



Arizona Permanent State Land Fund

December 2012 Updated Asset Allocation Analysis

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Updated Asset Allocation Policy Options¹

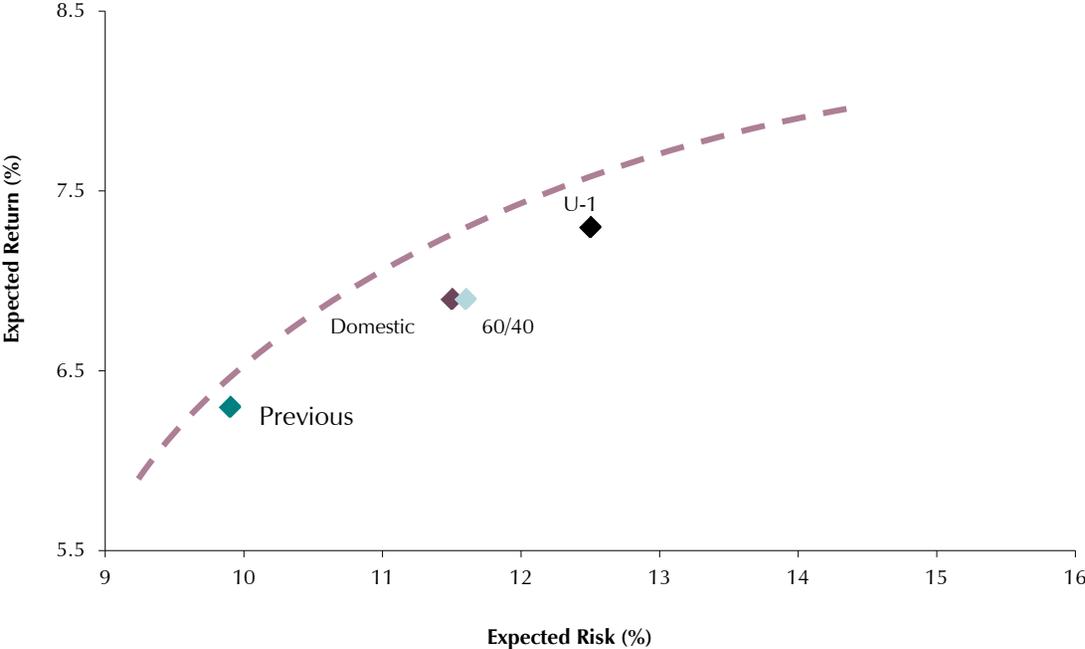
	Previous Policy (%)	Policy U-1 (%)	Domestic Policy (%)	60/40 Portfolio (%)
Equity	50	48	46	60
U.S. Equity	50	21	46	60
Developed Foreign Equity	0	14	0	0
Emerging Market Equity	0	12	0	0
Frontier Market Equity	0	1	0	0
Investment Grade Fixed Income	50	40	40	40
Investment Grade Bonds	50	13	30	40
TIPS	0	17	10	0
Foreign Bonds	0	10	0	0
Real Assets (Public Equity)	0	12	14	0
REITs	0	2	4	0
Natural Resources (public)	0	5	10	0
Infrastructure (public)	0	5	0	0
<i>Expected Return (%)</i>	6.3	7.3	6.9	6.9
<i>Standard Deviation (%)</i>	9.9	12.5	11.5	11.6
<i>Sharpe Ratio</i>	0.63	0.58	0.60	0.59
<i>Target Illiquid Assets (%)</i>	0	0	0	0
<i>Target Non-U.S. Assets (%)</i>	0	27	0	0

¹ Expected return and standard deviation are based upon Meketa Investment Group's 2012 Annual Asset Study. Throughout this document, returns for periods longer than one year are annualized.

Risk/Return Analysis

Mean Variance Optimization

Asset Allocation Policy Options



Asset Allocation Policy Options

	Previous Policy (%)	Policy U-1 (%)	Domestic Policy (%)	60/40 Portfolio (%)
Expected Return (%)	6.3	7.3	6.9	6.9
Expected Standard Deviation (%)	9.9	12.5	11.5	11.6
Sharpe Ratio	0.63	0.58	0.60	0.59
20-Year Projected Return (Percentiles)				
95th	9.5	11.2	10.6	10.6
75th	7.3	8.5	8.0	8.0
50th	5.8	6.6	6.3	6.2
25th	4.3	4.7	4.6	4.5
5th	2.3	2.1	2.2	2.1

- Each asset allocation policy option expresses a distinct expected return and expected volatility, as shown in the efficient frontier on the previous page.
- While the "expected return" represents the "median" of all possible outcomes, we also show the 20-year projected return across the 95th, 75th, 50th, 25th, and 5th percentiles to emphasize that the range of potential returns varies widely.

**20-Year Opportunity Cost of the Current 60/40 Allocation as Compared to Alternate Policies
Based on \$3 Billion Beginning Value at Selected Percentile Returns¹**

Ending Wealth Percentiles	Previous (\$ millions)	Policy U-1 (\$ millions)	Domestic Policy (\$ millions)
95th Percentile (highest value)	-4,030	2,800	20
75th Percentile	-1,710	1,240	80
50th Percentile	-800	650	100
25th Percentile	-250	290	90
5th Percentile (lowest value)	150	30	80

- The power of compounding makes small differences in average annual returns into large differences in end-of-period value.
- In the "median" expectation (50th percentile), the domestic policy would add \$100 million and Policy U-1 would add \$650 million to the value of the Fund over 20 years (assuming no cash inflows or outflows).
- In terms of projected ending wealth, the current 60/40 policy is generally preferable to the previous policy. For example, the previous policy's projected ending wealth at the end of twenty years is lower than that of the current policy at all but the 5th percentile.

¹ See the appendix for Meketa Investment Group's MVO assumptions. Ending market values assume no inflows to, or outflows from, the Fund.



Deterministic Economic Scenario Analysis

- Where mean-variance optimization captures a probabilistic forecast of portfolio returns, deterministic economic scenario analysis allows one to look at “path dependent” scenarios. These scenarios can incorporate many of the real world risks that are often overlooked when using only traditional mean-variance optimization.
- With history as a guide, we have developed five realistic economic scenarios, ranging from very pessimistic to very optimistic.
 - Our methodology is strict but also allows some creativity in how we construct our twenty-year forecasts: essentially, we use history to model five-year sub-periods with different economic characteristics, then we string these periods together in a way that captures possible future scenarios.
 - At the same time, we ensure that the entire twenty-year history passes reasonability checks. We believe that this methodology allows us to be cognizant of historical relationships between assets and economic factors, while at the same time ensuring that we are not presenting a set of scenarios dominated by (possibly unrepeatable) periods in history.

Deterministic Economic Scenario Analysis Summary

- Over the next twenty years, the investment outcome of the State Land Fund will be more determined by the economic conditions that unfold than the asset allocation policy selected.

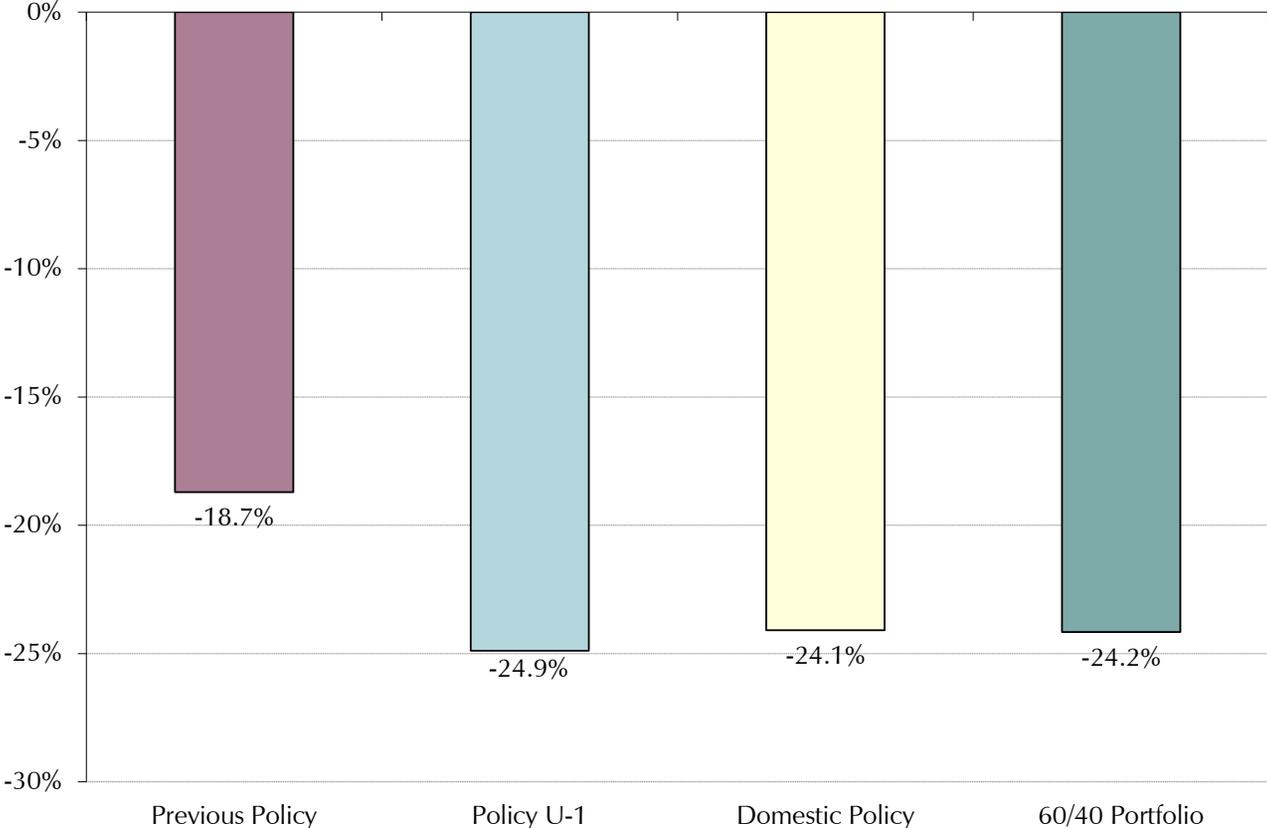
Average Annual Return

	Very Pessimistic (%)	Pessimistic (%)	Moderate (%)	Optimistic (%)	Very Optimistic (%)	Range (%)
Previous Policy	3.4	4.8	6.7	8.5	10.4	7.0
U-1	4.1	5.9	7.7	8.7	10.1	6.0
Domestic	3.2	5.2	6.9	8.7	10.7	7.5
60/40 Portfolio	3.2	4.7	6.8	8.8	10.9	7.7

- Policy U-1 has the narrowest range of outcomes across economic scenarios.

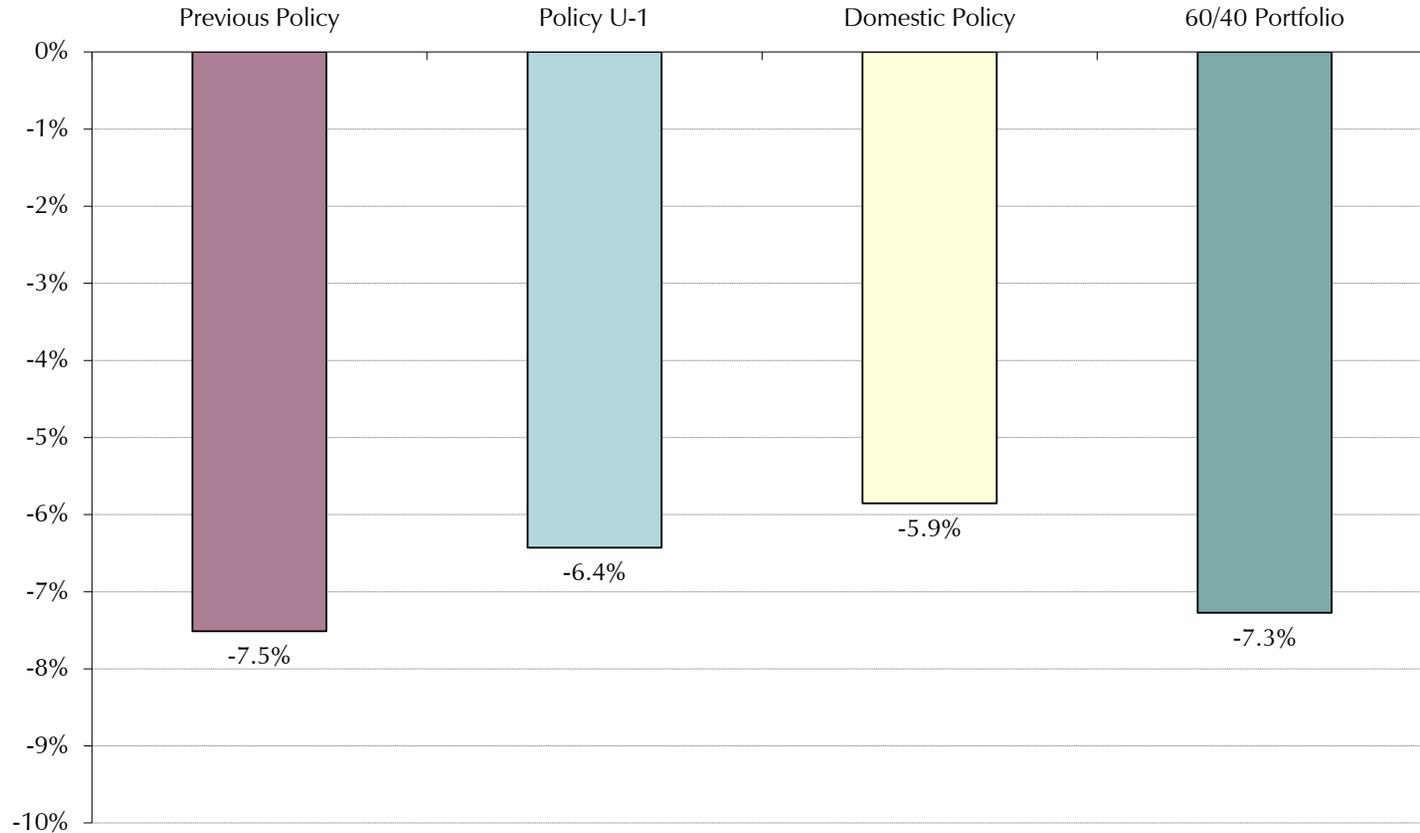
Risk Analytics

**Historical Stress Test: Global Financial Crisis (4Q07 thru 1Q09)
(Cumulative Return)**



- In an *extended down market* environment (e.g., the GFC), the previous 50/50 policy would best protect assets.

**Historical Stress Test: Stagflation (January thru March 1980)
(Cumulative Return)**



- In an environment of high inflation but low growth (e.g., early 1980), the domestic policy and Policy U-1 would best protect assets.

Stress Testing: Impact of Market Movements Expected Returns¹

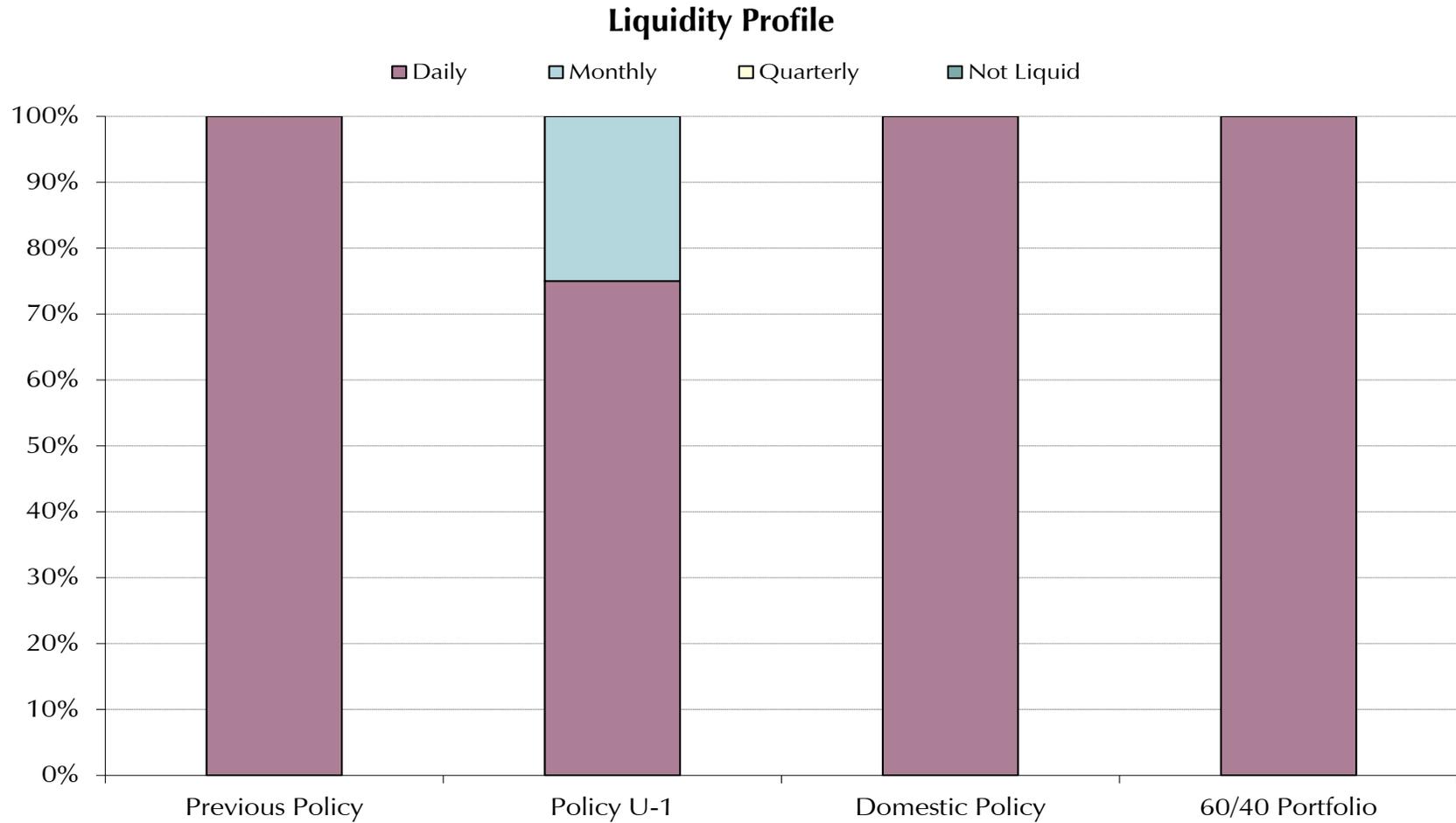
What happens if (over a 12-month period):	Previous Allocation (%)	Policy U-1 (%)	Domestic Policy (%)	60/40 Portfolio (%)
10-Year T-Bond rates rise 100 bp	4.5	9.0	7.3	5.9
10-Year T-Bond rates rise 200 bp	4.3	8.8	8.5	6.6
10-Year T-Bond rates rise 300 bp	-2.7	-0.7	1.7	-0.8
BBB Spreads widen by 100 bp, HY by 200 bp	3.0	4.7	4.0	3.6
BBB Spreads widen by 300 bp, HY by 1000 bp	-22.8	-21.9	-23.9	-26.6
Trade-weighted US\$ gains 10%	5.8	0.6	4.2	5.3
Trade-weighted US\$ gains 20%	11.5	1.3	8.5	10.6
Equities decline 10%	-4.0	-5.9	-5.2	-5.2
Equities decline 25%	-10.0	-14.7	-13.1	-13.0
Equities decline 40%	-16.0	-23.6	-20.9	-20.8

- Each policy portfolio has a different sensitivity to four major risk factors: interest rates, credit spreads, currency values, and equity values.
- The Fund's primary risk factor would continue to be a decline in the equity markets, regardless of the policy.

¹ Assumes that assets not directly exposed to the factor are effected nonetheless. See the Appendix for further details.

Liquidity Analysis

- Liquidity risk is a meaningful risk that is generally not captured in traditional asset allocation processes.
- The Fund should maintain adequate liquidity to avoid having to sell illiquid assets at distressed prices to satisfy any distribution needs.



- Using strict liquidity assumptions, each policy portfolio has at least 75% daily liquid assets.

Appendices

Detail of Deterministic Scenario Analysis

Scenario A – Very Pessimistic Case

Economic Conditions

- The economy suffers from a major recessions intermittently throughout the twenty-year period. Unemployment becomes a major economic concern, reaching double-digit levels for multiple years. Unemployment averages 7.4% during the period.
- Inflation is at its peak in the period's early years, and remains relatively low. The U.S. dollar declines in value by 3.1%.

Asset Class Returns

- Bonds produce a relatively attractive return during the period, with Treasuries and corporates outperforming the U.S. equity market over the entire period.
- Equity markets are volatile throughout the period, and produce an average annual return of only 2.6%, less than the rate of inflation. Twice during the period, in 2016 and 2026, domestic equities fall by nearly 40%. Developed and emerging market foreign stocks perform poorly as well.

Scenario A – Very Pessimistic Case

20-Year Period	Previous Policy	Policy U-1	Domestic Policy	60/40 Portfolio
Average Annual Return (%)	3.4	4.1	3.2	3.2
Standard Deviation (%)	10.5	10.9	10.3	11.8
Maximum Drawdown (%)	-20.9	-23.6	-21.2	-24.5
Ending Period Value (\$ millions) ¹	5,911	6,721	5,640	5,607

- In a very pessimistic scenario, policy U-1 would outperform the alternative policies.

¹ Assumes no cash flows into, or out of, the Fund.



Scenario B – Pessimistic Case

Economic Conditions

- Weak and inconsistent economic growth characterizes the period. A prolonged recession occurs in 2021-2023, followed by a recovery. Domestic unemployment remains an economic problem throughout the period, averaging 6.4%.
- Inflation peaks around 12% in 2022, during the recession. Long-term Treasury yields are low at the beginning of the time period, then increase after the recession and remain high until the end of the period.

Asset Class Returns

- Bond returns vary considerably during the period. As yields rise in the second half of the period, bonds produce a healthy return.
- Equities produce a negative return in 2016, and again in 2021-2022 during the recession. They experience a “bull run” from 2027-2031.

Scenario B – Pessimistic Case

20-Year Period	Previous Policy	Policy U-1	Domestic Policy	60/40 Portfolio
Average Annual Return (%)	4.8	5.9	5.2	4.7
Standard Deviation (%)	12.1	11.6	12.4	13.3
Maximum Drawdown (%)	-20.1	-20.5	-20.4	-23.7
Ending Period Value (\$ millions) ¹	7,655	9,391	8,209	7,557

- In a pessimistic scenario, the previous policy and 60/40 portfolio underperform the alternative policies.

¹ Assumes no cash flows to, or outflows from, the Fund.



Scenario C – Moderate Case

Economic Conditions

- Overall, GDP grows at a normal rate, with frequent but shallow economic cycles. Unemployment is held largely in check, peaking around 8% during cyclical downturns.
- Inflation is high (10%) at the beginning of the time period, then moderates after that. Long-term Treasury yields move within a range of 3% to 9%.

Asset Class Returns

- Bond returns reflect the moderate interest rate environment. Negative returns occur only during a few periods of economic stress.
- Equities exhibit normal levels of volatility and produce an average annual return of about 8%. A “bear market” afflicts equity investors in 2016-2017.

Scenario C – Moderate Case

20-Year Period	Previous Policy	Policy U-1	Domestic Policy	Current Policy
Average Annual Return (%)	6.7	7.7	6.9	6.8
Standard Deviation (%)	10.9	10.2	10.9	11.9
Maximum Drawdown (%)	-20.9	-23.2	-21.2	-24.5
Ending Period Value (\$ millions) ¹	10,971	13,190	11,391	11,286

- In a moderate case, Policy U-1 has the highest ending value, followed by the domestic policy.

¹ Assumes no cash flows to, or outflows from, the Fund.



Scenario D – Optimistic Case

Economic Conditions

- Economic growth is strong and persistent, interrupted only by a short recession in 2016. Unemployment is regularly maintained at or below the 6% level.
- Inflation is generally low and controlled, except for one high inflation year in 2022. Strong economic growth prevents long-term interest rates from going too low.

Asset Class Returns

- Bond returns reflect the low and controlled inflation environment, averaging over 6% for both Treasuries and corporates.
- The strong economy drives equity markets both in the U.S. and overseas. Over the entire period, U.S. stocks produce an average return of 9.8% per year, outpacing inflation, while private equity returns are very high. Foreign emerging equities outpace foreign developed equities.

Scenario D – Optimistic Case

20-Year Period	Previous Policy	Policy U-1	Domestic Policy	60/40 Portfolio
Average Annual Return (%)	8.5	8.7	8.7	8.8
Standard Deviation (%)	11.2	10.2	11.1	12.0
Maximum Drawdown (%)	-20.1	-22.4	-20.4	-23.7
Ending Period Value (\$ millions) ¹	15,272	15,804	14,663	16,190

- In the optimistic scenario, all policies perform very well.

¹ Assumes no cash flows to, or outflows from, the Fund.



Scenario E – Very Optimistic Case

Economic Conditions

- The global economy enters a period of enhanced productivity and economic growth, very much like that experienced by America in the 1950s and 1960s. U.S. real GDP grows at an average rate of 3.5%. After recovering from the current environment, the economy spends most of its time at or beyond what is now typically termed “full employment.” The unemployment rate averages 5.3%.
- After a couple of high years in 2012 and 2016, inflation is controlled throughout the period. Treasury yields are stable, reflecting low inflation and a stable economy.

Asset Class Returns

- Bond returns are strong, with Treasuries averaging 6.8% and corporate bonds averaging 8.9%.
- Equities produce a superb “real” return, as the economy’s increased productivity results in high earnings growth for corporate America. For the entire period, U.S. stocks return 13.7% per year. Riskier market segments of the equity markets (private equity, high yield bonds, real estate, and emerging market equities) perform impressively as well.

Scenario E – Very Optimistic Case

20-Year Period	Previous Policy	Policy U-1	Domestic Policy	60/40 Portfolio
Average Annual Return (%)	10.4	10.1	10.7	10.9
Standard Deviation (%)	8.4	6.3	8.2	8.6
Maximum Drawdown (%)	-4.0	-5.4	-5.4	-4.4
Ending Period Value (\$ millions) ¹	21,748	20,542	20,089	23,862

- In the very optimistic scenario, the allocation policy with the highest equity weight (the 60/40 portfolio) performs best.

¹ Assumes no cash flows into, or out of, the Fund.



Additional Risk Analytics

Types of Risk Analysis Addressed

- Risk budgeting¹
 - Attributes overall portfolio risks to specific asset classes
 - Highlights the source and scale of portfolio-level risk
- MVO-based risk analytics
 - Includes worst-case return expectations
 - Relies on assumptions underlying MVO
- Stress Testing
 - Stress tests policy portfolios using actual historical examples
 - Stress tests policy portfolios under specific hypothetical scenarios

¹ Risk budgeting seeks to decompose the aggregate risk of a portfolio into different sources (in this case, by asset class), with risk defined as standard deviation.

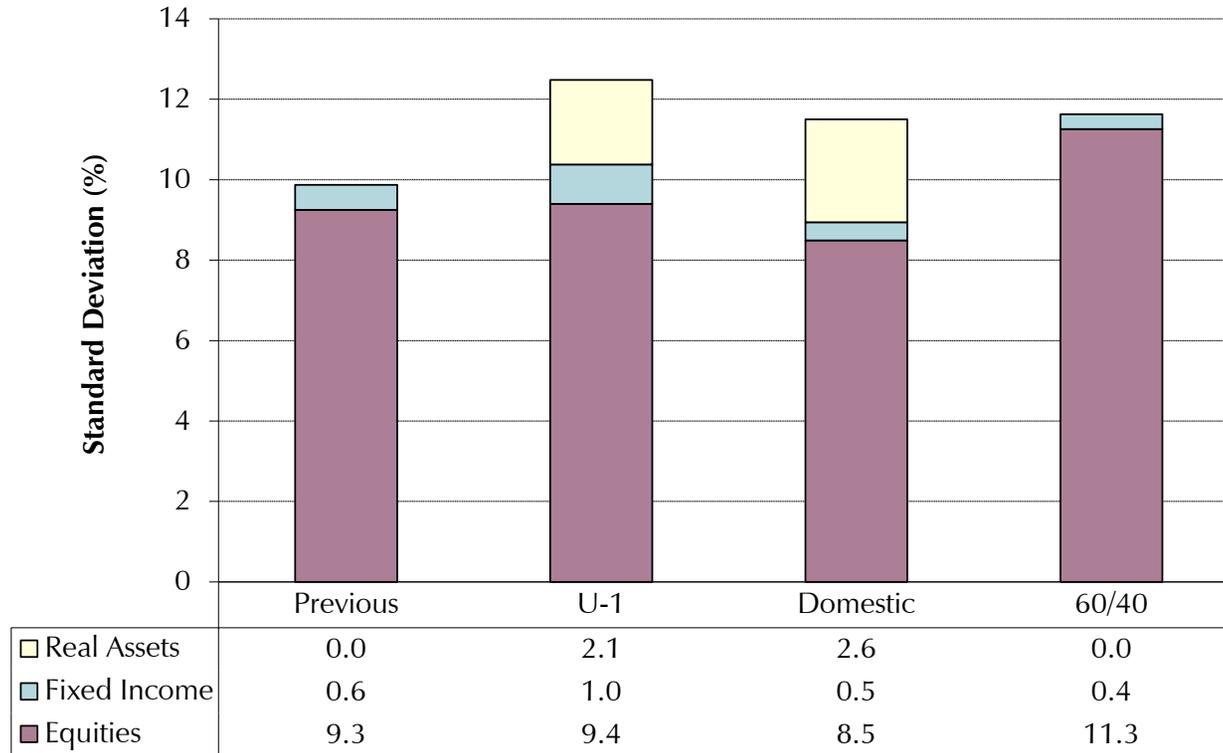
Risk Budgeting Analysis¹
Capital Allocation vs. Risk Allocation



- Assets with low relative volatility, such as fixed income, contribute less to risk than their asset weights imply.

¹ Risk allocation is calculated by multiplying the weight of the asset class by its standard deviation and its correlation with the total portfolio and then dividing this by the standard deviation of the total portfolio.

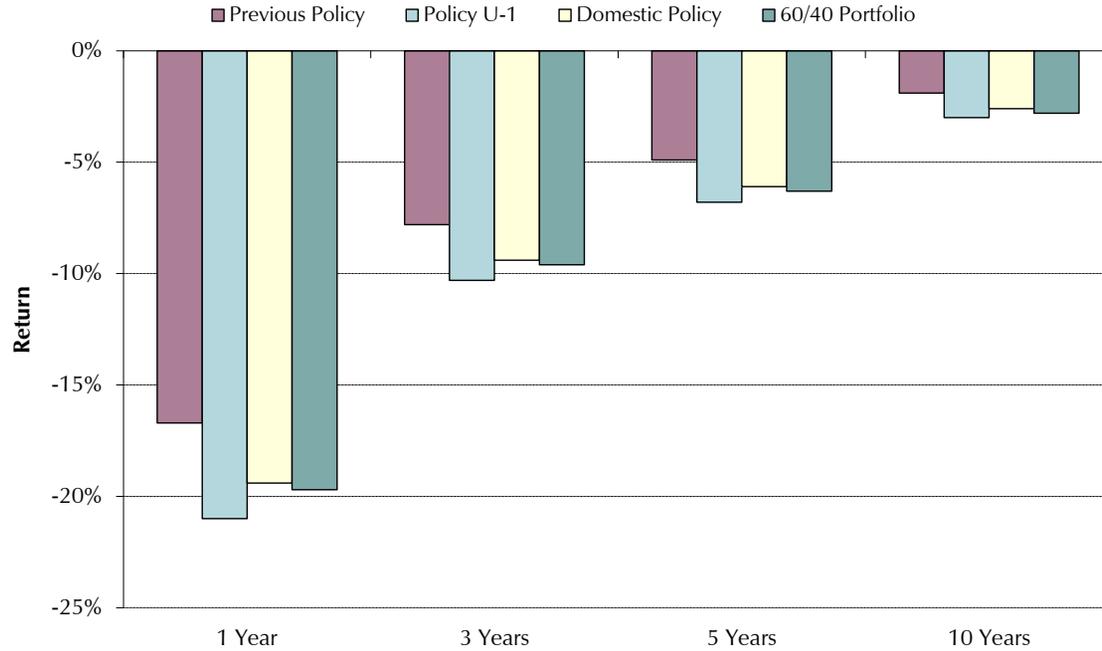
Risk Budgeting Analysis¹
Absolute Contribution to Risk



- In each policy option, equity risk dominates the risk profile of the portfolio, though the alternative policies reduce equity risk somewhat as compared to the 60/40 portfolio.

¹ Contribution to risk is calculated by multiplying the weight of the asset class by its standard deviation and its correlation with the total portfolio.

“Worst Case” Return Projections¹

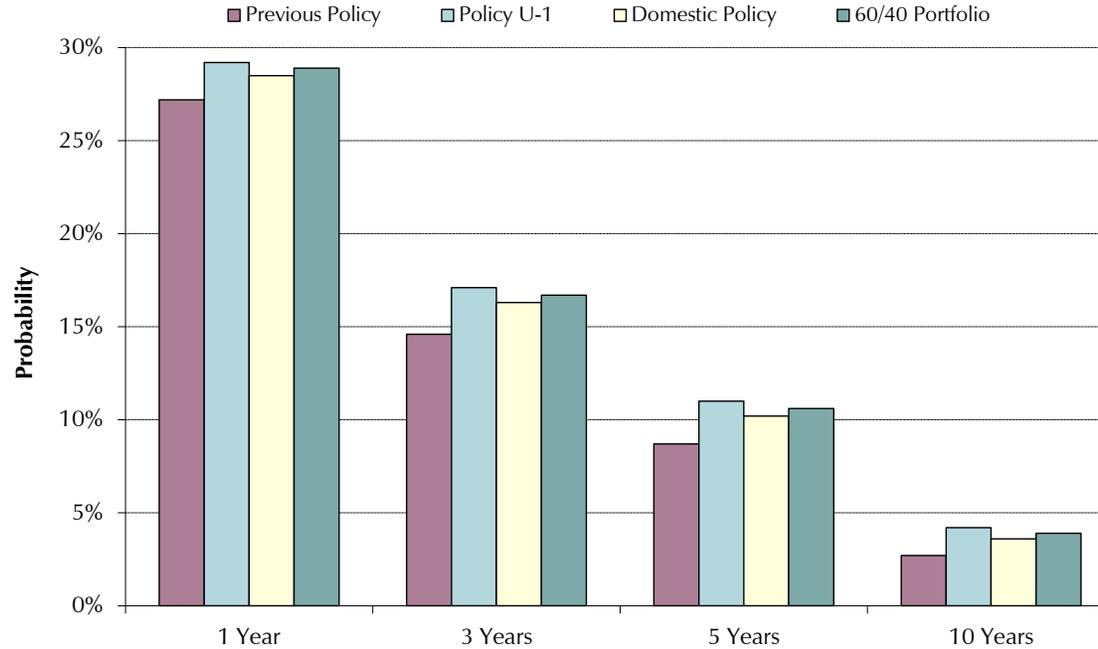


	Previous Policy (%)	Policy U-1 (%)	Domestic Policy (%)	60/40 Portfolio (%)
One Year	-16.7	-21.0	-19.4	-19.7
Three Years	-7.8	-10.3	-9.4	-9.6
Five Years	-4.9	-6.8	-6.1	-6.3
Ten Years	-1.9	-3.0	-2.6	-2.8

¹ “Worst Case” Return Projections encompass >99% of possible outcomes.

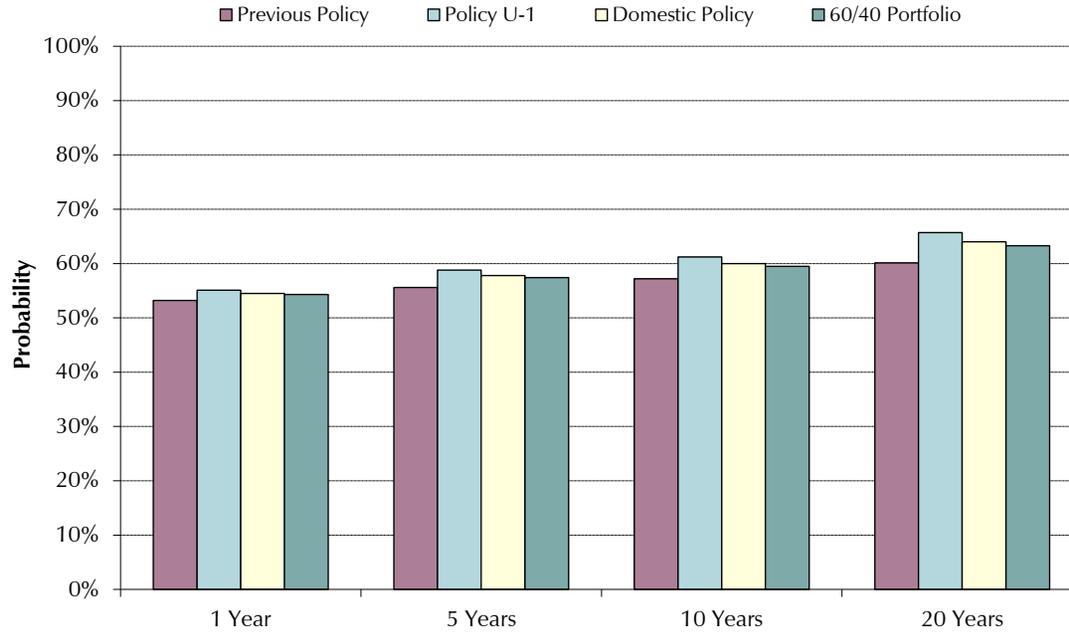


Probability of Experiencing Negative Returns



	Previous Policy (%)	Policy U-1 (%)	Domestic Policy (%)	60/40 Portfolio (%)
One Year	27.2	29.2	28.5	28.9
Three Years	14.6	17.1	16.3	16.7
Five Years	8.7	11.0	10.2	10.6
Ten Years	2.7	4.2	3.6	3.9

Probability of Achieving a 5% Annualized Return¹



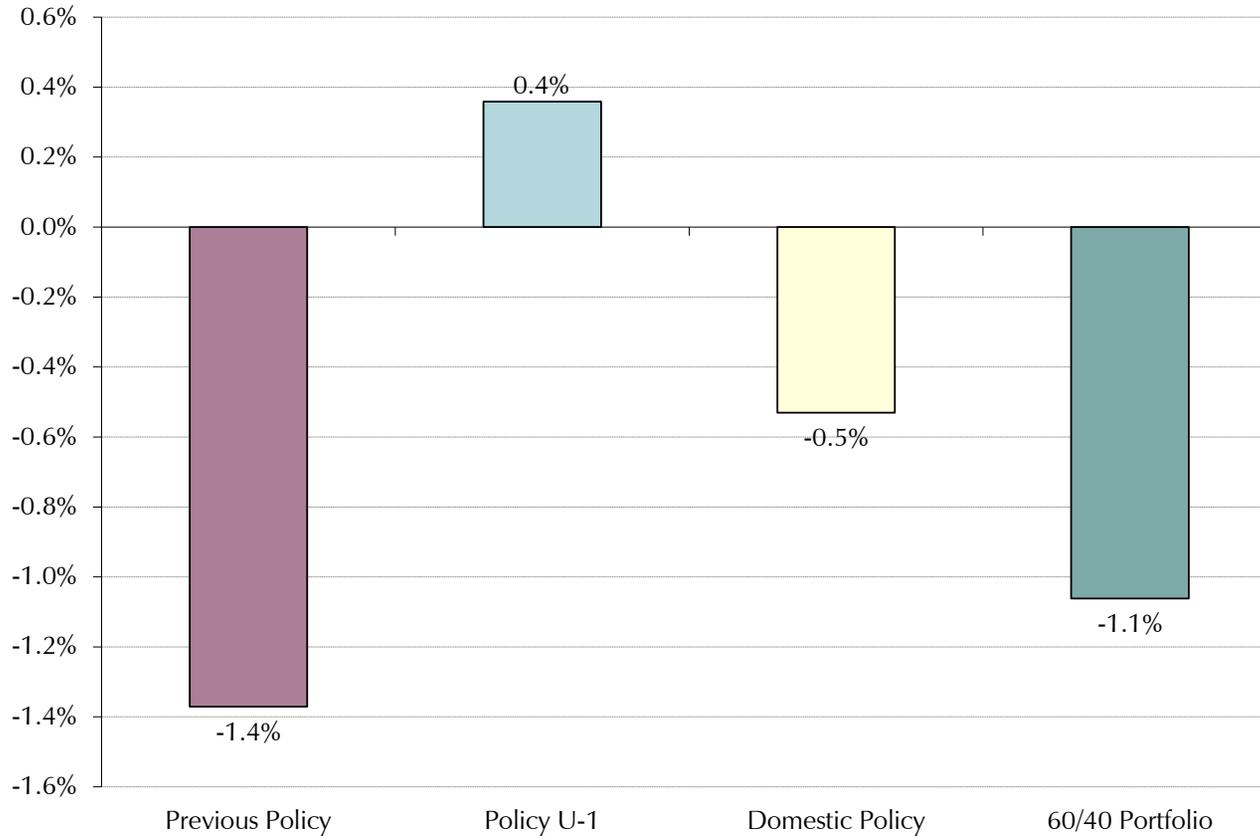
	Previous Policy (%)	Policy U-1 (%)	Domestic Policy (%)	60/40 Portfolio (%)
One Year	53.2	55.1	54.5	54.3
Five Years	55.6	58.8	57.8	57.4
Ten Years	57.2	61.2	60.0	59.5
Twenty Years	60.1	65.7	64.0	63.3

- Policy U-1 has the highest likelihood of producing a 5% annualized return over all time periods, followed by the Domestic Policy.

¹ Represents the probability of achieving a 5% return over the specified time horizon.

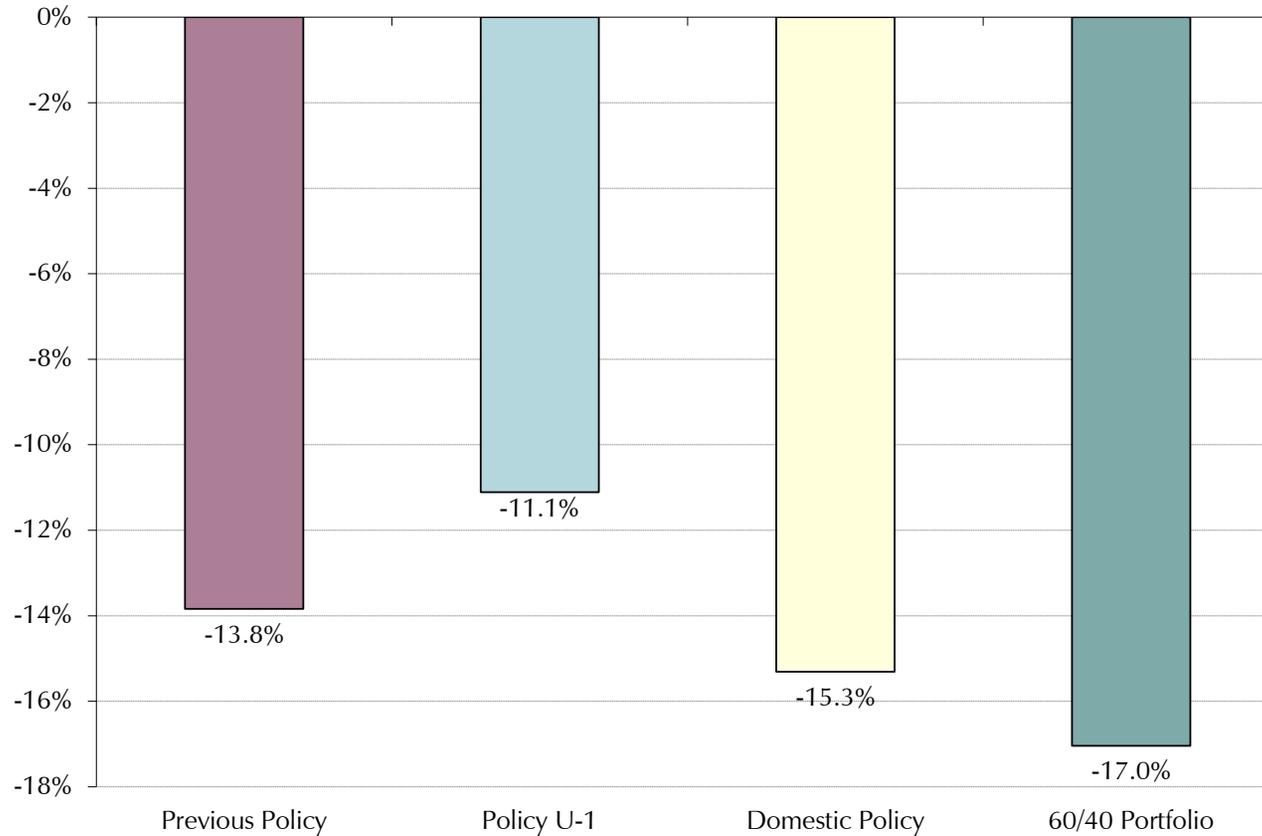


**Historical Stress Test: Interest Rate Spike (1994)
(Cumulative Return)**



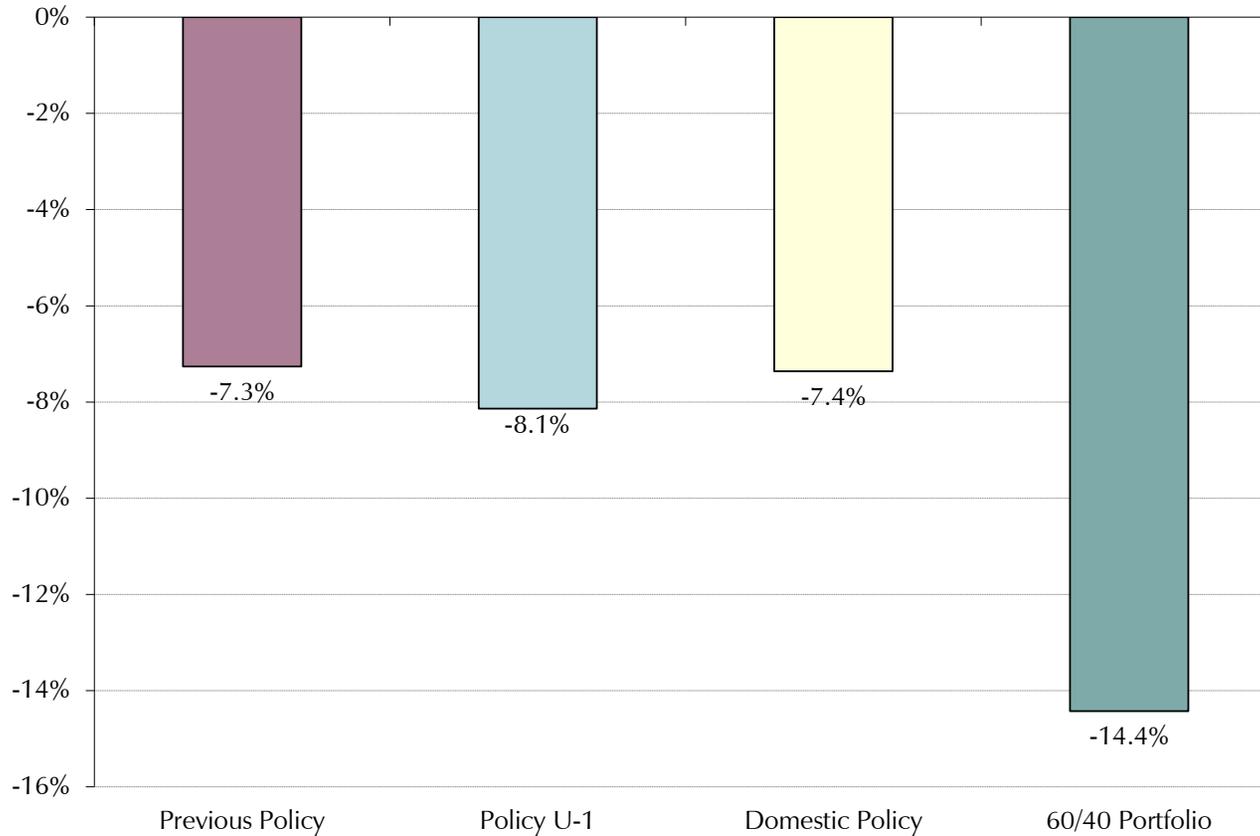
- In a period of rising interest rates (e.g., 1994), Policy U-1 would produce the highest return, as it has the lowest allocation to investment grade bonds.

**Historical Stress Test: Crash of 1987 (September thru November 1987)
(Cumulative Return)**



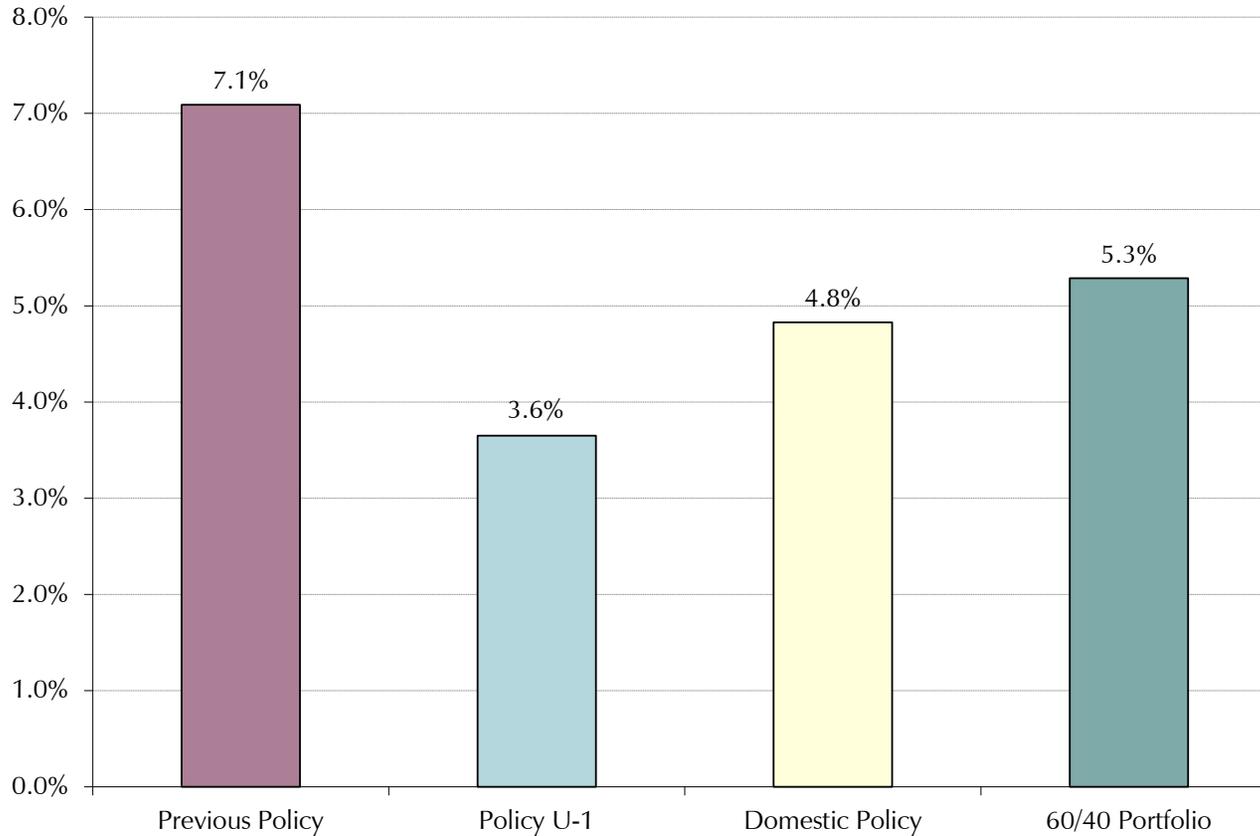
- In a *down market* environment that differs from 2008 (e.g., the Crash of '87), Policy U-1 would produce higher returns relative to the previous policy or the 60/40 portfolio.

Historical Stress Test: Bursting of the dot.com Bubble (2Q00 thru 3Q02)
(Cumulative Return)



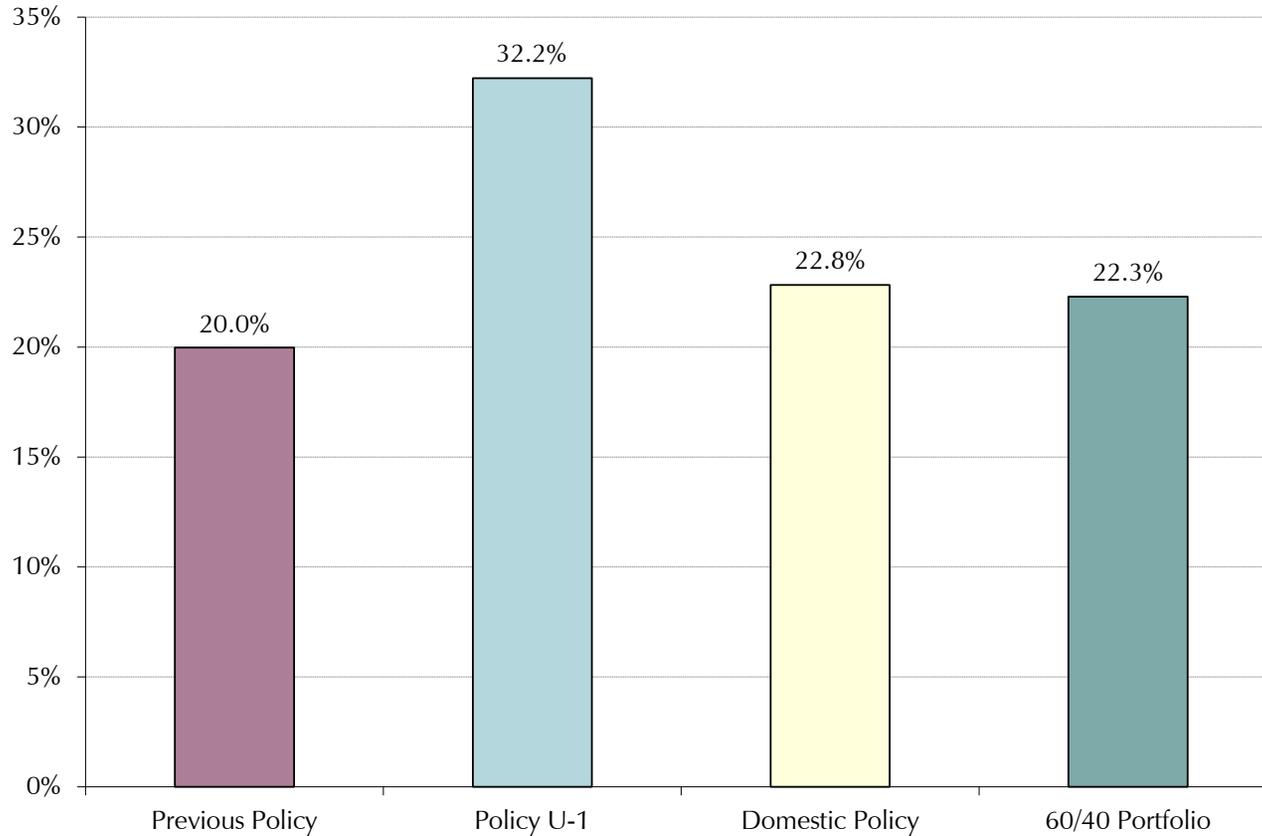
- In another *down market* environment that differs from 2008 (e.g., the bursting of the dot.com bubble), the alternative policies produce higher returns relative to the current 60/40 portfolio.

**Historical Stress Test: Strong US Dollar (1Q81 through 3Q82)
(Cumulative Return)**



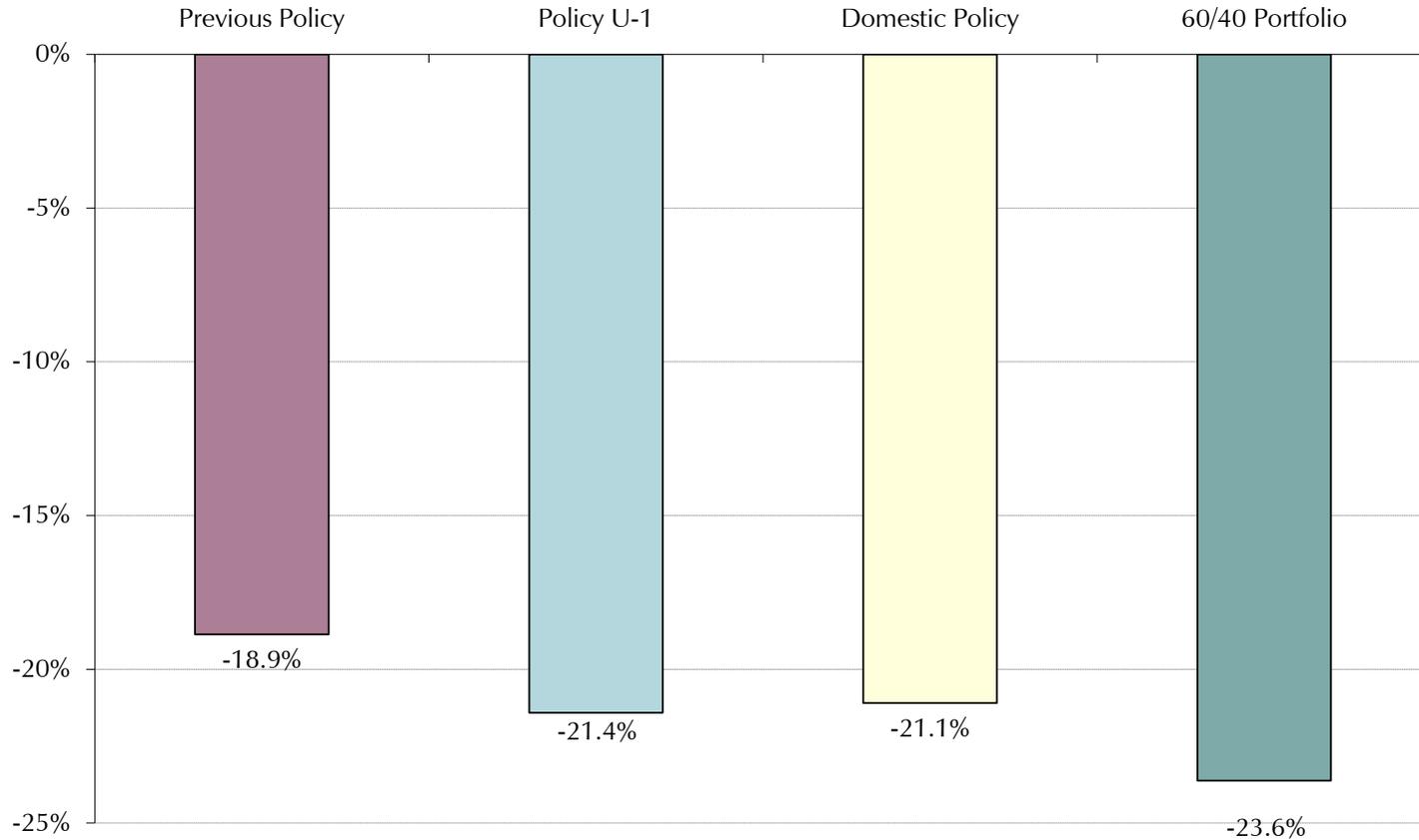
- In a period of an appreciating U.S. dollar (e.g., the early 1980's), the alternative policies generally produce lower returns relative to the previous allocation due to their lower allocations to US Equity.

**Historical Stress Test: Weak US Dollar (January 1986 thru August 1987)
(Cumulative Return)**



- In a period of a declining US dollar (e.g., the middle 1980's), Policy U-1 would produce higher returns relative to the current 60/40 allocation due to its allocation to foreign assets.

**Historical Stress Test: Stagflation (1Q73 thru 3Q74)
(Cumulative Return)**



- In an extended environment of high inflation but low growth (e.g., the middle 1970's), the alternative policies protect better than the current 60/40 allocation due to their allocations to real assets.

Asset Class Definitions

Asset Class Definitions

Domestic Equity

- Investments in publicly traded U.S. companies. There are over 6,000 investable U.S. stocks.
- Historically, have provided the main engine of growth for investors.
- Includes huge multinational companies and very small operations. Some investors consider large cap and small cap stocks to be different asset classes, due to their varying performance cycles.

Investment Grade Bonds

- Reduce portfolio volatility, provide stability in crisis environments, provide diversification benefits, and serve as a source of liquidity.
- An investment grade bond portfolio can be structured to target a certain sector, duration, and quality rating.
- The intermediate-term duration associated with a broad bond market index is likely to provide an investor with the best risk/reward tradeoff.

Treasury Inflation-Protected Securities (TIPS)

- Inflation-linked bonds offer investors a guaranteed return over inflation, if held to maturity.
- Investors receive an explicit annual coupon plus a variable adjustment based on the rate of inflation, providing inflation protection.
- TIPS should produce returns very close to nominal Treasuries.
- Since their inception in 1997, TIPS have exhibited a level of volatility similar to that of nominal Treasuries.
- TIPS should be uncorrelated with public equities and only modestly correlated with nominal bonds.

Natural Resources

- Natural resources are essentially products of the Earth (e.g., oil, coal, wheat, timber, water, wind, etc.). Natural resources investments are holdings in companies which are involved with the following activities:
 - Extracted resources: oil, natural gas, coal, industrial and precious metals
 - Harvested resources: agricultural production, ownership of farm- or timberland
 - Renewable energy: solar, biofuels, wind, hydro, and geothermal
- Historical data suggest (1) that public market natural resources strategies should perform best during periods of high inflation, and (2) that natural resources should produce returns in excess of those of broader public equities.

Commodities

- Commodities are generally physical goods or raw materials.
- Commodities may provide three benefits: increased portfolio diversification, a modest hedge against consumer price inflation, and a hedge against unique economic risks-including currency devaluation and armed conflict.
- Empirical work suggests that trend-following and momentum strategies can add value in commodities.

Risk/Return Analysis Assumptions

Scenario Return Inputs

Asset Class	Benchmark Used ¹
Investment Grade Bonds	Barclays Aggregate
TIPS	Barclays U.S. TIPS
EM Bonds	JPM GBI-EM Global Diversified
Bank Loans	CSFB Leveraged Loan
High Yield Bonds	Barclays High Yield
Core Real Estate	NCREIF Property
Value-Added RE	NCREIF Townsend Value Added
Opportunistic RE	NCREIF Townsend Opportunistic
REITs	NAREIT Equity
Infrastructure (private)	S&P Global Infrastructure
Natural Resources (private)	S&P Global Natural Resources
Commodities	Summer Haven Commodity
US Equity	Russell 3000
Public Foreign Equity (Developed)	MSCI EAFE
Public Foreign Equity (Emerging)	MSCI Emerging Markets
Long-short Equity	HFRI Equity Hedge
Private Equity	Venture Economics Private Equity Composite

¹ For U.S. Equity, we used the S&P 500 prior to 1979; for Investment Grade Bonds, we used Ibbotson's US Intermediate Government series prior to 1976; for EM Bonds, we used the JP Morgan EMBI+ prior to 2003; for Infrastructure, we used the S&P Utilities prior to 2002; for Natural Resources, we used a 75/25 mix of S&P Energy and S&P Diversified Metals and Mining prior to 2003.

Notes and Disclaimers

- ¹ The returns shown in the Policy Options and Risk Analysis sections rely on estimates of expected return, standard deviation, and correlation developed by Meketa Investment Group. To the extent that actual return patterns to the asset classes differ from our expectations, the results in the table will be incorrect. However, our inputs represent our best unbiased estimates of these simple parameters.
- ² The returns shown in the Policy Options and Risk Analysis sections use a lognormal distribution, which may or may not be an accurate representation of each asset classes' future return distribution. To the extent that it is not accurate in whole or in part, the probabilities listed in the table will be incorrect. As an example, if some asset classes' actual distributions are even more right-skewed than the lognormal distribution (i.e., more frequent low returns and less frequent high returns), then the probability of the portfolio hitting a given annual return will be lower than that stated in the table.
- ³ The standard deviation bars in the chart in the Risk Analysis section do not indicate the likelihood of a 1, 2, or 3 standard deviation event—they simply indicate the return we expect if such an event occurs. Since the likelihood of such an event is the same across allocations regardless of the underlying distribution, a relative comparison across policy choices remains valid.

Overview of Annual Asset Study Methodology

- In order to construct an optimal portfolio from a risk-return standpoint, conventional financial wisdom dictates that one develops return, volatility, and correlation expectations over the relevant investing horizon.
- Given the uncertainty surrounding financial and economic forecasts, expectations development is challenging, and any of several methodological approaches may meaningfully contribute to this complex task.
- Meketa Investment Group's process relies on both quantitative and qualitative methodologies.
- First, we employ a large set of quantitative models to arrive at a set of baseline expected ten-year annualized returns for major asset classes.
- These models attempt to forecast a gross "beta" return for each asset class.
- Our models may be econometrically derived (that is, based on a historical return relationship with current observable factors), factor-based (that is, based on a historical return relationship with predicted factors), or fundamentally based (that is, based on some theoretically defined return relationship with current observable factors).
- Some of these models are more predictive than others, for this reason, we next overlay a qualitative analysis, which takes the form of a data-driven deliberation among the asset allocation team (comprised of senior members of the firm).
- As a result of this process, we form our ten-year annualized return expectations, which serve as the primary foundation of our longer-term, twenty year expectations.
- We form our twenty-year annualized return expectations by systematically considering historical returns on an asset class by asset class level.

Overview of Annual Asset Study Methodology (continued)

- Depending on our confidence in the historical average, we will modify the weightings of the ten-year forecast and historical average returns.
- Finally, we develop our twenty-year volatility and correlation expectations, relying primarily on various historical averages -- qualitative adjustments, when applied, usually serve to increase the correlations and volatility over and above the historical estimates (e.g., using the higher correlations usually observed during a volatile market).
- These volatility and correlation expectations are then combined with our twenty-year return expectations to assist us in subsequent asset allocation work, including mean-variance optimization and scenario analyses.
- We review and make modifications to the inputs, based on changing market dynamics, on a quarterly basis.
- Throughout the process, we remind ourselves of our overarching goals:
 - Consistency of results with historical experience and fundamentals
 - Consistency of results with macroeconomic reality
 - Consistency of results across asset classes
 - Recognition of forecasting error and its implications

Meketa Investment Group 2012 Annual Asset Study

Inputs Summary: 20-Year Assumptions

Asset Class	Annualized Return (%)	Annualized Standard Deviation (%)
Fixed Income		
Cash Equivalents	2.5	1.0
Short-Term Investment Grade Bonds	2.8	2.0
Investment Grade Bonds	3.2	4.5
Long-term Government Bonds	3.3	11.0
TIPS	3.2	7.5
High Yield Bonds	6.8	12.0
Bank Loans	5.9	9.5
Foreign Bonds (unhedged)	3.5	9.0
Emerging Market Bonds (local)	6.9	12.0
Equities		
Public US Equity	9.3	19.0
Public Developed Market Equity	10.1	21.0
Public Emerging Market Equity	11.5	25.0
Private Equity	10.0	24.0
Hedge Funds	5.9	10.0
Real Assets		
Real Estate	8.0	17.5
REITs	7.7	23.0
Core Private Real Estate	6.9	13.0
Value Added Real Estate	8.4	20.0
Opportunistic Real Estate	10.2	25.0
Natural Resources (Private)	9.2	21.0
Commodities	6.1	19.0
Infrastructure (Private)	8.6	18.0

Meketa Investment Group 2012 Annual Asset Study
Inputs Summary: Correlations for Major Asset Class

	TIPS	Investment Grade Bonds	High Yield Bonds	Natural Resources (public)	Commodities	Public Domestic Equity	Public Foreign Equity (developed)	Public Foreign Equity (emerging)	Private Equity	Infrastructure (public)	Hedge Funds	Real Estate
TIPS	1.00											
Investment Grade Bonds	0.80	1.00										
High Yield Bonds	0.30	0.20	1.00									
Natural Resources (public)	0.15	0.00	0.55	1.00								
Commodities	0.35	0.05	0.40	0.75	1.00							
Public Domestic Equity	0.00	0.05	0.70	0.75	0.35	1.00						
Public Foreign Equity (developed)	0.15	0.05	0.70	0.85	0.55	0.90	1.00					
Public Foreign Equity (emerging)	0.15	0.05	0.70	0.85	0.60	0.80	0.90	1.00				
Private Equity	0.05	0.05	0.65	0.60	0.30	0.85	0.80	0.75	1.00			
Infrastructure (public)	0.30	0.20	0.70	0.80	0.55	0.80	0.90	0.80	0.55	1.00		
Hedge Funds	0.20	0.05	0.70	0.80	0.65	0.80	0.85	0.85	0.65	0.80	1.00	
Real Estate	0.10	0.20	0.50	0.50	0.15	0.50	0.45	0.40	0.45	0.55	0.45	1.00

Stress Test Return Assumptions¹

	Rates rise 100 bp	Rates rise 200 bp	Rates rise 300 bp	BBB Spreads widen by 50 bp	BBB Spreads widen by 300 bp	USD Gains 10%	USD Gains 20%	Equities Decline 10%	Equities Decline 25%	Equities Decline 40%	Rates fall 100 bp	Rates fall 200 bp
Public Domestic Equity	11.3%	15.8%	6.9%	6.0%	-42.0%	3.5%	7.0%	-10.0%	-25.0%	-40.0%	10.5%	8.4%
Public Foreign Equity (Developed)	20.3	23.6	4.8	5.5	-33.0	-7.0	-14.0	-10.5	-26.3	-42.0	0.5	10.0
Public Foreign Equity (Emerging)	20.3	23.6	4.8	5.0	-39.0	-7.0	-14.0	-11.0	-27.5	-44.0	4.4	9.0
Long-Short Hedge Funds	11.5	12.8	4.2	6.5	-21.0	2.1	4.2	-6.0	-15.0	-24.0	13.6	6.8
Private Equity	11.3	15.8	6.9	6.0	-42.0	3.5	7.0	-8.0	-20.0	-32.0	10.5	8.4
Core Real Estate	11.4	12.2	17.4	9.5	-12.0	4.0	8.0	-5.0	-12.5	-20.0	5.5	5.2
REITs	19.3	12.8	16.8	0.5	-36.0	1.0	2.0	-9.5	-23.8	-38.0	14.9	7.4
Non-Core Real Estate	8.3	13.0	17.4	11.5	-24.0	4.0	8.0	-8.0	-20.0	-32.0	6.9	7.2
Infrastructure (private)	14.0	6.6	5.7	3.5	-24.0	3.0	6.0	-5.0	-12.5	-20.0	7.2	7.1
Natural Resources (private)	11.4	18.4	14.4	2.0	-16.5	-3.1	-6.2	-5.0	-12.5	-20.0	5.0	0.8
Natural Resources (public)	22.8	36.8	28.8	4.0	-33.0	-6.2	-12.3	-9.5	-23.8	-38.0	10.0	1.6
Commodities	12.6	9.6	-0.6	-0.5	-21.0	-15.0	-30.0	-7.0	-17.5	-28.0	1.8	-4.8
Long-Term Government Bonds	-12.7	-29.6	-46.5	12.0	15.0	10.0	20.0	5.0	12.5	20.0	21.1	38.0
TIPS	-2.3	-7.6	-12.9	8.5	12.0	8.0	16.0	1.0	2.5	4.0	8.3	13.6
Investment Grade Bonds	-2.3	-7.3	-12.3	-0.1	-3.6	8.0	16.0	2.0	5.0	8.0	7.7	12.7
Investment Grade Corporate Bonds	-2.9	-9.5	-16.1	-0.3	-14.9	8.0	16.0	-1.5	-3.8	-6.0	10.3	16.9
Foreign Developed Bonds	-4.1	-10.7	-17.3	0.4	-2.4	-6.3	-12.6	-2.0	-5.0	-8.0	9.0	15.5
Emerging Market Bonds (external)	0.0	-6.2	-12.4	-1.4	-25.7	5.0	10.0	-2.0	-5.0	-8.0	12.4	18.6
Emerging Market Bonds (local)	1.8	-2.8	-7.4	3.0	-10.5	-6.3	-12.6	-3.0	-7.5	-12.0	11.0	15.6
High Yield Bonds	2.5	-2.0	-6.4	-3.3	-33.5	4.5	9.0	-6.0	-15.0	-24.0	11.5	16.0
Bank Loans	12.0	12.0	15.0	2.5	-30.0	4.5	9.0	-6.0	-15.0	-24.0	4.3	-2.8
Hedge Funds	6.6	8.4	3.6	3.5	-18.0	5.0	10.0	-5.0	-12.5	-20.0	8.1	4.4
TAA	10.2	11.4	2.6	6.5	-22.2	3.2	6.4	-7.0	-17.5	-28.0	8.8	12.2
Risk Parity	7.3	5.0	-2.5	5.6	-12.0	1.6	3.3	-2.0	-5.0	-8.0	10.2	12.3

¹ Assumptions are based on performance for each asset class during historical periods that resembled these situations.

