

Joint Meeting of the ERS Board of Trustees
and
Investment Advisory Committee

December 8, 2021



Public Agenda #20

Call Meeting of the Board of Trustees to Order

December 8, 2021

Public Agenda #21

*Call Meeting of the Investment Advisory Committee
to Order*

December 8, 2021

Public Agenda #22

Consideration of the Minutes to the August 25, 2021 Joint Meeting of the Board of Trustees and Investment Advisory Committee – (Action)

December 8, 2021

Questions?
Action Item

Public Agenda Item #23

*Consideration of the Texa\$aver Program Updates: Texa\$aver Product Review
Committee Recommendations -
(Action - BOT)*

December 8, 2021

Diana Kongevick, Director of Group Benefits
Georgina Bouton, CTCM, Assistant Director of Group Benefits
Thomas Nun, CFA®, GWI Portfolio Strategist

Texa\$averSM 401(k) / 457 Program



Program Overview

TEXA\$AVER 401(k) Program

- Established in 1985
- Available to employees of state agencies
- Uses competitive bid process for plan services
- Provides automatic enrollment for new hires since 1/1/2008
- Offers traditional and Roth contributions
- Delivers low-cost, diversified investment choices



TEXA\$AVER 457 Program

- Defined contribution plan established in 1974
- Available to employees of eligible higher education and state agencies
- Uses competitive bid process for plan services
- Offers traditional and Roth contributions
- Delivers low-cost, diversified investment choices

Texa\$aver Program

Executive Summary



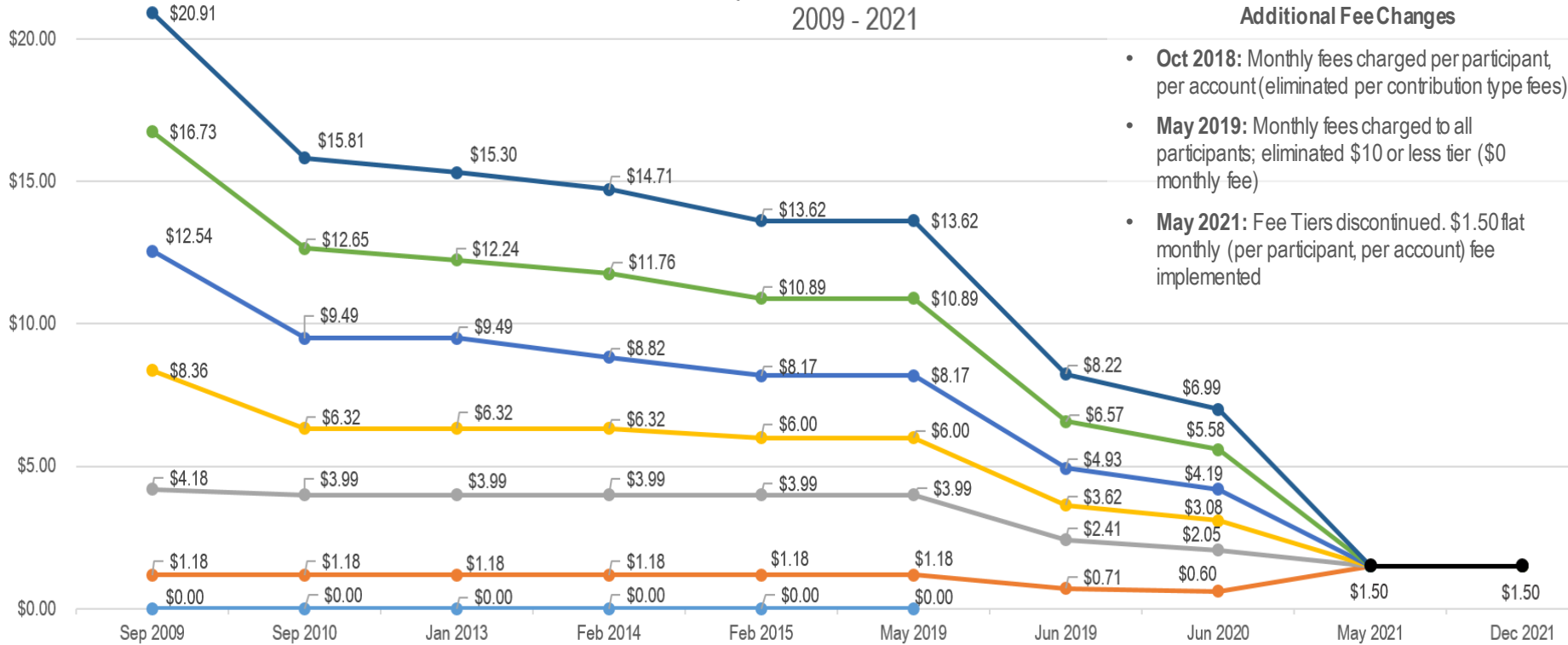
401(k) Plan, 09/30/21

| | |
|--|------------------|
| Assets under Management (AUM) | \$3,436 million |
| Traditional balances | \$3,346 million |
| Roth balances | \$90 million |
| No. of Participant Accounts | 221,806 |
| Contributing | 98,929 |
| Non-contributing | 112,877 |
| Contributions, deposits, loan repayments | \$57.2 million |
| Change in value & Interest/Dividends | \$2.2 million |
| Plan withdrawals | (\$62.8) million |
| Fees | (\$1.3) million |

457 Plan, 09/30/21

| | |
|--|------------------|
| Assets under Management (AUM) | \$1,282 million |
| Traditional balances | \$1,205 million |
| Roth balances | \$77 million |
| No. of Participant Accounts | 33,764 |
| Contributing | 17,668 |
| Non-contributing | 16,095 |
| Contributions, deposits, loan repayments | \$23.6 million |
| Change in value & Interest/Dividends | \$ 0.3 million |
| Plan withdrawals | (\$16.3) million |
| Fees | (\$0.3) million |

Monthly Participant Fee per TexasSaver account 2009 - 2021



Additional Fee Changes

- **Oct 2018:** Monthly fees charged per participant, per account (eliminated per contribution type fees)
- **May 2019:** Monthly fees charged to all participants; eliminated \$10 or less tier (\$0 monthly fee)
- **May 2021:** Fee Tiers discontinued. \$1.50 flat monthly (per participant, per account) fee implemented

Participant Account Balance Tiers for Monthly Fees (Fee Tiers)

● \$10 or less
 ● \$10.01 - \$1,000.00
 ● \$1,000.01 - \$16,000.00
 ● \$16,000.01 - \$32,000.00
 ● \$32,000.01 - \$48,000.00
 ● \$48,000.01 - \$64,000.00
 ● \$64,000.01 or more

Texa\$aver Program

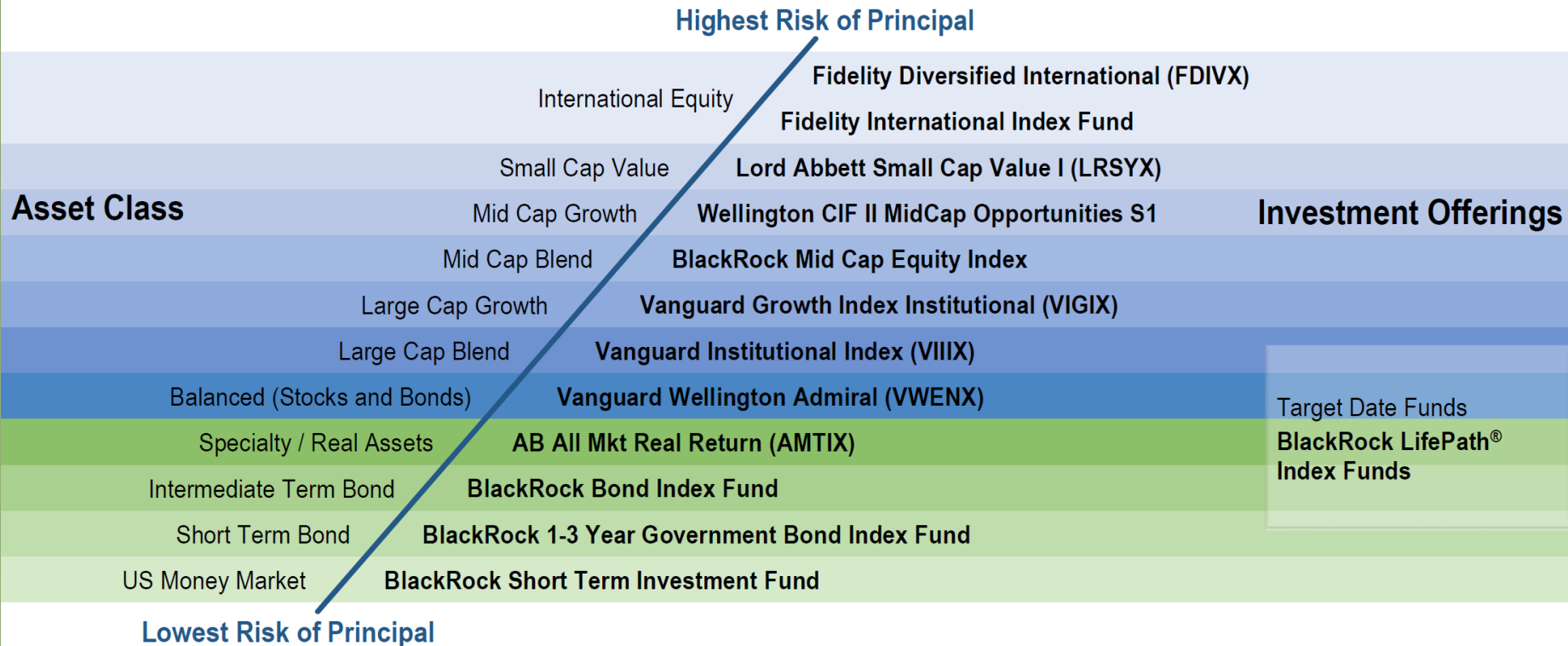
Investment Offerings



- Texa\$aver 401(k)/457 Program Investment Policy
- Diversified assortment of mutual funds and collective trust funds, self-directed brokerage account, and a target date fund series
- Institutionally priced offerings between the plans are the same

Texa\$aver Investment Offerings

September 30, 2021



Target Date Funds
BlackRock LifePath®
Index Funds

Texa\$aver Program

Product Review Committee (PRC)



| | |
|------------------------|--|
| Porter Wilson | ERS Executive Director |
| Catherine Terrell | ERS Deputy Executive Director |
| David Veal | ERS Chief Investment Officer |
| Leighton Shantz | ERS Director of Fixed Income |
| Carlos Chujoy | ERS Investment Risk Officer |
| Diana Kongevick | ERS Director of Group Benefits |
| Gene L. Needles, Jr. | ERS Investment Advisory Committee (IAC) member |
| Laurie L. Dotter, CPA | ERS IAC member |
| Laura T. Starks, Ph.D. | External investment professional |



PRC

Sub-committee



- PRC may appoint a sub-committee to perform a specific purpose (e.g., due diligence, fund evaluation, research, etc.).
- PRC sub-committee members include:

Carlos Chujoy

PRC Member

Leighton Shantz

PRC Member

Dr. Laura T. Starks

PRC Member

Lauren Honza

ERS Portfolio Manager

Brannon Andrews

ERS Assistant General Counsel

Gene Needles

PRC Member to serve as an alternate



PRC

Semi-annual Meeting



- The PRC meets at least semi-annually to conduct investment reviews and undertake any other action required for the administration of the Program
- October 20, 2021, the PRC meeting included
 - Investment performance update
 - Next steps for Lord Abbett Small Cap Value I, small cap value fund
 - Program assets, 3Q 2021: \$169.7 million
 - Number of TexaSaver accounts, 3Q 2021: 33,042



Lord Abbett Small Cap Value I (LRSYX)

Lord Abbett Small Cap Value I (LRSYX)



Due Diligence

- PRC closely monitored Lord Abbett Small Cap Value I fund
- Annual review with Portfolio Manager, September 21, 2021
 - Performance issues
 - Underperformed to benchmark (Russell 2000 Value Index)
 - Carries a 2-star rating from Morningstar
 - Portfolio management turnover: Eli Rabinowich (August, 2021)
 - Changes in investment process

Lord Abbett Small Cap Value I (LRSYX)

Small Cap Value, 3Q 2021

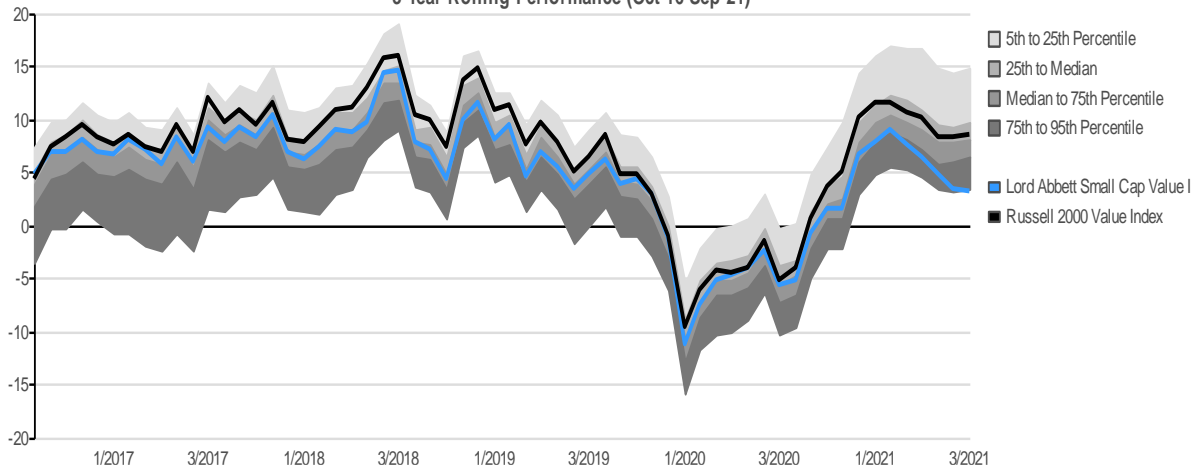


PROGRAM ASSETS: \$169.7 MILLION

NO. OF TEXA\$AVER ACCOUNTS: 33,042

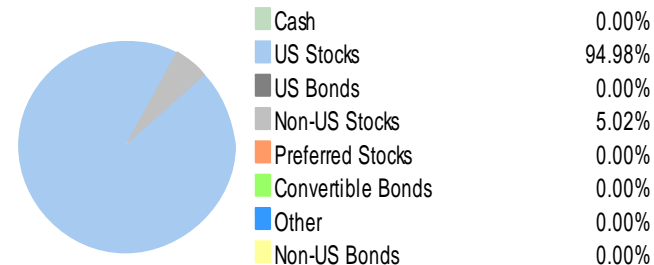
| PERFORMANCE | 1Y | 3Y | 5Y | 7Y | 10Y |
|-------------------------------------|--------------|-------------|-------------|-------------|--------------|
| Fund | 52.72 | 3.27 | 7.38 | 7.71 | 11.13 |
| Benchmark: Russell 2000 Value Index | 63.92 | 8.58 | 11.03 | 10.19 | 13.22 |
| Peer Group Median | 62.42 | 8.11 | 10.23 | 8.83 | 12.76 |

3 Year Rolling Performance (Oct 16-Sep 21)



PORTFOLIO COMPOSITION

Assets



Overall Morningstar Rating™



FUND OVERVIEW

| | |
|------------------------|-------------|
| Investment type | Mutual fund |
| Investment strategy | Active |
| Fund expense ratio | 0.94% |
| Fund reimbursement | 0.10% |
| Net Texa\$aver expense | 0.84% |

PRC Meeting

Lord Abbett Performance Review



- At the October 20, 2021 PRC meeting, GWI Portfolio Strategist presented the following considerations for Lord Abbett Small Cap Value fund.
 - Texa\$aver's portion of the strategy's assets
 - Difficult risk-adjusted performance: Sharpe ratios in the 82nd and 85th peer percentiles (3- and 5-year)
 - Trailing 36-month alpha: -3.3%
 - Up- and Down-capture ratios below peer median (97.1% up, 106.7% down; 61st and 64th, respectively)

Sub-committee Initial Screening

Passive Domestic Small Cap Fund



- PRC decided to pursue a passive domestic small cap fund; appointed sub-committee for the fund search
- October 25, 2021 sub-committee met to formulate parameters for initial screening
 - \$2B minimum fund size
 - Net expense ratio \leq 35 bps
 - Availability on TPA's platform
 - Fund objective and investment style

Fund Due Diligence Questionnaire

Passive Domestic Small Cap Fund



- October 27, 2021, sub-committee finalized parameters, reviewed initial list of funds, and passed 9 funds to the next phase.
- Passive Domestic Small Cap Fund Due Diligence Questionnaires (DDQ) went out on October 28, 2021
 - 7 funds use Russell 2000 benchmark
 - 2 funds use S&P 600 benchmark
- Responses were received from all funds by the required response date.

Initial Evaluation

Passive Domestic Small Cap Fund



- Sub-committee performed an initial evaluation of:
 - Minimum Requirements
 - Firm Qualifications
 - Management team; investment team
 - Compliance and operations
 - Strategy Qualifications
 - Investment strategy and philosophy; style and process; risk management; historical returns and performance; asset flows

Finalists Recommendation

Passive Domestic Small Cap Fund



- On November 16, 2021, the sub-committee recommended the following entities to the PRC as finalists based on DDQ responses and fund performance.
 - BlackRock Russell 2000 Index Fund
 - BlackRock S&P SmallCap 600[®] Equity Index Fund F
 - Fidelity Small Cap Index Fund
 - Vanguard S&P Small-Cap 600 Index Fund I
- PRC agreed with the sub-committee's recommendations.
- Finalist meetings were held November 16 and 17, 2021.

Finalists Phase

Passive Domestic Small Cap Fund



| Fund Name | Fidelity Small Cap Index Fund (FSSNX) | BlackRock Russell 2000 Index Fund - L | Vanguard S&P Small-Cap 600 Index (VSMX) | BlackRock S&P 600 Index Strategy |
|-----------------------|---|--|---|--|
| Fund Type | Mutual Fund | Collective Trust | Mutual Fund | Collective Trust |
| Benchmark | Russell 2000 | Russell 2000 | S&P 600 | S&P 600 |
| Fee | 2.5 bps | 1.85 bps | 8.0 bps | 2.45 bps |
| AUM | \$21.6 B | \$11.2 B | \$1.9 B | \$713 M |
| Tracking Error | 0.08%* | 0.06%* | 0.05%* | 0.13%* |
| Comments | <ul style="list-style-type: none"> • Managed by Geode Capital Mgmt. • Process: Full replication • Consistent positive inflows (Morningstar), last 3 yrs. • Team turnover in 2019 • Maximum mo. performance deviations (avg. +0.01): -18bps (1st month of operations) +8bps (11/2016) • Morningstar: 4 stars | <ul style="list-style-type: none"> • Process: Full replication or optimization • Sec. lending adds materially to returns • Team managed • Maximum mo. performance deviations (avg. +0.00): -40bps minimum +35bps maximum • Morningstar: not rated (CIT) | <ul style="list-style-type: none"> • Process: full replication • Team: Co-PMs: Coleman (2013), Butler (2015) • Maximum mo. performance deviations (avg. 0.00): -5.7bps minimum +5.8bps maximum • Morningstar: 4 stars | <ul style="list-style-type: none"> • Process: Full replication or optimization • Sec. lending adds materially to returns • Team managed • Maximum mo. performance deviations (avg. +0.00): -22bps minimum +11bps maximum • Morningstar: not rated (CIT) |

* Tracking error figures sourced from Morningstar

Next Steps



Passive Domestic Small Cap Fund

- Passive domestic small cap fund will be offered within the program's fund lineup
 - High-quality, well-managed, competitively priced small cap fund
 - Available to participant contributions 1Q 2022
- Remove the small cap value fund from the Texa\$aver lineup, and transfer assets to the newly selected.
- TPA and ERS staff will coordinate operational process for the new funding and asset transitions, which includes a communication strategy for participants.

Texa\$aver Program

PRC and Staff recommendation



It is the recommendation of the Product Review Committee (PRC) that the Board of Trustees of the Employees Retirement System remove the Small Cap Value fund from the Texa\$aver 401(k)/457 Program with the program assets being transferred to the selected passive domestic small cap fund.

Questions?
Action Item -BOT

Public Agenda Item #24

Review of Texa\$aver 401(k)/457 Program Compliance and Operational Updates

December 8, 2021

Diana Kongevick, Director of Group Benefits

Georgina Bouton, CTCM, Assistant Director of Group Benefits

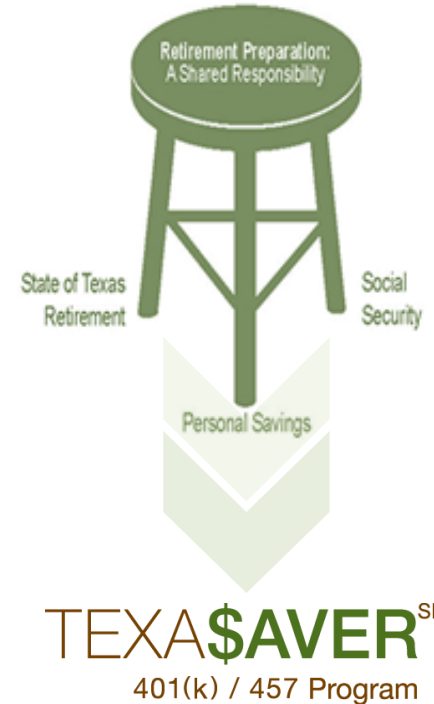
Nora Alvarado, CTCM, Voluntary Income Plans, Group Benefits

Texa\$averSM Program

Calendar Year 2020 Overview



- Texa\$aver 401(k)/457 program (Texa\$aver) is a voluntary tax-deferred supplemental retirement program
 - Designed to help state and eligible higher education employees with personal retirement savings
- Texa\$aver is comprised of two plans
 - 401(k) plan - available to state agency employees
 - 457 plan - available to state agency and eligible higher education employees



Contract Monitoring Overview

Performance Guarantee Assessments



- A performance guarantee (PG) is connected to a business-critical service function(s) required of a vendor throughout the contract period.
- PG metrics are formulated from regulatory standards and industry best practices. Each PG is then risk-rated using risk assessment modeling and given a PG severity level.
- Severity levels identify the basis for the assessment amount in the event a PG is missed. The severity levels are:

Severity 1: Emergency

Severity 2: Critical

Severity 3: Moderate

Severity 4: Minor

Texa\$aver Program

Vendor Contracts



- Two vendors provide contracted services to the Texa\$aver program.
 - Empower Retirement provides third party administrator services.
 - Advised Assets Group (AAG) provides advisory services.

Texa\$aver Program

Empower Retirement Performance Reporting, CY20



| Severity Level | PG Category | Vendor Performance Results | PG Assessments | PG Requirement | PG Actual |
|----------------|--------------|----------------------------|--|--|-----------|
| 2 | Critical PGs | 3 Critical PG assessments | Resolution of File and/or Transaction Errors 3 PGs assessed (3 of 12 months) | Any file transfer/data errors shall be resolved within twenty-four hours of the notice to ERS. | Not Met |
| 3 | Moderate PGs | 5 Moderate PG assessments | Notification of File and/or Transaction Errors 5 PGs assessed (5 of 12 months) | Notification to ERS of any file transfer/data errors within twenty-four hours. | Not Met |
| 4 | Minor PGs | 2 Minor PG assessments | Communications Material 2 PGs assessed (2 of 12 months) | All communication materials must adhere to ERS' communication review and approval process. | Not Met |

While now resolved, most assessments shown are related to the critical misses due to newly hired state employees not being automatically enrolled into the 401(k) plan.

Texa\$aver Program

Advised Assets Group Performance Reporting, CY20



| Severity Level | PG Category | Vendor Performance Results | PG Assessments | PG Requirement | PG Actual |
|----------------|-------------|----------------------------|--|-----------------|-------------------|
| 4 | Minor PGs | 2 Minor PG assessments | Interval Service Levels (Call answering speed) 2 PGs assessed (2 of 4 quarters) | 80% per quarter | 46.15% and 73.33% |

Questions?

Public Agenda Item #25

**Annual Ethics Training*

December 8, 2021

Cynthia Hamilton, General Counsel
Charles Herring Jr., Herring & Panzer LLP



Fiduciary Duty

Charles Herring, Jr.

HERRING & PANZER, LLP

Lawyers

Liability

- ▶ Legal Malpractice – Negligence
- ▶ Breach of Fiduciary Duty

Discipline

- ▶ Violations of Texas Disciplinary Rules

Criminal prosecution

Origins



- ▶ Code of Hammurabi
- ▶ Roman Civil Law
- ▶ The Bible

Code of Hammurabi



Code of Hammurabi



Code of Hammurabi

1. If anyone ensnare another, putting a ban upon him, but he cannot prove it, then he that ensnared him shall be put to death.

Code of Hammurabi

102. If a merchant entrust money to an agent (broker) for some investment, and the broker suffer a loss . . . , he shall make good the capital to the merchant.

Roman Civil Law – 350 B.C.

Praetors



The Bible



Genesis: 2:15 – 1400 B.C.

Titus: 1:17 – 66 A.D.

Matthew 6:24 – 80 A.D.

No man can serve two masters: for either he will hate the one, and love the other; or else he will hold to the one, and despise the other, Ye cannot serve God and mammon.

Sources of Fiduciary Duty



- ▶ Statutes – Civil and Criminal
- ▶ Codes, Rules, Regulations
- ▶ Internal policies
- ▶ Common Law – court decisions

Jury Charge

Did *[the Fiduciary]* comply with *his* fiduciary duty to *Paul Payne*?

[As Paul Payne's agent,] *[the Fiduciary]* owed *Paul Payne* a fiduciary duty. To prove he complied with *his* duty, *[the Fiduciary]* must show—

1. The transaction[s] in question [was/were] **fair and equitable** to *Paul Payne*; and
2. *[The Fiduciary]* made **reasonable use of the confidence** that *Paul Payne* placed in *him*; and
3. *[The Fiduciary]* **acted in the utmost good faith and exercised the most scrupulous honesty** toward *Paul Payne*; and

Jury Charge

4. [The Fiduciary] placed the interests of *Paul Payne* before *his* own, did not use the advantage of *his* position to gain any benefit for *himself* at the expense of *Paul Payne*, and did not place *himself* in any position where *his* self-interest might conflict with *his* obligations as a fiduciary; and

5. [The Fiduciary] fully and fairly disclosed all important information to *Paul Payne* concerning the transaction[s].

Answer "Yes" or "No."

Motivations

- ▶ Ignorance
- ▶ Inadvertence
- ▶ Intentional theft or fraud
 - ▶ Psychopaths
 - ▶ Financial “need” – debts, family, drugs
 - ▶ Greed
 - ▶ Coercion
 - ▶ Relationships – love, revenge
 - ▶ Workplace culture
 - ▶ Ideology

Allen Stanford



Elizabeth Holmes



Avoiding Breaches of Fiduciary Duty

- ▶ Avoid conflicts of interests in investments – directly and indirectly – personally, family, businesses
- ▶ Maintain confidentiality
- ▶ Study, Question; Study, Question; Study, Question

Questions?

*Public Agenda Item #26

Chief Investment Officer's Report

December 8, 2021

David Veal, CFA, CAIA, FRM, Chief Investment Officer

Trust Performance

Mission & Objectives



Invest prudently in a diversified portfolio at a reasonable cost to maximize the probability that promised benefits are provided.



Obtain returns over rolling five-year periods in excess of adopted benchmarks



Achieve results that are commensurate with the amount of active risk assumed

Trust Performance

Investment Strategy



Allocate
thoughtfully to
available assets



Select carefully
managers that
add value



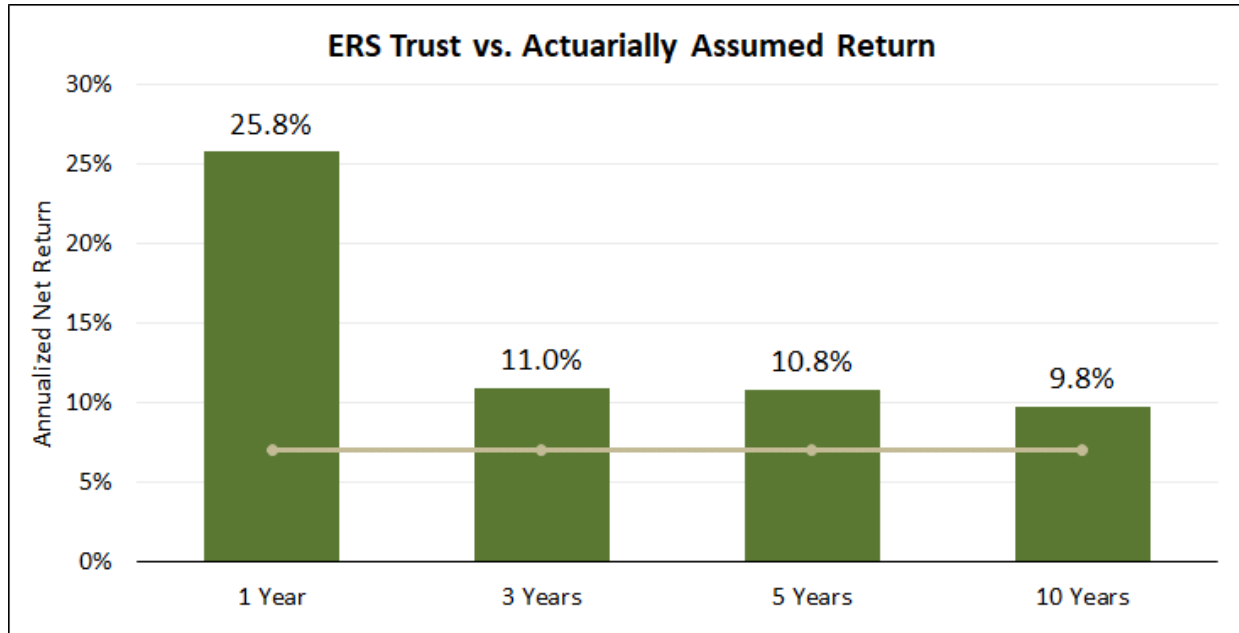
Diversify well to
control risk as
markets change

ERS Trust Performance

Relative Return



- Strong performance versus Policy Index across all time horizons

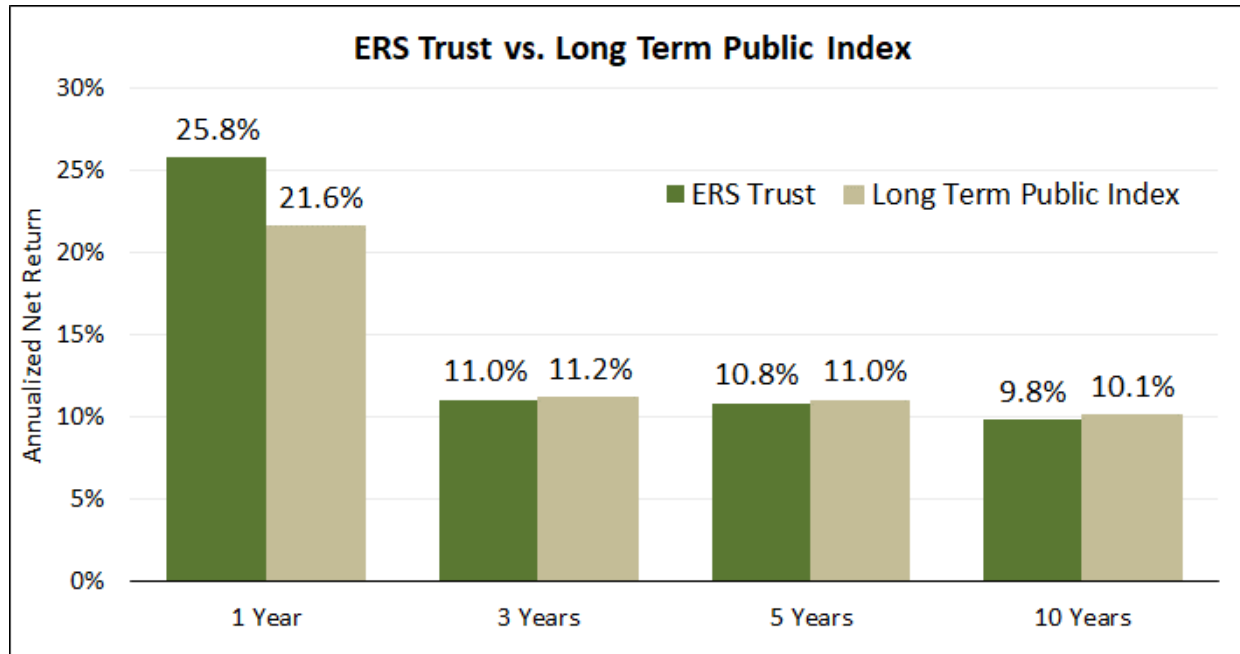


ERS Trust Performance

Relative Return



- Outperformance versus Long-Term Public Index across shorter time horizons

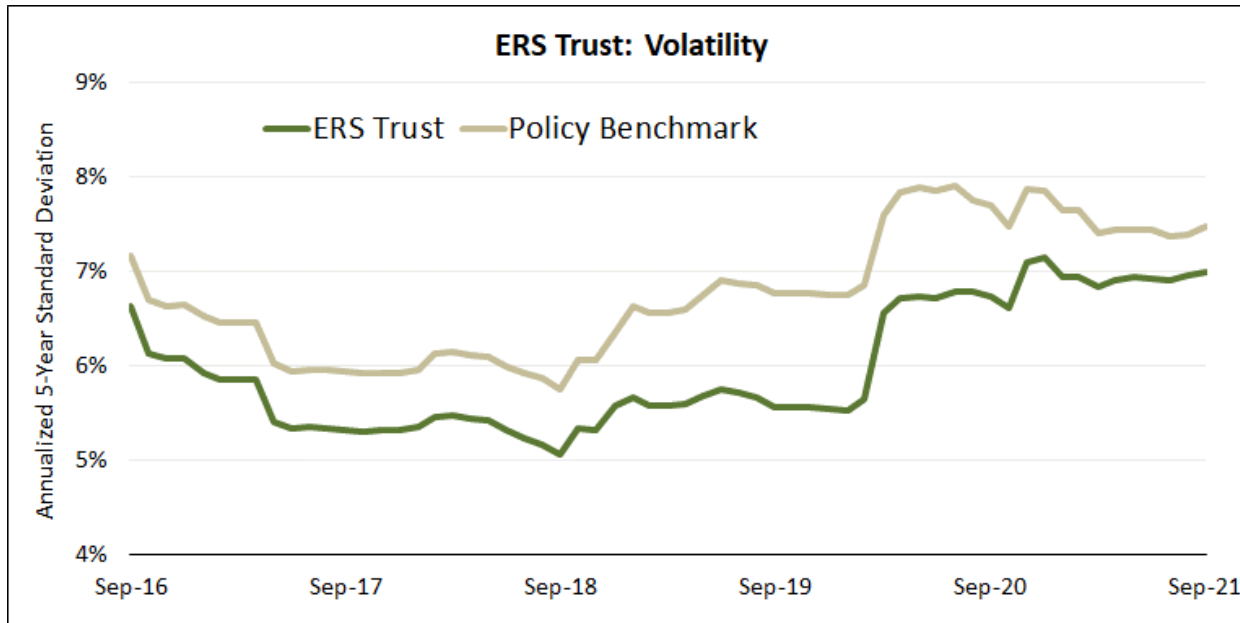


ERS Trust Performance

Absolute Risk



- Volatility levels trending upward and remain below that of the benchmark

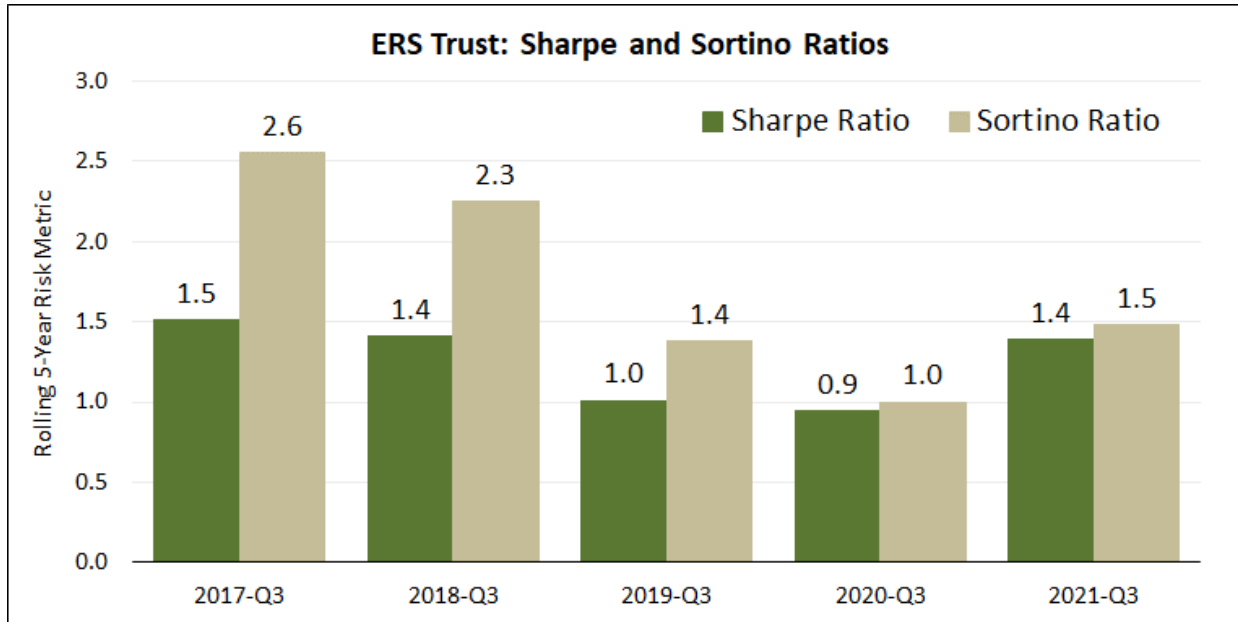


ERS Trust Performance

Risk-Adjusted Returns



- Good returns per unit of absolute risk and downside risk

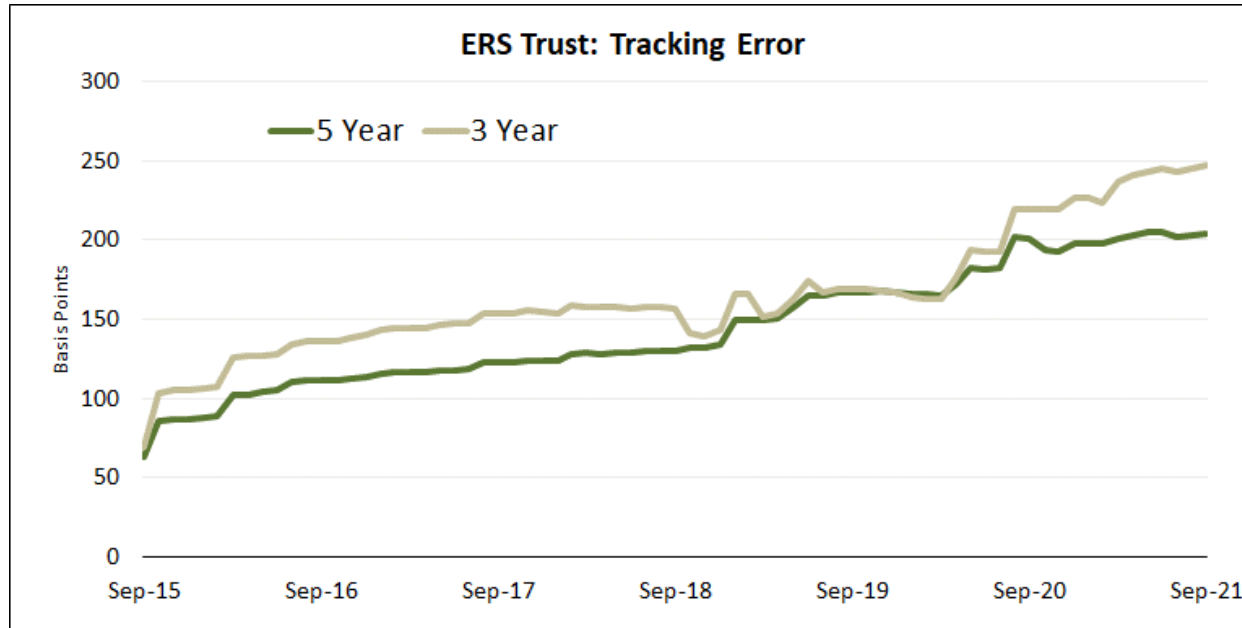


ERS Trust Performance

Relative Risk



- Tracking error trending upward over time as portfolio matures

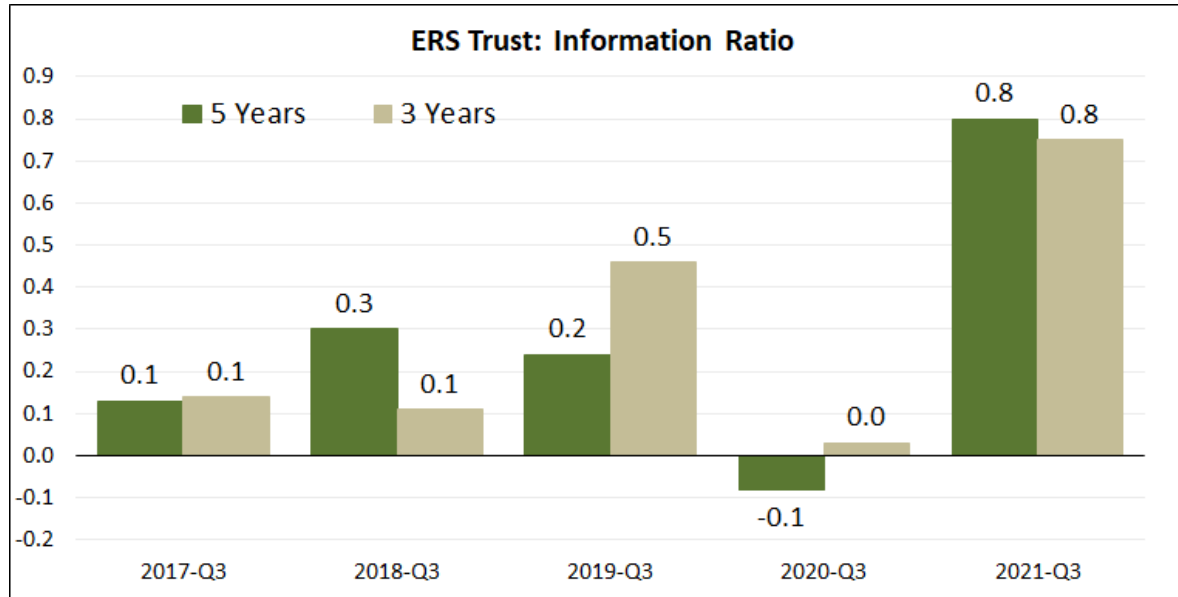


ERS Trust Performance

Risk-Adjusted Returns



- Returns per unit of relative risk now at their highest levels in several years

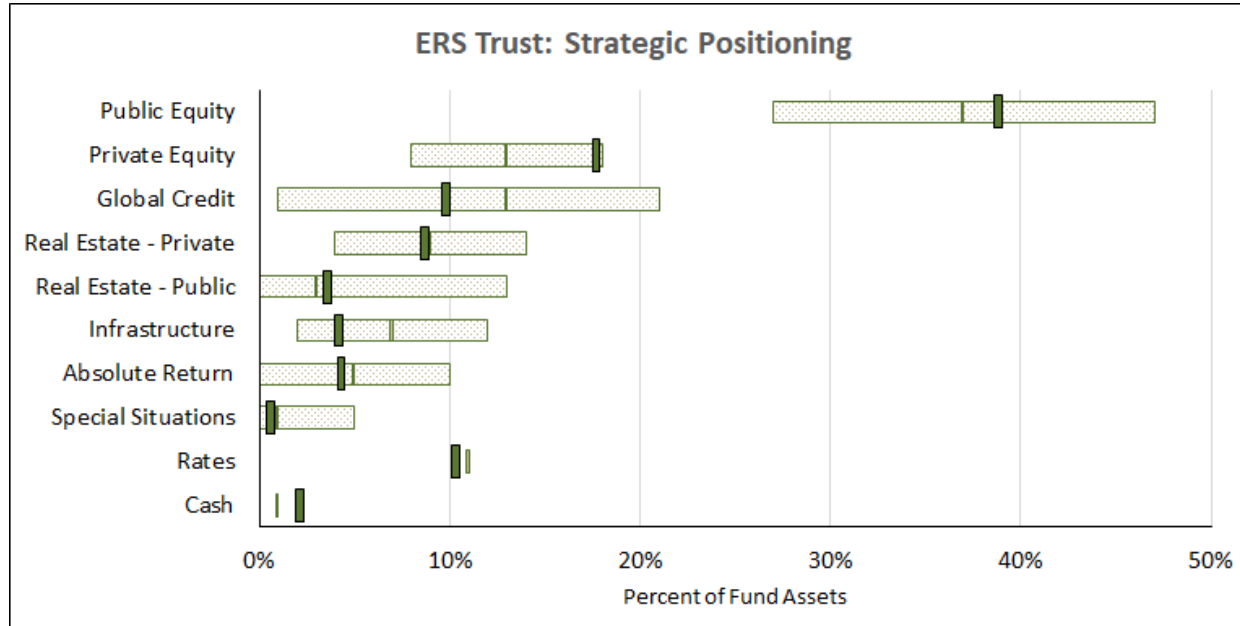


ERS Trust Performance

Fund Positioning



- Asset classes remain within ranges with private equity near maximum

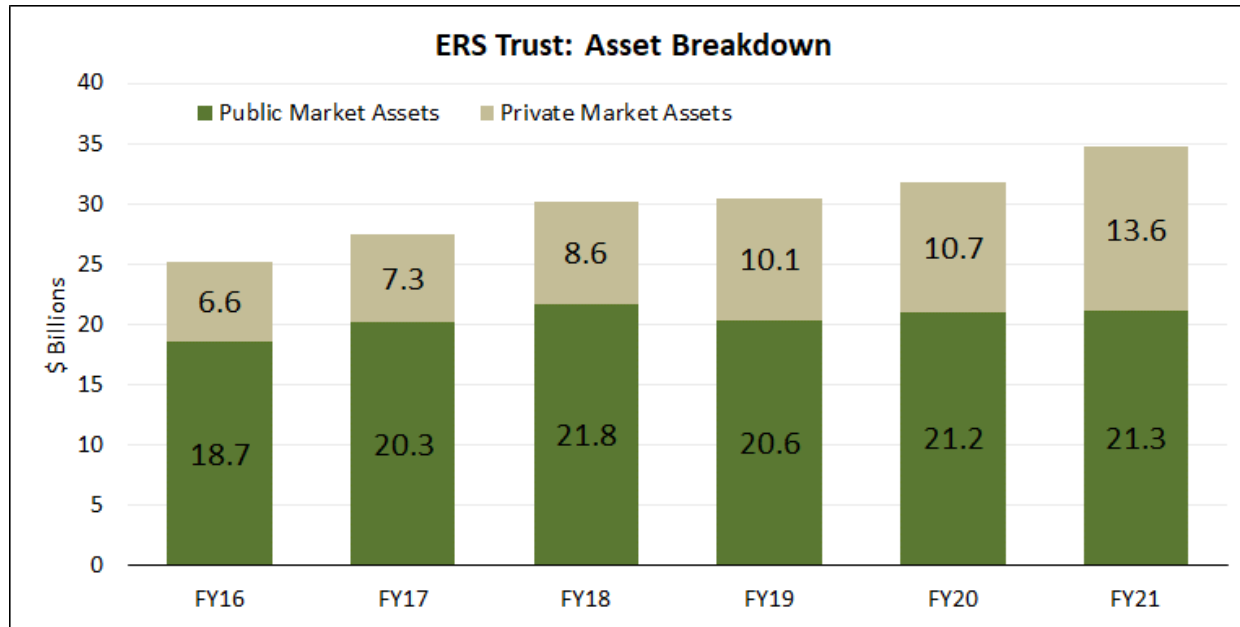


ERS Trust Performance

Asset Mix



- Mix shift toward private markets has left public markets essentially flat

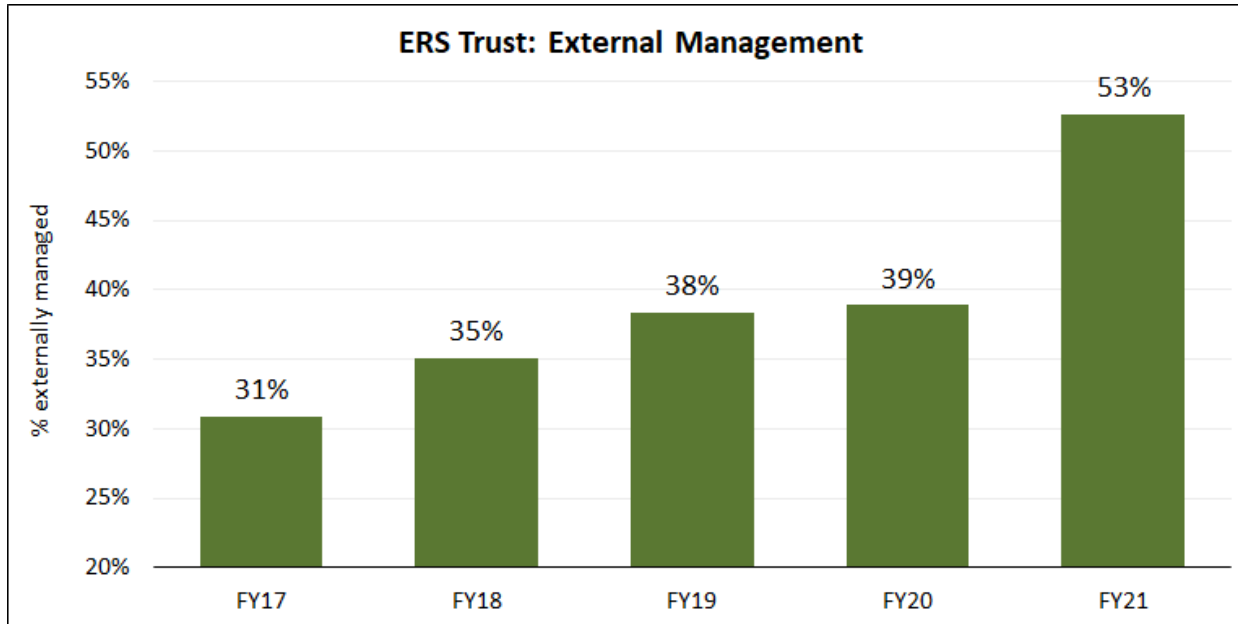


ERS Trust Performance

Asset Mix



- Mix shift toward external management has made that the majority of the Trust

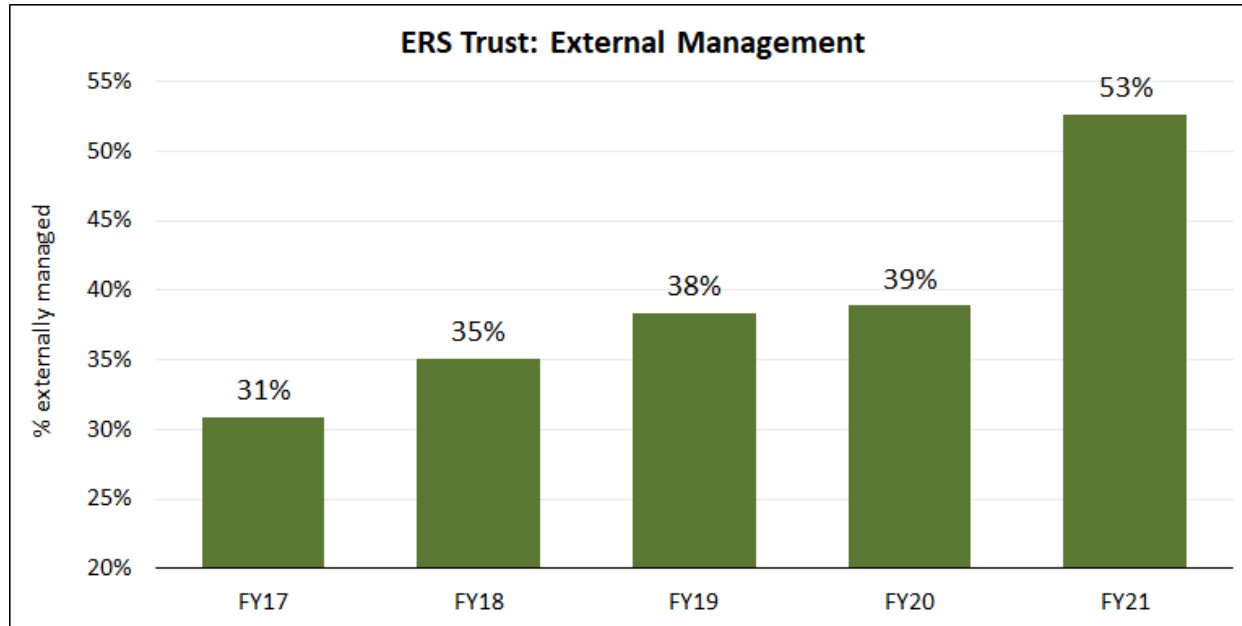


ERS Trust Performance

Asset Mix



- Mix shift toward external and private markets has added to illiquidity

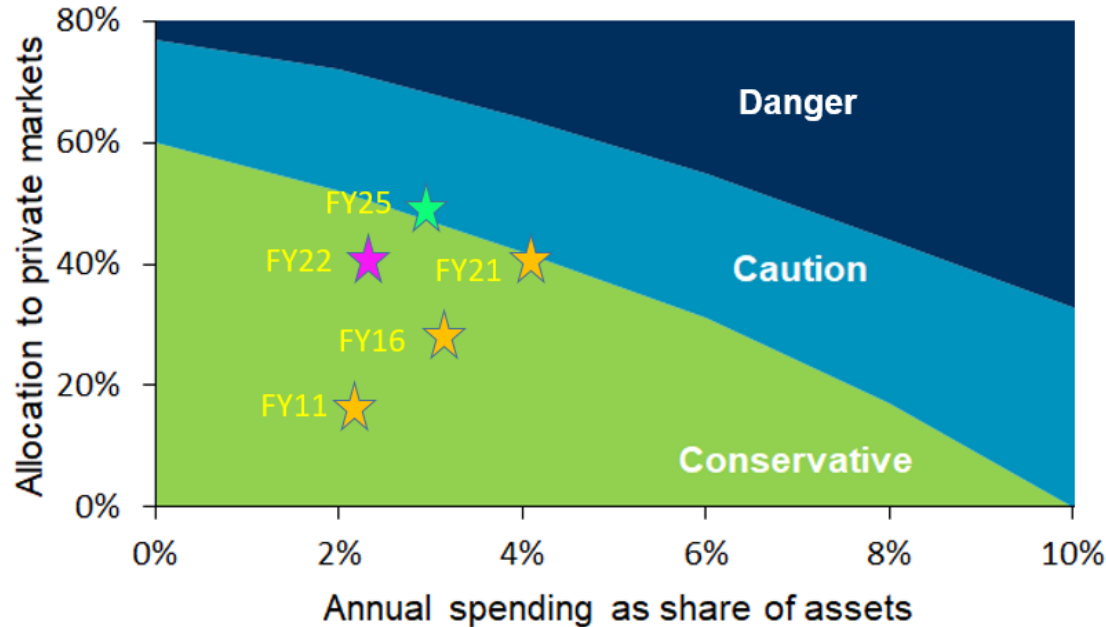


ERS Trust Performance



Liquidity vs. Spending

- Liquidity is balanced with the payment obligations of the System

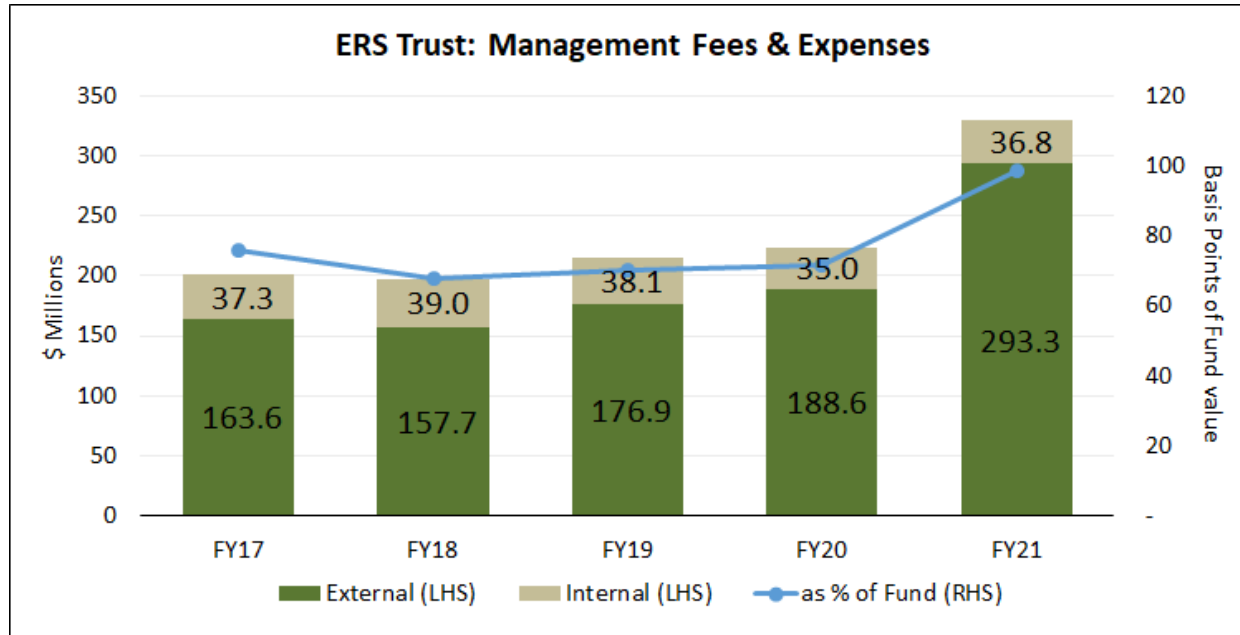


ERS Trust Performance

Fees & Expenses



- Mix shift toward private markets has led to an increase in expense levels



Questions?

Public Agenda Item #27

**Review of Investment Performance for the 3rd Quarter of 2021 and
Risk Update*

December 8, 2021

David Veal, Chief Investment Officer
Carlos Chujoy, Director of Risk Management and Applied Research
Sam Austin, Partner, NEPC



QUARTERLY PERFORMANCE REPORT

EMPLOYEES RETIREMENT SYSTEM OF TEXAS

DECEMBER 8, 2021

Sam Austin, Partner
Michael Malchenko, Sr. Client Specialist



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- Total ERS Trust Performance Summary
- Appendix and Disclosures



EXECUTIVE SUMMARY

ERS TRUST DASHBOARD

| | CYTD | FY 2021 |
|----------------------------|-------|---------|
| Fund Performance | 15.3% | 25.5% |
| Policy Benchmark | 9.7% | 18.5% |
| Excess Return | 5.6% | 7.0% |
| 3 Yr Tracking Error | 2.47% | |
| 5 Yr Sharpe Ratio | 1.39 | |
| 5 Yr Sortino Ratio | 1.48 | |

Largest Contributors (Quarter)

Private Equity (+0.9%) and Private Real Estate (+0.2%) contributed positively versus the policy benchmark.

Largest Detractors (Quarter)

None. All asset classes were contributors or flat versus the policy benchmark.

| Profile |
|--|
| Market Value at September, 2021: |
| \$34.95 Billion |
| Actuarial Accrued Liability August 31, 2020 : |
| \$43.2 Billion |
| Actuarial Value of Assets August 31, 2020 : |
| \$28.5 Billion |
| ERS Trust Funded Ratio August 31, 2020 |
| 66.0% |
| Actuarial Assumed Rate of Return: |
| 7.00% |
| Retirees and Beneficiaries August 31, 2020: |
| 117,996 |
| Retirement Payments Year Ended August 31, 2020: |
| \$2.70 Billion |

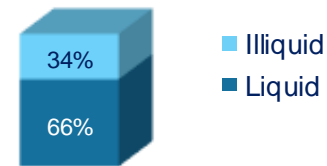
Management



Allocation



Liquidity





PERFORMANCE SUMMARY

TOTAL ERS TRUST PERFORMANCE DETAIL (NET OF FEES)

| | Market Value | Fiscal YTD | 3 Mo | 1 Yr | 3 Yrs | 5 Yrs | 10 Yrs |
|-------------------------------------|-------------------------|--------------|-------------|--------------|--------------|--------------|-------------|
| Total ERS Trust | \$34,948,286,762 | -0.9% | 2.7% | 25.8% | 11.0% | 10.8% | 9.8% |
| <i>Total ERS Trust Policy Index</i> | | -1.7% | 1.4% | 18.1% | 9.1% | 9.2% | 9.0% |
| <i>Long Term Public Index</i> | | -3.4% | -0.8% | 21.6% | 11.2% | 11.0% | 10.1% |

- **One-year ended September 30, 2021, the ERS Trust outperformed the policy benchmark by 7.7%.**
- **The Fund's assets increased from \$28.6 billion to \$34.9 billion in the calendar year which includes a \$7.2 billion investment gain in the calendar year and a \$919.0 million investment gain in the third calendar quarter of 2021.**



Note: Long Term Public Index is comprised of 79% MSCI ACW IMI and 21% Barclays Intermediate Treasury Index. Index definitions can be found in the appendix.

TOTAL ERS TRUST PERFORMANCE DETAIL (NET OF FEES)

3 Years Ending September 30, 2021

| | Anlzd Ret | Anlzd Std Dev | Sharpe Ratio | Sortino Ratio RF |
|--------------------------|-----------|---------------|--------------|------------------|
| Total Trust | 10.96% | 8.66% | 1.15 | 1.34 |
| Total Trust Policy Index | 9.10% | 9.12% | 0.88 | 1.12 |

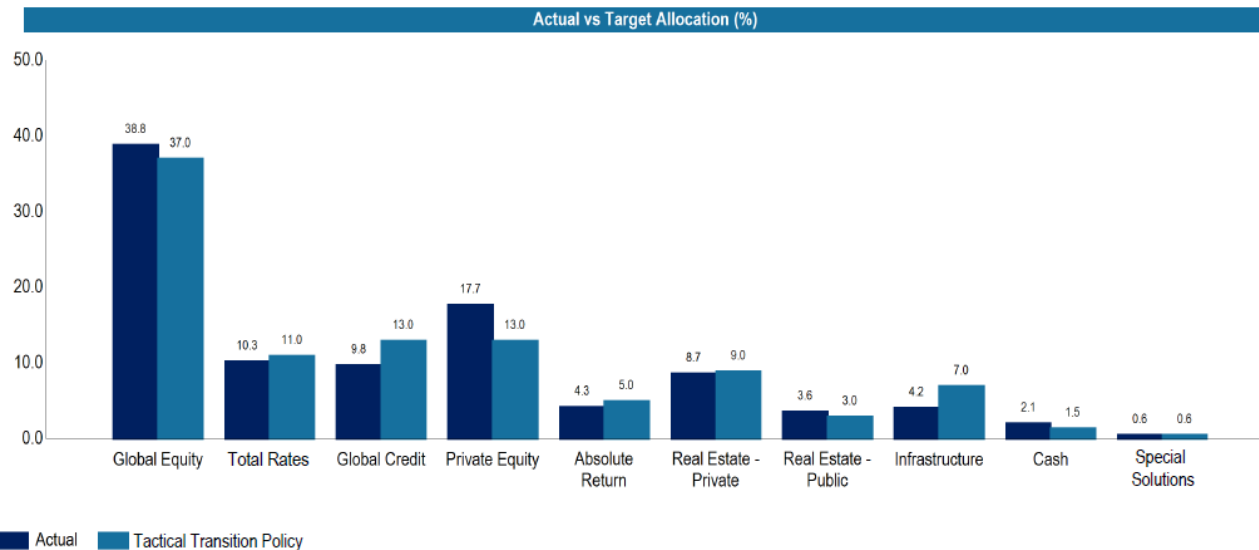
5 Years Ending September 30, 2021

| | Anlzd Ret | Anlzd Std Dev | Sharpe Ratio | Sortino Ratio RF |
|--------------------------|-----------|---------------|--------------|------------------|
| Total Trust | 10.79% | 6.99% | 1.39 | 1.48 |
| Total Trust Policy Index | 9.16% | 7.46% | 1.08 | 1.22 |

- **Three-year period ended September 30, 2021, the return of 10.96% outperformed the benchmark by 1.86%. On a risk-adjusted basis, the Sharpe and Sortino Ratios over this period outperformed the benchmark.**
- **Five-year period ended September 30, 2021, the Trust returned 10.79% and outperformed the policy benchmark by 1.63%. On a risk-adjusted basis, the Trust's Sharpe and Sortino Ratios outperformed the benchmark and indicate that active management benefitted the Plan.**
- **The three-year and five-year Fund returns have outperformed the actuarial rate of return.**



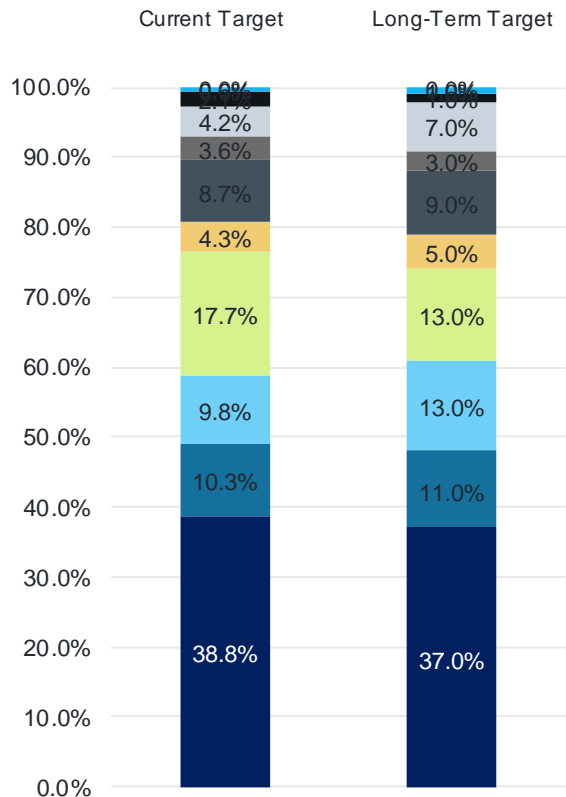
TOTAL ERS TRUST ASSET GROWTH SUMMARY



| | Summary of Cash Flows | | | | | |
|------------------------|-----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | Fiscal Year-To-Date | Last Three Months | Year-To-Date | One Year | Three Years | Five Years |
| Beginning Market Value | \$34,909,583,238 | \$33,902,876,973 | \$30,865,543,933 | \$28,618,113,390 | \$28,923,385,305 | \$25,570,386,973 |
| Contributions | \$1,817,352,089 | \$5,704,092,337 | \$16,014,801,930 | \$18,521,382,055 | \$46,677,604,006 | \$64,365,772,666 |
| Withdrawals | -\$1,447,811,501 | -\$5,577,731,788 | -\$16,579,702,421 | -\$19,439,177,525 | -\$50,216,759,995 | -\$70,054,194,552 |
| Net Cash Flow | \$369,540,588 | \$126,360,548 | -\$564,900,491 | -\$917,795,470 | -\$3,532,679,248 | -\$5,676,302,338 |
| Net Investment Change | -\$330,837,064 | \$919,049,241 | \$4,647,643,320 | \$7,247,968,842 | \$9,557,580,705 | \$15,054,202,128 |
| Ending Market Value | \$34,948,286,762 | \$34,948,286,762 | \$34,948,286,762 | \$34,948,286,762 | \$34,948,286,762 | \$34,948,286,762 |



TRUST ASSET ALLOCATION VS. POLICY TARGETS

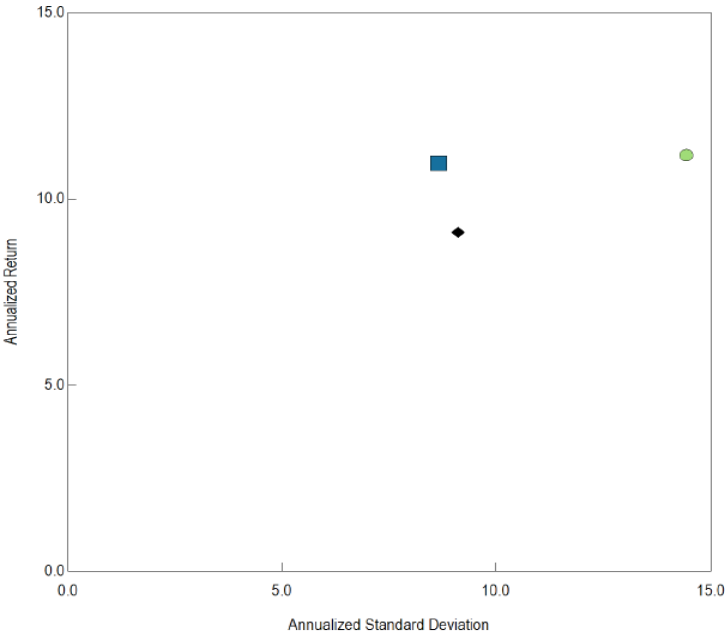


| Asset Allocation on September 30, 2021 | | | | | |
|--|-----------|-----------------------|-------------|------------------|------------------------|
| | | Current | Current | Long-Term Target | Long-Term Target Range |
| Public Equity | \$ | 13,564,096,040 | 38.8% | 37.0% | 27.0% - 47.0% |
| Total Rates | \$ | 3,592,126,068 | 10.3% | 11.0% | -- |
| Global Credit | \$ | 3,410,702,031 | 9.8% | 13.0% | 1.0% - 21.0% |
| Private Equity | \$ | 6,198,135,994 | 17.7% | 13.0% | 8.0% - 18.0% |
| Absolute Return | \$ | 1,489,645,750 | 4.3% | 5.0% | 0.0% - 10.0% |
| Real Estate - Private | \$ | 3,025,075,579 | 8.7% | 9.0% | 4.0% - 14.0% |
| Real Estate - Public | \$ | 1,269,049,694 | 3.6% | 3.0% | 0.0% - 13.0% |
| Infrastructure | \$ | 1,454,441,995 | 4.2% | 7.0% | 2.0% - 12.0% |
| Cash | \$ | 735,850,016 | 2.1% | 1.0% | -- |
| Special Situations | \$ | 196,179,102 | 0.6% | 1.0% | 0.0% - 5.0% |
| Global Futures | \$ | 12,984,492 | 0.0% | -- | -- |
| Total | \$ | 34,948,286,762 | 100% | 100.0% | |



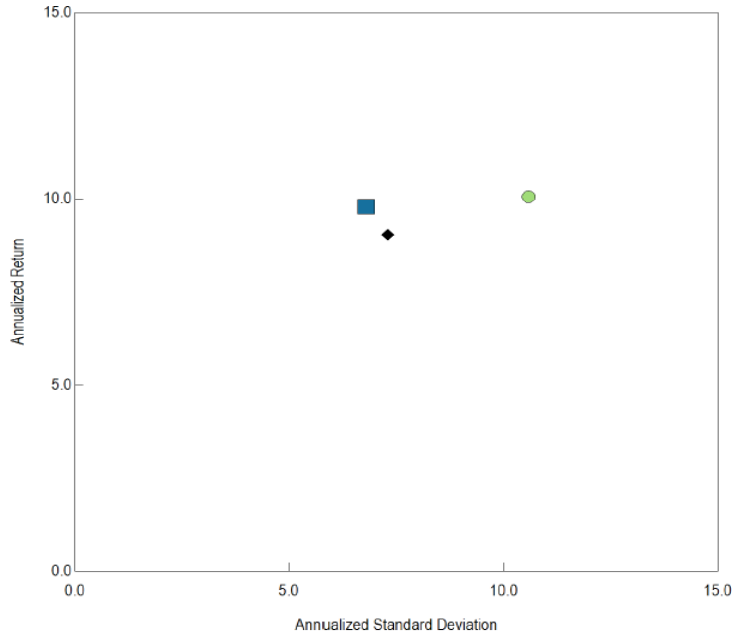
TOTAL RISK/RETURN

3 Years Ending September 30, 2021



- Total Fund
- ◆ Total Fund Policy Index
- Long Term Public Index

10 Years Ending September 30, 2021



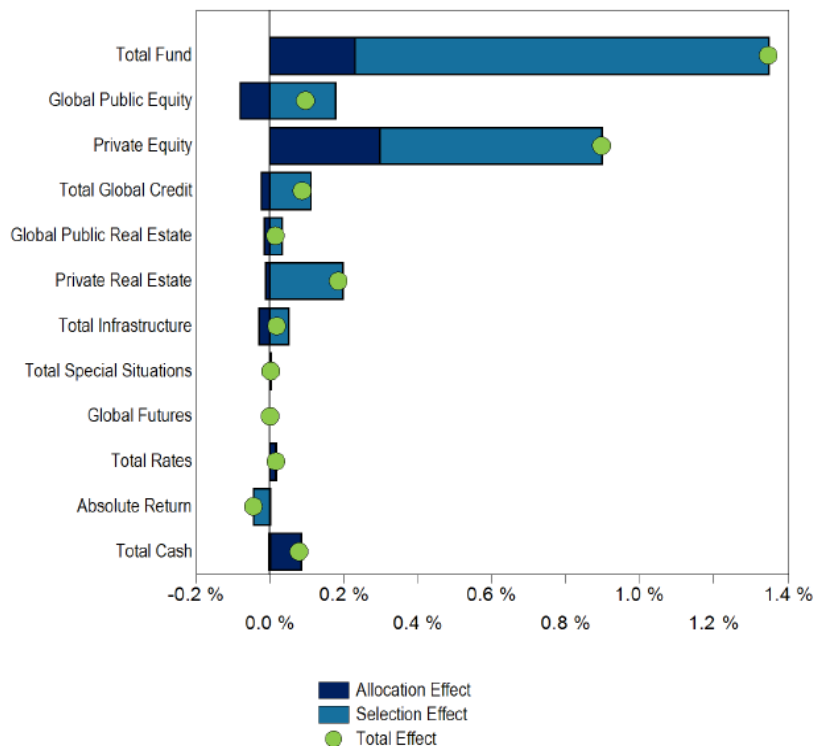
- Total Fund
- ◆ Total Fund Policy Index
- Long Term Public Index



Note : Long Term Public Index is comprised of 79% MSCI ACW IMI and 21% Barclays Intermediate Treasury Index. Index definitions can be found in the appendix.

TOTAL TRUST ATTRIBUTION ANALYSIS

Attribution Effects
3 Months Ending September 30, 2021



Attribution Summary

3 Months Ending September 30, 2021

| | Wtd. Actual Return | Wtd. Index Return | Excess Return | Selection Effect | Allocation Effect | Total Effects |
|---------------------------|--------------------|-------------------|---------------|------------------|-------------------|---------------|
| Global Public Equity | -0.6% | -1.1% | 0.5% | 0.2% | -0.1% | 0.1% |
| Private Equity | 12.4% | 8.7% | 3.7% | 0.6% | 0.3% | 0.9% |
| Total Global Credit | 2.1% | 0.9% | 1.2% | 0.1% | 0.0% | 0.1% |
| Global Public Real Estate | 0.0% | -0.8% | 0.8% | 0.0% | 0.0% | 0.0% |
| Private Real Estate | 6.1% | 3.7% | 2.5% | 0.2% | 0.0% | 0.2% |
| Total Infrastructure | 3.9% | 2.6% | 1.3% | 0.0% | 0.0% | 0.0% |
| Total Special Situations | 1.5% | 1.3% | 0.3% | 0.0% | 0.0% | 0.0% |
| Global Futures | -- | -- | -- | -- | -- | -- |
| Total Rates | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Absolute Return | -0.1% | 0.9% | -1.0% | 0.0% | 0.0% | 0.0% |
| Total Cash | -0.2% | 0.0% | -0.2% | 0.0% | 0.1% | 0.1% |
| Total | 2.7% | 1.4% | 1.3% | 1.1% | 0.2% | 1.4% |

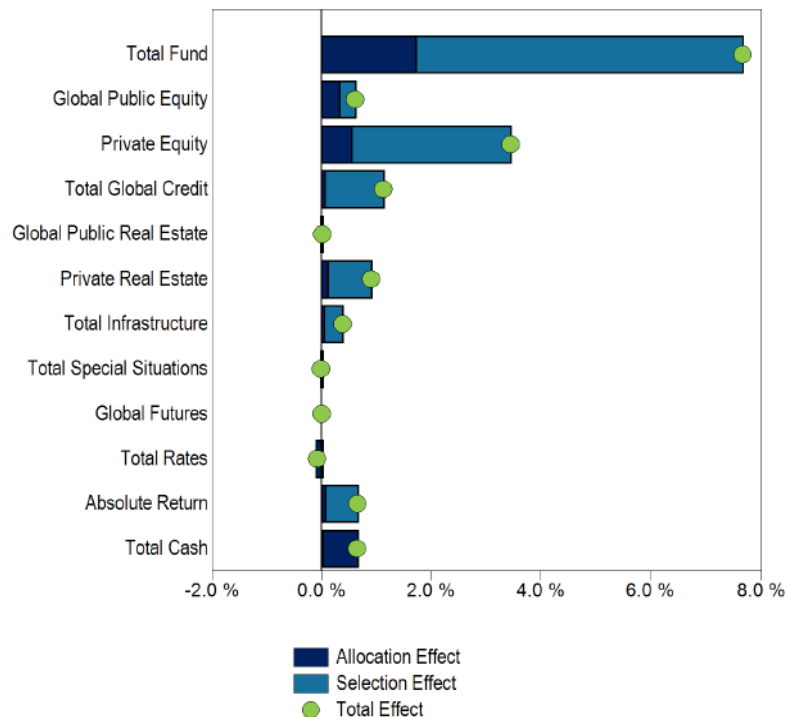
Note: Not all assets are valued through September 30, 2021 within Private Equity, Total Global Credit, Private Real Estate, Total Infrastructure and Absolute Return.

*Total Trust Attribution Analysis uses policy weights.



TOTAL ERS TRUST ATTRIBUTION ANALYSIS

Attribution Effects
1 Year Ending September 30, 2021



Attribution Summary
1 Year Ending September 30, 2021

| | Wtd. Actual Return | Wtd. Index Return | Excess Return | Selection Effect | Allocation Effect | Total Effects |
|---------------------------|--------------------|-------------------|---------------|------------------|-------------------|---------------|
| Global Public Equity | 30.0% | 29.2% | 0.8% | 0.3% | 0.3% | 0.6% |
| Private Equity | 52.0% | 31.6% | 20.5% | 2.9% | 0.5% | 3.4% |
| Total Global Credit | 21.5% | 11.3% | 10.2% | 1.1% | 0.1% | 1.1% |
| Global Public Real Estate | 30.6% | 30.5% | 0.1% | 0.0% | 0.0% | 0.0% |
| Private Real Estate | 16.0% | 7.1% | 8.9% | 0.8% | 0.1% | 0.9% |
| Total Infrastructure | 17.6% | 9.4% | 8.2% | 0.3% | 0.0% | 0.4% |
| Total Special Situations | 11.4% | 12.9% | -1.5% | 0.0% | 0.0% | 0.0% |
| Global Futures | -- | -- | -- | -- | -- | -- |
| Total Rates | -1.3% | -1.4% | 0.1% | 0.0% | -0.1% | -0.1% |
| Absolute Return | 15.2% | 3.6% | 11.6% | 0.6% | 0.1% | 0.6% |
| Total Cash | -0.1% | 0.1% | -0.2% | 0.0% | 0.6% | 0.6% |
| Total | 25.7% | 18.1% | 7.6% | 5.9% | 1.7% | 7.7% |

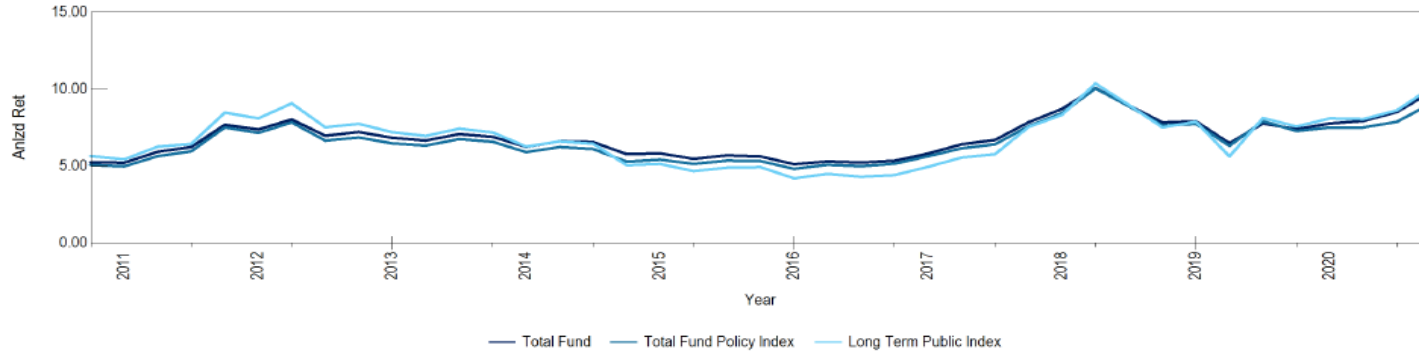
Note: Not all assets are valued through 30, 2021 within Private Equity, Total Global Credit, Private Real Estate, Total Infrastructure and Absolute Return.

* Total Trust Attribution Analysis uses policy weights.

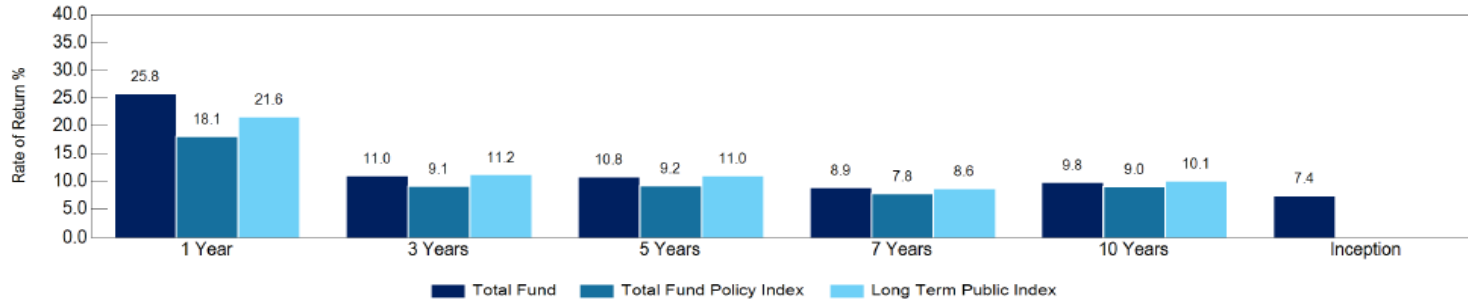


LONG TERM INVESTMENT RESULTS

Rolling 10 Year Annualized Return (%)



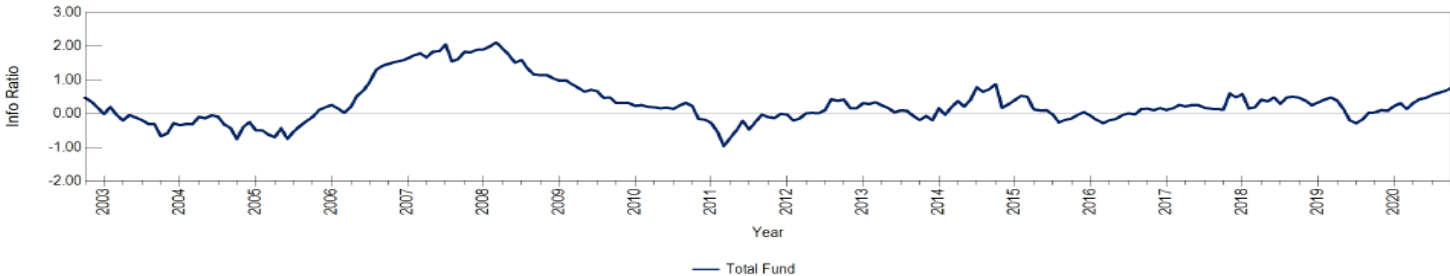
Return Summary
Ending September 30, 2021



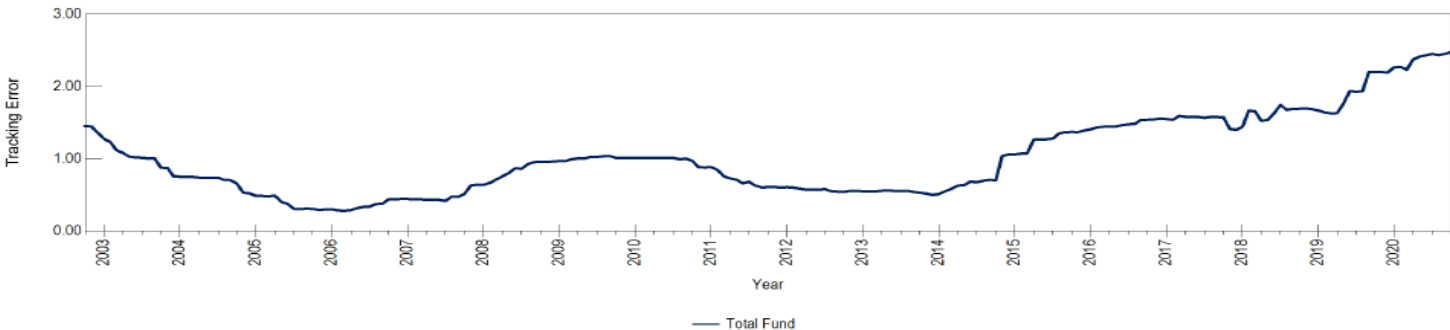
Note: Long Term Public Index is comprised of 79% MSCI ACW IMI and 21% Barclays Intermediate Treasury Index. Index definitions can be found in the appendix.

ROLLING INFORMATION RATIO AND TRACKING ERROR

Rolling 3 Year Information Ratio



Rolling 3 Year Tracking Error



SUMMARY PERFORMANCE COMMENTARY

- **Over the past 10 years, Total Trust returns outperformed the policy benchmark by 0.75% and outperformed the Plan's actuarial rate of return (currently 7.0%).**
- **In the one-year ended September 30, 2021 the Trust outperformed the policy benchmark by 7.7%.**
 - Private Equity contributed +3.4%, Global Credit contributed +1.1%, Private Real Estate contributed +0.9%, Global Public Equity contributed +0.6% and Absolute Return contributed +0.6% to returns vs. the policy benchmark.
- **In the past one-year, portfolio positioning at the asset class level contributed +1.7% to Total ERS Trust returns vs. policy benchmark.**
 - An over-weight position to Private Equity contributed positively (+0.5%) to total Trust returns vs. the policy benchmark.
 - An over-weight position to Public Equity contributed positively (+0.3%) to total Trust returns versus the policy benchmark.



Risk Management & Applied Research Market and Portfolio Update

Carlos Chujoy, CFA, Director of Risk Management & Applied Research

Market and Portfolio Update

3Q2021 Update



Agenda

- Headwinds and Tailwinds
- Review of 3rd Quarter Market Conditions
- ERS Portfolio Overview
- Summary

Market Conditions

3Q2021 Update



Tailwinds

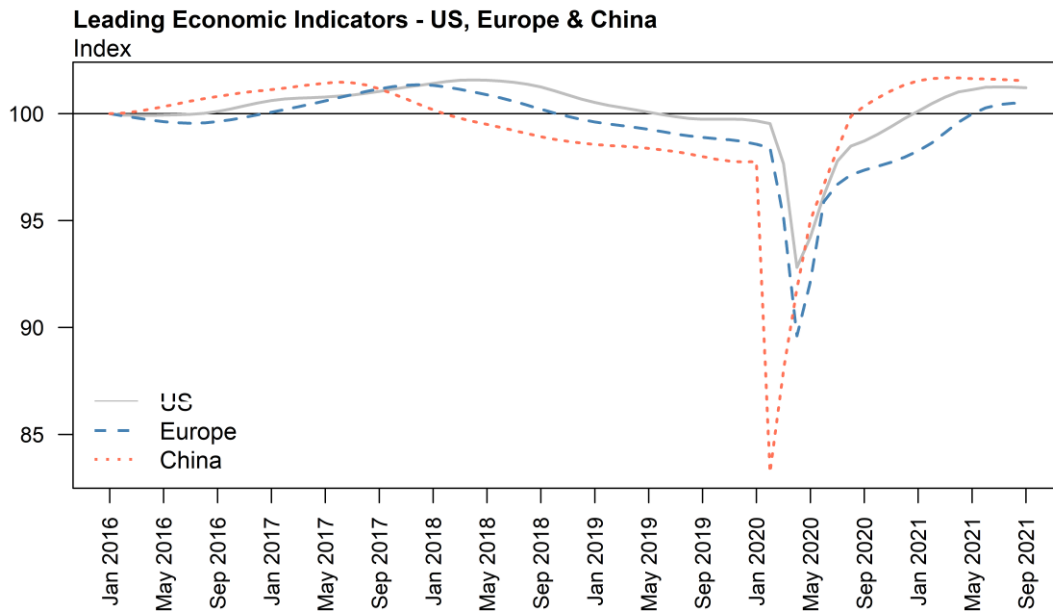
- Continued reopening of the economy
- Fed maintaining its supportive stance with ample liquidity
- Fundamentals still supportive of continued growth albeit at a lower pace
- Diversified nature of ERS portfolio well positioned for adverse market events

Headwinds

- Concerns about slowing economic growth and higher inflation, Fed tapering, US debt levels
- More evidence of a deteriorating environment
- China economic slowdown and the impact from the Evergrande fallout

Global Economic Activity

Economic Slowdown Concerns Due To A Deceleration In Largest 2 Economies

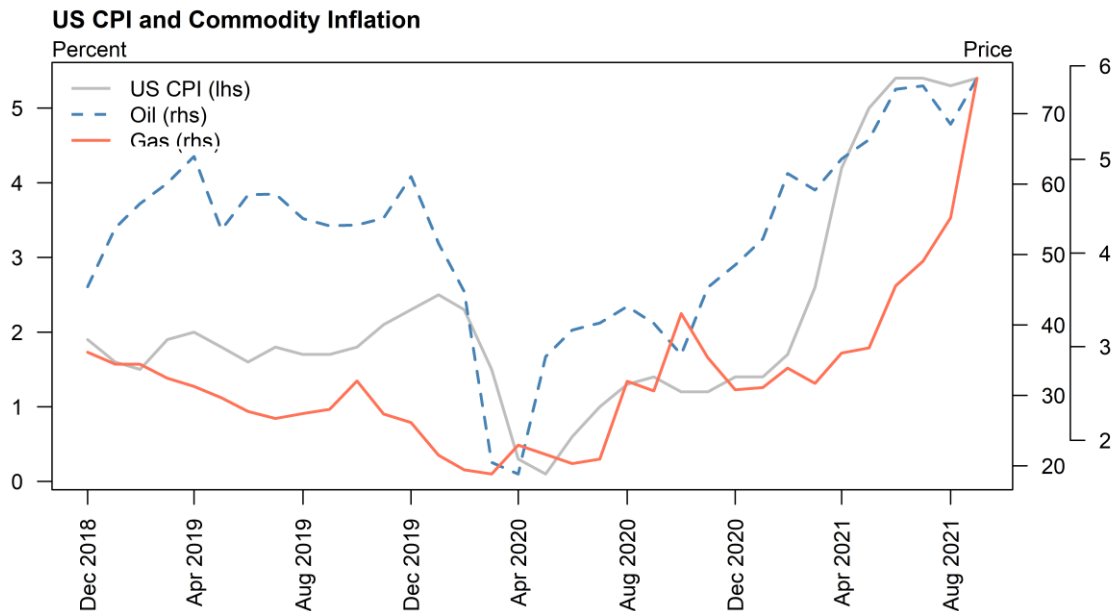


Source: ERS, Bloomberg

- The quick V-shaped economic recovery in major regions of the world led risk-oriented assets to perform well in the recent past
- However, the peaking of economic activity had investors concerned about prospects of an economic deceleration
 - PMIs stalling from a high of 64 and 55 in the US and China respectively to 61 and 49

Inflation and Commodities

The Rise In Commodity Prices Are Adding to Inflationary Concerns



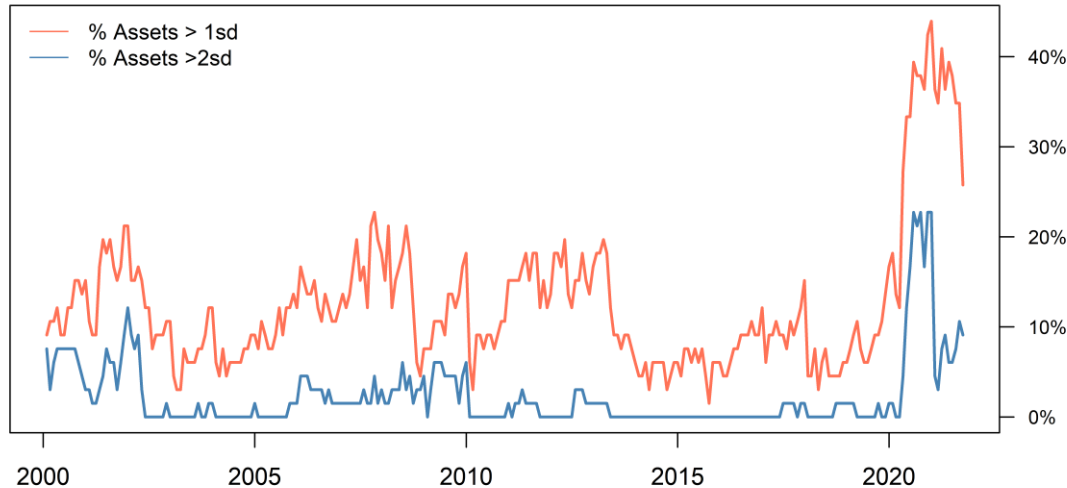
Source: ERS, Bloomberg

- The Fed views inflation as temporary. At the end of the quarter, US inflation was annualizing just over 5%
- Prices for commodities such as Oil and Natural Gas rose due to green energy policies, frictions from the pandemic recovery, and geopolitical risk
- The combination of an economic slowdown and higher inflation poses risk to the markets

Valuation

Over 80% of Assets Tracked Trade At Fair Valuation Levels

Percent Assets Trading Expensive



Source: ERS, Bloomberg

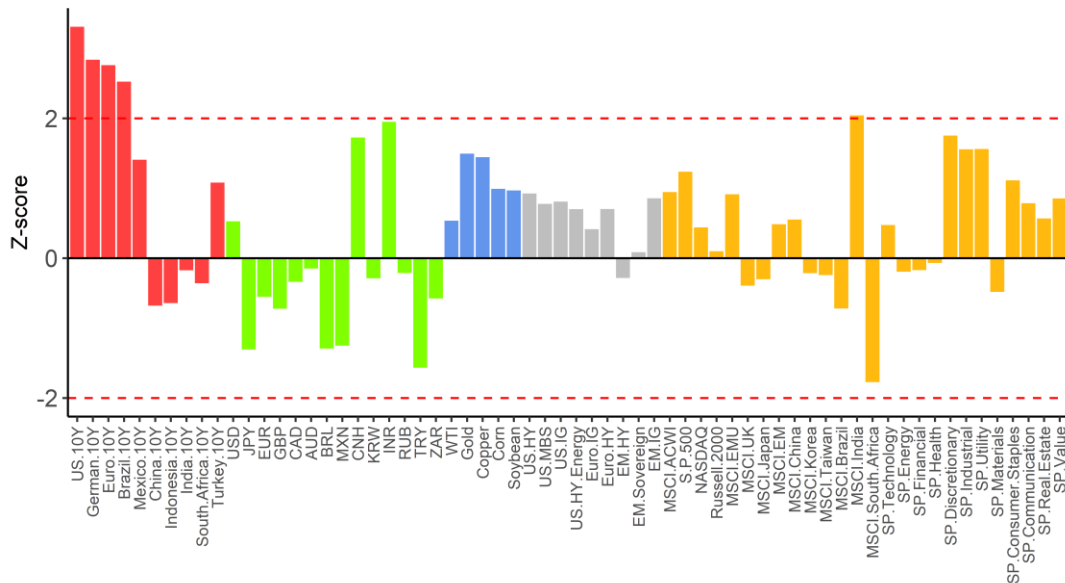
- Valuation levels dramatically increased as the Fed funds rate dropped to all time lows during 2020
- Public equities explained the majority of the assets trading on the expensive side during the run up in 2020 but have since come down
- Assets tracked include public equities, fixed income, currencies and commodities

Valuation

Most Assets Trade At Reasonable Valuation Levels

Cross Asset Valuation

Bonds, Equities, Currencies and Commodities

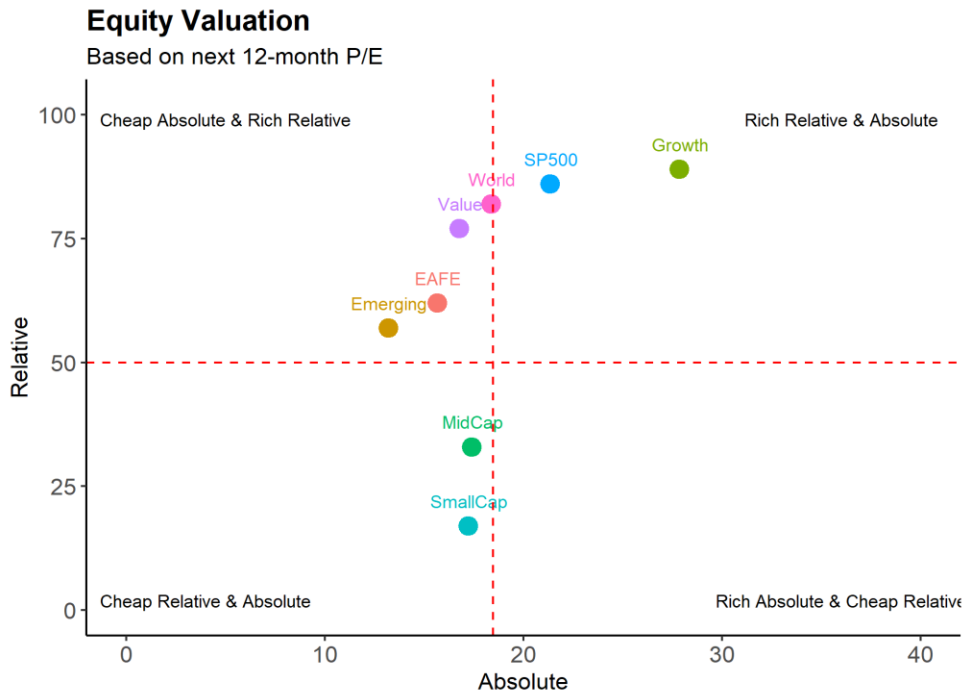


Source: ERS, Bloomberg

- Most currencies exhibit undervaluation
- Within equities cyclical sectors trade at a relative premium to other sectors
- Valuations are high for Long Treasury Bonds

Valuation - Equities

Within Equities, Mid and Small Appear Attractive On a Relative Basis



Source: ERS, Bloomberg

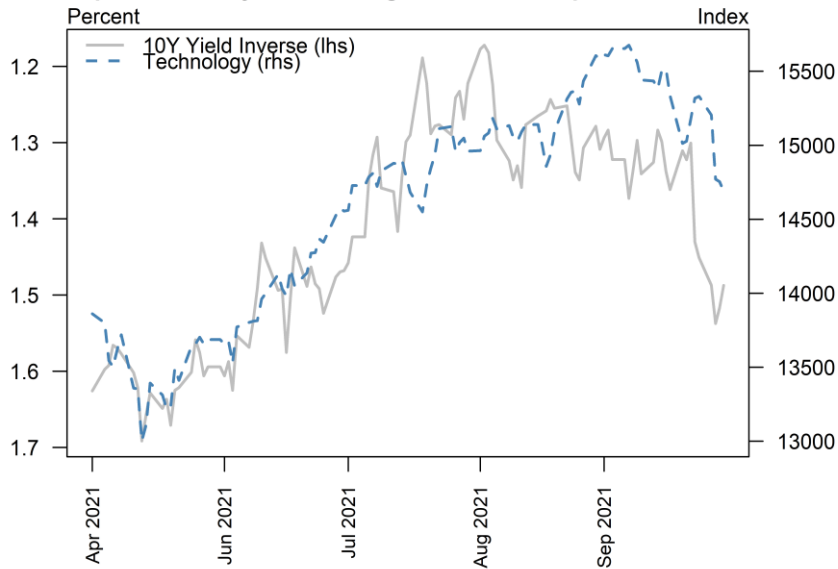
- Growth in particular looks expensive
- Midcap stocks and Smallcap stocks look attractively priced relative to history

Bond Yields, Regulation and Long Duration Assets



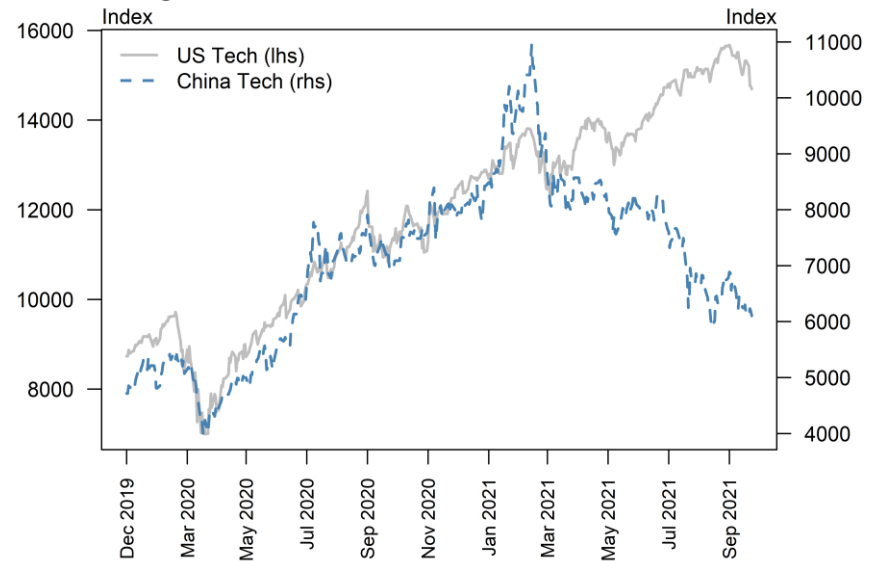
Rising Yields and Increased Regulatory Environment Impact On Risky Assets

Impact of bond yields on long duration asset performance



Source: ERS, Bloomberg

Divergence in Performance In US-China Tech Stocks



Source: ERS, Bloomberg

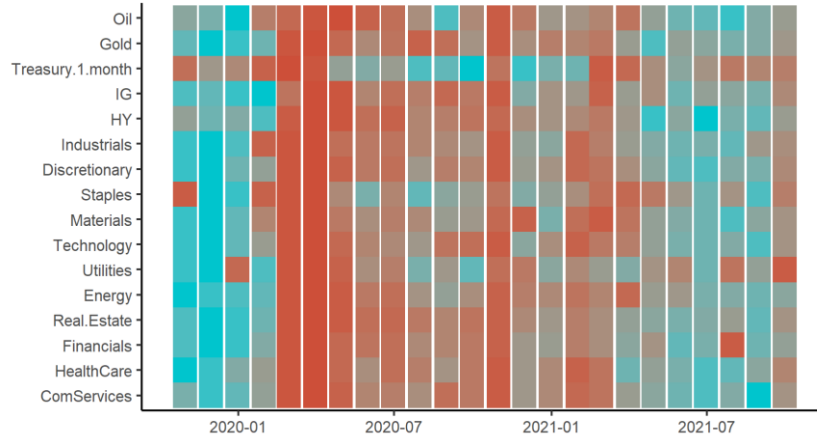
Market Stress

Global Financial Stress Indicators and Cross Asset Class Implied Risk



Heatmap of Cross Asset Class Implied Risk

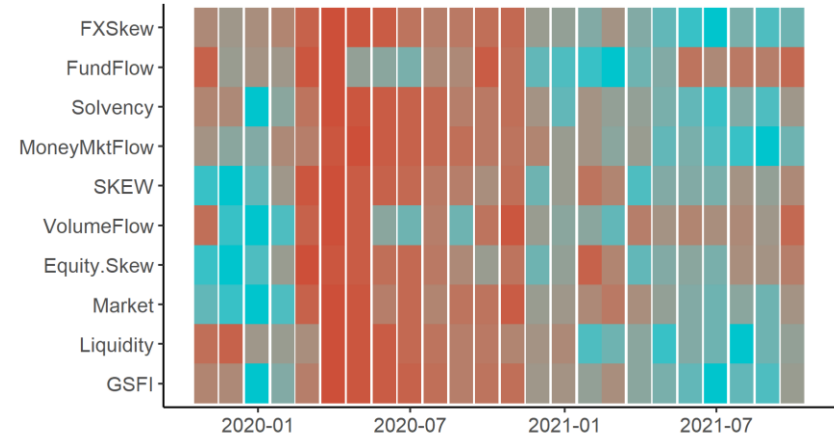
Over the preceding 24-month period ending September 2021.



Source: ERS, Bloomberg

Heatmap of Global Stress Financial Indicators

Over the preceding 24-month period ending September 2021.



Source: ERS, Bloomberg, Bank of America

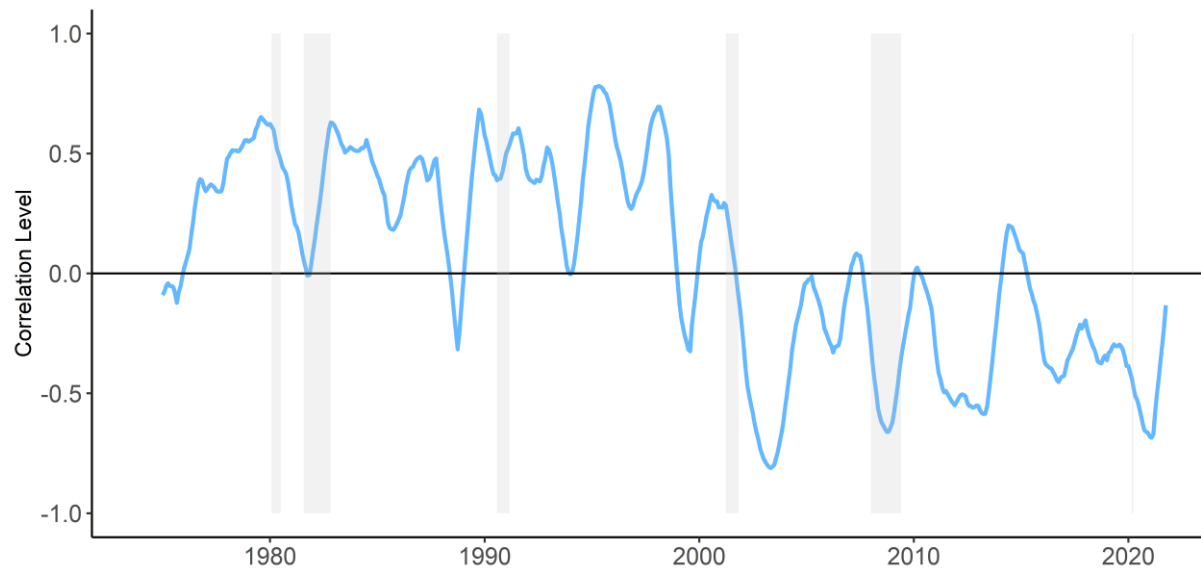
- The 3rd quarter saw an increase of stress levels as manifested by the GSFI.
- Several risk indicators such as fund flow and volume flow momentum provided a sense of increased anxiety.
- September proved to be a challenging month for risk seeking assets during the quarter.

Portfolio Diversification

Rise in Equity/Bond Correlation Means Less Diversification And More Volatility



Rolling 1-Yr (Moving Average) Equity/Bond Correlation



Source: Federal Reserve Bank of St. Louis, ERS
Data covers the Period of Dec.1974-Sep.2018

Market Update

Current Market Concerns



1. Global economic weakening backdrop
2. Real bond yields rising as central banks start to pull back from the COVID-19 support
3. Market volatility to be influenced by
 - a. ongoing supply-chain disruptions
 - b. shortages
 - c. climbing energy prices
 - d. downward revisions to economic and financial estimates
 - e. expectations on Fed policy
4. Realignment of portfolio positioning in response to underlying market dynamics

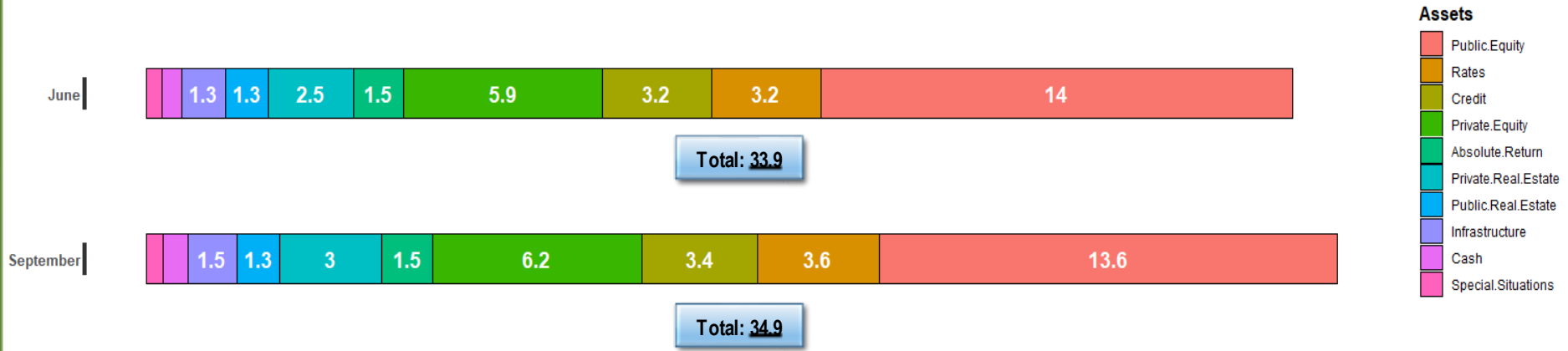
Portfolio Positioning

ERS Trust dollar allocation



- Total Trust assets gained about \$1bil (3.1%) in the quarter, driven by 2.7% of investment gains
- With the exception of Public Equity, asset class positions either remained approximately same or increased
- Public equity position dropped roughly \$400mil (2.8%) in the quarter, attributable to both downsized return and asset allocation

Assets Under Management (\$bil)



Portfolio Positioning

ERS Trust vs policy allocation



- The ERS portfolio was overweight Public Equity and Private Equity while underweight Infrastructure at end of Q2. The overweight in Public Equity was reduced at end of Q3.

Fund Positioning Relative to FY2021 Weight Targets



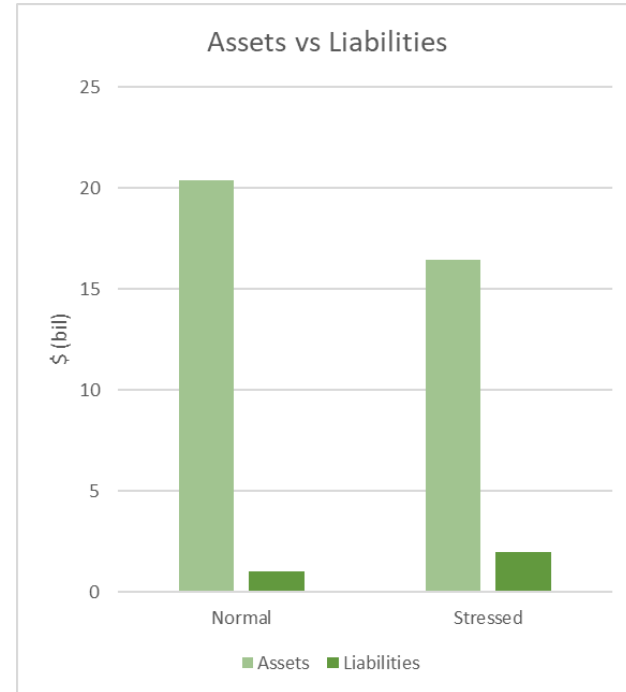
Liquidity Analysis (Monthly)

Sufficient ability to meet short-term needs

| Assets Liquidable within 30 days (\$bil) | | |
|--|-------------|-------------|
| | Normal | Stressed |
| Equity | 13.6 | 11.6 |
| Rates | 3.6 | 2.5 |
| Internal Credit | 2.5 | 1.7 |
| Cash | 0.7 | 0.7 |
| Total | 20.4 | 16.5 |

| Potential Liability over the next 30 day period (\$bil) | | |
|---|------------|------------|
| | Normal | Stressed |
| Net Plan Contribution | 0.1 | 0.2 |
| Capital Call | 0.9 | 1.8 |
| Total | 1.0 | 2.0 |

| Liquidity Ratio | | |
|----------------------|--------|----------|
| | Normal | Stressed |
| Assets / Liabilities | 20.40 | 8.25 |
| Pass (>5) | Yes | Yes |



Methodology:

Rates portfolio can be liquidated in 5day(normal)/ 10days(stressed). The equity portfolio can be liquidated in 10days(normal)/30 days(stressed). The slippage for the liquidation is VaR(99.99%) for stressed scenario.

Liabilities are estimated using historical patterns. These are multiplied by two in stressed scenarios.

Summary

3Q2021 Update



- Concerns about the pace of the economic recovery and increasing sentiment towards higher inflation drove market sentiment during the quarter as concerns about 'stagflation' started to surface. Risk seeking assets remained volatile during the quarter
- The increasing breadth of risk indicators turning pink captured the deteriorating market sentiment
- Cross asset valuation analysis suggests most assets to be trading at a reasonable valuation level
- The ERS Trust gained about \$1 billion in value with half of that coming from state contributions and the remainder from investment gains
- The ERS Trust maintains sufficient liquidity based on internal stress test analysis

Questions?

*Public Agenda Item #28

**Annual Review of Retirement Program Actuarial Valuations and Financial Status*

December 8, 2021

Ariana Whaley, Pension Policy Analyst

Ryan Falls, Senior Consultant, Gabriel Roeder & Smith

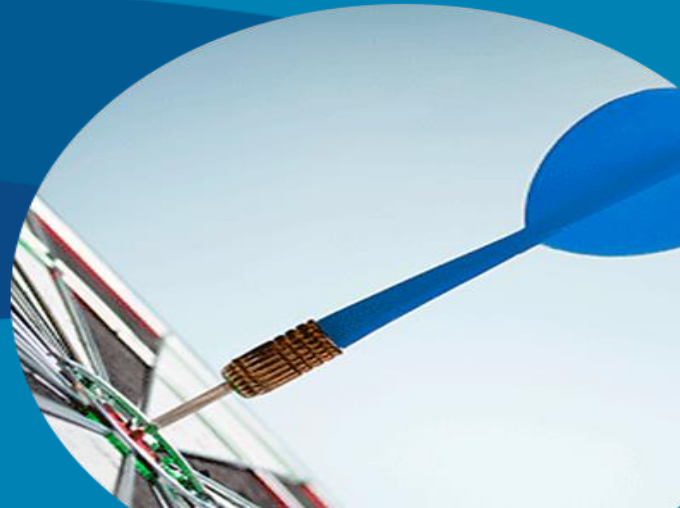
Joe Newton, Pension Practice Leader, Gabriel Roeder & Smith



Actuarial Valuations of the ERS Retirement Funds as of August 31, 2021

Ryan Falls, FSA, EA, MAAA
Joe Newton, FSA, EA, MAAA

December 8, 2021



Agenda

- ERS Funding Valuation Results
 - Review of 2021 Legislative Reform
 - Impact on Accounting Results as of August 31, 2021
 - Impact of FY2021 Investment Performance
- LECOSRF and JRS2 Funding Valuation Results

Purpose of Actuarial Valuation

- Snapshot as of August 31, 2021 using member data, financial data, benefit and contribution provisions, actuarial assumptions and methods as of that date
- Purposes:
 - Measure the actuarial liabilities and funding levels
 - Determine adequacy of current statutory contributions
 - Set future amounts of contributions if current found to be inadequate
 - Provide other information for reporting
 - GASB 67/68, Annual Comprehensive Financial Report
 - Explain changes in actuarial condition of the plans
 - Track changes over time
 - Analyze future outlook

My, what a difference a year makes!

- SB 321 passed by the 2021 Legislature made foundational changes to the funding mechanisms and to benefits for future hires
 - As we will show, the “ability to adapt” is the most impactful feature of the new package of policies
 - Went from a projected depletion date of 41 years to a target full funding date in 33 years
- The 25% return on market assets equates to three and a half years worth of expected investment earnings generated in one year
 - This will be smoothed in over the next five valuation cycles
 - This takes significant pressure off of needing to generate 7.0% returns on a market basis over the short to intermediate term in order to maintain the same contribution expectations discussed when SB 321 was implemented

SB 321 - Funding

Sec. 815.407 LEGACY PAYMENTS. (a) In addition to the state contributions required by this subtitle, each fiscal year the state shall make an actuarially determined payment in the amount necessary to amortize the system's unfunded actuarial liabilities by not later than the fiscal year ending August 31, 2054.

- This amount is a level dollar amount schedule, not tied to payroll or headcount
- \$510 million per year in the 2022-2023 biennium
- Projected at \$510 million per year through 2054 in the impact statement
- ERS will also continue to receive contributions from the members and 10% of pay contributions from the State/agencies

New Terminology

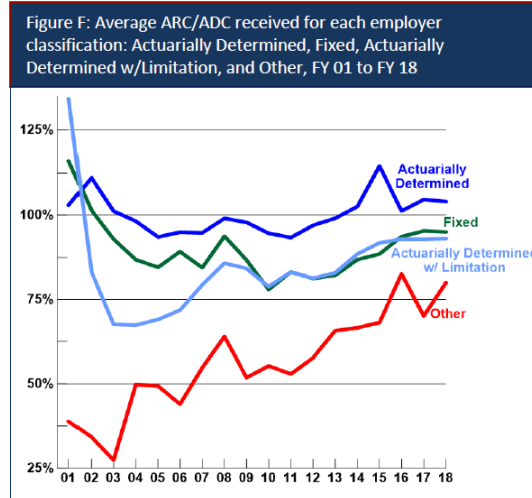
- Moving from a world with a “Funding Period” to one with an “Amortization Period”
- Funding Period is used to convert a contribution stream into a time period
 - UAAL is \$100, receive \$10 a year, how long until the UAAL is paid off?
 - 10 years would be the funding period, it is the output
- Amortization Period is used to convert a time period into a contribution stream
 - UAAL is \$100, want to pay it off in 10 years, how much to pay each year?
 - 10 years is the amortization period, it is an input
 - The contribution stream is the output

Plans with pre-determined, automatic formulas received substantially more of their needed contributions over the past two decades

Table 1. Median ARC/ADC received by each classification of employer contribution, FY 01 to FY 18

| Method for Determining Employer Contributions | Actuarially Determined | Fixed | Actuarially Determined w/ Limitation | Other |
|---|------------------------|-------|--------------------------------------|-------|
| Median ARC/ADC Received | 100.0% | 87.9% | 86.8% | 71.7% |

SB 321 Moved ERS from polices that created the Green line (Fixed)



To policies that created the bright Blue Line (Actuarially Determined)

NASRA Issue Brief: State and Local Government Contributions to Statewide Pension Plans: FY 18
Issued April 2020

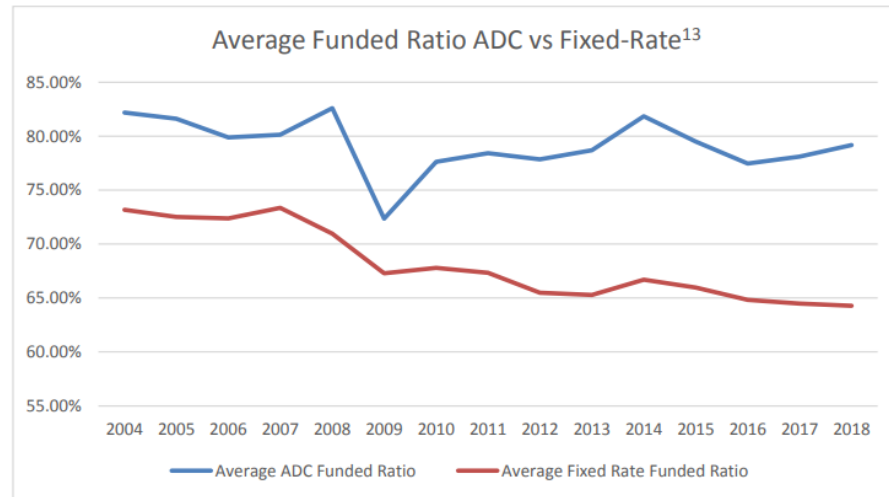
Source: State retirement system CAFRS, compiled by NASRA



Automatic Funding Policies Provide Benefit Security

- Excerpt from a Study by the Texas Pension Review Board

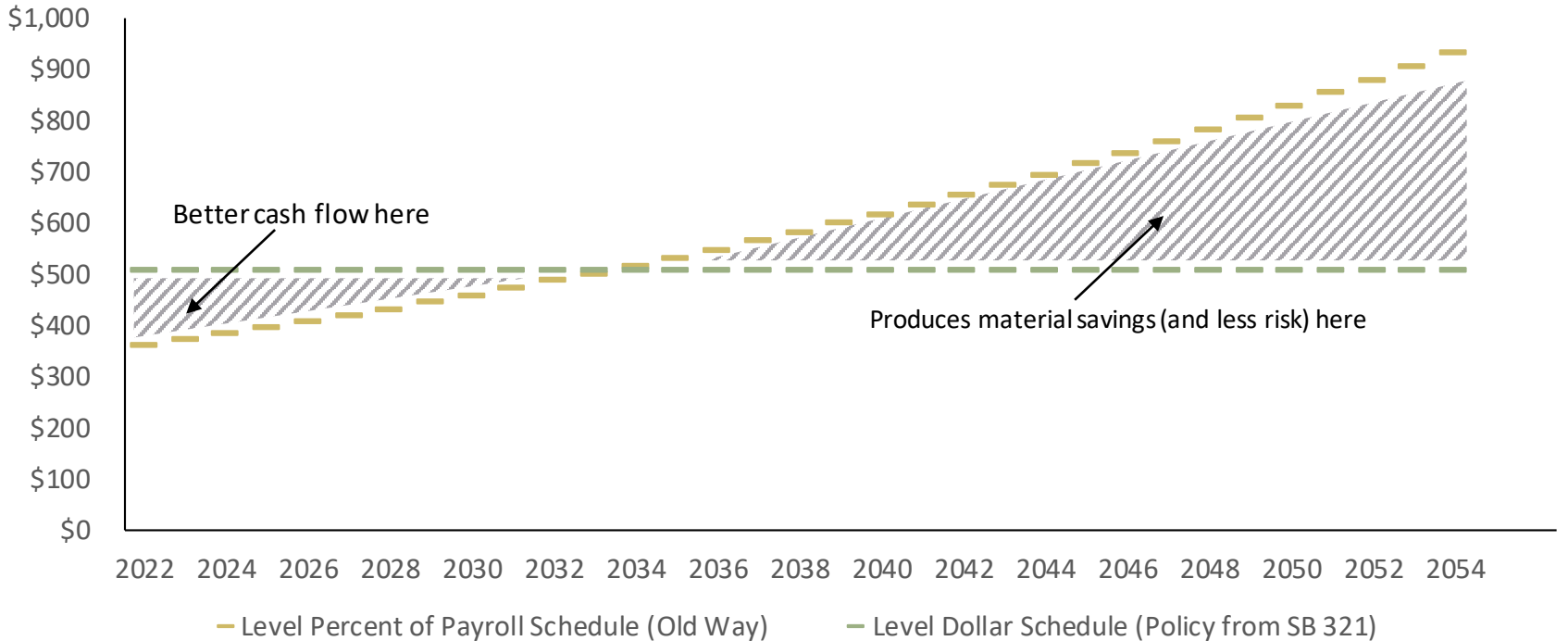
SB 321 Moved ERS from policies that created the Red line



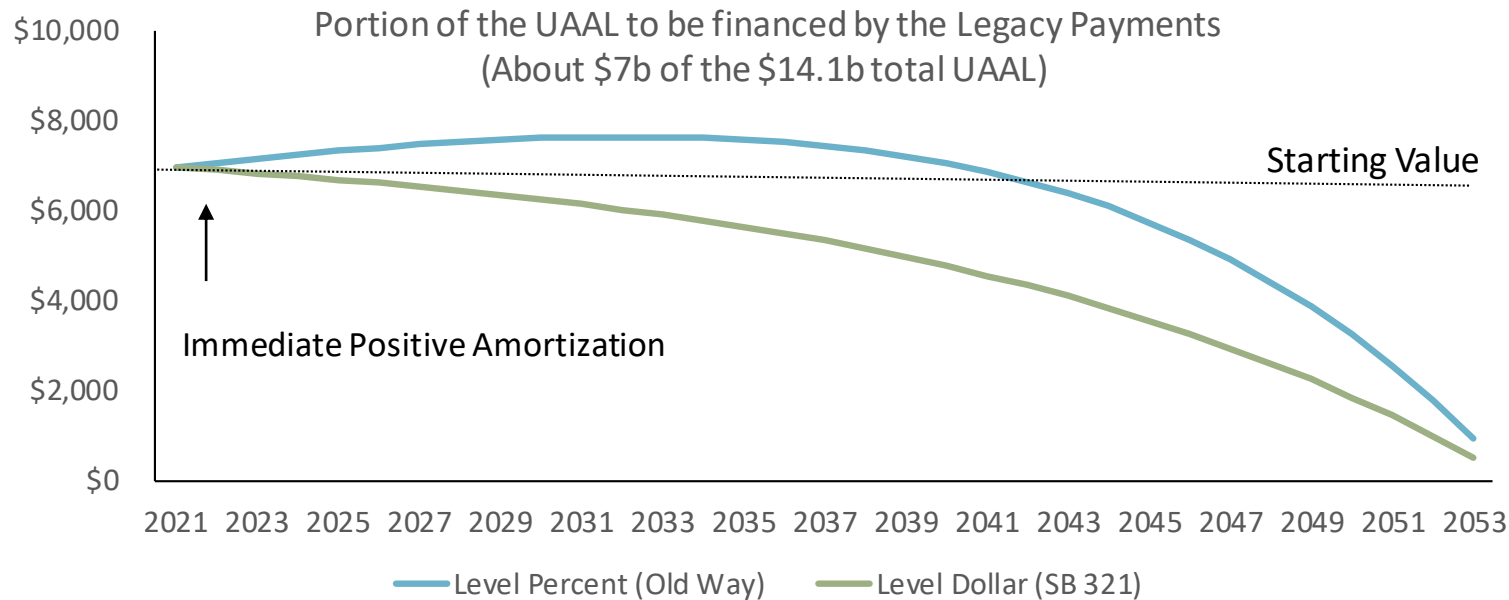
To policies that created the Blue Line

- Fixed Rate Plans: Situations where the contribution is a set percentage of payroll specified in statute/ordinance or local bargaining agreements
 - Actuarially Determined Plans: Situations where a predetermined formula, either set by the Board or by Statute sets the amount of contribution
- <https://www.prb.state.tx.us/txpen/wp-content/uploads/2019/02/Funding-Policy-Paper.pdf>

Level dollar Legacy Payment schedule saves \$3.2b in interest charges over the time period compared to the previous level percent approach

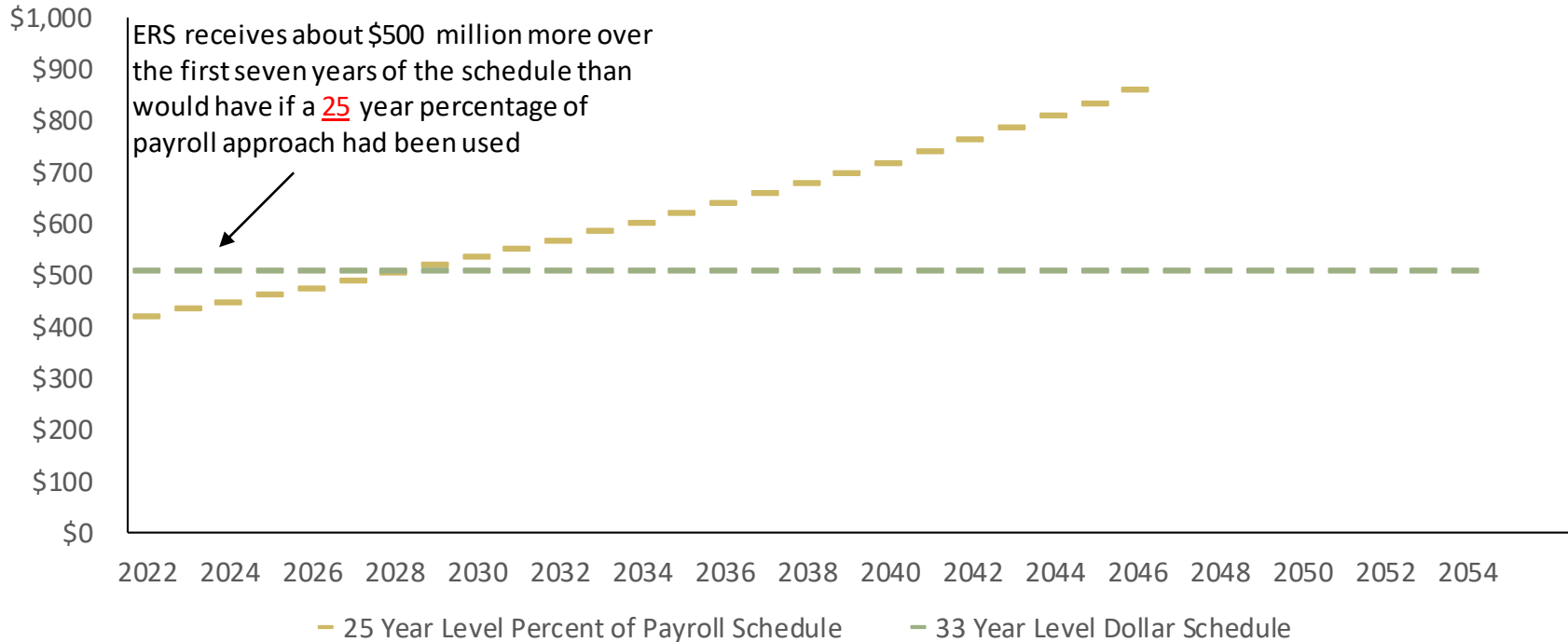


Level Dollar Schedules Produce Immediate Positive Amortization



If had chosen the prior method (percentage of payroll financing), this portion of the UAAL would have increased for 11 years, and is still larger than the original amount 19 years later

Hypothetical Example to Show the Strength of Level Dollar Amortization: Compare 33 Year Level Dollar to 25 Year Level Percent



Impact from Contraction in Membership on Payroll

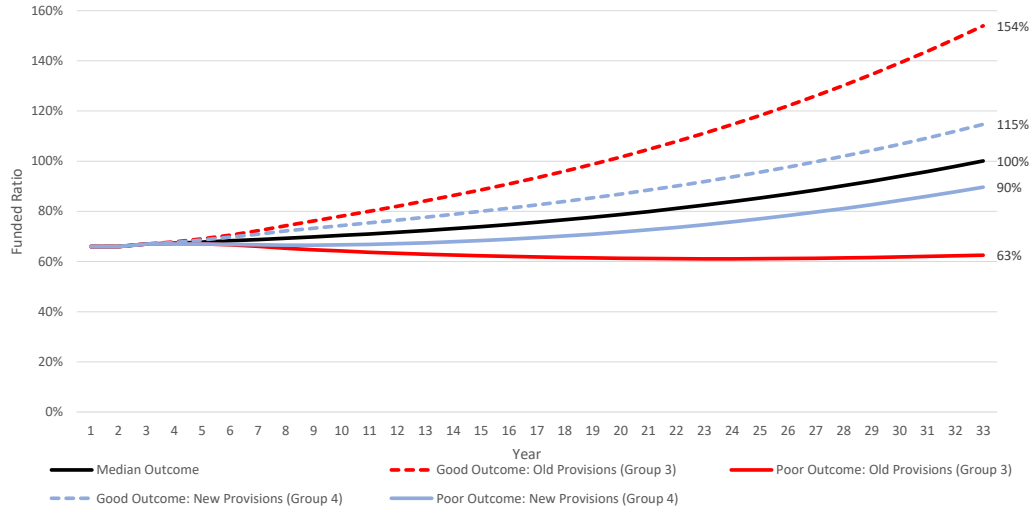
- Active membership declined about 3.5% year over year
 - Even more pronounced for LECOs which declined 8%
- This led to an actual decline in covered payroll from \$7.2b to \$7.1b
 - Valuation assumes this increases at 2.7% per year
- Under old policies where all contributions were tied to this payroll, lower payroll would have increased the funding period (and ASC) materially
- The change to level dollar financing separates a significant portion of the funding from the headcount or payroll
 - The \$510m stays the same, regardless of headcount or payroll (or inflation)
 - More dependable, less risk

SB 321

- There will be more detail in future meetings from ERS Staff and GRS on the new benefit structure as there are details/rules that need to be codified
- This only applies to future hires so has no impact on the 2021 valuation results
- The overall employer provided value is approximately the same so this has minimal impact on projected future results if assumptions are met
 - Difference will emerge when experience is different than the assumptions (positively or negatively)

Illustration of Future Impact from Having Adaptable Benefit Provisions

Projected Funded Ratio
Comparison of Having Adaptable Benefit Provisions



This graph compares the adaptable benefit package from group 4 to the non-adaptable benefits from group 3 based on actual investment performance

The red lines represent a “poor” and a “good” investment scenario with group 3 benefits. The likely range of funded ratio 33 years out is 63% to 154%

The blue lines represent a “poor” and a “good” investment scenario with group 4 benefits. The likely range of funded ratio 33 years out is 90% to 115%

For this hypothetical example, we modeled all current and future members in either group 3 or group 4 to show the impact once all members are in group 4. Thus, this gives a view into the future risk profile of ERS, 30-50 years from now

ERS

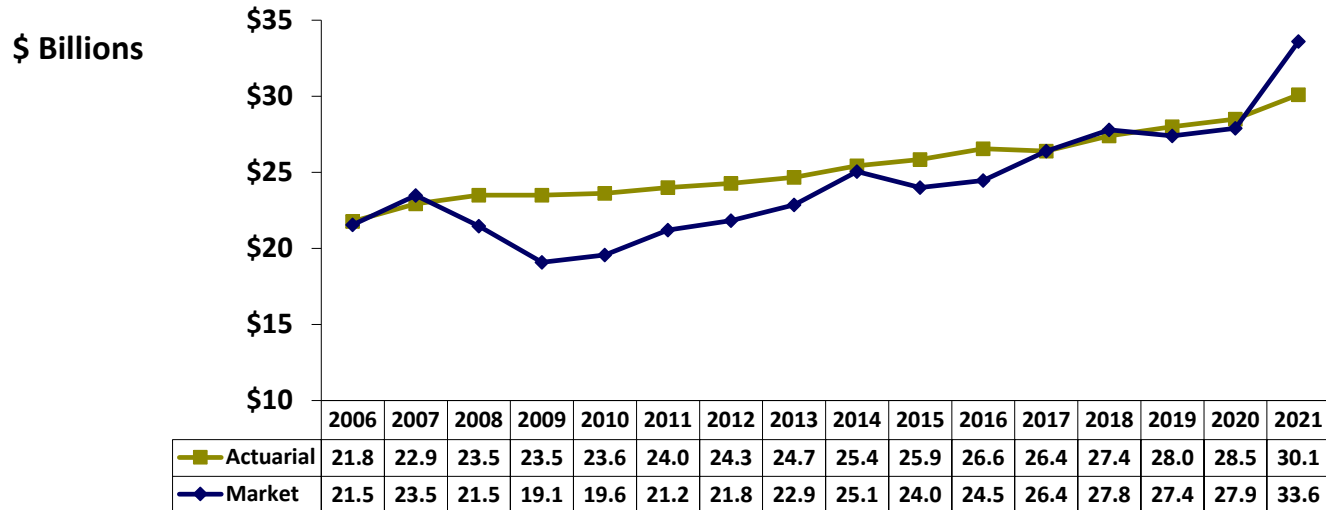
Funding Valuation Results at August 31, 2021

Investment Experience

- Actual rate of return on market for FY21 was $\approx 25\%$
- All of the actuarial funding metrics based on 5-year smoothed value of assets (actuarial value, or AVA), not market value
- 5-year smoothed return on AVA was 10.0% in FY21
- \$3.5 billion in net deferred gains, not yet recognized
 - Represents 8% of the current actuarial accrued liability
 - Represents 10% of current market assets
 - Will be recognized over next four years, either to improve the funded status of ERS or to offset adverse experience during that time

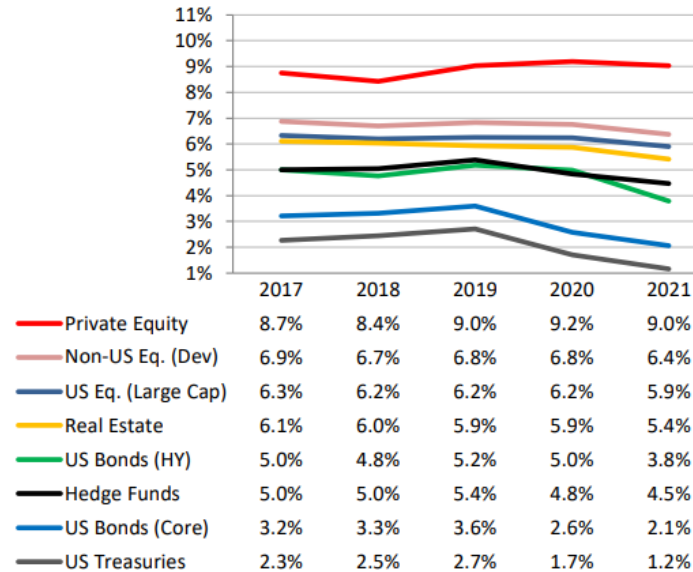
ERS Asset Values: Market vs Smoothed

- The strong investment performance put the System in a situation with material deferred investment gains



Recent Strong Performance has lead to declines in Return Expectations

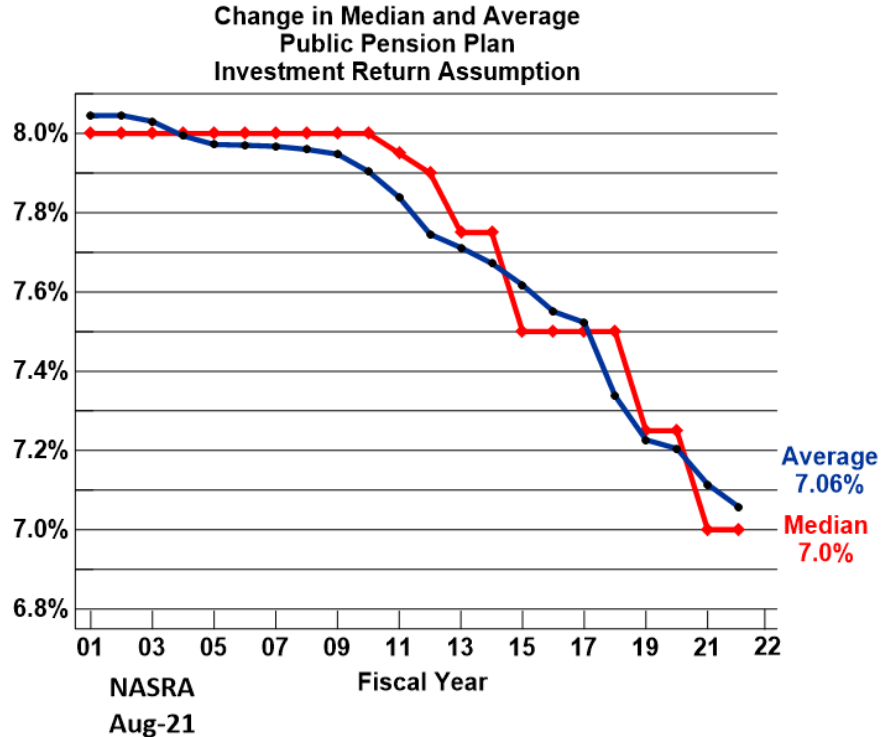
Average Expected Returns (10-Year Horizon)



Figures are average geometric returns for selected asset classes for the 30 advisors who provided short-term assumptions in each of the surveys from 2017 through 2021.

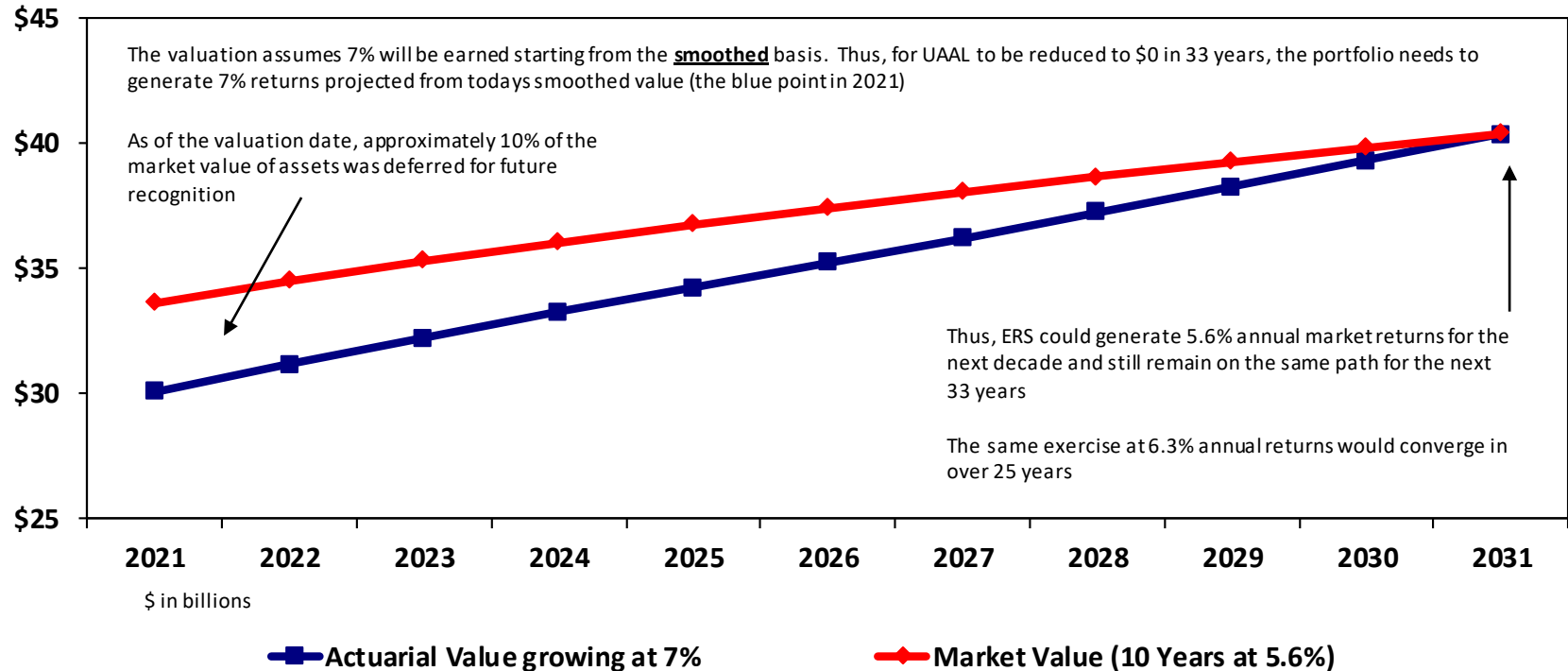
[Survey of Capital Market Assumptions, 2021 Edition by Horizon Actuarial Services, LLC](https://www.horizonactuarial.com/uploads/3/0/4/9/30499196/rpt_cma_survey_2021_v0804.pdf)
https://www.horizonactuarial.com/uploads/3/0/4/9/30499196/rpt_cma_survey_2021_v0804.pdf

Investment Return Assumptions have been Declining



Data compiled by the
National Association of
State Retirement
Administrators

What the deferred gains does for ERS: Projected Growth of Market and Actuarial Assets



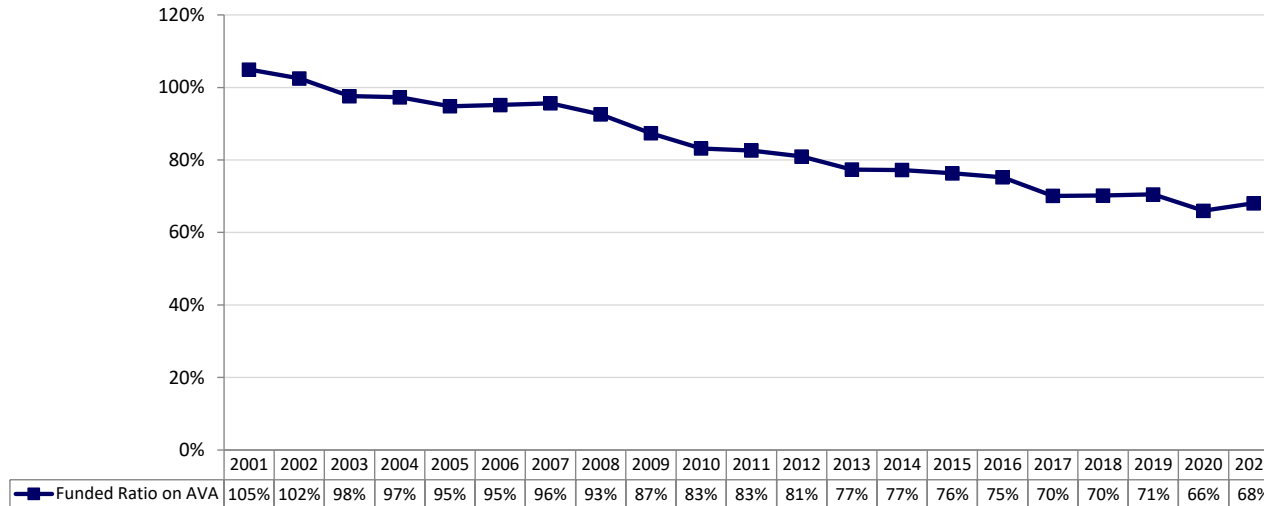
UAAL and Funded Status (ERS)

(\$ in millions)

| Actuarial Valuation as of August 31, | | |
|---|---------------|---------------|
| | 2021 | 2020 |
| Actuarial Accrued Liability | \$44,184 | \$43,258 |
| Actuarial Value of Assets | <u>30,065</u> | <u>28,543</u> |
| Unfunded Accrued Liability | \$14,119 | \$14,715 |
| Funded Ratio | 68.0% | 66.0% |
| Amortization Period Per Section 815.407 | 33 years | Never |

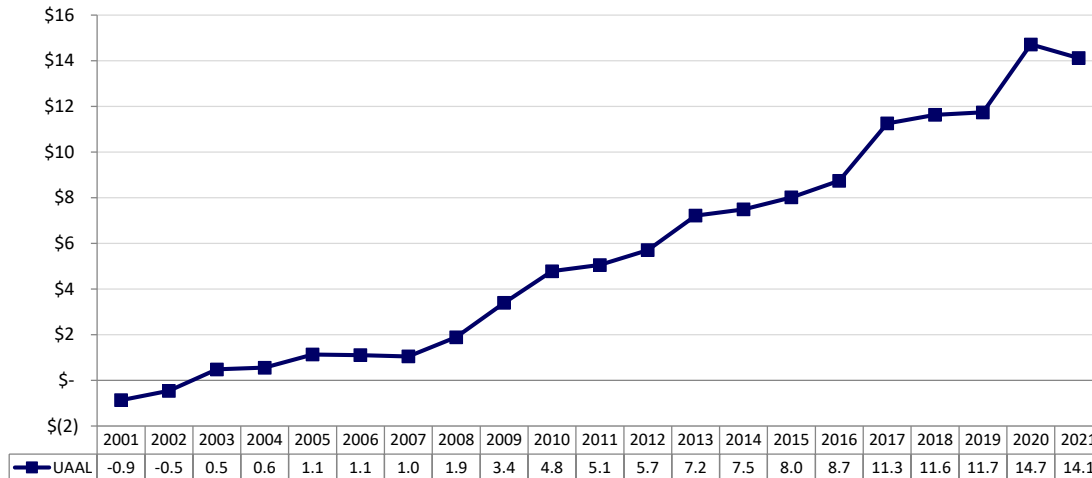
Funded Ratio

- The Funded Ratio increased from 66% to 68% on a smoothed basis
- This was based on experience, not because of SB 321



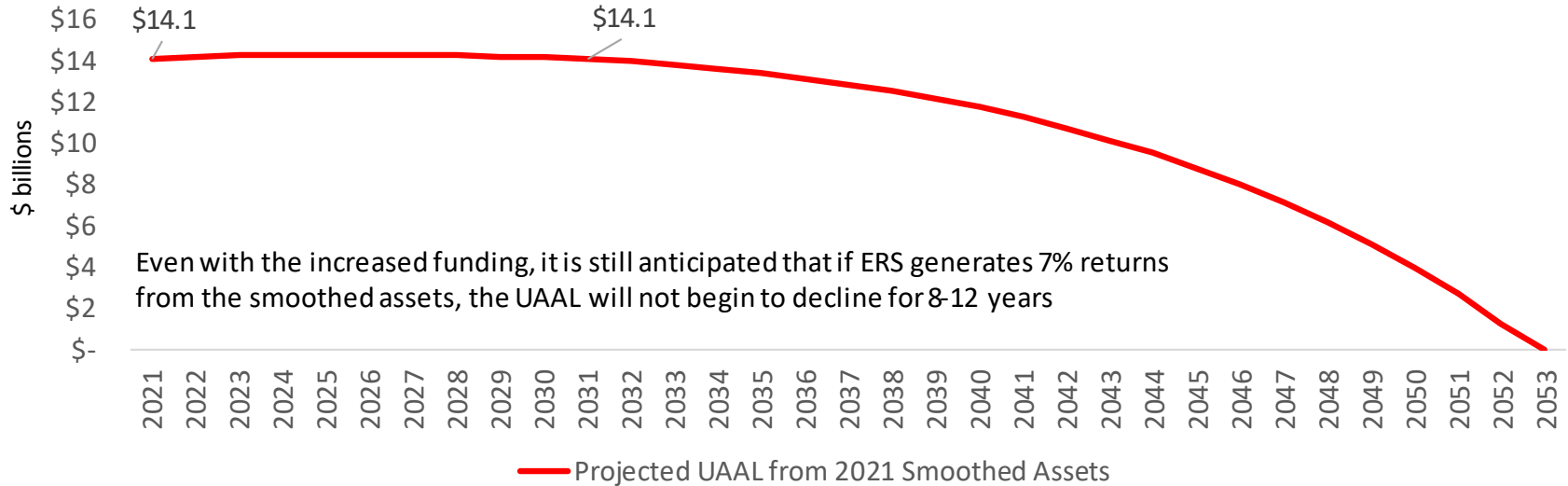
UAAL History

- UAAL decreased for the first time since 2007
- Trend in UAAL is the main metric for monitoring the strength of a pension system
- An increasing UAAL means the accumulation of assets is falling further behind the target
- A declining UAAL (especially for a number of years in a row) means the package of benefits, funding, and investments is strengthening in comparison to the target



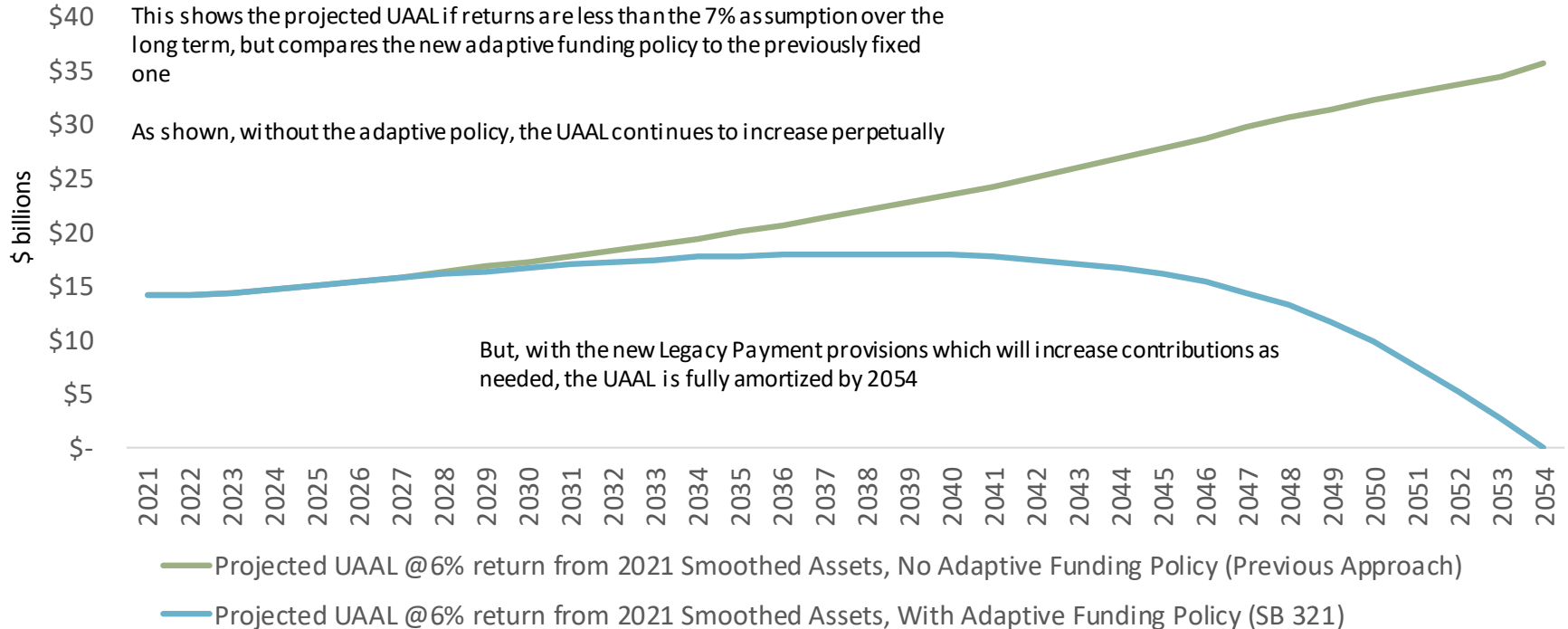
Projections

Projected UAAL from 2021 Smoothed Assets



Assumes 7% annual returns on the smoothed assets and annual \$510m legacy payments, and all other assumptions met

Sensitivity Projections



LECOSRF and JRS2 Funding Valuation Results at August 31, 2021

LECOSRF and JRS2 Need Additional Funding

- Current level of contributions are not sufficient to sustain either plan
 - LECOSRF projected depletion date in 29 years
 - Need 2.75% of payroll increase in contribution
 - JRS2 projected depletion date in 55 years
 - Need 8.05% of payroll increase in contribution

Funded Status

(\$ in millions)

| LECO Supplemental Retirement Fund | | |
|-----------------------------------|------------|------------|
| Actuarial Valuation as of | 2021 | 2020 |
| Actuarial Accrued Liability | \$1,650 | \$1,610 |
| Actuarial Value of Assets | <u>998</u> | <u>968</u> |
| Unfunded Accrued Liability | \$652 | \$642 |
| Funded Ratio | 60.5% | 60.1% |
| Funding Period | Never | Never |

| Judicial Retirement System of Texas, Plan 2 | | |
|---|------------|------------|
| Actuarial Valuation as of | 2021 | 2020 |
| Actuarial Accrued Liability | \$618 | \$591 |
| Actuarial Value of Assets | <u>523</u> | <u>487</u> |
| Unfunded Accrued Liability | \$95 | \$104 |
| Funded Ratio | 84.6% | 82.3% |
| Funding Period | Never | Never |



Utilization of a Legacy Payment Structure

- Legacy Payment Structure could be implemented to finance the UAAL
- However, in both cases, the current contribution rates are less than the normal cost
 - Contribution rates need to be increased to cover at least the normal cost
 - At that point, UAAL could be financed through level dollar fixed payments

Summary

Summary

- SB 321, along with one of the strongest 12 month investment performance periods in plan history, have remarkably changed the outlook for ERS
- For LECOSRF and JRS-2, current contribution levels are not sufficient to sustain the plans
 - Benefit security will continue to deteriorate without an increase in contributions over the current schedules

Disclaimers

- This presentation is intended to be used in conjunction with the actuarial valuation reports issued in December 2021. This presentation should not be relied on for any purpose other than the purpose described in the valuation reports.
- This presentation shall not be construed to provide tax advice, legal advice or investment advice.

Questions?

Public Agenda Item #29

Annual Review and Discussion of Global Equity

December 8, 2021

John Streun, CFA, CPA Director of Internal Public Equity

Lauren Honza, CFA, Director of External Public Equity

Global Public Equity Program



Agenda

- Investment Objective
- Asset Class Mix
- Historical Performance
- Internal Structure
- Management Fees
- External Advisor Program Update
- 2022 Initiatives

Global Public Equity Program

Investment Objective & Strategy



Investment Objective – Outperform the Global Public Equity Program benchmark over rolling 5-year periods, while maintaining compliance with the active risk budget

Investment Strategy

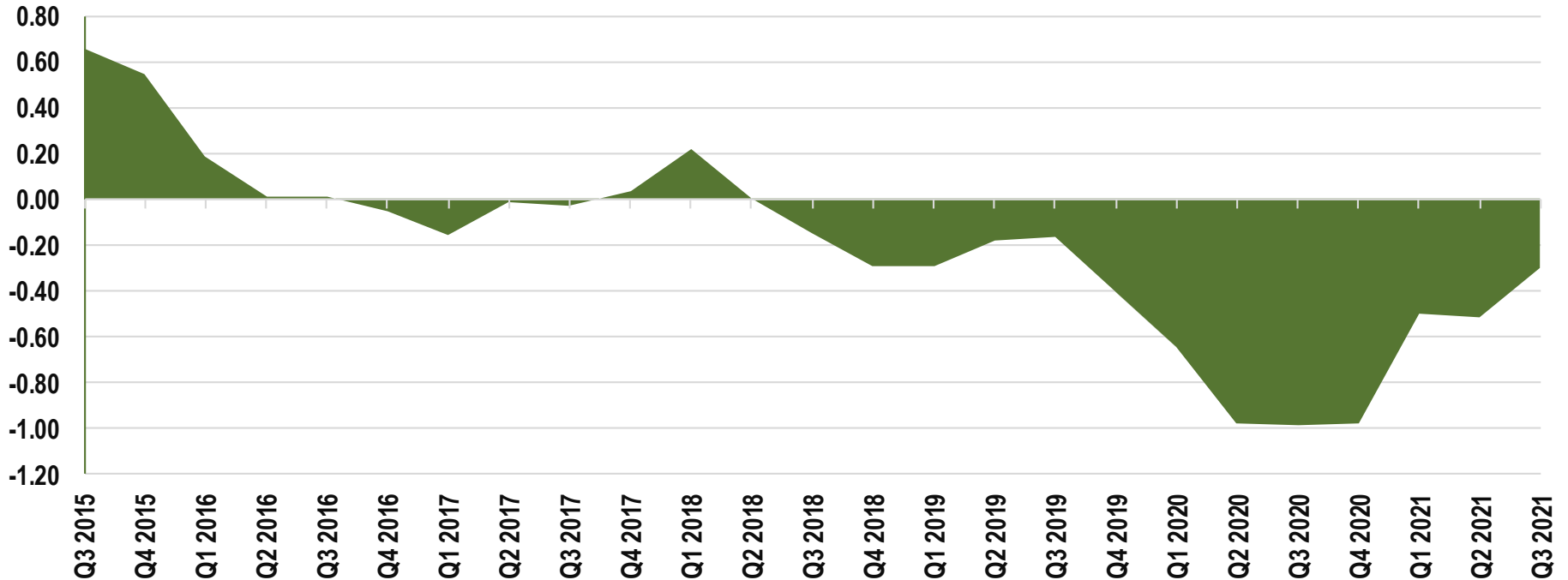
- Combine lower risk internal strategies with higher risk external strategies
- Target tracking error of 150 basis points
- Target excess return of 25 basis points or better

Global Public Equity Program

Rolling 5-Year Relative Return



Total Global Public Equities: Excess Returns - 5-Year Rolling



Global Public Equity Program

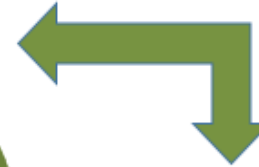
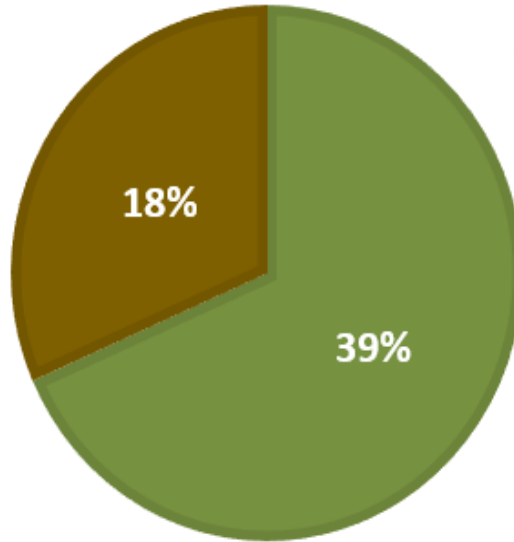
Role in the Trust



GLOBAL EQUITY BREAKDOWN

■ Public Equity ■ Private Equity

Global Equity
57%
of the Trust



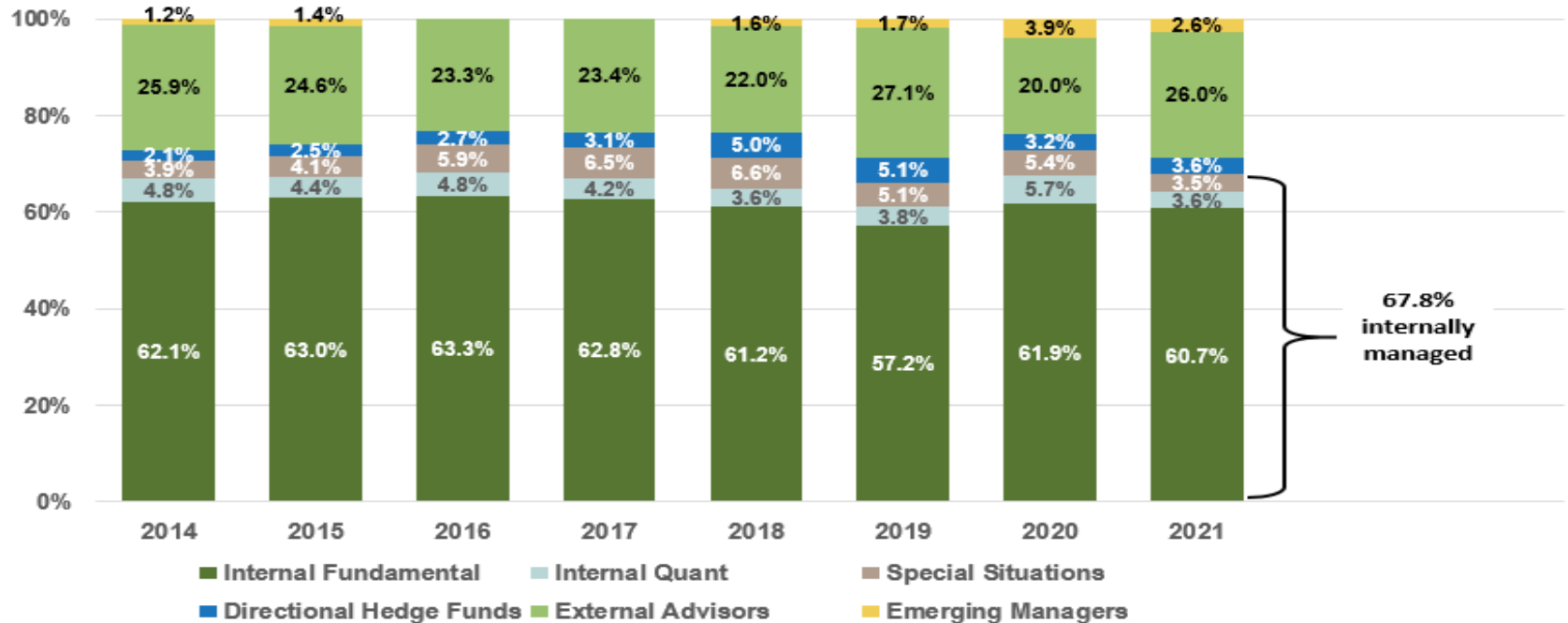
| Public Equity Portfolio | | |
|----------------------------|----------------------|---------------------------|
| As of 08/31/21 | Assets (in billions) | Assets (percent of trust) |
| Internally Managed | \$9.20 | 26.49% |
| Externally Managed | \$4.30 | 12.45% |
| Total Public Equity | \$13.50 | 38.94% |

Global Public Equity Program

Historical Composition



Public Equity Group by Strategy Group

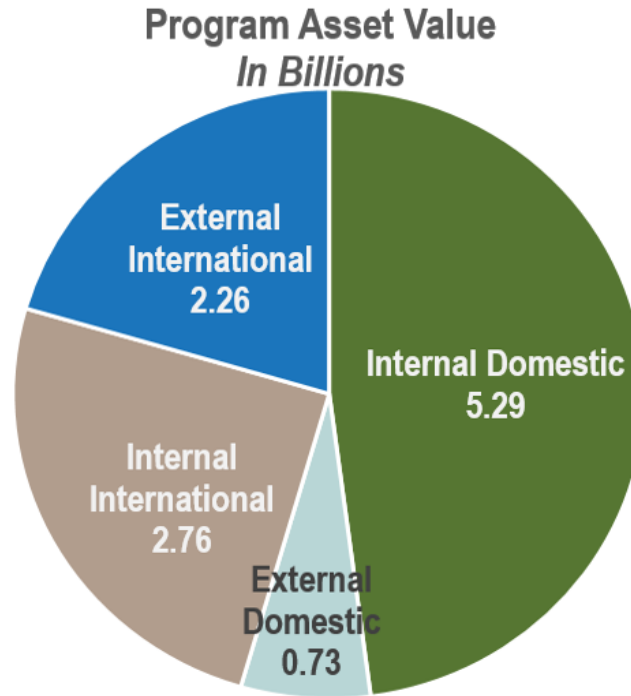


Global Public Equity Program

Portfolio Structure as of 9/30/2021

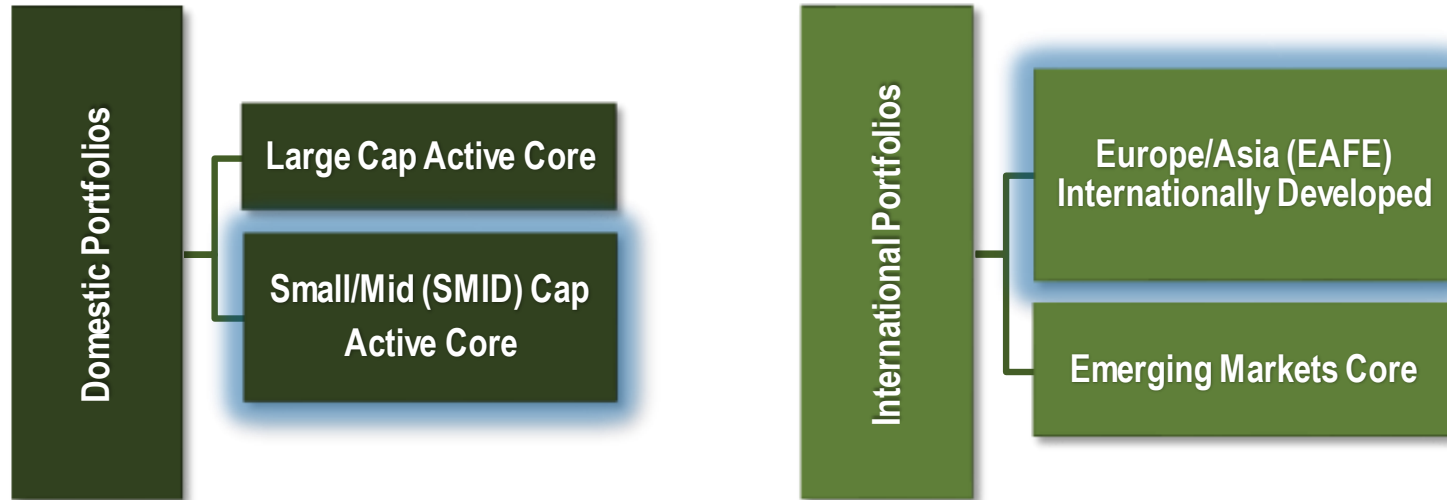


39% of Trust



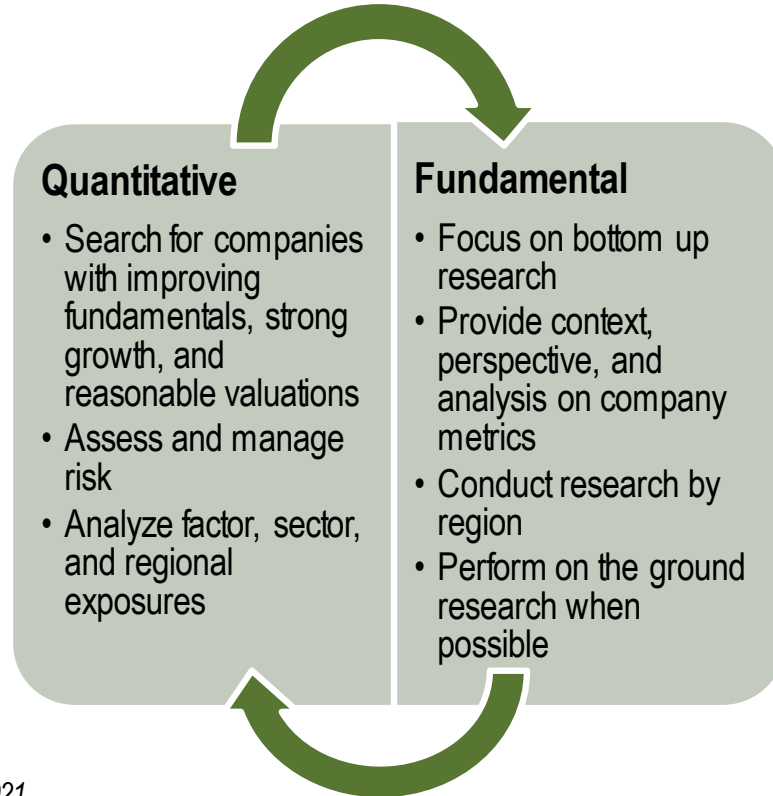
Global Public Equity Program

Internal Actively Managed Portfolios



Global Public Equity Program

Internal Emerging Market Process



Global Public Equity Program

Performance as of 9/30/2021



| | Assets (in \$millions) | Assets (percent of Trust) | 1-Year Return (%) | 3-Year Return (%) | 5-Year Return (%) |
|---|---|--|------------------------------------|------------------------------------|------------------------------------|
| Domestic Equity | 7008.00 | 20.10 | 32.79 | 14.48 | 16.02 |
| Benchmark | | | 32.29 | 16.79 | 17.02 |
| Relative Return | | | 0.51 | -1.79 | -0.99 |
| International Equity | 5556.00 | 15.90 | 26.02 | 9.14 | 9.81 |
| Benchmark | | | 23.92 | 8.03 | 8.94 |
| Relative Return | | | 2.11 | 1.11 | 0.86 |
| Public Equity Special Situations | 480.00 | 1.40 | 30.21 | 10.64 | 13.50 |
| Benchmark | | | 30.68 | 14.93 | 15.92 |
| Relative Return | | | -0.47 | -4.29 | -2.42 |
| Directional Hedge Funds | 521.00 | 1.50 | 36.39 | 15.68 | 15.71 |
| Benchmark | | | 28.64 | 13.27 | 12.94 |
| Relative Return | | | 7.75 | 2.41 | 2.77 |
| Total Public Equity | 13564.00 | 38.80 | 30.00 | 12.03 | 13.09 |
| Benchmark | | | 29.23 | 12.71 | 13.39 |
| Relative Return | | | 0.77 | -0.68 | -0.30 |

Global Public Equity Program

Short-Term Performance Drivers



1-year relative performance +77 basis points

Contributors to Relative Performance

- Strong stock selection from both domestic and international portfolios
- Great performance from external advisors, including directional hedge fund manager
- Outperformance from internal International Developed and internal Large-Cap Active portfolios

Detractors from Relative Performance

- Under performance from internal Emerging Markets and internal SMID cap portfolios
- Strategic overweight to international markets and an underweight to domestic markets
- Cash drag

Global Public Equity Program

Long-Term Performance Drivers



3-Year relative performance -68 basis points

5-Year relative performance -30 basis points

Contributors to Relative Performance

- Positive stock selection in international and directional hedge fund portfolios
- All four fundamental internal portfolios outperformed their respective benchmarks

Detractors from Relative Performance

- Strategic underweight to domestic large-caps, which significantly outperformed domestic SMID caps
- Allocations to domestic value advisors
- Strategic overweight to international markets and an underweight to domestic markets
- Cash drag

Global Public Equity Program

Performance as of 9/30/21



| | Assets (in \$millions) | Assets (percent of Trust) | <u>1-Year</u> Return (%) | <u>3-year</u> Return (%) | <u>5-Year</u> Return (%) |
|-------------------------------|---|--|------------------------------------|------------------------------------|------------------------------------|
| Internal Public Equity | 9155.00 | 26.20 | 29.45 | 12.92 | 13.93 |
| Benchmark | | | 29.41 | 12.93 | 13.83 |
| Relative Return | | | 0.04 | 0.00 | 0.10 |
| External Public Equity | 4409.00 | 12.60 | 31.92 | 10.31 | 11.31 |
| Benchmark | | | 27.54 | 9.81 | 10.45 |
| Relative Return | | | 4.38 | 0.50 | 0.86 |

Global Public Equity Program

Relative Performance for External and Internal Programs

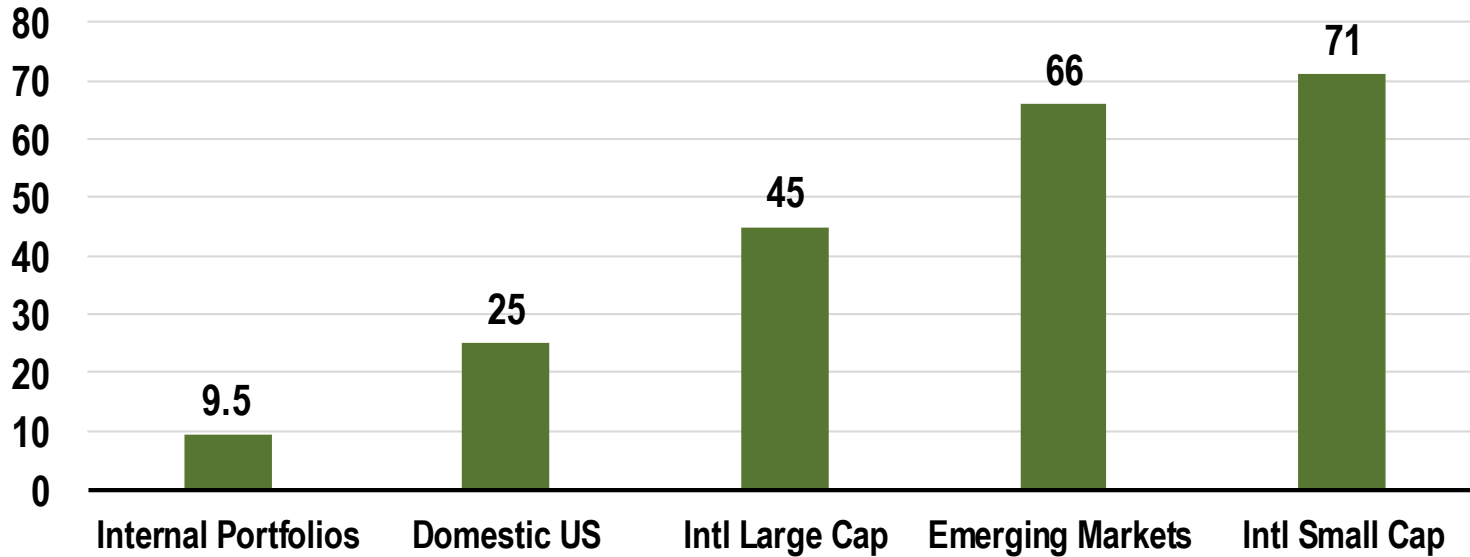


- Internal Program
 - Composite returns met or exceeded benchmarks over all time periods
- External Advisors
 - Strong 1-year returns improved 3-year and 5-year relative performance
 - Substantial majority of portfolios outperformed their benchmarks
 - Allianz and Templeton (both now defunded) detracted from 3- and 5-year periods

Management Fees 9/30/2020 – 9/30/2021



Fees in Basis Points



External Advisor Program

Lauren Honza, CFA, Director of External Public Equity

External Advisor Program Update



Agenda

- Overview
- Investment Process
- Selection Process
- Current Allocation
- Funded External Advisors
- Select Pool
- Performance

External Advisor Program Update

Investment Process



External Advisor Program Update

Selection Process: RFP



- Phase I: Minimum Requirements and Short Form Review
- Phase II: Investment DDQ Review and Operational DDQ Review
- Phase III: Onsite Meetings and Reference Checks
- Phase IV: Committee Approval
- Phase V: Contract/Fund

External Advisor Program Update

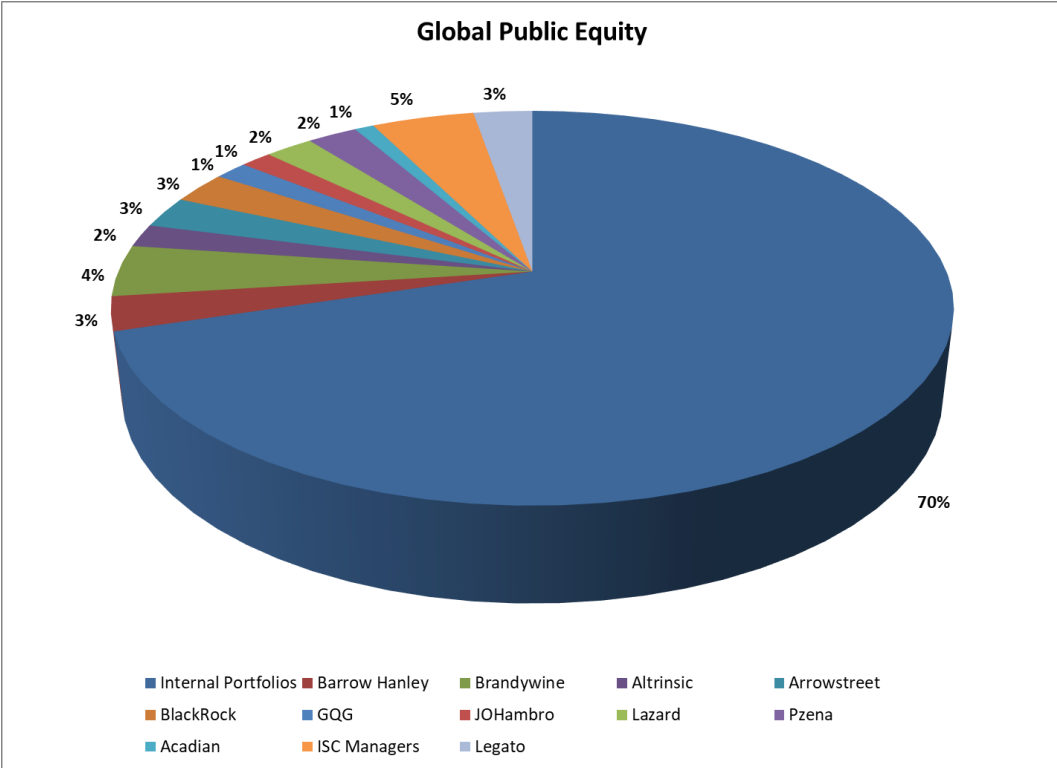
RFP Updates



- International Investment Advisory Services
 - Published January 24, 2020
 - Benchmarks: *MSCI ACWI ex-US* and *MSCI EAFE*
- U.S. Large Cap Investment Advisory Services
 - Published March 15, 2021
 - Benchmarks: *MSCI Large Cap*, *Large Cap Value*, *Large Cap Growth*

External Advisor Program Update

Global Public Equity Current Allocation



External Advisor Program Update

Funded External Advisors



| Firm | Strategy | Selection Date | Portfolio Inception |
|--|--------------------------------|----------------|---------------------|
| Acadian Assset Management | Emerging Markets | 12/2/2011 | 11/1/2017 |
| Altrinsic Global Advisors | International | 2/10/2021 | 5/1/2021 |
| Arrow street Capital | International | 2/10/2021 | 8/1/2021 |
| Axiom International Investors | International Small Cap Equity | 12/20/2018 | 3/1/2019 |
| Barrow , Hanley , Mew hinney & Strauss | Large Cap Value | 12/2/2010 | 4/1/2011 |
| BlackRock | International | 12/2/2011 | 3/1/2015 |
| Brandyw ine GIM | Large Cap Value | 12/2/2010 | 4/1/2017 |
| EAM Investors | International Small Cap | 12/20/2018 | 3/1/2019 |
| Global Alpha Capital Management | International Small Cap | 12/20/2018 | 3/1/2019 |
| GQG Partners | International | 2/10/2021 | 6/1/2021 |
| JO Hambro Capital Management | International | 2/10/2021 | 7/1/2021 |
| Kayne Anderson Rudnick | International Small Cap | 12/20/2018 | 3/1/2019 |
| Lazard Asset Management | International | 8/23/2011 | 12/1/2011 |
| Legato Capital Management | International Small Cap | 5/25/2010 | 2/1/2017 |
| Legato Capital Management | Emerging Markets | 9/25/2019 | 11/1/2019 |
| Pzena Investment Management | International | 2/10/2021 | 5/1/2021 |
| Quantitative Management Associates | Emerging Markets Small Cap | 12/20/2018 | 3/1/2019 |

External Advisor Program Update

Select Pool



| Firm | Strategy | Selection Date | Portfolio Inception |
|--------------------------------|--------------------------------|----------------|---------------------|
| Algert Global | International Small Cap | 12/20/2018 | TBD |
| Arrow street Capital (Alpha) | International | 2/10/2021 | TBD |
| Ativo Capital Management | International Small Cap | 12/20/2018 | TBD |
| Axiom International Investors | International | 2/10/2021 | TBD |
| Fisher Investments* | International | 1/24/2006 | TBD |
| Neuberger Berman | International | 2/10/2021 | TBD |
| Rondure Global Advisors | International | 2/10/2021 | TBD |
| Schroders | International | 2/10/2021 | TBD |
| Strategic Global Advisors | International Small Cap Equity | 12/20/2018 | TBD |
| Templeton** | International | 11/19/2002 | TBD |
| TimesSquare Capital Management | International Small Cap | 12/20/2018 | TBD |
| William Blair | International | 2/10/2021 | TBD |

*Fisher Investments was defunded 10/2019.

**Templeton was defunded 3/2021.

External Advisor Program Update

Performance



| Global Public Equity (as of 09/30/21) | 1-Year | 3-Year | 5-Year | Since Inception |
|---|--------|--------|--------|-----------------|
| Global Public Equity External Advisor Program | 31.92% | 10.31% | 11.31% | 6.81% |
| Blended Benchmark | 27.54% | 9.81% | 10.45% | 6.44% |
| <i>Excess Return</i> | 4.38% | 0.50% | 0.85% | 0.37% |
| Barrow Hanley (Inception: April 1, 2011) | 40.55% | 10.31% | 12.45% | 11.41% |
| MSCI USA Large Value Index | 29.66% | 9.36% | 10.89% | 10.63% |
| <i>Excess Return</i> | 10.89% | 0.95% | 1.56% | 0.78% |
| Brandywine (Inception: April 1, 2017) | 46.34% | 11.43% | n/a | 11.79% |
| MSCI USA Large Value Index | 29.66% | 9.36% | | 9.62% |
| <i>Excess Return</i> | 16.67% | 2.07% | | 2.17% |
| BlackRock (Inception: March 1, 2015) | 33.10% | 15.09% | 13.15% | 9.35% |
| MSCI ACWI ex-US Index | 23.92% | 8.03% | 8.94% | 5.88% |
| <i>Excess Return</i> | 9.19% | 7.06% | 4.21% | 3.48% |
| Lazard (Inception: December 1, 2011) | 24.42% | 8.36% | 9.39% | 9.44% |
| MSCI EAFE Index | 25.73% | 7.62% | 8.81% | 7.78% |
| <i>Excess Return</i> | -1.31% | 0.74% | 0.58% | 1.66% |
| Acadian (Inception: November 1, 2017) | 26.99% | 9.87% | n/a | 7.56% |
| MSCI Emerging Markets Index | 18.20% | 8.58% | | 5.36% |
| <i>Excess Return</i> | 8.78% | 1.28% | | 2.20% |

External Advisor Program Update

Performance



| Global Public Equity (as of 09/30/21) | 1-Year | 3-Year | 5-Year | Since Inception |
|---|--------|--------|--------|-----------------|
| Axiom (Inception: March 1, 2019) | 29.58% | n/a | n/a | 26.25% |
| MSCI ACWI ex-US Small Cap Index | 33.06% | | | 14.72% |
| <i>Excess Return</i> | -3.49% | | | 11.54% |
| EAM (Inception: March 1, 2019) | 27.83% | n/a | n/a | 20.70% |
| MSCI ACWI ex-US Small Cap Index | 33.06% | | | 14.72% |
| <i>Excess Return</i> | -5.24% | | | 5.98% |
| Global Alpha (Inception: March 1, 2019) | 33.73% | n/a | n/a | 14.81% |
| MSCI EAFE Small Cap Index | 29.02% | | | 13.85% |
| <i>Excess Return</i> | 4.72% | | | 0.96% |
| Kayne Anderson (Inception: March 1, 2019) | 35.92% | n/a | n/a | 19.80% |
| MSCI ACWI ex-US Small Cap Index | 33.06% | | | 14.72% |
| <i>Excess Return</i> | 2.86% | | | 5.08% |
| QMA (Inception: March 1, 2019) | 40.22% | n/a | n/a | 14.75% |
| MSCI Emerging Markets Small Cap Index | 43.24% | | | 15.78% |
| <i>Excess Return</i> | -3.02% | | | -1.03% |
| Legato International Small Cap Portfolio (Inception: February 1, 2017) | 26.62% | 8.38% | n/a | 11.47% |
| MSCI EAFE Small Cap Index | 29.02% | 9.05% | | 11.03% |
| <i>Excess Return</i> | -2.40% | -0.67% | | 0.44% |
| Legato Emerging Markets Portfolio (Inception: November 1, 2019) | 16.65% | n/a | n/a | 9.86% |
| MSCI Emerging Markets Index | 18.20% | | | 12.52% |
| <i>Excess Return</i> | -1.55% | | | -2.67% |

Global Public Equity Program

2022 Initiatives



- Continue to enhance the portfolio construction process
- Complete the U.S. Large-Cap Select Pool RFP
- Evaluate existing software tools and resources
- Examine Special Situations Portfolios
- Cultivate employee development and mentoring

Questions?

*Public Agenda Item #30

**Annual Review of ERS' Emerging Manager Program*

December 8, 2021

Lauren Honza, CFA, Director of External Public Equity

Emerging Manager Program

Agenda



- Background
- Team
- Approach
- Current Allocation
- Performance
- CY22 Initiatives

Emerging Manager Program

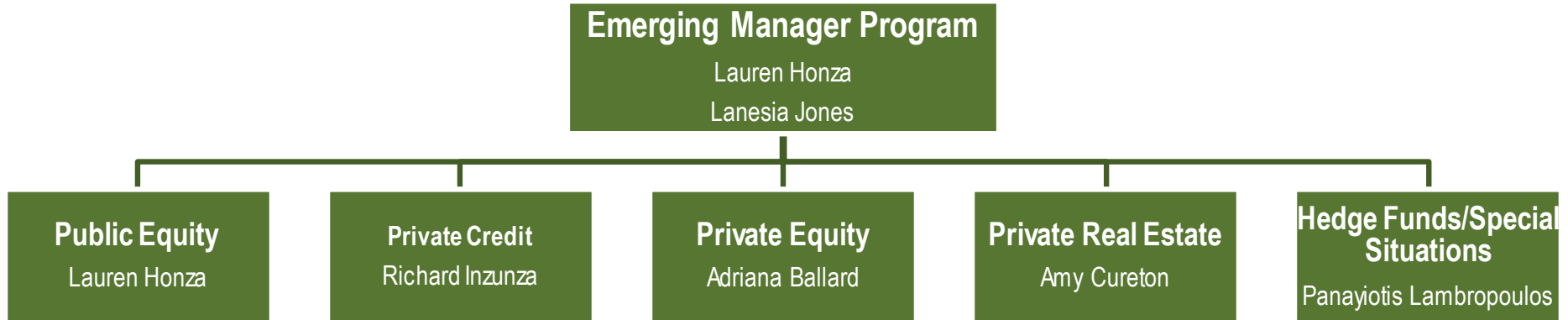
Defined



- Texas Government Code § 815.301 (g), (h) and (i) requires the Employees Retirement System of Texas to make a **good faith effort** to acquire financial services from emerging managers. Emerging managers are defined in the statute as private professional **investment managers with less than \$2 billion in assets** who provide pension fund management, consulting, investment advising, brokerage services, hedge fund management, private equity management, and real estate investment.

Emerging Manager Program

Team



Emerging Manager Program

Approach



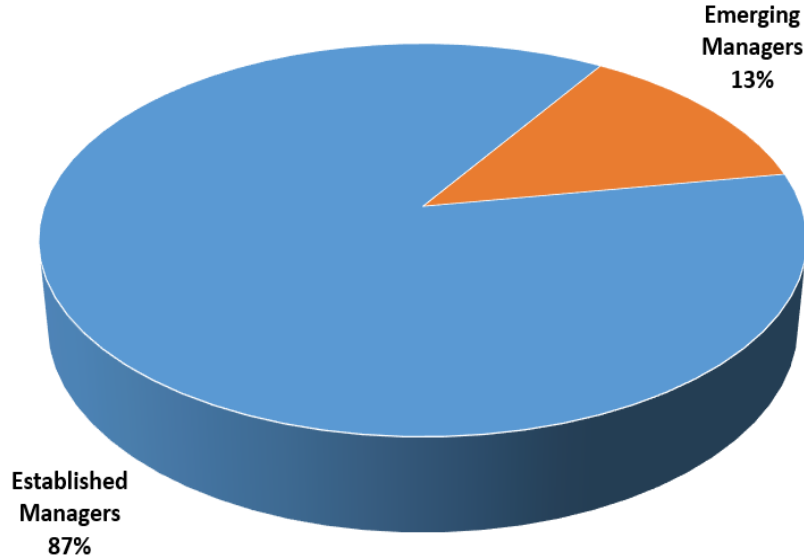
- ERS External Advisor Website
- Managers of Emerging Managers
- Consultants
- Outreach

Emerging Manager Program

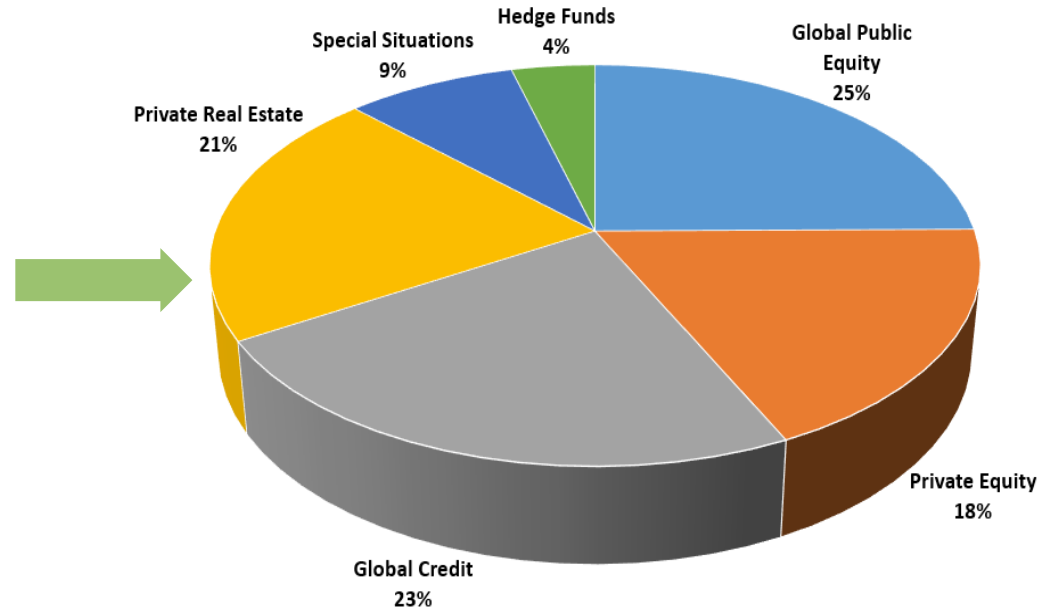
Investments as of September 30, 2021



Externally Managed/Advised Assets
\$17,676,679,882



Emerging Manager Program
\$2,331,614,121



Emerging Manager Program

Public Equity



- Direct
 - Funded (EAM and Global Alpha)
 - RFPs (International RFP and USLC RFP)
- Legato Capital Management
 - International Small Cap (\$218 MM)
 - Emerging Markets (\$134 MM)

Emerging Manager Program

Public Equity



| Public Equity | 1-Year | 3-Year | 5-Year | Since Inception (as of 09/30/21) |
|--|--------|--------|--------|-------------------------------------|
| Legato International Small Cap Portfolio (Inception: February 1, 2017) | 26.62% | 8.38% | n/a | 11.47% |
| MSCI EAFE Small Cap Index | 29.02% | 9.05% | | 11.03% |
| | | | | |
| Legato Emerging Markets Portfolio (Inception: November 1, 2019) | 16.65% | n/a | n/a | 9.86% |
| MSCI Emerging Markets Index | 18.20% | | | 12.52% |

Emerging Manager Program

Private Credit



- Direct Relationships: Six
- FY21 Commitments (\$275 MM)
 - CLO Warehousing and U.S. Middle Market Distressed Debt
- Expected FY22 Commitments (\$275 MM)
 - Non-performing Residential Mortgage Loans and European Direct Origination Middle Market Lending

Emerging Manager Program

Private Equity



- Direct Relationships: Three
- Fund of Funds
 - Fund I (Grosvenor)
 - Fund II (Grosvenor)
 - Fund III (Barings)
 - CY21 Commitments (\$15 MM)
 - Six investments in Healthcare, Information Technology, and Services

Emerging Manager Program

Private Equity



| Private Equity | 1-Year | 3-Year | 5-Year | Net IRR (as of 06/30/21) |
|---|--------|--------|--------|-----------------------------|
| Total Emerging Manager Portfolio (Inception: November 2010) | 33.94% | 13.73% | 13.36% | 15.40% |
| <i>Total Private Equity Portfolio</i> | 52.41% | 17.40% | 17.16% | 14.13% |

Emerging Manager Program

Private Real Estate



- Direct Relationships: 11
 - FY21 Commitments (\$135 MM)
 - Two Investments in Manufactured Housing and PropTech
- Fund of Funds
 - Fund I (Oak Street)
 - Fund II (Oak Street)
 - FY21 Commitments (\$15 MM)
 - Three Investments in Medical Office, Student Housing, and Data Center

Emerging Manager Program

Private Real Estate



| Private Real Estate | 1-Year | 3-Year | 5-Year | Net IRR (as of 09/30/21) |
|---|--------|--------|--------|-----------------------------|
| Total Emerging Manager Portfolio (Inception: December 2010) | 20.07% | 12.98% | 14.03% | 16.03% |
| <i>Total Private Real Estate Portfolio</i> | 14.09% | 7.92% | 9.79% | 11.74% |

Emerging Manager Program

Hedge Funds/Special Situations



- Direct Relationships: One
- PAAMCO Prisma Launchpad
 - Commitments
 - Original Commitment in June 2018 (\$150 MM)
 - Additional Commitment in April 2021 (\$175 MM)
 - Investments
 - Cinctive Capital Management
 - Phase 2 Partners
 - Additional Investment Expected Late CY21/Early CY22

Emerging Manager Program

Hedge Funds/Special Situations



| Special Situations | 1-Year | 3-Year | 5-Year | Since Inception (as of 09/30/21) |
|--|--------|--------|--------|-------------------------------------|
| ERS Launchpad (Inception: October 1, 2019) | 11.40% | n/a | n/a | 6.59% |
| <i>Launchpad Benchmark</i> | 12.93% | | | 5.78% |

Emerging Manager Program

Calendar Year 2022 Initiatives



- Maintain the target of 10% of externally managed assets with emerging managers
- Focus on relevant direct relationships with emerging managers in ERS Portfolio
- Continue to collaborate with fund-of-funds
- Promote emerging manager program best practices by working with other investors

Emerging Manager Program

Conferences



- Real Estate Emerging Manager (REEM) Summit (January 11–12, 2022)
- TRS/ERS Emerging Manager Conference (January 19, 2022)

Questions?

*Public Agenda Item #31

Educational Presentation: Global Demographic Trends and their Implication for the ERS Investment Program

December 8, 2021

Micheal Yuan, Portfolio Manager
David Veal, CFA, CAIA, FRM, Chief Investment Officer

Key Points

- Demographics represents a key driver of economic growth, inflation, and interest rates.
- Ageing has resulted in slower global economic growth and lower interest rates.
- COVID-19 pandemic has accelerated many demographic trends.
- Investors must observe these trends and construct resilient portfolios.
- Employers will need flexible arrangements, collaborative culture and productivity tools.

Key Terms

America's Generations

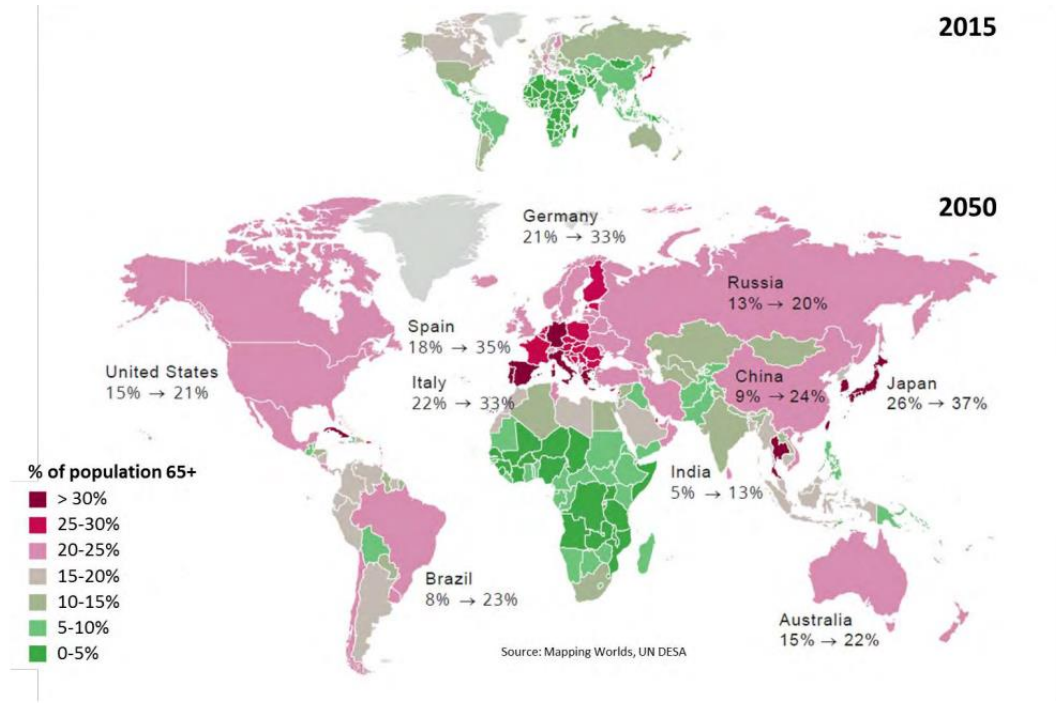


- Demographics is the statistical data related to the populations, and particular groups within it.” Including: age, race, ethnicity, gender, marital status, income, education, and employment.

| Generation | Birth years | Defining events | Key technologies |
|-------------|-------------|-------------------------------------|--------------------|
| Silent | 1928-1945 | Depression, WWII | Appliances, autos |
| Boomers | 1946-1964 | Cold War, Vietnam War, Moon Landing | TV, Telephone |
| Gen X | 1965-1980 | Berlin Wall, Gulf War | Personal Computers |
| Millennials | 1981-1995 | 9/11, Afghanistan | Internet |
| Gen Z | 1995-2016 | Financial Crisis, COVID | iPhone |

Global Populations are Aging

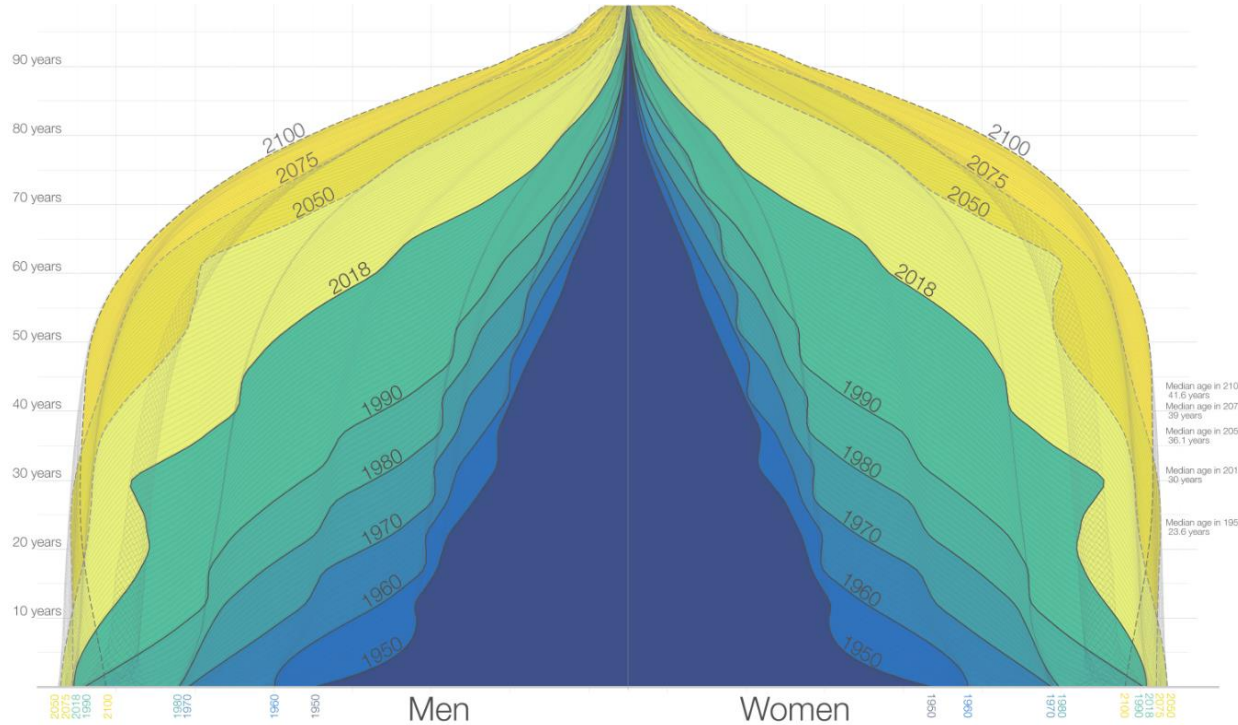
The Greatest Transformation of Our Time



- The ageing of the world population is one of the today's investment themes.
- By 2050, the world's Silver Generation (people aged 65 years and older) of 3.4bn will outnumber children under 14 for the first time in human history (UN).
- This map shows that the countries with the largest proportion of old people in 2050 will be Japan (37%), Spain (35%) and Germany and Italy (33%).

Global Populations are Aging

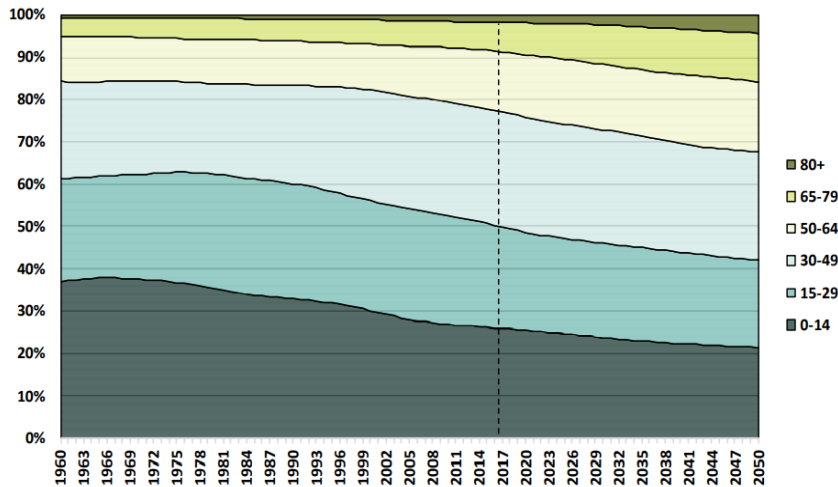
Demography of world population 1950-2100



A Different World Ahead

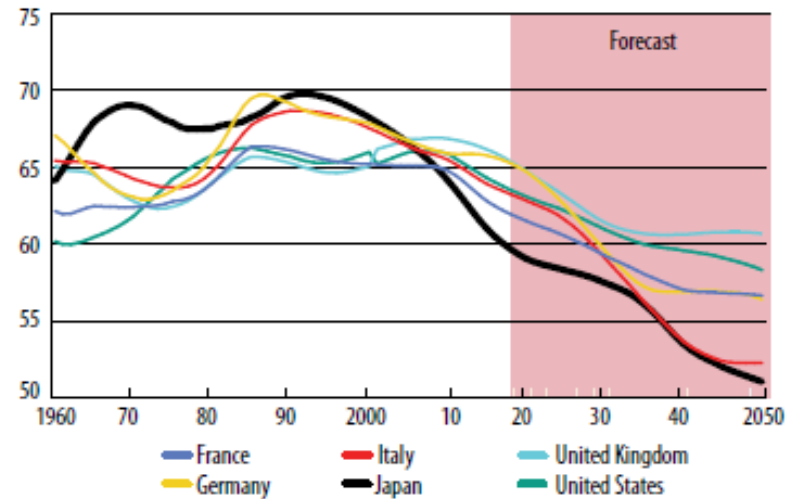
Peak Youth, Peak Workforce

World population composition by age group



Source: World Bank data and estimates (2017+), and Bernstein analysis

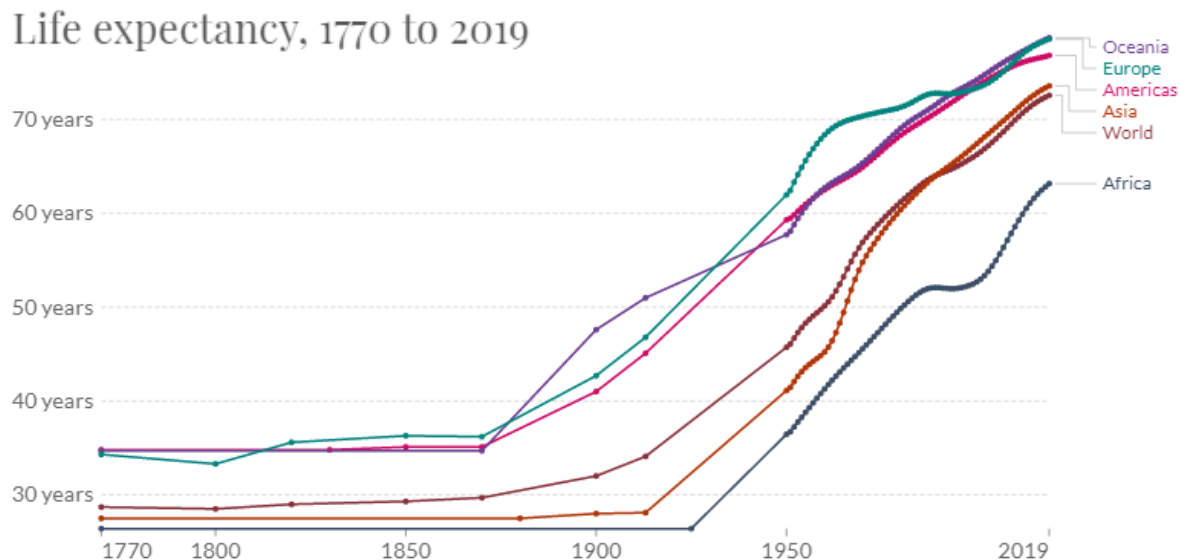
Working-aged population as a percentage of total population falling drastically



Source: United Nations, *World Population Prospects*, 2017 revision.

Key Trends

Trend #1: Life Expectancy Lengthening



Source: Riley (2005), Clio Infra (2015), and UN Population Division (2019)

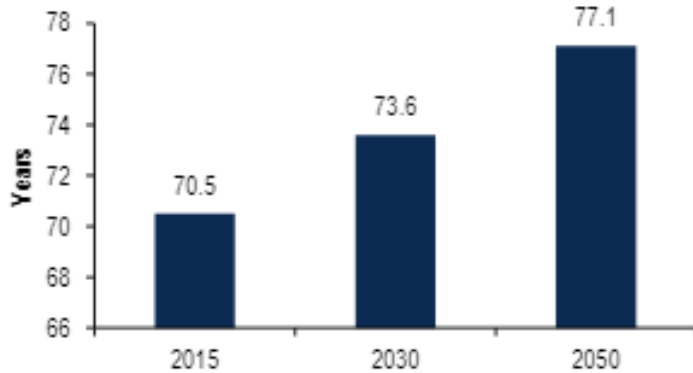
OurWorldInData.org/life-expectancy • CC BY

Note: Shown is period life expectancy at birth, the average number of years a newborn would live if the pattern of mortality in the given year were to stay the same throughout its life.

Key Trends

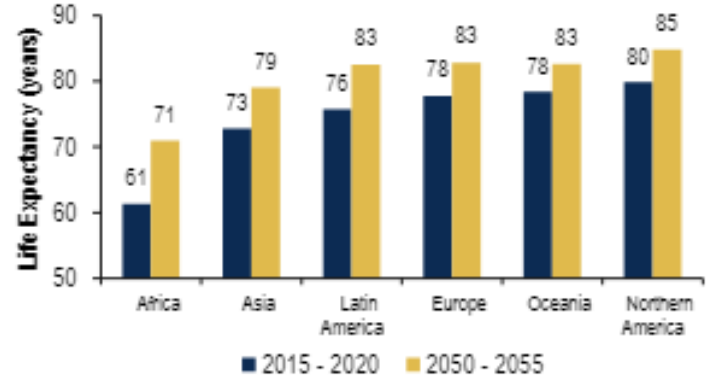
Trend #1: Life Expectancy Lengthening

Life expectancy at birth



Source: United Nations, Haver Analytics and World Health Organization.

Life expectancy 2015-2020 vs 2050-2055

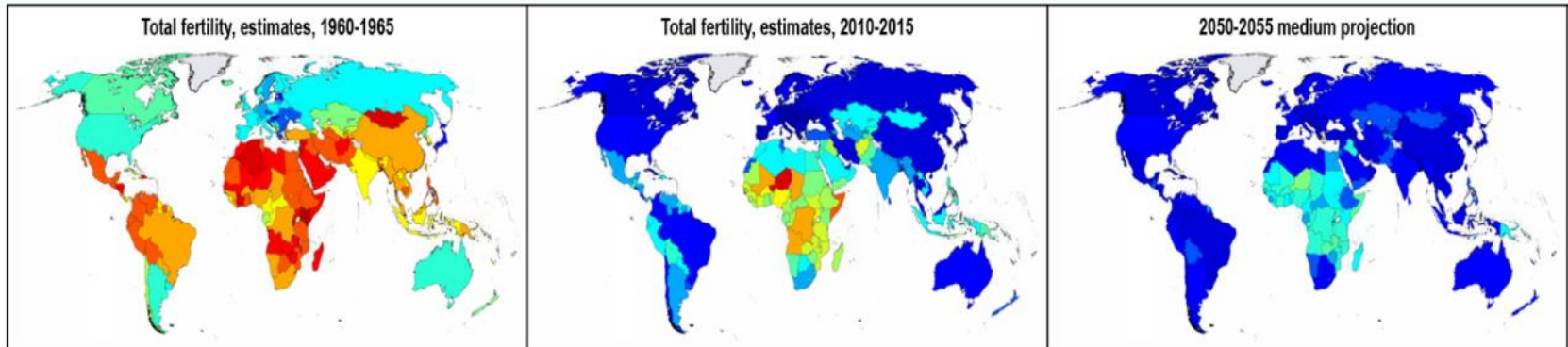


Source: United Nations, Haver Analytics and World Health Organization.

Key Trends

Trend #2: *Plunging Fertility*

- Global birth rates down 50% since 1960, and half of the world's population is below replacement rate.



Total fertility (children per woman)

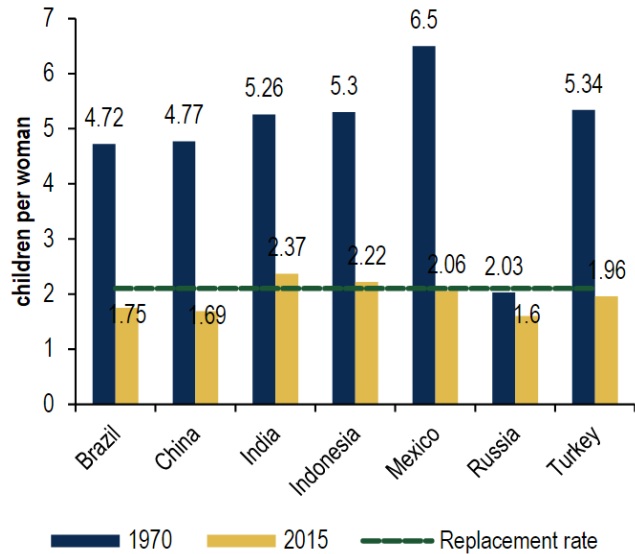


Source: United Nations, Haver Analytics.

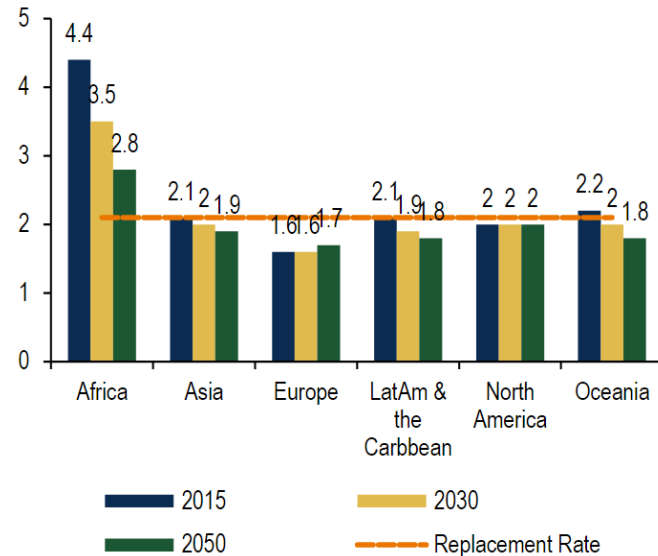
Key Trends

Trend #2: Plunging Fertility

- Declining fertility has been universal to developed and emerging market nations.



Source: World Bank data and estimates (2017+), and Bernstein analysis

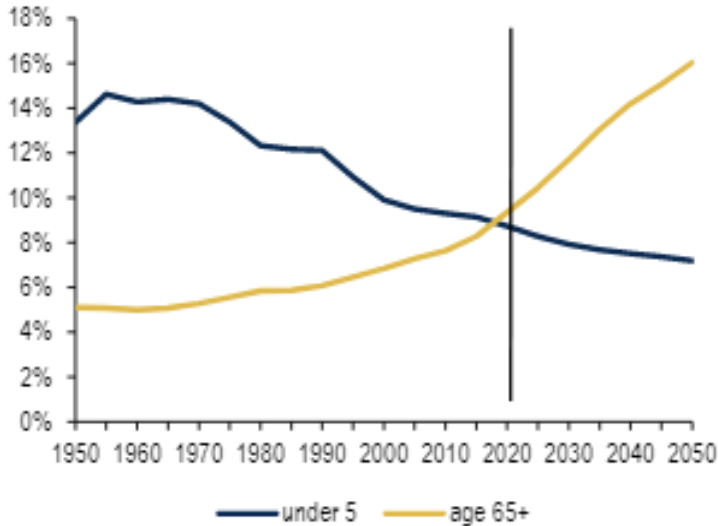


Source: World Bank data and estimates (2017+), and Bernstein analysis

Key Trends

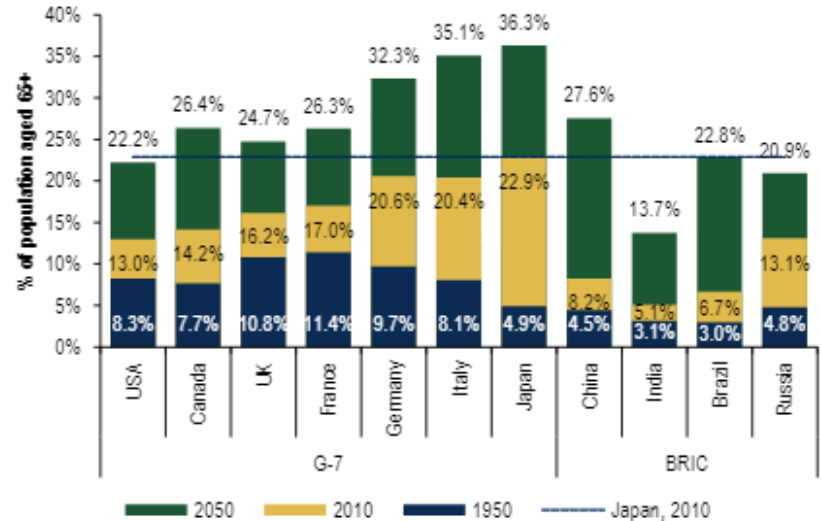
Trend #3: Graying Population

Young children and older people as a % of global population: 1950-2050



Source: United Nations, Haver Analytics.

By 2050, populations around the world will be as old as Japan is today



Source: United Nations, Haver Analytics.

Key Trends

Trend #4: Shrinking Workforce

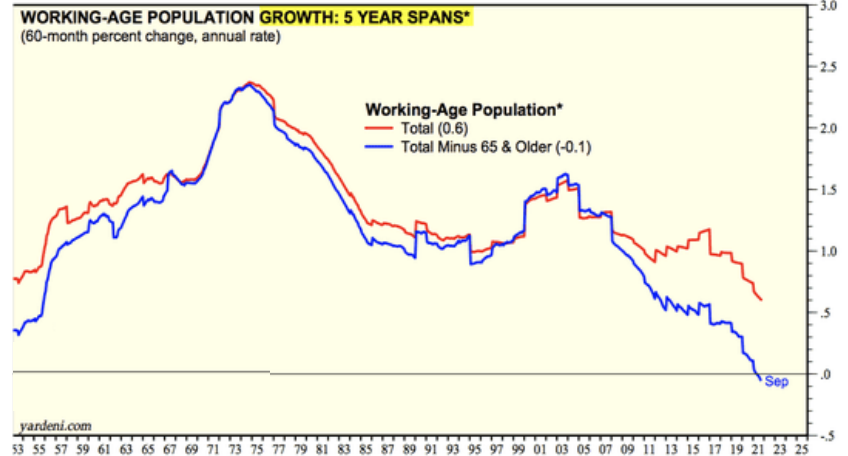
- Advanced economies hit critical milestone in 2017, the combined workforce declined.

Working age population age 15-64

| Country | 1990-2000 | 1990-2015 | 2000-2015 | 2015-2050 | 2015-2065 |
|--------------------------|-----------|-----------|-----------|-----------|-----------|
| China | 14.1% | 32.6% | 16.2% | -21.1% | -33.5% |
| Japan | 0.6% | -9.7% | -10.2% | -28.5% | -35.2% |
| Republic of Korea | 11.1% | 22.9% | 10.6% | -26.3% | -37.1% |
| Russian Federation | 3.0% | 1.7% | -1.2% | -21.3% | -24.3% |
| United Kingdom | 2.8% | 11.9% | 8.8% | 6.0% | 7.7% |
| Italy | -1.4% | -2.5% | -1.1% | -23.2% | -26.2% |
| France | 2.7% | 6.7% | 3.9% | 0.7% | 2.9% |
| Germany | 2.5% | -2.7% | -5.1% | -22.6% | -29.5% |
| Canada | 11.3% | 29.6% | 16.4% | 6.2% | 7.6% |
| United States of America | 12.8% | 28.0% | 13.5% | 10.0% | 13.4% |

Source: United Nations, WPP 2015

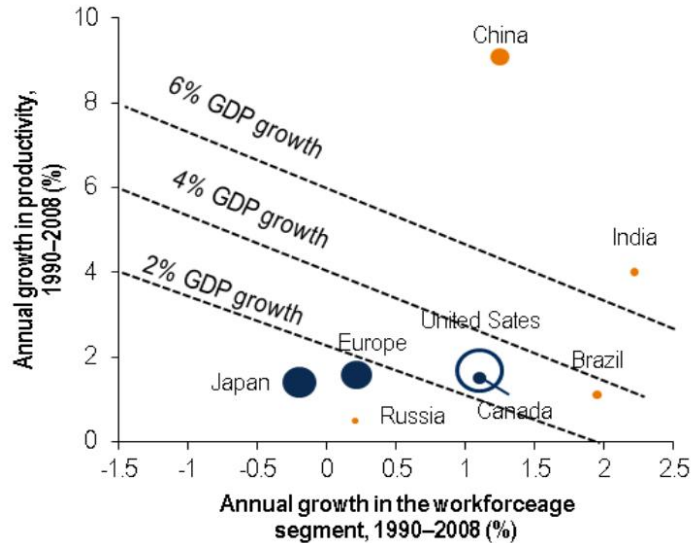
US Working-age population growth: 1953-2021



Key Trends

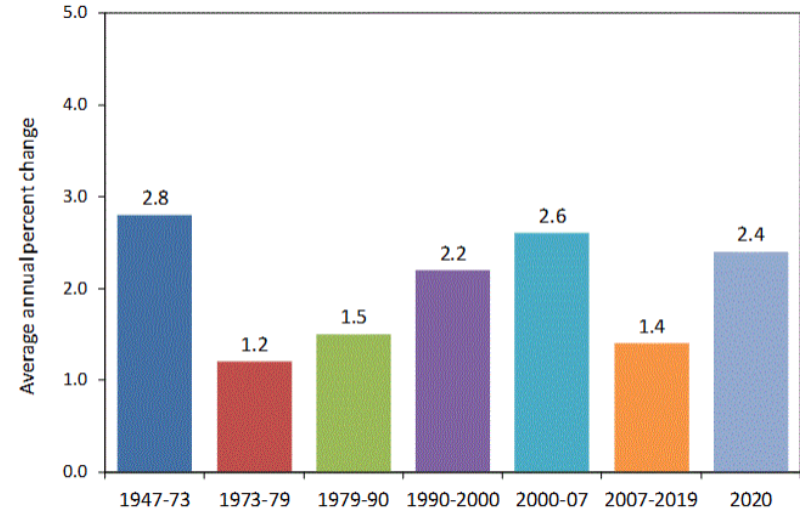
Trend #5: Declining Productivity

Emerging markets economic growth has largely driven by productivity gains: 1990-2008



Sources: UN WPP 2010; World Bank; BCG

US Productivity change in nonfarm business sector, 1947-2020



Source: U.S. Bureau of Labor Statistics

COVID as Catalyst

Result #1: Higher Mortality

How Excess Mortality In 2020 Compares

Excess all-cause mortality per 100,000 inhabitants compared to the same weeks in 2015-2019*

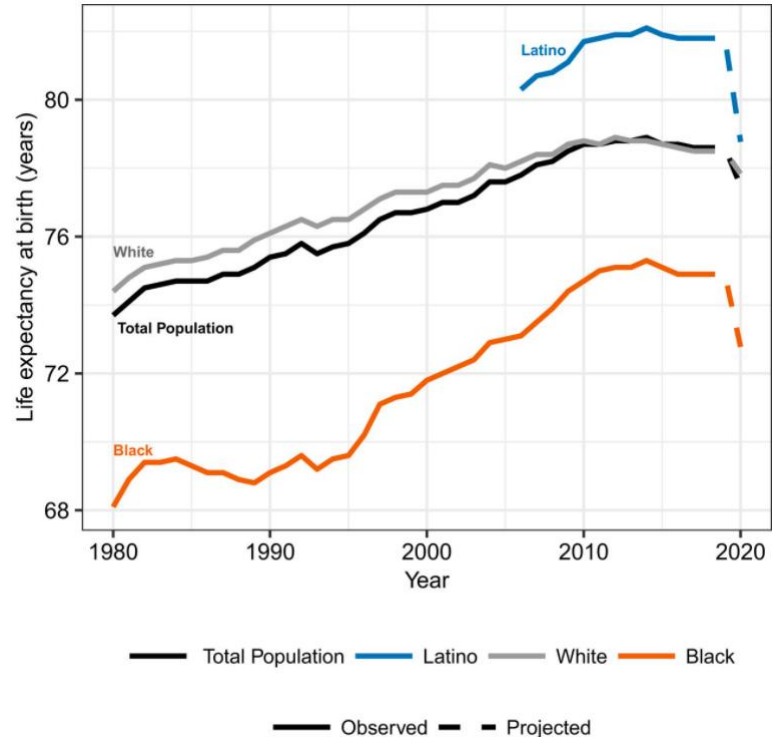


* As of July 25, 2020. Beginning when a country surpassed 1 case per million inhabitants. Selected countries.

Source: JAMA Network



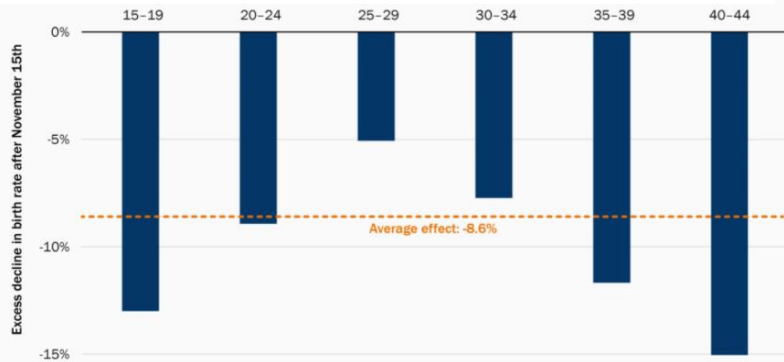
statista



COVID as Catalyst

Result #2: Fewer Births

Estimated impact of COVID-19 on births in late 2020, by age group



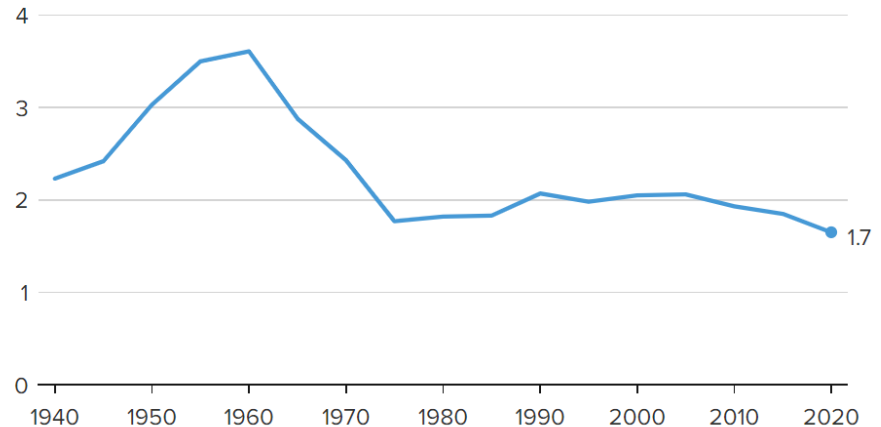
Source: Observed quarterly birth rates obtained from National Center for Health Statistics, Vital Statistics Rapid Release, Natality - Quarterly Provisional Estimates (2021).

Note: Predicted birth rates in the absence of COVID reflect Q4 2019 birth rates decreased by the percentage reduction in births observed between Q4 2018 and 2019. The COVID impact is the excess decline in births between observed and predicted values multiplied by two, which assumes that COVID reduced births in half of the quarter (November 15th onward).

B Economic Studies
at BROOKINGS

U.S. fertility rate

Average number of children per American woman



Note: 2020 data is estimated using provisional data through the third quarter.

Source: Social Security Administration

COVID as Catalyst

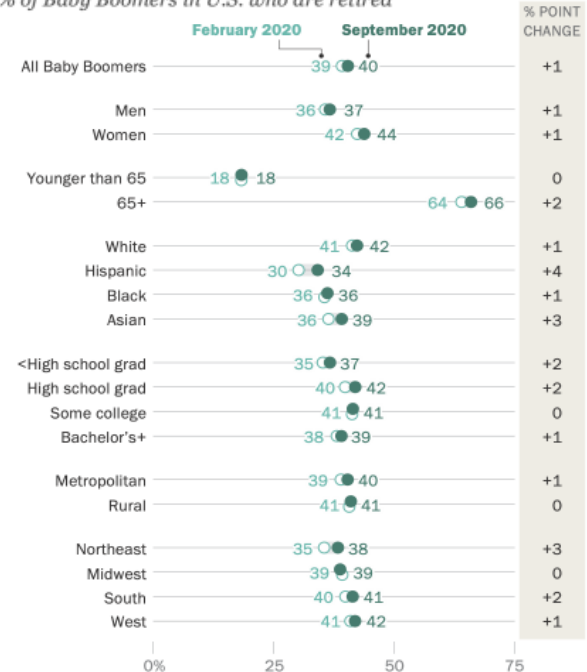
Result #3: More Retirements

In the US, Covid has generated a surge in 'excess retirements'



Source: Miguel Faria e Castro, Federal Reserve Bank of St. Louis
© FT

% of Baby Boomers in U.S. who are retired

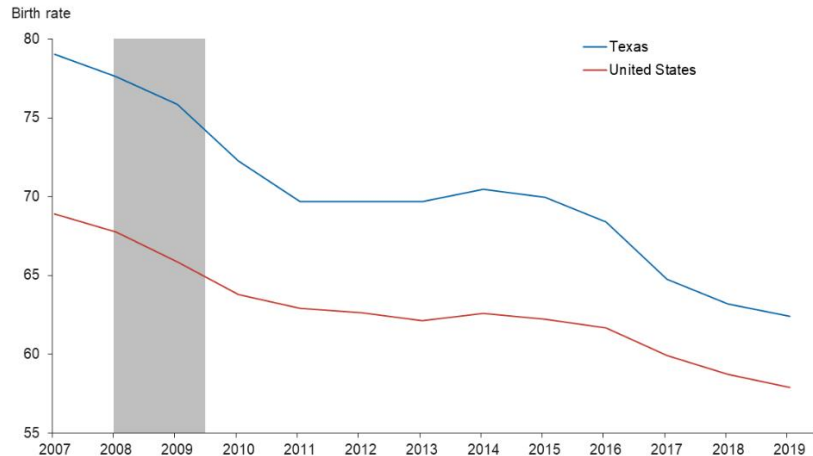


Note: "Retired" refers to those not in the labor force due to retirement. Baby Boomers are those born between 1946 and 1964. White, Black and Asian adults include those who report being only one race and are not Hispanic. Hispanics are of any race. "Some college" includes those with an associate degree and those who attended college but did not obtain a degree. The percentage point changes are computed from unrounded shares.

Texas Demographics

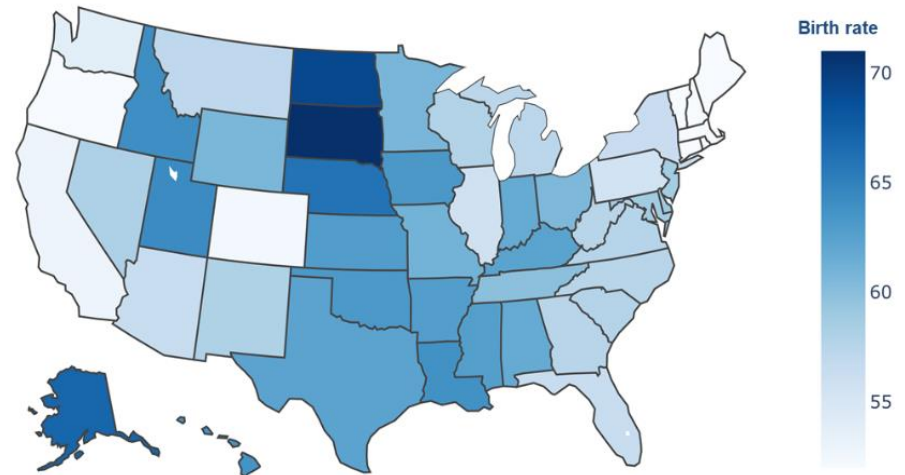
Birth Rates Declining Faster Than Average

Birth rates have fallen faster in Texas than nationally since 2007



NOTES: Birth rate is expressed as births per 1,000 women ages 15-44 during the calendar year. Shaded area represents recession.
SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics.

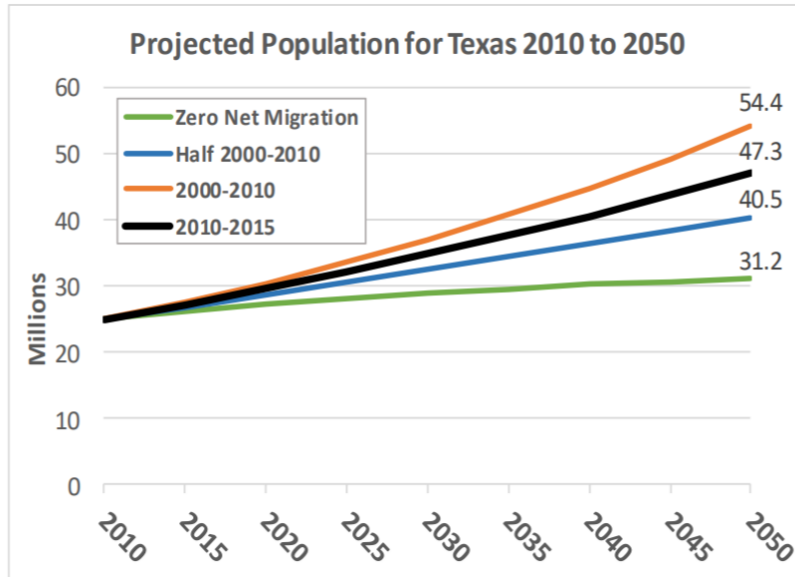
Texas birth rate ranks #14 among states - births per 1,000



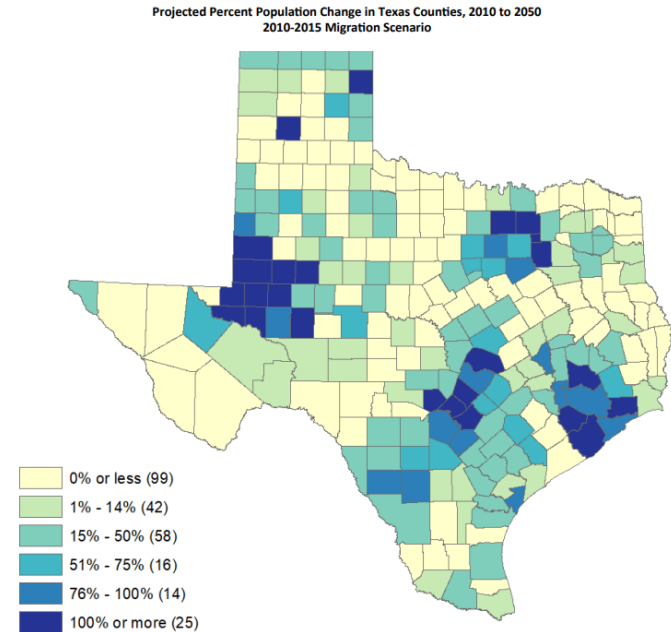
Texas Demographics

Migration Is The Primary Growth Driver

- Migration will be the largest contributor to population growth in Texas, largely in urban centers.

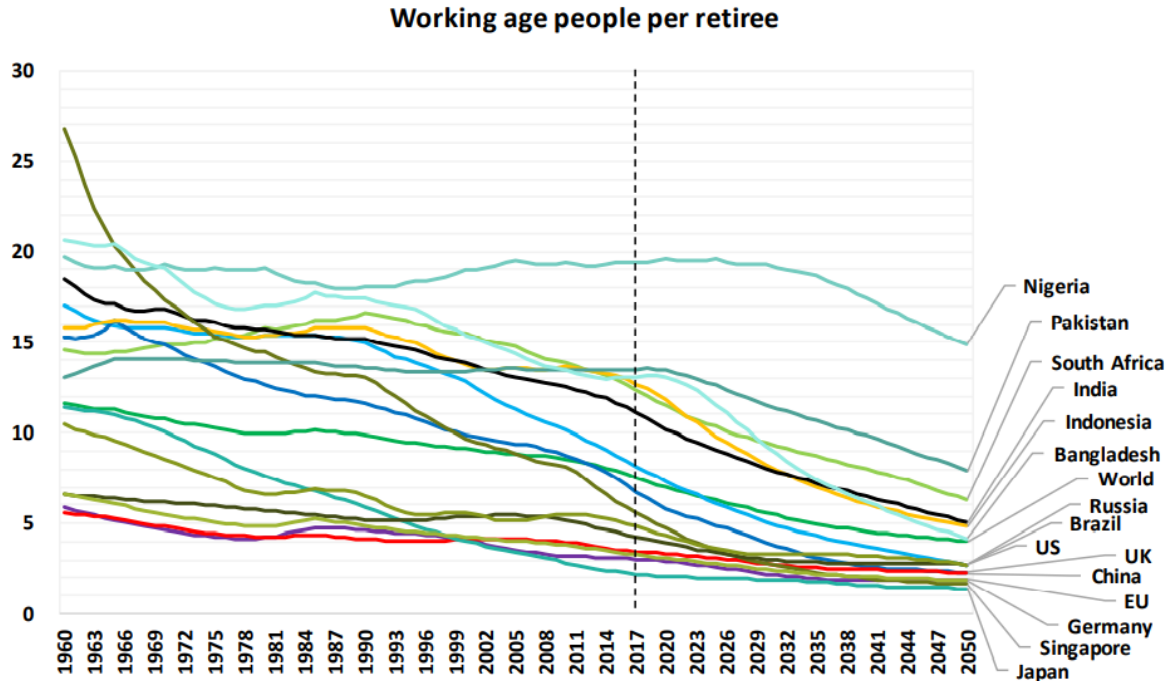


Source: The Texas Demographic Center Projections – September 2019



Effects of Demography

Effect #1: Rising Dependency Ratio



Source: World Bank data and estimates (2017+), and Bernstein analysis

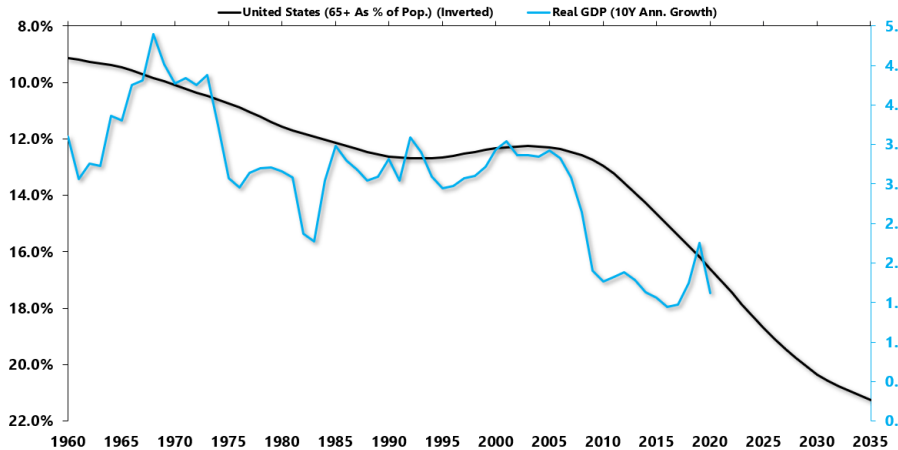
- 1960: 12 working age people per retiree
- 2017: 7.5 working age people per retiree
- 2050: the ratio is projected to decline to ~4, including <3 in many advanced economies
- 2050: US declines to ~2.7 from 6.6 in 1960

Effects of Demography

Effect #2: Slower Growth

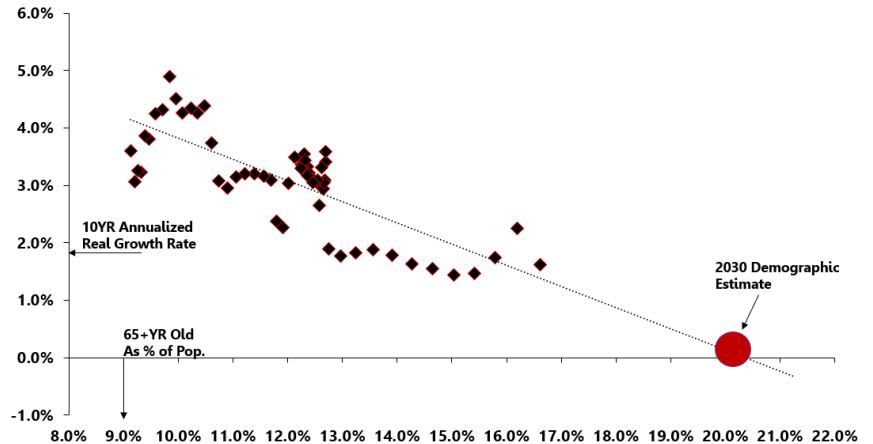
- Slowing population growth represents a drag on economic growth

Aging Demographics vs. Real Growth



Source: One World in Data, BEA, FRED and EPBMacroResearch.com

United States: Aging Demographics vs. Real Growth



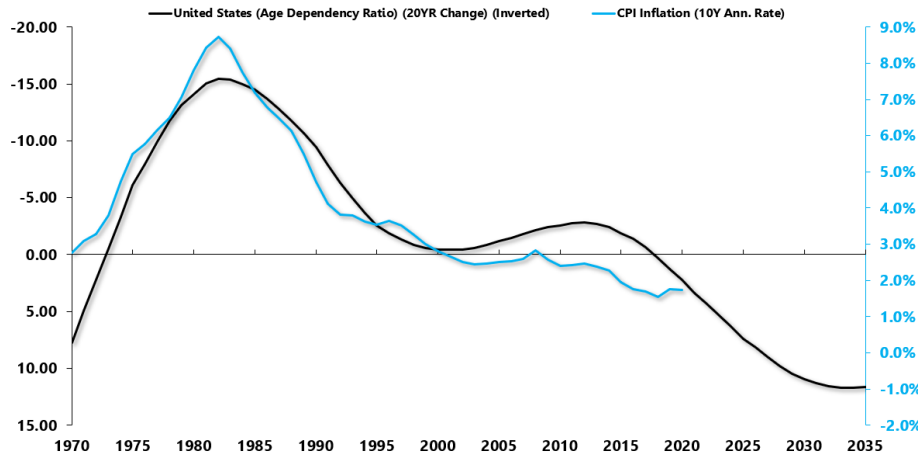
Source: One World in Data, BEA, FRED and EPBMacroResearch.com

Effects of Demography

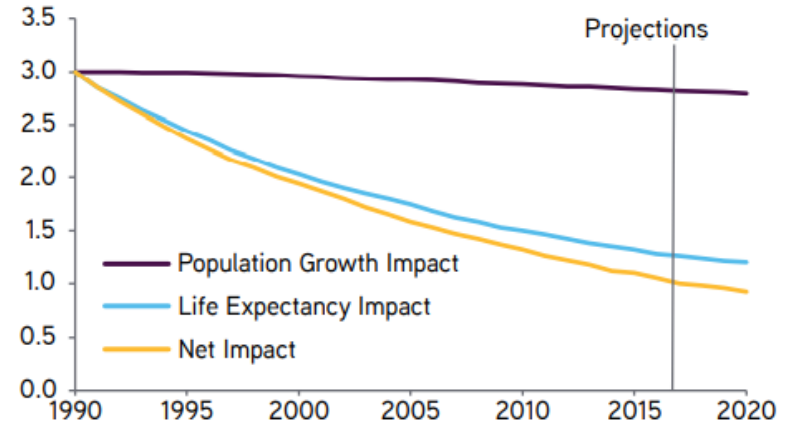
Effect #3: Lower Real Rates

- Long-term inflation and real interest rates are linked to the age-dependency ratio and longevity

Demographics vs. Inflation



Source: One World in Data, BEA, FRED and EPBMacroResearch.com

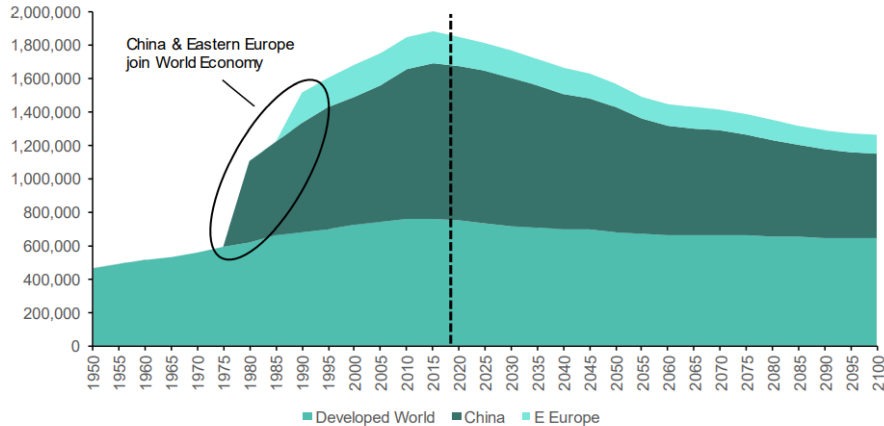


Source: Carlos Carvalho, Andrea Ferrero, and Fernanda Nechio, "Demographics and Real Interest Rates: Inspecting the Mechanism," Federal Reserve Bank of San Francisco.

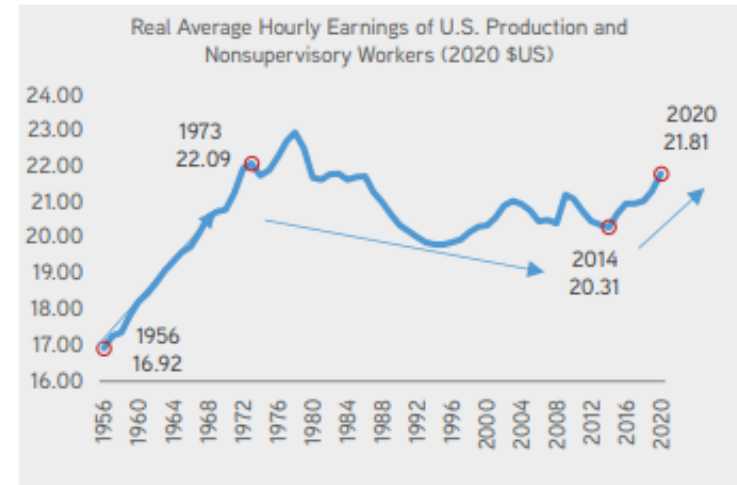
Effects of Demography

Effect #4: Higher Wages

- Shrinking workforce may accelerate wage gains as demand outpaces supply



Source: UN Population Division data and estimates (2018+), and Bernstein analysis

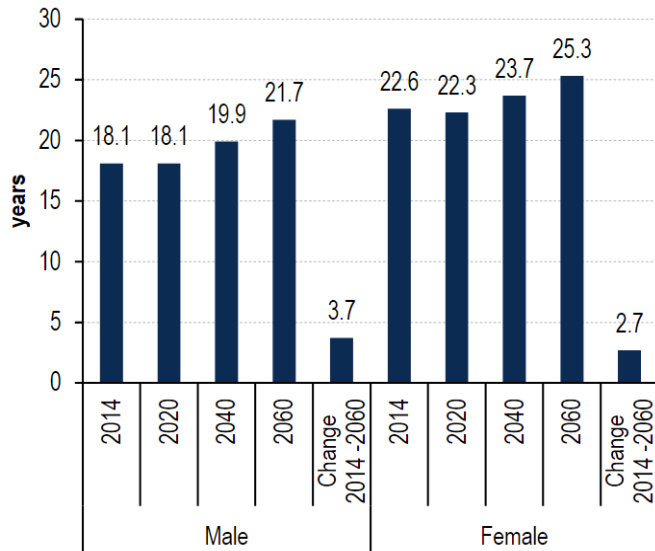


Latest data as at July 19, 2021. Source: Bureau of Labor Statistics, KKR Global Macro & Asset Allocation analysis.

Effects of Demography

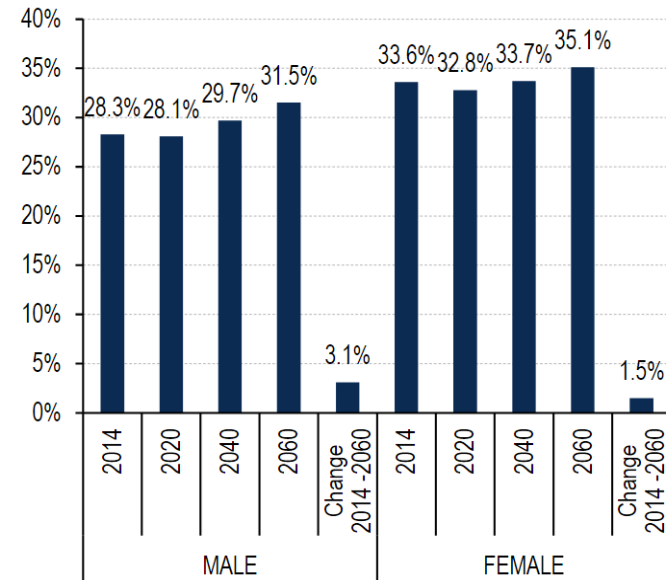
Effect #5: Longer Retirements

Duration of retirement by gender



Source: IMF and Bernstein analysis

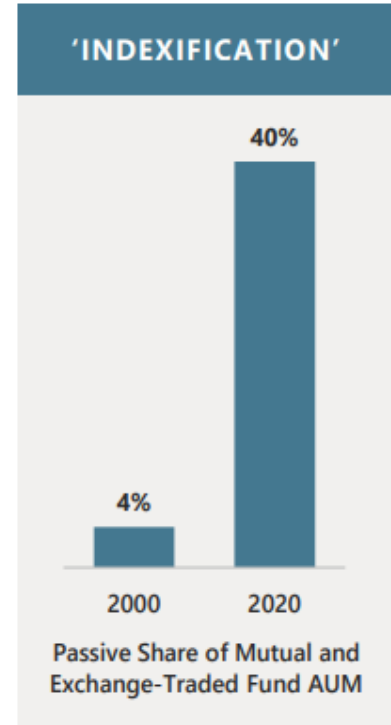
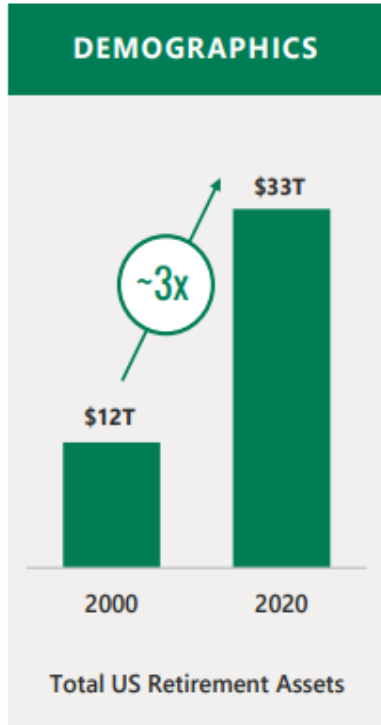
Percentage of adult life spent at retirement by gender



Source: IMF and Bernstein analysis

Effects of Demography

Effect #6: Competition for Attractive Returns



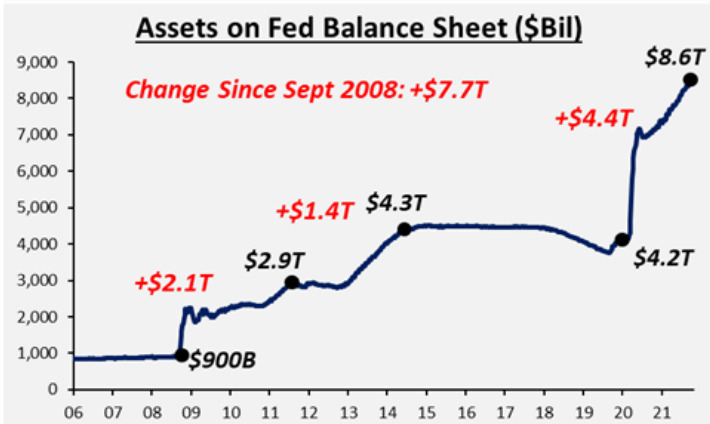
Sources: Investment Company Institute, Federal Reserve Economic Data, Accenture, Morningstar. 1. 10-Year Treasury yield as of October 15, 2021.

Potential Solutions

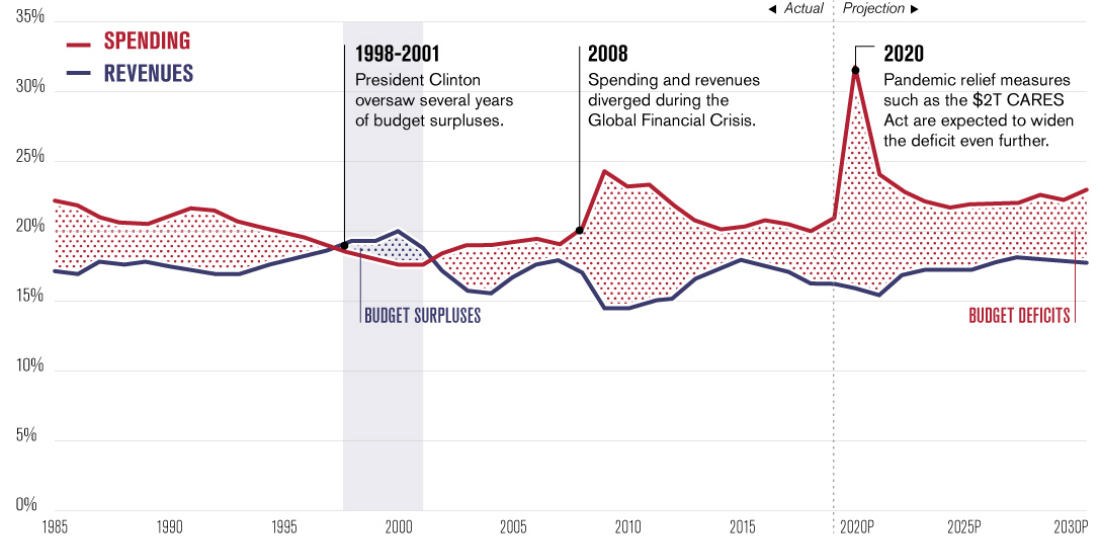
Solution #1: Easier Monetary Policy and Increased Fiscal Spending



Quantitative Easing enables the financing of fiscal spending



Federal Spending and Revenues (% of GDP)



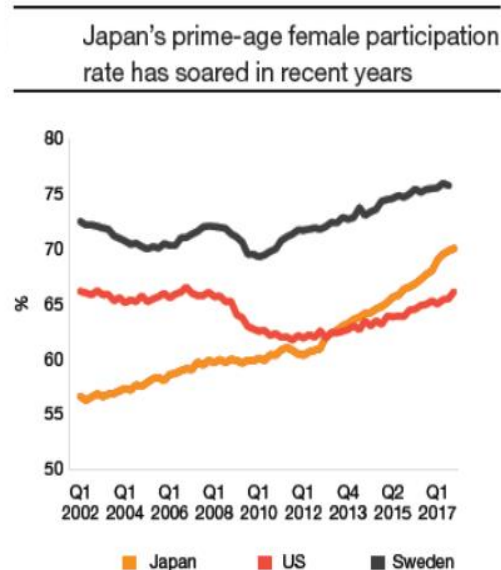
Source: Peter G. Peterson Foundation

Potential Solutions

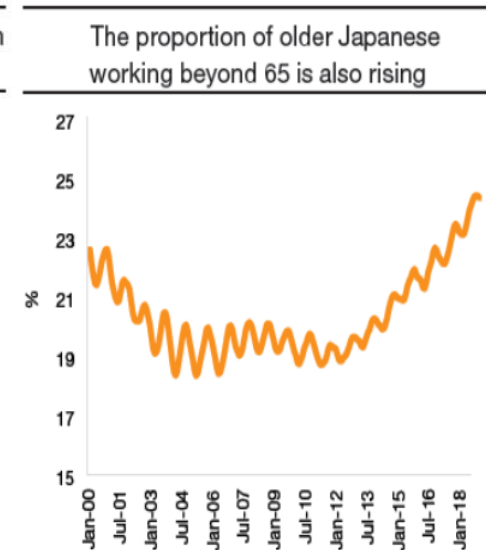
Solution #2: Greater Inclusivity



- Economic growth = Workers × Productivity



Source: Federal Reserve Bank of St Louis



Source: Ministry of Internal Affairs and Communication, Labour Force Survey

Potential Solutions

Solution #3: Immigration

- IMF: more immigration needed to stabilize the elderly share of advanced countries' population.

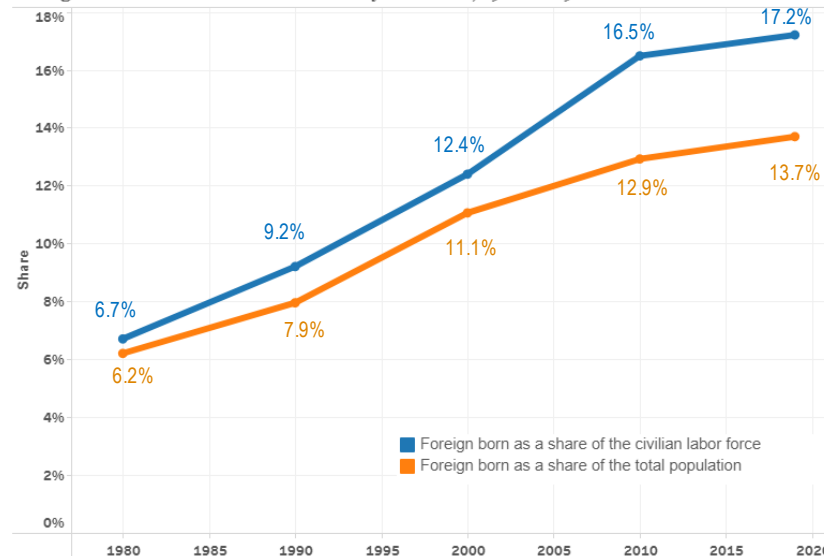
Economic and demographic asymmetries will drive international migration

Population position ranking in parentheses

| 2015 | 2050 |
|-----------------------------|------------------------------|
| 1) China: 1.4 billion | 1) India: 1.7 billion |
| 2) India: 1.3 billion | 2) China: 1.3 billion |
| 3) U.S.: 321.8 million | 3) Nigeria: 398.5 million |
| 4) Indonesia: 257.6 million | 4) U.S.: 388.9 million |
| 5) Brazil: 207.8 million | 5) Indonesia: 322.2 million |
| 6) Pakistan: 188.9 million | 6) Pakistan: 309.6 million |
| 7) Nigeria: 182.2 million | 7) Brazil: 238.3 million |
| 8) Bangladesh: 161 million | 8) Bangladesh: 202.2 million |
| 9) Russia: 143.5 million | 9) The Congo: 195.3 million |
| 10) Mexico: 127 million | 10) Ethiopia: 188.5 million |
| 13) Ethiopia: 99.4 million | 11) Mexico: 163.8 million |
| 19) The Congo: 77.3 million | 15) Russia: 128.6 million |

Source: UN

Immigrants in the Civilian Labor Force by U.S. State, 1980-2019



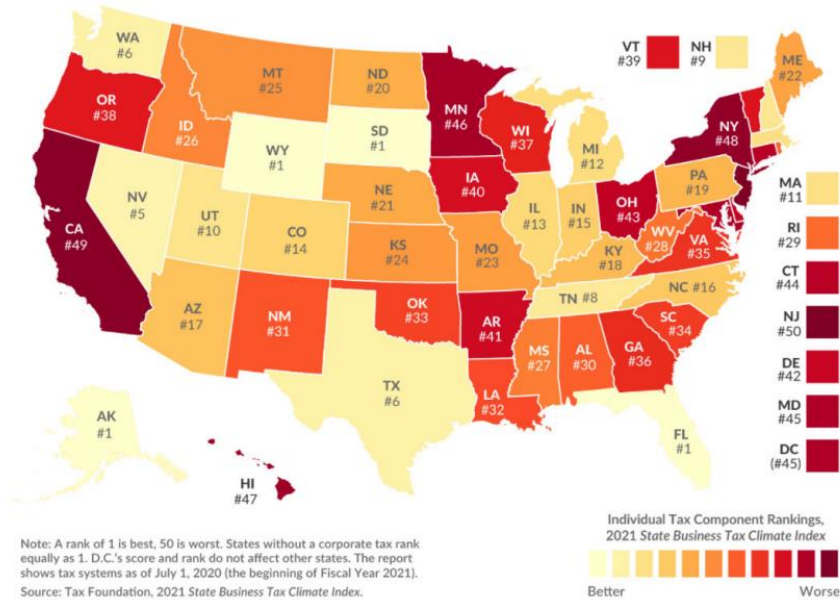
Source: Migration Policy Institute (MPI) tabulation of data from the U.S. Census Bureau.

Potential Solutions

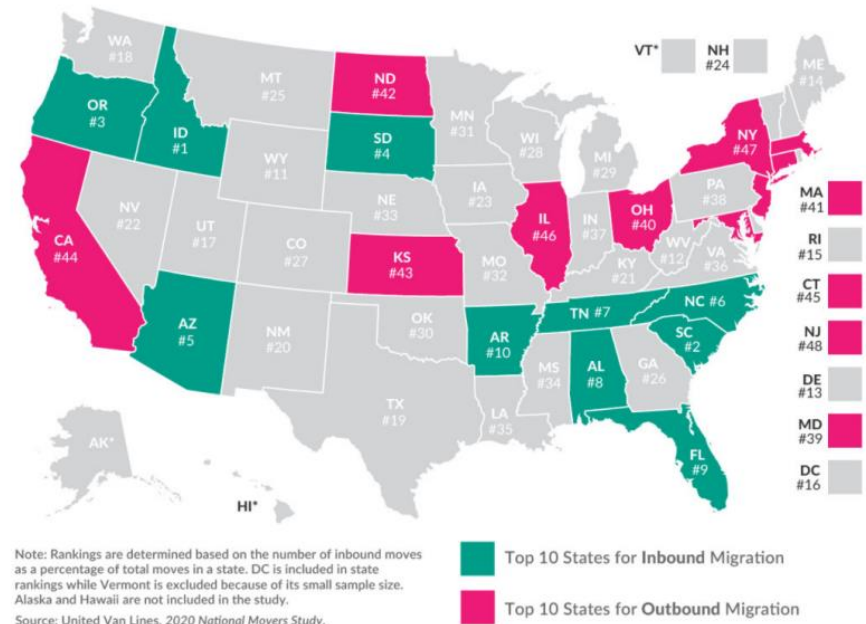
Solution #4: Pro-Growth Policies

- Low taxes and pro-growth policies have attracted inflows of migrants

Individual Tax Component Rankings, 2021 State Business Tax Climate Index



State Migration Patterns, from Most Inbound to Most Outbound, 2020



Potential Solutions

Pro-Growth Policies Benefiting Austin



- Apple broke ground in 2019 on its \$1 billion, 3 million square foot campus. Set to be completed mid-2022, the complex will house 5,000 employees initially and could expand to up to 15,000.



- Tesla's nearly 3,000-acre Giga-factory is expected to be completed by the end of 2021. Tesla is expected to create 5,000 new jobs in Central Texas.

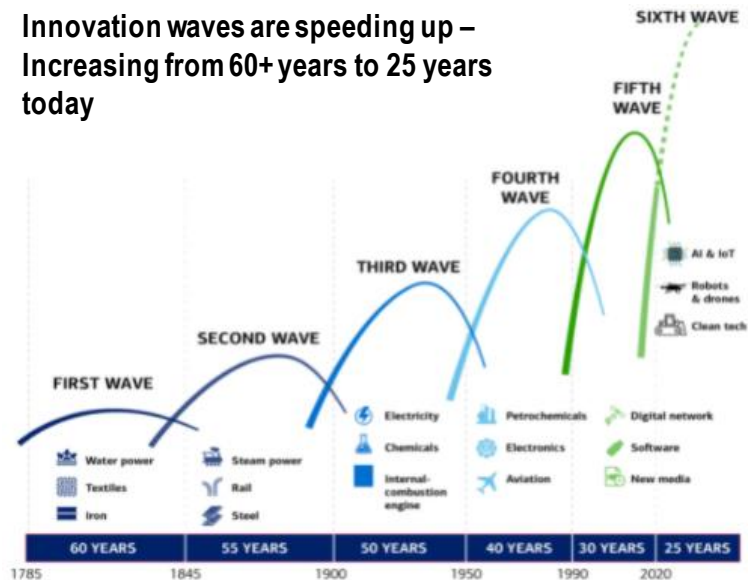


- Samsung will invest \$17 billion in its North American headquarters in Taylor, just outside Austin. It will be second in size only to the company's global headquarters in South Korea.

Potential Solutions

Solution #5: Productivity Gains

Innovation waves are speeding up –
Increasing from 60+ years to 25 years
today



Source: Visual Capitalists, Edison Institute, BofA Global Research

Labour productivity – Output per hour

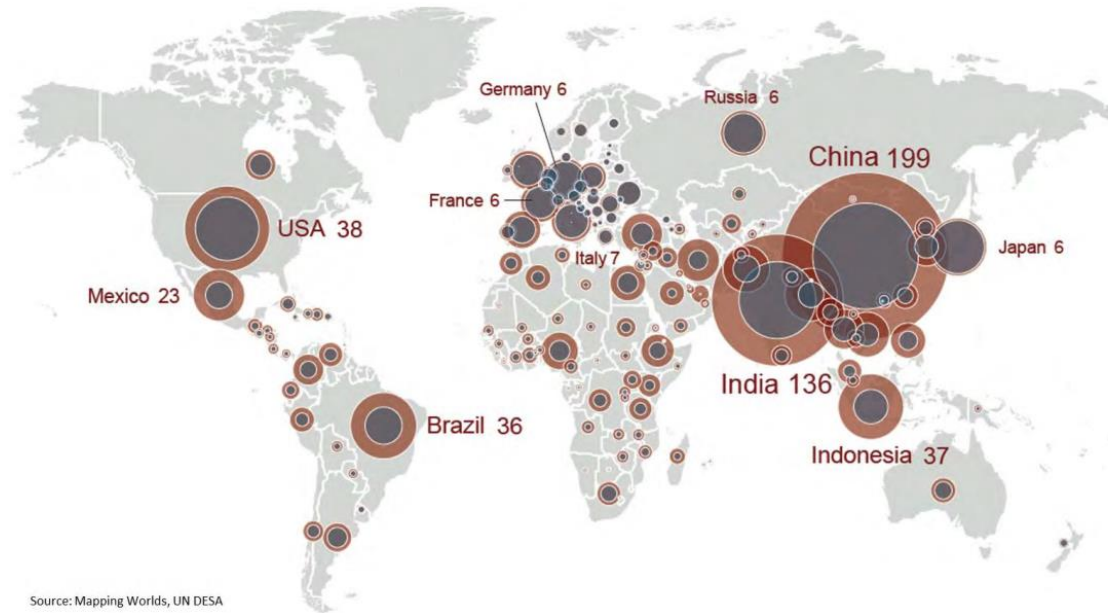


Sources: Bureau of Labor Statistics and Desjardins, Economic Studies

Investment Themes

Theme #1: Longevity

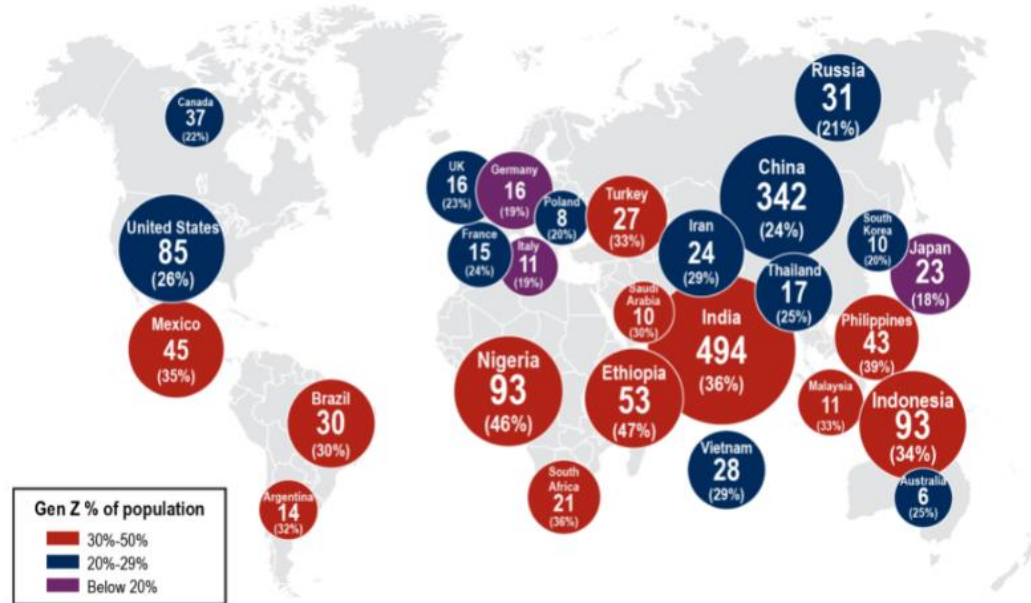
- By 2025 the population of people aged 65+ will rise by millions in most countries



Investment Themes

Theme #2: Gen Z

Size of bubble denotes combined population of the cohorts (million)



Source: United Nations

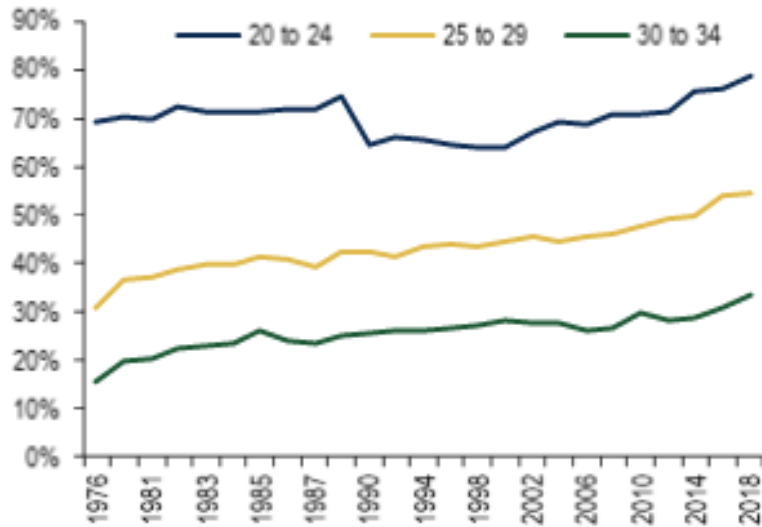
Investment Themes

Gen Z Extending Existing Trends



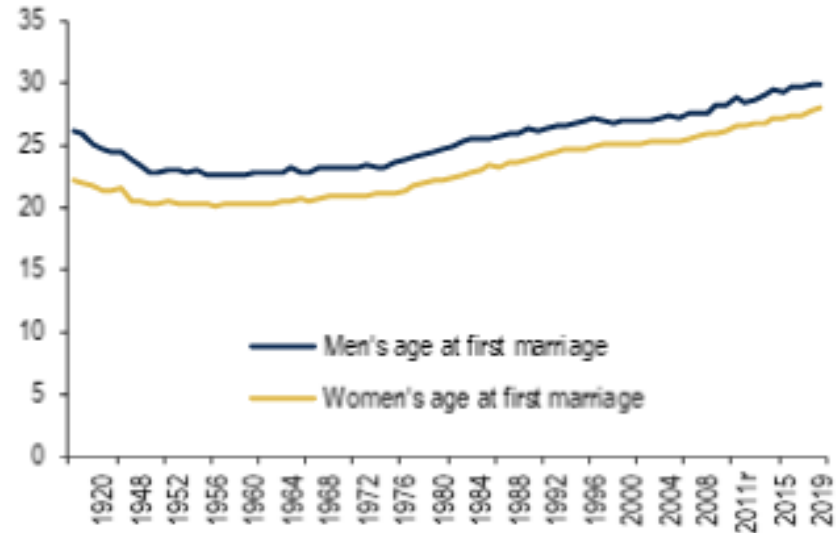
- Gen Z delaying key milestones of marriage and children in favor of other priorities or out of necessity.

% of women that are childless for each age group over time



Source: US Census Bureau

Estimated median age at first marriage in the US

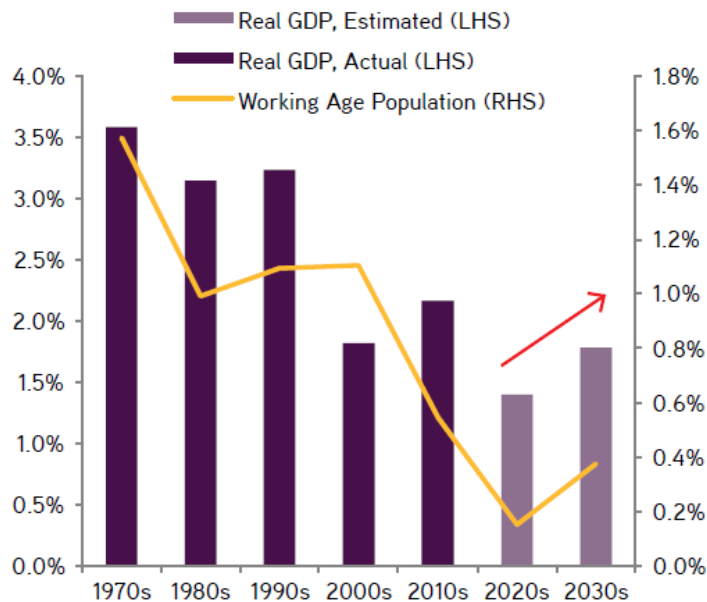


Source: US Census Bureau

Investment Themes

Theme #3: Gen Z Boosts US

U.S. Real GDP vs. Working Age Population Growth, %

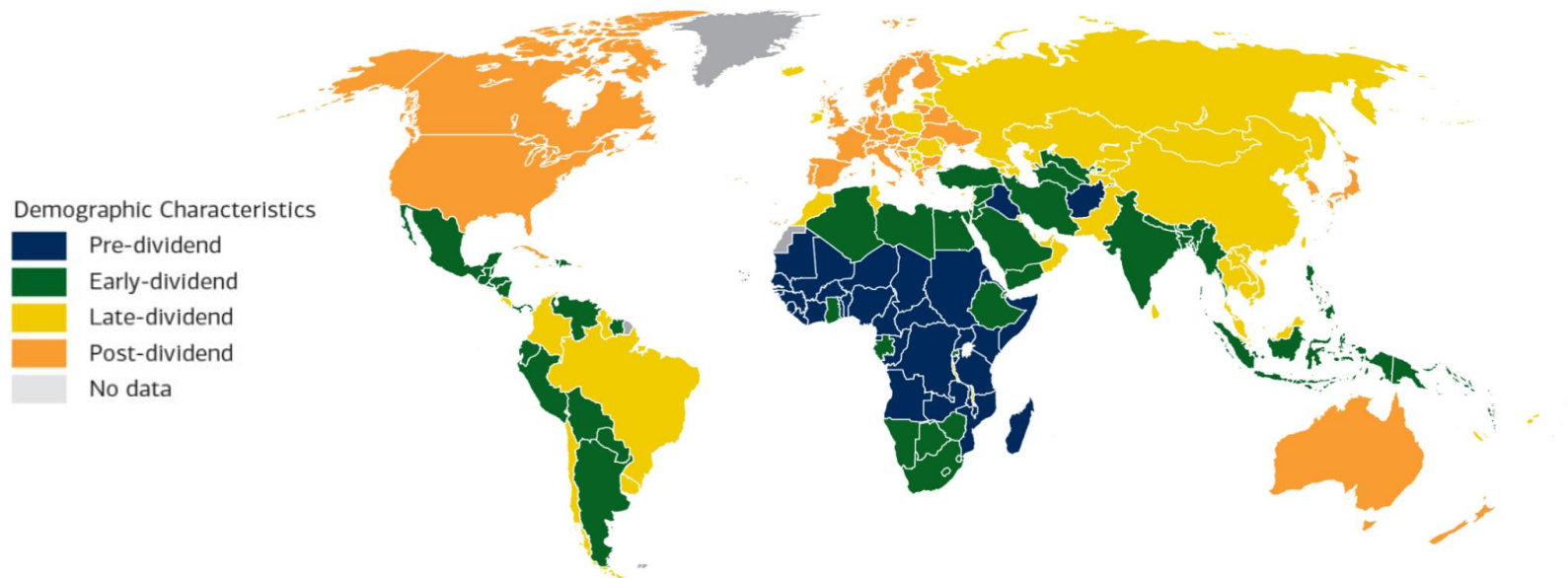


Data as at June 23, 2017. Source: United Nations, Haver Analytics.

- Millennial and Gen Z population could provide an important tailwind to US growth
- Working age population rebounds 0.4% in 2030 vs. growth near zero in 2020s
- Outsized productivity gains could also drive growth above recent ranges
- May be sufficient to sustain GDP growth rates of 1.5% to 2.0% over the next decade

Investment Themes

Theme #4: Demographic Opportunities & Challenges



Source: United Nations

Conclusion

Takeaways for ERS



Investments

- Asset Allocation
- Capital Abundance
- Competition for Returns
- Competition for Talent
- Lower Real Yields
- Rising Inflation Risk
- Monetary/Fiscal Policy

Actuarial

- Workforce Growth
- Wage Inflation
- Longevity Risk
- Healthcare Costs
- Investment Returns

Organizational

- Worker Scarcity
- Collaborative Culture
- Next-Gen Workplace
- Flexible Arrangements
- Investments in Productivity

Questions?

Public Agenda Item #32

*Adjournment of the Joint Meeting of the Board of Trustees and
Investment Advisory Committee and Reminder of Upcoming Meeting
Dates*

December 8, 2021

Next Meeting Dates



2022 Meeting Dates

Wednesday, March 9, 2022

Wednesday, May 11, 2022

Wednesday, August 24, 2022