



PORTFOLIO REBALANCING WHAT, WHEN, HOW?

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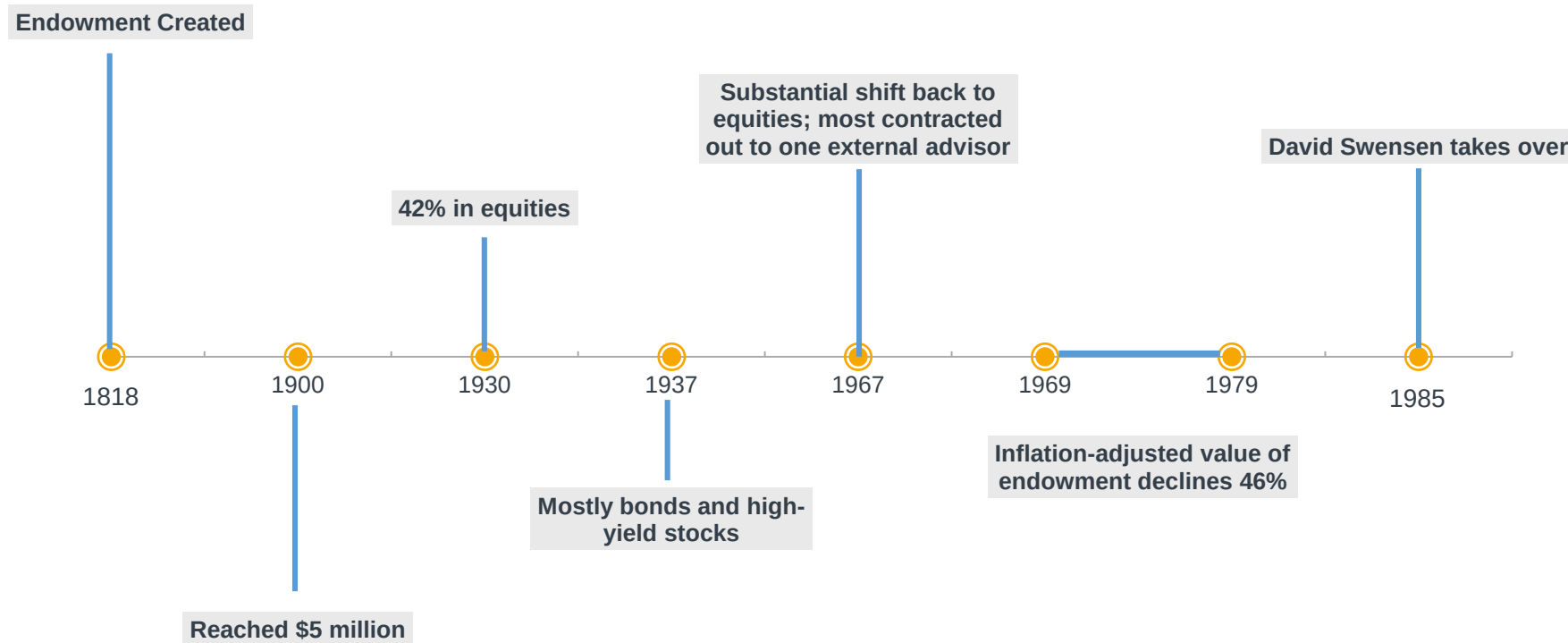
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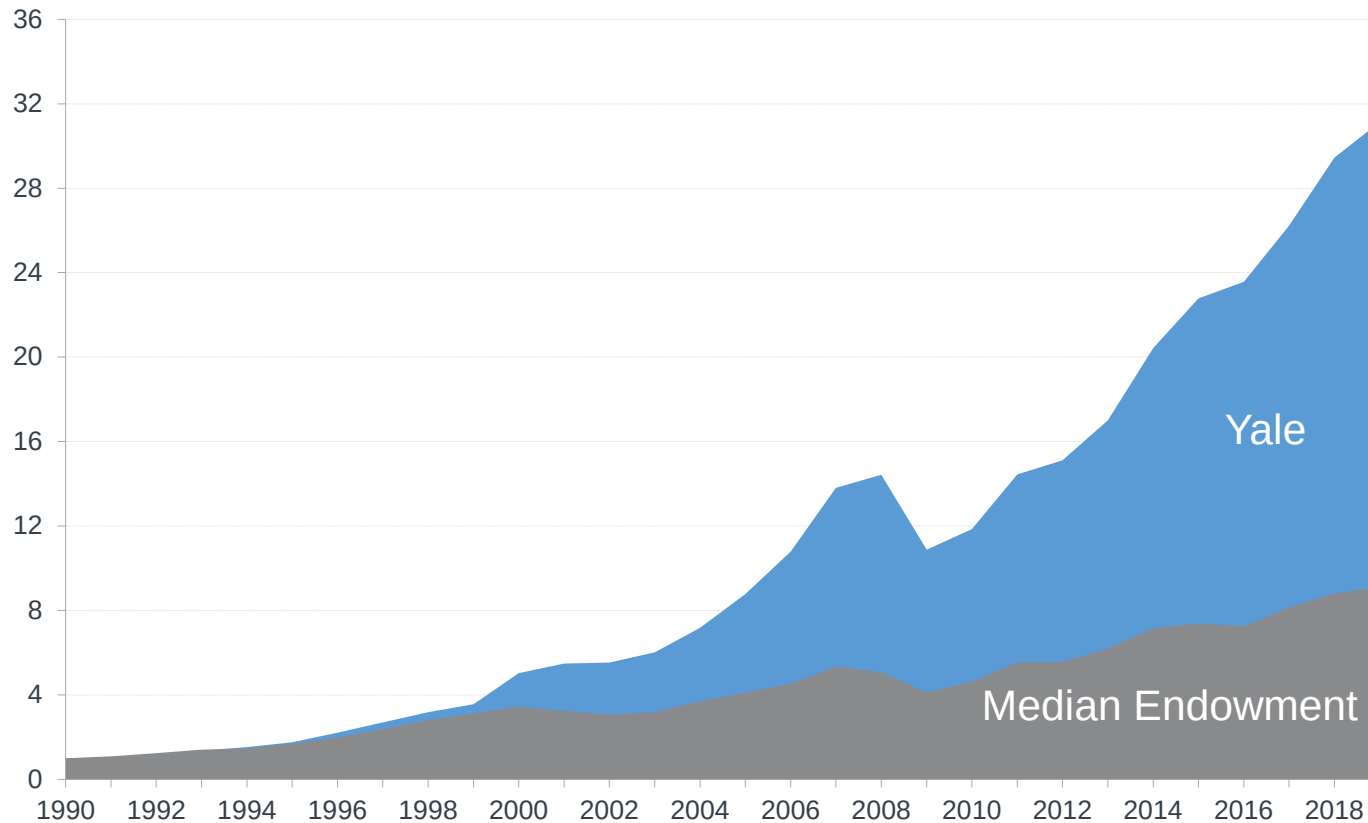
REBALANCING DECISIONS ARE EASY

- **You just need to factor in:**
 - Mission and goals
 - Liabilities and spending needs
 - Liquidity and other constraints
 - Risk tolerance
 - Time horizon
 - Forward looking returns and risks
 - The investment opportunity set
 - Transactions costs
 - Investment policy
 - Tail risk management
 - Performance and other reporting
 - Incentives
 - Governance

CASE STUDY: THE YALE ENDOWMENT

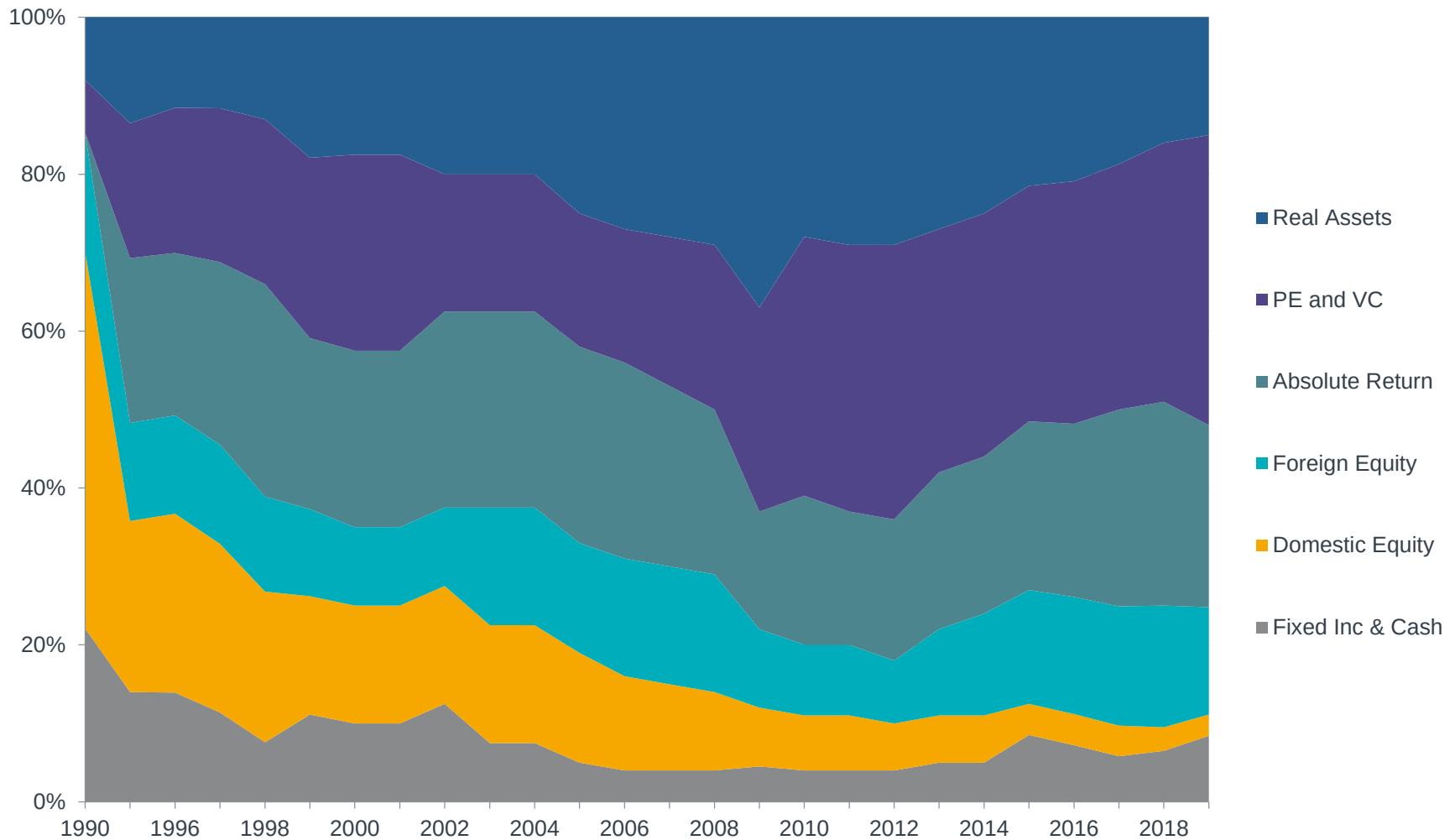


YALE ENDOWMENT PERFORMANCE (1990 TO 2019)



Source: Yale Investments Office Investment Updates

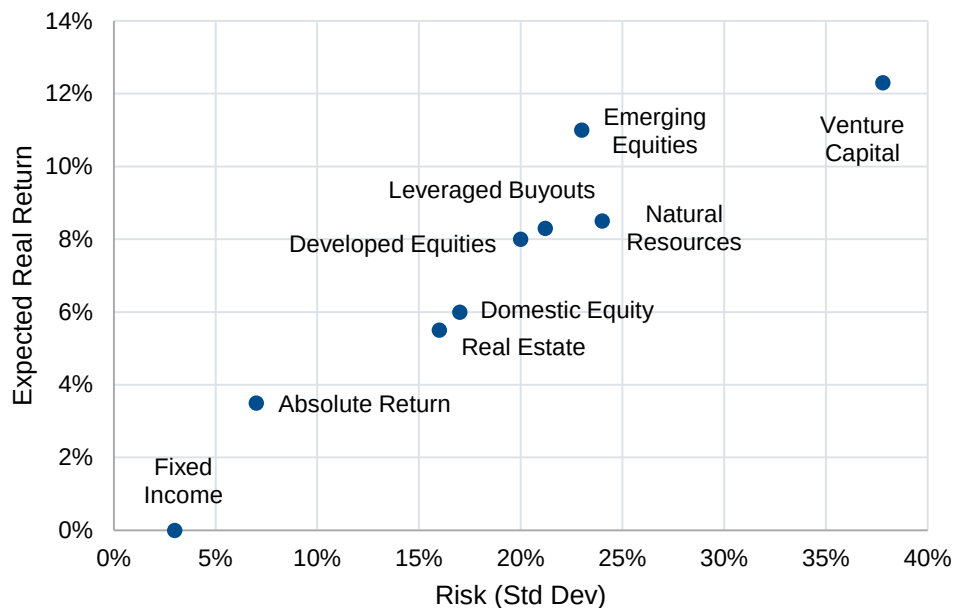
YALE'S HISTORICAL ASSET ALLOCATION (1990 TO 2019)



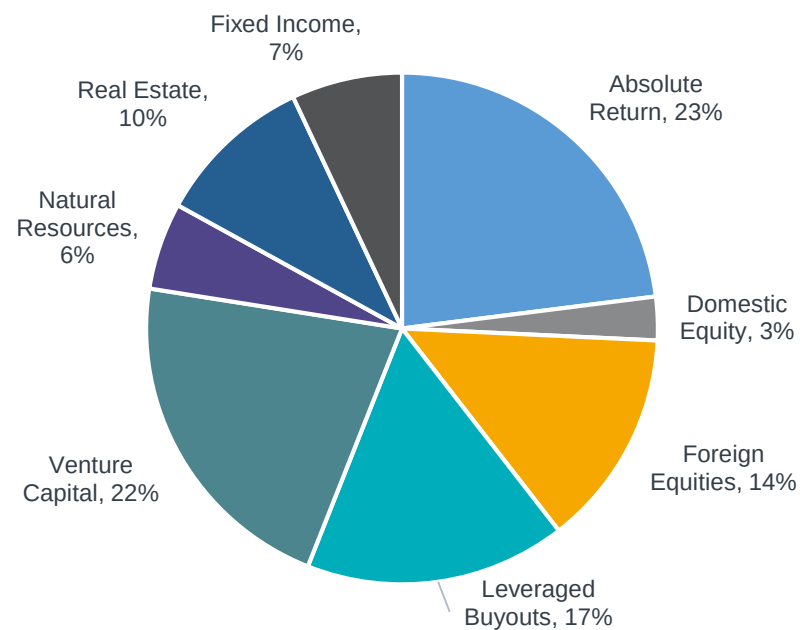
Source: Yale Investments Office Investment Updates

YALE ASSET CLASS ASSUMPTIONS AND ALLOCATIONS (2019)

Asset Class	Real Return	Risk	Sharpe Ratio
Absolute Return	3.5%	7.0%	0.50
Domestic Equity	6.0%	17.0%	0.35
Developed Equities	8.0%	20.0%	0.40
Emerging Equities	11.0%	23.0%	0.48
Leveraged Buyouts	8.3%	21.2%	0.39
Natural Resources	8.5%	24.0%	0.35
Real Estate	5.5%	16.0%	0.34
Venture Capital	12.3%	37.8%	0.33
Fixed Income	0.0%	3.0%	-



Asset Allocation



Source: Yale Investments Office Investment Updates

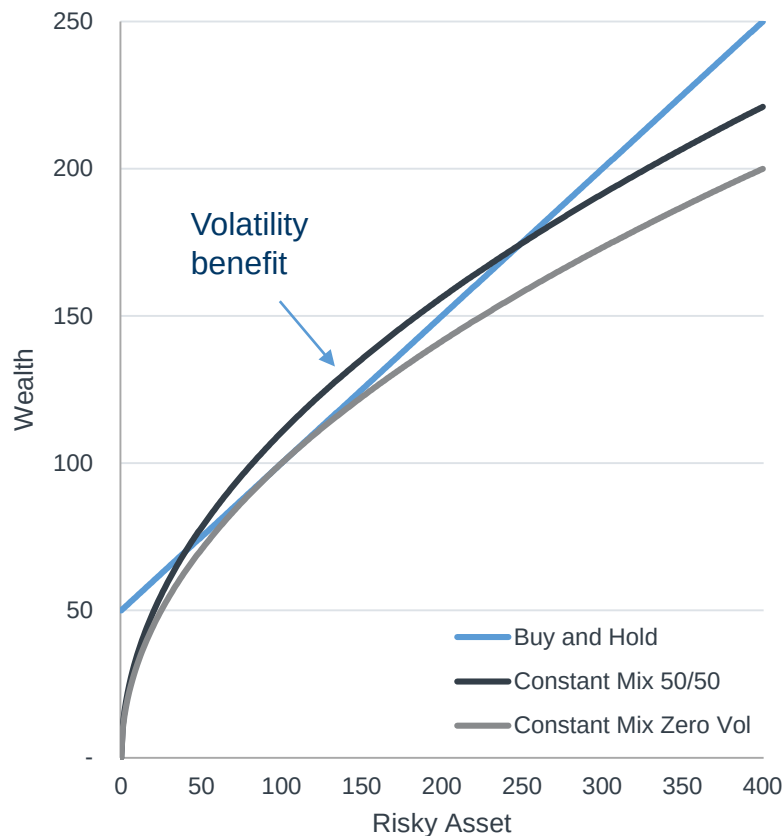
BASIC STRATEGIES

- **Buy and hold**
 - Do nothing
 - This is the only strategy we all can follow
- **Constant mix**
 - E.g. 60/40
 - Buy on downs, sell on ups
- **Portfolio insurance (including leverage)**
 - Manage to a minimum floor
 - Sell on downs, buy on ups
- **Risk-based asset allocation**
 - Exposures proportional to risk
 - Risk parity
 - Vol targeting

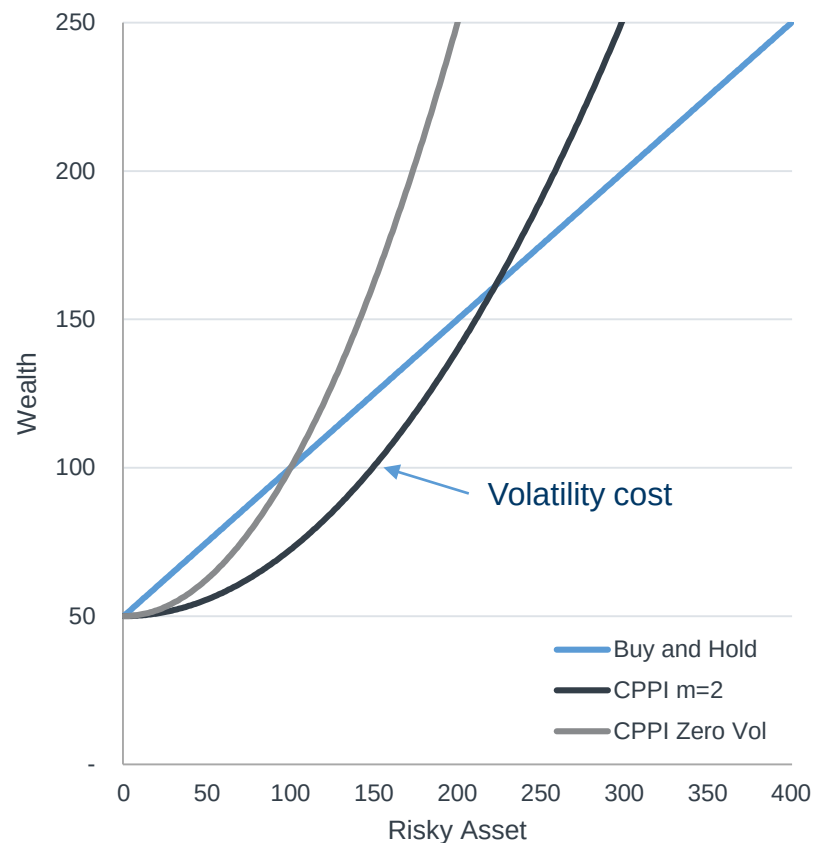
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CONCAVE VS CONVEX STRATEGIES

Concave Strategies: Buy on Downs, Sell on Ups



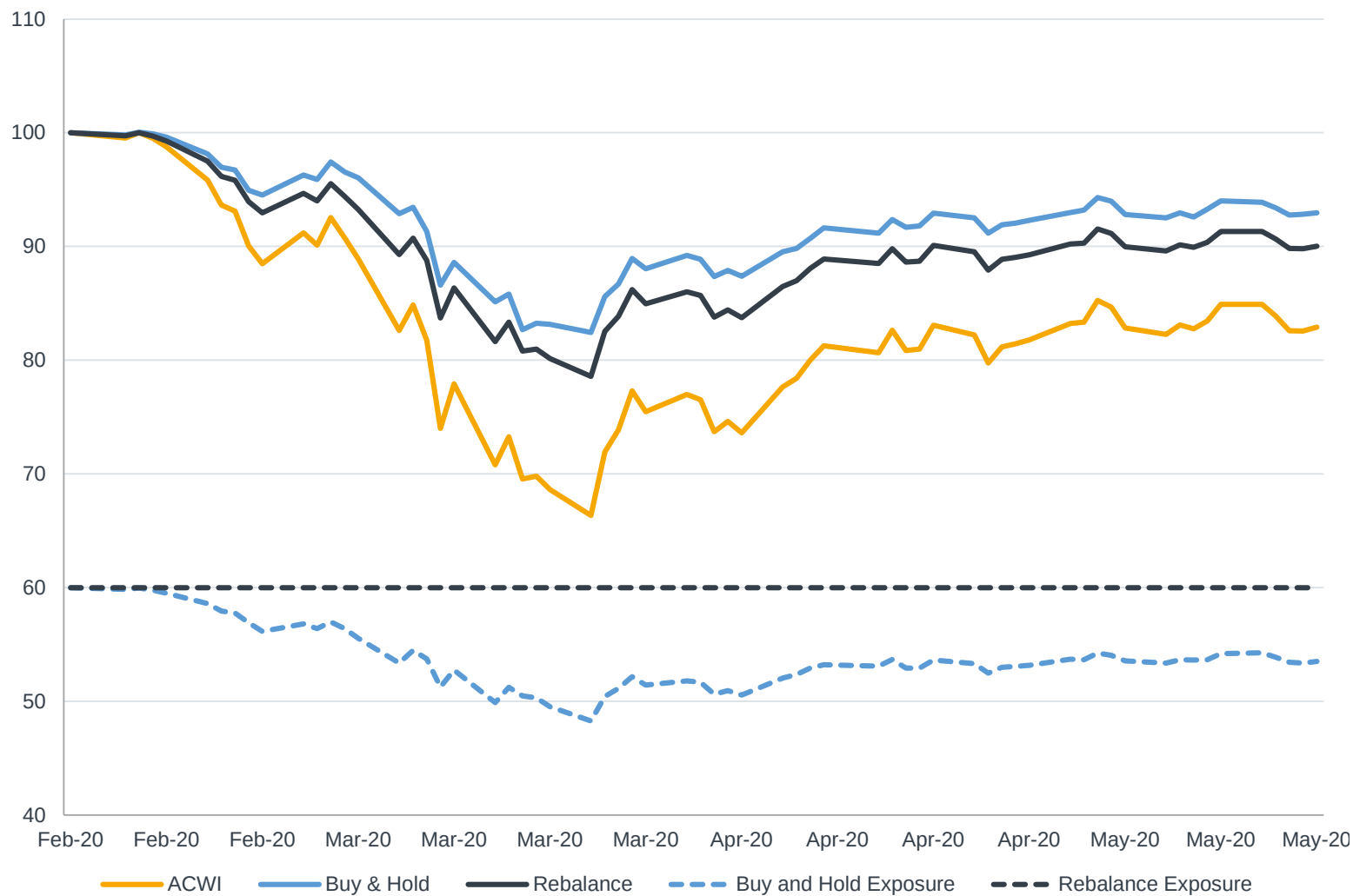
Convex Strategies: Sell on Downs, Buy on Ups



$$Wealth = W_T = F + (W_0 - F)e^{-.5m(m-1)\sigma^2 T}$$

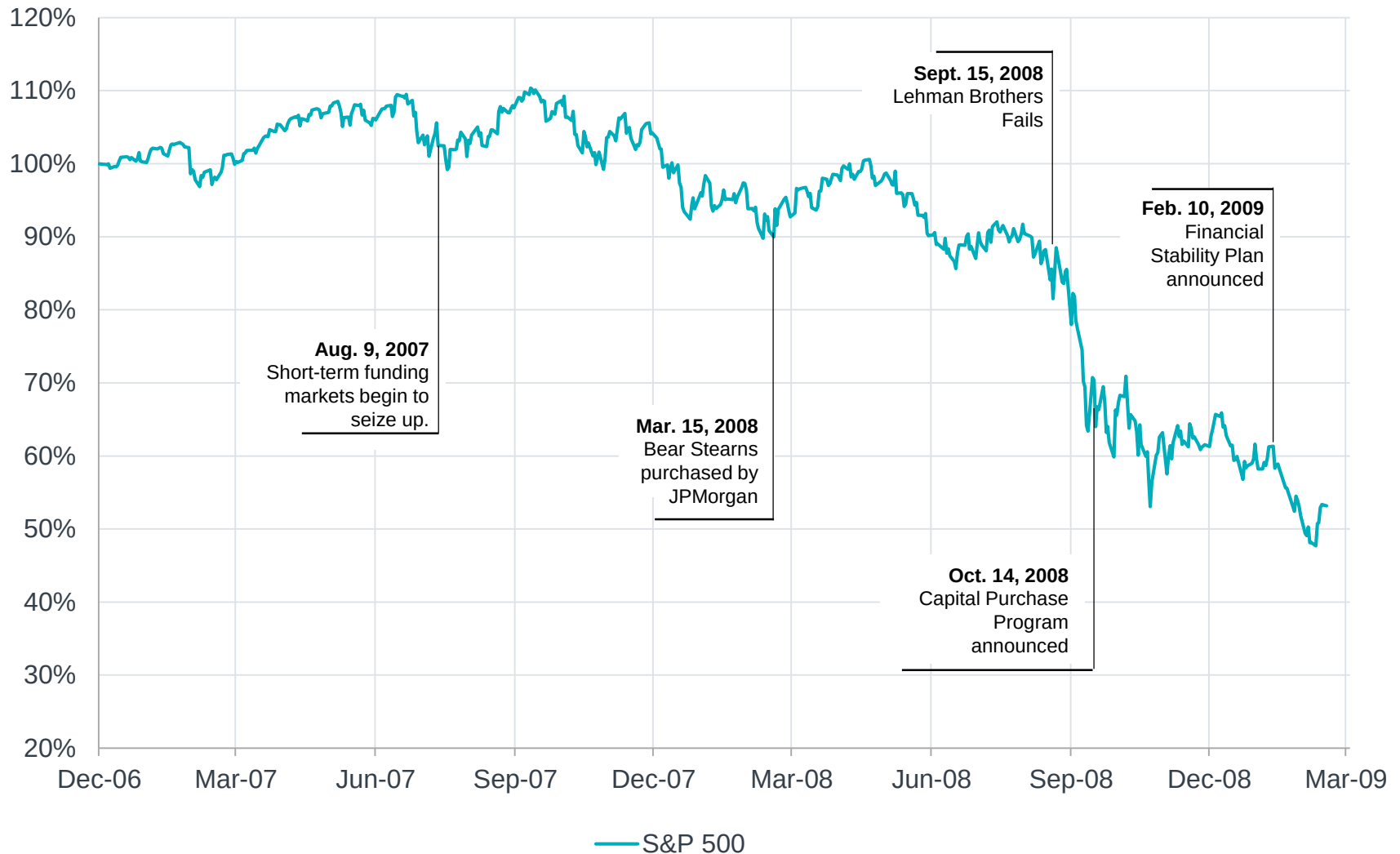
Source: André F Perold and William F Sharpe, *Dynamic Strategies for Asset Allocation*, Financial Analysts Journal, January/February 1988

BUY AND HOLD VS REBALANCING DURING COVID (SO FAR)



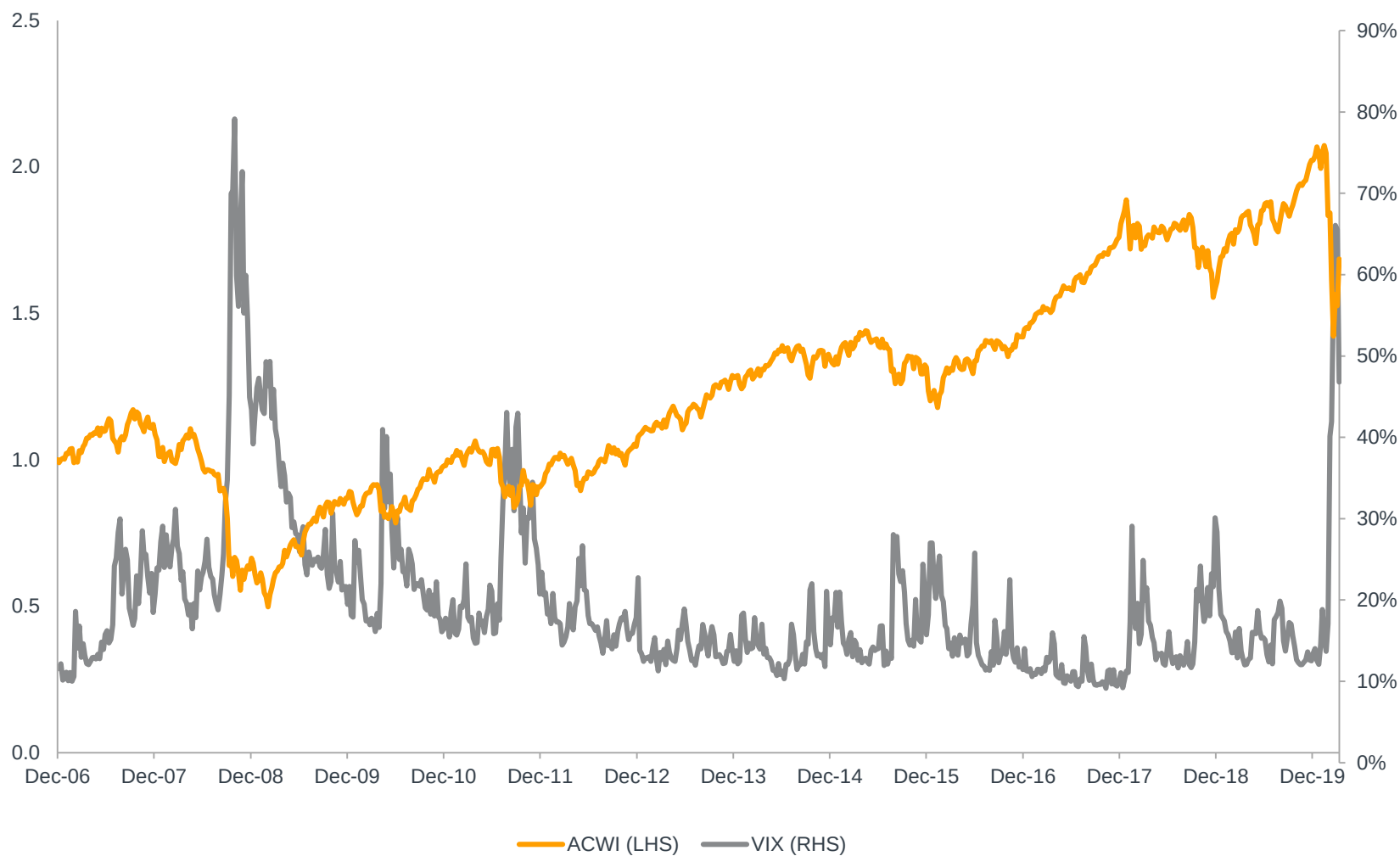
Source: Bloomberg and Internal Analysis. Provided for informational purposes only.

GFC: WHEN TO BUY OR SELL?



Source: Harvard Business School, *Project on Behavioral Finance and Financial Stability*

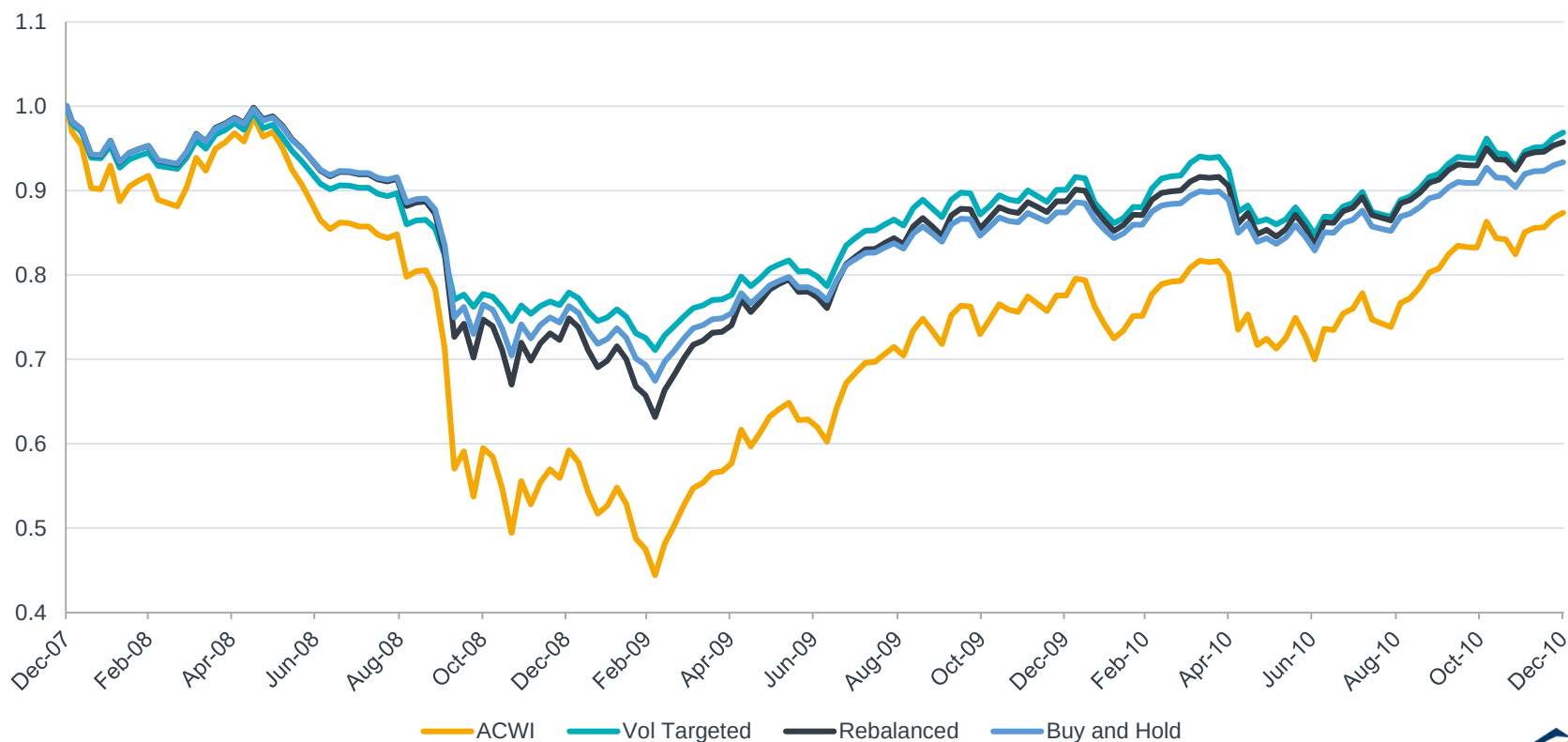
RISK-BASED ALLOCATION (VOL TARGETING)



Source: Bloomberg

DYNAMIC STRATEGIES DURING THE GFC

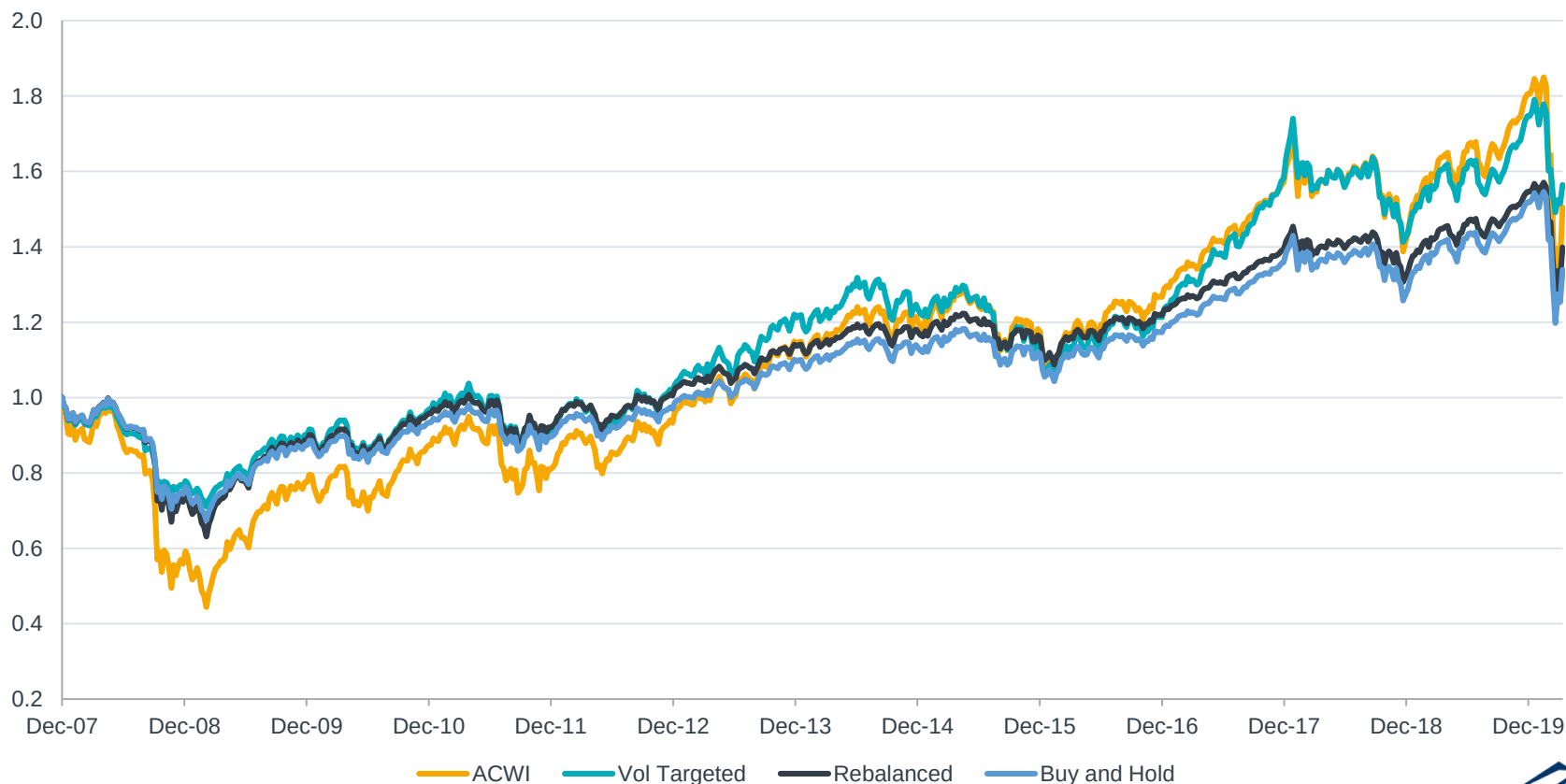
	ACWI	Rebalance	Buy & Hold	Vol Targeted
Return (compounded)	-4.4%	-1.4%	-2.2%	-1.0%
SD	27.3%	16.4%	13.4%	11.6%
Kurtosis	5.3	5.3	5.6	(1.2)
Drawdown	56%	-37%	-33%	-29%



Source: Bloomberg and Internal Analysis

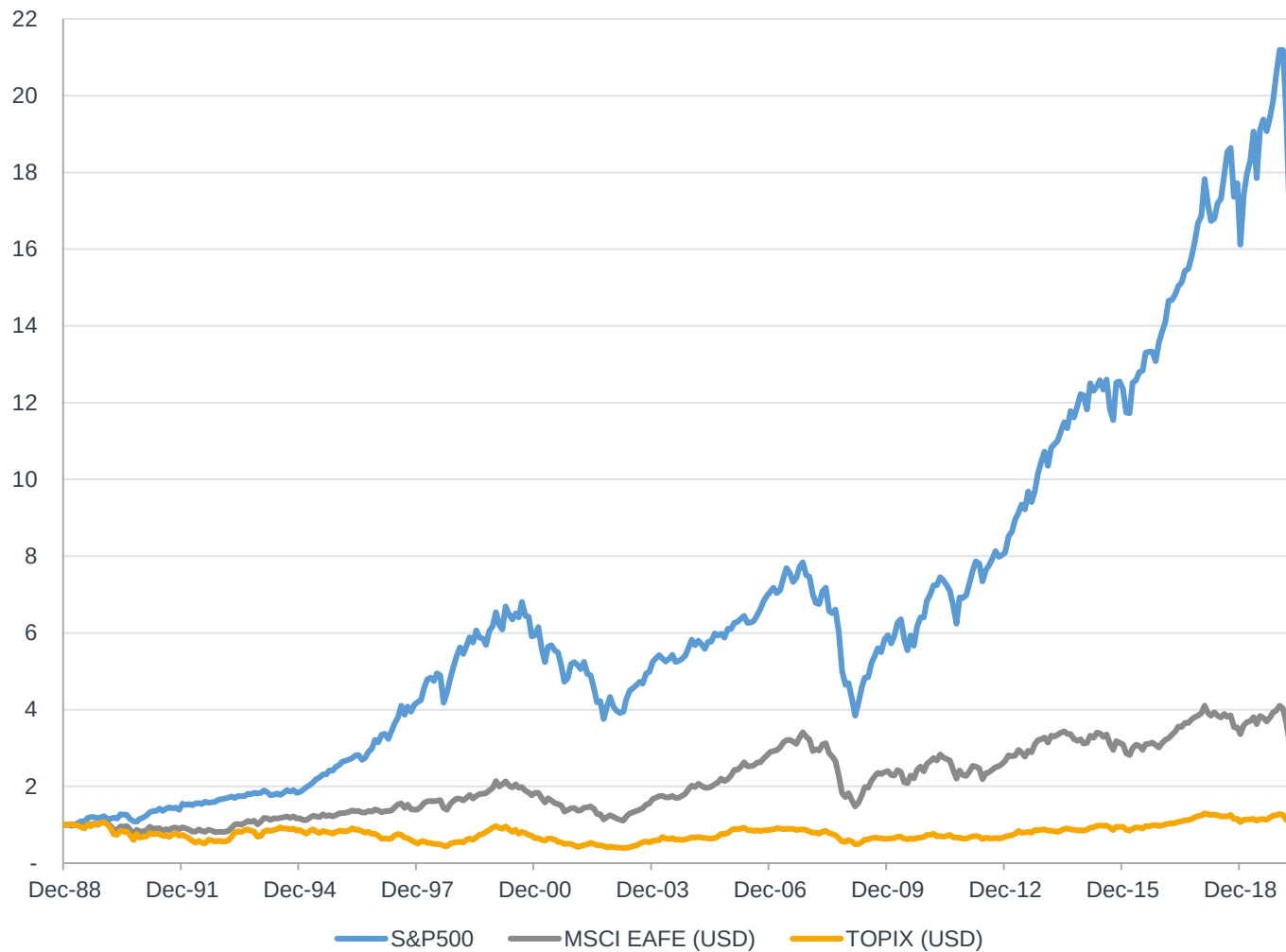
FROM GFC TO COVID

	ACWI	Rebalance	Buy & Hold	Vol Targeted
Return (compounded)	3.4%	2.8%	2.4%	3.7%
SD	19.1%	11.4%	10.8%	11.4%
Sharpe	0.23	0.23	0.21	0.31
Kurtosis	8.9	8.9	8.3	2.1



Source: Bloomberg and Internal Analysis. Provided for informational purposes only. This information does not constitute, and should not be construed as, an offer of advisory services, securities or other financial instruments, a solicitation of an offer to buy any security or other financial instrument, or a recommendation to buy, hold or sell a security or other financial instruments in any jurisdiction.

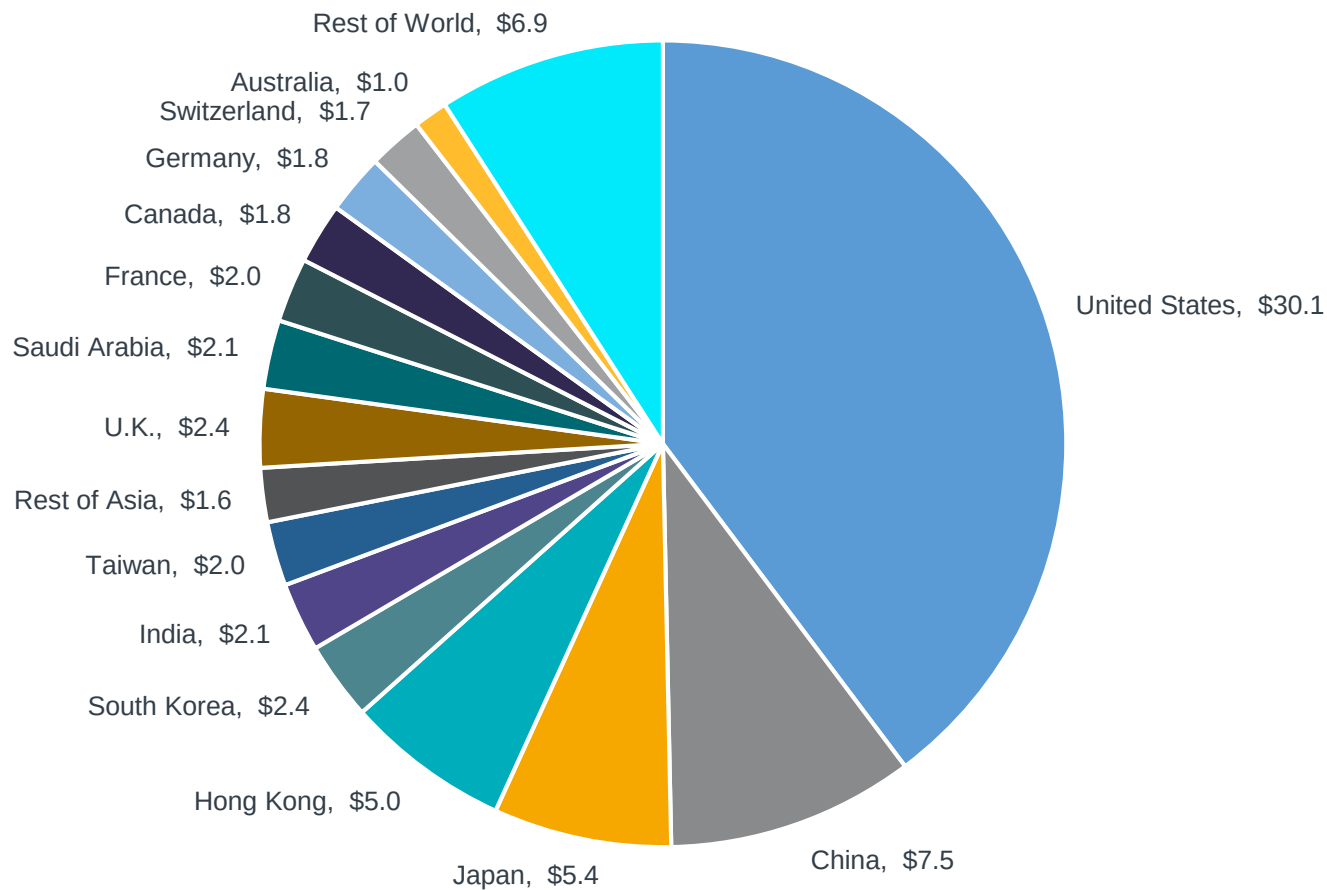
LONG TERM DIVERGENCES ARE UNFAVORABLE FOR REBALANCING



Source: Bloomberg

REBALANCE WITHIN PUBLIC EQUITIES?

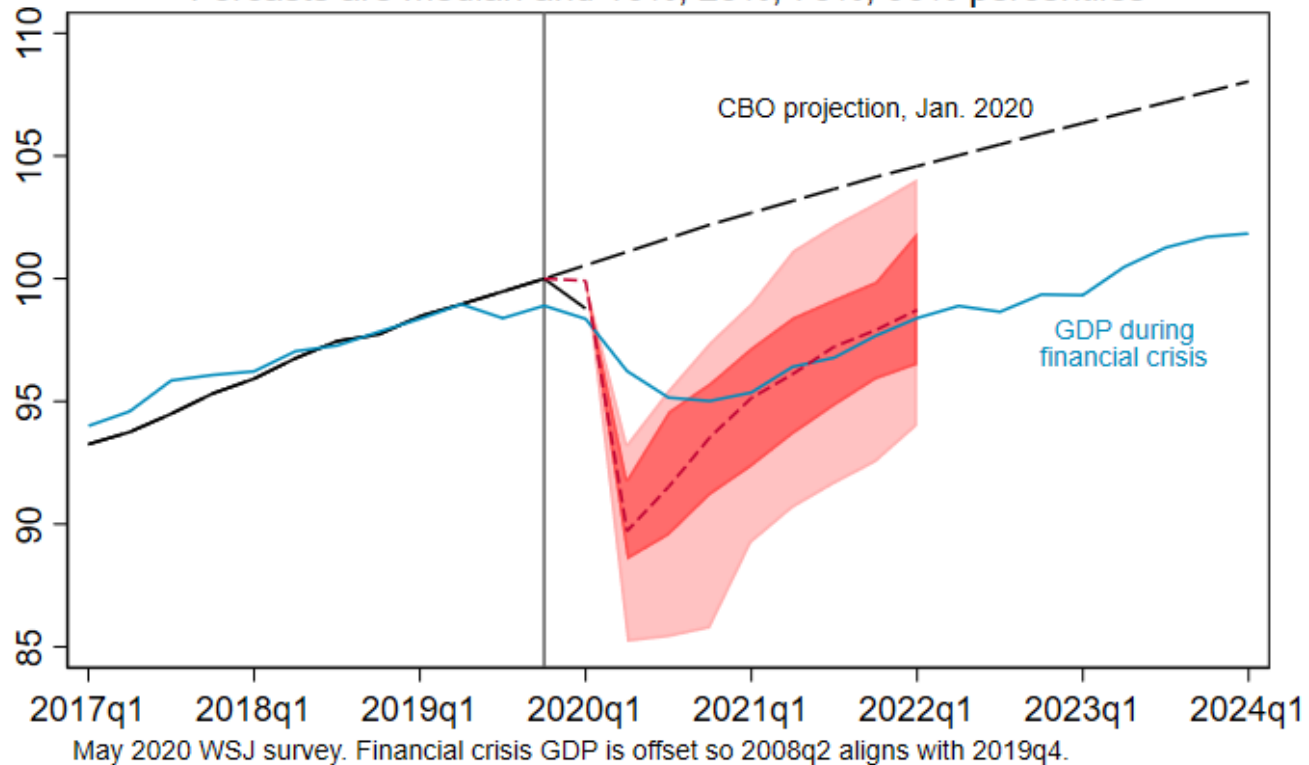
World Market Portfolio (\$75 Trillion, 5/15/2020)



THE FUTURE?

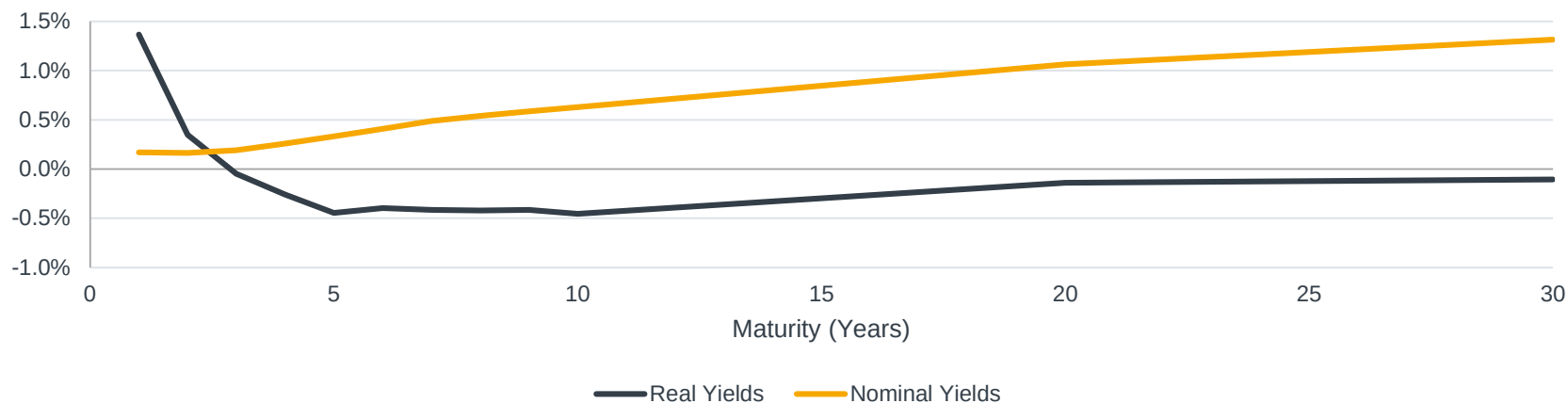
GDP: WSJ Survey of Professional Forecasters

GDP during the financial crisis is superimposed
Forecasts are median and 10%, 25%, 75%, 90% percentiles

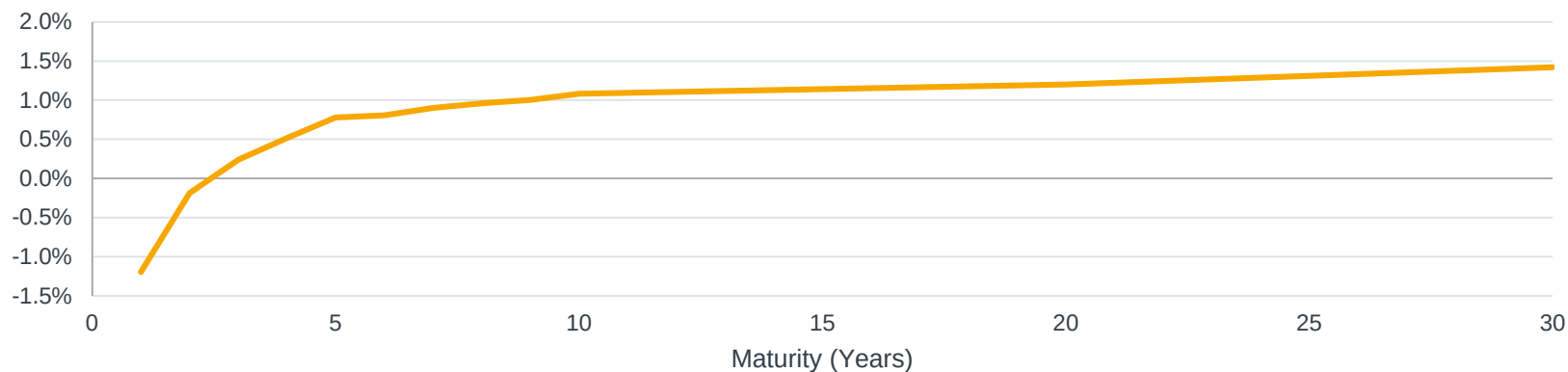


FUTURE YIELDS AND INFLATION?

U.S. Nominal and Real Yields



U.S. Break Even Inflation



Source: Bloomberg

FURTHER THOUGHTS

- Most important for rebalancing decisions is the investment policy and strategy
 - If well formulated, they will tell you what to do
- Beware of competing objectives which compromise goal setting and execution
 - Institutional pools are often managed similarly even though they serve very different objectives
- Covid-19 has changed the world as well as individual circumstances
 - Focus on where your institution has been impacted the most
 - Use an enterprise-wide perspective in devising your investment roadmap



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