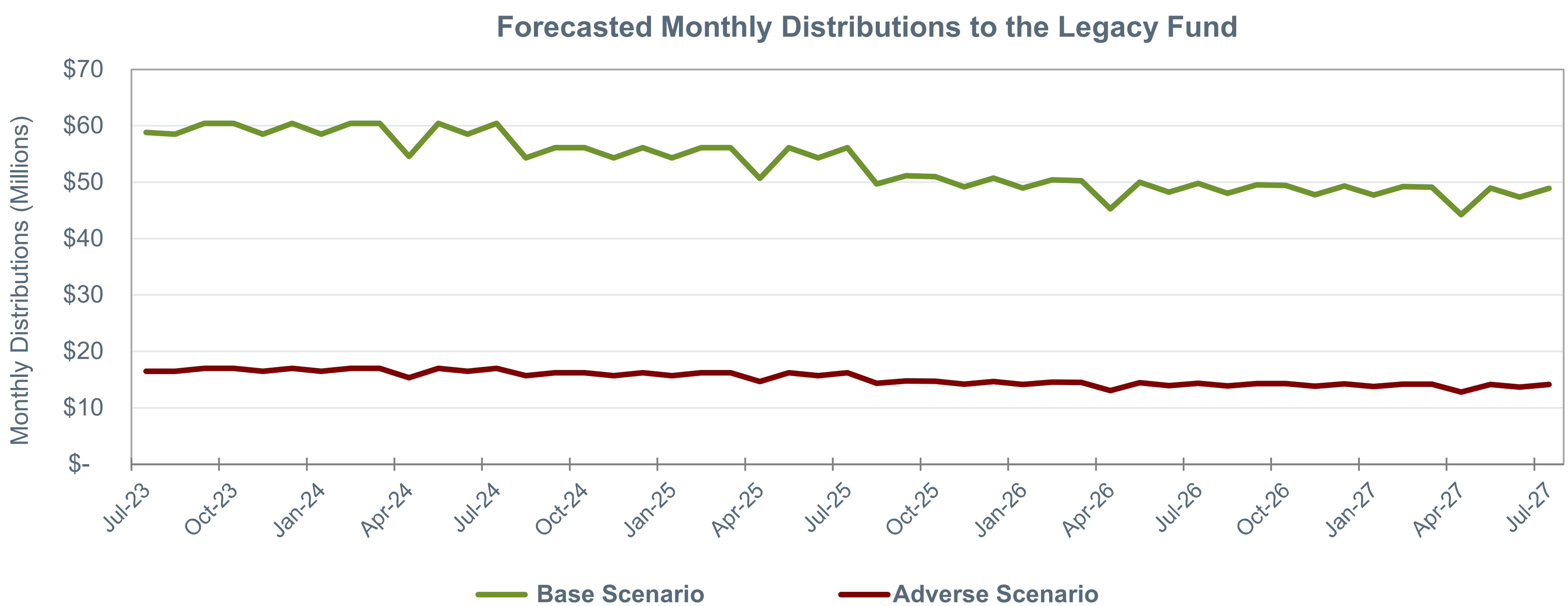
- The distinctions between the two scenarios are that in the **adverse** case scenario:
  - spot oil prices are cut by 50%,
  - average daily production levels reduced by 25%,
  - the effective tax rate for oil revenue reduced by 25% (from current 4.8% to 3.6%).





Forecast: Distributions to the Legacy Fund

- After fiscal year 2027, monthly cash flows into the Legacy Fund are assumed to be nearly static, only varying by month due to the number of days in each month.
- In the base case scenario this represents a monthly cash flow of approximately $48.5 million and in the adverse case scenario this monthly cash flow figure is $14 million.



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Asset Allocation Study

Identification of Asset Classes

- As a starting point, RVK considered the existing asset classes employed by the Legacy Fund per the approved Investment Policy.
- We also analyzed the historical relationship between the returns of various potential asset classes and changes in the price of oil, using the change of prices of West Texas Intermediate over time as an input to reflect oil price volatility.
- Crude Oil prices over the last two plus decades have exhibited negative correlation with Fixed Income and very low correlation with Private Infrastructure, TIPS and Core Real Estate.
- The remaining asset classes all exhibit varying degrees of positive correlation with Crude Oil.

Correlations (1998-2022)	Broad US Equity	Broad International Equity	Core Fixed Income	High Yield Fixed Income	TIPS	Core Real Estate	Private Infrastructure	US Private Equity
Change in Crude Oil Prices	0.365	0.413	(0.180)	0.477	0.187	0.136	0.025	0.379

Note: Correlations are calculated using quarterly periodicity.

The optimal asset allocation policy should minimize asset class exposures that exhibit a high degree of correlation to oil prices and conversely emphasize asset class exposures that exhibit low degrees of correlation.

Asset Allocation

RVK Process - Capital Market Assumptions ("CMA")

- The first step in the asset allocation model is the development of long-term capital market assumptions for each asset class.
- Significant time and resources are devoted to our CMA analysis:
  - Annual process.
  - Multiple members of the consulting team are engaged, organized by asset class.
  - Individual asset class focus.
- Multiple data and information sources are considered to create return, risk, and correlation forecasts:
  - Historical and current market data.
  - Financial theory.
  - Economic forecasts.
  - Product performance.
  - Custom assumptions can be developed.
- RVK consultants are polled, their feedback considered, and support for the final result is required.
- Whole firm CMA and capital market line triangulation.

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Assumptions and Constraints

- Asset classes considered were consistent with those currently being used by the North Dakota Legacy Fund.
- Additionally, we modeled and developed risk, return and correlations assumptions for the in-state investments as described in HB 1425 and HB 2330.
  - **Private Equity**: returns = 50% of traditional private equity investments; risk = 150% of similar traditional investments.
  - **Infrastructure Loan**: returns = 1.5% as defined in HB1425 and HB2330; risk = RVK's private credit assumption.
  - **Bank of North Dakota CD Match**: returns and risk = 10-year Treasury Bonds.
- Additional Assumptions and Constraints:
  - **Custom Real Assets** assumption assumes a customized mandate with 65% to private real estate and 35% allocation to private infrastructure.
  - Non-US equity should be less or equal to 40% of US equity.
  - Illiquid assets cannot exceed 25%: Efficient Frontier 1 (HB1425 As Written).
  - Illiquid assets cannot exceed 35%: Efficient Frontier 2.
- On each frontier we also included the following portfolios:
  - Current North Dakota Legacy Fund ("NDLF") target allocation.
  - A sample portfolio from the efficient frontier based on HB 1425 with equivalent risk to the current target.

Assumptions and Constraints: HB 2330

- For modeling purposes, the following assumptions were made for the in-state programs:
  - Minimum allocation boundaries are set either at the current total invested or committed capital.
  - Maximum allocation boundaries were determined by the provisions of the amended HB 2330[1].
  - The min and max boundaries for the infrastructure loan program are set at 1% and 2% respectively, as RIO expects to commit the full allowed amount by the end of CY2023, but the % allocation will decline as the fund grows.
  - We assume the target allocation of $600 M to private equity will be reached over time with prudent pacing based on available opportunities

In-State Program	Invested or committed capital	MIN % allocation based on the total Fund MV	Statutory cap (explicit and implied)	MAX % allocation based on the total Fund MV
Infrastructure revolving loan	$0	1%	Up to $150M	2%
BND CD match program	$400M	4%	Up to $550M	6%
In-state equity	$250M	3%	$600M	7%

[1] Senate Bill No. 2330. Sixty-eighth Legislative Assembly of North Dakota. Introduced by Senators Klein, Hogan, Meyer and Representatives Bosch, Kreidt. Signed by Governor on April 29, 2023.

Asset Class Assumptions

Return and Risk Assumptions

Asset Class	Arithmetic Return Assumption	Standard Deviation Assumption
Broad US Equity	6.80	16.10
Broad International Equity	9.35	18.70
Private Equity	10.00	22.00
In-State Private Equity	5.00	33.00
Core Fixed Income	4.00	5.00
High Yield Fixed Income	7.25	10.50
Private Credit	8.00	13.00
BND CD Match	3.50	3.50
Infrastructure Loans	1.50	13.00
TIPS	4.00	5.50
Private Real Assets	6.28	10.72
Cash Equivalents	2.50	2.00

Index Longest Historical Time Frame

Index	Longest Historical Time Frame	Annualized Arithmetic Return	Annualized Standard Deviation
Russell 3000	Jan 1979 - Dec 2022	11.58	16.79
MSCI ACW Ex US IMI (Gross)	Jun 1994 - Dec 2022	5.15	20.89
Cambridge US Private Equity	Jan 1987 - Dec 2021	14.64	13.06
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Bloomberg US Agg Bond	Jan 1980 - Dec 2022	6.76	7.39
Bloomberg US Corp: Hi Yld	Jan 1986 - Dec 2022	7.67	14.71
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Bloomberg US Trsy: US TIPS	Jan 1998 - Dec 2022	4.79	6.73
Private Real Assets Custom	Jun 1995 - Dec 2022	7.49	9.70
BofA ML 3 Mo US T-Bill	Jan 1978 - Dec 2022	4.56	4.05

Correlations Assumptions

	Broad US Equity	Broad International Equity	Private Equity	In-State Private Equity	Core Fixed Income	High Yield Fixed Income	Private Credit	BND CD Match	Infrastructure Loans	TIPS	Private Real Assets	Cash Equivalents
Broad US Equity	1.00	0.85	0.78	0.78	0.21	0.67	0.70	-0.08	0.70	0.19	0.25	-0.01
Broad International Equity	0.85	1.00	0.77	0.77	0.12	0.72	0.80	-0.16	0.80	0.24	0.25	-0.08
Private Equity	0.78	0.77	1.00	0.99	-0.06	0.63	0.84	-0.32	0.84	0.16	0.41	-0.21
In-State Private Equity	0.78	0.77	0.99	1.00	-0.06	0.63	0.84	-0.32	0.84	0.16	0.41	-0.21
Core Fixed Income	0.21	0.12	-0.06	-0.06	1.00	0.31	-0.18	0.91	-0.18	0.78	-0.14	0.30
High Yield Fixed Income	0.67	0.72	0.63	0.63	0.31	1.00	0.69	0.00	0.69	0.38	0.15	-0.05
Private Credit	0.70	0.80	0.84	0.84	-0.18	0.69	1.00	-0.45	0.98	0.05	0.33	-0.12
BND CD Match	-0.08	-0.16	-0.32	-0.32	0.91	0.00	-0.45	1.00	-0.45	0.66	-0.21	0.31
Infrastructure Loans	0.70	0.80	0.84	0.84	-0.18	0.69	0.98	-0.45	1.00	0.05	0.33	-0.12
TIPS	0.19	0.24	0.16	0.16	0.78	0.38	0.05	0.66	0.05	1.00	-0.03	0.04
Private Real Assets	0.25	0.25	0.41	0.41	-0.14	0.15	0.33	-0.21	0.33	-0.03	1.00	-0.16
Cash Equivalents	-0.01	-0.08	-0.21	-0.21	0.30	-0.05	-0.12	0.31	-0.12	0.04	-0.16	1.00

Efficient Frontier 1: HB1425 As Written

Max Illiquids <= 25%

- This efficient frontier shows the range of possible optimal allocations given the target allocations to in-state investments enacted by the HB 1425.
- **“Risk Eq: 1425”** portfolio is a sample portfolio from this frontier with equivalent risk to the current target.

	Min	Max	1	2	3	4	5	6	7	8	9	10	NDLF Target	Risk Eq: 1425
Broad US Equity	20	50	20	20	23	25	28	31	34	36	39	39	30	20
Broad International Equit	10	30	10	13	15	17	19	21	22	24	26	26	20	14
Private Equity	0	10	0	0	0	0	0	0	0	0	0	5	1	0
In-State Private Equity	10	10	10	10	10	10	10	10	10	10	10	10	0	10
Core Fixed Income	10	40	40	40	37	33	28	23	19	14	10	10	29	36
Private Credit	0	8	0	0	0	0	0	0	0	0	1	0	3	0
BND CD Match	6	6	6	6	6	6	6	6	6	6	6	6	2	6
Infrastructure Loans	4	4	4	4	4	4	4	4	4	4	4	4	0	4
TIPS	0	5	5	2	0	0	0	0	0	0	0	0	5	5
Private Real Assets	0	10	5	5	5	5	5	5	5	5	4	0	10	5
Total			100	100	100	100	100	100	100	100	100	100	100	100
Capital Appreciation			40	43	48	52	57	62	66	71	76	80	54	44
Capital Preservation			50	50	47	43	38	33	29	24	20	20	31	46
Inflation			0	0	0	0	0	0	0	0	0	0	0	0
Alpha			10	7	5	5	5	5	5	5	4	0	15	10
Expected Arithmetic Return			**5.2**	**5.4**	**5.5**	**5.7**	**5.9**	**6.1**	**6.2**	**6.4**	**6.6**	**6.8**	**6.3**	**5.4**
Expected Risk (Standard Deviation)			**8.9**	**9.4**	**10.0**	**10.7**	**11.4**	**12.1**	**12.8**	**13.5**	**14.2**	**15.0**	**9.5**	**9.5**
Expected Compound Return			**4.8**	**4.9**	**5.1**	**5.2**	**5.3**	**5.4**	**5.5**	**5.6**	**5.7**	**5.7**	**5.9**	**5.0**

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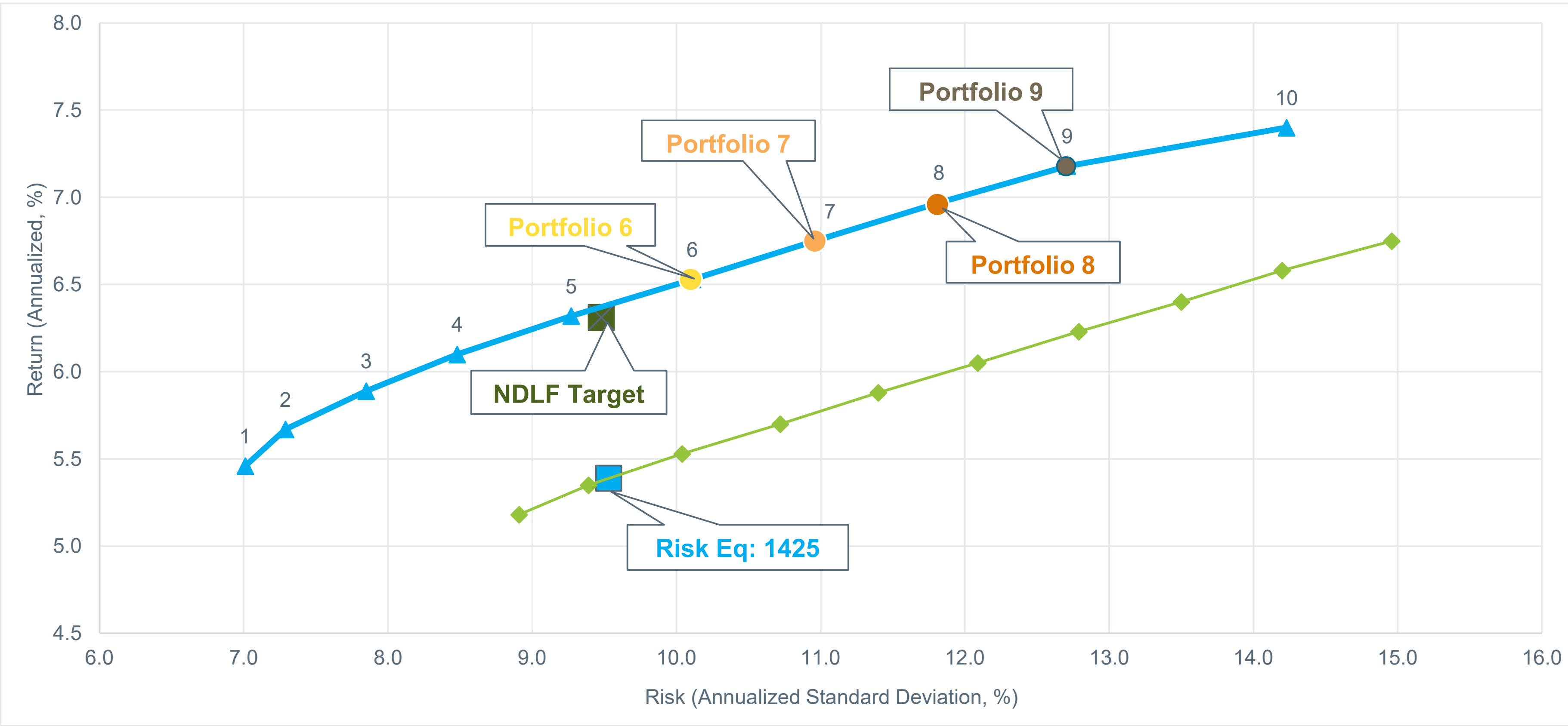
Efficient Frontier 2: HB2330 Amendment

Maximum Illiquids <= 35%

- The second frontier (in blue) shows the **improved** range of possible optimal allocations given the prescribed allocations to in-state investments per the HB 2330.
- Optimal portfolios 6, 7, 8 and 9 on this efficient frontier offer improved risk / return profile than the current NDLF Target while also allocating to in-state investments in accordance with HB 2330.



Efficient Frontier 2: HB2330 Amendment

Maximum Illiquids <=35%

	Min	Max	1	2	3	4	5	6	7	8	9	10	NDLF Target	Risk Eq: 1425	EF2_P6	EF2_P7	EF2_P8	EF2_P9
Broad US Equity	10	50	15	15	15	15	18	21	24	28	30	36	30	20	21	24	28	30
Broad International Equity	10	40	10	10	10	10	12	14	16	19	20	24	20	14	14	16	19	20
Private Equity	0	12	0	0	3	6	7	7	7	7	9	12	1	0	7	7	7	9
In-State Private Equity	3	7	3	3	3	3	3	3	3	3	3	3	0	10	3	3	3	3
Core Fixed Income	10	40	40	40	37	36	31	25	19	14	10	10	29	36	25	19	14	10
High Yield Fixed Income	0	5	5	5	5	5	5	5	5	5	5	0	0	0	5	5	5	5
Private Credit	0	10	4	9	10	10	10	10	10	10	10	10	3	0	10	10	10	10
BND CD Match	4	6	6	6	6	4	4	4	4	4	4	4	2	6	4	4	4	4
Infrastructure Loans	1	2	2	1	1	1	1	1	1	1	1	1	0	4	1	1	1	1
TIPS	0	5	5	1	0	0	0	0	0	0	0	0	5	5	0	0	0	0
Private Real Assets	0	10	10	10	10	10	10	10	10	10	8	0	10	5	10	10	10	8
Total			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Capital Appreciation			37	42	46	49	54	60	66	71	77	85	54	44	60	66	71	77
Capital Preservation			48	47	44	41	36	30	24	19	15	15	31	46	30	24	19	15
Inflation			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alpha			15	11	10	10	10	10	10	10	8	0	15	10	10	10	10	8
Expected Arithmetic Return			**5.5**	**5.7**	**5.9**	**6.1**	**6.3**	**6.5**	**6.8**	**7.0**	**7.2**	**7.4**	**6.3**	**5.4**	**6.5**	**6.8**	**7.0**	**7.2**
Expected Risk (Standard Deviation)			**7.0**	**7.3**	**7.9**	**8.5**	**9.3**	**10.1**	**11.0**	**11.8**	**12.7**	**14.2**	**9.5**	**9.5**	**10.1**	**11.0**	**11.8**	**12.7**
Expected Compound Return			**5.2**	**5.4**	**5.6**	**5.8**	**5.9**	**6.1**	**6.2**	**6.3**	**6.4**	**6.5**	**5.9**	**5.0**	**6.1**	**6.2**	**6.3**	**6.4**
Expected Return (Arithmetic)/Risk Ratio			0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.7	0.6	0.7	0.6	0.6	0.6
RVK Expected Eq Beta (LCUS Eq = 1)			0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.6	0.5	0.6	0.6	0.7	0.7
RVK Liquidity Metric (T-Bills = 100)			68	64	61	60	60	60	61	61	61	66	79	69	60	61	61	61

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Spending Policy

Monte Carlo Analysis

- Monte Carlo simulation uses a random sampling of asset class returns, based on the probability distribution implied by the empirical returns, to create several thousand estimates of portfolio performance.
- The asset allocation process provides a snapshot of portfolio performance that is highly dependent on the mean return expectations. A Monte Carlo simulation process "stress tests" these assumptions, various asset allocation targets and different spending policy scenarios through thousands of independent samplings of portfolio returns.
- Expected values, variances of the returns and inflation, and correlations are used to generate 5,000 trials to produce a distribution of results.
- A stochastic analysis can answer questions about the best/worst case outcomes along with the probability of such outcomes of adopting various asset allocation strategies and spending policies.
- Monte Carlo simulations can be run in both nominal and real terms, to help examine the probability of achieving Legacy Fund objectives related to preserving real purchasing power of the funds.

Monte Carlo Simulation

1 Year	NDLF Target	Risk Eq: 1425	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9
1st Percentile	-21.30	-17.13	-18.53	-21.49	-24.45	-25.92
5th Percentile	-9.80	-7.19	-7.93	-9.20	-10.71	-12.09
25th Percentile	-0.31	0.44	0.80	0.36	-0.18	-0.59
50th Percentile	**6.01**	**5.19**	**6.20**	**6.52**	**6.70**	**6.88**
75th Percentile	12.65	10.34	12.23	13.04	13.89	14.71
95th Percentile	22.91	18.23	21.01	22.90	24.67	26.48
99th Percentile	30.93	24.12	27.91	30.65	33.42	36.47
3 Years	.	.	.	.	.	.
5th Percentile	-3.87	-2.49	-2.43	-3.31	-4.16	-4.96
25th Percentile	2.18	2.33	3.02	2.77	2.51	2.26
50th Percentile	**6.08**	**5.32**	**6.33**	**6.52**	**6.63**	**6.76**
75th Percentile	9.86	8.23	9.75	10.26	10.80	11.32
95th Percentile	15.50	12.43	14.58	15.70	16.83	17.98
5 Years	.	.	.	.	.	.
5th Percentile	-1.46	-0.54	-0.39	-1.06	-1.75	-2.39
25th Percentile	3.07	2.99	3.69	3.55	3.37	3.22
50th Percentile	**5.91**	**5.19**	**6.25**	**6.38**	**6.50**	**6.63**
75th Percentile	8.90	7.50	8.88	9.34	9.76	10.21
95th Percentile	13.30	10.78	12.67	13.61	14.54	15.41
10 Years	.	.	.	.	.	.
5th Percentile	0.36	0.81	1.25	0.79	0.27	-0.17
25th Percentile	3.71	3.48	4.23	4.15	4.05	3.95
50th Percentile	**5.90**	**5.17**	**6.23**	**6.37**	**6.49**	**6.60**
75th Percentile	8.07	6.83	8.13	8.48	8.83	9.15
95th Percentile	11.09	9.11	10.79	11.44	12.13	12.76

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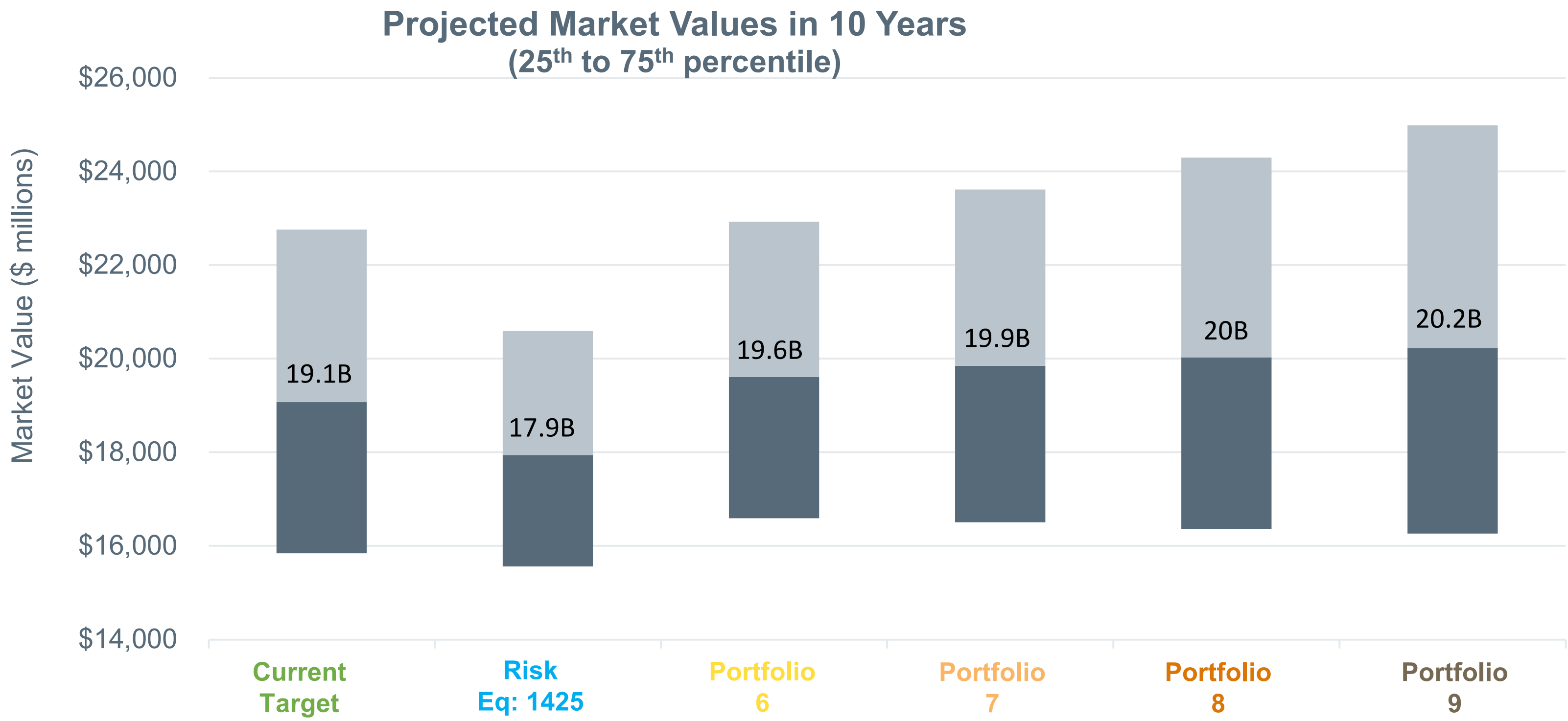
Wealth Outcome Modeling

Estimated Wealth Implications: Base Case

Projected Market Values - *Nominal*

- We have modeled the potential range of nominal wealth values over the next 10 years using the risk and return characteristics of the portfolios detailed on the previous slides with the following assumptions:
  - The starting value for the Legacy Fund of $9.16 billion for the FY2024 starting in July[1].
  - Annual contributions based on monthly forecasts outlined in the Revenue Forecast section.
  - Distributions out of the Fund are forecasted based on the “earnings" definition enacted by HB2330[2].



Note: Market values stated on each distribution bar represent 50th percentile value.

[1] Utilized market value as of April 30, 2023 and assumed flat returns for May and June 2023.

[2] As stipulated by HB2330, “earnings” means an amount equal to 7% of the 5-year average value of the legacy fund assets as reported by the state investment board using the value of the assets at the end of each fiscal year for the 5-year period ending with the most recently completed even - numbered fiscal year.

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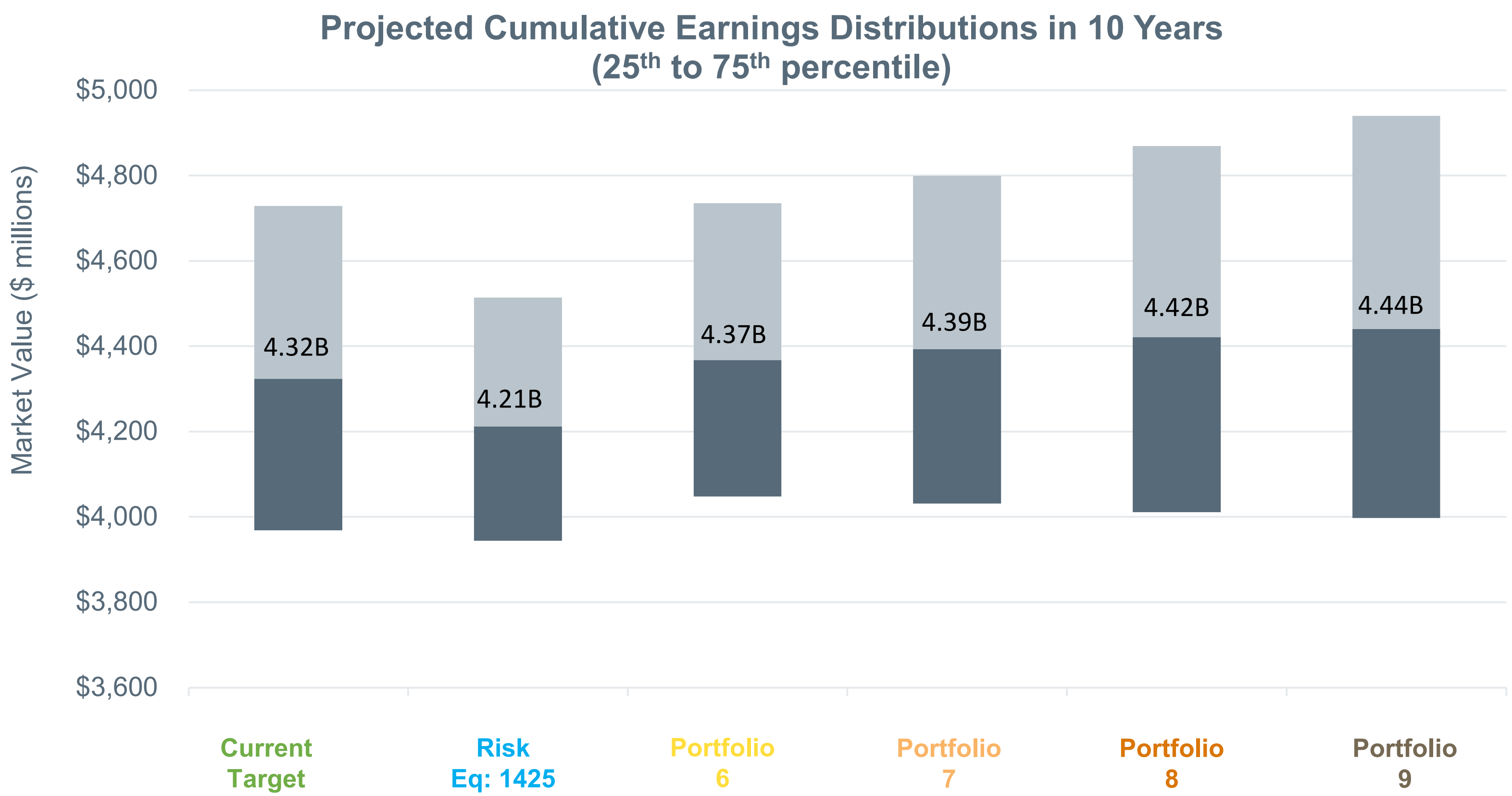
Estimated Wealth Implications: Base Case

Projected Cumulative Earnings Distribution - *Nominal*

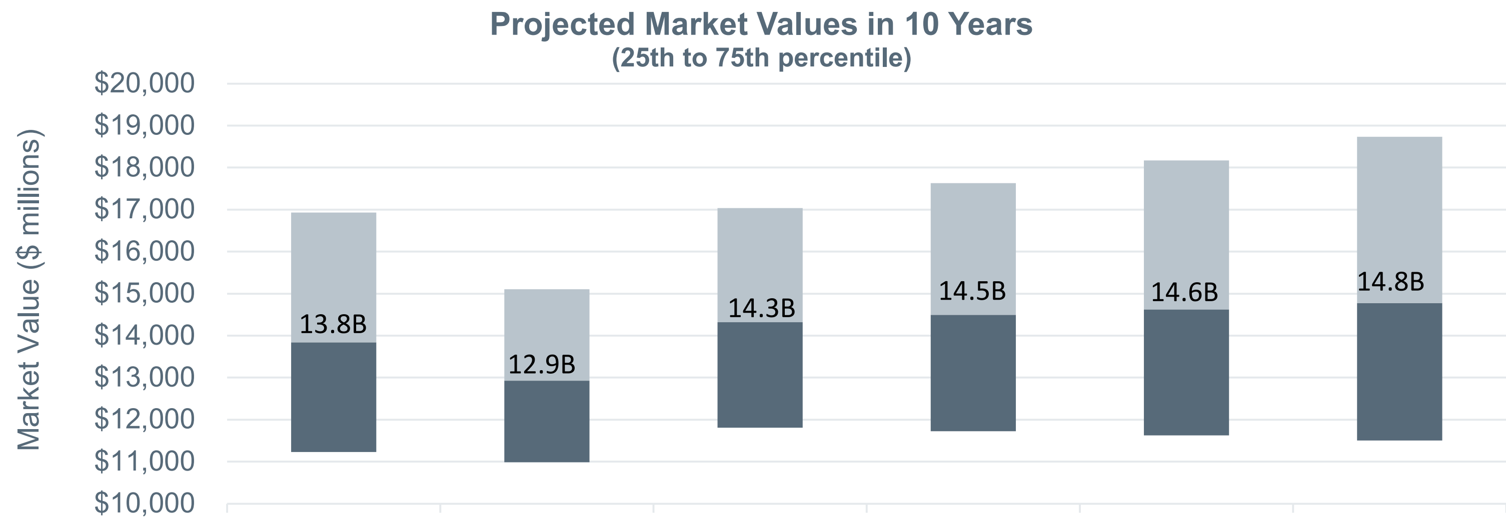


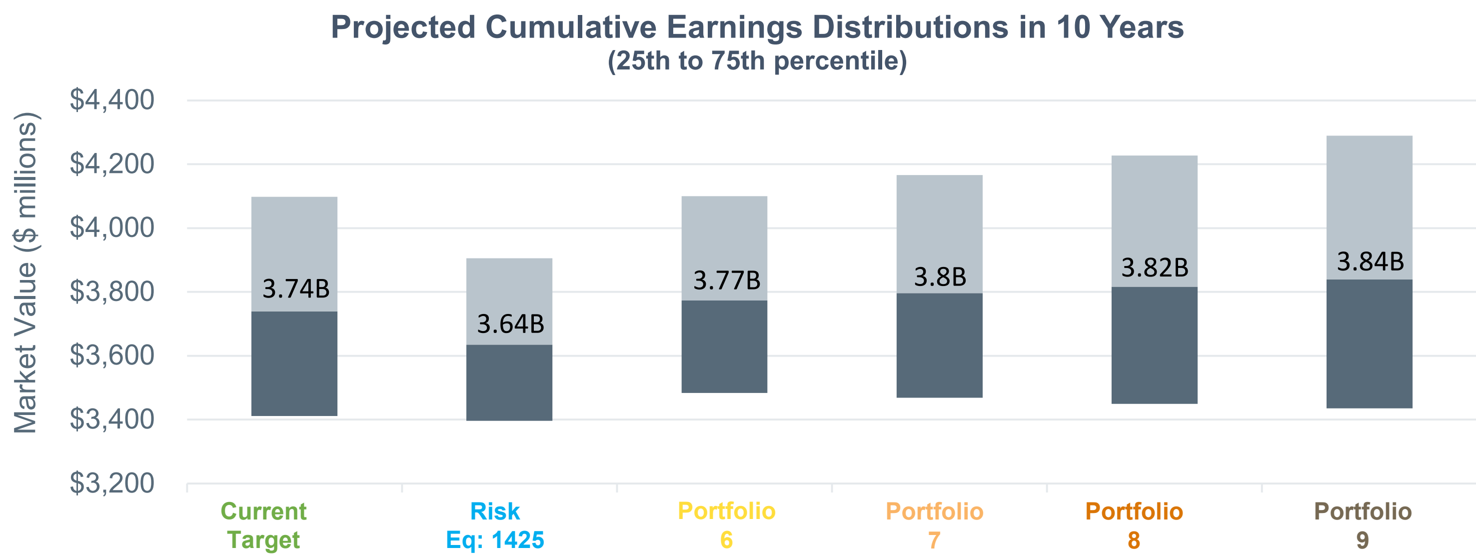
Note: Market values stated on each distribution bar represent 50th percentile value.

Estimated Wealth Implications: *Adverse* Case

Projected Market Values and Earnings Distributions - *Nominal*

- We have modeled the potential range of wealth values over the next 10 years for the **adverse case** scenario which assumes a reduction on oil prices, oil production and tax rate.





Note: Market values stated on each distribution bar represent 50th percentile value.

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Real Wealth Analysis

Preserving Purchasing Power

- Per the Fund's Investment Policy, the primary mission of the legacy fund is to preserve the **real, inflation-adjusted purchasing power** of the money deposited into the fund while maximizing total return for a prudent level of risk.
- The table below shows the percentage chance of preserving the purchasing power of the corpus plus the contributions to the Fund over the course of 10 years (not accounting for inflation).
  - In the base case scenario, the estimated aggregate value of the corpus plus the contributions is estimated at $15.2B and for the adverse case at $10.9B.

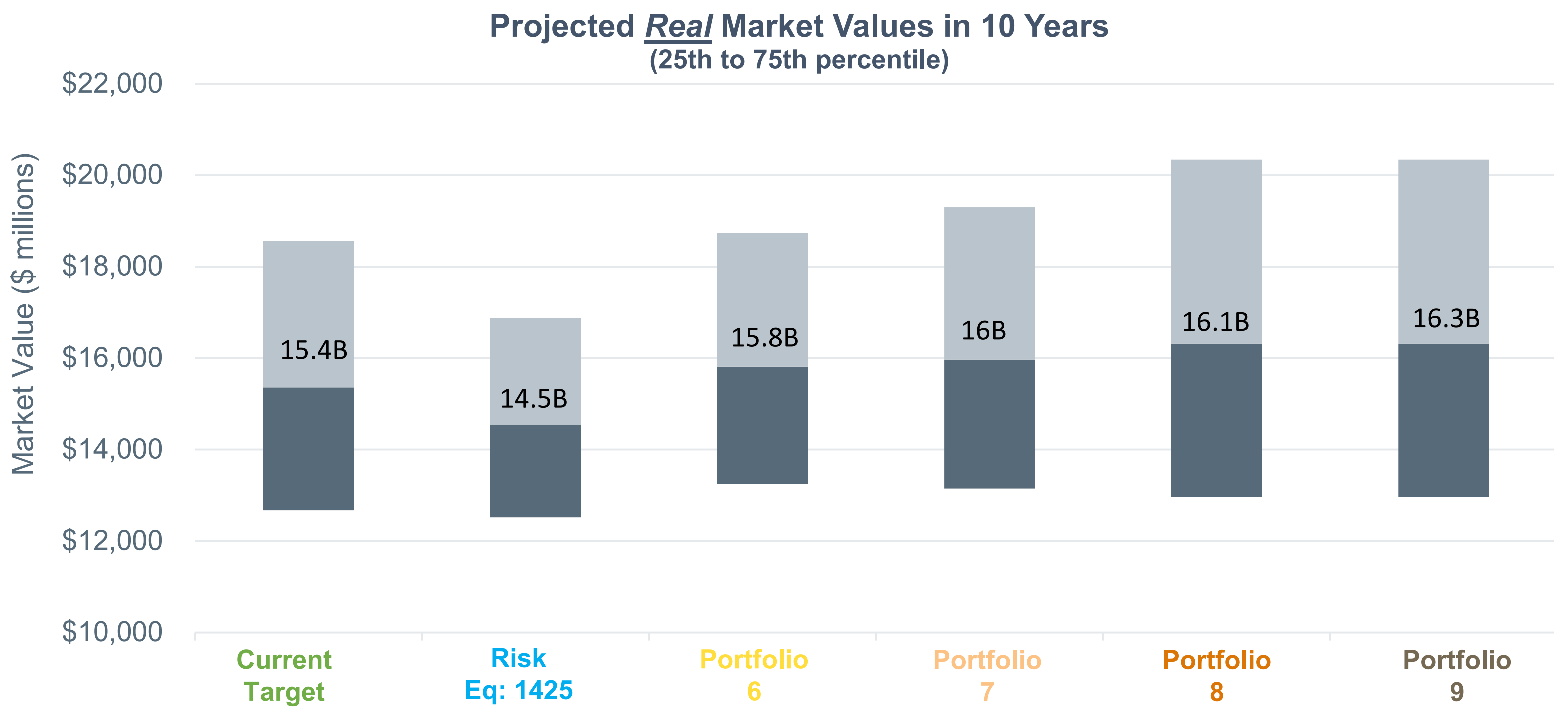
Probability of Preserving the Real Purchasing Power in 10 Years

After 10 years	Target Allocation	Risk Eq: 1425	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9
Base Case	51.6%	42.0%	55.8%	56.8%	57.7%	58.5%
Adverse Case	49.0%	39.2%	53.2%	54.4%	55.3%	56.1%

RVK

Real Wealth Analysis: Base Case

Projected Real Market Values



10 years	Current Policy		1425 As Written		Portfolio 6		Portfolio 7		Portfolio 8		Portfolio 9	
5th Percentile	$	9,437	$	9,793	$	10,048	$	9,720	$	9,119	$	9,119
25th Percentile	$	12,668	$	12,518	$	13,247	$	13,149	$	12,968	$	12,968
50th Percentile	**$**	**15,357**	**$**	**14,548**	**$**	**15,812**	**$**	**15,969**	**$**	**16,316**	**$**	**16,316**
75th Percentile	$	18,556	$	16,875	$	18,740	$	19,301	$	20,339	$	20,339
75th Percentile	$	24,425	$	21,000	$	23,829	$	25,085	$	27,866	$	27,866

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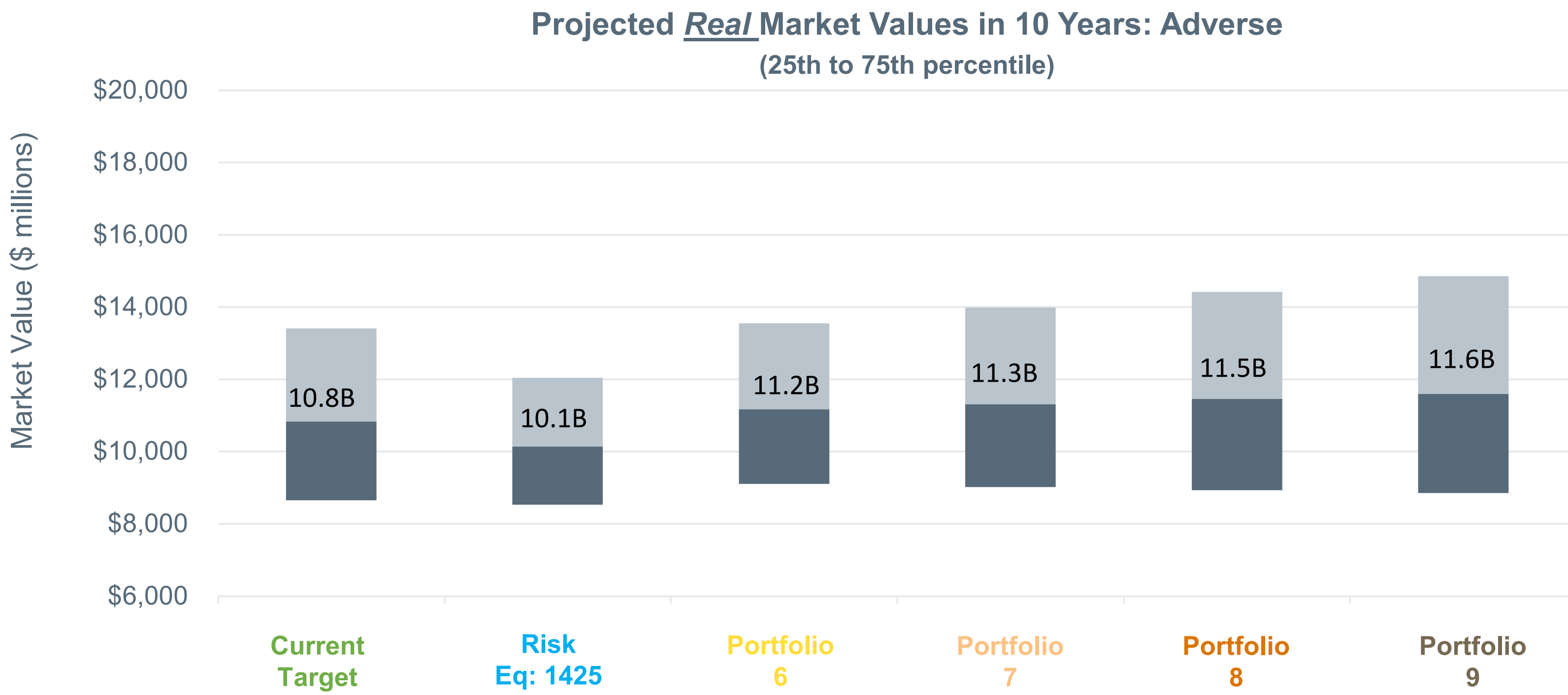
Real Wealth Analysis: *Adverse* Case

Projected Real Market Values



10 years	Current Policy	1425 As Written	Portfolio 6	Portfolio 7	Portfolio 8	Portfolio 9
5th Percentile	$ 6,114.96	$ 6,350.66	$ 6,618.99	$ 6,329.35	$ 6,058.32	$ 5,804.59
25th Percentile	$ 8,657.11	$ 8,534.05	$ 9,108.43	$ 9,020.61	$ 8,932.94	$ 8,855.47
50th Percentile	**$ 10,826.70**	**$ 10,144.99**	**$ 11,173.65**	**$ 11,313.16**	**$ 11,456.73**	**$ 11,597.98**
75th Percentile	$ 13,411.38	$ 12,043.37	$ 13,552.68	$ 13,985.84	$ 14,421.87	$ 14,856.91
75th Percentile	$ 18,124.63	$ 15,433.91	$ 17,693.74	$ 18,797.88	$ 19,857.01	$ 20,983.14

Summary Conclusions and Recommendations

Summary Conclusions and Recommendations

- The changes to HB 1425 enacted though HB 2330 improve the opportunity set for the Legacy Fund to achieve its long-term objectives, particularly if the “target” amount for in-state equity investment is understood to be a target that will be achieved over time with prudent pacing of investment commitments.
- All of the candidate portfolios considered (portfolios 6, 7, 8 and 9) improve the probability that the Legacy Fund will achieve its long-term objectives from an approximate 50/50 proposition for the current policy targets, to incrementally higher probabilities based on incrementally larger allocations to growth assets.
- RVK recommends removing Portfolios 6 and 9 from consideration based on the following rationale:
  - Portfolio 6: Lowest probability of the candidate portfolios considered to achieve long-term objectives. Arguably more conservative than is necessary for the perpetual nature of the Legacy Fund.
  - Portfolio 9: Marginal expected return improvement over Portfolio 8, with material increase in near-term downside risk. Highest allocation to assets with the highest correlation to oil prices.
- **RVK recommends further consideration of Portfolios 7 and 8 by the Board, followed by policy refinements as appropriate, and the development of pacing and implementation plans.**

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Appendix

Excerpts from the House Bill No. 1425[1]

SECTION 2. A new section to chapter 21-10 of the North Dakota Century Code is created and enacted as follows:

Prudent investor rule - Exception.

Notwithstanding section 21-10-07, for purposes of investment of the legacy fund, the state investment board shall give preference to qualified investment firms and financial institutions with a presence in the state.

SECTION 4. AMENDMENT. Section 21-10-11 of the North Dakota Century Code is amended and reenacted as follows:

21-10-11. Legacy and budget stabilization fund advisory board.

…

2. The goal of investment for the legacy fund is **principal preservation while maximizing total return** and to **provide a direct benefit to the state by investing a portion of the principal in the state**. …

3. The board shall determine the asset allocation for the investment of the principal of the legacy fund including:

    a. A target allocation of **ten percent to fixed income investments** within the state, of which:

        (1) Up to forty percent must be targeted for infrastructure loans to political subdivisions under section 6-09-49.1. The net return to the legacy fund under this paragraph must be fixed at a target rate of one and one-half percent;

        (2) Up to sixty percent, with a minimum of four hundred million dollars, must be designated to the Bank of North Dakota's certificate of deposit match program with an interest rate fixed at the equivalent yield of United States treasury bonds having the same term, up to a maximum term of twenty years; and

        (3) Any remaining amounts must be designated for other qualified fixed income investments within the state.

    b. A target allocation of **ten percent to equity investments in the state**, of which at least three percent may be targeted for investment in one or more equity funds, venture capital funds, or alternative investment funds with a primary strategy of investing in emerging or expanding companies in the state. Equity investments under this subdivision must:

[1] Enrolled House Bill No. 1425 - Sixty-seventh Legislative Assembly of North Dakota in regular session commencing Tuesday, January 5, 2021.

Excerpts from the House Bill No. 2330[1]

- Revisions enacted by HB 2330 are indicated in blue below.
- Deletions enacted by HB 2330 are crossed out.

SECTION 2. AMENDMENT. Section 21-10-11 of the North Dakota Century Code is amended and reenacted as follows:

21-10-11. Legacy and budget stabilization fund advisory board.

…

2. The goal of investment for the legacy fund is **principal preservation** and growth while maximizing total return for an appropriate level of risk and to provide a direct benefit to the state by investing a portion of the principal in the state. …

3. The board shall determine the asset allocation for the investment of the principal of the legacy fund including:

a. A target allocation of ~~ten percent~~ seven hundred million dollars to fixed income investments within the state, ~~of which~~ including:

(1) Up to ~~forty percent must be targeted~~ one hundred fifty million dollars for infrastructure loans to political subdivisions under section 6-09-49.1. The net return to the legacy fund under this paragraph must be fixed at a target rate of one and one-half percent;

(2) ~~Up to sixty percent, with a~~ A minimum of four hundred million dollars, ~~must be designated to~~ for the Bank of North Dakota's certificate of deposit match program with an interest rate fixed at the equivalent yield of United States treasury bonds having the same term, up to a maximum term of twenty years; and

(3) ~~Any remaining amounts must be designated for other~~ Other qualified fixed income investments within the state based on guidelines developed by the legacy and budget stabilization fund advisory board.

b. A target allocation of ~~ten percent~~ six hundred million dollars to equity investments in the state, ~~of which~~ including:

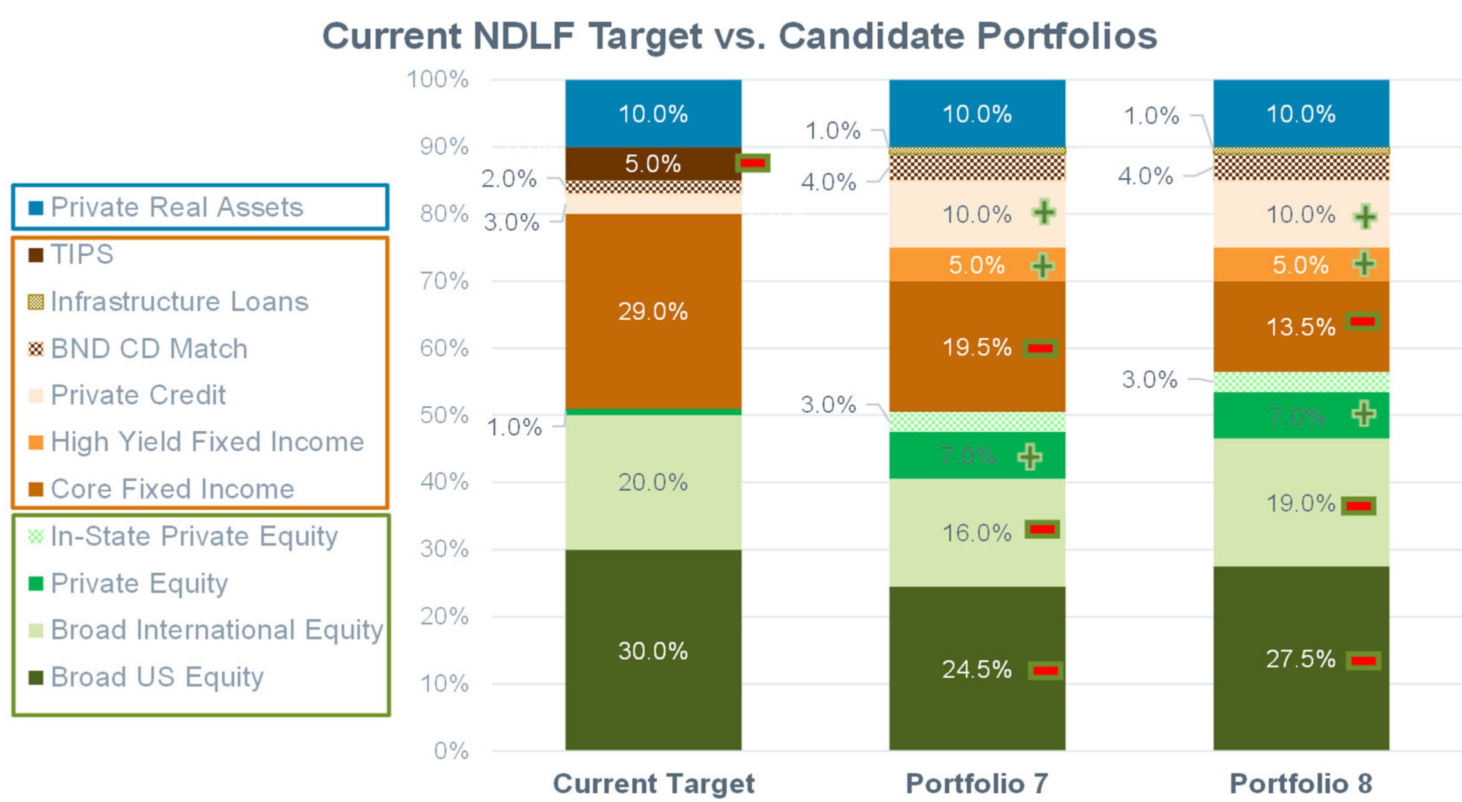
(1) ~~At least three percent may be targeted for investment~~ Investments in one or more equity funds, venture capital funds, or alternative investment funds with a primary strategy of investing in emerging or expanding companies in the state. …

[1] Senate Bill No. 2330. Sixty-eighth Legislative Assembly of North Dakota. Introduced by Senators Klein, Hogan, Meyer and Representatives Bosch, Kreidt. Signed by Governor on April 29, 2023.

RVK

PORTLAND BOISE CHICAGO NEW YORK

Summary of Recommendations – North Dakota Legacy Fund



		NDLF Target	Portfolio 7	Portfolio 8
Probability of preserving purchasing power (over 10 years)	Base[1]	51.6%	56.8%	57.7%
	Adverse[1]	49.0%	54.4%	55.3%
50th %-tile projected nominal Portfolio value (over 10yr), in billions	Base	$ 19.1	$ 19.9	$ 20.0
	Adverse	$ 13.8	$ 14.5	$ 14.6
Projected compound return		5.9%	6.2%	6.3%
Projected risk		9.5%	11.0%	11.8%
1 year downside risk		-21.3%	-21.5%	-24.5%
Percentage of portfolio in assets with stated level of correlation to changes in oil prices	>0.3	51.0%	52.5%	58.5%
	0 to 0.3	20.0%	28.0%	28.0%
	negative	29.0%	19.5%	13.5%

[1] Base case scenario assumes normal revenue projections for the contributions to NDLF; adverse case assumes 50% drop in oil price, and 25% reduction in production and tax rate.