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# Texas Education Agency

## A Study on Distributions from the Texas Permanent School Fund to the Available School Fund

August 31, 2020

## Table of Contents

## Section 1 – Introduction

Texas House Bill 4388, 86th Legislature 2019 ("HB 4388") mandated that the Texas Education Agency ("TEA") conduct a study regarding the distributions paid from the Texas Permanent School Fund ("PSF") to the Available School Fund ("ASF") to fund public education in Texas. HB 4388 was codified in the Natural Resources Code §51.414. TEA conducted a Request for Qualifications ("RFQ") for firms to conduct the required study. RVK, Inc. ("RVK") was selected and hired by TEA in May 2020 to conduct this study.

This report is structured to meet the requirements of the Bill, specifically Section 5 of HB 4388 set out the following parameters for this study:

> *(b) The Texas Education Agency, in consultation with the General Land Office, shall conduct a study regarding distributions from the permanent school fund to the available school fund. The study must:*
>
> > *(1) examine historical patterns in the real value of distributions made from all assets and revenues of the permanent school fund and historical patterns in the real value of permanent school fund assets relative to the number of students enrolled in the public education system;*
> >
> > *(2) analyze the impact of underlying data and methodological assumptions on actual and projected distributions from the permanent school fund;*
> >
> > *(3) seek input from state government officials involved in public education policy or in the appropriation of state funds to support the public education system;*
> >
> > *(4) examine current and alternative approaches to balance the needs and interests of present and future beneficiaries of the permanent school fund and the available school fund;*
> >
> > *(5) develop options to maximize available revenue distributions for the education of students enrolled in the public education system while preserving the permanent school fund for future generations; and*
> >
> > *(6) consider any other subjects relevant to the purpose of the study.*

This report satisfies the requirements of Section 5 of HB 4833 and provides recommendations on potential enhancements that can be made to maximize the distributions for the students of the state of Texas. Additionally we would note that RVK is an independent firm with no ties to the Texas Education Agency (TEA), the Permanent School Fund (PSF), the State Board of Education (SBOE), or the State Land Board (SLB). Given our lack of engagement with any of the entities involved, we believe the analysis found in this report is thoroughly objective and represents our best analysis given the time available to conduct the study.

The structure of the PSF makes this analysis considerably more complex than a traditional single portfolio endowment as the PSF consists of three separate investment portfolios. The first portfolio is managed by the State Board of Education ("SBOE"). In this report we will identify this pool of assets as ("PSF-SBOE"). The second portfolio is under the direction of the General Land Office ("GLO") and managed by the School Land Board ("SLB") and is called the Real Estate Special Fund Account ("PSF-RESFA"). The third portfolio is the newly established Liquid Account. This account holds uncalled capital commitments made by SLB in the PSF-RESFA. This account is invested and managed by SBOE and will be identified as ("PSF-LA"). The SLB

also manages income producing lands and mineral rights owned by the PSF. The income from these assets are deposited in the PSF-RESFA. These real assets cannot be distributed and as such, unless otherwise noted, are excluded from this analysis with the exception of the income they generate which goes into the PSF-RESFA. This is shown in Figure 1 below.

Figure 1: Permanent School Fund Management


| | | | | |
|---|---|---|---|---|
| **Asset Pool** | SBOE | SLB | SLB | SLB |
| **Managed By** | SBOE | SLB | SBOE | SLB |
| **Gains/Losses** | SBOE | SLB | SBOE | SLB |
| **Distributable** | Yes | Yes | Yes | No |

Adding yet more complexity to any analysis of the PSF is that its assets are not only subdivided among multiple funds and two separate agencies managing them, but that PSF is subject to a different set of policies and restrictions governing (1) permissible investments, (2) latitude in setting distributions versus re-investment, and (3) the magnitude of distributions, all against a backdrop of statutory and constitutional guidance that may apply to the PSF in total.

## Section 2 – Summary

This study provides a comprehensive analysis of past and potential future distributions from the PSF. The key takeaways from our analysis are as follows:

1. Our analysis suggests a sustainable distribution rate from the total PSF is between 3.26% and 3.46% based on *current* market conditions, *current* capital markets forecasts, *current investment* strategies, and a review of other key variables (**Sections 6 and 7 and Figures 22 and 25**). This is an aggregated rate based on all assets excluding the income-producing state lands and mineral rights which are constitutionally excluded from distribution calculations. The income generated from the land and mineral assets supports a higher ongoing distribution rate from the PSF-RESFA. The PSF-SBOE's sustainable distribution rate is 3.2% (using the PSF-SBOE assets as the denominator) while the rate from the PSF-RESFA is between 5.28% and 5.70% (using the PSF-RESFA as the denominator). By "sustainable" we mean a rate that maintains the real economic value of the corpus and a stable real distribution per enrolled student.

2. The PSF-SBOE policy governing distributions explicitly seeks a goal of maintaining intergenerational equity in the benefits conferred by that fund's assets to Texas students (**Section 3**). However, unfortunately there is a distinct lack of clarity in precisely how intergenerational equity is to be defined. Is it to be defined as a constant, real distribution per student in each biennium over time? Or, shall each student in each biennium over time receive a distribution from a corpus (the PSF-SBOE) that is maintained at the same real value? We believe that it is not possible to satisfy both definitions over time. Further, each definition has differing implications for the stability of distributions over time and in times of rising and declining investment markets.

3. While the PSF-SBOE has formally adopted intergenerational equity as a goal for distributions, the SLB has not done so for the PSF-RESFA. Since distributions from both funds are combined in the ASF, the resulting *total* distribution only partially reflects the goal of intergenerational equity.

4. Our research indicates that in setting distributions, the SBOE has attempted to strike a balance between the pursuit of intergenerational equity as defined in the two ways described above. The net result of the series of SBOE distribution decisions has leaned toward ensuring relatively constant real distributions per student over time (**Figure 16**).

5. Effective distribution rates from PSF fluctuate through time based on capital market forecasts, student population growth rates, and investment approach (**Section 5 and Figure 18**). This implies future real effective distributions from PSF-SBOE could potentially be higher under current assumptions and how the SBOE strikes the balance discussed above between constant real distributions to students versus a constant real corpus from which students benefit also needs to be reexamined. Should assumptions change, or the SBOE's weighting of these two goals change, distributions may need to adjust accordingly (**Section 7**). Based on our research and understanding, we believe this is a likely scenario as assumptions are updated based on new information as time passes.

6. Total distributions will similarly fluctuate so long as the contributions to them from the PSF-RESFA remain episodic and vary idiosyncratically over time (**Figure 17**).

7. Seeking additional return by adding incremental risk to the PSF-SBOE fund investment

strategy in hopes to boost future distributions has potential drawbacks, notably including the possibility of decreasing the stability of distributions should market conditions not provide additional return associated with elevated risk taking (**Section 8, Figures 39 and 40**). It would seem that efforts to stabilize distributions as much as possible given the inevitably volatile investment returns is thematically consistent with a more specific goal of intergenerational equity in distributions. Furthermore, stability in distributions from the PSF-SBOE is clearly beneficial to budgeting decisions. In short, we find it likely imprudent to seek further increases in the volatility of the investment assets.

8. If distribution rates from PSF are not increased, this introduces the possibility of seeking reductions in expected return and associated volatility in both returns and PSF's assets through a more conservative strategic asset allocation (**Section 8, Figures 39 and 40**). Such a step to emphasize preserving PSF capital and reduce expected risk could potentially provide greater stability in distribution rates in the future in the event of adverse market conditions. This is the converse of the Observation #4 above. Pursuing increased stability in the value of the corpus and distributions by materially reducing risk comes at the potential cost of earning additional returns that could either increase the real value of distributions over the long run, the real value of the corpus, or both.

9. Utilizing a defined rule-based distribution methodology can increase transparency and potentially reduce year to year volatility in distribution amounts. Current practice allows for meaningful discretion in distribution rates; this latitude in setting distributions is particularly high when compared to other similar institutions across the U.S. and this is especially true for distributions sourced from the PSF-RESFA (**Section 9**).

10. A final note on the constitutional provisions governing distributions: we could not determine with certainty whether they applied to only the PSF-SBOE or also to the PSF-RESFA.

## Section 3 – Background and Project Process

### Project Objectives

The objectives of this project are wide and far reaching, but generally fall within the following categories. The objectives of the project were designed by TEA to align with the requirements of HB 4388.

1. Examination of historical patterns in the real value of distributions from all assets and revenues of the PSF as well as historical patterns in the real value of PSF assets relative to public education students.
2. Analysis of impact of data and methodological assumptions on actual and projected distributions from the PSF.
3. Assistance in seeking governmental input regarding education policy and appropriation of State funds to support the public education system.
4. Examination of current and alternative approaches to balance the needs and interests of current and future beneficiaries of the PSF and ASF.
5. Development of options to maximize revenue for public education students.

Our task was to deliver a report accessible to all readers even those without backgrounds in investments, finance, or other specialties.

### Who RVK Worked With

In seeking to meet project objectives and conduct a thorough analysis, RVK collaborated with many organizations and stakeholders. These meetings and interviews provided us with a critical understanding of the PSF from many perspectives. We would like to thank the following for generously providing their time to meet with RVK as we conducted this project.

- Texas Education Agency Staff
- State Board of Education Board Members and Staff
- GLO and SLB Staff
- The Office of Representative Jim Murphy
- Moody's
- S&P
- Fitch

We would also like to thank all the organizations that participated in providing information for the peer review section of this report (Section 9).

### Bond Guarantee Program

The Bond Guarantee Program ("BGP") is a critical component of the PSF. PSF assets are used to back bonds issued by individual school districts and charter schools allowing these entities to receive AAA ratings from each of the three major rating agencies in the US. The AAA rating

allows for a lower interest rate on certain bonds issued by these entities which in turn reduces borrowing costs within the state of Texas for education.

The overall size of the BGP is limited by several factors including an IRS limit of $117.3 billion and a SBOE limit of 3.5 times current book value of assets equating to a limit of approximately $117 billion as of FYE 2019. Current utilization sits at about 2.4 times book value as of FYE 2019. SBOE statutorily may revise their limit up to 5 times book value and may adjust the value as needed to maintain a credit rating. No school district has defaulted on debt guaranteed by the BGP and PSF assets have never had to be drawn upon directly to pay debt obligations under the program.

Analysis of the BGP falls outside the scope of our analysis. However, given the importance of the BGP and our belief that the BGP is a separate, but nonetheless obviously important benefit to Texas students that is derived from a healthy and sustained PSF, we reviewed the program and interviewed each of the three major US ratings agencies to understand considerations that drive the AAA rating and the primary risks that may lead to a rating downgrade. The primary factors in the rating decisions include:

- Strong legal mechanics of the BGP provided under the Texas constitution and other state legislation
- Strong credit quality of underlying school districts
- Market value and liquidity of PSF investment assets
- High default tolerance levels
- Limited concentration in top borrowers
- Ability for the state to intercept payments to school districts and route them to PSF to cover default payments

Our analysis indicated that the primary risks to the AAA rating include:

- Changes to Texas constitution regarding operating, oversight, and increased distribution levels out of PSF
- Loss of assets and/or materially reduced liquidity in the investment portfolio
- Material downgrade in school district credit quality or operating reserves
- Change in the composition of public school districts versus charter schools utilizing BGP

Given the scope of our review we cannot say with certainty that the recommendations in this report will lead to the BGP retaining its AAA rating. We do believe that improvements to the long-term stability of the PSF including improvement in governance structure, continued evaluation of investment portfolio risk, a standardized distribution policy, and coordination between SBOE and SLB in setting distribution rates should not deteriorate the strength of the program in the rating agencies' models. While not explicitly asked to address this question, we would point out that the BGP is clearly a benefit to students and the extent to which it can be consistently implemented over long periods of time contributes to the overall policy goal of intergenerational equity in the receipt of benefits from the PSF by Texas students.

### A Note on COVID-19

COVID-19 has had a significant effect on capital markets and therefore the value of the PSF portfolios. Given the deliberate distribution setting process and complex structure of the investment portfolios, the full impact of the pandemic on PSF will take significant time to unfold. This report is largely based on data ending August 31, 2019, the end of the State of Texas' fiscal year. We have updated market values to estimated May 31, 2020 values where appropriate for future projections. The values will certainly continue to fluctuate as the current fiscal year is set to come to an end, but we believe given the timing of this report the values utilized represent a reasonable starting point for this analysis. Given the circumstances created by the pandemic and its economic repercussions, it still needs to be read in the context of evolving global conditions.

### Legislation and Documentation Reviewed

PSF is governed by many statutes enacted over time. Our review focused on the following critical legislation and documents. Additional detailed data was provided by TEA, SBOE, and the SLB.

- **The Texas Constitution**
    - **Article 7 Section 2 –** Establishes the PSF.
    - **Article 7 Section 5 –** Outlines distributions to the ASF.
- **Texas Administrative Code**
    - **Title 31, Chapter 31 § 151.6 –** Establishes procedures for how SLB distributions are made from the PSF-RESFA to the ASF and PSF-SBOE.
    - **Title 19, Chapter 33 –** Rules of the SBOE including setting distributions, investment guidelines, and policies.
- **Texas Natural Resources**
    - **Chapter 32 –** Establishes and outlines duties of the SLB.
    - **Chapter 51 –** Outlines management of PSF lands and the PSF-RESFA. Establishes the PSF-LA. Codifies Texas House Bill 4388, 86th Legislature 2019.
- **Texas House Bill 4388, 86th Legislature 2019** – Authorizes this study and establishes the PSF-LA.
- **Texas Education Code**
    - **Chapter 43 –** Outlines investment guidelines of the PSF.
- **Audited Annual Financial Statements of the PSF**
- **The 2018-19 Biennium Legislative Budget Board Fiscal Size-Up**
- **Investment Policies of both SBOE and SLB**

**What is Intergenerational Equity?**

Intergenerational equity represents the distinct desire for egalitarian equity between present and future generations. Specifically within the context of this project, attainment of intergenerational equity strives to provide a safeguard that students within the state of Texas share the same opportunities today and in the future. In its simplest form, intergenerational equity is achieved by balancing anticipated demands on the corpus with expected contributions (from any number of sources). In many cases, and most often for Sovereign Wealth Funds, a key objective is transforming *finite, non-renewable real assets* into *perpetual financial wealth* for its beneficiaries that will provide fiscally sustainable and equitable benefits well after the funding source may be depleted.

In order to achieve intergenerational equity it must first be clearly defined and articulated. Only then can it be measured and assessed over time to ensure long-term fiscal health of the funds and provide for a trigger to course-correct as needed.

There are two plausible definitions for specifying precisely what intergeneration equity means in the case of the PSF. And while a distribution policy can be devised that "balances" consideration of both, it is highly unlikely that both definitions can be met by any distribution policy over time. Each definition, if strictly followed, has different implications on distribution stability in nominal terms across future "student" bienniums.

A. **Intergenerational equity means that each student in each biennium over the coming years should benefit from the same amount of real (inflation adjusted) value in the PSF corpus.** *A distribution policy strictly based on this definition would require that the distributions from the PSF should target real (i.e., exactly offsetting inflation) growth in the PSF corpus that equals student population growth. In eras where real investment returns achieved by the PSF are high, distributions would also be high. Conversely, a period of years where real investment returns from PSF assets were less than student population growth or negative, distributions would have to be reduced – perhaps significantly – until the real value of the corpus recovers, thus restoring the real assets available to support each future student.*

**B. Intergenerational equity means that each student in each biennium over the coming years should receive the same real distribution from the PSF.** *While definition **A** above is likely to make distributions more variable, this definition can lead to the real value of PSF corpus varying, that is increasing or decreasing in real terms – potentially either beneficially or adversely affecting the ability of the PSF to sustain a distribution policy based upon it. If, for example, the PSF encountered a period of years where real returns were below student growth or negative, the requirement that the each biennium's distribution would cause the real value of the corpus to decline. Conversely, in a multi-year period of real returns from the PSF's assets well in excess of student growth, distributions driven by this definition would result in the real value of the PSF to grow.*

In our discussions with the SBOE, it appears that distribution decisions over time have been crafted to strike a balance between these two definitions of intergenerational equity. The cumulative result of those distributions over the past decade plus in an era where real investment returns have been strong, has resulted in the real value of the PSF to grow but also a measure of stability in distributions. This growth in the real value of the PSF is a result that could result in future student generations benefitting ***or*** creating a foundation for the PSF corpus to weather a period of negative real returns protecting the corpus.

By definition, intergenerational equity is a long-term endeavor spanning generations and therefore must be considered in the context of a sufficiently long time horizon. An endowed institution can target intergenerational equity by striking a sustainable balance across the specific components mentioned in Figure 19—each component is a lever that plays a critical role in maintaining this objective. These levers can be summarized as investment returns (after inflation), contributions/inflows, and the distribution/spending rate. While they are all important, they are not necessarily equal in terms of their flexibility and discretion.

Changes to any one of the aforementioned levers can have a material impact on the ability to achieve intergenerational equity, capital market expectations—and therefore expected investment returns—change with economic conditions, demands on the assets with changes to student growth and inflows are largely dependent on prevailing prices of the physical assets, all of which are not static. The dynamic nature of these components requires a dedicated and similarly dynamic commitment to achieving the objective of intergenerational equity. A periodic review of the prevailing conditions of these underlying components and their impact on the prospects of a fund allows for minor adjustments that can have meaningful benefits to the long-term fiscal health of a fund. This is critical to avoid substantially larger—and likely more painful and far less palatable—changes at a later time. We would note that given the dynamic nature of these underlying components, any potential changes that appear needed at a given point in time should be examined with the possibility that they are driven by transient events or short-term volatility and may self-correct in the near-term. However, if persistent trends of over- or under-shooting intergenerational equity are observed, changes are not only prudent, but necessary.

## Section 4 – Background of the Texas Permanent School Fund

### History of the Texas Permanent School Fund

The PSF was founded in 1854 for the benefit of public schools in Texas with a $2 million appropriation by the Texas Legislature and is established in the Article 7 Section 2 of the Texas constitution operating as perpetual sovereign endowment. Article 7 Section 5 of the constitution provides the composition, management, and distributions to the ASF of the PSF. Specifically, Section 5 sets the parameters for distributions to the ASF.

(1) in each year of a state fiscal biennium must be an amount that is not more than six percent of the average of the market value of the permanent school fund, excluding real property belonging to the fund that is managed, sold, or acquired under Section 4 of this article, but including discretionary real assets investments and cash in the state treasury derived from property belonging to the fund, on the last day of each of the 16 state fiscal quarters preceding the regular session of the legislature that begins before that state fiscal biennium, in accordance with the rate adopted by:

   A. a vote of two-thirds of the total membership of the State Board of Education, taken before the regular session of the legislature convenes; or

   B. the legislature by general law or appropriation, if the State Board of Education does not adopt a rate as provided by Paragraph (A) of this subdivision; and

(2) over the 10-year period consisting of the current state fiscal year and the nine preceding state fiscal years may not exceed the total return on all investment assets of the permanent school fund over the same 10-year period.

We believe, that with an estimated $44.9 billion in assets as of May 31, 2020, the PSF is the largest public education endowment in the US. The assets of PSF are managed by two independent Boards, the SBOE and the SLB. The SBOE manages $33.3 billion in assets that are largely invested in financial assets including common equity and bonds. SLB assets are valued at approximately $11.6 billion inclusive of $3.7 billion in the PSF-RESFA and $4.1 billion in the PSF-LA. The SLB also manages income producing land and mineral rights currently valued at $3.8 billion. As noted in the Constitution, the $3.8 billion in real holdings is excluded from distribution calculations and therefore unless noted otherwise, are excluded from our analysis in this report. Assets across the PSF's multiple portfolios are shown in more detail in Figure 2 below. All asset values are estimated preliminary values as of May 31, 2020.

Figure 2: PSF Assets as of May 31, 2020

| | | |
|---|---|---|
| **PSF** | **$** | **44,941,194,222** |
| **PSF-SBOE** | **$** | **33,315,497,784** |
| **PSF-SLB Total** | **$** | **11,625,696,438** |
| PSF-RESFA | $ | 3,733,843,458 |
| PSF-LA | $ | 4,074,019,983 |
| PSF-Land and Minerals* | $ | 3,817,832,997 |

*As of FYE 2019

Over the last 10 years PSF has distributed $10.1 billion (on a nominal basis) to the ASF to support public education in Texas. At the same time (and excluding Lands and Minerals) PSF

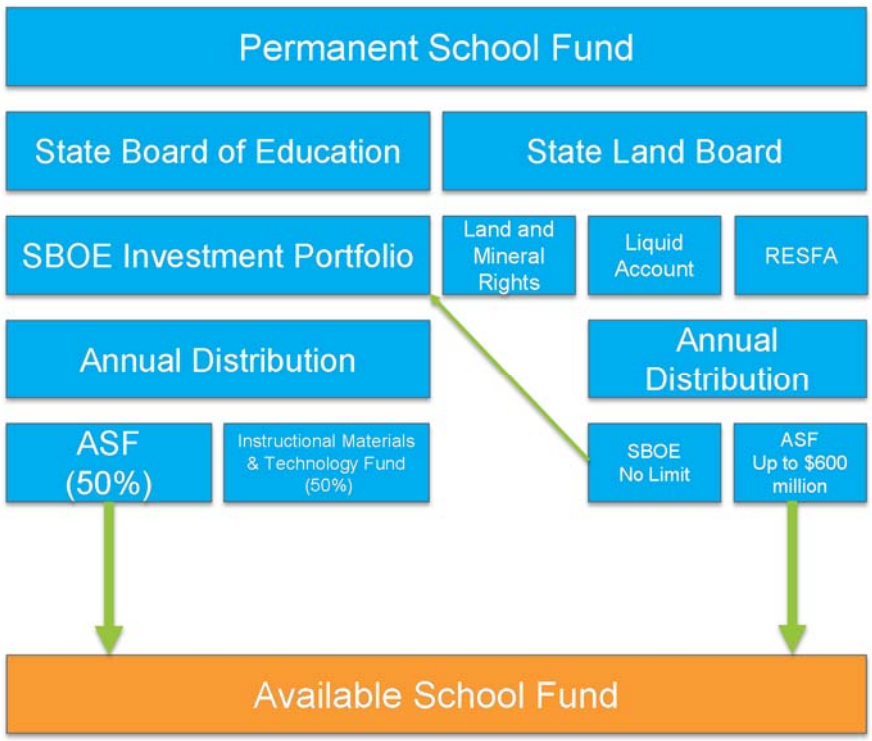
assets have grown on a nominal basis from $22.4 billion at fiscal year-end 2009 to $41.1 billion as of May 31, 2020. On an inflation-adjusted real basis these assets have grown from $26.6 billion in 2009 to $41.1 billion as of May 31, 2020.

In addition to providing funding to ASF, PSF assets are used to back eligible bonds issued by school districts (and charter schools) in Texas through the Bond Guarantee Program ("BGP"). The guarantees provided to these bonds allows school districts to issue bonds with a AAA rating resulting in significant interest savings for school districts and charter schools across the State; savings that are realized across many years.

The diagram below (Figure 3) outlines the management of the PSF in more detail. As mentioned, management of the PSF is split between the SBOE and the SLB. The SBOE manages a diversified portfolio of financial assets. The SBOE has wide discretion on setting asset allocation for the PSF-SBOE and can invest in most financial and real assets. We discuss allowable investments in more depth in Section 4.

The SLB, however, is significantly limited as to the types of investments it can make on behalf of the PSF. The SLB invests the income from the real holdings of income producing land and mineral rights per Chapter 51 of the Natural Resources Code in the PSF-RESFA. House Bill 4388 also established the PSF-LA. This account holds SLB assets committed, but not yet called to other allowable investments. The PSF-LA is managed by the SBOE in a similar fashion to the SBOE-PSF to generate higher returns than the previous practice of having the Texas Treasury invest these assets in cash. The gains (and losses) of the PSF-LA accrue to the benefit of the SBOE portfolio. Due to HB 4611 from the 2019 legislative session, SLB distributions to the ASF are now also split between the ASF and the IMTF ("Instruction Materials & Technology Fund"). Additionally, while the SBOE is to set aside half of the distribution for the IMTF, the legislature must appropriate the dollars.

Figure 3: PSF Management and Distributions



### Available School Fund

The Available School Fund ("ASF") is comprised of distributions from the PSF and a portion of tax revenue generated by the state's motor fuel tax. The funds are distributed annually to school districts and charter schools in the state of Texas. Distributions are made on a per capita basis determined on the prior year's average daily attendance ("ADA").

### Texas Education Agency and State Board of Education

TEA overseas primary and secondary public education in the state of Texas. TEA is led by the Commissioner of Education who is appointed by the governor. The SBOE "sets certain policy related to public education in Texas." The broad responsibilities and authority of the TEA beyond the PSF, however, are not germane to this report.

The SBOE is responsible for oversight of the PSF-SBOE through its 15-member elected board. As part of its broad mandate, the SBOE sets annual distribution rates to the ASF. The five member SBOE sub-Committee on School Finance/Permanent School Fund is responsible for "Permanent School Fund management oversight, including audit responsibility, investment objectives, and investment decisions." Within SBOE, the investment team of the PSF-SBOE is headed by an Executive Administrator and Chief Investment Officer ("CIO"). The investment team consists of 30+ individuals who oversee and manage the investment portfolio.

Article 7 Section 5 of the Texas constitution allows the PSF-SBOE to invest the assets it manages under the prudent investor standard.

> (f) Notwithstanding any other provision of this constitution, in managing the assets of the permanent school fund, the State Board of Education may acquire, exchange, sell, supervise, manage, or retain, through procedures and subject to restrictions it establishes and in amounts it considers appropriate, any kind of investment, including investments in the Texas growth fund created by Article XVI, Section 70, of this constitution, that persons of ordinary prudence, discretion, and intelligence, exercising the judgment and care under the circumstances then prevailing, acquire or retain for their own account in the management of their affairs, not in regard to speculation but in regard to the permanent disposition of their funds, considering the probable income as well as the probable safety of their capital.

The PSF-SBOE has used its authority to build a highly diversified investment portfolio consisting of multiple asset classes including public equity, fixed income securities, hedge funds, private equity, and real estate. SBOE's objective per Texas Administrative Code (Title 19, Section 33.15(b)(1) and (c)(1)) for setting the asset allocation strategy is to "maintain intergenerational equity whereby the Fund (PSF-SBOE) will pay-out a constant distribution per student after adjusting for inflation." Figure 4 outlines the current target asset allocation as set by the SBOE.

Figure 4: PSF-SBOE Target Asset Allocation

| PSF-SBOE | 100% |
|---|---|
| **Equity** | **52%** |
| **Public Equity** | **37%** |
| Large Cap US Equity | 14% |
| Small/Mid Cap US Equity | 6% |
| International Equities | 14% |
| Emerging Markets Equity | 3% |
| **Private Equity** | **15%** |
| **Fixed Income** | **25%** |
| Core Bonds | 12% |
| High Yield | 3% |
| Emerging Markets Debt (Local) | 7% |
| Treasuries | 3% |
| **Alternative Investments** | **22%** |
| Absolute Return | 7% |
| Real Estate | 11% |
| Real Return | 4% |
| **Emerging Manager Program*** | **1%** |

*Modeled as a 50/50 allocation to Real Estate and Private Equity.

A diversified strategic asset allocation strategy that delivers the targeted expected return at the lowest level of risk possible is prudent, particularly given the intergenerational equity mandate. We explore alternate asset allocation strategies in more depth in Section 8 of this report.

### General Land Office and School Land Board

The General Land Office is "The oldest state agency in Texas, the GLO was formed to determine who owned what and where after the Texians and Tejanos won independence. Today, the General Land Office manages state lands, operates the Alamo, helps Texans recovering from natural disasters, helps fund Texas public education through the Permanent School Fund, provides benefits to Texas Veterans, and manages the vast Texas coast."

The GLO, through the five member SLB, is responsible for oversight of the PSF-RESFA. The SLB manages the sale and mineral leasing of PSF lands, is responsible for approving land sales, trades and purchase of PSF land, and issues permits, leases and easements for uses of state-owned submerged land. The GLO and SLB are led by the Texas Land Commissioner. The investment team consists of 5 individuals, including a CIO, who oversees day-to-day operations of the investment portfolio.

Section 51.401 of Chapter 51 of the Natural Resources Code establishes the PSF-RESFA. The Code allows the SLB to invest, through the PSF-RESFA, the "funds received from any land, mineral or royalty interest, real estate investment, or other interest, including revenue received from those sources." Subsection 51.402 of the Code defines allowable investments for the PSF-RESFA. The language considerably limits what the PSF-RESFA can invest in to primarily real estate and infrastructure.

> Sec. 51.402. USE OF DESIGNATED FUNDS. (a) Except as provided by Subsection (c), the board may use funds designated under Section 51.401 for any of the following purposes:
>
> (1) to add to a tract of public school land to form a tract of sufficient size to be

manageable;

(2) to add contiguous land to public school land;

(3) to acquire, as public school land, interests in real property for biological, commercial, geological, cultural, or recreational purposes; (4)

(4) to acquire mineral and royalty interests for the use and benefit of the permanent school fund;

(5) to protect, maintain, or enhance the value of public school land;

(6) to acquire interests in real estate;

(7) to pay reasonable fees for professional services related to a permanent school fund investment; or

(8) to acquire, sell, lease, trade, improve, maintain, protect, or use land, mineral and royalty interests, or real estate investments, an investment or interest in public infrastructure, or other interests, at such prices and under such terms and conditions the board determines to be in the best interest of the permanent school fund.

Given the significant statutory constraints on allowable investments, the SLB has limited options when making decisions regarding strategy for the PSF-RESFA. Figure 5 shows the current target asset allocation on the PSF-RESFA, as expected it is in private energy, infrastructure, and real estate strategies.

Figure 5: PSF-RESFA Target Asset Allocation

| PSF-RESFA | 100% |
|---|---|
| **Real Assets** | **100%** |
| Energy | 35% |
| Infrastructure | 32% |
| Real Estate | 33% |

The PSF-RESFA is the recipient of income and royalties from land and mineral right holdings of the PSF. These cash inflows vary considerably over time based on numerous factors, but tend to be highly correlated to energy prices and demand. Recent receipts have been significantly above long-term averages due mainly to the shale revolution. This has contributed to significant asset growth within the PSF-SLB. Going forward the proceeds are unpredictable, but expected by SLB to be lower in the near future due to collapsing energy demand and oil prices as a result of the COVID-19 crisis and a continued emphasis on renewable energy sources.

### PSF-Liquid Account

Section 51.414 of Chapter 51 of the Natural Resources Code establishes the PSF-LA while Subsection C outlines how assets are to be invested. The Code allows the PSF-LA to be invested in only liquid investments and in the same manner the PSF-SBOE portfolio is managed. Given the PSF-SBOE has significant exposure to illiquid investments which are not allowed for the PSF-LA, a new asset allocation was adopted for this account in July 2020. The PSF-LA was established in 2019 and the funds were previously invested in cash. The adopted asset allocation is phased in on a quarterly basis ending at the long-term target in the first

quarter of 2022. Figure 6 below shows the long-term target asset allocation. The interim quarterly allocations to reach this point are shown in the Appendix.

> (c) The State Board of Education may invest funds in the permanent school fund liquid account. The investments may be made only in liquid assets, in the same manner that the permanent school fund is managed by the State Board of Education.

Figure 6: PSF-LA Long-Term Target Asset Allocation

| PSF-LA* | 100% |
|---|---|
| **Equity** | **40%** |
| **Public Equity** | **40%** |
| Large Cap US Equity | 20% |
| Small/Mid Cap US Equity | 5% |
| International Equities | 15% |
| **Fixed Income** | **40%** |
| Core Bonds | 10% |
| US TIPS | 5% |
| Short Duration | 25% |
| **Cash** | **20%** |

*The allocation shown for the PSF-LA represents the long-term target expected to be fully implemented in Q1 2022.

**Distributions to the ASF**

**SBOE**

When setting distribution rates the SBOE is guided by Article 7 Section 5 of the Texas Constitution and Chapter 33, Subchapter A, Rule 33.10 of the Texas Administrative Code (please refer to page 11 for additional discussion).

The Code states that:

> *The SBOE shall strive to manage the PSF consistently with respect to the following: generating income for the benefit of the public free schools of Texas, the real growth of the corpus of the PSF, protecting capital, and balancing the needs of present and future generations of Texas school children. The PSF will strive to maintain intergenerational equity by attempting to pay out a constant distribution and maintain the value of assets per student after adjusting for inflation.*

Per the Constitution, distribution rates from the PSF-SBOE are calculated in even-numbered years for the next fiscal biennium and are set at the discretion of the SBOE. The determined rate is then multiplied by the previous 16 quarter average market value of the PSF to determine the distribution amount for each year. The distribution amount is limited by two factors:

1. must be less than 6% of the sixteen quarter average market value of the PSF and
2. less than the total return on the PSF-SBOE assets over the ten-year period consisting of the current state fiscal year and the previous nine fiscal years.

The quarterly market values used in the calculation of the distribution amount are set at the end of the sixteen quarters previous to the regular legislative session that begins before the state

fiscal biennium for which the distribution will be made. Distributions are therefore calculated using market values as stale as 8 quarters prior to the beginning of each of the distribution biennium.

The effective distribution rate is the annual distribution divided by the ending market value of assets. Given the mechanics of the distribution calculation, the effective rate of distribution tends to be lower than the adopted or stated distribution rate as PSF assets are expected to grow in most years. The distinction between the adopted distribution rate and effective distribution rate can cause confusion among parties who do not fully understand the distribution methodology. The greater the growth in assets of the PSF, the greater the spread between the effective and adopted distribution rates. Because the first quarterly market value used in the distribution calculation is 5.5 years old by the time the distribution is made, significant changes in asset values can occur. The time period is sufficient where in almost all cases the effective distribution rate will almost always be below the adopted distribution rate.

Given the certainty required for planning state and district budgets, we find this process consistent with other organizations setting distribution rates. Providing this certainty for state and local budgeting, however, comes at a cost: namely, an effective distribution rate below the rate that perfectly aligns with intergenerational equity so long as actual returns rise above expectations.

At each July even-numbered year meeting the SBOE Board adopts a potential range of rates for further consideration. At each November even-numbered year meeting the Board adopts the final rate. Factors included in the rate setting discussion include expected rates of return on assets, expected inflation, expected student population growth, administrative expenses, and expected SLB contributions. In Section 6 of this report we discuss the impact each of these assumptions has on future distribution rates. In Section 7 we discuss the sustainable distribution rate to achieve intergenerational equity going forward.

**SLB**

The SLB has broad discretion when setting distributions to either the ASF or PSF-SBOE, but is guided by Texas Natural Resources Code Section 51.413(b) and Texas Administrative Code Chapter 31 § 151.6. The Natural Resources Code states “The board shall adopt rules to establish the procedure that will be used by the board to determine the date a transfer will be made and the amount of money that will be transferred to the available school fund or to the State Board of Education for investment in the permanent school fund from the real estate special fund account as provided by Subsection (a).

The Administrative Code builds on this and outlines the following procedure by which the SLB shall evaluate potential distributions.

1. No later than July 31 of each even-numbered year the Chief Investment Officer (“CIO”) performs the following analysis and provides it to the SLB.

    a. Determine an amount equal to 6% of the average market value of the GLO PSF (PSF-RESFA) Real Assets Investment Portfolio (Portfolio) over the trailing sixteen-quarter measurement period.

    b. Round the amount calculated in paragraph (1)(A) of this section up or down to the nearest $5,000,000 increment.

    c. Determine the average quarterly change in the amount determined in paragraph

(1)(A) of this section over the trailing sixteen-quarter measurement period. Multiply this amount times 4 and add the resulting product to the amount determined in paragraph (1)(A) of this section. Round the resulting amount up or down to the nearest $5,000,000 increment.

The above analysis is provided by the CIO to the SLB by September 1 of each even-numbered year to make their determination on transfer to PSF-SBOE and distributions to the ASF. There is no requirement that the distributions equal the amounts calculated in the above. Distributions are set for each year of the next approaching fiscal biennium. Not only does the SLB have discretion on setting the distribution amount, the SLB also decides where to send assets, to the PSF-SBOE or the ASF, and how much each receives.

In addition to the statutory guidance, the SLB has adopted a rule intending to distribute 6% of the 16 quarter average market value of the PSF-RESFA account.

## Section 5 – Analysis of Historical Patterns and Trends of the PSF

RVK has reviewed various historical metrics related to distributions from the PSF to the ASF. These include the market value of the investment portfolio, distribution levels, student population growth rates, and public education spending in Texas. We conducted this analysis in real terms to allow for year to year comparisons and understand trends first without the effect of inflation. We have used FYE 2019 as the base year for all dollar figures shown below (i.e., all amounts are shown in 2019 dollars). We have also reviewed multiple definitions and measures of inflation to gain a robust understanding of the drivers of distributions.

No measure of inflation is perfect for an analysis with such a specific and targeted definition of spending as the per student cost of public education in the state of Texas. Most available measures of education inflation center on higher education costs and are not directly applicable to public education. At the same time, the broader measures of inflation include many components that do not directly change the cost of providing public education. Figure 7 compares various options for converting historical nominal values into real inflation adjusted values.

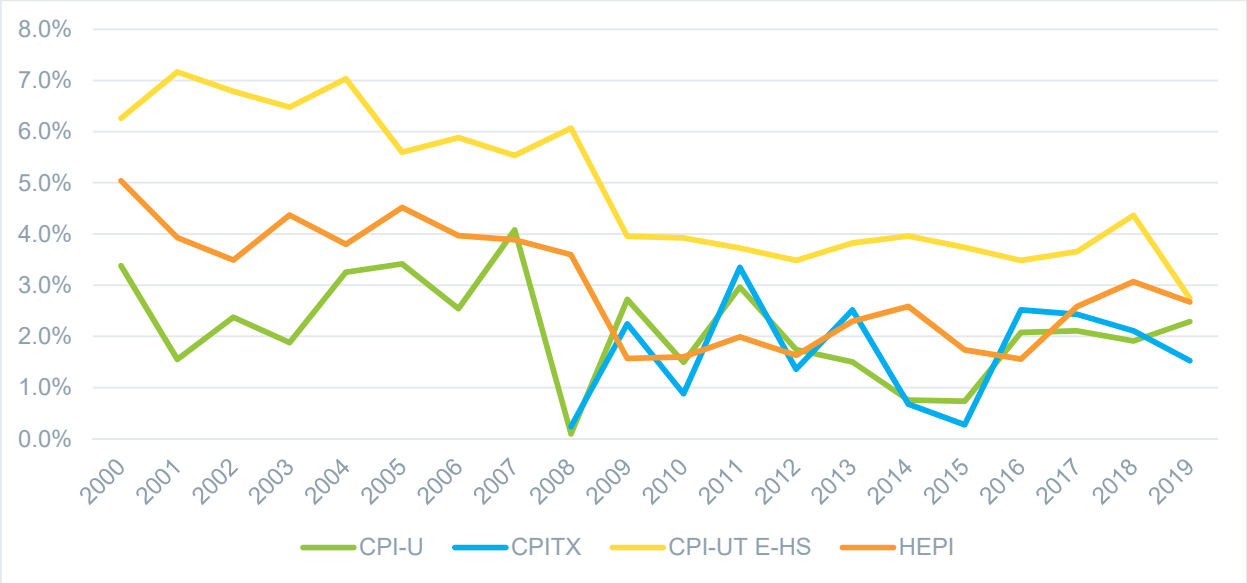
- **Consumer Price Index ("CPI-U") –** The CPI-U is a measure of general inflation in the United States produced by the US Bureau of Labor Statistics ("BLS") on a monthly basis. It is one of the most widely used and broad measures of US inflation. Per the BLS, CPI-U is a "measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services." While widely utilized, CPI-U is nationally based on a large array of products and services used by consumers, making it far from perfect for this analysis. Many factors that drive CPI-U do not directly impact the cost of public education. Additionally, CPI-U is a national measure making it less than perfect for price increases in Texas.

- **Texas Consumer Price Index ("CPITX") –** CPITX is the same as CPI-U, but only for the state of Texas. Our analysis shows that while CPITX is lower on an absolute basis than national inflation, the two series are highly correlated and movements tend to mirror each other very closely. While CPITX is more relevant to analyses in Texas, the much longer availability of CPI-U makes it a makes CPI-U a more useful measure for this study.

- **CPI-U Tuition (Elementary and High School Tuition and Fees) ("CPI-UT E-HS") –** This measure produced by the BLS analyzes tuition costs at private K-12 schools across the US. While this study is focused on public education, an analysis of this data set allows us to compare educational cost increases to general price increases. As can be seen in Figure 7, this measure tends to be higher than overall inflation. Given private schools operate in a different budgetary environment, one not necessarily aligned with the tax base, we believe this is a sub-optimal measure of inflation for this study.

- **Higher Education Price Index ("HEPI") –** HEPI tracks the costs of higher education. It is a well utilized measure of educational cost inflation in the US, but given its higher education focus is not a useful measure for this study.

Figure 7: Measures of Inflation (Annual)



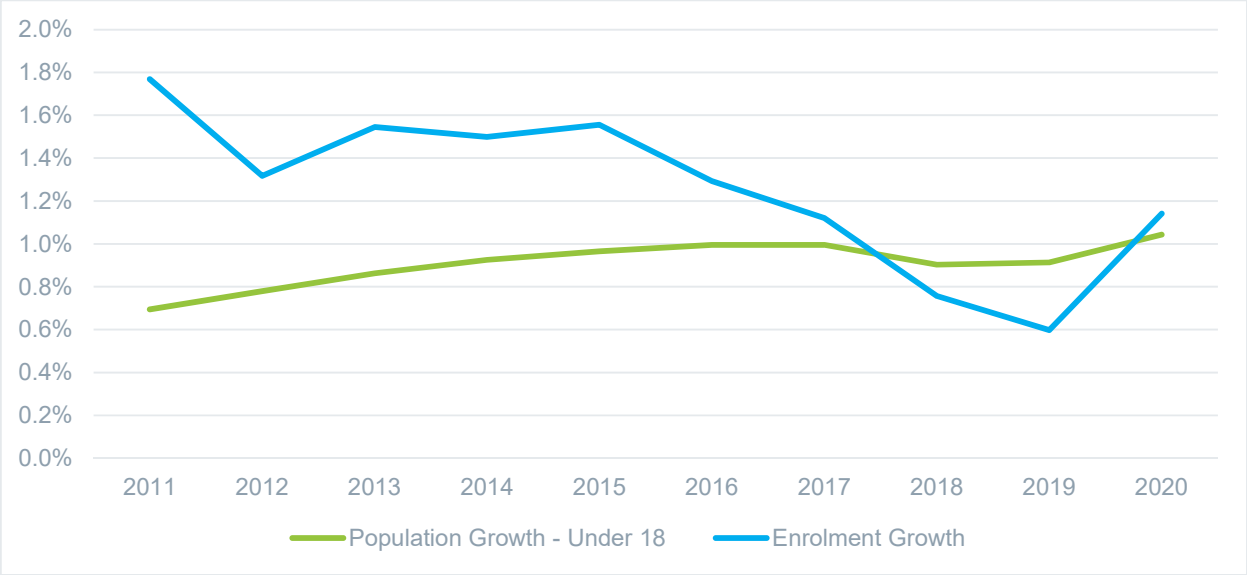

After evaluating these potential metrics, RVK has chosen to utilize CPI-U as the baseline inflation metric for our analysis. While many of the drawbacks in using the CPI-U are real, over the very long-term we believe public education inflation is most reasonably estimated by general inflation among the metrics available.

**Student Enrollment Growth**

Several measures of student populations in Texas are available, including student enrollment, average daily attendance ("ADA"), and weighted average daily attendance ("WADA"). Each serves a specific purpose in determining state funding for public education. For our analysis we have chosen to use student enrollment as it is the most comprehensive measure of student population and it has the advantage of providing the longest available data set.

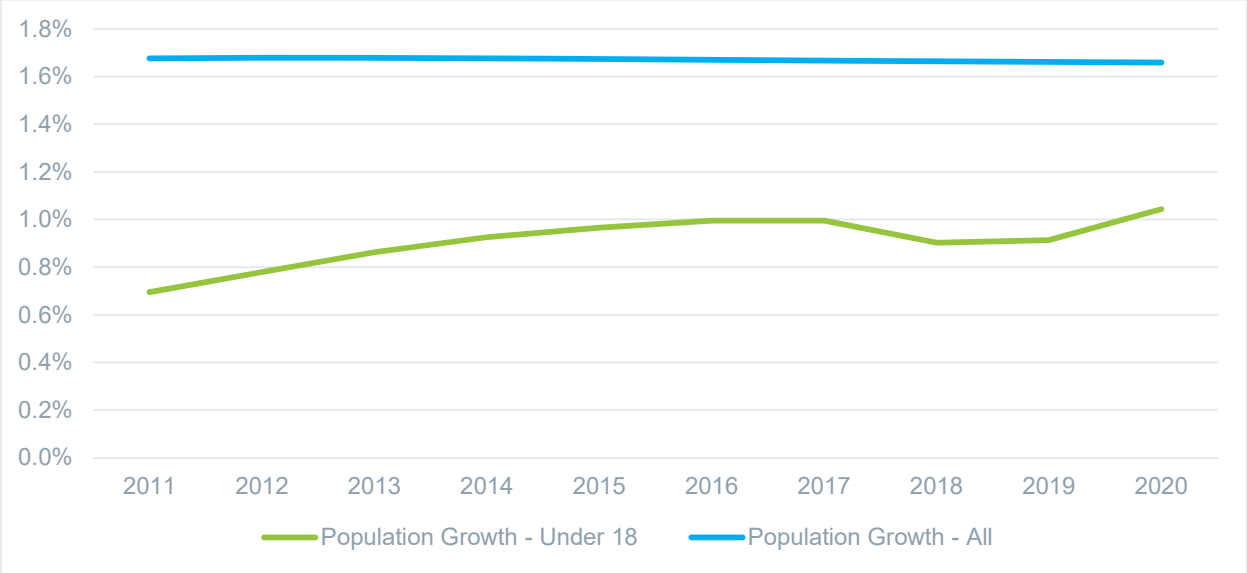
Student enrollment growth is critical to understanding distributions on a *per student* basis. The figures below show historical enrollment as well as population growth rates for the state of Texas. The average student enrollment growth rate has been 1.7% since 1987. However, with the exception of the most recent year, this average has been trending down over time and has averaged 1.3% over the last 10 years and 1.0% over the last 5 years.

Figure 8: Texas Population and Student Enrollment Growth




To gain a better understanding of student enrollment we have also examined population growth in the state of Texas. General population growth has also been slowing over recent years and projections by the Texas Demographic Center show this trend is expected to continue over the next 30 years into the 2050s. When examining trends in student age populations, the trend has actually shown an increasing rate of growth in the less than 18 years of age demographic. Growth rates have increased from 0.7% in 2011 to 1.0% in 2020. Projections show growth rates between 1.1% and 1.4% over the next 30 years.

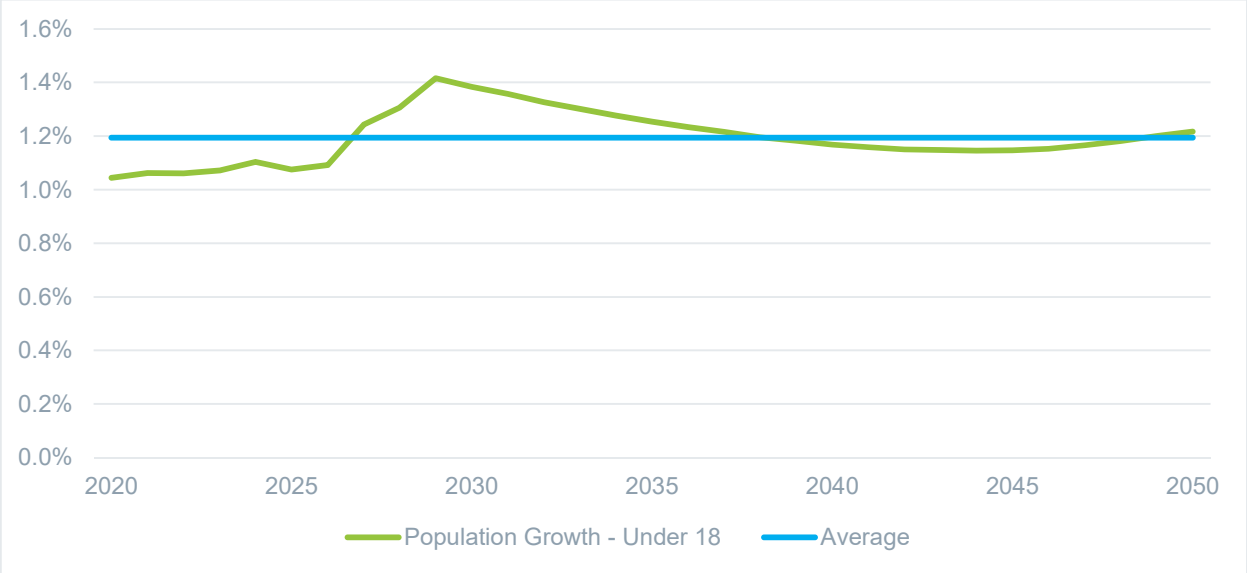
Figure 9: Texas Population Growth Rates




For the 2019-2020 school year, student enrollment increased by 1.1% which mirrors the estimated growth rate of population growth of those under 18 which grew at 1.0%. Based on this analysis, a reasonable estimate of student enrollment is estimated population growth of those under 18. Over the next 30 years this demographic is projected by the Texas Demographic

Center to grow on average by 1.2%.

Figure 10: Projected Texas Population Growth Rates – Under 18




**PSF Market Value**

Figure 11 shows the historical market value since 2003 broken out between the PSF-SBOE and PSF-SLB. The PSF-SLB includes the PSF-RESFA and cash account prior to 2019. After June 30, 2019 it includes the PSF-RESFA and the PSF-LA. Also shown is the per enrolled student value of the PSF during this same time period. All values are real after inflation expressed, as noted earlier, in 2019 dollars. On an inflation adjusted basis, total PSF assets have grew by 69% between FYE 2003 to FYE 2019. PSF-SBOE grew by 36% during this time period and PSF-SLB has grown by over 2100%. This has led to PSF-SLB making up a larger percentage of total assets since FYE 2003 as shown in Figure 11. At FYE 2003 PSF-SLB represented 1.5% of assets whereas at FYE 2019 the value was 19.8% of assets. The PSF-RESFA is constitutionally limited to 15% of total PSF. At this time PSF-RESFA is about 9% of total assets.

Figure 11: Historical Real PSF Market Values

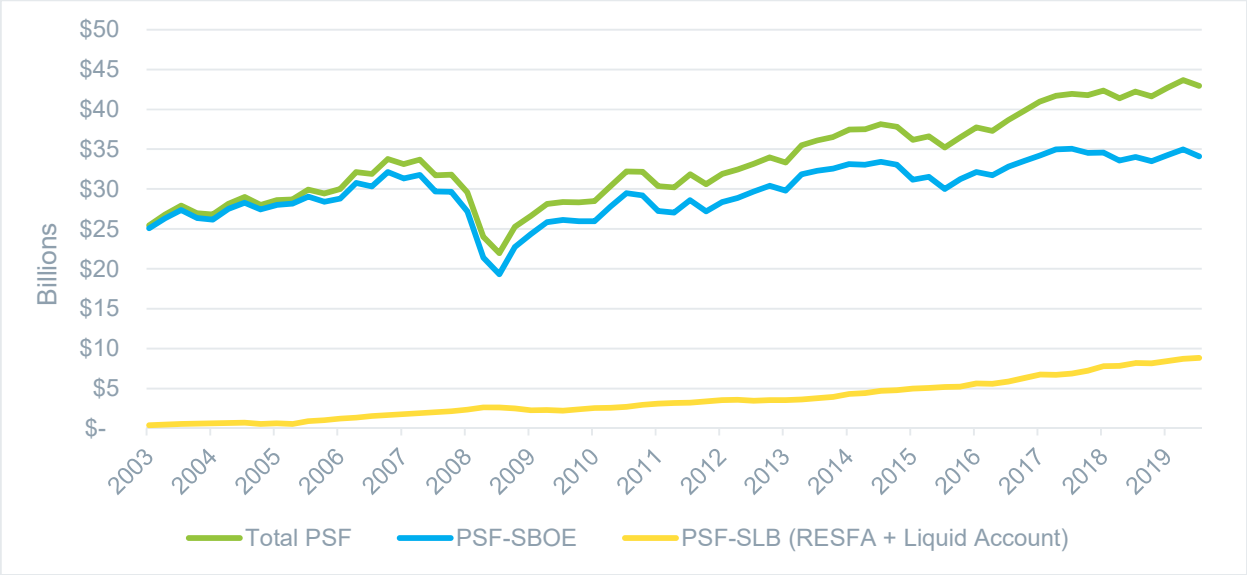
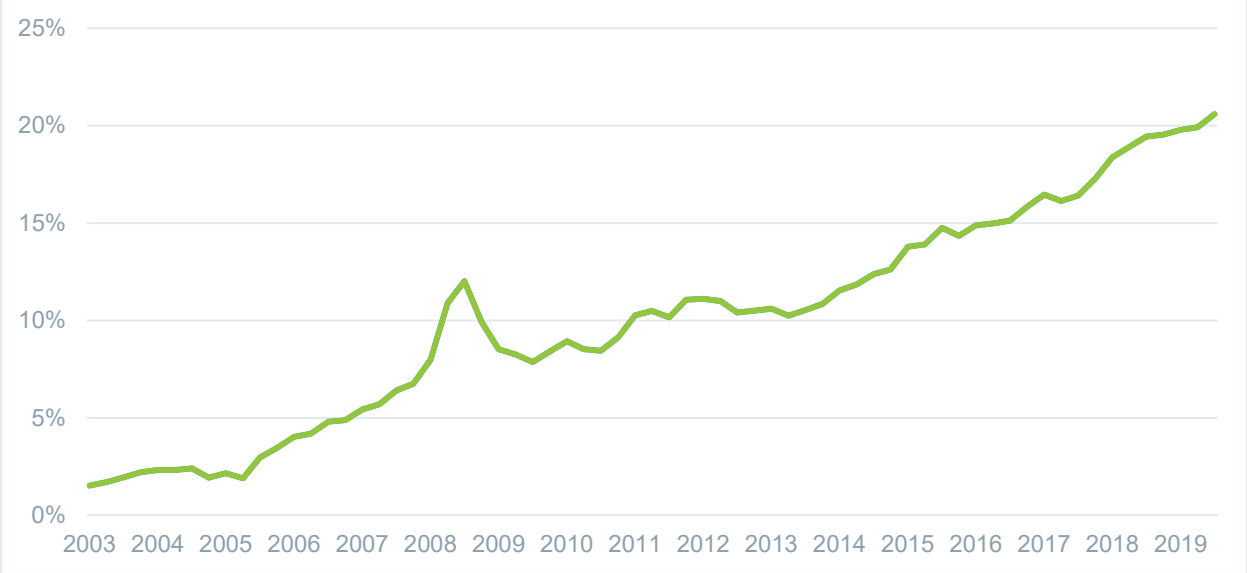
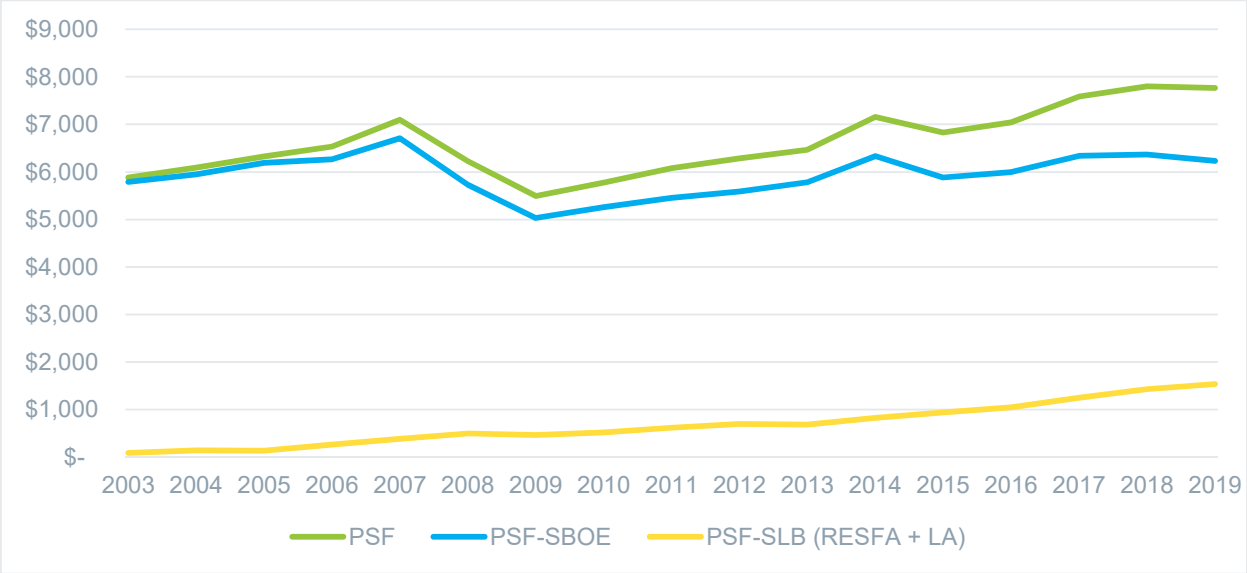



Figure 12: PSF-SLB (PSF-RESFA + PSF-LA) Assets as a Percentage of Total PSF Assets




When we examine the real market value of the PSF on a per enrolled student basis, assets have grown by 32% since 2003. PSF-SBOE has grown assets by 8% on a per student basis while PSF-SLB has grown assets by over 1600% on a per student basis.

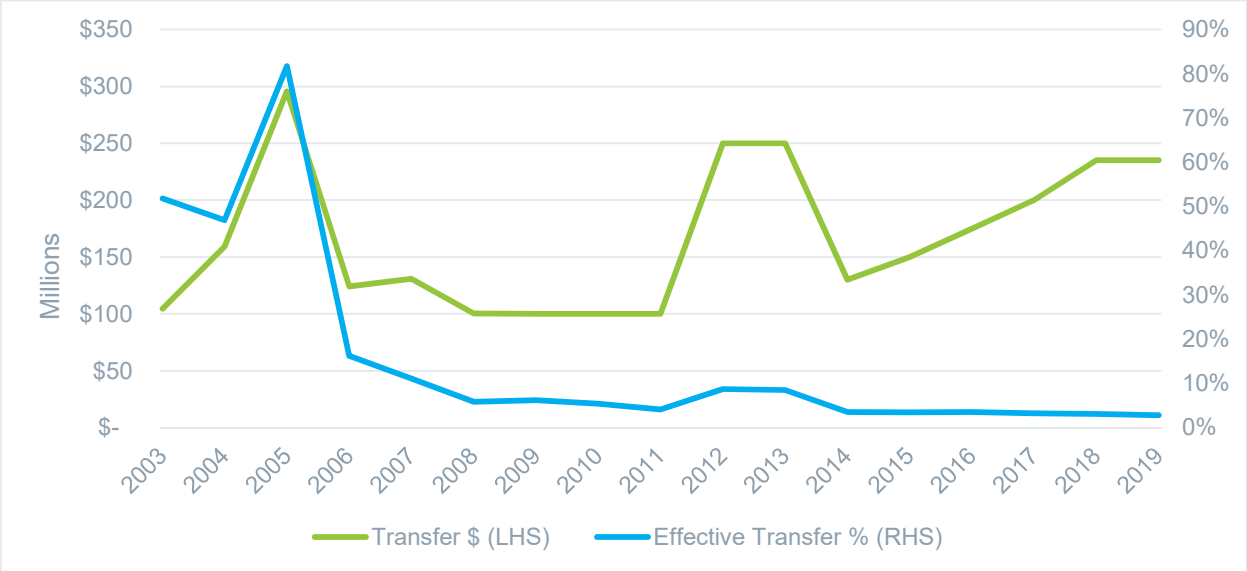
Figure 13: PSF Real Assets per Enrolled Student




**Transfers from PSF-RESFA to PSF-SBOE**

The SLB has discretion to transfer assets to the PSF-SBOE. These transfers have averaged $191 million (real) annually since 2003, but have varied year–over-year as shown in Figure 14 below. While growing on an absolute basis, the 2019 transfer represented the lowest in terms of percentage of assets transferred over the last 10 years at 2.8% (of total PSF-SLB assets) of the current year's end market value. However, this does not include distributions to the ASF from the PSF-RESFA. Since 2003, the SLB distributed $300 million in both 2013 and 2019 to the ASF from PSF-RESFA and is projected to distribute the same amount in both 2020 and 2021.

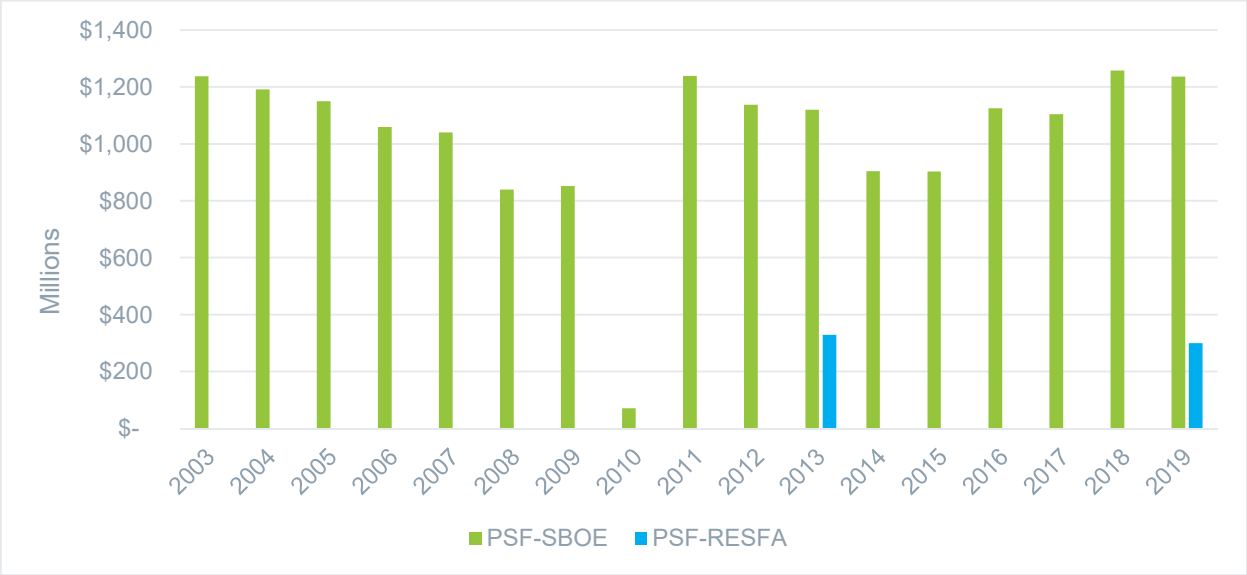
Figure 14: Real PSF-SLB Transfers to PSF-SBOE



### Distributions to the ASF

Figures 15 (as well as 18 and 23) shows historical distributions from the PSF to the ASF broken out between PSF-SBOE and PSF-RESFA. Over the last 10 years real PSF-SBOE distributions to the ASF have averaged $995.1 million. In fiscal year 2011 the distribution was materially less than all other years in the time period. This was due to the adverse returns suffered by the PSF-SBOE investment portfolio during the Great Financial Crisis combined with constitutional limits on distributing assets in excess of the 10 year total return for the PSF-SBOE. This was offset to some degree with a larger distribution in 2011. SLB twice made $300 million distributions to the ASF, one in 2013 and again in 2019. No distributions were made from the PSF-RESFA to the ASF in the other years of this 10 year period. This equates to an average annual real distribution of $57.2 million. Combined, real annual distributions have averaged $1.05 billion.

Figure 15: Annual Real Distributions to the ASF



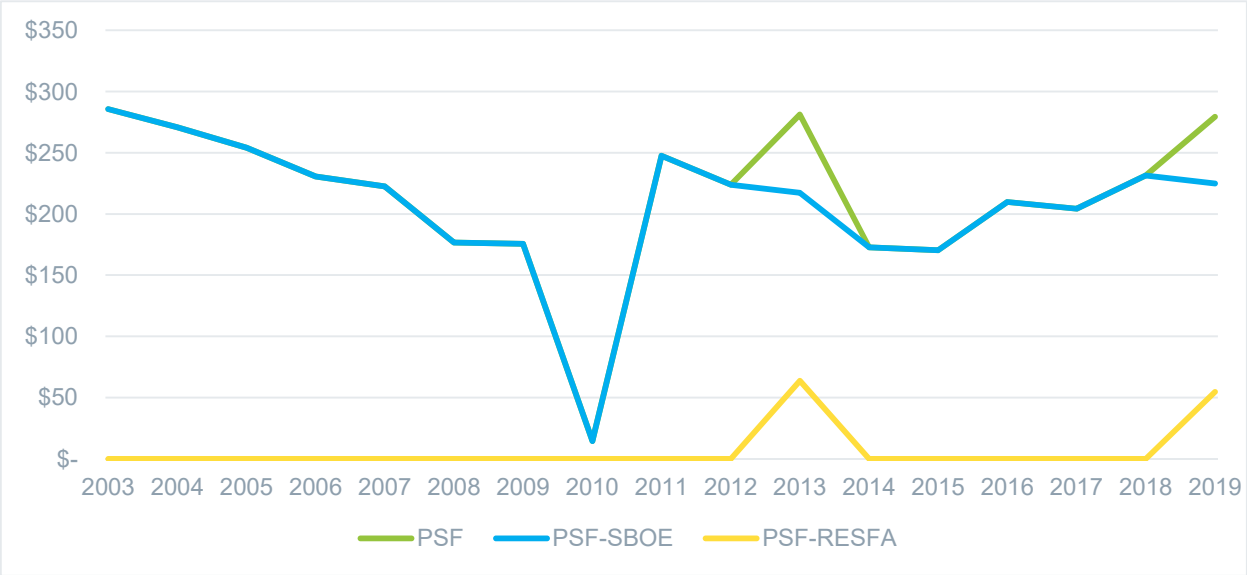

The SBOE has set FY 2020 and 2021 distributions at $1.102 billion per year. The SLB released $600 million to ASF and $10 million to PSF-SBOE in FY 2020. The SLB has approved the release of $415 million in FY 2022 and $460 million in FY 2023 directly to the ASF.

Since 2003 real distributions from the PSF-SBOE alone have remained roughly constant. Over the last 10 years they have grown at an annual rate of 3.8%. If we remove the Great Financial Crisis and start this analysis in 2012 we find the real annual growth rate in PSF-SBOE distributions to the ASF have averaged 1.0%.

On a *per student* basis, distributions from the PSF-SBOE have fallen about 1.4% since 2003 but have grown 3.8% per year over the last 10 years. Growth in the student population over the last 10 years has resulted in distributions on a *per student* basis to grow at a lower rate of 2.5%. Since 2003, real distributions have averaged $208 per enrolled student. Again taking out the Great Financial Crisis and beginning the analysis in the biennium beginning in 2012, the annual per student real growth rate has been 0.1%. Intergenerational equity would target a rate as close to 0.0% as possible while also preserving the real market value of the portfolio. While distributions per student have largely achieved this goal, as shown above, assets have continued to grow at a faster rate. This would suggest the potential that distributions have recently perhaps been too low.

Of course this conclusion is reached with the benefit of perfect hindsight. No analysis can perfectly estimate the distribution rate that exactly achieves long-term intergenerational equity. Additionally, intergenerational equity distribution rates should be expected to change as estimates of the future update. More important than the question of whether past distributions have met the intergenerational mandate is whether decisions affecting future distributions can be aligned even closer with holding real growth in the corpus (per student) to zero. We address future distribution rates in the following sections to reset and refresh the forecast and try to better align future distributions with intergenerational equity. We also note there has been a general upward trend as shown in Figure 16 of real per student distributions since 2015 and particularly since 2017.

Figure 16: PSF Real Distributions per Enrolled Student




Given the irregular pattern of distributions to the ASF from PSF-RESFA, it is not useful to compare year-over-year changes except to note that the real value of those distributions follow no discernable pattern we can determine either with respect to events in the capital markets or the intergenerational equity objective.

However, we can examine trends in *total* distributions and transfers from the PSF-RESFA whether they were sent to the ASF or to the PSF-SBOE. Total distributions have averaged $229 million on a real basis since 2003 and have grown 8.0% on an annual basis over this time period. When analyzed on a per student basis, real distributions have grown by 6.5%. However, the trend line of total distributions over the last 17 years has been highly irregular and the total amount over this period is dominated largely by the inclusion of a recent $300 million transfer to the ASF in 2019. As shown in Figure 17, annual distributions from the PSF-SLB tend to be volatile and highly episodic. This volatility is largely driven by the SLB's decision to distribute additional funds directly to the ASF.

Figure 17: Total Real PSF-SLB Distributions

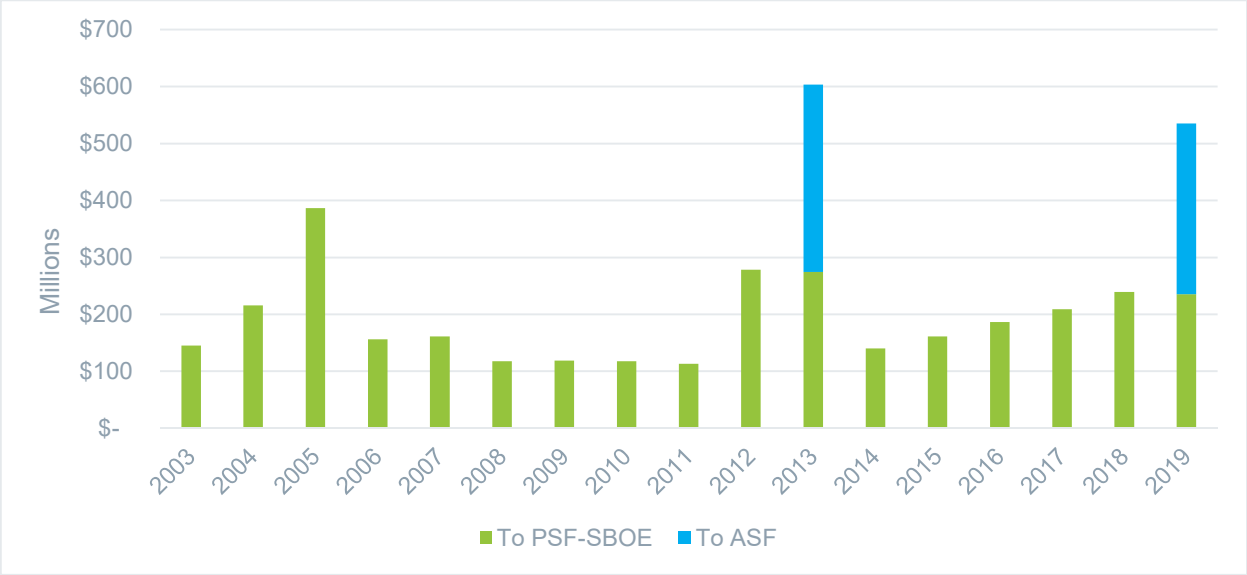
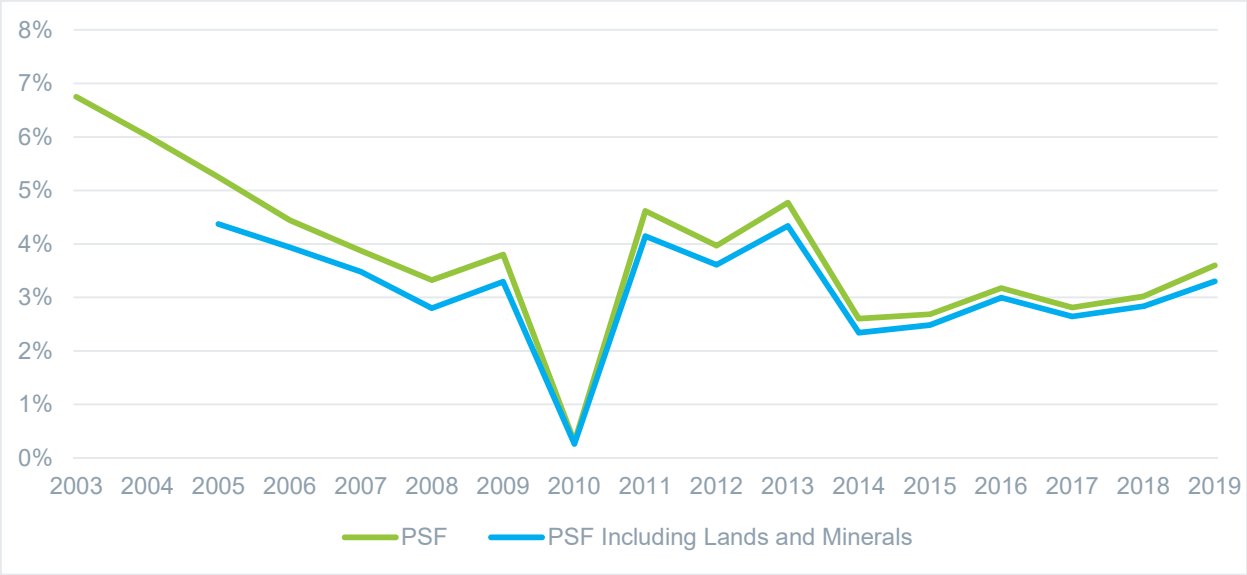



Figure 18 shows the total effective distribution rate from PSF (both) PSF-SBOE and PSF-RESFA) to the ASF. For clarity this is calculated as total transfers to the ASF divided by total PSF assets at the end of that year including PSF-SBOE, PSF-RESFA, and the PSF-LA (cash prior to June 30, 2019). These rates differ from the rates adopted by both PSF-SBOE and PSF-SLB for several reasons. First, this is the *total* distribution, regardless of source. Second, the chart shows effective distribution rates, not adopted distribution rates. As outlined earlier, effective rates are the current year's distribution compared to the current year's assets while the adopted rates are based on current year's distribution compared to the trailing 16 quarter asset value.

Figure 18: PSF Effective Distribution Rate




The effective distribution rate has averaged 3.8% since FY 2003. This drops to 3.1% since FY 2005 if the Lands and Mineral assets are included in the calculation.

Based on the analysis in this section, over the last 10 year distributions have potentially been below the level that achieves intergenerational equity. Real distributions on a per enrolled student basis have remained relatively constant while real asset growth has exceeded enrolled student growth. When we examine a slightly longer period back to 2003 we find the intergenerational mandate has largely been met. As we examine in the next section it is not easy to estimate the future drivers of distributions. However, under reasonable assumptions based on conditions today we believe distributions in the future can be increased while still maintaining intergenerational equity.

## Section 6 – Impact of Data and Methodological Assumptions

For this section we utilize a basic model for estimating long-term sustainable distribution rates that can be constructed as shown in Figure 19. This allows us to examine each component individually.

Figure 19: Distribution Model

$$\boldsymbol{Distribution} =$$

$$Return$$

$$-inflation$$

$$-expenses$$

$$-student\ growth\ rate$$

$$-corpus\ growth\ target$$

$$+expected\ cash\ inflows$$

We have estimated historical values for each component of this model as shown in Figure 19. Future distributions rates are influenced heavily by estimates for each model component. The only two of which that can be controlled are expected return (through the selection of a strategic asset allocation) and expenses. Inflation, regardless of what measure is used, and student growth rates cannot be controlled by TEA, SBOE, GLO, or any other organization. However, they must be estimated and examined to help understand what a sustainable distribution rate is going forward.

### Expected Return

Many academic studies show that expected returns are largely driven by the strategic asset allocation of the assets and the current capital markets environment. In Section 8 we examine asset allocation in more depth and analyze changes that may be expected via increases or reductions in expected returns going forward. Given expected return is the largest driver of future distributions, Capital Markets Assumptions ("CMAs") play a critical role in setting appropriate distribution rates. CMAs play two important roles in estimating future expected returns. First, they are used in asset allocation modeling to determine an optimal allocation of assets between various asset classes (equities, bonds, real estate, alternatives, etc.). Setting the asset allocation target is an attempt to position asset class weightings to generate the maximum level of expected return at a given level of risk. Once the asset allocation has been set, the portfolio will generate returns based on what markets do going forward regardless if the CMAs were correct or not. The second role CMAs play is estimating the future expected returns of the portfolio in absolute terms to determine appropriate distribution rates. CMAs with expected returns higher than levels achieved in the future can cause a fund like PSF to over-distribute now leaving less for future generations. On the other hand, CMAs with returns too low can lead to under-distributing today shortchanging the current generation. In other words, poor CMAs can lead to poor intergenerational equity.

CMAs are forward-looking estimates of the behavior of investment asset classes (i.e., groups of closely related investment opportunities). Examples include U.S. stocks, international stocks, real estate, U.S. bonds, etc. CMAs estimate three behaviors of these asset classes including

expected return, expected risk or volatility, and the relationship of the asset class returns and all other asset classes or correlation. CMAs (in the form of a “set” of risk, return, and correlation parameters for every asset class) are the most pervasively used tools in the management of institutional portfolios and are generally long-term in nature (at least 7 years or longer).

The accuracy of CMAs can be evaluated in two ways: relative accuracy and absolute accuracy. Relative accuracy (well distributed) across the assumptions set is far more important than barbell accuracy where some assumptions are “spot on” and others are far off. Relative accuracy leads to well-diversified portfolios. Barbell accuracy produces the opposite: unbalanced and poorly diversified funds. Achieving relative accuracy across a CMA set, requires that every risk and return assumption needs to be “triangulated” to all other assumptions—particularly closely related ones.

Absolute accuracy matters as well, but is a secondary consideration in the set of CMAs. Having CMAs that are too low across the board can cause a perpetual fund to believe it must restrict distributions to a greater degree than necessary. Having CMAs that are too high across the board is an even worse problem because it leads an endowment to believe it can distribute more than it can afford.

Using excessively high CMAs across the board is one way to win business by suggesting clients will earn high returns. Remember, these are forecasts only, and their chief purpose is to optimally structure the portfolio. Well-structured funds are produced by “well-distributed accuracy” not simply “forecasting” higher returns. Well-structured funds end up with higher long-term returns and lower risk.

A well-structured and well-executed fund will produce the highest returns the markets will allow—regardless of what we consultants forecast for total return.

CMA expectations have generally been falling across most asset classes for the past several years as several factors drive down future expected returns. First, public equities are highly valued and this remains true even after the COVID-19 crash as the subsequent rise in stock prices coupled with falling earning expectations have pushed valuations back towards all-time highs. High equity valuations tend to produce lower future returns. In the fixed income space future return expectations have fallen as a result of falling yields across the yield curve as governments and central banks across the globe attempt to stimulate the economy during the current recession. Again, current yields are a strong indicator of future return expectations for fixed income.

Alternative asset classes have not been immune from falling return expectations either. Private investments such as private equity, private credit, and real estate have seen massive asset flows into the asset classes. These flows have pushed prices up increasing valuation and reducing yields. The result of reduced return expectations going forward is lower distribution rates as the portfolios don’t generate the same level of returns they have in the past. One path some institutional investors have taken in their journey for higher returns is to increase the riskiness of the portfolio with the expectation that this will deliver higher returns in the future. While we do not recommend this for PSF, we do discuss this option in more detail in Section 8.

Reviewing SBOE-PSF distribution discussion materials an expected rate of return is based on their investment consultants’ (NEPC) CMAs based on the asset allocation of the SBO-PSF. The excepted return used for the 2020/2021 distribution rate was 6.52%. We have compared this to two other sources for CMAs. First, we use RVK’s own 2020 CMAs to compare. Then we look at the Horizon Actuarial Services, LLC Survey of Capital Markets Assumptions 2020 Edition. This

survey collects CMA data from 39 investment advisors and provides aggregate data to help gauge market expectations for institutional investors.

Figure 20 outlines the expected return based on this data.

Figure 20: Expected Returns

| | PSF | PSF-SBOE | PSF-RESFA | PSF-LA |
|---|---|---|---|---|
| **RVK CMAs** | | | | |
| Expected Compound Return | 6.41% | 6.43% | 8.00% | 4.28% |
| Expected Risk (Volatility) | 11.13% | 11.14% | 17.71% | 6.75% |
| Expected Sharpe Ratio | 0.44 | 0.44 | 0.37 | 0.41 |
| **Horizon Survey Median** | | | | |
| Expected Compound Return | 7.03% | 7.14% | 8.14% | 4.84% |
| Expected Risk (Volatility) | 11.22% | 11.59% | 14.13% | 6.76% |
| Expected Sharpe Ratio | 0.49 | 0.49 | 0.47 | 0.49 |

The Sharpe Ratio represents the excess rate of return over the risk-free return divided by the standard deviation of the excess return to the risk free asset. The result is the absolute rate of return per unit of risk. The higher the value, the better the product's historical risk-adjusted performance. The values above are based on a risk-free rate of 1.50%.

Using RVK's CMAs we estimate the expected return for PSF is 6.41% while the Horizon survey suggest a slightly higher long-term return of 7.03%. The values for PSF-SBOE are roughly in-line with expectations for PSF as a whole. The PSF-RESFA has a higher expected return given its target asset allocation is 100% in private strategies, this also drives expected risk higher as well. The PSF-LA offsets the higher expected return of the PSF-RESFA as it is expected to be heavily invested in cash and fixed income securities in-line with its more conservative mandate.

### Inflation

Inflation requires greater investment earnings to maintain a constant real market value of the portfolio. Should inflation expectations move higher, distributions would need to decrease all else equal to maintain intergenerational equity and constant per student distribution rates.

Despite a variety of approaches and attempts by the Fed to stimulate growth, low inflation has persisted in the US since the Great Recession. Additional stimulus following the COVID-19 crisis has only pushed market expectations for future inflation even lower. The "break-even inflation rate" approximates the expected inflation compensation using the difference between the yield-to-maturity of nominal and inflation-linked Treasury securities of equivalent maturities. As of June 30, 2020, the 30-year market breakeven inflation expectations fell to 1.56% down 25 basis points since the beginning of 2020.

Inflation is also a critical component of any set of CMAs. RVK's current expectation for inflation is 2.00% while PSF-SBOE's investment consultant assumes 2.50% (as of the most recent report provided) and SBOE Staff estimates 2.28%. The Horizon study discussed above shows average inflation expectations of 2.16%.

Figure 21: Expected Inflation

| | RVK | Horizon Study | SBOE Staff | SBOE Investment Consultant | 30 Year Break Even Inflation% |
|---|---|---|---|---|---|
| Expected Inflation | 2.00% | 2.16% | 2.28% | 2.50% | 1.56% |

While there are certainly risks to higher inflation in the future, most notably the large expansion in the Fed's balance sheet corresponding with massive fiscal stimulus, expectations on average are for low inflation to continue. Therefore we believe a range of 2.00% to 2.50% is reasonable based on current market conditions.

### Expenses

The primary driver of expenses are investment management fees. Overall fee levels are also largely driven by asset allocation. While reducing management fees should be the goal of any institutional investment pool, the results that generate additional assets for distributions are net of fees investment performance. Reducing fees does not necessarily equate to higher net of fees returns. Said differently, asset allocation decisions should not be made on fees, but on net of fees expected returns. Additionally, if the quality of investment managers is sacrificed through fee cutting, net of fees performance might also fall resulting in fewer assets to support distributions.

That said, the CMAs discussed above are net of investment management expenses so no additional fees need to be considered in this analysis.

### Enrollment growth

When we examine materials related to setting distribution rates, it appears the SBOE assumptions for the 2020/2021 distributions used a range between 1.4% and 1.5% for student enrollment growth rates. This was based on 5- and 10- year historical averages. Based on our discussion in Section 5, this may be too high as future population growth for the under 18 demographic is expected to average 1.2% over the next 30 years. However, we believe utilizing conservative assumptions in distribution setting discussions is appropriate. We do recommend the SBOE considers linking student enrollment assumptions with population forecasts to better estimate future trends. For our analysis we have used 1.2%.

### Corpus Growth

Consistent with the stated objective of intergenerational equity we believe the appropriate real (after inflation) corpus growth rate for use when setting distribution rates is 0.00%. A real corpus growth rate higher than zero would suggest distributing less today for the benefit of future students. Conversely, a rate below zero would target over distributing today leaving less for future generations.

### SLB Cash Inflows

Assets flowing into the PSF-RESFA allows the SLB to distribute additional assets on an annual basis. Estimating future inflows is extremely challenging. Discussing the issue with the SLB we believe a reasonable long-term assumption is 50% of the current levels. Based on this we assume $500 million comes into the PSF-RESFA on an annual basis outside of investment gains. We assume these transfers grow at inflation to maintain a constant real value. At current PSF-RESFA asset levels this represents approximately a 0.70% increase in distribution rate. Over a 25-year projection it averages a 0.50% increase.

### Putting it All Together

Based on the model described above, and our discussion of the model components, we can estimate a sustainable effective distribution rate that achieves intergenerational equity. Figure 22 shows the effective distribution rate based on both RVK's CMAs and the median

expectations based on the Horizon survey. We find an average distribution rate of 3.21% based on RVK's CMAs and 3.67% based on the Horizon survey to represent a sustainable effective distribution rate.

Figure 22: Sustainable Forward Looking Effective Distribution Rates

| | PSF* | | PSF-SBOE | | PSF-RESFA | |
|---|---|---|---|---|---|---|
| | RVK | Horizon | RVK | Horizon | RVK | Horizon |
| Expected Return | 6.41% | 7.03% | 6.43% | 7.14% | 8.00% | 8.14% |
| - Inflation | 2.00% | 2.16% | 2.00% | 2.16% | 2.00% | 2.16% |
| - Expenses | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| - Student Growth Rate | 1.20% | 1.20% | 1.20% | 1.20% | 1.20% | 1.20% |
| - Corpus Growth Target | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Sustainable Spending Rate | 3.21% | 3.67% | 3.23% | 3.78% | 4.80% | 4.78% |
| + Asset Inflows | 0.05% | 0.05% | 0.00% | 0.00% | 0.50% | 0.50% |
| Sustainable Spending Rate with Cash Inflow | 3.26% | 3.72% | 3.23% | 3.78% | 5.30% | 5.28% |

*Includes Liquid Account which is not shown on its own.

Given the asset pool is split with different investment strategies the actual distribution from each pool will be different. Based on the higher expected return for the PSF-RESFA, we would expect distributions from this portfolio to be higher on a percentage basis than the PSF-SBOE. Using this methodology, we estimate the PSF-SBOE portfolio can support an effective distribution rate of between 3.23% and 3.78% and meet the intergenerational equity mandate. For the PSF-RESFA we estimate a rate in excess of the 6% statutory limit. If we exclude the projected cash inflow we estimate a rate of approximately 4.80% under both sets of CMAs. On a weighted average basis this works out to the 3.21% as discussed above for PSF as a whole. If we include asset inflows the rate can be materially higher, 4.35% based on RVK's CMAs.

Focusing on the more conservative sustainable distribution rate that excludes asset inflows we find recent effective distribution rates (as repeated below in Figure 23) have been below what we find in this analysis. However, this not the case in every year as some year's distributions have been above this rate. As previously discussed, translating an adopted distribution rate into an effective rate that closely matches the estimated long-term sustainable rate is difficult to achieve.

Additionally, cash inflows into the PSF-RESFA have also likely contributed to asset growth outpacing distribution growth. These cash inflows have been higher in the past 5 years than previously experienced or expected.

Figure 23: Historical Effective Distribution Rates*

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PSF-SBOE | 3.5% | 0.3% | 4.5% | 4.0% | 3.8% | 2.7% | 2.9% | 3.5% | 3.2% | 3.6% | 3.6% |
| PSF-SLB (PSF-RESFA + PSF-LA) | 5.2% | 4.6% | 3.6% | 7.9% | 17.1% | 3.2% | 3.2% | 3.3% | 3.1% | 3.1% | 6.3% |
| PSF-SLB (PSF-RESFA + PSF-LA + Land and Minerals) | 1.9% | 1.9% | 1.7% | 4.1% | 8.8% | 1.6% | 2.0% | 2.4% | 2.2% | 2.3% | 4.4% |
| PSF (PSF-SBOE + PSF-RESFA + PSF-LA) | 3.8% | 0.3% | 4.6% | 4.0% | 4.8% | 2.6% | 2.7% | 3.2% | 2.8% | 3.0% | 3.6% |
| PSF (PSF-SBOE + PSF-RESFA + PSF-LA + Land and Minerals) | 3.3% | 0.3% | 4.1% | 3.6% | 4.3% | 2.3% | 2.5% | 3.0% | 2.6% | 2.8% | 3.3% |

*To calculate historical effective distribution rates, RVK has divided the given year's distribution by that year's ending market value.

## Section 7 – Alternative Approaches to Balance the Needs of the PSF and ASF

### What is an Intergenerational Equity Study?

An intergenerational equity study enables PSF to monitor the Fund's ability to achieve its vision over the long-term. It uses a holistic approach to assess the fiscal health and sustainable distribution rate of PSF by incorporating the current investment structure of the PSF as well as future demands on those assets (distributions). An intergenerational study provides the ability to dynamically examine the impact of potential changes to PSF that impact the long-term fiscal health of the Fund including:

- Investment Decisions (e.g., asset allocation changes, asset class additions)
- Anticipated Future Market Environments (e.g., rising inflation)
- Constitutional Amendments
- Legislative Action

We have experience modeling and measuring intergenerational objectives over various lengths of time. The time horizon should be sufficiently long to ensure it captures and spans at least one generation and provides sufficient time for modeling assumptions to materialize, however not so long that potential inputs may no longer be relevant or estimated with any reasonable degree of confidence. For these reasons, RVK typically recommends modeling a time period of 25 years which is what we have used for the PSF model.

Funds should strive to reach and maintain a 50% probability of attaining the intergenerational equity objective in order to provide equitable opportunities across all generations.

Figure 24: Intergenerational Equity

| Probability | Interpretation |
|---|---|
| 0% - 49% | Value of benefits available to future generations is eroding relative to generations of today |
| 50% | Value of benefits available to future generations is equal relative to generations of today |
| 51% - 100% | Value of benefits available to future generations is greater relative to generations of today |

With distribution rates for both PSF-SBOE and PSF-SLB largely discretionary (with constitutional and legislative caps and limits), our objective with this model is not to analyze the distribution policy in place, but rather gain insight on to what levels of distribution is sustainable to support long-term intergenerational equity for PSF.

### PSF Intergenerational Analysis

We have developed a stochastic model for the PSF to determine the distribution rate that achieves intergenerational equity over time. One of the advantages of using a stochastic model is that it provides a distribution of possible outcomes, not just the most likely outcome. In addition to showing the median value of variables, we have also shown the 25$^{th}$ and 75$^{th}$ percentiles to show this range. By using 25$^{th}$ and 75$^{th}$ percentiles we capture half of the distribution of potential outcomes meaning there is a 50% chance the outcome falls inside of this range.

Our Monte Carlo model simulates 5,000 potential paths of future capital markets returns based

on RVKs 2020Q1 CMAs. Additional information about our CMAs is provided in the Appendix of this report. Critical to this is the use of our Monte Carlo (or simulation) model that allows asset classes to behave based on their historical distribution of returns. For example, we know public equity has not historically followed a normal distribution. Public equity's returns have been skewed by drawdowns occurring more frequently and at larger magnitudes than estimated by a normal distribution. Using a non-normal distribution allows us to capture these intricacies and better estimate future ranges of returns.

In order to construct this type of distribution model we have to make several assumptions on how the PSF operates going forward. We believe the assumptions discussed below are reasonable and do not systematically skew results.

1. Expected asset returns are based on RVK's 2020Q1 CMAs.
2. Inflation is also based on RVK's CMA set and assumes a 2.00% long-term average.
3. Assets are invested at current target asset allocation weights based on estimated May 31, 2020 market values. We assume no changes in investment policy going forward other than the full adoption and continued implementation of the long-term PSF-LA target asset allocation.
4. Assets for the 3 investment pools (PSF-SBOE, PSF-RESFA, and PSF-LA) are modeled separately and the results are combined for total PSF analysis.
5. The PSF-LA is invested at the long-term target asset allocation at the beginning of the projection period.
6. The SLB receives $500 million annually from the income producing lands and mineral rights. This is a conservative estimate based on conversations with the SLB. There is no way to predict what will happen to royalties, oil prices, energy demand etc. going forward with any certainty. This estimate is based on the SLB receiving approximately 50% of what they have averaged over the last 5 years.

The primary objective of our modeling was to determine the distribution rate from each asset pool that achieves long-term intergenerational equity. Based on our model we determine that this rate is 3.22% for PSF-SBOE and 5.70% for PSF-RESFA of the 16 quarter trailing market value. This equates to a combined total PSF distribution rate of 3.46%. These values are slightly lower than those calculated in Section 6. The primary driver of the reduction is the introduction of volatility and uncertainty into the model. In Section 6 we assume the investment return was earned each and every year without exception. In this section returns are averaged across many scenarios. In this type of analysis bad years tend to pull down distribution rates more than good years pull rates up.

Figure 25: Intergenerational Equity Analysis

| | PSF* | PSF-SBOE | PSF-RESFA |
|---|---|---|---|
| Intergenerational Equity Effective Distribution Rate | 3.46% | 3.22% | 5.70% |
| Probability of Achieving Intergenerational Equity | 62% | 50% | 50% |
| Projected Real Market Value in 25 Years (billions) | $66.0 | $44.8 | $14.7 |
| Projected Total Distributions (billions) | $47.3 | $33.3 | $14.0 |

*Includes PSF-LA.

An interesting result of the PSF-LA is that the distribution rates that achieve intergenerational

equity from both the PSF-SBOE and PSF-RESFA leave the probability of PSF achieving intergenerational equity at 62%. This results from the fact that no distributions are made directly from the PSF-LA. This would suggest that PSF-SLB as a whole can actually contribute at a rate higher than the 5.70% calculated for the PSF-RESFA. We would note however even small changes to any of the assumptions can have a large impact on this analysis and any material changes should be reviewed in this context.

Figure 26 shows the projected distribution of market values for the PSF over the next 25 years. Similar charts are shown for PSF-SBOE and PSF-RESFA individually in the appendix. The PSF projected real market value is expected to end the 25 year projection at $66.0 billion assuming the distribution rates that achieve intergenerational equity as discussed above. The range in outcomes is large, as expected investment volatility is high. The 25th percentile projected market value is $53.0 billion and the 75th percentile is $84.0 billion. Extreme cases could widen this range.

Figure 26: PSF Projected Real Market Value

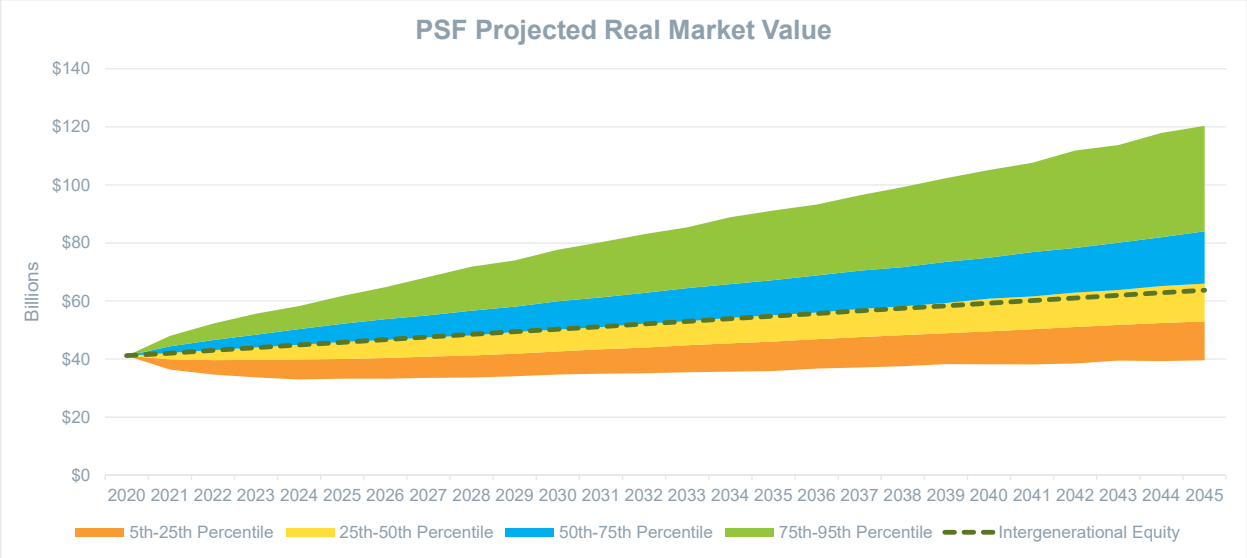



Figure 27 shows the projected range of distributions over the next 25 years. The 25th percentile distribution rate is $1.7 billion while the 75th percentile is $3.4 billion.

Figure 27: PSF Projected Real Annual Distributions

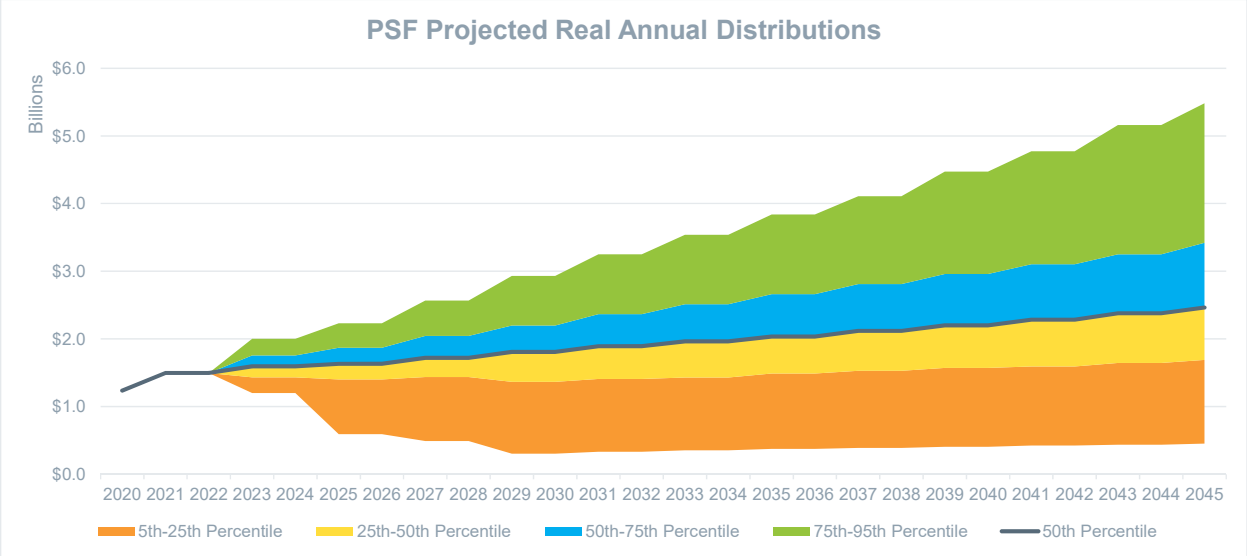
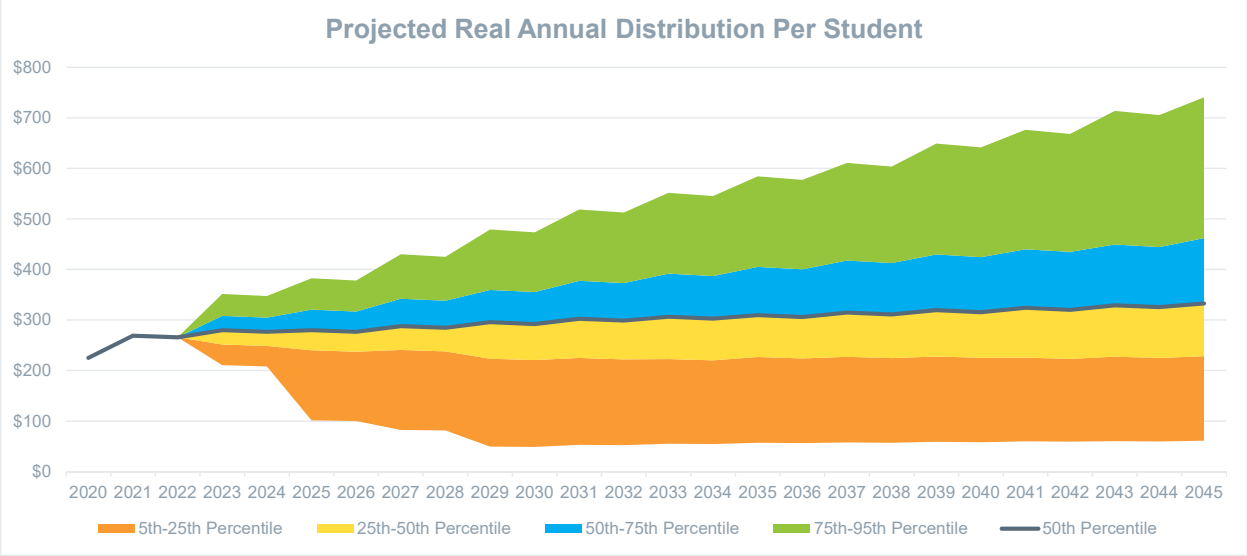



Figure 28 shows the projected range of distribution per enrolled student over the next 25 years. Assuming the 1.2% student enrollment growth rate as discussed in Section 5, we find the median annual distribution per enrolled student to be $225 in 2020. This value grows through the projection as PSF-RESFA continues to grow through cash inflows and in 25 years we project the median distribution per student to be $333. The 25th percentile distribution rate is $228 while the 75th percentile is $462.

Figure 28: Projected Real Annual Distribution per Enrolled Student




An alternative way to examine sustainable distribution rates is by analyzing the probability of achieving intergenerational equity at various effective distribution rates. Figure 29 shows the probability of achieving intergenerational equity at an effective distribution rate for both PSF-SBOE and PSF-RESFA.

Figure 29: Probability of Achieving Intergenerational Equity

| | 3.00% | 3.25% | 3.50% | 3.75% | 5.25% | 5.50% | 5.75% | 6.00% |
|---|---|---|---|---|---|---|---|---|
| PSF-SBOE | 55% | 49% | 44% | 39% | -- | -- | -- | -- |
| PSF-RESFA | -- | -- | -- | -- | 56% | 53% | 49% | 47% |

Based on our analysis in this section, we find a sustainable distribution rate based on current target asset allocations of 3.22% for PSF-SBOE and 5.70% for PSF-REFSA. This equate to a blended total PSF rate of 3.46%. Consistent with the analysis in Sections 5 and 6, these rates are above actual effective distribution rates over the past several years with the exception of 2019.

### Scenario/Sensitivity Analysis

Any stochastic model is highly sensitive to the inputs. Therefore, we have run three scenarios in addition to the baseline run of the model to determine a reasonable range of distribution that is likely to achieve intergenerational equity. The first two scenarios examine the results under both a reduced inflationary environment and an increased inflationary environment. The third scenario examines the case where the SLB receives no income from lands or mineral rights and therefore there is no outside cash flow into the PSF-RESFA. These scenarios are outlined in Figure 30.

Figure 30: Scenario Descriptions

| Scenario | Description |
|---|---|
| Lower Inflation | Reduced inflation expectations from 2.00% in the base model to 1.00% |
| Higher Inflation | Increased inflation expectations from 2.00% in the base model to 3.00% |
| No Inflows | No cash flow into RESFA from lands or mineral rights |

### Lower Inflation

Figure 31: Lower Inflation Intergenerational Equity Analysis

| Lower Inflation | PSF* | PSF-SBOE | PSF-RESFA |
|---|---|---|---|
| Intergenerational Equity Effective Distribution Rate | 4.41% | 4.26% | 6.61% |
| Probability of Achieving Intergenerational Equity | 63% | 50% | 50% |
| Projected Real Market Value in 25 Years (billions) | $67.8 | $45.4 | $16.0 |
| Projected Total Distributions (billions) | $60.7 | $43.5 | $17.2 |

*Includes PSF-LA.

The lower inflation scenario allows for higher effective distribution rates that achieve intergenerational equity than the base scenario. It also produces higher overall distributions as less assets need to be retained to maintain a consistent real asset value. The change in effective distribution at the PSF level is 0.95% higher than under the base scenario meaning almost all of the reduction in inflation expectations can be put towards increased distributions. In the base scenario we estimate the intergenerational equity real distribution per student to be $333 in 25 years. In this reduced inflation scenario we estimate it to be $428.

The risk to using a lower inflation assumption going forward is if it does not occur and instead

inflation runs higher than expectations, distributions will have been too high and future generations will suffer the consequences through lower distributions.

### Increased Inflation

Figure 32: Increased Inflation Intergenerational Equity Analysis

| Increased Inflation | PSF* | PSF-SBOE | PSF-RESFA |
|---|---|---|---|
| Intergenerational Equity Effective Distribution Rate | 2.52% | 2.19% | 4.77% |
| Probability of Achieving Intergenerational Equity | 62% | 50% | 50% |
| Projected Real Market Value in 25 Years (billions) | $64.8 | $44.9 | $13.8 |
| Projected Total Distributions (billions) | $34.1 | $22.9 | $11.2 |

*Includes PSF-LA.

As one would expect, distribution rates that achieve intergenerational equity are lower. The base scenario projects a rate of 3.46% for PSF as a whole while the increased inflation scenario allows for a rate of 2.52%, a difference of 0.94%. This is almost the exact opposite of the lower inflation scenario. In the base scenario we estimate the intergenerational equity real distribution per student to be $333 in 25 years. In this increased inflation scenario we estimate it to be $238. The tradeoff of using an increased inflation assumption is that if inflation turns out to be lower than expectations, current distribution rates will have been set too low and future generations will benefit through higher distributions.

### No Inflows

Figure 33: No Inflows Intergenerational Equity Analysis

| No Inflows | PSF* | PSF-SBOE | PSF-RESFA |
|---|---|---|---|
| Intergenerational Equity Effective Distribution Rate | 3.13% | 3.22% | 5.07% |
| Probability of Achieving Intergenerational Equity | 62% | 50% | 50% |
| Projected Real Market Value in 25 Years (billions) | $55.7 | $45.2 | $5.0 |
| Projected Total Distributions (billions) | $38.9 | $33.3 | $5.6 |

*Includes PSF-LA.

In this scenario we have assumed the PSF-RESFA does not receive cash inflows from lands or mineral rights. While this might be an extreme scenario, it allows us to examine intergenerational equity distribution rates from assets currently in hand. The PSF-SBOE results are the same in this scenario as the base scenario given that we have made no changes to its assumptions. The PSF-RESFA's effective distribution rate drops from 5.70% to 5.07%. Projected distributions drop from $14.0 billion to $5.6 billion over the 25 year projection period, a drop of 60%. The total PSF distribution rate drops from 3.46% to 3.13%. This equates to a drop in cumulative distributions from $47.3 billion to $38.9 billion, or an 18% drop. In the base scenario we estimate the intergenerational equity real distribution per student to be $333 in 25 years. In this reduced inflation scenario we estimate it to be $247. Clearly the continued inflow of cash is an important source for long-term distribution rates.

## Section 8 – Options to Maximize Distributions

The primary areas we focused our analysis on include the asset allocation of the assets, collaboration between SBOE and SLB, and the mechanics of the distribution rate setting process.

### Asset Allocation

As previously discussed there are three pools of assets that comprise the PSF, each with unique objectives and constraints. We have examined the asset allocation of each of these pools individually as well as combined as a single pool of assets. The asset allocation drives the expected return of the portfolio therefore having a direct impact on the sustainable distribution rate going forward.

There are many factors that drive the ultimate asset allocation decision. These include investment objective, time horizon, risk tolerance, liquidity needs, legal constraints, implementation considerations, among others. In the context of this study we do not have full insight into many of these factors in the detail required to recommend a comprehensive asset allocation. However, we can evaluate the potential for improvements in the efficiency of the risk-return tradeoff and the general themes and consequences of making changes to the level of risk being taken in the portfolio as it relates to the objectives of the PSF.

While increasing the expected return of the portfolio may allow for increased distributions in times of strong markets, it can also cause periods of lower distributions due to larger asset losses when markets fall. Therefore the objective of the asset allocation analysis is not to maximize expected return, but maximize expected return at a given level of risk.

Figure 34 shows the current target asset allocation of each portfolio with expected compound return and standard deviation based on RVK's CMAs.

Figure 34: Target Asset Allocations

| | PSF | PSF-SBOE | PSF-RESFA | PSF-LA |
|---|---|---|---|---|
| **Equity** | **47%** | **52%** | **0%** | **40%** |
| **Public Equity** | **34%** | **37%** | **0%** | **40%** |
| Large Cap US Equity | 13% | 14% | 0% | 20% |
| Small/Mid Cap US Equity | 5% | 6% | 0% | 5% |
| International Equities | 13% | 14% | 0% | 15% |
| Emerging Markets Equity | 2% | 3% | 0% | 0% |
| **Private Equity** | **13%** | **15%** | **0%** | **0%** |
| **Fixed Income** | **27%** | **25%** | **0%** | **40%** |
| Core Bonds | 11% | 12% | 0% | 10% |
| High Yield | 2% | 3% | 0% | 0% |
| Emerging Markets Debt (Local) | 6% | 7% | 0% | 0% |
| Treasuries | 2% | 3% | 0% | 0% |
| TIPS | 3% | 0% | 0% | 5% |
| Short Duration | 2% | 0% | 0% | 25% |
| **Alternative Investments** | **25%** | **22%** | **100%** | **0%** |
| Absolute Return | 6% | 7% | 0% | 0% |
| Real Estate | 12% | 11% | 33% | 0% |
| Real Return | 1% | 4% | 0% | 0% |
| Energy | 3% | 0% | 35% | 0% |
| Infrastructure | 3% | 0% | 32% | 0% |
| **Emerging Manager Program*** | **0%** | **1%** | **0%** | **0%** |
| **Cash** | **2%** | **0%** | **0%** | **20%** |
| **Expected Compound Return** | **6.41%** | **6.43%** | **8.00%** | **4.28%** |
| **Expected Risk (Volatility)** | **11.13%** | **11.14%** | **17.71%** | **6.75%** |
| **Expected Sharpe Ratio** | **0.44** | **0.44** | **0.37** | **0.41** |

*Modeled as a 50/50 allocation to Real Estate and Private Equity and included in these buckets for PSF.

Asset allocation analysis attempts to maximize the level of return for a given level of risk (as measured by standard deviation or volatility). The process uses a set of CMAs, an optimization model, and constraints limiting how much of the portfolio can be invested in various asset classes to develop an efficient frontier. An efficient frontier can then be used to evaluate the tradeoff between taking more or less risk with the expectation of increasing or decreasing expected long-term returns. Given the unique investment opportunities of each portfolio, we have modeled the efficient frontier for each pool separately and then combined the results for the overall PSF.

The following charts show efficient frontiers for each of the three portfolios. Overall the target asset allocations in place for each of the three portfolios appear reasonable plotting near the efficient frontier.

Figure 35 shows the efficient frontier for the PSF-SBOE.

Figure 35: PSF-SBOE Efficient Frontier

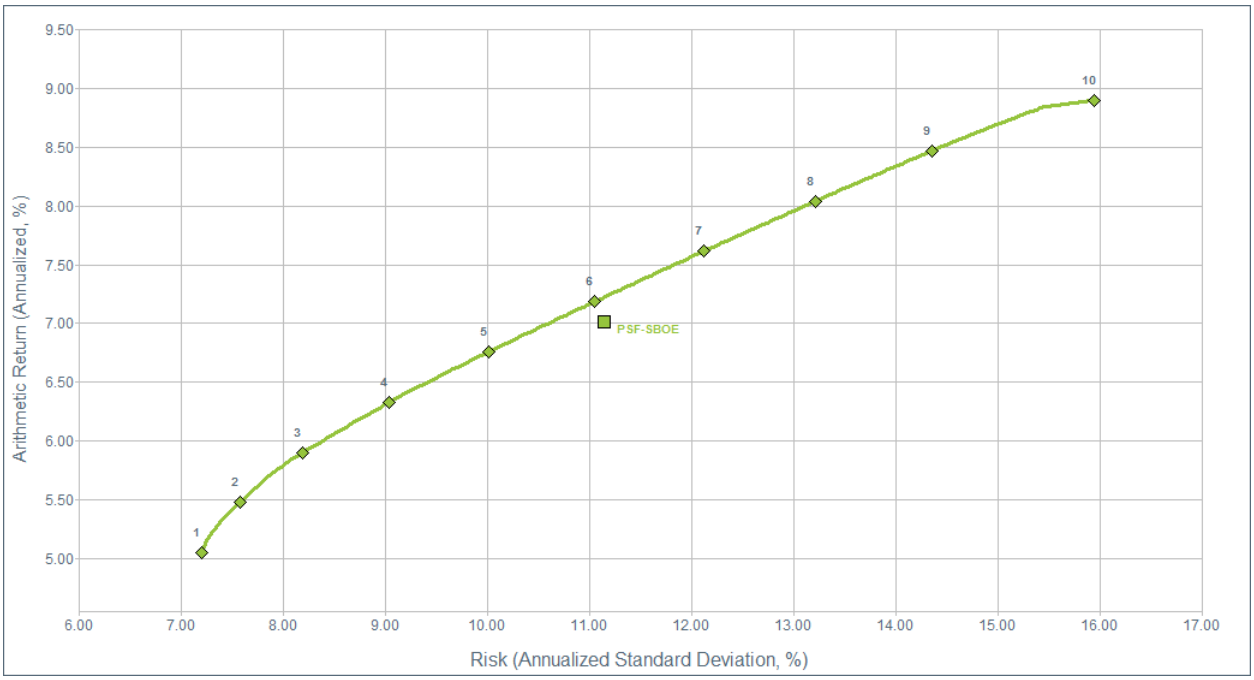



Figure 36 shows the efficient frontier for the PSF-RESFA.

Figure 36: PSF-RESFA Efficient Frontier

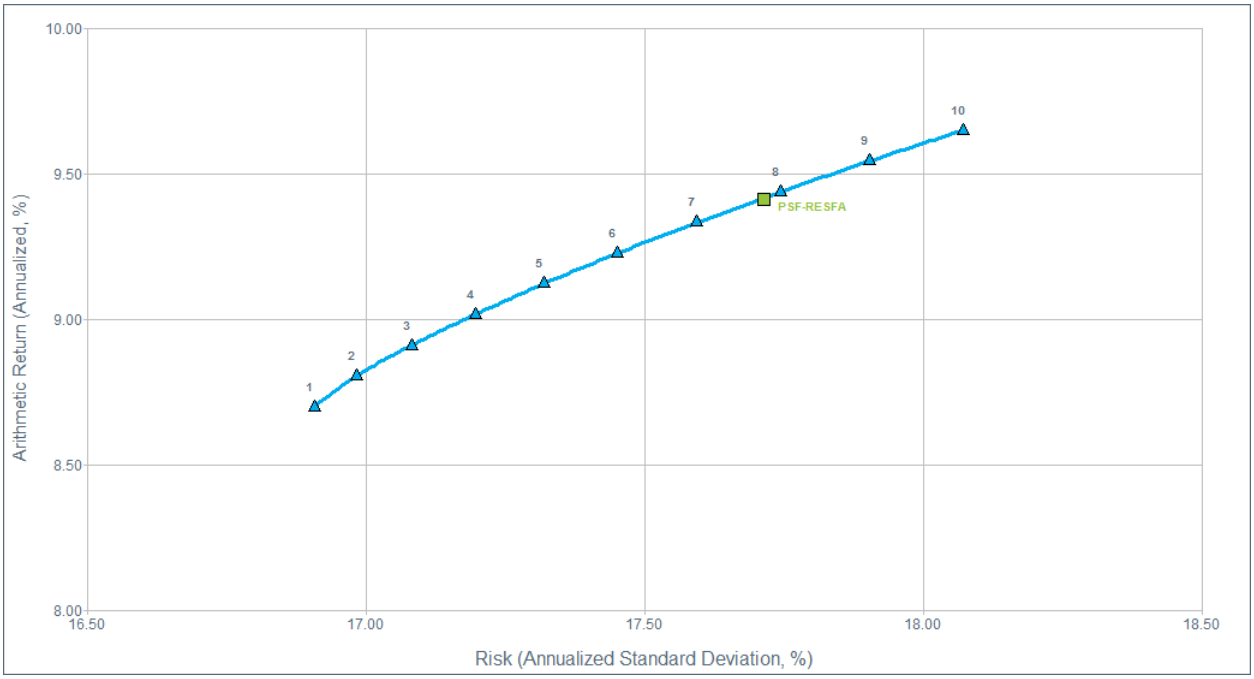



Figure 37 shows the efficient frontier for the PSF-LA.

Figure 37: PSF-LA Efficient Frontier

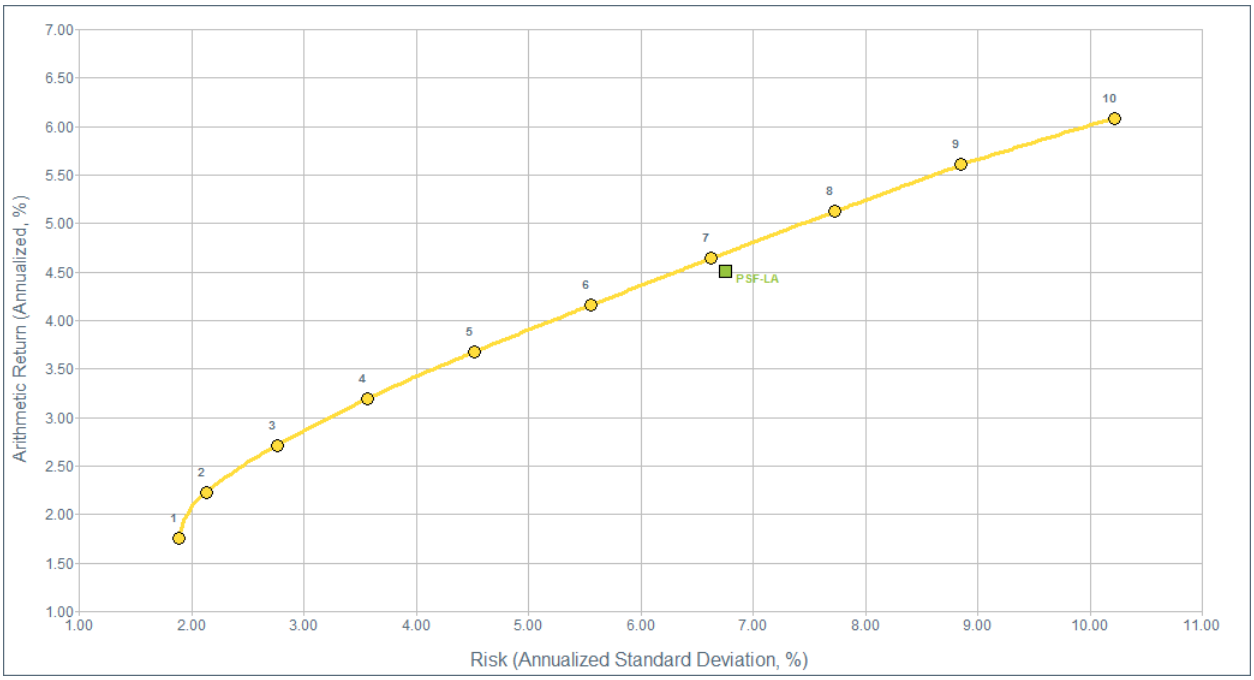
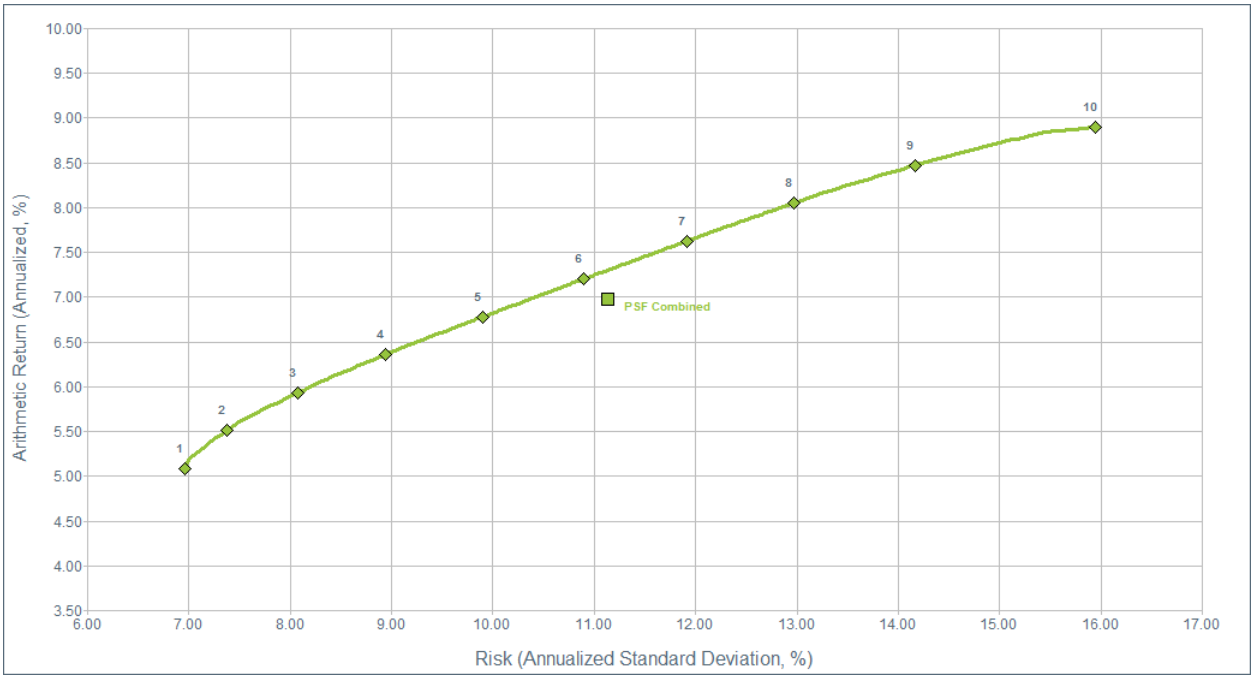



Figure 38 shows the efficient frontier for the PSF as a whole.

Figure 38: PSF Efficient Frontier




In addition to the sensitivity analysis of the intergenerational equity model in Section 7, in this section we add two additional scenarios focused on alternate asset allocation targets for each portfolio. The two alternate scenarios include a reduction in overall PSF risk of approximately 100 basis points as well as an increase in risk of the same magnitude. This analysis allows us to

assess the appropriateness of current risk levels from risk/return tradeoff perspective. Figure 39 summarizes the key inferences from these two scenarios and compares the outcomes to the baseline run of the model that is based on the current target asset allocations in place. The purpose of this analysis is to examine the risk/return tradeoff, not make specific asset allocation recommendations. Therefore we have chosen not to show the portfolios used to examine the addition or removal of portfolio risk. We believe doing so could distract from the key point of the analysis which is a focus on appropriate levels of risk. However, the risk-return tradeoff is shown in the efficient frontier above.

Figure 39: Asset Allocation Scenarios

| Scenario | Description | PSF Expected Return | PSF Expected Risk |
|---|---|---|---|
| Decreased Expected Risk | Reduced expected total PSF investment risk (standard deviation) by 1.00% | 6.10% | 10.13% |
| Base | | 6.41% | 11.13% |
| Increased Expected Risk | Increase expected total PSF investment risk (standard deviation) by 1.00% | 6.69% | 12.13% |

Examining the results of this analysis we find that while reducing risk has the expected corresponding decrease in distribution rates that satisfy intergenerational equity, because asset values are not as volatile, projected total distributions actually slightly increase. This is particularly true on the downside when market returns are less than expected. The second table in Figure 40 shows the distribution of projected real market values in 25 years for the 25$^{th}$, 50$^{th}$, and 75$^{th}$ percentiles for each of these scenarios. The projected 25$^{th}$ percentile real market value is higher in the decreased scenario compared to the other two scenarios which are relatively the same. This reduction in potential loss for the decreased risk scenario allows for similar to slightly higher distribution rates than the base scenario even though we expect less investment earnings from the decreased risk portfolio.

Figure 40: Asset Allocation Intergenerational Equity Model

| PSF | Decreased Risk | Current | Increased Risk |
|---|---|---|---|
| Intergenerational Equity Effective Distribution Rate | 3.29% | 3.46% | 3.77% |
| Probability of Achieving Intergenerational Equity | 64% | 62% | 63% |
| Projected Real Market Value in 25 Years (billions) | $65.4 | $66.0 | $66.4 |
| Projected Total Distributions (billions) | $48.8 | $47.3 | $55.8 |

| PSF | Decreased Risk | Current | Increased Risk |
|---|---|---|---|
| 25th Percentile Projected Real Market Value (billions | $55.0 | $53.0 | $53.4 |
| 50th Percentile Projected Real Market Value (billions | $65.4 | $66.0 | $66.4 |
| 75th Percentile Projected Real Market Value (billions | $79.8 | $84.0 | $83.3 |

### Collaboration between SBOE and SLB and Holistic Asset Allocation

For the first time, in 2020 the Boards of the SBOE and SLB held a joint meeting to discuss what each respective entity is doing in terms of asset allocation and strategy going forward. As mentioned above we believe this is a critical development for the PSF going forward as without this dialog the effectiveness of asset allocations can be diminished. While materials provided for this joint meeting were informative, they lacked any actual analysis of the characteristics of the combined portfolio. The addition of information including expected return and risk, potential drawdowns, liquidity analysis, can only deepen the conversation and lead to better outcomes for the PSF.

One of the risks of managing a portfolio such as the PSF in separate portfolios is that, when combined, the portfolios may not achieve the objectives of the PSF in total. For example, the

exposures of one portfolio may offset the other portfolio. Or, the portfolios may both have exposure to a particular risk that on its own is appropriate, but when combined may increase the overall risk of the portfolio. In our analysis we did not find that this is the case right now. However, we encourage continued dialog between SBOE and SLB as they each work to continue to develop and modify their long-term strategies as this could change in the future.

### Distribution Policy Design

The most basic way to increase distribution rate transparency is to adopt a set rule that meets the long-term needs of the PSF and also adheres to constitutional and legislative requirements and limits. While this approach would limit the discretion of both the SBOE and SLB in setting distributions it would allow for full transparency and more certainty for planning purposes around what future distributions would be.

There are 4 basic distribution methodologies commonly used by similar funds. We have outlined them in Figure 41. Each can be designed to target intergenerational equity with slightly differing priorities.

Figure 41: Spending Policy Design

**Desired Outcomes of a Spending Policy***

1. Minimize year-to-year variability
2. Maintain growth above the rate of inflation
3. Ensure long-term spending sustainability

| Simple Policies | Smoothing Policies | Inflation-Based Policies | Blended Policies |
|---|---|---|---|
| Example: Spending based on only dividend and interest income earned (may also include realized gains). | Example: Spending based on set rate (e.g., 5.0%) of an average market value over set period of time. | Example: Spending based on prior year spending plus change in CPI. | Example: Blends inflation and average market value components. |
| **Advantages**<br>• Simple to administer.<br>**Disadvantages**<br>• Spending goals are at the mercy of market yields. | **Advantages**<br>• Widely recognized and simple implementation.<br>• Reduces impact of sudden market value changes.<br>**Disadvantages**<br>• Actual spending can be less predictable and fluctuate<br>• Spending declines can occur at the time they are needed the most | **Advantages**<br>• Simplicity of calculation<br>• Spending precisely mirrors change in inflation<br>• Spending volatility is low<br>**Disadvantages**<br>• Risk of overspending in certain economic climates (e.g., stagflation)<br>• Risk of overspending during severe market downturns. | **Advantages**<br>• Seeks to leverage benefits of various approaches<br>• Lower volatility relative to simple, market-based policies<br>• Customization possible depending on unique portfolio needs<br>**Disadvantages**<br>• Complexity of implementation<br>• Difficulty communicating methodology to stakeholders. |

*Spending Policy is the amount removed annually from the corpus and used for the designated beneficiary purpose.

## Section 9 – Review of Peer Organizations

### Process

To begin, RVK worked with TEA to establish relevant peers to include within the study in an effort to gain valuable insight into how these funds approach furthering the advancement of education policy and appropriation legislation. Figure 42 summarizes the characteristics of the funds we analyzed as well as the criteria for inclusion. The following funds were included in our review (shown below in alphabetical order, this does not align with the order shown elsewhere):

- Alaska Permanent Fund
- Commissioners of the Land Office, State of Oklahoma
- Montana Board of Investments
- New Mexico State Investment Council
- North Dakota State Land Board
- North Dakota State Legacy Fund
- Texas Permanent University Fund
- Texas Treasury
- Utah State Trust Lands Administration
- Wyoming State Treasurer's Office (Common School Permanent Land Fund)
- Wyoming State Treasurer's Office (Permanent Mineral Trust Fund)

Figure 42: Organizations Reviewed

| Fund Number | Similar Mission/ Distribution Needs | Source of Funds | Based in TX | Size of Relevant Investment Portfolio ($B) | Comments |
|---|---|---|---|---|---|
| Fund 1 | ✓ | ✓ | x | 2.6 | When State 1 became a state in 1896, the U.S. Congress granted approximately six million acres of land to benefit public education in perpetuity. The primary return objective is to maintain purchasing power while sustaining the current distribution amount. |
| Fund 2 | ✓ | ✓ | x | 27.4 | The purpose of State 2's Permanent Endowment Trust Funds is to contribute recurring revenues for the operating budget of the State and to provide resources to various fund beneficiaries. These Funds are assets which largely represent the depletion of the State's natural resources and land grant proceeds, and are intended to provide ongoing and growing benefits for State 2. |

| | | | | | |
|---|---|---|---|---|---|
| Funds 3 and 4 | ✓ | ✓ | x | 21.8 | The State's Treasurer's Office manages over $20 billion in assets. The State's portfolio consists of nine investment pools. The various Funds are funded by constitutional and intermittent statutory mineral severance tax revenues, royalties, leases, fees and permits, and/or other revenue generated from state lands. |
| Fund 5 | ✓ | ✓ | x | 2.5 | Of the three million acres of land granted at statehood, the State's Land Office still own and manage 750,000 surface acres and 1.1 million mineral acres. Money from the land leases are distributed to common schools, colleges and universities. Revenue from the sale of land or royalties from oil or gas are placed in the Permanent Trust. |
| Fund 6 | ✓ | ✓ | x | 66.3 | State 6's Permanent Fund Corporation was created in 1980 for the purpose of managing investments. Revenues for State 6's Permanent Fund come from oil revenues. Long-term return objective is to generate total returns in excess of inflation (CPI) + 5%. |
| Fund 7 | ✓ | ✓ | x | 2.5 | State 7's Coal Severance Tax Trust Fund was established by the state constitution, which requires that at least 50 percent of the coal severance tax be deposited in a trust fund. The goal of the Coal Severance Tax Trust Fund is to support various legislative programs "to develop a stable, strong, and diversified economy" in State 7. |
| Fund 8 | ✓ | ✓ | x | 5.9 | With the passing of the Enabling Act by Congress in 1889, State 8 was granted nearly 2.6 million acres of land. Further land grants were provided to State 8 for the support of colleges, universities, the state capitol, and other public institutions. Revenues are generated through the prudent management of trust assets, which assets include approximately 706,000 surface acres and nearly 2.6 million mineral acres. |
| Fund 9 | ✓ | ✓ | x | 6.2 | State 9's Legacy Fund was created in 2010 when the voters of State 9 approved a constitutional amendment-now Article X, Section 26, of the Constitution of State 9 to provide that 30 percent of oil and gas |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | gross production and oil extraction taxes on oil and gas produced after June 30, 2011, be transferred to the Legacy Fund. |
| Fund 10 | ✓ | x | ✓ | 4.2 | The Fund's Trust Company manages eleven endowment funds totaling over $4 billion. Distributed funds are used by governmental entities to provide funding for health care, health education higher education, and historic preservation. The Funds' aim to earn an annual total return that ensures the inflation-adjusted value of distributions is maintained over the long-term. |
| Fund 11 | ✓ | ✓ | ✓ | 15 | In 1876, the Constitution set aside land in West Texas to support higher education. Today, that land – encompassing 2.1 million acres – is leased to oil and gas companies whose wells generate revenue that flows into the Fund. Land also is leased for grazing, wind farms and other revenue-generating activities. |

After establishing the peer group, RVK created a survey designed to gather information about the unique characteristics of the investment programs that support similar missions (or have similar distribution needs), as well as a like-source of funds (i.e., land-related income), where possible. Questions included within the survey inquired about general plan information as well as specifics such as: fund objectives and sources of funds, distribution methodology, governance and regulatory implications, strategic asset allocation and benchmarking, as well as staffing information. The following pages provide a summary of the most relevant comparisons sourced from the survey, conversations with the staff members responsible for the management of these funds, as well as publicly available information.

**Summary Observations**

While every fund considered in this study is unique, a number of similarities between the various programs were evident in this review. First, the stated primary fund objectives were similar in that the goal of each fund was generally to invest the revenues, often derived from land, mineral, or gas-related income, in a manner that would support the distributions to respective beneficiaries now and in the future (i.e., by protecting the fund's purchasing power). In order to accomplish this, each of the investment portfolios supporting these missions appear to be structured in a manner that is expected to achieve these objectives while also considering the risk tolerance and unique constraints of each fund. It is also worth mentioning that each of these funds were alike in that the environment in which they operate is restricted by rules and regulations set forth by governing documents and bodies such as respective state constitutions as well as the Boards that oversee the programs.

The distribution rate for each fund ranged from 3-5%, with the majority of funds reporting a distribution rate of 5%. Each of the funds had a different method of calculating how much would be distributed, which most often involved applying the distribution rate to an asset value averaged over 3-5 years, on a quarterly basis (with 5 years being the most common). The asset

value used in the calculation most often appeared to be the Fund Asset Value, but also included adjusting the prior year's distribution, fund assets excluding land and mineral assets, as well as fund assets on a one-year lag. Furthermore, several funds reported that all investment income is distributed on a monthly basis, and as such, a distribution rate is not employed in their method of funneling income to the beneficiaries.

Of the funds that responded to the question regarding distribution payment discretion, no funds reported having the ability to decide whether or not to pay the required distribution. Instead, in the case of one fund, there appeared to be some flexibility as to the amount of the distribution paid out, ranging from 3.5% at minimum, to 6% at maximum. However, despite this flexibility, this fund described not having to make too many adjustments because the current distribution policy (which adjusts the prior year's distribution by CPI+2.65%), has worked well. In addition, of the funds that responded to the question of whether or not corpus was inviolate (meaning that only investment income can be distributed), all but one fund reported that the corpus cannot be spent.

As a result, each of these funds appear to employ a strategy comprised of a diversified asset mix, consisting of equity, investment grade fixed income, non-investment grade fixed income, real assets, private assets, and more. The frequency of asset allocation review ranged from continuous (i.e., multiple times a year) to at least every 4 years, with annual reviews being the most common. The expected return based on these diversified mixes, as reported by each peer, ranged from 5.95% to 7.20%, with the average of all reported figures equating to approximately 6.46%. The assumptions for inflation also diverged among the funds, with known assumptions ranging from 2.00% to 2.25%.

From a benchmarking perspective, the majority of the funds reported the usage of a target asset allocation index, which represents a target-weighted index applied to each asset class's primary benchmark. The next most common index used to benchmark total fund returns appeared to be an actual allocation index, which represents an asset-weighted index applied to each asset class's primary benchmark. Several funds also reported using the Consumer Price Index + 5% as the fund's return objective. In addition, most funds appear to determine appropriate benchmarks through a combination of recommendations from the internal Investment and Risk Teams, as well as respective Investment Consultants.

In terms of risk management, most funds reported the use of diversification, liquidity management, monitoring and reporting (i.e., transparency), limited use of leverage, and appropriate over-collateralization (102% domestic / 105% international) with respect to counterparty risk associated with securities lending, where applicable. Furthermore, several funds employ dedicated risk management professionals tasked with reporting to the Committee or Board several times a year, in which they confirm that certain metrics and guidelines are within expectations. In one known case, a dedicated Risk Committee is also used.

With regard to governance and investment decision making, there are four common challenges that we have identified through our Investment Committee Best Practices research (which studied more than 30 investment programs). These four common challenges include 1) defining the scope of authority, 2) selecting committee members, 3) maintaining strategic continuity, and 4) optimizing decision making and execution. In our peer research summarized within this report, we have focused on challenges 1 and three as described in the following two paragraphs.

In RVK's recent sovereign wealth fund survey completed in late 2019 (which surveyed 10 funds, 8 of which are included as peers within this survey), results indicated that some form of

Investment Board is most likely to have the responsibility of approving the strategic asset allocation and investment policy. Of the 10 funds surveyed, the Land Board was solely responsible for these decisions for only 4 of the 10 funds. In addition, tactical asset allocation and selection of managers were the tasks most likely to be delegated to staff.

With respect to maintaining strategic continuity, a few of the more common challenges are Committee member turnover, infrequent committee meetings, and pre-existing biases of members of the Committee. In our research on Investment Committee Best Practices, a few tactics emerged as effective in addressing these challenges to maintain strategic continuity. These routines included: 1) Committee and Board Member Orientations, 2) Annual Investment Strategy Reviews, 3) Rolling Work Plans, and 4) Strategic Objective Statements.

**The remainder of this section provides summary tables and charts of the information gathered via independent review of public documents and RVK's peer surveys.**

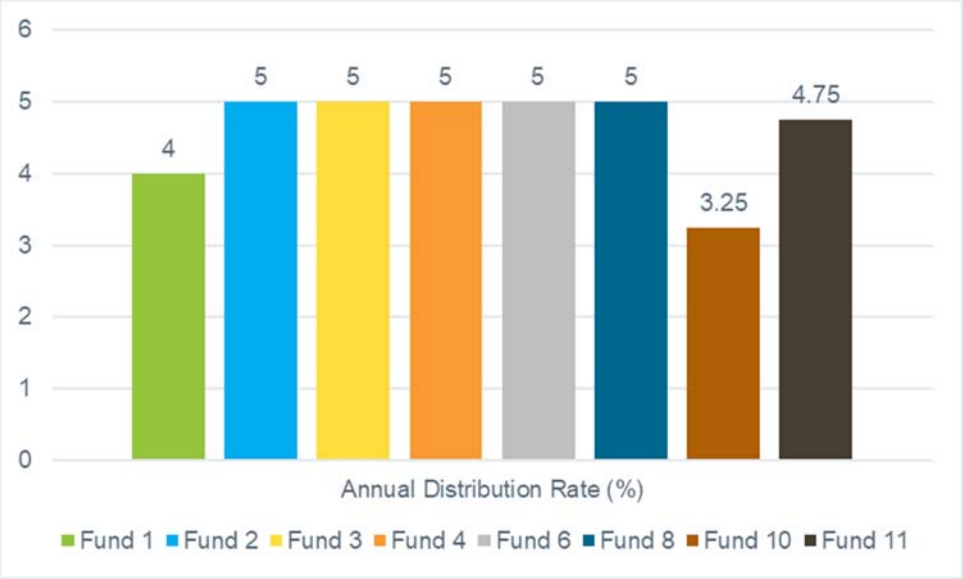
## Summary Tables and Charts

Figure 43: Primary Fund Objective(s)

| Fund | Primary Fund Objective(s) |
|---|---|
| ***Fund 1*** | *To invest revenues in a manner that supports the distribution policy in perpetuity while providing for intergenerational equity between current and future beneficiaries. Trusts are managed for the sole benefit of their respective beneficiaries.* |
| ***Fund 2*** | *Provide the annual distribution to beneficiaries as defined in State statute; protect the purchasing power of the corpus of the fund such that future distributions from the funds stay stable or increase in economic value; and provide some growth in real value, to keep up with population growth and other growth factors of the beneficiaries.* |
| ***Fund 3*** | *The main objectives are to produce maximized long-term investment income and capital gains while providing an appropriate level of safety and liquidity.* |
| ***Fund 4*** | *Preserve long-term purchasing power after spending and inflation, while providing stable income for distributions.* |
| ***Fund 5*** | *Total return objective that seeks to balance capital preservation, capital appreciation, and income generation.* |
| ***Fund 6*** | *To achieve the highest level of investment performance that is compatible with the Board's risk tolerance and prudent investment practices. Because of the perpetual nature of the Fund and the Legislature's finding that the Fund should benefit all generations, the Board maintains a long-term perspective when formulating this Policy and in evaluating Fund performance. To that end, the Board expects the Fund's design and performance will be evaluated using the following criteria:*<br>*1.* ***Investment Performance:*** *ability to generate an annualized return of CPI + 5% over a 10-year period ("long-term target")*<br>*2.* ***Investment Risk:*** *ability of the Fund to achieve the long-term target while conforming to the risk appetite approved by the Board* |
| ***Fund 7*** | *To achieve the highest level of investment performance compatible with each sub-fund's risk tolerance and prudent investment practices. The Board seeks to maintain a long-term perspective in formulating and implementing investment policies and evaluating investment performance subject to the specific objectives and constraints of each sub-fund.*<br><br>*Sub-Fund 1: Provide funds to meet all principal and interest payments on bonds payable from the coal severance tax bond fund during the next 12 months.*<br>*Sub Funds 2-5: Attain above benchmark total return for all investments within the parameters of the Investment Guidelines with an emphasis on investment income and preservation of principal.* |
| ***Fund 8*** | *Preserve purchasing power and maintain stable distributions to trust beneficiaries.* |
| ***Fund 9*** | *The primary mission of the Fund is to preserve the real, inflation-adjusted purchasing power of the monies deposited into the Fund while maximizing total return.* |
| ***Fund 10*** | *The Trust Company's mission is to preserve and grow the state's financial resources by competitively managing and investing them in a prudent, ethical, innovative and cost-effective manner while focusing on client needs.* |
| ***Fund 11*** | *To maximize investment returns within the risk parameters specified in the Investment Policy Statement without regard to the distribution rate and preserve purchasing power over time.* |

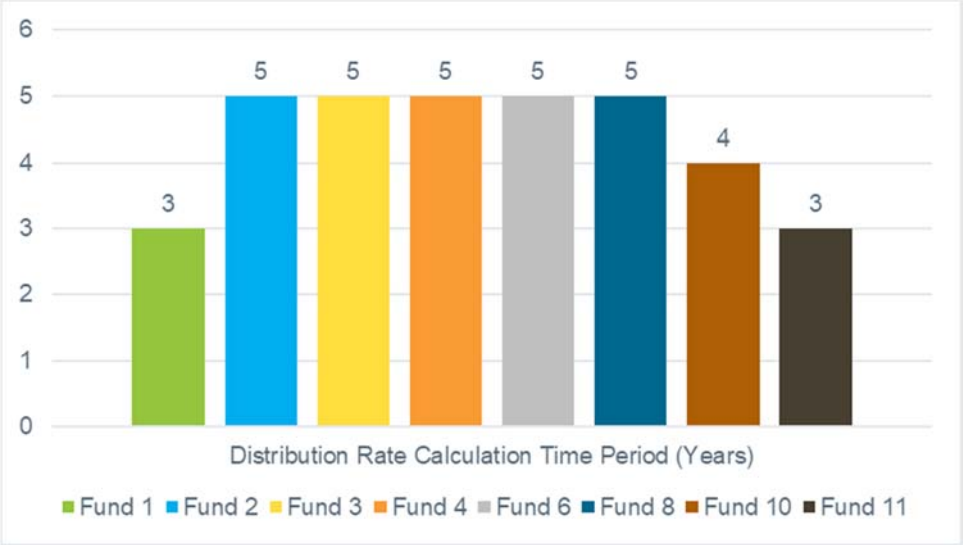
Figure 44: Annual Distribution Rate (%)

The distribution rates shown below are targeted distribution rates on an asset value measured over a trailing period of 3-5 years. As such, effective distribution rates are likely to be lower than the targeted rates shown below in environments where the asset values have trended upwards over the time periods measured. In addition, all of the distribution rates shown below are statutory, constitutional and/or are mandated by respective governing Boards (with the majority of fund distribution rates being either statutory or constitutional). In the case of one fund, a minimum and maximum range is used to provide distribution rate flexibility. For this particular fund, a maximum of 6% of the trailing 20 quarter NAV is set by the Board, but the constitutional/statutory maximum is 7%. RVK has not evaluated the ability of these stated rates for these funds to meet intergenerational equity objectives and note it is possible, if not likely, not all of these rates meet that mandate given current market conditions. Additionally, the objectives of these funds may not match those of the PSF and caution should be used when comparing potential future distribution rates between funds.




- Funds 5 and 7 distribute income monthly.
- Fund 8's distribution rate is biennial and was converted to an annual figure.
- Fund 9 distributes earnings every 2 years (i.e., net income defined by GAAP, excluding unrealized gains/losses).
- Fund 10's distribution rate shown is an average of the target distribution rate of 3.00-3.50%, which varies by each underlying funds' policy.
- Fund 11's distribution rate shown in the table above is the average of the maximum and minimum distribution rate allowed per the distribution policy which stipulates that each year in May, the prior year's distribution amount is increased by a 3 year CPI+2.65% (CPI assumption is 2%), unless the resulting distribution rate falls below 3.5% of the trailing 20 quarter average of the NAV (in which case the distribution rate is increased to 3.5%), and the distribution rate is capped at 6% (as defined by the Board). However, per the constitution, the maximum distribution must not exceed 7% of the average net fair market value.

Figure 45: Distribution Rate Calculation: Time Period in Years




- Funds 5 and 7 distribute income monthly.
- Fund 9 distributes earnings every 2 years (i.e., net income defined by GAAP, excluding unrealized gains/losses).
- Fund 10's distribution rate calculation is based on a 12 – 20 quarter (or 3 – 5 year) moving average and varies by each underlying fund.

Figure 46: Distribution Rate Calculation: Average Asset Value Measured

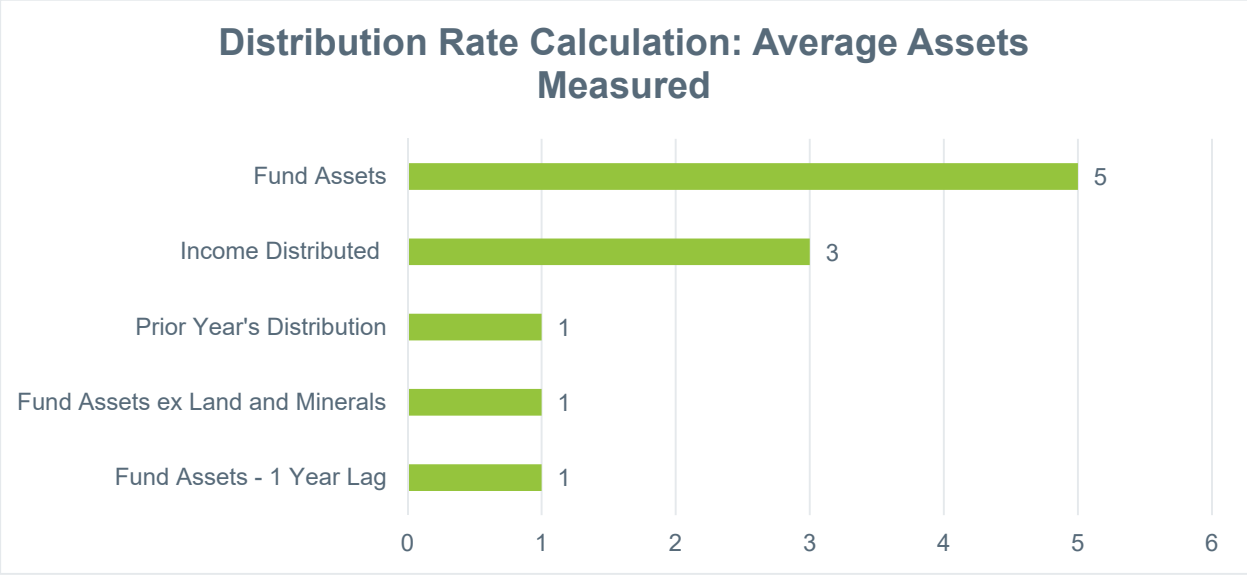


Figure 47: Distribution Payments: Discretion on Whether or Not to Distribute?

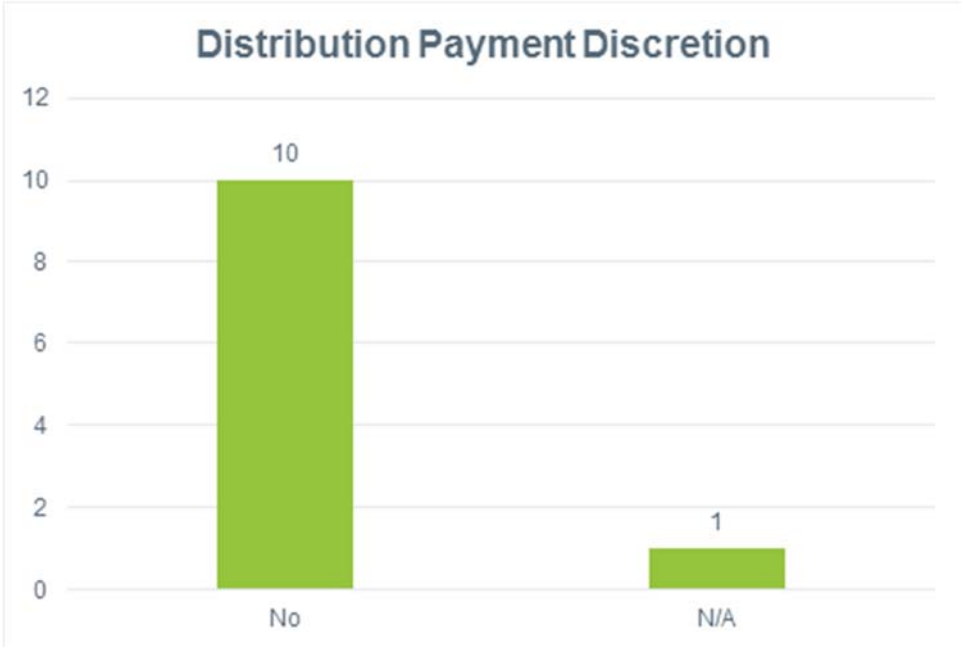



Figure 48: Does the Fund Target Corpus Growth?

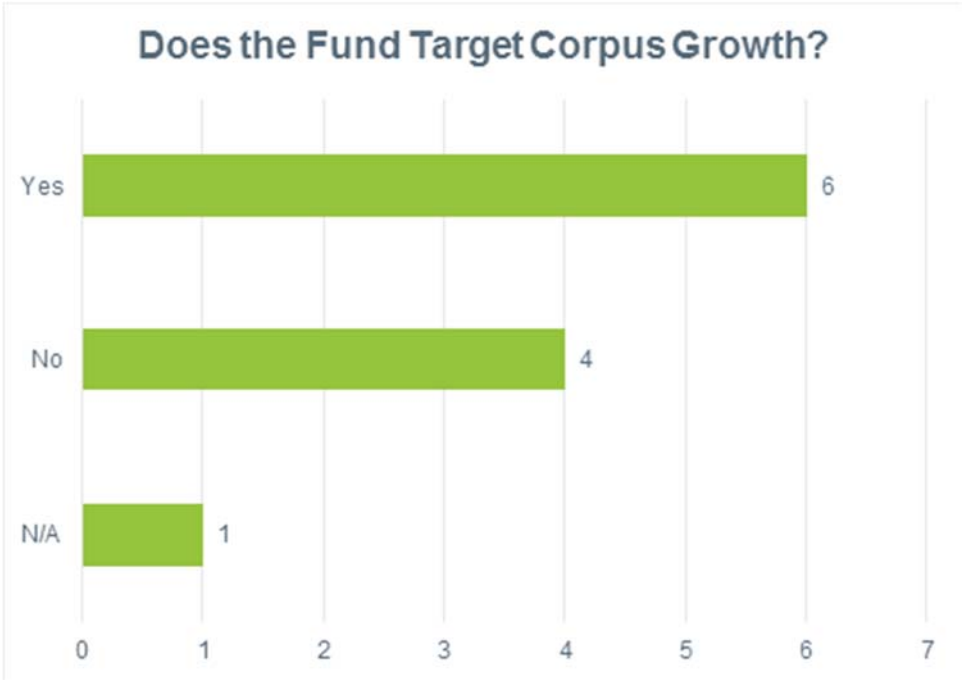


Figure 49: Is the Corpus Inviolate?

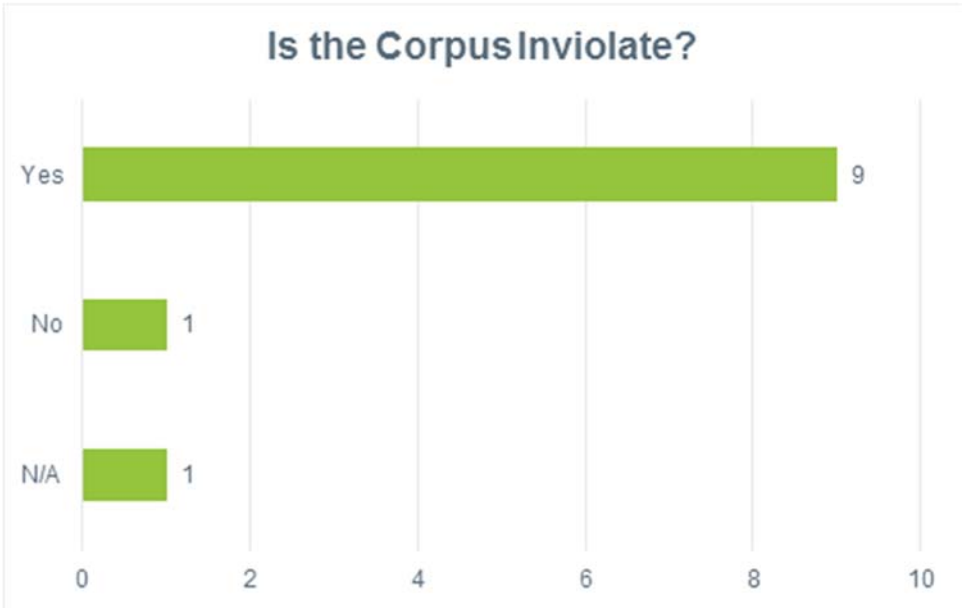



Figure 50: Governance and Investment Decision Making

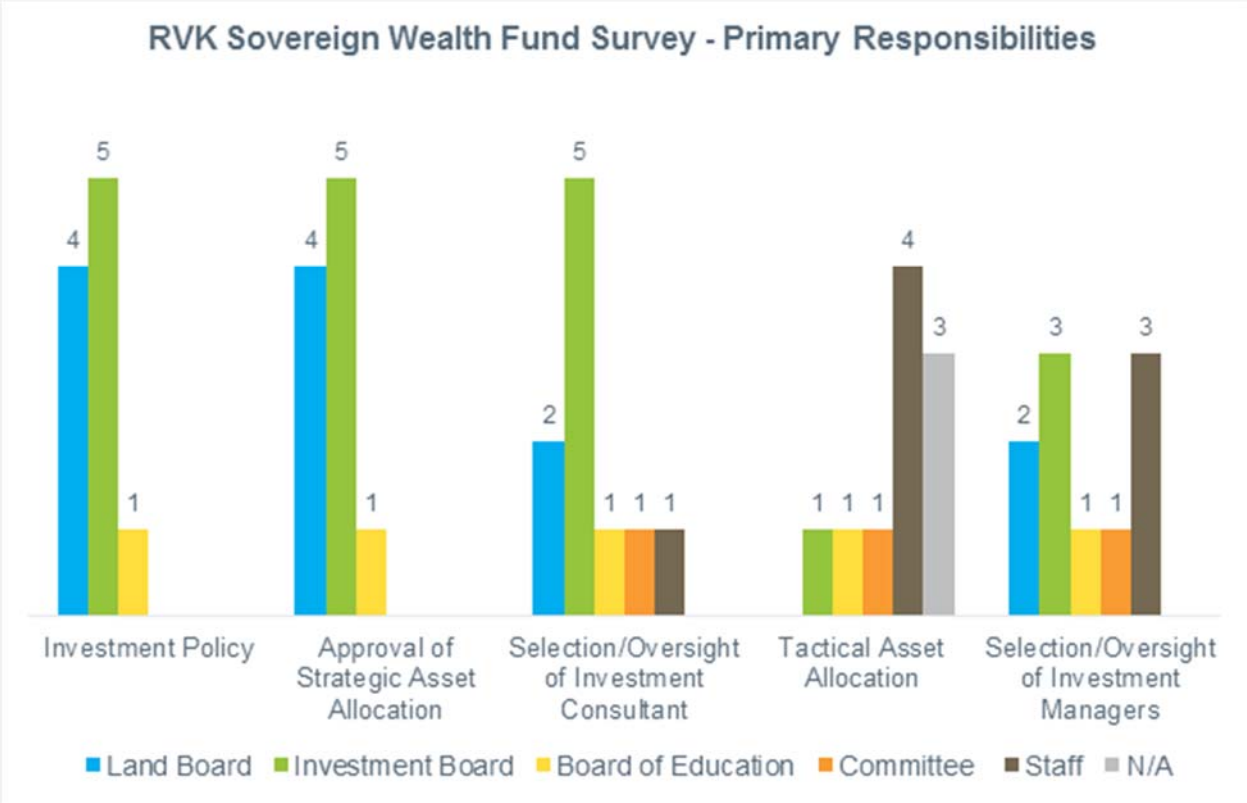
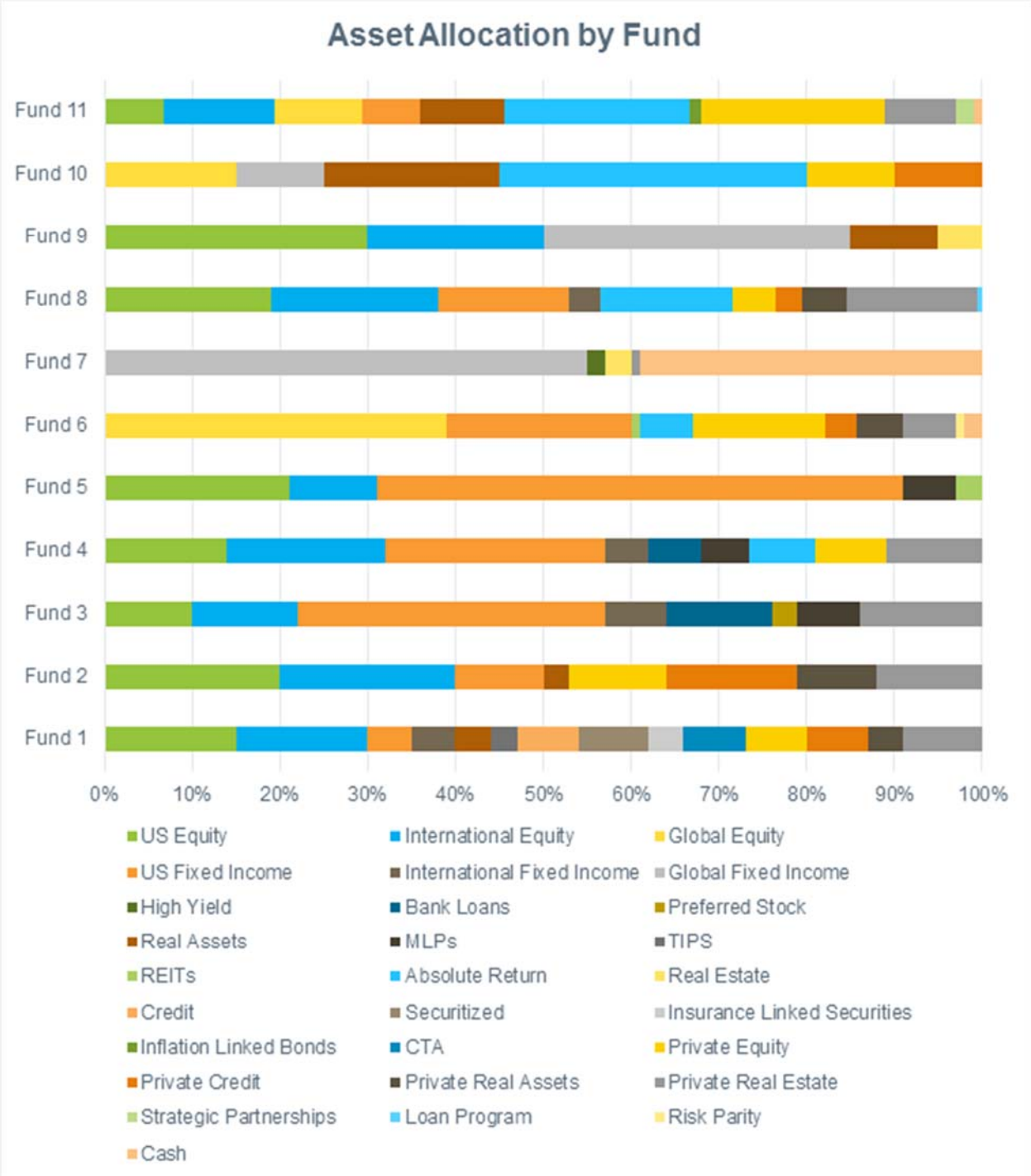


Figure 51: Strategic Asset Allocation




- Information shown for Fund 6 reflects FY2021 target.
- Information shown for Fund 7 is the actual allocation as of 3/31/2020 as this fund has strategic ranges rather than targets.
- Information shown for Fund 9 represents targets as of April 2, 2013.

- Real Assets shown for Fund 10 includes Stable Value Real Estate and Enhanced Real Estate. Absolute Return shown for Fund 10 includes Alternative Fixed Income and Hedged Equity.
- International Equity Allocation shown for fund 11 includes emerging markets debt.

Figure 52: Frequency of Asset Allocation Review

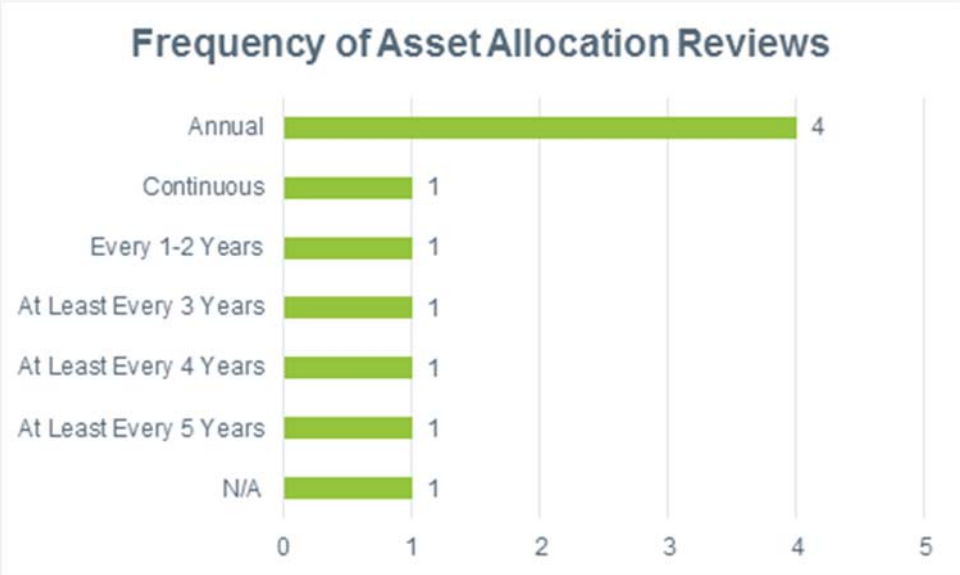
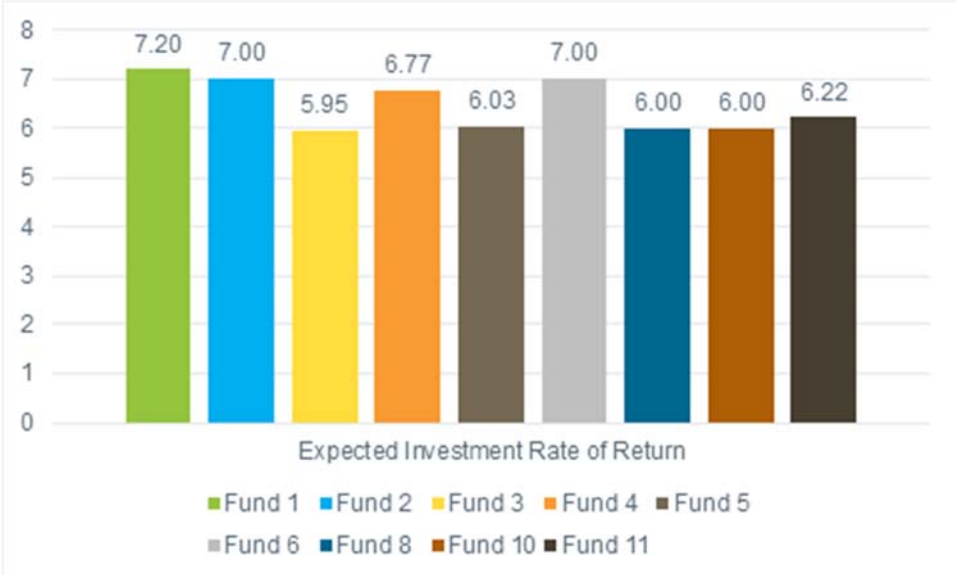


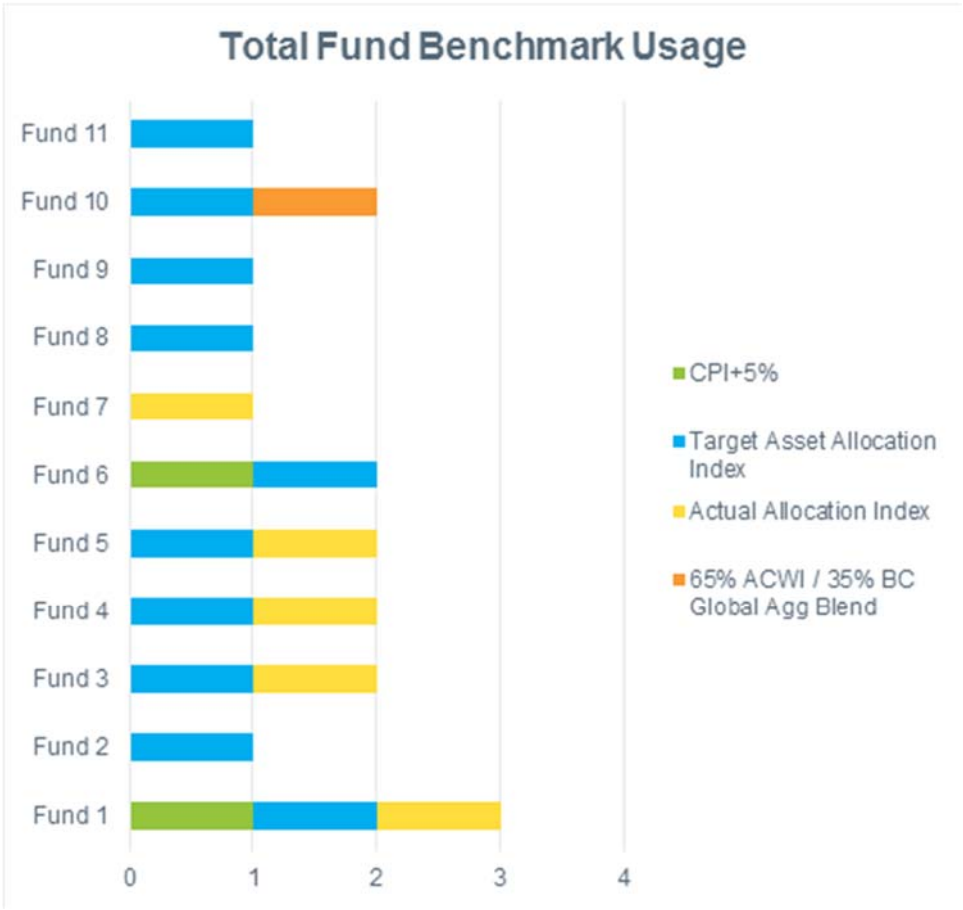

Figure 53: Expected Investment Rate of Return (Arithmetic, %)




- Fund 6's expected return represents the FY21-FY29 expected return based on the median expected returns provided by the fund's Consultant.
- Fund 7 was excluded from this chart, as the expected rate of return was reported as better than the Bloomberg Barclays Investment Grade Aggregate Index.

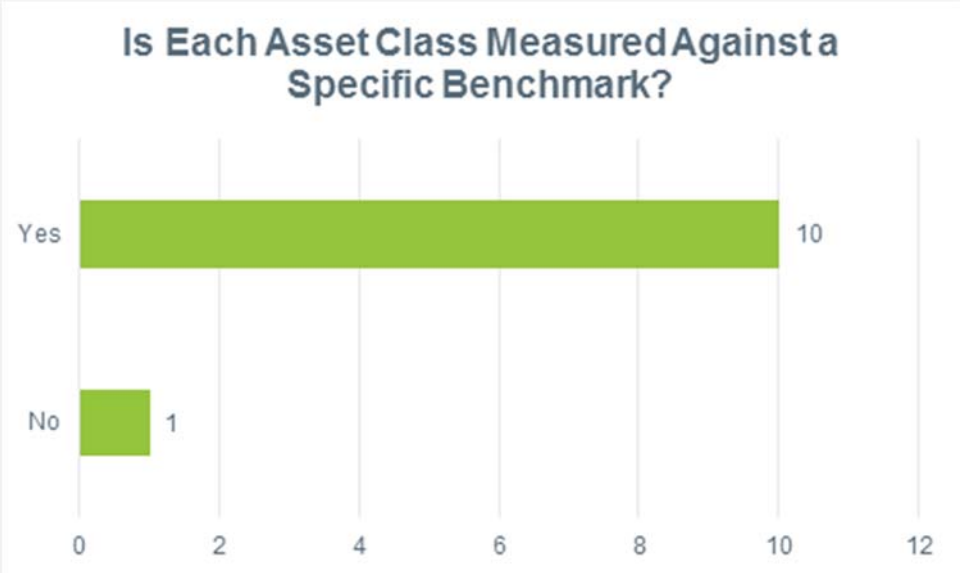
- Fund 9 was excluded from this chart as this fund does not specifically note or target a certain rate of return. Instead, the fund's objective is to preserve inflation-adjusted purchasing power.
- Fund 10's expected return represents the investment return objective as defined in the investment policy statement.

Figure 54: What type of Benchmark is Used to Measure Total Fund Performance?




- Target Asset Allocation Index refers to a target-weighted index applied to each asset class's primary benchmark.
- Actual Asset Allocation Index refers to an asset-weighted index applied to each asset class's primary benchmark.

Figure 55: Is Each Asset Class Measured Against a Specific Benchmark?



# Appendix

## Liquid Account Interim Asset Allocation Targets

| PSF-LA* | Pahe 1 | Q3 2020 | Q4 2020 | Q1 2021 | Q2 2021 | Q3 2021 | Q4 2021 | Q1 2022 |
|---|---|---|---|---|---|---|---|---|
| **Equity** | **0%** | **5%** | **10%** | **15%** | **20%** | **27%** | **34%** | **40%** |
| **Public Equity** | **0%** | **5%** | **10%** | **15%** | **20%** | **27%** | **34%** | **40%** |
| Large Cap US Equity | 0% | 3% | 5% | 8% | 10% | 13% | 17% | 20% |
| Small/Mid Cap US Equity | 0% | 2% | 2% | 2% | 3% | 5% | 5% | 5% |
| International Equities | 0% | 0% | 3% | 5% | 7% | 9% | 12% | 15% |
| **Fixed Income** | **40%** | **40%** | **40%** | **40%** | **40%** | **40%** | **40%** | **40%** |
| Core Bonds | 0% | 5% | 10% | 10% | 10% | 10% | 10% | 10% |
| US TIPS | 0% | 3% | 5% | 5% | 5% | 5% | 5% | 5% |
| Short Duration | 40% | 32% | 25% | 25% | 25% | 25% | 25% | 25% |
| **Cash** | **60%** | **55%** | **50%** | **45%** | **40%** | **33%** | **26%** | **20%** |

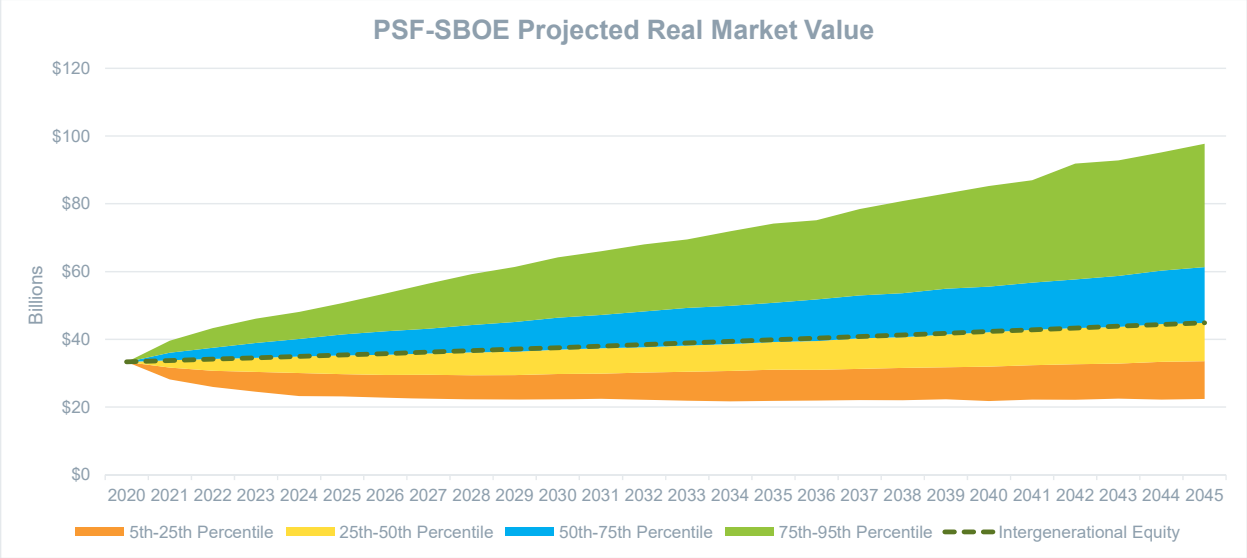
## RVK 2020Q1 CMAs

The below table outlines RVK's 2020Q1 CMAs.

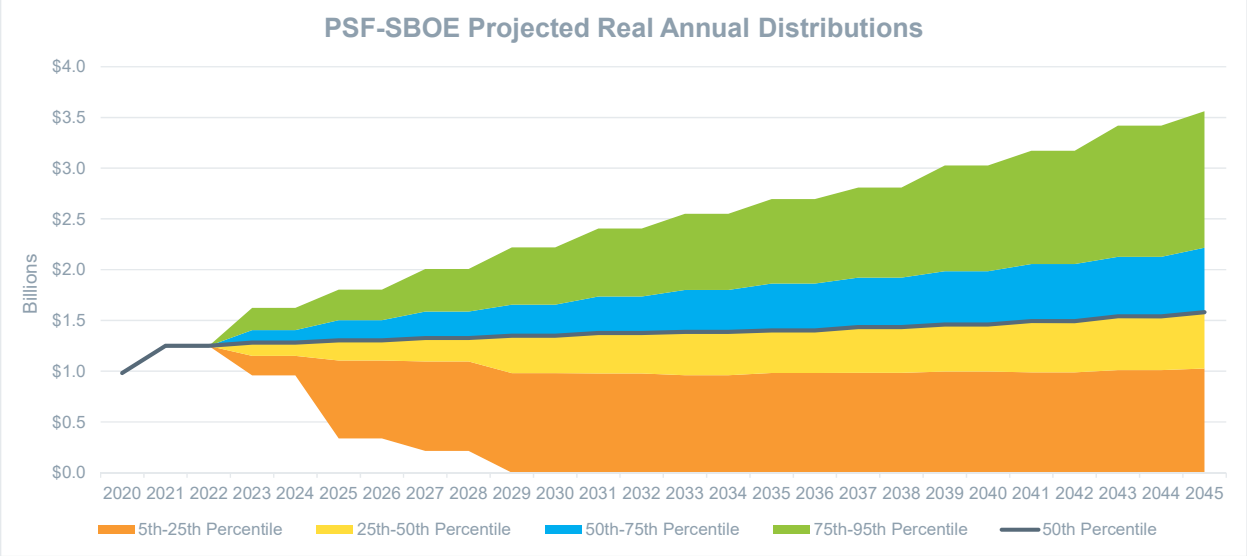
| | | 2020Q1 | | |
|---|---|---|---|---|
| **Asset Class** | **Benchmark** | **Nominal Return (Arith.)** | **Standard Deviation** | **Nominal Return (Geo.)** |
| Large/Mid Cap US Equity | S&P 500 (Cap Weighted) | 7.25% | 16.00% | 6.08% |
| Small Cap US Equity | Russell 2000 | 8.50% | 19.00% | 6.87% |
| Broad International Equity | MSCI ACW Ex US IMI (Gross) | 9.70% | 18.30% | 8.20% |
| DeVd Large/Mid Cap Int'l Equity | MSCI EAFE (Gross) | 9.00% | 17.00% | 7.70% |
| Emerging Markets Equity | MSCI Emerging Markets (Gross) | 11.25% | 25.00% | 8.54% |
| US Aggregate Fixed Income | Bloomberg US Aggregate Bond | 2.50% | 5.00% | 2.38% |
| Emerging Markets Debt Local Currency | JPM GBI EM Global Diversified | 5.75% | 11.50% | 5.13% |
| TIPS | Bloomberg US Treasury: US TIPS | 2.50% | 5.50% | 2.35% |
| Low Duration Fixed Income | Bloomberg US Govt/Cred: 1-3 Year | 2.00% | 2.50% | 1.97% |
| Int Treasury | Bloomberg US Trsy Interm | 1.50% | 3.00% | 1.46% |
| High Yield | Bloomberg US Corp: High Yield | 7.50% | 10.00% | 7.04% |
| Core Real Estate | NCREIF ODCE (Gross) (AWA) | 5.75% | 12.50% | 5.02% |
| Non-Core Real Estate | Preqin Non-Core Real Estate | 7.75% | 22.50% | 5.47% |
| Global REITs | MSCI World Real Estate Index (Gross) | 7.50% | 21.00% | 5.51% |
| Infrastructure | S&P Global Infrastructure | 7.75% | 19.00% | 6.11% |
| Funds of Hedge Funds | HFRI Fund of Funds Composite | 4.75% | 9.50% | 4.32% |
| Multi-Strategy Hedge Funds | HFRI RV Multi-Strat | 5.50% | 8.50% | 5.16% |
| Private Equity | Cambridge US Private Equity | 10.00% | 22.00% | 7.86% |
| Commodities | Bloomberg Commodity | 5.00% | 17.50% | 3.57% |
| Private Energy | Cambridge Natural Resources | 12.50% | 26.00% | 9.61% |
| US Inflation | Consumer Price Index | 2.00% | 1.50% | 1.99% |
| Cash Equivalents | BofA ML 3 Mo US T-Bill | 1.50% | 2.00% | 1.48% |

## Additional Charts

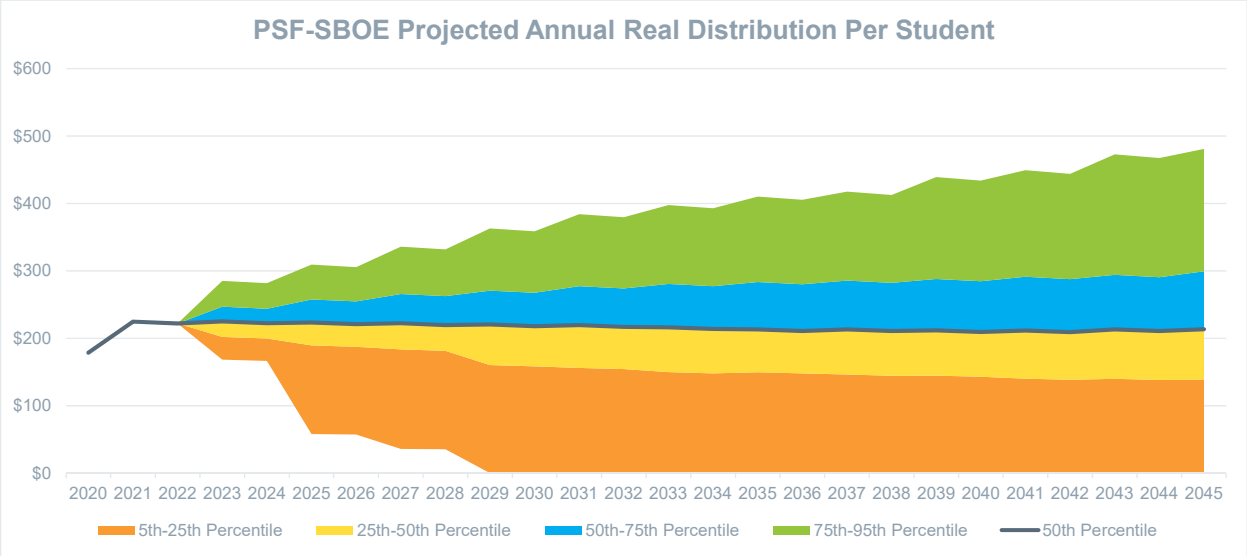
### PSF-SBOE – Projected Real Market Value



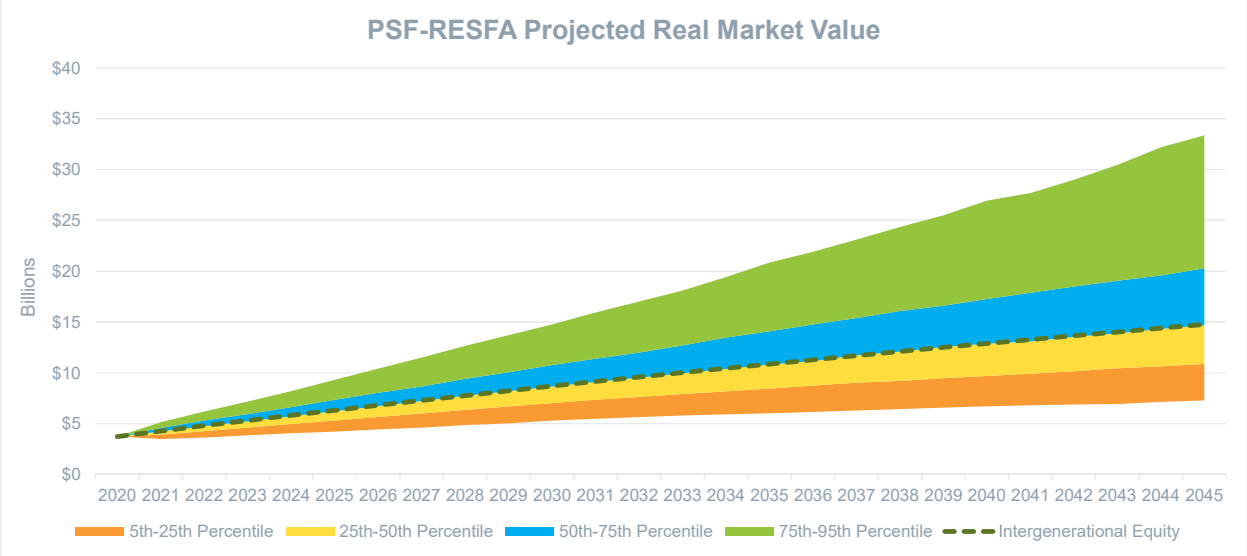

### PSF-SBOE – Projected Real Annual Distributions



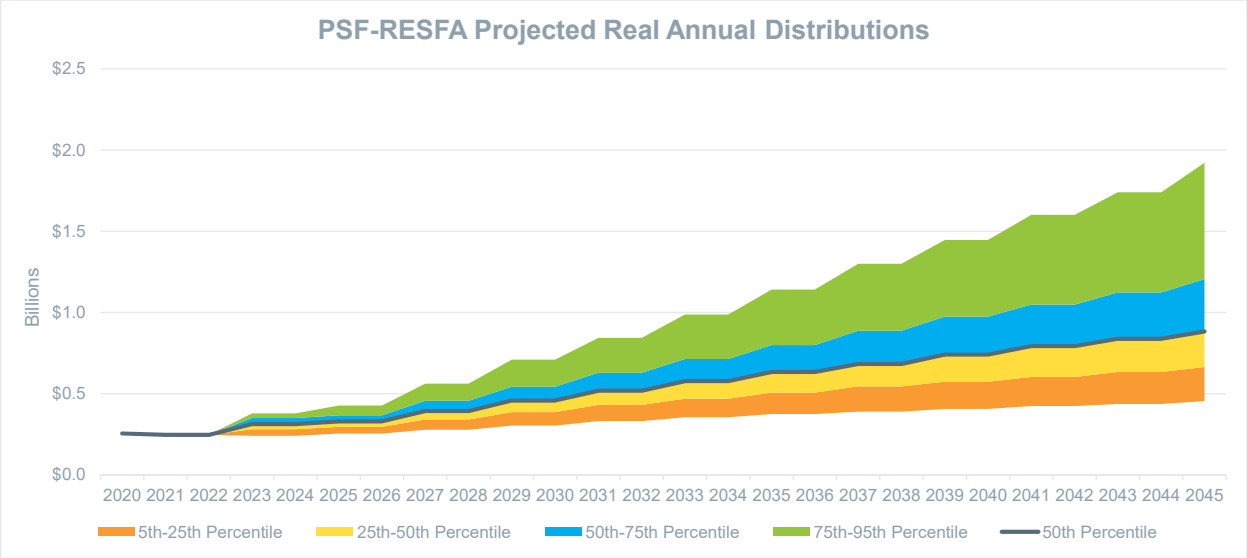
## PSF-SBOE – Projected Annual Real Distribution per Enrolled Student



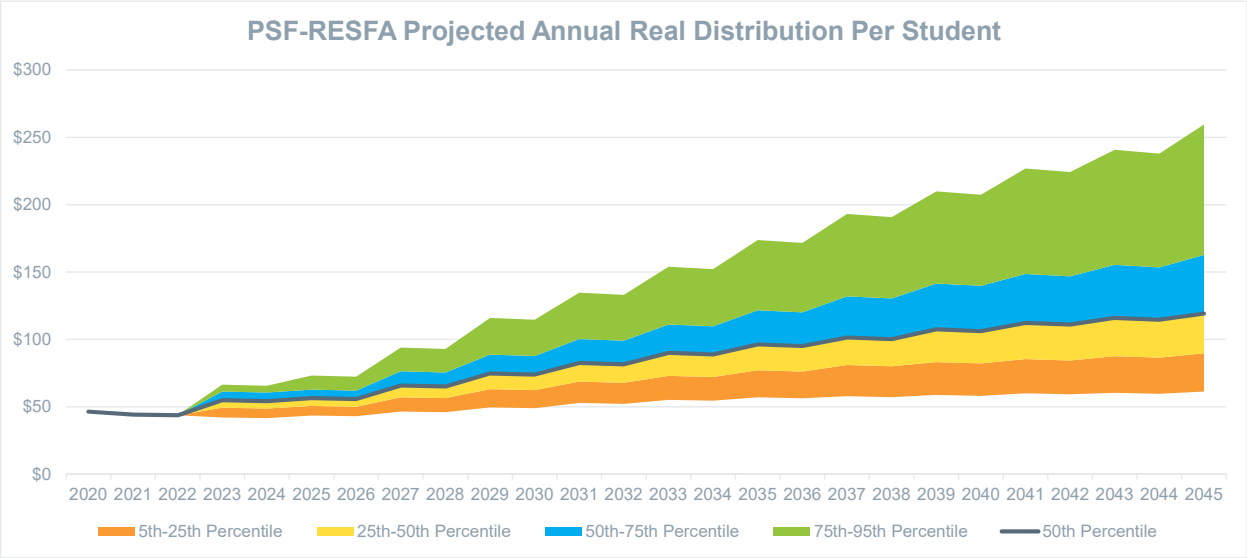

## PSF-RESFA – Projected Real Market Value



## PSF-RESFA – Projected Real Distribution




## PSF-RESFA – Projected Real Distribution per Enrolled Student

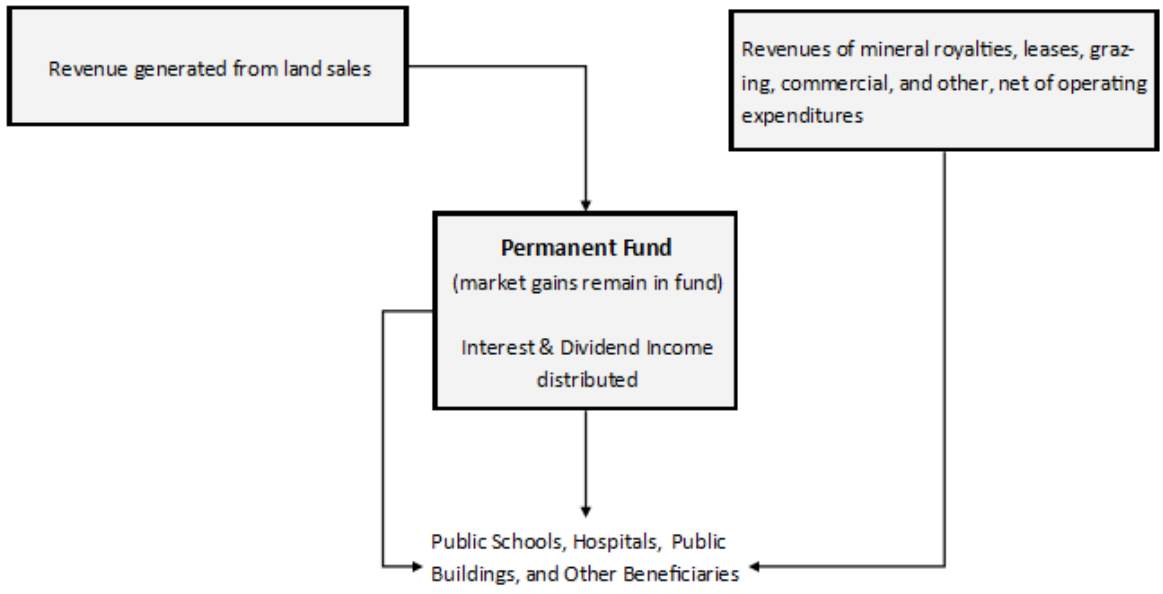


## Peer Fund Schematics

| Fund | Revenue Source | Distributions | Beneficiaries | Notes |
|---|---|---|---|---|
| ***Fund 1*** | Revenue generated from land sales (i) | Interest & Dividend Income | Public schools, hospitals, public buildings, and other beneficiaries. | (i) Revenues of mineral royalties, leases, brazing, commercial, and other, net of operating expenditures, are distributed directly to Beneficiaries as well. |
| ***Fund 2*** | Revenue from leases and royalties produced by non-renewable natural resources (primarily oil and gas), and income from returns on invested capital | 5% of 5 year moving average NAV | Public schools, universities, and other beneficiaries | |
| ***Fund 3*** | Mineral royalties, leases, fees and permits, and other revenue generated from state lands. | 5% of 5 Year Moving Average NAV (only net capital gains and income may be spent) | Public Schools (K-12) | |
| ***Fund 4*** | Mineral Severance Tax Revenues | 5% of 5 Year Moving Average NAV (only net capital gains and income may be spent) | State General Fund | |
| ***Fund 5*** | Money from land leases | Investment Income, limited to interest, rent, and dividends | Common Schools (K-12), Colleges, and Universities | |
| ***Fund 6*** | Mineral Extraction Royalties | 5% of 5 Year trailing average value of corpus, lagged by 1 year | Citizens of the State | |
| ***Fund 7*** | At least 50% of the Coal Severance Tax | (i) Amount necessary to meet all principal and interest payments on bonds payable from the coal severance tax bond fund during the next 12 months<br>(ii) 25% of tax receipts after (i)<br>(iii) 75% of tax receipts after (i)<br>(iv) Remainder of tax receipts after School Facilities Fund (iii) reaches $200M | (i) Debt Service<br>(ii) State Economic Development Fund<br>(iii) School Facilities Fund<br>(iv) Coal Severance Tax Permanent Fund | |
| ***Fund 8*** | Agricultural leases, oil and gas royalties and lease bonuses, as well as other productive uses of the surface and mineral lands. | 5% (biennial distributions of 10% of the five-year average value of the trust assets, excluding the value of lands and minerals.) | Schools (K-12) | |

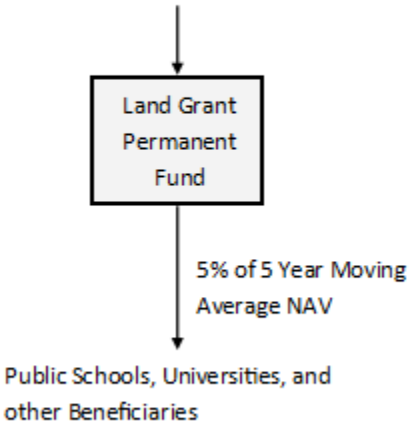
| Fund | Revenue Source | Distributions | Beneficiaries | Notes |
|---|---|---|---|---|
| ***Fund 9*** | 30% of total revenue derived from taxes on oil and gas production or extraction | All investment earnings | State General Fund | |
| ***Fund 10*** | Various Revenues, including tobacco settlements, and assessments collected by the Office of Consumer Credit commissioner | Various spending policies/calculations | Governmental entities supporting health care, health education, higher education, and historic preservation | |
| ***Fund 11*** | Surface Income (i) & Mineral Receipts (ii) from State Lands | Surface Income and Investment Distributions | 2/3 to State University System 1<br>1/3 to State University System 2 | (i) Surface Income is distributed directly to Available University Fund.<br>(ii) Mineral Receipts are invested, and investment distributions are distributed to Available University Fund.<br>Each State University System uses distributions for payment on interest and principal on respectively-issued bonds. After interest and principal payments, distributions are used for University Administration. |

## Fund 1



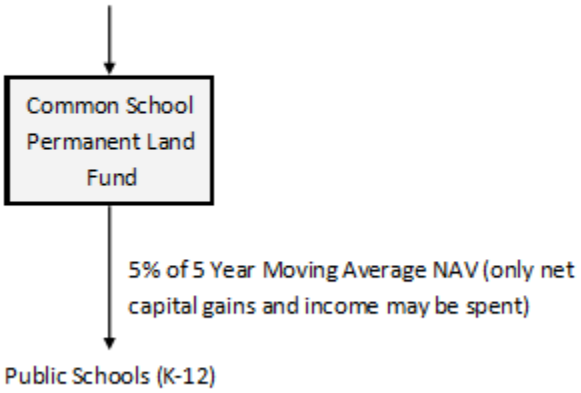
## Fund 2

Revenue from leases and royalties produced by non-renewable natural resources (primarily oil and gas), and income from returns on invested capital.

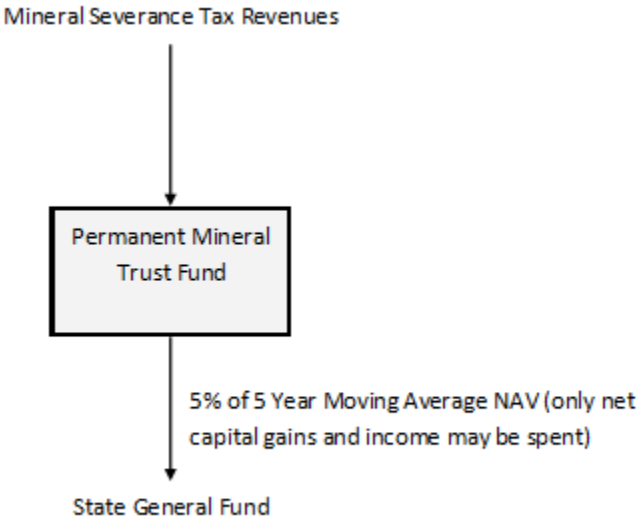



## Fund 3

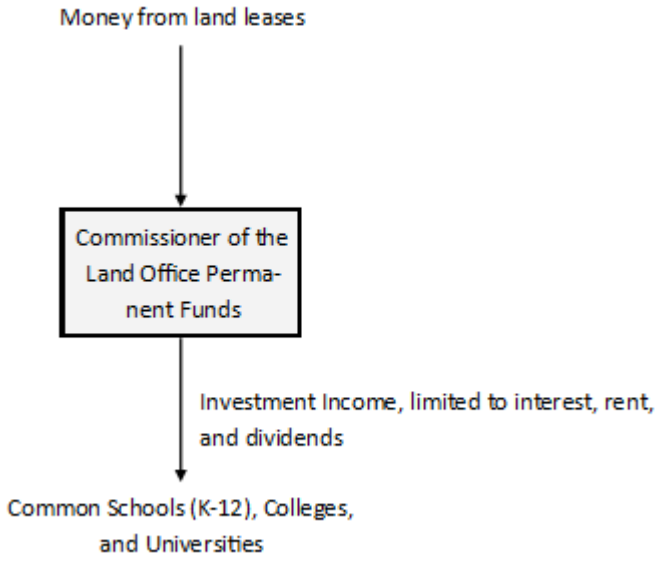
Mineral royalties, leases, fees and permits, and other revenue generated from state lands.



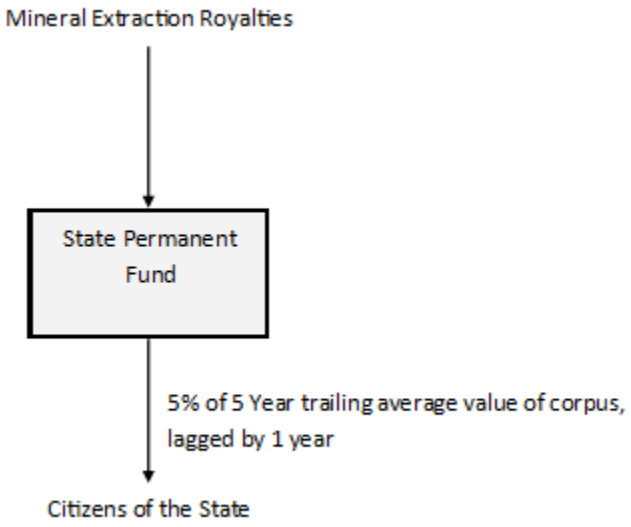
## Fund 4


Mineral Severance Tax Revenues
Permanent Mineral Trust Fund
5% of 5 Year Moving Average NAV (only net capital gains and income may be spent)
State General Fund

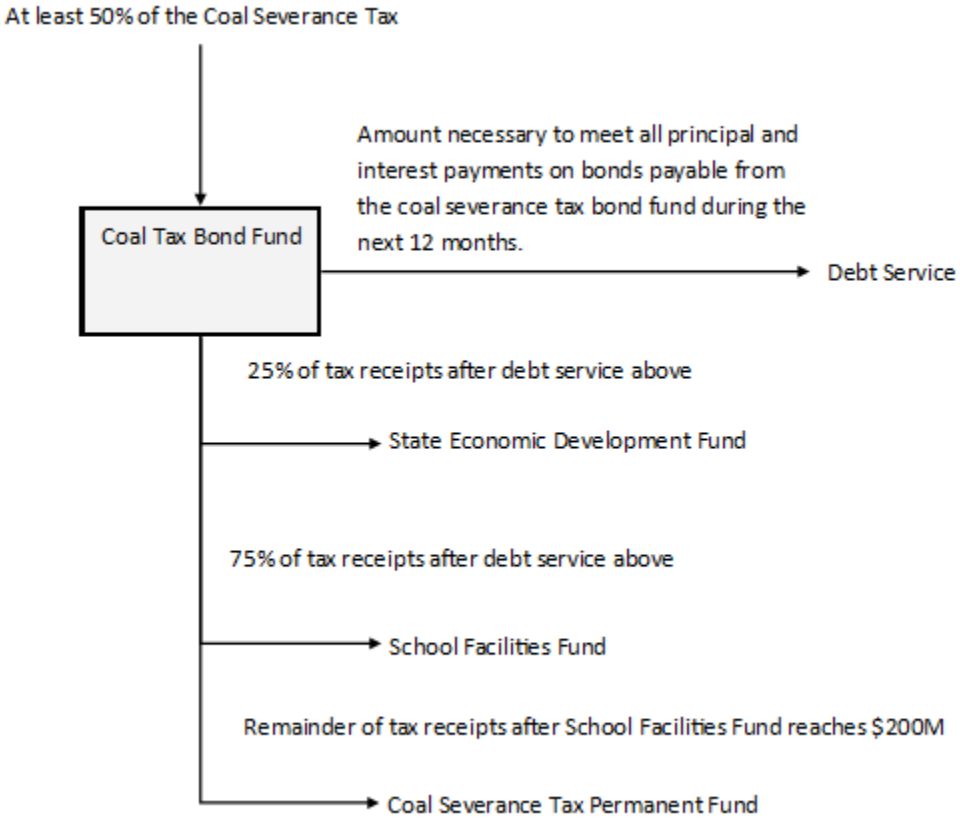
## Fund 5


Money from land leases
Commissioner of the Land Office Perma-nent Funds
Investment Income, limited to interest, rent, and dividends
Common Schools (K-12), Colleges, and Universities

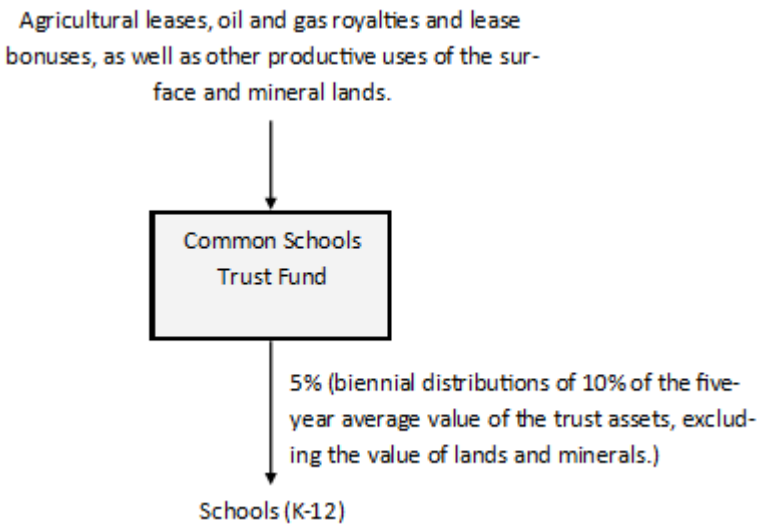
## Fund 6



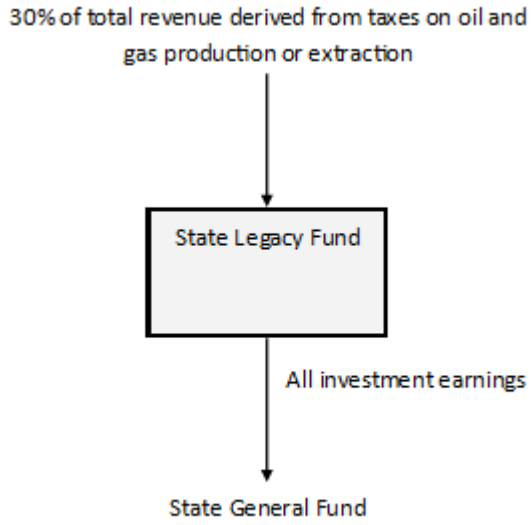

## Fund 7



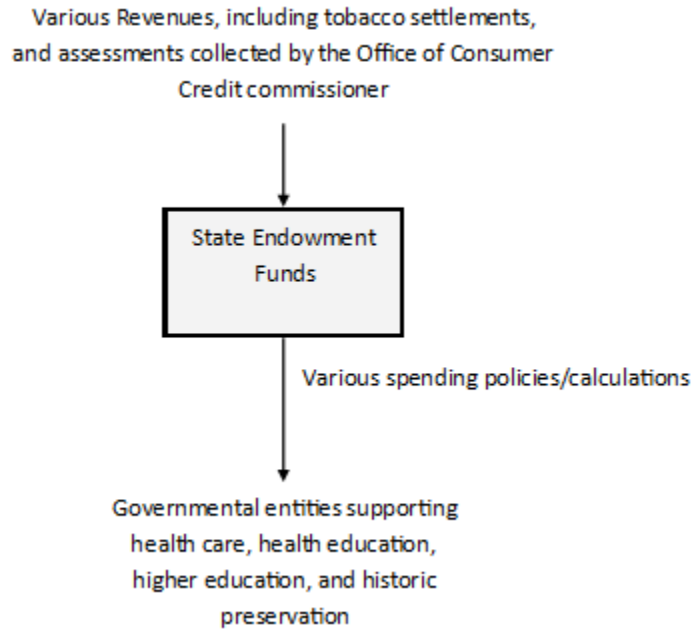

## Fund 8


Agricultural leases, oil and gas royalties and lease bonuses, as well as other productive uses of the surface and mineral lands.
Common Schools Trust Fund
5% (biennial distributions of 10% of the five-year average value of the trust assets, excluding the value of lands and minerals.)
Schools (K-12)

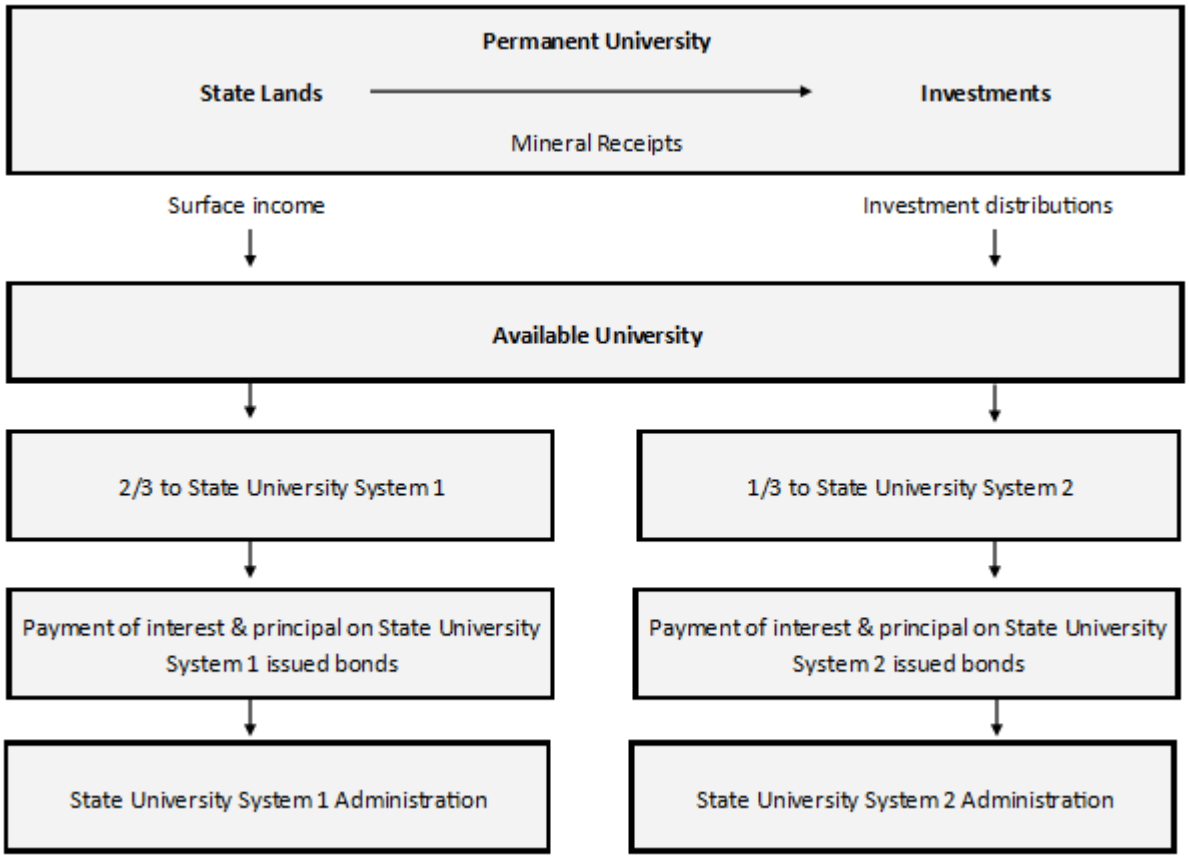
## Fund 9


30% of total revenue derived from taxes on oil and gas production or extraction
State Legacy Fund
All investment earnings
State General Fund

## Fund 10




## Fund 11



PORTLAND BOISE CHICAGO NEW YORK