North Dakota Legacy Fund

RVK Analysis of the Investment Implications of SB2330 Relative to HB1425

Background

RVK, Inc. is currently engaged by the Legacy Fund Advisory Board on a project basis to assist with a strategic asset allocation study, inclusive of in-state investments. RVK President Jim Voytko is available to offer expert testimony on Senate Bill No. 2330 as it relates to investment implications for the Legacy Fund. We appreciate the potential opportunity to offer our thoughts based on the extensive analysis we have conducted for the Legacy Fund Advisory Board over the past year.

As it relates to the contents of SB 2330, as we understand, it makes the changes detailed on the following pages, which we believe in sum are both material and generally positive to the investment of Legacy Fund Assets, including the probable future returns of the Legacy Fund.

Section 1

Fixed Income Investments within the state – target allocation is reduced from ten percent to six percent.

RVK Note: *A reduction of this requirement adds to expected long-term returns for the Legacy Fund, as it reduces the required allocation to lower returning investments. Over the long-term, this should increase the flow of returns to the state via the spending policy (discussed below)*

Infrastructure loans to political subdivisions, at a fixed target rate of 1.5 % - is removed.

RVK Note: *Removal of this provision increases expected long-term returns to the Legacy Fund, as it (a) eliminates a required allocation to loans that would generate very low investment returns and (b) also removes a potential liquidity constraint related to the potential call on these funds allowing incrementally greater use of higher returning illiquid private investments.*

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Section 1

Equity investments in the state – target allocation is reduced from ten percent to three percent.

RVK Note: *A reduction of this requirement adds to expected long-term returns to the Legacy Fund, as it significantly enhances the flexibility to pursue the highest returning investments regardless of domicile and does not force as large of a pre-specified % of assets into a particular market without prior knowledge of the eventual opportunity set. It also reduces the compounding liquidity constraints placed on legacy fund assets from the potential call on these assets. Yet, given the size of the Legacy Fund, the 3% target represents a substantial pool of capital for potential investment within North Dakota, a pool in-state capital pool that will grow in dollar terms along with the future growth of the Fund.*

Section 1 Summary:

On a "Risk Equivalent Basis" we estimate that a strategic asset allocation optimized under the constraints of SB 2330 is under a base case (50th percentile) return scenario, likely to deliver approximately ***$920 M in additional investment returns*** *for the Legacy Fund over the next decade when compared to a similar risk portfolio optimized under the constraints of HB 1425.*

See appendix for modeling details and assumptions.

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Section 2

Earnings – definition is changed from a net income approach to a percentage of market value approach.

RVK Note: *We believe this is an important change to the structure of the Legacy Fund. This adjustment is beneficial to the investment strategy and operation of the investment portfolio and provides greater predictability of distribution amounts. By removing the net income approach to distributions, the strategic asset allocation decision can be focused on maximizing long-term wealth that the Legacy Fund represents for North Dakota by eliminating the need to make explicit trade offs between current income and future growth.*

Additional Considerations

We offer the following points of consideration as potentially beneficial further enhancements:

Targeting in state investment as a specific $ amount rather than a % target of the strategic asset allocation.

This could allow for greater precision in targeting an appropriate investment sizing. Percent of market value of the legacy fund assets at any point in time is not necessarily related to the size of the opportunity set for investment in the state

Benchmark return for in state ***equity investments*** *set as the same for other* ***similar equity investments***

As currently drafted, in state equity investments will target a return that is lower than other similar non-in-state investments as it will be set against a diversified portfolio that includes equity and debt. This is a mismatch. All equity investments, ideally, should require the same rate of return as similar equity investments.

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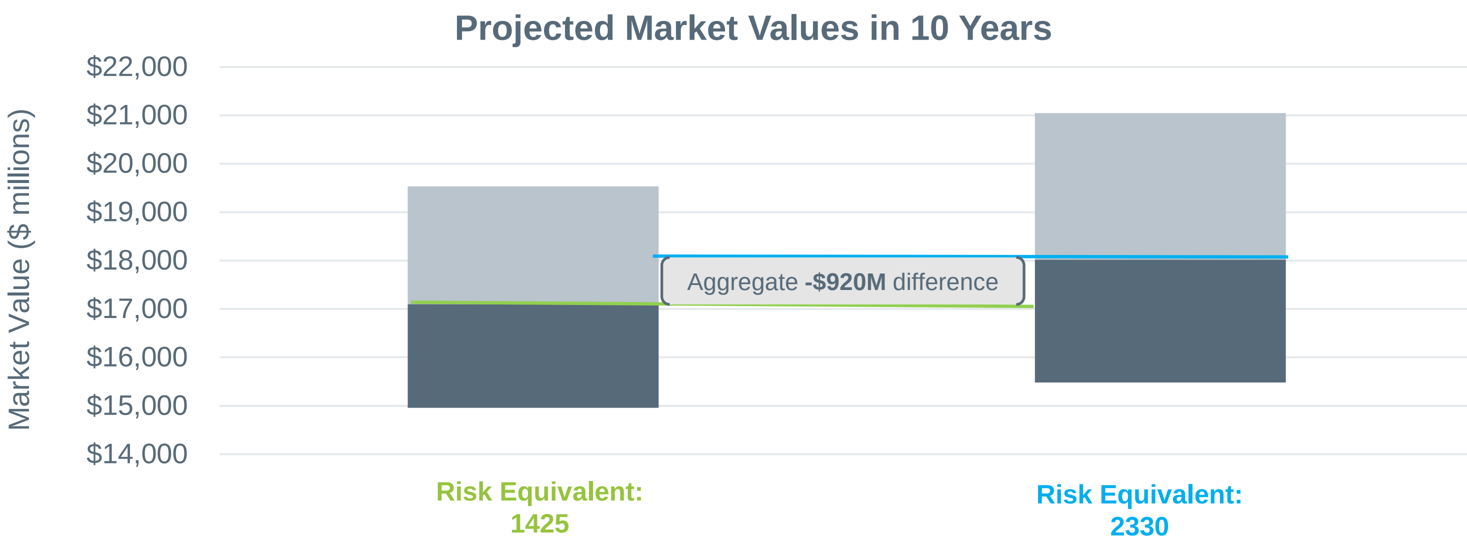
Appendix

- Preliminary Asset Allocation Modeling and Estimated Impact on Future Wealth Values

Estimated Wealth Implications

- We modeled the potential range of wealth values over the next 10 years using the risk and return characteristics of the risk equivalent portfolios for the HB1425 and HB2330 with the following assumptions:
  - Starting market value of $7.95 billion.
  - Monthly contributions based on monthly production assumptions as provided by the ND Office of State Tax Commissioner and monthly oil price forecasts.
  - To isolate the impact of just the asset allocation differences, applied the proposed distribution policy to both scenarios: 7 % of the 5-year average value of the legacy fund assets as reported by the SIB 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[1].
- We estimate the impact of the **proposed HB2330 to be accretive to the expected future values for the Legacy Fund.** We project the Risk Equivalent portfolio under HB2330 to potentially increase the fund's values by $920 million over the next 10 years (about $92 million per year) as compared to the Risk Equivalent portfolio under the HB1425.



Note: Colored horizontal lines represent estimated *median* market value outcomes utilizing Monte Carlo simulations; floating bars represent the 25th to 75th percentile of outcomes.

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

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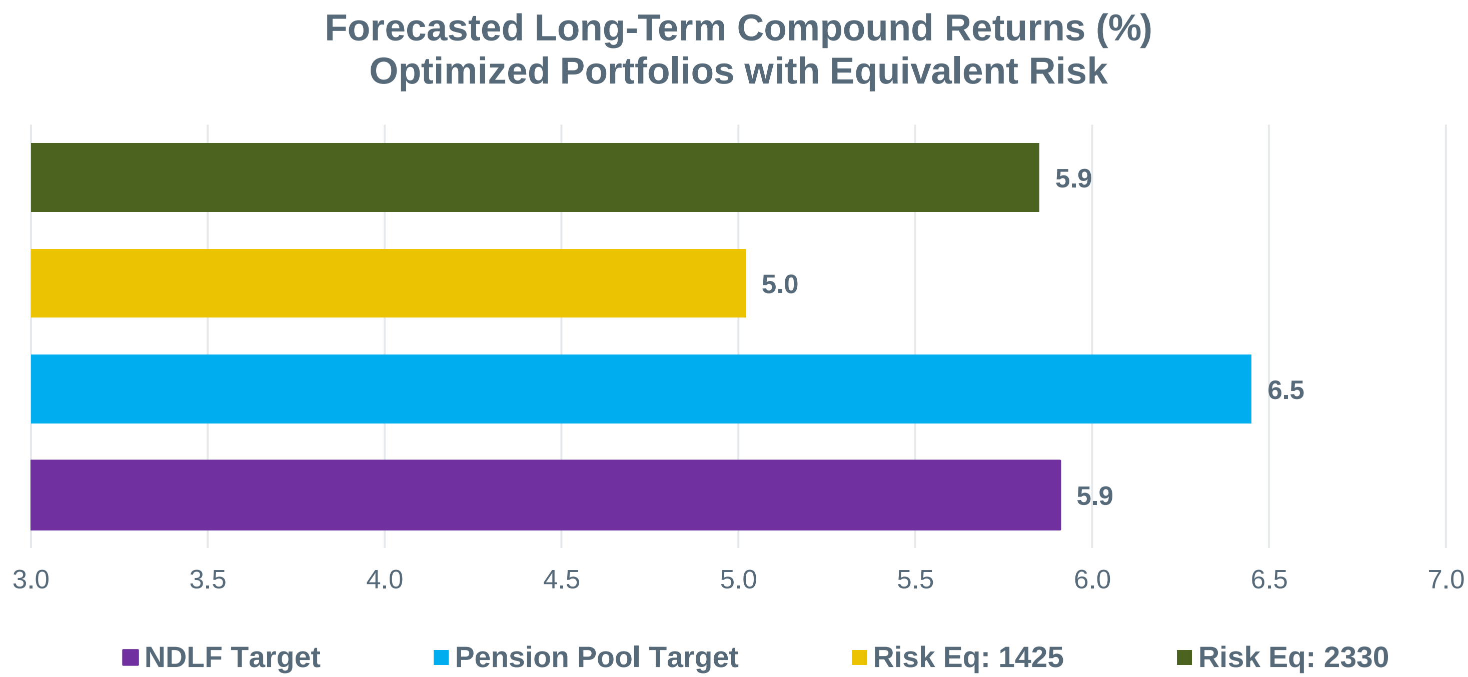
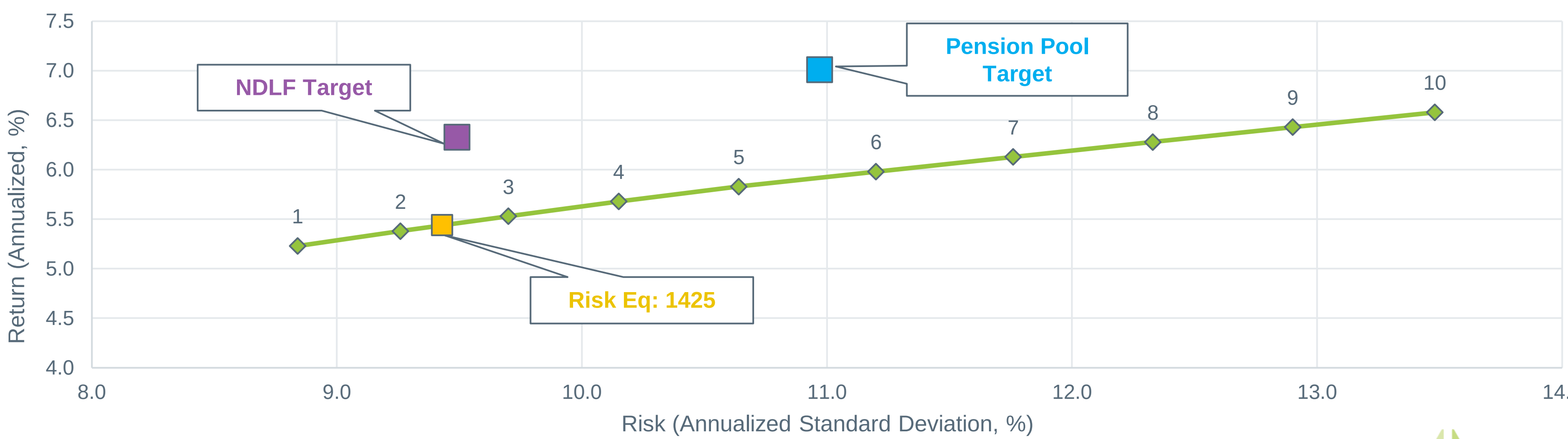
Estimated Return Implications



- Assets invested in the Legacy Fund are projected to annualize at a lower rate of long-term returns with **HB1425** implemented as currently written (Risk Eq: 1425).
  - Utilizing the assumptions described, a portfolio with 20% in-state investments (10% equity and 10% fixed income) could **reduce total Legacy Fund *annualized* long-term returns by approximately 0.9%** assuming a risk profile similar to the current policy.
- Assets invested in the Legacy Fund under the proposed **HB2330** (Risk Eq: 2330) are projected to have practically the same long-term annualized returns as the current target.

Efficient Frontier 1: HB1425 As Written

	Min	Max	1	2	3	4	5	6	7	8	9	10	NDLF Target	Pension Pool Target	Risk Eq: 1425	Diff From the Target
Broad US Equity	20	40	20	20	20	20	21	23	24	26	28	30	30	29	20	-10
Broad International Equity	10	30	10	13	16	18	21	23	24	26	28	30	20	19	14	-6
Private Equity	0	10	0	0	0	0	0	0	0	0	0	0	1	8	0	-1
In-State Private Equity	10	10	10	10	10	10	10	10	10	10	10	10	0	0	10	10
US Agg Fixed Income	10	40	40	37	34	32	28	25	21	17	14	10	29	17	36	7
High Yield Fixed Income	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	
Private Credit	0	8	0	0	0	0	0	0	0	0	0	0	3	0	0	-3
BND CD Match	6	6	6	6	6	6	6	6	6	6	6	6	2	0	6	4
Infrastructure Loans	4	4	4	4	4	4	4	4	4	4	4	4	0	0	4	4
TIPS	0	7	5	5	5	5	5	5	5	5	5	5	5	0	5	
Private Core Infrastructure	0	5	5	5	5	5	5	5	5	5	5	5	5	7	5	
Core Real Estate	0	8	0	0	0	0	0	0	0	0	0	0	5	12	0	-5
Total			100	100	100	100	100	100	100	100	100	100	100	100	100	
Expected Arithmetic Return			**5.2**	**5.4**	**5.5**	**5.7**	**5.8**	**6.0**	**6.1**	**6.3**	**6.4**	**6.6**	**6.3**	**7.0**	**5.4**	
Expected Risk (Standard Deviation)			**8.8**	**9.3**	**9.7**	**10.2**	**10.6**	**11.2**	**11.8**	**12.3**	**12.9**	**13.5**	**9.5**	**11.0**	**9.4**	
Expected Compound Return			**4.9**	**5.0**	**5.1**	**5.2**	**5.3**	**5.4**	**5.5**	**5.6**	**5.7**	**5.7**	**5.9**	**6.5**	**5.0**	
Expected Return (Arithmetic)/Risk Ratio			0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.7	0.6	0.6	
RVK Expected Eq Beta (LCUS Eq = 1)			0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.5	
RVK Liquidity Metric (T-Bills = 100)			69	69	69	69	70	70	70	70	71	71	79	68	69	



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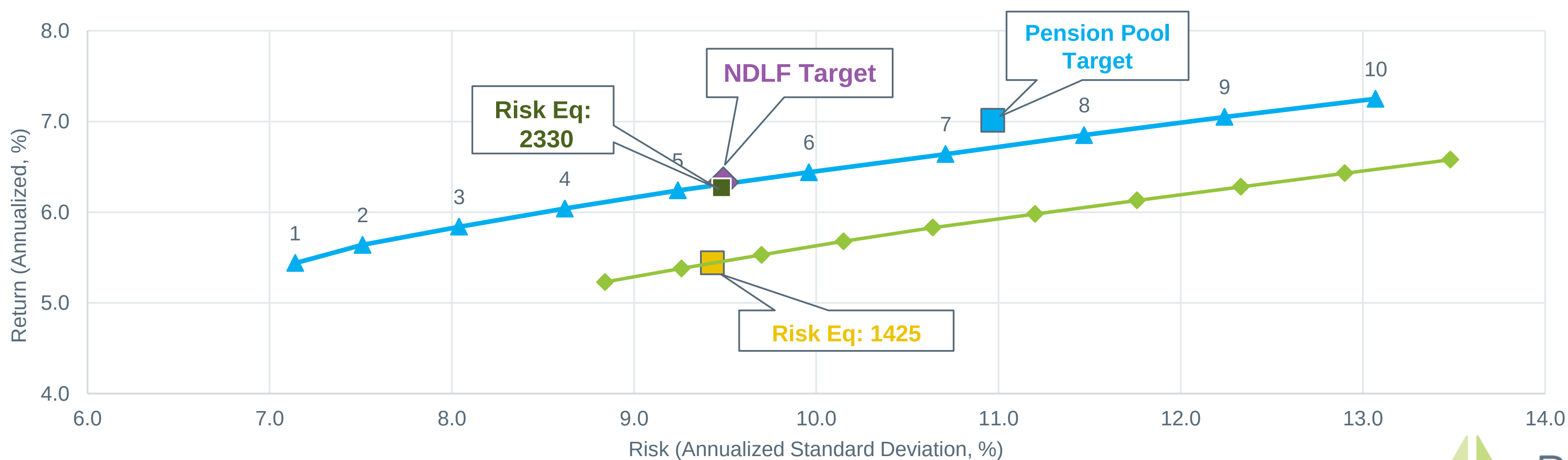
Efficient Frontier 2: Proposed HB2330 Allocations

	Min	Max	1	2	3	4	5	6	7	8	9	10	NDLF Target	Pension Pool Target	Risk Eq: 1425	Risk Eq: 2330	Diff from NDLF Target
Broad US Equity	20	40	20	20	20	20	20	22	24	27	29	30	30	29	20	22	-8
Broad International Equity	10	30	10	11	14	18	20	22	24	27	29	30	20	19	14	21	1
Private Equity	0	10	0	0	0	0	2	3	3	3	3	10	1	8	0	2	1
In-State Private Equity	3	3	3	3	3	3	3	3	3	3	3	3	0	0	10	3	3
US Agg Fixed Income	10	40	40	37	36	35	31	26	21	16	11	10	29	17	36	32	3
High Yield Fixed Income	0	8	0	0	0	0	0	0	0	0	0	0	0	8	0	0	
Private Credit	6	6	1	7	8	8	8	8	8	8	8	1	3	0	0	4	1
BND CD Match	0	0	6	6	6	6	6	6	6	6	6	6	2	0	6	6	4
Infrastructure Loans	0	7	0	0	0	0	0	0	0	0	0	0	0	0	4	0	
TIPS	0	5	7	7	5	2	4	5	5	5	5	5	5	0	5	0	-5
Private Core Infrastructure	0	8	5	5	5	5	5	5	5	5	5	5	5	7	5	5	
Core Real Estate	0	0	8	4	3	3	1	0	0	0	0	0	5	12	0	5	
Total			100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Expected Arithmetic Return			**5.4**	**5.6**	**5.8**	**6.0**	**6.2**	**6.4**	**6.6**	**6.9**	**7.1**	**7.3**	**6.3**	**7.0**	**5.4**	**6.3**	
Expected Risk (Standard Deviation)			**7.1**	**7.5**	**8.0**	**8.6**	**9.2**	**10.0**	**10.7**	**11.5**	**12.2**	**13.1**	**9.5**	**11.0**	**9.4**	**9.5**	
Expected Compound Return			**5.2**	**5.4**	**5.5**	**5.7**	**5.8**	**6.0**	**6.1**	**6.2**	**6.4**	**6.5**	**5.9**	**6.5**	**5.0**	**5.9**	
Expected Return (Arithmetic)/Risk Ratio			0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.7	
RVK Expected Eq Beta (LCUS Eq = 1)			0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.6	0.6	0.5	0.6	
RVK Liquidity Metric (T-Bills = 100)			72	70	70	70	70	70	70	71	71	71	79	68	69	70	



Assumptions and Constraints

- For purposes of this analysis, we developed preliminary assumptions regarding the return and risk profile of the various potential forms of in-state investment as described in HB 1425.
  - **Private Equity**: returns = 50% of similar traditional investments; risk = 150% of similar traditional investments.
  - **Infrastructure Loan**: returns = 1.5% as defined in 1425; risk = RVK's private credit assumption.
  - **Bank of North Dakota CD Match**: returns and risk = 10-year Treasury Bonds.
- Additional Assumptions and Constraints:
  - Additional group and relative constraints are utilized to focus the efficient frontier on a range of reasonable and prudent choices (Total Equity between 30% & 70%, Total Fixed Income between 15% and 50%, Real Assets between 10% and 20%, and Non-US equity cannot exceed US equity).
  - Illiquid assets cannot exceed 25%.
- On each frontier we showed the following portfolios:
  - Current North Dakota Legacy Fund ("NDLF") target allocation.
  - Current target allocation for the Consolidated Pension Pool.
  - **"Risk Eq: 1425":** a model portfolio on the frontier for the 1425 bill with the same risk profile as the current Legacy Fund target portfolio.
  - **"Risk Eq: 2330"**: a model portfolio on the frontier for the proposed 2330 bill with the same risk profile as the current Legacy Fund target portfolio.

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