## METHODOLOGY

# Scenarios

Point estimates of future returns are implicitly accompanied by some level of uncertainty. For that reason, we have constructed four additional sets of capital market assumptions that represent strong bear, moderate bear, moderate bull, and strong bull outlooks. These scenarios are intended to bookend our baseline scenarios, allowing for consideration of a range of economic and return scenarios.

The scenarios are underpinned by the belief that the level of aggregate investor risk appetite is the primary driver of investment returns over short- to medium-term horizons. With this in mind, our scenario generation process begins by analyzing historical periods of differing investor sentiment towards risk. Using global equity returns as a proxy for risk, we divide the past 15 years of common asset class performance into quartiles and estimate the volatility of each asset class and its correlation to global equities during those periods. This approach explicitly acknowledges that average correlations ands volatilities do not adequately represent asset class behaviors during all risk regimes. We then divide the past 30 years of rolling 5-year periods into quartiles and reconstruct the broader set of asset class returns using their previously estimated volatilities and correlations. These quartiles correspond to the strong bear, moderate bear, moderate bull, and strong bull market scenarios.

The resulting asset class returns from this quantitative process form the starting point for the Capital Market Assumptions Governance and Investment Committee's oversight. The Committee makes adjustments to returns, often due to structural changes of an asset class that are not reflected through a solely backwards-looking quantitative lens. These qualitative insights are important in assessing the forward-looking potential behavior of investments.

We believe that considering portfolio designs across multiple regimes is necessary for aligning investor objectives and asset allocation.

# APPENDIX

## APPENDIX
# Acknowledgments

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# APPENDIX

## REFERENCE INDEXES

| | ASSET CLASS | REPRESENTATIVE INDEX |
|---|---|---|
| EQUITY | Global Equity | MSCI ACWI |
| | Global ex-U.S. Equity | MSCI ACWI ex-USA |
| | Global ex-Japan Equity | MSCI Kokusai |
| | Global ex-Australia Equity | MSCI ACWI ex-Australia |
| | DM Equity | MSCI World |
| | DM ex-U.S. Equity | MSCI World ex-USA |
| | U.S. Equity | Russell 3000 |
| | Europe ex-UK Equity | MSCI Europe ex-UK |
| | UK Equity | FTSE 100 |
| | U.S. Large-Cap Equity | Russell 1000 |
| | U.S. Small-Cap Equity | Russell 2000 |
| | Europe Equity | MSCI Europe |
| | Asia ex-Japan Equity | MSCI Asia ex-Japan |
| | Japan Equity | MSCI Japan |
| | Australia Equity | S&P/ASX 200 |
| | EM Equity | MSCI Emerging Markets |
| | Real Asset Equity | S&P Real Assets Index |
| FIXED INCOME | Global Aggregate | Bloomberg Global Aggregate |
| | Global Aggregate (Hdg) | Bloomberg Global Aggregate (Hdg) |
| | Global Agg ex-U.S. (Hdg) | Bloomberg Global Aggregate ex-U.S. (Hdg) |
| | Global Agg ex-U.S. | Bloomberg Global Aggregate ex-U.S. |
| | Global IG Corporate (Hdg) | Bloomberg Global-Aggregate Corporate (Hdg) |
| | Global High Yield | Bloomberg Corporate High Yield |
| | U.S. Cash | Bloomberg 1–3M Treasury Bills |
| | U.S. TIPS | Bloomberg Global Inflation-Linked U.S. TIPS |
| | U.S. Short TIPS | Bloomberg Global Inflation-Linked 1-5 Year U.S. TIPS |
| | U.S. Treasury | Bloomberg U.S. Treasury |
| | U.S. IG Corporate | Bloomberg U.S. Aggregate Corporate |
| | U.S. IG Coporate (Hdg) | Bloomberg U.S. Aggregate Corporate (Hdg) |
| | U.S. Long Credit | Bloomberg U.S. Long Credit |
| | U.S. Long Treasury | Bloomberg U.S. Long Treasury |
| | U.S. Aggregate | Bloomberg U.S. Aggregate Bond |
| | U.S. High Yield | Bloomberg U.S. Corporate High Yield |
| | U.S. Bank Loans | S&P/LSTA Leveraged Performing Loan |
| | U.S. Securitized | Bloomberg U.S. Securitized |
| | UK Cash | Bloomberg Sterling Treasury Bills 0-3 Month |
| | UK Gilts | Bloomberg UK Gilts |
| | UK IG Corporate | Bloomberg UK Aggregate Corporate |
| | Europe Cash | Bloomberg EUR Treasury Bills 0-3 Month |
| | Europe Treasury | Bloomberg EUR Treasury |
| | Europe IG Corporate | Bloomberg EUR Aggregate Corporate |
| | Europe IG Corporate (Hdg) | Bloomberg EUR Aggregate Corporate (Hdg) |
| | Europe High Yield | Bloomberg EUR High Yield |
| | Japan Cash | Bloomberg Japan Treasury Bills 1-3 Months |
| | Japan Treasury | Bloomberg Japan Treasury |
| | Japan IG Corporate | Bloomberg Japan Aggregate Corporate |
| | Australia Cash | Bloomberg Ausbond Bank Bill |
| | Australia Bonds | Bloomberg Ausbond 0+ Composite |
| | EM Sovereign Local | JP Morgan GBI – EM Global Diversified |
| | EM Sovereign | JP Morgan EMBI Global Diversified |
| | EM Corporate | JP Morgan CEMBI |
| ALTERNATIVES | Hedge Funds | HFRI Fund of Funds Composite |
| | Private Equity | Cambridge Associates LLC Global Private Equity |
| | Commodities | Bloomberg Commodity |
| | Gold | S&P GSCI Gold Total Return |
| | Global Private Real Estate | NCREIF Property |
| | REITs | FTSE EPRA/NAREIT Developed |

Hdg = Hedged currency treatment. EM =Emerging Markets. DM = Developed Markets.

## References


Bernstein, William J., and Arnott, Robert D., "Earnings Growth: The Two Percent Dilution." *Financial Analyst Journal*. September/October 2003. 47–55.

Black, F., and Litterman, R. (1991), "Global Asset Allocation with Equities, Bonds, and Currencies." Fixed Income Research, Goldman, Sachs & Company, October.

Diebold, F.X., and Li, C. (2006), "Forecasting the Term Structure of Government Bond Yields," *Journal of Econometrics*, 130, 337–364.

Diebold, F.X., Rudebusch, G.D., and Aruoba, B. (2006), "The Macroeconomy and the Yield Curve: A Dynamic Latent Factor Approach." *Journal of Econometrics*, 131, 309–338.

Desclee, Albert, Maitra, Anando, and Polbennikov, Simon (2013), "Managing Conflicting Views in Asset Allocation Decisions." Barclays Bank PLC.

Ibbotson, Roger G., and Chen, Peng, "Long-Run Stock Returns: Participating in the Real Economy." *Financial Analysts Journal*, Vol. 59, No. 1, February 2003.

Mahalanobis, Prasanta Chandra (1936), "On the generalised distance in statistics" (PDF). Proceedings of the National Institute of Sciences of India.

Page, Sébastien (2020). "Beyond Diversification: What Every Investor Needs to Know About Asset Allocation." McGraw-Hill Education.

Pedersen, Niels, Page, Sébastien, and He, Fei (2014), "Asset Allocation: Risk Models for Alternative Investments." *Financial Analysts Journal*, Vol. 70, No. 3: 34–45.

Straehl, Philip U., and Ibbotson, Roger G. (2017), "The Long-Run Drivers of Stock Returns: Total Payouts and the Real Economy." *Financial Analysts Journal*, Vol. 73, No. 3: 32–52.

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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Joseph T. Kelliher, Chairman;
Suedeen G. Kelly, Marc Spitzer,
Philip D. Moeller, and Jon Wellinghoff.

Composition of Proxy Groups for Determining Gas and Oil Pipeline Return on Equity — Docket No. PL07-2-000

PROPOSED POLICY STATEMENT

(Issued July 19, 2007)

1. In this proposed Policy Statement, the Commission is proposing to update its standards concerning the composition of the proxy groups used to decide the return on equity (ROE) of natural gas and oil pipelines. Firms engaged in the pipeline business are increasingly organized as master limited partnerships (MLPs). Therefore, the Commission proposes to modify its current policy regarding the composition of proxy groups to allow MLPs to be included in the proxy group. This proposed Policy Statement explains the standards that the Commission would require to be met in order for an MLP to be included in the proxy group. The Commission proposes to apply its final Policy Statement to all gas and oil pipeline rate cases that have not completed the hearing phase as of the date the Commission issues its final Policy Statement. The Commission intends to decide on a case-by-case basis whether to apply the final Policy Statement in cases that have completed the hearing phase. Finally, the Commission is requesting comments on this proposed Policy Statement. Initial comments are due 30 days after publication of this order in the *Federal Register*, with reply comments due 50 days after publication in the *Federal Register*.

## I. Background

2. Since the 1980s, the Commission has used a Discounted Cash Flow (DCF) model to develop a range of returns earned on investments in companies with corresponding risks for determining the ROE for natural gas and oil pipelines. The DCF model was originally developed as a method for investors to estimate the value of securities, including common stocks. It is based on "the premise that a stock is worth the present value of its future cash flows, discounted at a market rate commensurate with the stock's risk."[1] Unlike investors, the Commission uses the DCF model to determine the ROE to be included in the pipeline's rates, rather than to estimate a stock's value. Therefore, the Commission solves the DCF formula for the discount rate, which represents the rate of

[1] *Ozark Gas Transmission System*, 68 FERC ¶ 61,032 at 61,104, n. 16 (1994).

return that an investor requires in order to invest in a firm. Under the resulting DCF formula, ROE equals current dividend yield (dividends divided by share price) plus the projected future growth rate of dividends.

3. The Commission uses a two-step procedure for determining the constant growth of dividends: averaging short-term and long-term growth estimates.[2] Security analysts' five-year forecasts for each company in the proxy group, as published by Institutional Brokers Estimate System (IBES), are used for determining growth for the short term; long-term growth is based on forecasts of long-term growth of the economy as a whole, as reflected in the Gross Domestic Product. The short-term forecast receives a 2/3 weighting and the long-term forecast receives a 1/3 weighting in calculating the growth rate in the DCF model.[3]

4. Most gas pipelines are wholly-owned subsidiaries and their common stock is not publicly traded, and this is also true for some jurisdictional oil pipelines. Therefore, the Commission uses a proxy group of firms with corresponding risks to set a range of reasonable returns for both natural gas and oil pipelines. The Commission then assigns the pipeline a rate within that range or zone, to reflect specific risks of that pipeline as compared to the proxy group companies.[4]

5. The Commission historically required that each company included in the proxy group satisfy the following three standards.[5] First, the company's stock must be publicly traded. Second, the company must be recognized as a natural gas or oil pipeline company and its stock must be recognized and tracked by an investment information service such as Value Line. Third, pipeline operations must constitute a high proportion of the company's business. Until the Commission's 2003 decision in *Williston Basin*

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[2] *Northwest Pipeline Co.,* 71 FERC ¶ 61,309 at 61,989-92 (1995) (Opinion No. 396), 76 FERC ¶ 61,068 (1996) (Opinion No. 396-A), 79 FERC ¶ 61,309 (1997) (Opinion No. 396-B), *reh'g denied*, 81 FERC ¶ 61,036 (1997) (Opinion No. 396-C); *Williston Basin Interstate Pipeline Co.*, 79 FERC ¶ 61,311, *order on reh'g*, 81 FERC ¶ 61,033 (1997), *aff'd in relevant part, Williston Basin Interstate Pipeline Co.,* 165 F.3d 54 (D.C. Cir. 1999)(*Williston Basin*).

[3] The Commission presumes that existing pipelines fall within a broad range of average risk, and thus generally sets pipelines' return at the median of the range. *Transcontinental Gas Pipe Line Corp.,* 84 FERC ¶ 61,084 at 61,423-4 (1998) Opinion No. 414-A, *reh'g*, 85 FERC ¶ 61,323 (1998) (Opinion No. 414-B), *aff'd North Carolina Utilities Commission v. FERC*, 340 U.S. App. D.C. 183 (D.C. Cir) (unpublished opinion).

[4] *Williston Basin* at 57 (*citation omitted*).

[5] *Transcontinental Gas Pipe Line Corp.*, 90 FERC ¶ 61,279 at 61,933 (2000).

*Interstate Pipeline Co.*,[6] the third standard could only be satisfied if a company's pipeline business accounted for, on average, at least 50 percent of a company's assets or operating income over the most recent three-year period.

6. As a result of mergers, acquisitions, and other changes in the natural gas industry, fewer and fewer interstate natural gas companies have satisfied the third requirement. Thus, in *Williston*, the Commission relaxed this requirement for the natural gas proxy group. Instead, the Commission approved a pipeline's proposal to use a proxy group based on the corporations listed in the Value Line Investment Survey's list of diversified natural gas firms that own Commission-regulated natural gas pipelines, without regard to what portion of the company's business comprises pipeline operations.

7. In *HIOS*[7] and *Kern River*, the only fully litigated section 4 rate cases decided since *Williston*, the Commission again drew the proxy group companies from the same Value Line list. When those cases were litigated, there were six such companies: Kinder Morgan Inc., the Williams Companies (Williams), El Paso Natural Gas Company (El Paso), Equitable Resources, Inc., Questar Corporation, and National Fuel Gas Corporation. The Commission excluded Williams and El Paso on the ground that their financial difficulties had lowered their ROEs to a level only slightly above the level of public utility debt, and the Commission stated that investors cannot be expected to purchase stock if lower risk debt has essentially the same return. This left a four-company proxy group, three of whose members derived more revenue from the distribution business, rather than the pipeline business. In *Kern River*, the Commission adjusted the pipeline's return on equity 50 basis points above the median in order to account for the generally higher risk profile of natural gas pipeline operations as compared to distribution operations.

8. In both *Kern River* and *HIOS*, the Commission rejected pipeline proposals to include MLPs in the proxy group. The pipelines contended that MLPs have a much higher percentage of their business devoted to pipeline operations, than most of the corporations that the Commission currently includes in the proxy group.

9. Unlike corporations, MLPs generally distribute most available cash flow to the general and limited partners in the form of quarterly distributions. Most MLP agreements define "available cash flow" as (1) net income (gross revenues minus operating expenses) plus (2) depreciation and amortization, minus (3) capital investments the partnership must

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[6] *Williston Basin Interstate Pipeline Company*, 104 FERC ¶ 61,036 at P 35, n. 46 (2003).

[7] *High Island Offshore System, L.L.C.*, 110 FERC ¶ 61,043, *reh'g denied*, 112 FERC ¶ 61,050 (2005), *appeal pending*.

make to maintain its current asset base and cash flow stream.[8] Depreciation and amortization may be considered a part of "available cash flow," because depreciation is an accounting charge against current income, rather than an actual cash expense. As a result, the MLP's cash distributions normally include not only the net income component of "available cash flow," but also the depreciation component. This means that, in contrast to a corporation's dividends, an MLP's cash distributions generally exceed the MLP's reported earnings. Moreover, because of their high cash distributions, MLPs usually finance capital investments required to significantly expand operations or to make acquisitions through debt or by issuing additional units rather than through retained cash, although the general partner has the discretion to do so.

10. In rejecting the pipelines' proposals in *HIOS* and *Kern River* to include MLPs in the proxy group, the Commission made clear that it was not making a generic finding that MLPs cannot be considered for inclusion in the proxy group if a proper evidentiary showing is made.[9] However, the Commission pointed out that data concerning dividends paid by the proxy group members is a key component in any DCF analysis, and expressed concern that an MLP's cash distributions to its unit holders may not be comparable to the corporate dividends the Commission uses in its DCF analysis. In *Kern River*, the Commission explained its concern as follows:

> Corporations pay dividends in order to distribute a share of their earnings to stockholders. As such, dividends do not include any return *of* invested capital to the stockholders. Rather, dividends represent solely a return *on* invested capital. Put another way, dividends represent profit that the stockholder is making on its investment. Moreover, corporations typically reinvest some earnings to provide for future growth of earnings and thus dividends. Since the return on equity which the Commission awards in a rate case is intended to permit the pipeline's investors to earn a profit on their investment and provides funds to finance future growth, the use of dividends in the DCF analysis is entirely consistent with the purpose for which the Commission uses that analysis. By contrast, as Kern River concedes, the cash distributions of the MLPs it seeks to add to the proxy group in this case include a return *of* invested capital through an allocation of the partnership's net income. While the level of an MLP's cash distributions may be a significant factor in the unit holder's decision to invest in the MLP, the Commission uses the DCF analysis solely to determine the pipeline's return on equity. The Commission provides for the return of invested capital through a separate depreciation allowance.

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[8] The definition of available cash may also net out short term working capital borrowings, the repayment of capital expenditures, and other internal items.

[9] *Kern River Gas Transmission Company*, 117 FERC ¶ 61,077 (2006) (Opinion No. 486) at P 147, *reh'g pending.*

> For this reason, to the extent an MLP's distributions include a significant return of invested capital, a DCF analysis based on those distributions, without any adjustment, will tend to overstate the estimated return on equity, because the 'dividend' would be inflated by cash flow representing return of equity, thereby overstating the earnings the dividend stream purports to reflect.[10]

11. The Commission stated that it could nevertheless consider including MLPs in the proxy group in a future case, if the pipeline presented evidence addressing these concerns. The order suggested that such evidence might include some method of adjusting the MLPs' distributions to make them comparable to dividends, a showing that the higher "dividend" yield of the MLP was offset by a lower long-term growth projection, or some other explanation why distributions in excess of earnings do not distort the DCF results for the MLP in question. However, the Commission concluded that Kern River had not presented sufficient evidence to address these issues, and that the record in that case did not support including MLPs in the proxy group.

12. In addition, *Kern River* pointed out that the traditional DCF model only incorporates growth resulting from the reinvestment of earnings, not growth arising from external sources of capital.[11] Therefore, the Commission stated that if growth forecasted for an MLP comes from external capital, it is necessary either (1) to explain why the external sources of capital do not distort the DCF results for that MLP or (2) propose an adjustment to the DCF analysis to eliminate any distortion. The Commission's orders in *HIOS* reached the same conclusions.

13. In some oil pipeline rate cases decided before *HIOS* and *Kern River*, the Commission included MLPs in the proxy group used to determine oil pipeline return on equity on the ground that there were no corporations available for use in the oil proxy group.[12] In those cases, no party raised any issue concerning the comparability of an MLP's cash distribution to a corporation's dividend. However, that issue did arise in the first oil pipeline case decided after *HIOS* and *Kern River*, involving SFPP's Sepulveda Line.[13] The Commission approved inclusion of MLPs in the proxy group in that case on the grounds that the MLPs in question had not made distributions in excess of earnings. The Sepulveda Line order therefore analyzed the five MLPs that have been used to determine SFPP's ROE: Buckeye Partners, L.P., Enbridge Energy Partners, L.P., Enron

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[10] *Id.* at P 149-50.

[11] *Id.* at P 152.

[12] *SFPP, L.P.*, 86 FERC ¶ 61,022 at 61,099 (1999).

[13] *SFPP, L.P.*, 117 FERC ¶ 61,285 (2006) (SFPP Sepulveda order), *rehearing pending*.

Gas Liquids (Enron),[14] TEPPCO Partners, L.P., and Kaneb Partners, L.P. (later Valero Partners), now NuStar Energy, L.P. The order reviewed each entity for the year 1996 and the previous four years, and held that four of the firms had had income (earnings) in excess of distributions and that their incomes (earnings) were stable over that period with minor exceptions. The order found these facts sufficient to address the concerns expressed in *HIOS* and *Kern River*. The fifth firm, Enron, had distributions in excess of income (earnings) in four of the five years. While the Commission did not preclude use of such MLPs, Enron did not meet the *HIOS* test and was excluded as unrepresentative.

## II. Discussion

14. As discussed below, the Commission proposes to permit inclusion of MLPs in a proxy group. However, the Commission proposes to cap the "dividend" used in the DCF analysis at the pipeline's reported earnings, thus adjusting the amount of the distribution to be included in the DCF model. The Commission would leave to individual cases the determination of which MLPs and corporations should actually be included in the natural gas or oil proxy group. However, participants in these cases should include as much information as possible regarding the business profile of the firms they propose to include in the proxy group, for example, based on gross income, net income, or assets.

15. The Supreme Court has stated that "the return to the equity owner should be commensurate with the return on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital."[15] The Commission is concerned that its current approach to determining the composition of the proxy group for determining gas and oil pipeline return on equity is, or will, require the use of firms which are less and less representative of either natural gas or oil pipeline business risk.

16. As has been discussed, there are fewer and fewer publicly traded diversified natural gas corporations that have interstate gas pipelines as their predominant business line, whether this is measured on a revenue, income, or asset basis. As such, there are fewer diversified natural gas companies available for inclusion in a natural gas pipeline proxy group which may reasonably be considered representative of the risk profile of a natural gas pipeline firm. Moreover, at this point the only publicly traded oil pipeline firms are controlled by MLPs, which makes the issue of a representative proxy group more acute.

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[14] Enron Gas Liquids was not affiliated with Enron, Inc. at that time, but was a former affiliate that was spun off in the early 1990's.

[15] *FPC v. Hope Natural Gas Co.*, 320 U.S. 591 (1944); *Bluefield Water Works & Improvement Co. v. Public Service Comm'n*, 262 U.S. 679 (1923).

17. Cost of service ratemaking requires that the firms in the proxy group be of comparable risk to the firm whose equity cost of capital is at issue in a particular rate proceeding. If the proxy group is less than clearly representative, this may require the Commission to adjust for the difference in risk by adjusting the equity cost-of-capital, a difficult undertaking requiring detailed support from the contending parties and detailed case-by-case analysis by the Commission. Expanding a proxy group to include MLPs whose business is more narrowly focused on pipeline activities would help ameliorate this problem. Thus, including MLP natural gas pipelines in the equity proxy group should reduce the need to make adjustments since the proxy group is more likely to contain firms that are representative of the regulated firm whose rates are at issue. Including MLPs will also recognize the trend to greater use of MLPs in the natural gas pipeline industry and address the reality of the oil pipeline industry structure.

18. The Commission's primary concern about including MLPs in the proxy group has arisen from the interaction between use of the DCF analysis to determine return on capital while relying on a depreciation allowance for return of capital. The Commission permits a pipeline to recover through its rates both a return *on* equity and a return *of* invested capital. The Commission uses the DCF analysis solely to determine the return *on* equity component of the cost-of-service. The Commission provides for the return *of* invested capital through a separate depreciation allowance. Given the purpose for which the Commission uses the DCF analysis, the cash flows included in that analysis must be limited to cash flows which may reasonably be considered to reflect a return *on* equity. Such cash flows include that portion of an MLP's cash distribution derived from net income, or earnings.

19. To the extent an MLP makes distributions in excess of earnings, it is able to do so because partnership agreements define "cash available for distribution" to include depreciation. This enables the MLP to make cash distributions that include return *of* equity, in addition to return *on* equity. However, because the Commission includes a separate depreciation allowance in the pipeline's cost-of-service, a DCF analysis including cash flows attributable to depreciation would permit the pipeline to double recover its depreciation expense, once through the depreciation allowance and once through an inflated ROE. Adjusting an MLP's cash distribution to exclude that portion of the distribution in excess of earnings addresses this problem.

20. The Commission recognizes that it raised several concerns in *Kern River* as to whether adjusting the MLP's cash distribution down to the level of its earnings would be sufficient to eliminate the distorting effects of including MLPs in the proxy group. The Commission pointed out that corporations generally do not pay out all of their earnings in dividends, but retain some earnings in order to generate future growth. The Commission also suggested that the DCF model is premised on growth in dividends deriving from reinvestment of current earnings, and does not incorporate growth from external sources, such as issuing debt or additional stock.

21. The Commission believes that these concerns should not render unreliable a DCF analysis using the adjusted MLP results. The market data for the MLPs used in the DCF analysis should itself correct for any distortions remaining after the adjustment to the cash distribution described above. For example, the IBES growth projections represent an average of the growth projections by professionals whose business is to advise investors.[16] The level of an MLP's cash distributions as compared to its earnings is a matter of public record and thus known to the security analysts making the growth forecasts used by IBES. Therefore, the security analysts must be presumed to take those distributions into account in making their growth forecasts for the MLP. To the extent an MLP's relatively high cash distributions reduce its growth prospects that should be reflected in a lower growth forecast, which would offset the MLP's higher "dividend" yield.

22. In order to test the validity of this assumption, the Commission reviewed the most recent IBES growth forecasts for five diversified energy companies and six MLPs in the natural gas business. The average IBES forecast for the corporations is 9 percent, while the average IBES forecast for the MLPs is 6.17 percent, or nearly 300 basis points lower.[17] Thus, the security analysts do project lower growth rates for the MLPs than for the corporations.

23. In addition, the fact MLPs may rely upon external borrowings and/or equity issuances to generate growth is not a reason to exclude them from the proxy group. Most pipelines organized as corporations also use external borrowings and to some extent equity issuances. To the extent that gas or oil pipelines are controlled by diversified energy companies with unregulated assets (either federal or state), the financial practices may be the same, although perhaps not as highly leveraged, and the results are likewise reflected in the IBES projections. A prudent investor deciding whether to invest in a security will reasonably consider all factors relevant to assessing the value of that security. The potential effect of future borrowings or equity issuances on share values of either MLPs or corporations is one such factor. Since a DCF analysis is a method for investors to estimate the value of securities, it follows that such an analysis may reasonably take into account potential growth from external capital.

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[16] Opinion No. 414-B, 85 FERC at 62,268-70.

[17] The IBES forecasts were prepared as of May 31, 2007 applying the current DCF model for the corporate sample and using distributions capped at earnings for the MLPs. Thus the short term growth rates for the five diversified gas corporations were: (1) National Fuel Gas Corporation, 5 percent; (2) Questar Corporation, 9 percent; (3) Oneok, Inc., 9 percent; (4) Equitable Resources Inc., 10 percent; and (5) Williams Companies, 12 percent. The short term growth rates for the six gas MLPs were: (1) Oneok Partners, L.P., 5 percent; (2) TEPPCO Partners, L.P., 5 percent; (3) TC Pipelines, L.P., 5 percent; (4) Boardwalk Pipeline Partners, L.P., 7 percent, (5) Kinder Morgan Energy Partners, L.P., 7 percent, and (6) Enterprise Products Partners, L.P., 8 percent.

24. The Commission does, however, recognize that an MLP's lack of retained earnings may render cash distributions at their current level unsustainable, and thus still unsuitable for inclusion in the DCF analysis. Therefore, the Commission intends to require participants proposing to include MLPs in the proxy group to provide a multi-year analysis of past earnings. An analysis showing that the MLP does have stable earnings would support a finding that the cash to be included in the DCF calculation is likely to be available for distribution, thus replicating the requirement of the corporate model of a stable dividend.

## III. Procedure for Comments

25. The Commission invites interested persons to submit written comments on its proposed policy to permit the inclusion of MLPs in the proxy group to be used to determine the equity cost of capital of natural gas and oil pipelines. The comments may include alternative proposals for determining a representative proxy group given that (1) few natural gas companies meet the Commission's traditional standards for inclusion in the proxy group, and (2) the only publicly traded oil pipeline firms available for inclusion in the proxy group are controlled by MLPs. Comments may also address the analysis advanced in this proposed policy statement, alternative methods for adjusting the amount of the MLP's distribution to be included the DCF analysis, and the relevance of the stability of MLP earnings.

26. Comments are due 30 days from the date of publication in the *Federal Register* and reply comments are due 50 days from the date of publication in the *Federal Register*. Comments must refer to Docket No. PL07-2-000, and must include the commentor's name, the organization it represents, if applicable, and its address. To facilitate the Commission's review of the comments, commentors are requested to provide an executive summary of their position. Additional issues the commentors wish to raise should be identified separately. The commentors should double space their comments.

27. Comments may be filed on paper or electronically via the eFiling link on the Commission's web site at http://www.ferc.gov. The Commission accepts most standard word processing formats and commentors may attach additional files with supporting information in certain other file formats. Commentors filing electronically do not need to make a paper filing. Commentors that are not able to file comments electronically must send an original and 14 copies of their comments to: Federal Energy Regulatory Commission, Office of the Secretary, 888 First Street N.E., Washington, D.C. 20426.

28. All comments will be placed in the Commission's public files and may be viewed, printed, or downloaded remotely as described in the Document Availability section below. Commentors are not required to serve copies of their comments on other commentors.

## IV. Document Availability

29. In addition to publishing the full text of this document in the *Federal Register*, the Commission provides all interested persons an opportunity to view and/or print the contents of this document via the Internet through the Commission's Home Page (http://www.ferc.gov) and in the Commission's Public Reference Room during normal business hours (8:30 a.m. to 5:00 p.m. Eastern time) at 888 First Street, N.E., Room 2A, Washington D.C. 20426.

30. From the Commission's Home Page on the Internet, this information is available in the Commission's document management system, eLibrary. The full text of this document is available on eLibrary in PDF and Microsoft Word format for viewing, printing, and/or downloading. To access this document in eLibrary, type the docket number (excluding the last three digits) in the docket number field.

31. User assistance is available for eLibrary and the Commission's website during normal business hours. For assistance, please contact the Commission's Online Support at 1-866-208-3676 (toll free) or 202-502-6652 (e-mail at FERCOnlineSupport@ferc.gov or the Public Reference Room at 202-502-8371, TTY 202-502-8659 (e-mail at public.referenceroom@ferc.gov)

By the Commission.

( S E A L )

Kimberly D. Bose,
Secretary.

The Economist

# Discounting the bull

## Sell-side share analysis is wrong

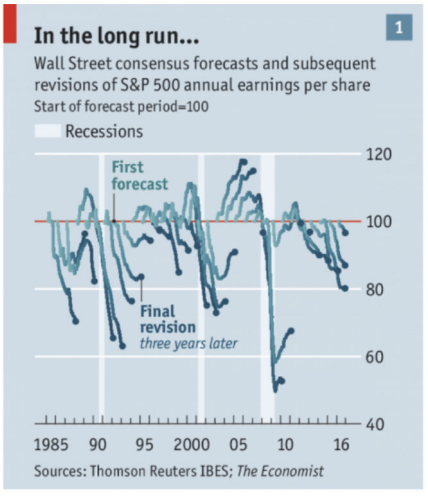
## But in reassuringly predictable ways

Print edition | Finance and economics

Dec 1st 2016

"SELL-SIDE" analysts, whose firms make money from trading and investment banking, are notoriously bullish. As one joke goes, stock analysts rated Enron as a "can't miss" until it got into trouble, at which point it was lowered to a "sure thing". Only when the company filed for bankruptcy did a few bold analysts dare to downgrade it to a "hot buy".

Economic research shows that there is some truth to the ribbing. The latest figures from FactSet, a financial-data provider, show that 49% of firms in the S&P 500 index of leading companies are currently rated as "buy", 45% are rated as "hold", and just 6% are rated as "sell". In the past year, 30% of S&P 500 companies yielded negative returns.



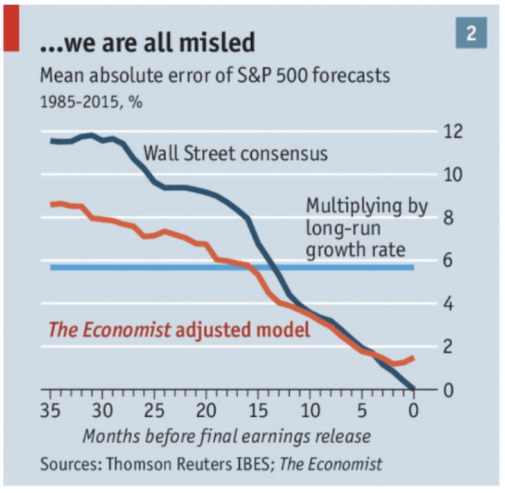

Profits forecasts made more than a few months ahead have a dismal record of inaccuracy. According to Morgan Stanley, a bank, forecasts for American firms' total annual earnings per share made in the first half of the year had to be revised down in 34 of the past 40 years. Studying their forecasts over time reveals a predictable pattern (see chart 1).

In theory, a diligent share analyst should do his own analysis—that is, by projecting a firm's future revenue and expenses, and discounting them to the present. Such models, however, are extremely sensitive to different assumptions of growth rates. Since no one can know the future, analysts cheat.

Three statistical sins are common. Analysts can look at comparable companies to glean reasonable profits estimates, and then work backwards from their conclusions. Or they can simply echo what their peers are saying, and follow the herd. Or, most important, they can simply ask the companies they are following what their actual earnings numbers are.

Surveys conducted by Lawrence Brown of Temple University found that two-thirds of sell-side analysts found private calls with company managements to be "very useful" in making their estimates. Analysts' need to maintain relationships with the companies they cover must colour their projections. They are judged primarily on the accuracy of their short-term forecasts, so there is little risk in issuing flattering, if unrealistic, long-term projections. In the short run, however, they have an incentive to issue ever-so-slightly pessimistic forecasts, so companies can "beat" expectations. Since the financial crisis, company profits have exceeded short-term analyst forecasts around 70% of the time.

So are forecasts are useless? Simply taking the market's earnings figures from the previous year and multiplying by 1.07 (corresponding with the stockmarket's long-run growth rate) can be expected to yield a more accurate forecast of profits more than a year in the future.




Yet the very predictability of the errors in analysts' forecasts suggests they could be informative, if they are properly interpreted. Taking forecasts of S&P 500 earnings from 1985-2015, The Economist has built a simple statistical model to try to take out the bias that taints Wall Street's prognostications. After controlling for the forecasts' lead time and whether or not they were made during a recession, we find that even our relatively crude model can improve upon the Wall Street consensus for forecasts made more than a quarter in advance (see chart 2).

Adjusting for bias in short-term forecasts is harder. It is tempting simply to accept the errors—after all, they tend to be off by just a little. Data from Bloomberg show that the 320 S&P 500 companies that beat earnings expectations in 2015 did so only by a median of 1.4%. An alternative is to look at crowdsourcing websites such as Estimize. There punters—some amateur, and some professional—are shown Wall Street consensus estimates and asked to make their own forecasts. Estimize users beat Wall Street estimates two-thirds of time.

To some extent, judging Wall Street by its ability to make accurate predictions is silly. Harrison Hong, an economist at Columbia University, reckons that stock analysts should be viewed "more like media". The latest forecasts aggregated by Thomson Reuters suggest that the S&P 500 will yield earnings per share of $130.83 in 2017 and $146.33 in 2018. According to our model, that would imply that they believe the actual numbers will be closer to $127.85 and $134.30. Share analysts want to tell the truth. They just like making it difficult.

This article appeared in the Finance and economics section of the print edition under the headline "Discounting the bull"

The Economist

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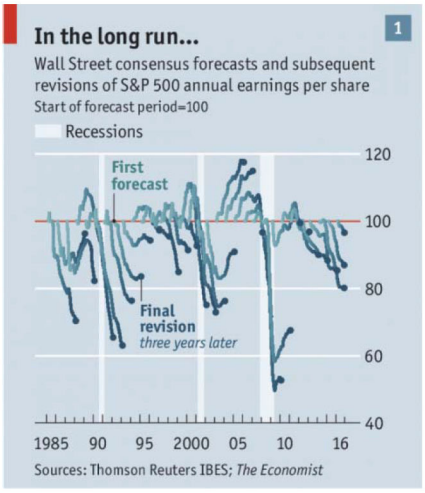


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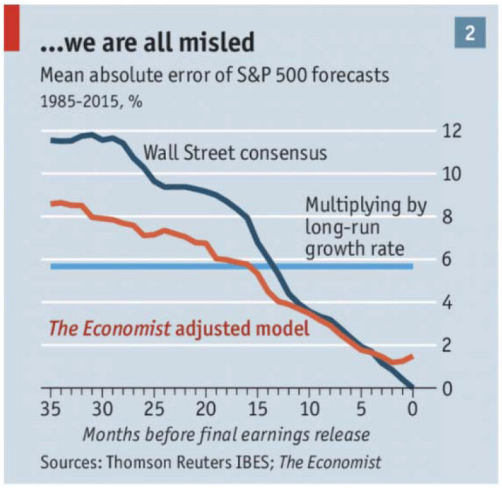


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# The S&P And GDP Are Not The Same Thing

Burt White and Jeff Buchbinder, LPL Financial Nov. 4, 2014, 2:31 PM

Business Insider - https://www.businessinsider.com/sp-is-not-gdp-2014-11

.S. economic growth has been subpar — right around 2% — during much of the ongoing economic expansion. Yet, the S&P 500 has returned nearly 230% cumulatively since the bear market low on March 9, 2009. How did that happen and is it justified?

Before trying to answer to those questions, it is worth pointing out that this situation is not all that unusual. In fact, since 1950, the S&P 500 median return is 13% (average is 12%) when real gross domestic product (GDP) grows less than 3%, with the S&P generating a positive return 68% of the time. However, a good portion of those returns come during recessions — historically, the best time to buy stocks is at recession troughs. But even if we take those periods in and around recessions out of the equation and look at annual returns when GDP growth is between 1-3%, the median (and average) S&P 500 return is a respectable 7-8%. Stocks tend to like average (or slightly below average) growth, which is not strong enough to generate worrisome inflation.

Now back to the question of what has driven this stock market to far outperform economic growth. Some might say quantitative easing (QE), which ended at the end of October 2014 in the United States (the Bank of Japan expanded its QE program last week on Halloween). While QE has benefitted U.S. stocks (how much is up for debate) by helping keep interest rates low and encouraging investors to buy riskier assets (see this week's Weekly Economic Commentary for details), the bull market has been driven by much more than that. Increasing confidence in the economic recovery — albeit a slow one — and greater policy clarity in Washington have also been factors. But we think the best answer is earnings. In fact, over the past four decades, earnings have provided solid support for equity market gains [Figure 1].

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stocks LPL Financial

But this commentary is not a deep dive into earnings (that's coming soon). Instead, this week we highlight the differences between the S&P 500 and GDP, i.e., the U.S. economy, to shed some light on how corporate profits can grow so much faster than the economy, and bring stock prices right along with them.

stocks gdp

LPL Financial

## How Is S&P Different from GDP?

S&P 500 companies have different drivers for earnings than the components that drive GDP. There are several key factors that differentiate the economic data from the earning power of corporate America that we think are important for investors to keep in mind:

Corporate profits are more manufacturing driven. Two-thirds of S&P 500 profits are from manufacturing, while two-thirds of U.S. consumption in GDP is services. The Institute for Supply Management (ISM) Manufacturing Survey has exceeded a solidly expansionary 55 level for five consecutive months, a positive signal for U.S. manufacturers. The recently released report on GDP for the third quarter of 2014 showed capital spending growth of 7% annualized, double the 3.5% growth rate of the overall U.S. economy. Many U.S. industrial and materials companies are benefiting from the U.S. energy renaissance that has brought greater access to cheaper energy sources and demand for infrastructure. The strength of the U.S manufacturing economy continues to support our positive industrials sector view.

Corporate profits are less consumer driven. While 70% of GDP is consumer spending, only one-third of it is from discretionary categories, while an even lower 15% of S&P 500 profits come from consumer discretionary spending. A more significant portion of S&P 500 earnings — estimated 20-25% — comes from business spending. As we move into the latter half of the economic cycle, we expect a stronger contribution from the business spending side than consumer spending side, suggesting the S&P 500 is better positioned than GDP as 2014 comes to a close and we enter 2015. Still, we expect U.S. GDP to sustain a growth rate at or around 3% through year end and well into 2015.

Corporate profits are more international trade driven. International trade only accounts for about 10% of GDP and acts as a drag on growth for most quarters because the United States imports more than it exports. Today, we estimate that 40% of S&P 500 profits are earned overseas — with about half of that from rapidly emerging market economies, including China. This makes S&P 500 earnings less dependent upon U.S. growth than 15-20 years ago, when roughly 20% of S&P profits were earned overseas, and 30 years ago when only a small portion of earnings were foreign sourced.

Corporate profits are hurt much less by higher commodity prices than GDP (see below). In fact, higher commodity prices generally benefit S&P 500 companies because most of them either produce commodities (energy and materials), supply commodity producers with equipment (largely industrials), or are not heavy commodity users and are therefore not impacted much by higher commodity prices (technology, healthcare, financials, and telecommunications). U.S. corporations are increasingly benefiting from access to cheaper energy as the energy renaissance continues, although the pace of oil and gas production and the corresponding infrastructure build-out may slow and be a modest drag on S&P 500 earnings should oil prices fall much further. Our view is that oil stabilizes at or near $80 and begins to move higher; but lower oil prices are a risk for energy producers and equipment manufacturers.

Solid Business Spending with Slower GDP Growth Trajectory

We believe the backdrop of solid business spending within a slower trajectory of overall GDP growth can be a favorable one for the stock market. The economic data, while good recently, do not accurately reflect the earning power of corporate America, which remains quite strong. The S&P is not GDP — S&P 500 companies have different drivers for earnings than the components that drive GDP growth. Stocks are fundamentally driven by earnings, which have supported the gains during the current bull market and left valuations still within a reasonable range. The earnings picture still looks quite good today, with the S&P 500 on track for 9% year-over-year earnings growth in the third quarter, with about three quarters of the index constituents having reported.

Although stocks are at the low end of our target 10-15% S&P 500 return range for 2014, we see further gains between now and year end may be likely, with profit growth as a primary driver—with perhaps some help from the calendar, as midterm elections have historically been positive for stock returns.

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Corporate Profits Are Soaring. Here's Why It Can't Last

Fortune

http://fortune.com/2017/12/07/corporate-earnings-profit-boom-end/

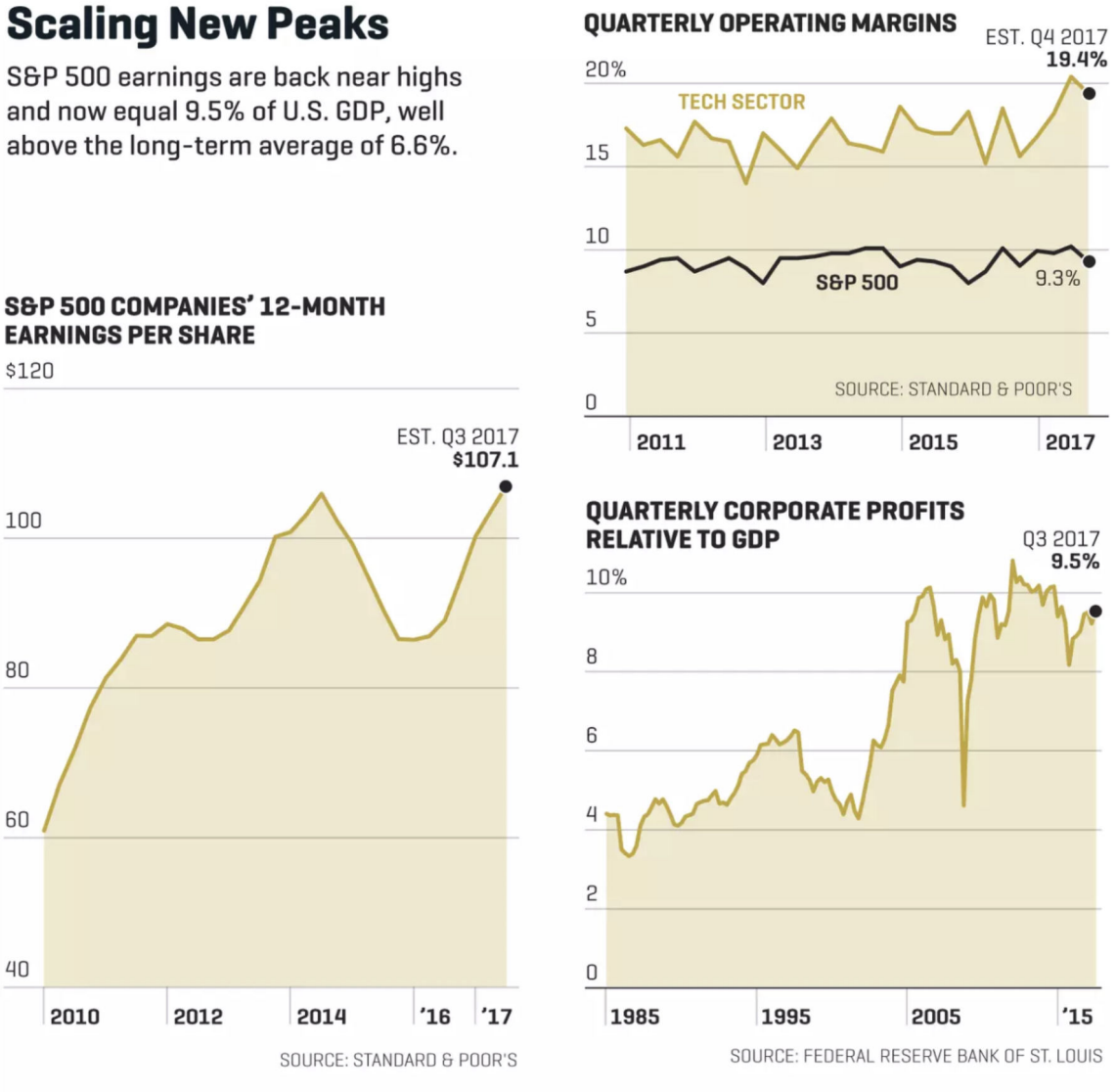
By SHAWN TULLY December 7, 2017

Some of the trends behind America's earnings boom and stock market surge are about to change. Investors beware.

Milton Friedman wasn't buying the profit boom. It was late 1997, corporate earnings had surged to heights unseen in over a decade, and the Wall Street crowd was predicting years of near-double-digit gains to come. So I called the Nobel Prize–winning economist, the most celebrated monetarist of the 20th century, to get his take on whether the bull case for long-term profit growth was reasonable—or mostly bull.

The 85-year-old Friedman phoned back, collect as usual, from his office at the Hoover Institution. "Would you accept the charges from Milton?" asked the operator. I said I would, and Friedman got straight to the point. "Beware of predictions that earnings can grow faster than the economy for long periods," he warned. "When earnings are exceptionally high, they don't just keep booming." Eventually, Friedman explained, profits must move back down to their traditional share of GDP. Earnings can get only so high, Friedman said. "They can't break loose from economic gravity."

Two decades later, Friedman's warning is as timely as ever. Earnings are again in the stratosphere: Consider that in the second quarter, corporate profits in the U.S. were equal to 9.5% of GDP vs. the long-term average since 1950 of 6.6%. And Wall Street analysts are forecasting that cumulative earnings per share for the S&P 500 will jump by 11% in 2018 and another 10% in 2019, according to analytics and data provider FactSet.




Nic Rapp

Here's one problem with that projection: The S&P 500's profit margins are now near all-time highs. Even if they remain elevated, a questionable assumption, earnings can grow only as fast as sales. "And sales grow along with the economy," says Roger Ibbotson, professor emeritus at Yale and chief of investment firm Zebra Capital. In other words, as Friedman preached, it's the fundamentals underpinning GDP—basics such as consumer spending and capital investment—that will guide earnings growth in the years ahead. Nobody is projecting GDP growth of 11% in 2018; the consensus, including inflation, is around 4%.

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It's highly uncertain, however, that profits can even manage to climb in step with GDP. That's because they're already highly elevated thanks to those super-rich margins. Put simply, U.S. companies have benefited in recent years from an unusual combination of tailwinds—including flat labor costs, super-low interest rates, and, in 2017, a falling dollar. Those factors have outraced a plodding economy, so that the share of the economic pie flowing to corporate profits has swelled while the slice going to labor has shrunk. Last year, wages and salaries were just 43% of GDP—well below the long-term average of 47%.

Those factors are starting to reverse. Labor costs are rising, interest rates are poised to trend higher, and the greenback is starting to strengthen. It all adds up to a looming squeeze on profits. What does that mean for stocks?

To bring the profit picture into tighter focus, Fortune spoke to a number of market experts with strong academic credentials—all of whom are largely unswayed by the herd mentality of Wall Street. Although their outlooks varied, the differences in their forecasts were relatively narrow.

In the pessimistic camp is Rob Arnott, founder and CEO of Research Affiliates, a firm overseeing strategies for $200 billion in index funds. He says that workers are due for a raise. "Companies and shareholders have been taking a bigger and bigger share of the pie at the expense of labor," says Arnott. "That can't last. Labor's share will rise as wages and other factors normalize." He predicts that the crunch will slow earnings gains to at least a point below GDP growth over the next decade. That's at best 3% annual growth—or well below the Congressional Budget Office's estimate of an average of 4% nominal GDP growth over the next several years (consisting of 1.9% real increases annually, plus 2.1% inflation).

Mark Zandi, chief economist at Moody's Analytics, takes a middle position. "Earnings are peaking or have already peaked," he says. "At best, they'll track U.S. GDP going forward. And that includes a boost from the rebound in economic growth overseas." (All of our discussion on profits refers to earnings per share, or EPS, the number that really counts for investors.)

A notable optimist, relatively speaking, is Jeremy Siegel, the renowned professor of finance at the Wharton School. Siegel thinks that earnings per share can grow about half a point faster than nominal GDP—in the 5% range including inflation—chiefly because of big gains in the technology sector. "In tech

today, it's all about ideas that don't require much capital, not about building $100 million plants. Margins for the tech titans can expand from here," says Siegel. Still, he dismisses Wall Street's projections as bogus. "The idea of 8% or 10% or 12% growth is ridiculous," he says. "It will not happen."

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- MARK ZANDI, CHIEF ECONOMIST, MOODY'S ANALYTICS

All of the experts agree, however, that the sluggish outlook could improve if Congress enacts robust tax reform. (Republicans appeared to be closing in on a bill at press time.) The potential benefits are twofold. First, a reduction in the nominal corporate rate from 35% to 20% should give companies a healthy boost in after-tax profits. Not that the average U.S. company pays the official 35% rate now: Howard Silverblatt, senior industry analyst for S&P, calculated that the average effective levy for the S&P 500 in 2016 was 24.8%. Still, dropping down to 20% will have a significant impact.

It won't necessarily be America's big multinationals that gain the most under the tax plan proposed by Republicans. The GOP wants to erase their biggest shelter—deferring payments to the Treasury by leaving foreign-generated profits in overseas subsidiaries. That kind of strategy helped Alphabet (GOOGL, +1.94%), for instance, pay an effective tax rate of just 19.3% in its most recent fiscal year. Rather, the leading beneficiaries would be enterprises that do most of their business in the U.S. Grocery giant Kroger (KR, -4.43%), for example, pays over 30% in federal taxes. Michael Arone, chief investment strategist at State Street Global Advisors, reckons that new legislation that drops the rate all the way to 20%, and contains other levy-lowering provisions such as immediate expensing of capital expenditure, could raise EPS for the S&P 500 by 8% in the first year. A weaker package would deliver substantially less juice, he says.

Tax reform could also provide a more long-lasting tonic to earnings. A 20% corporate rate would greatly lower the break-even point for investments in the U.S. "Corporate profits right now are great," says Urooj Khan, a professor at Columbia Business School. "But they're not translating into economic growth in the U.S. And that's because of the way the U.S. taxes foreign earnings, as well as the drag from a rate that's extremely high by international standards." Khan cites research showing that companies invest in foreign projects and acquisitions that aren't as profitable as those available in the U.S. just to avoid taxes. Lower U.S. rates would make overseas shelters far less attractive and encourage companies to bring the money home, potentially causing a surge in capital expenditure, says Khan.

"Companies and share-holders have been taking a bigger and bigger share of the pie at the expense of labor. That can't last."

- ROB ARNOTT, CHAIRMAN AND CEO, RESEARCH AFFILIATES

Wall Street, meanwhile, is jacking up its forecasts based on recent history. Analysts at big banks are touting a big surge in earnings that started in 2016. In Q1 of that year, cumulative EPS for the S&P 500 was $23.97. That figure has risen strongly in every quarter since. For the most recent three months, ended Sept. 30, the S&P 500's EPS was $31.50—a robust 9.8% gain compared with the same quarter last year. Boosters on Wall Street are suggesting that springboard can turn into a trampoline going forward. But digging into the S&P's numbers over a longer stretch reveals a more discouraging picture.

In real terms, EPS actually peaked three years ago, in the third quarter of 2014. The reason the S&P 500's recent performance looks so good is that earnings cratered for six quarters (stretching from that peak in late 2014 to early 2016), thanks to a collapse in oil prices that pushed earnings for energy giants deeply into the red. EPS (specifically, "as reported" GAAP earnings per share) hit bottom in Q1 of 2016 at a trailing, 12-month reading of $86. Now that we're past that period of easy year-over-year comparison, the earnings hill will get harder to climb.

The profit boom looks even more mirage-like when you examine S&P profits in raw dollars. At its high point in Q3 2014, the S&P 500 had earned $943 billion in the previous 12 months. Three years later, the comparable number was $885 billion—or 6.2% lower. "Basically, we're just back to where we were at the previous peak," says Silverblatt of S&P.

Earnings per share have managed to stay flat partly because of a massive surge in share buybacks. But that's a departure from the norm that likely won't repeat. From Q3 of 2014 to Q3 of 2016, S&P members went on a rampage of stock repurchasing. "After their stocks took a big fall, they raised repurchases to extremely high levels," says Silverblatt.

A study of the S&P 500 by Research Affiliates finds that since 2012, buybacks have modestly boosted growth in earnings per share—adding around 0.16 percentage points per year. But that period has been highly unusual, the study concluded. Over the long term, new issuance exceeds repurchases by a large margin, eroding rather than bolstering EPS. From 1988 to 2017, the S&P 500 saw average dilution of 1.2% a year. That's because many big enterprises regularly issue more stock than they buy back, using the proceeds for repurchase of new shares from newly exercised options and vested restricted stock, for M&A, and for secondary offerings. Adding to dilution are IPOs that flood the market with new shares, funding the expansion of newly public companies that snatch profits from the established incumbents.

But annualized spending on buybacks has dropped by at least 15% from its high point last year, according to Silverblatt. And investors shouldn't count on another buyback boom. Given the long-term history of new issuance exceeding buybacks, it's more likely that future EPS could actually suffer from net dilution.

So if earnings growth has been so anemic, why have stocks continued to soar over the past few years—with the S&P 500 rising 29% since September 2014? "It's all multiple expansion," says Silverblatt, noting that the price-to-earnings ratio for the 500 has jumped over those three-plus years from 18.9 to the current, super-rich 24.3. Let's look at the S&P as one big company. Its current annualized earnings of $107 haven't budged in three years, yet its "price" has risen from 2,018 to 2,602. Hence, investors who three years ago paid less than $19 for $1 of earnings now pay $24.30—an extra $5.30, or an almost 30% premium, for a dollar of earnings.

Much of the bullishness driving that multiple expansion derives from enthusiasm about the tech sector. And indeed, tech is the star when it comes to profit growth. From Q3 2014 to Q3 2017, the sector boosted EPS by a phenomenal 31% while S&P 500's earnings overall remained flat. The jump wasn't primarily generated by annualized revenues, which rose a modest 11% per share over that period. The engine was an explosion in margins from 15.9% to 20.4%. By contrast, energy profits dropped over the same period by 76%, explaining in large part why EPS didn't budge overall.

The energy sector should rebound in 2018 because of the resurgence in oil prices. But it accounts for a surprisingly small portion of index earnings; Silverblatt reckons that the oil and natural-gas giants will contribute around 4% of the S&P 500's total in 2018. "The energy rebound is a nice tailwind, but it doesn't move the total much," he says. By comparison, tech is by far the dominant industry, accounting for around one-quarter of all S&P earnings. Financial services is No. 2, at approximately 18%.

The most powerful hit to profits will come from rising labor costs, which account for between two-thirds and three-quarters of all business expense. For years shareholders have garnered big returns while workers' incomes have remained flat. "Labor costs have been depressed for a long time, and that can't continue," says Zandi. "They will accelerate and cut into margins." That balance is already starting to flip. Today's 4.2% unemployment rate signals an extremely tight market for workers. The Department of Labor's Employment Cost Index calculates that total compensation rose at an annual rate of 2.51% in the third quarter of 2017. That's 1.2 percentage points higher than inflation, and far above the 1.77% increase in early 2014.

Let's step back and do a little math to see how this applies to stocks. Even if you hold on to some very bullish assumptions about the near future, the numbers argue that prices must come down. For example, let's assume that the S&P 500's P/E stays at its current elevated level. Then imagine that earnings drop from 9.5% of GDP to 8%—a figure that's still well above the historical average. In that scenario, the S&P 500 index would fall by 13%, even if economic growth meets expectations.

Earnings bulls invariably cite the recent, synchronized rise in global growth as a major boon to U.S. multinationals. And they're correct. What's mostly ignored is a heavy counterweight—the meager prospects at home. The S&P 500 is highly international: Around 30% of total sales, and 40% of profits,

flow from abroad. Increasingly, it's been fast-growing overseas operations supplying the juice. According to FactSet, S&P companies with more than 50% of their sales outside the U.S. raised their earnings 13.4% in Q3 of 2017 vs. the same quarter a year ago, compared with just 2.3% for those with more than half their sales in the U.S. Europe has turned from a millstone into a motor. Nike (NKE, +1.96%) recently reported seven straight quarters of rising sales in Europe. And DowDuPont (DD, +0.00%), Apple (AAPL, +1.00%), and McDonald's (MCD, +0.65%) all highlighted strong results in the most recent quarters from Europe, Asia, and emerging markets.

The dollar's 9% decline this year against a basket of global currencies helped greatly. But since the end of October, the greenback has stabilized and even gained slightly against the euro. The prospect of higher U.S. rates and lower corporate taxes is likely to arrest or even reverse the dollar's decline, curbing the recent pace of overseas profits.

Still, U.S. multinationals should benefit from robust growth abroad, especially in developing markets. The Organization for Economic Cooperation and Development (OECD) projects real global GDP of 3.7% in 2018. But non-OECD countries, including China, are forecasted to grow by 4.9% in aggregate, while the OECD estimates that U.S. GDP will grow just 2.5% next year. Among the top beneficiaries of this overseas growth story should be tech titans such as Apple, Google, Facebook (FB, +0.51%), and Amazon (AMZN, +1.95%). Technology is by far the most global sector in the S&P, garnering no less than 60% of revenues from abroad. "U.S. tech companies have tremendous market power globally," says Zandi. "Google and Facebook have 60% of all ad revenue. That power will continue to grow."

Chiefly because of tech's global strength, Zandi predicts that foreign profits for the S&P 500 will grow faster than U.S. national income. But he also projects that domestic earnings will lag GDP. The bottom line: The domestic drag will offset the global boost, so that future profits will simply track the economy. Even in a tech-driven global world, it comes back to cold, hard math.

Zandi's scenario isn't exciting, but unlike the Wall Street consensus, it makes sense. In 1999, Warren Buffett wrote an influential article for Fortune arguing that corporate profits as a share of GDP tend to go far higher after periods where they're depressed—and drop sharply after they've been hovering at historically high levels. So whom should you believe? Today's Wall Street crowd, or Buffett and Friedman? When two such sages agree, you should think twice before following the herd in the other direction.

A version of this article appears in the Dec. 15, 2017 issue of Fortune with the headline "When Will the Profit Boom Fizzle?"

How on Earth Can Profits Grow at 10% in a 2% Economy?

Fortune

By SHAWN TULLY July 27, 2017

Can profits really grow in double-digits in an economy bumping along at 2%?

http://fortune.com/2017/07/27/profits-economic-growth/

That's the question that investors should be asking, and instead ignore at their peril. We've all heard the Wall Street bulls' mantra, endlessly advanced by analysts and market strategists, that a renewed surge in profits will keep equity prices waxing. The current consensus among analysts forecasts that reported S&P earnings-per-share will jump from $100.29 in Q1 of 2017 (based on the past four quarters) to $133 by the end of 2018, an annualized increase of over 18%.

Of course, those consensus forecasts are always inflated. But even if we discount those projections by 45%, the bulls are still expecting 10% gains in EPS over the the seven quarters spanning Q2 2017 to Q4 2018.

But recent history, and projections from every agency from the IMF to the CBO, foresee GDP growth in the 2% range, or 4% including projected inflation, well into the future. So how can the profits expand 6 points faster than the overall economy that drives the sales that largely determine the course of those profits?

It's clear that over long periods, growth in profits and GDP are closely linked. But that's not necessarily the case in shorter timeframes. If EPS are stuck well below trend for an extended period, earnings can rapidly expand to regain their historic levels. But today, profits are hardly depressed. It's the opposite: Two key metrics confirm that earnings are extremely high by historical standards. On average, corporate profits have averaged 7.5% of GDP since 1951. Today, they absorb 9.2% of national income. How about margins? They're lofty as well. For the Fortune 500, the ratio of profits to sales was 7.4% in 2016, more than 2 points higher than the average over the 64 year history of the list, and the fourth highest annual reading.

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Hence, the most likely outcome is that profits at best expand at the less-than-thrilling rate of GDP.

What does that mean for the future of stock prices? Let's assume that today's price-to-earnings ratio remains at the current, and extremely high, 24.6. Haven't heard that figure? That's the one in the books, the ratio of the current S&P 500 average of 2464 to 12-month, reported annual earnings of $100. In other words, what companies actually earned. The 18 multiple more routinely cited is bogus. It's based on the bluebird prognosticating that "forward" profits will reach $133 in seven quarters, a mathematical impossibility.

At a PE of almost 25, the S&P is producing $4 in earnings for every $100 you spend on stocks. You receive $1.90 of that $4 in dividends, for a puny yield of 1.9%. A constant PE of 25 predicts a total "real" return of the inverse of that ratio, or 4%. In addition to the 1.9% dividend yield, the other 2.1% comes in the form of profit gains that drive equivalent capital gains––quite reasonable given current projections of overall economic growth. The total comes to 6%, including 2% inflation. That's nowhere the double-digit future the earnings bulls are projecting, but with the 10 year treasury at 2.33%, it's not bad.

Or is it? The risks that future returns will fall far below our benchmark of 6% over the next decade are a lot greater than the chances they'll exceed that bogey. Since corporate profits are well above historic averages, they could finish in three or four years right where they are today, repeating the scenario since 2013. That's the danger signal flashed by the cyclically-adjusted price-earnings multiple developed by economist Robert Shiller, a yardstick that smoothes the peaks and troughs in earnings to get a normalized multiple; today, profits according to the CAPE are so far above normal that the CAPE adjusted PE looms at a terrifying 30.

Nor will low rates help. John Hussman of the Hussman Funds stated in a recent article that "if low interest rates emerge as a consequence of low expected nominal growth...prospective returns will be lower," because low economic growth causes both low interest rates and low profit growth. They're the stock market's ham and eggs. Hussman is projecting a 0 total return for the S&P over the next decade.

Hussman makes a crucial point on the interaction between rates, economic growth and gains in profits. All three are closely aligned over any extended period. It's sub-par economic growth that causes both low real rates and sluggish profit growth. So low rates shouldn't be a boon to stocks at all if they're signaling a mediocre business climate ahead, as is usually the case. As Hussman points out, the benefit of the "low discount rate" is fully offset by the slower growth in earnings. So flagging growth and declining rates cancel each other out.

It's true that a fall in real rates swells multiples. But that game is over. Now we're left with hugely expensive PEs that will saddle folks buying equities today with extremely low returns. That's the curse of mid-20s PEs.

Why, then, do stocks keep soaring? For Hussman, it's all about a speculative frenzy, an "overvalued, overbought, overbullish syndrome." The market keeps defying his warnings, but one thing is certain: A future where EPS grows at 10% in a 4% (2% real) economy, where profits gallop while GDP lopes, is a Wall Street fantasy.

# Corporate Profits Are Soaring. Here's Why It Can't Last

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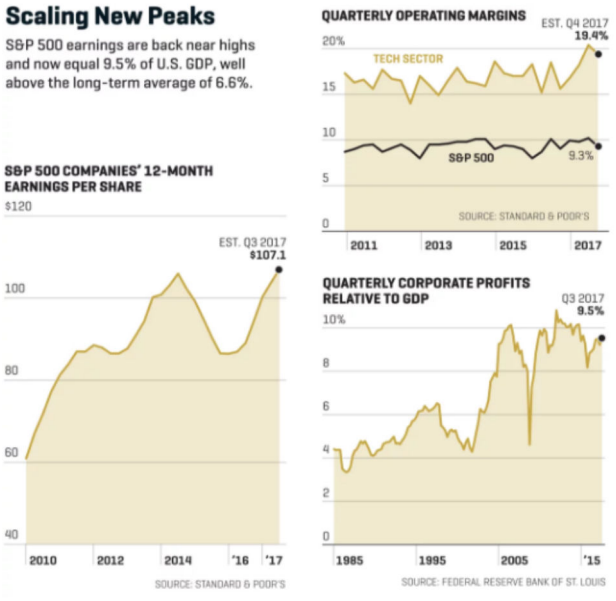


Nic Rapp

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June 2020

# Looking ahead

## Intermediate projections of the economy and capital markets – five-year outlook

**Louis D. Finney**, Co-Head of Strategic Asset Allocation Modeling
**Michele Gambera**, Co-Head of Strategic Asset Allocation Modeling

The equity rally that retraced much of the February through March drop signals that the market is pricing in a relatively quick economic rebound from the COVID-19 pandemic. However, many are concerned that the market has gotten ahead of economic realities. Is the crisis going to last two more months or will a second and third wave disrupt the economy into next year? Is there a distinction between the capital markets and underlying economic disruption? What will asset returns look like along these different paths? With tens of millions – probably hundreds of millions across the globe – now unemployed, there is a long road back.

In this paper we provide two sets of analyses of the possible outcomes over the next five years. In Part I, we use basic scenario analysis to lay out the range of possible economic and market outcomes with four different scenarios (Bull, Base, Stagnation and Stagflation) over the next five years. Although our focus in this section is on the United States, the analysis is representative of the broader global experience faced by developed and emerging markets. In Part II, we present an update of our capital market assumptions and discuss what has changed since their previous iteration in June 2019. In this section, we take a broader global view across the spectrum of investable assets.

## Backdrop

As the pandemic crisis resolves, some industries may quickly bounce back to something very recognizable. Other industries – such as airlines, cruise lines, hotels, restaurants, sporting events, theater, concerts, and public transportation – may be impaired for a lot longer as we struggle to find a new balance. The impact on real estate is uncertain. Certainly, there is a short term hit to some sectors (namely, high density urban centers) and a benefit to others (suburban office parks), but we doubt the hit will be permanent in these real estate categories. The density of urban centers may decrease, but we believe that they will always have a certain dynamic element to them because of the economies of scale and high networking benefits.

Balancing disruption is innovation. We already see the creation of new businesses and models from low tech to high tech: personal protection equipment (masks and Plexiglas panels), video conferencing, and telemedicine. Moreover, interest in the biosciences has increased and new supply chains will be built.

One key drag on growth will be the continued deglobalization that began in the mid-2010s. A huge wave of globalization started in the post-WWII reconstruction period and was sustained by a series of positive shocks: for example, the fall of the Berlin Wall in the late 1980s and the entry of China into the WTO in the early 2000s. However, after the Global Financial Crisis (GFC), the appeal of free trade and immigration faded and reversed in the mid-2010s. At a minimum, we expect further deglobalization with tighter border controls and movement of strategic supply lines closer to home markets. In the long run, we believe that the drop in the expected growth rate will be minimal because there has been no destruction of physical capital and human capital has not diminished, though it may take quite a while for the markets to absorb and reallocate both factors.

Another drag on growth in the short run is the growth of precautionary savings by households. A lot of people will likely spend less and we already see the savings rate rising as they build a reserve fund for emergencies. This should put pressure on short term rates to stay low as this stock gets build up. Offsetting this are corporations which are systematically dissaving.

The pro-active policies of the central banks in an effort to stabilize the credit markets have been a substantial development. Credit spreads immediately tightened and inspired rebounds in the equity market before any of these facilities were operational. This response has taken some of

the refinancing risk and solves several liquidity problems, but many firms have long-term solvency issues that only an orderly restructuring can resolve.

Finally, the huge increase in government deficits across the globe is a natural reaction to the resulting slowdown from the COVID-19 pandemic, though perhaps unprecedented in size and speed. The market is pricing in very little inflation risk premium. But this could change; for example, if policymakers over-stimulate amid supply-side constraints, inflation pressures could emerge.

## Part I: Deterministic scenario projections

We present four sets of projections of the economy and capital markets.

**Bull Case**

– The global economy and capital markets quickly return to the pre-pandemic world of moderate growth and low inflation, potentially as a result of a successful vaccine. The economy and markets re-adapt quickly. Few permanent disruptions occur, as airlines, hotels and other vulnerable industries survive much in their current form.

**Base Case**

– Growth returns in the latter half of 2020 and gradually trends back toward normal growth. Some de-globalization, lingering outbreaks of COVID-19 and precautionary behaviors by consumers and businesses hamper growth initially. Inflation starts low and rises back toward trend.

**Stagnation**

– This is a combination of sluggish growth and low inflation – Japanification. The economy rolls out of the pandemic-induced recession with a burst of growth, but this quickly subsides and continues at a low level.

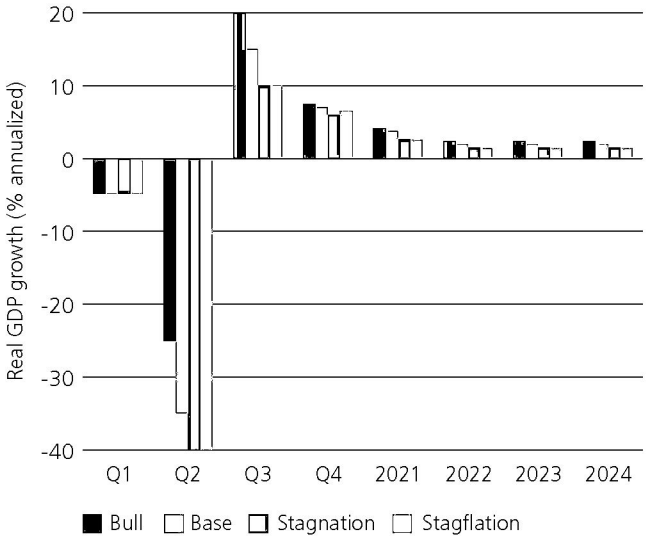
**Stagflation**

– We model this as a combination of a sharp recession followed by low growth and rising inflation. Supply-side constraints limit growth and ultimately trigger inflationary pressures. Eventually, bond vigilantism reappears as investors become nervous about inflation and higher interest rates. Central banks struggle with the direction of monetary policy: higher interest rates to fight inflation or lower interest rates to spur the economy.

While our research encompasses a large range of asset classes around the world, for simplicity we present scenarios focusing on the United States as the representative economy. The projections here can be extended to many regions without loss of direction and magnitude.

The following graphs show the paths of growth across the four scenarios. (These should broadly represent most of the developed world and many emerging markets.)

**Real GDP growth across scenarios**




Source: UBS Asset Management. Data as of 30 April 2020.

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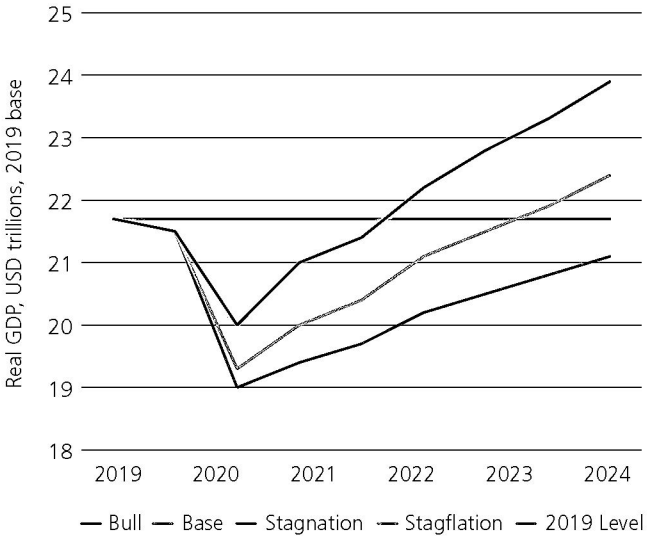



Source: UBS Asset Management. Data as of 30 April 2020.

Real GDP in the US peaked in the fourth quarter of 2019 at $21.7 trillion and contracted sharply thereafter. In our Base case, we project real GDP will remain below $21.7 trillion until late 2022. In the Bull case, we expect that it will be early 2021, but in both our Stagnation and Stagflation cases, which have near identical levels of growth, it will take years to recover.

In all the scenarios, we expect the normal measures of inflation to decline sharply in the coming months. In the Bull case, it rebounds to a 2.0% level and the Fed starts to raise rates in 2023. In the Base case, inflation is slightly below most Central Banks' target levels (2.0%, usually). In the Stagnation case, it is initially low and stays low. In the Stagflation scenarios, inflation starts low, but aggressive monetary and fiscal stimulus triggers higher inflation, which creeps up and disrupts the markets.[1]

Now, let's extend these economic fundamentals to pricing in the capital markets for the four scenarios. First, below is a set of paths for the fixed income market.

In most scenarios, we expect the Federal Reserve to keep short interest rates low and on hold well into 2022, with the most likely hikes not occurring until at earliest 2023. And we don't expect the 10-year bond yield to get near its highs seen in 2018 (less than two years ago it was over 3.0%!). The Fed has several reasons to keep rates low: a historic recession with unprecedented levels of slack in the labor market and huge budget deficits that need to be financed. In recent communications, the Fed has indicated that they are willing to have inflation above their target level of 2% for a period of time in order to achieve full employment. We expect they will apply this in the coming future.

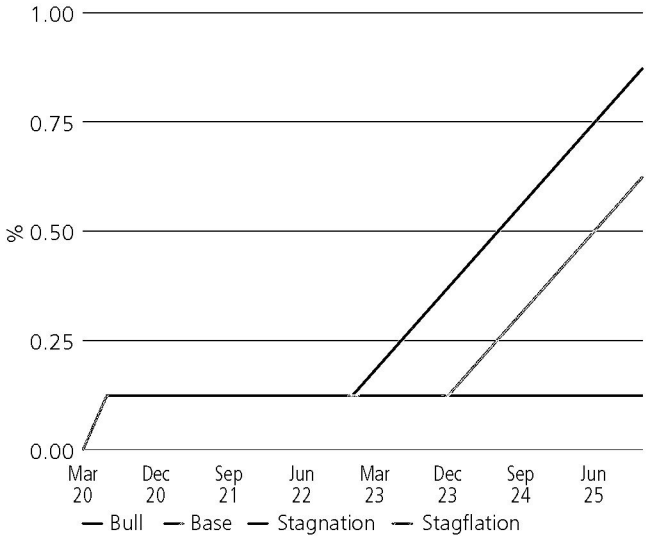
One difficulty in modeling the Stagflation scenario is the reaction of the Fed. We have the Fed being somewhat cautious here and focusing more on employment than inflation; thus, we model T-Bills rising modestly and lagging inflation. However, a more aggressive, hawkish Fed is clearly possible over time. A key question is how the Fed will react: does it suppress the yield curve to support weak growth or does it raise rates to trim inflation expectations starting to accelerate?

In our Base case, we expect 10-year government bond yields are steady through the next few months and then gradually rise as the economy shows moderate to strong growth. In our Stagnation case, we expect rates to stay low through the projection period.

After rising sharply earlier this year, credit spreads narrowed in March and April, especially in the US where the Fed established programs to buy a wide array of bonds to keep interest rates low, facilitate easier refinancing, and provide liquidity to stressed markets. In our Base Case we expect the recovery to be slower than what the market currently is pricing and we expect ongoing volatility in the credit market as the economy confronts challenges with restarting.

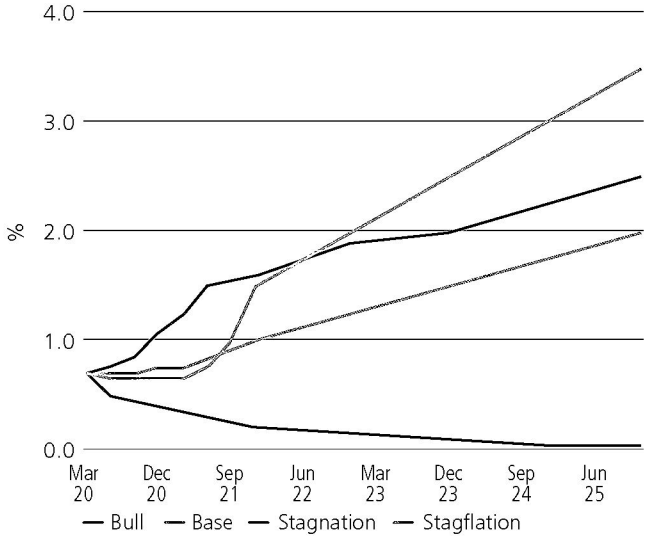
1 Inflation deserves a special note in the short run. In normal times, the basket of goods that are included in the definition of the consumption basket is stable. But in times of huge disruption, the measure of inflation may be difficult to interpret, potentially even misleading. How do we incorporate goods for which demand is plummeting (airfares and restaurant dining) with goods surging in demand (personal protection equipment)?

**Projected US 1-month T-Bill yields by scenario**




Source: UBS Asset Management. Data as of 30 April 2020.

**Projected US 10-yr yields by scenario**

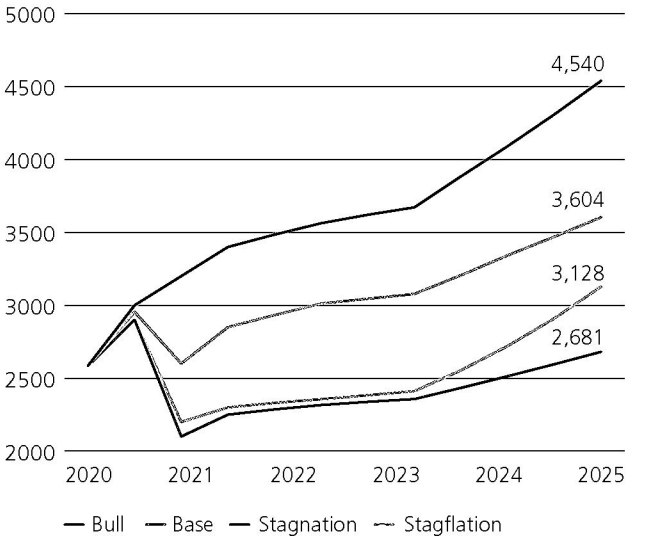



Source: UBS Asset Management. Data as of 30 April 2020.

In the equity market, we lay out the potential paths for the S&P 500 price level. Our Base Case projection has a renewed growth in equities after a near-term drop due to on-going stumbles as the economy recovers. We don't doubt that there is a long period of growth ahead of us; we just expect it to be bumpier than indicated by the recent rally. In the Bull case, we quickly reach new highs due to economic strength resulting from fiscal and monetary stimulus. In the two bearish cases, we don't reach the February highs for many years.

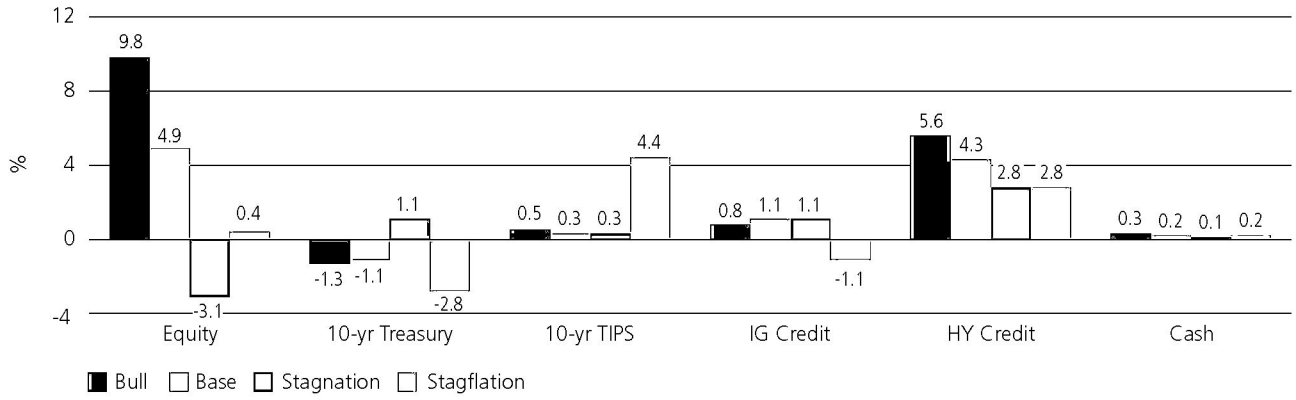
On a cumulative return basis over the five years ending June 2025, we project the following sets of returns in nominal and real terms.

**Projected S&P 500 price levels across scenarios**



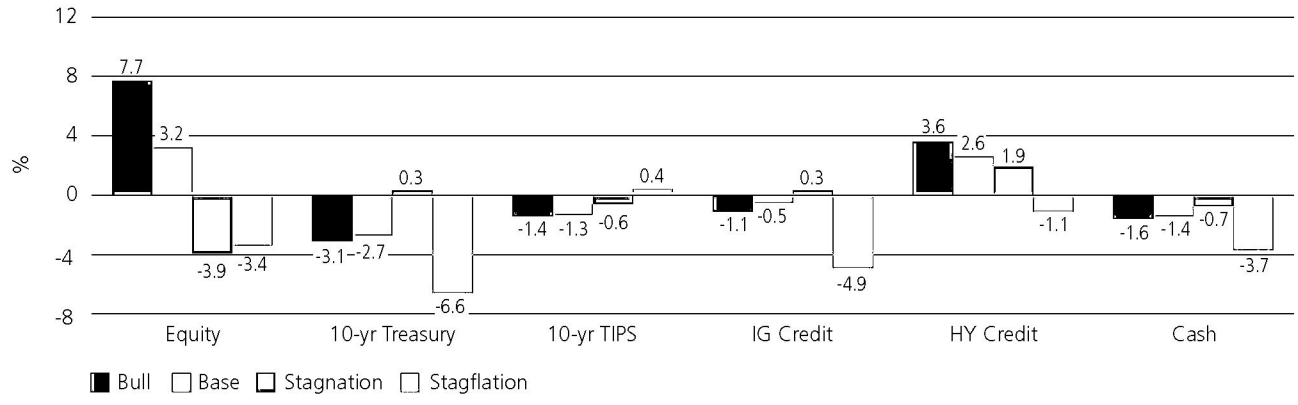

Source: UBS Asset Management. Data as of 30 April 2020.

**Five-yr nominal returns through June 2025**




Source: UBS Asset Management. Data as of 30 April 2020.

**Five-yr real returns through June 2025**




Source: UBS Asset Management. Data as of 30 April 2020.

Some observations:

- Despite the low starting yields, the possible return upside for Treasuries in the short run is the Stagnation case. The first year of this scenario has Treasuries earning a positive return and looks even better in real terms.
- Notice that TIPS perform best in the Stagflation scenario. Initially, the returns are poor as the economy bounces back and experiences a modest rebound. It really takes off in the 'out years' as inflation builds to levels higher than anticipated.
- High yield bonds look good in all the scenarios because of the high starting yield. Spreads continued to tighten into May, so the expected returns have declined.

## Stock-bond correlation

One key area that we want to highlight across these scenarios is the stock-bond correlation. Over the last 22 years, the returns of stocks have been negatively correlated with the return on Treasury bonds. (In general, this is true for most developed countries, but there are exceptions such as Canada, Australia and several emerging market countries).

We believe that there is an increased likelihood that this negative correlation will break down sometime in the next five years. First, with central banks committed to low interest rates, QE, and potentially yield curve control, the correlation would go to zero because short-term rates would remain constant. Then, if inflation creeps up, investors will likely start to shun bonds, pushing yields up through the auctions (though central banks will not allow significant increases and will buy up the bonds to keep rates low). At some point central banks may relent and at least allow the yield curve to steepen in order to accommodate inflation risk premiums for holding longer dated bonds. In this case, we believe we would see a reversal and a positive stock-bond correlation.

The historic data indicate that the stock-bond relationship is regime dependent. The critical threshold is sustained 2.5% inflation; below this, we expect the relationship to be negative; above this, there has been a positive stock-bond correlation.

These scenarios provide a range of market events that investors need to prepare for. These scenarios not only affect returns, but the potential relationship of stocks and bonds as well as the relative performance of asset classes.

## Global implications for returns

With adjustments, these scenarios project to other major markets and produce similar results, though the level may vary depending on local valuation, interest rates and policy reactions.

One major adjustment is for valuation outside the US. Non-US equity markets have done worse than the US, but we expect a rebound, as not only the markets are cheaper, but their currencies are as well.

Normally, in scenario analysis, it is difficult to comment on the direction of currencies. Currency performance is about relative performance. For example, if one region is growing more strongly than the other, the currency will typically appreciate relative to the other, though underlying fundamentals will alter this drift and rate. We will address our expectations for currency in our five-year capital market assumptions in the following section.

The negative stock-bond correlation appears to be robust for the US, Japan, Europe, and the non-commodity emerging markets. Again, until we see a burst of sustained inflation, we don't expect the relationship to turn positive.

| Scenario | Stock-Bond Correlation | Implications |
|---|---|---|
| Bull | Stock-bond correlation **remains negative** as inflation does not go above 2.5% for an extended time period. | Diversified portfolios continue to provide low volatility and consistent returns. Risk-on/risk-off positioning has a natural hedge. |
| Base Case | Stock-bond correlation remains generally negative, but with yield curve controls, this may **drift towards zero**. | Bonds offer less diversification than has been the case of the last 20 years, increasing complexity for risk management. |
| Stagnation | Stock-bond correlation becomes **less stable**. At times this can be negative (with flight-to-quality events), but because of lower bounds, the relationship can drift to zero as well. | Diversified portfolios will be subject to more volatility as the stock-bond correlation is erratic. Investors take on more risk (higher exposure to credits over sovereigns, for example) to increase yield and expected return. |
| Stagflation | Initially, the stock-bond correlation remains negative, but as additional stimulus programs get rolled out and budget deficits rise, inflation rises as well. Short term rates are kept low for a while as central banks are conflicted on which front to fight: inflation or low growth. When inflation rises to 2.5% and is expected to stay there, we get an **eventual change to a positive** stock-bond correlation. | Risk management for traditional stock-bond portfolios becomes more difficult, requiring real or alternative assets to hedge against inflation.<br><br>Although nominal returns start to rise, in real terms the markets do poorly. Enhanced risk controlled techniques needed; disciplined volatility management. |

# Part II: Capital Market Assumptions Update

UBS Investment Solutions provides estimates of capital market returns across a wide array of asset classes and from multiple currency perspectives.[2] For this paper, we focus on our 5-yr Baseline expected geometric returns. These 5-yr Baseline estimates closely match the Base Case in the deterministic scenario projections provided above. They are built to be very consistent with each other.

Our last publication highlighted our June 2019 assumptions. Since then, equities ended the decade with an admirable 10-year record and momentum continued with new highs into February.

Then the pandemic hit and the equity markets dropped more than 30% before rallying sharply. Government bond yields across all maturities declined in the US – which lowered expected return in local terms. Credit markets have had surprising ups and downs, but are still at relatively wide levels going into the end of May.

The main updates in our five-year capital market assumptions compared to our mid-2019 report are:

- Expected equity returns in nominal terms are higher, as valuation is improved.
- Government bond yields are even lower, so expected returns are lower. European yields did not drop as much as US yields, but were lower to start with.
  - In general, we lowered expected 10-year yields in developed countries in 2025 by 0.4% to 1.1%. This has offset some of the drop in yields in projected returns.
- Credit spreads are higher due to higher default risks, but returns are more attractive relative to governments. They bottomed out in early January 2020 before ballooning late in the first quarter of 2020. They tightened significantly in April and into May.
- The dollar appreciated against most, but not all currencies. Emerging markets had extremely large depreciations (Brazil -29.2% for example). In general, we view the dollar as overvalued against both developed market and emerging market currencies.

**Global asset class returns**

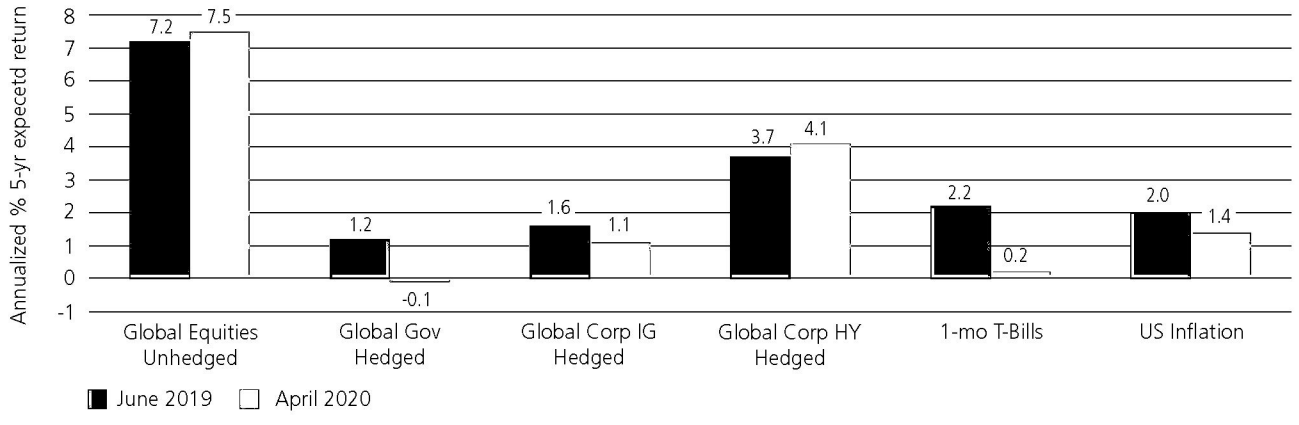
In nominal terms, the expected return of equities rises to 7.5%[3] in unhedged USD terms, an increase of 0.3% from the June 2019 version. A portfolio of global government bonds is expected to return -0.1% in hedged USD terms, a large drop from the 1.2% in June 2019. Global credit drops from 1.6% to 1.3% and high yield bonds grows from 3.7% to about 4%. Cash declines the most, dropping from 2.2% to 0.2%.

In general the expected returns for risk markets have improved while the expected returns for safe assets have declined. The improvement for equities is due to improved valuations (i.e., equity prices falling more than discounted future earnings). For most markets, this improvement is quite large, but it is somewhat offset by declines in expected growth and inflation. US Large Cap equity is one significant outlier to this, as this expected return declines due to the large bounce back in valuations. US large cap returns fell to 4.9%; the valuation improvement since last June (0.5% increase) is offset by lower expected inflation (0.6% decline) and decline in aggregate earnings growth (a 0.1% decline).

In inflation-adjusted terms, prospective returns in April 2020 look a bit better than the pure nominal rates indicates. With lower inflation, the real return is boosted. In the short run, it is possible that with negative inflation and unchanged bond rates, real returns could be 2% to 3%, well within its historic performance.

[2] We provide Equilibrium, 5-yr and 10-yr estimates of the capital markets that will vary over time. By far, the most interest from clients is on our 5-year expectations.
[3] Our convention is to report equity returns in unhedged terms and fixed income in hedged terms.

**Five-year expected returns in USD terms**

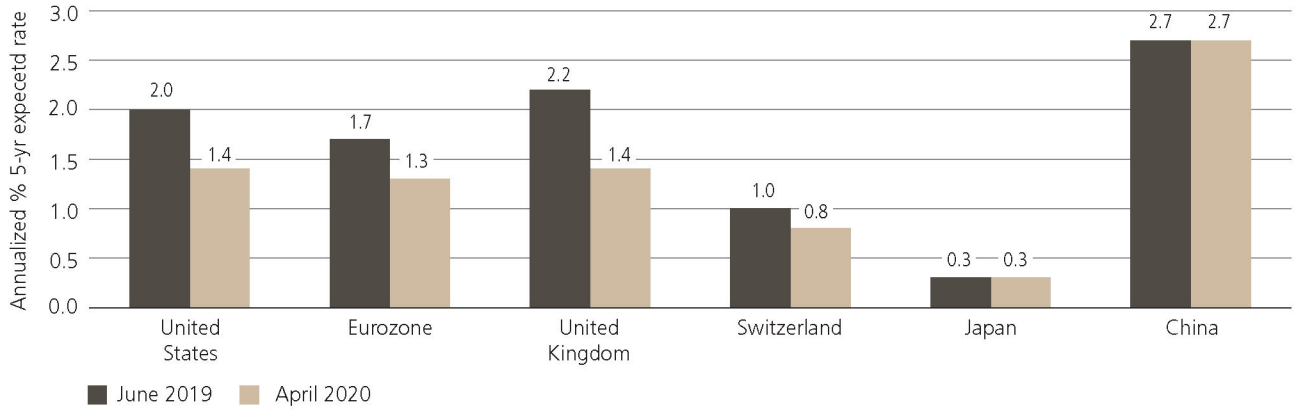



Source: UBS Asset Management. Data as of 30 April 2020.

**Economic fundamentals**

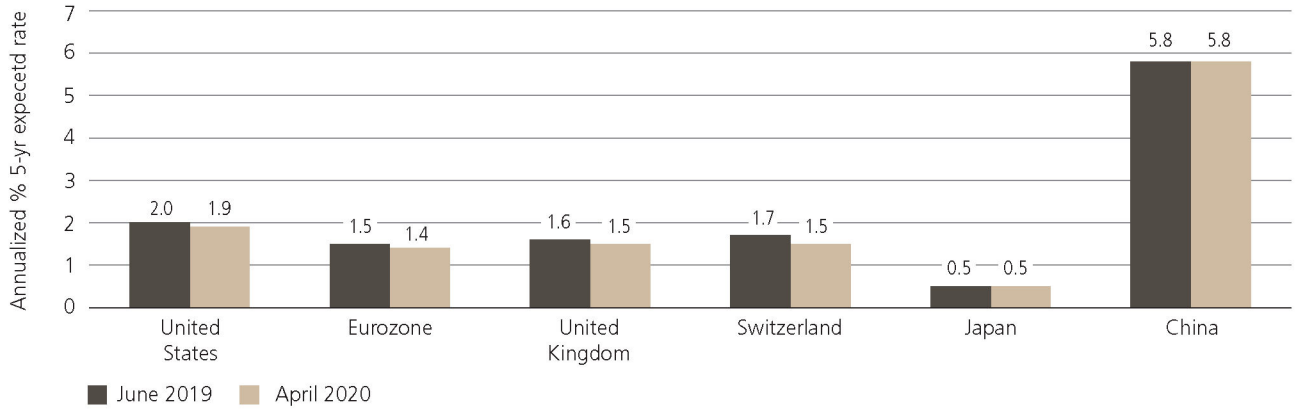
Our estimate of expected inflation dropped sharply in the last ten months. The 10-year breakeven inflation rate for the US, for example, declined from 1.7% in June 2019 to 1.1% at the end of April and reached a low of 0.9% in March.

**Five-year expected inflation**




Source: UBS Asset Management. Data as of 30 April 2020.

**Five-year expected growth**




Source: UBS Asset Management. Data as of 30 April 2020.

## Equities

Over the last 10 months, there were wide variations in equity returns. The S&P 500 dropped 10.8%, but the Eurozone, UK, and Australia had larger declines (19.9%, 21.7%, and 21.3%, respectively). Japan and Switzerland had smaller declines than the US. The emerging markets dropped 18.2% in USD terms. China was one of the better equity market performers since last June, as their market fell earlier and recovered earlier.

For prospective returns, our 5-year Baseline estimates in local nominal terms have increased with the glaring exception of the US where returns are down slightly. For the US, the prospective valuation improves, but this is exactly offset by a lower inflation rate and growth path. Interestingly with inflation declining, expected real returns have generally increased.

There are some large increases in expected equity returns in USD terms for several regions: Eurozone, UK, China[4], and Australia. Most of the gain is through expected currency appreciation, as the dollar has soared in the last 10 months. We expect the large increase in the dollar in the last 10 months to abate and reverse slightly.

Emerging market countries are expected to have the higher return, but this is accompanied by the highest risk as well.

**Equity market 5-year expected returns**

| | June 2019 | | April 2020 | | Real returns of Unhedged USD | |
|---|---|---|---|---|---|---|
| | Local | USD Unh | Local | USD Unh | June 2019 | April 2020 |
| US Large Cap | 5.1 | 5.1 | 4.9 | 4.9 | 3.1 | 3.5 |
| Eurozone | 8.3 | 9.1 | 8.6 | 10.5 | 7.1 | 9.1 |
| Switzerland | 7.3 | 7.3 | 7.2 | 7.7 | 5.3 | 6.3 |
| United Kingdom | 8.6 | 9.5 | 8.7 | 10.6 | 7.5 | 9.2 |
| Japan | 5.7 | 8.3 | 5.9 | 8.6 | 6.3 | 7.2 |
| China | 8.2 | 8.0 | 11.3 | 11.4 | 6.0 | 10.0 |
| Australia | 8.5 | 8.7 | 9.4 | 10.2 | 6.7 | 8.8 |
| Canada | 6.8 | 7.6 | 7.0 | 8.5 | 5.6 | 7.1 |
| Global | | 7.2 | | 7.5 | 5.2 | 6.1 |
| Developed Markets | | 6.6 | | 6.8 | 4.6 | 5.4 |
| Emerging Markets | | 11.2 | | 11.8 | 9.2 | 10.4 |
| Dev Mkts x US | | 8.7 | | 9.6 | 6.7 | 8.2 |
| Inflation | | 2.0 | | 1.4 | | |

Source: UBS Asset Management. Data as of 30 April 2020.

4 Our expected equity return for China increased because we only recently started to overlay a valuation metric with our April assumptions. The June 2019 estimate was based purely on expected inflation, earnings growth and dividends only.

**Fixed income**

In the last ten months, government bond yields in the developed markets dropped for most countries. In particular, the US saw its 10-year Treasury yield drop from 2.0% to 0.7% – one of the largest drops – and most other DM nations saw more modest declines. Germany saw only a 0.1% decline in already negative 10-year Bunds and the UK 10-year Gilt dropped 0.5%. Switzerland and Japan recorded slight increases.

In developing our intermediate views we have lowered the path of bond yields in the developed markets in the last ten months. In general, we have lowered them anywhere from 40 bps to 100 basis points.

**10-year Government Bond yields and expected changes**

| | June 2019 baseline | | | April 2020 baseline | | |
|---|---|---|---|---|---|---|
| | Starting yield | In 5 yrs | Rise in yields | Starting yield | In 5 yrs | Rise in yields |
| US | 2.0 | 3.1 | 1.1 | 0.6 | 2.0 | 1.4 |
| Australia | 1.3 | 2.5 | 1.2 | 0.9 | 1.8 | 0.9 |
| Canada | 1.5 | 2.9 | 1.4 | 0.5 | 2.0 | 1.5 |
| Germany | -0.3 | 0.9 | 1.2 | -0.5 | 0.5 | 1.0 |
| France | 0.0 | 1.2 | 1.2 | -0.1 | 0.8 | 0.9 |
| Italy | 2.1 | 2.2 | 0.1 | 1.8 | 2.1 | 0.3 |
| Spain | 0.4 | 1.6 | 1.2 | 0.7 | 1.5 | 0.8 |
| Japan | -0.2 | 0.4 | 0.6 | 0.0 | 0.4 | 0.4 |
| Switzerland | -0.6 | 0.9 | 1.4 | -0.5 | 0.4 | 0.9 |
| UK | 0.8 | 2.5 | 1.7 | 0.2 | 1.5 | 1.3 |
| China | 3.2 | 3.5 | 0.3 | 2.5 | 3.0 | 0.5 |

Source: UBS Asset Management. Data as of 30 April 2020.

**Fixed income (continued)**

For the US, our expected returns on holding a government bond index for 5-years have fallen the most from 1.0% to -0.7%. Other countries – Switzerland, for example, have expected returns in CHF terms rise from -3.1% to -2.4%.[5] Credit spreads narrowed sharply going into the New Year, then widened to recession levels in a period of weeks and now have fallen back. On net, the expected return to investment grade credit has declined, but looks attractive relative to sovereigns.

In the credit markets, both investments grade and high yield credits rallied significantly in April and May, with IG option-adjusted spreads narrowing from 255 to 165 bps and high yield spread narrowing from 880 to 634 bps. This has produced two month returns of 6.3% for IG bonds and 9.1% for high yield. Consequently, we have updated our estimates of credit returns to reflect the end of May.

**Selected bond market returns 5-yr baseline**

| | June 2019 Baseline | | April 2020 Baseline | |
|---|---|---|---|---|
| | 5yr Local | 5yr Hdg USD | 5yr Local | 5yr Hdg USD |
| **Government Bonds** | | | | |
| US Treasuries | 1.0 | 1.0 | -0.7 | -0.7 |
| Australia Gov | 0.1 | 0.8 | 0.0 | 0.1 |
| Canada Gov | 0.2 | 0.5 | -0.8 | -1.0 |
| Eurozone Gov | -0.8 | 1.6 | -0.6 | 0.2 |
| Japan Gov | -1.0 | 1.3 | -0.5 | 0.0 |
| Switzerland Gov | -3.1 | -0.3 | -2.4 | -1.4 |
| United Kingdom Gov | -2.1 | -0.7 | -2.4 | -2.5 |
| Global Government | -0.2 | 1.2 | -0.5 | -0.1 |
| **Other Markets** | | | | |
| US Corporates | 1.4 | 1.4 | 1.0[1] | 1.0[1] |
| US High Yield | 3.7 | 3.7 | 4.2[1] | 4.2[1] |
| US TIPS | 1.5 | 1.5 | 0.2 | 0.2 |
| EMD Hard Currency | 4.5 | 4.5 | 7.3 | 7.3 |

[1] Updated to reflect change in spreads in May
Source: UBS Asset Management. Data as of 30 April 2020.

[5] When we look at real terms or excess return terms, things look better, but there still has been a decline in many markets.

## Cash markets

In general, cash rates[6] have fallen sharply across the globe in both real and nominal terms in the last ten months, with the biggest drop coming at the end of the period. Countries with some room for them to drop (the US and many emerging markets) saw large declines in 1-month to 3-month yields. The US 1-month Bill rate dropped from 2.32% to 0.05%--a significant move in this market. The exceptions are Europe and Japan; European bill rates actually rose slightly and Japan's rates dropped only 6 basis points (a relatively large move for Japan).

The emerging markets mirrored the developed and there were sharp declines in countries with already high rates (Brazil, Mexico, South Africa) and more modest declines in countries with limited room for decreases (Korea, Taiwan). Turkey and Argentina, in particular, had large declines, recovering some from their dismal experiences in 2019.

**Five-year expected return from rolling 1-month Treasury Bills**

| | Expected 5-yr T-Bills returns | | Expected 5-yr inflation | | Expected 5-yr real cash returns | |
|---|---|---|---|---|---|---|
| | June 2019 | April 2020 | June 2019 | April 2020 | June 2019 | April 2020 |
| United States | 2.1 | 0.2 | 2.0 | 1.4 | 0.1 | -1.2 |
| Eurozone | -0.2 | -0.4 | 1.7 | 1.3 | -1.9 | -1.7 |
| China | 2.6 | 1.5 | 2.8 | 2.7 | -0.2 | -1.2 |
| United Kingdom | 0.7 | 0.4 | 2.2 | 1.4 | -1.5 | -1.0 |
| Japan | 0.0 | -0.2 | 0.3 | 0.3 | -0.3 | -0.5 |
| Switzerland | -0.5 | -0.3 | 1.0 | 0.8 | -1.5 | -1.1 |
| South Korea | 1.8 | 1.0 | 2.0 | 1.4 | -0.2 | -0.4 |
| Taiwan | 1.0 | 0.3 | 1.9 | 1.2 | -0.9 | -0.9 |
| Brazil | 5.5 | 3.1 | 4.2 | 3.2 | 1.3 | -0.1 |
| Mexico | 7.1 | 5.3 | 3.3 | 2.7 | 3.8 | 2.6 |
| South Africa | 6.4 | 4.1 | 4.5 | 4.1 | 1.9 | 0.0 |
| Turkey | 19.6 | 8.5 | 11.5 | 9.5 | 8.1 | -1.0 |

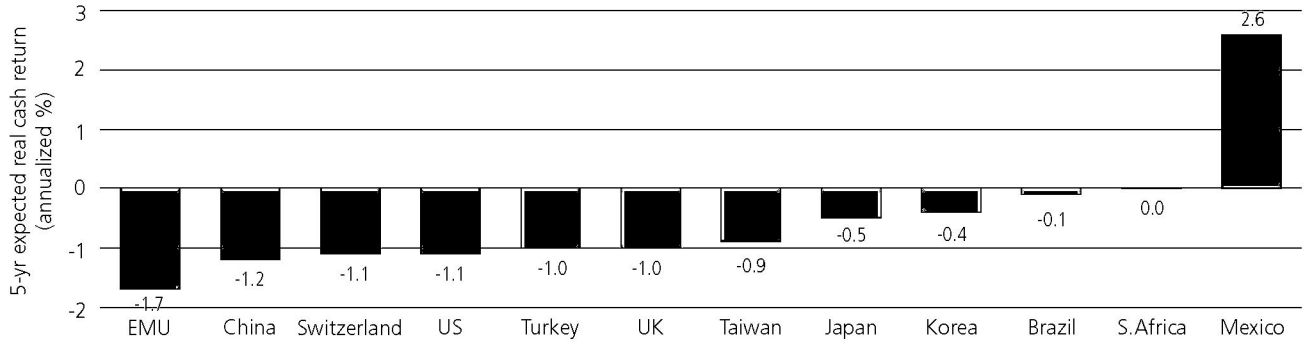
Source: UBS Asset Management. Data as of 30 April 2020.

[6] We follow several rates in the cash markets. Traditionally, we have used the 3-month Libor rate or an equivalent rate since this has been an important benchmark that is widely available for all currencies. With the transition away from Libor, we will also focus on 1-month, 3-month government bill and 1-year government bond rates where available and extrapolate them to all countries. 1-month bill yields are excellent estimates of what money market funds return, so they play an important role for investors needing the highest degree of liquidity. Libor rates and other deposit rates better estimate hedging costs in currency markets as well as what investor must pay to leverage or short positions. Another key rate that we follow is the 1-year government yield, as it is used in UBS's valuation calculations.

**Cash markets (continued)**
We expect real cash rates to be negative for quite a while. Rates will likely stay low as central banks will be reluctant to tighten prematurely.

Another development in the cash markets was a huge increase in risk premiums on the credit side. Libor rates (and other short rates with credit risks) saw increased spreads over government bill rates, but have subsided into April and May.

**Five-year expected real cash returns**




Source: UBS Asset Management. Data as of 30 April 2020.

## Currencies

In the past ten months the US dollar rose against almost all currencies with the DXY gaining 3.0%.

Several emerging market countries had substantial currency declines: for example, Argentina (-36%), Brazil (-29%) and South Africa (-23%). Two developed market economies that had large declines were Norway (-17%) and Australia (-7%). The Japanese yen and the Swiss franc ended up with small changes relative to the US dollar, while the euro dropped about 4.0%.

Overall, we view the US dollar as overvalued on a long run basis against the EUR and EM currencies. As a result we expect the USD to decline slightly in the coming years, partly as a result of the flight-to-quality effect wearing off.

In the following table we compare the changes in currency effects from a USD investor's perspective. These estimates are based on purchasing power parity, the relative paths of inflation, and the degree of reversion to fair value. In June of 2019, a USD investor in Eurozone equities or bonds should have expected an additional return of 0.8% per year due to the euro rising in value relative to the dollar. Interest rate differentials were quite large at that point in time, so hedging would have improved expected returns by 2.4%. Since then the dollar appreciated and interest rate differentials narrowed. Consequently, by April 2020, we expect that this same investor now expects their euro investments to appreciate by 1.9%, but hedging 'income' to drop to 0.8%.

We also apply the same methodology when looking at multi-currency baskets such as global equities or global government bonds. For example, a USD investor investing in developed market equities ex US would have expected 1.1% gains per year from foreign currency appreciation in the June 2019 assumptions and this increased to 1.8% in our April 2020 assumptions.

Another effect of the narrowing of interest rate differentials is that hedged impacts are lower. For example, for a global government bond portfolio, the impact of hedging dropped from 1.4% to 0.4%. As can be seen in the chart below, this impact is across the board for this group of major currencies. Many investors on the wrong side of the hedging proposition have found the high negative income unattractive (for example, Japanese investors who are considering whether to hedge a US real estate portfolio). Now this consideration has narrowed, making hedging more attractive from their perspective.

**Currency impacts in USD terms**

| | June 2019 Currency | | April 2020 Currency | |
|---|---|---|---|---|
| | Unhedged | Hedged | Unhedged | Hedged |
| EUR | 0.8 | 2.4 | 1.9 | 0.8 |
| GBP | 1.0 | 1.4 | 1.9 | -0.1 |
| JPY | 2.6 | 2.3 | 2.7 | 0.6 |
| CHF | 0.0 | 2.8 | 0.5 | 1.0 |
| CAD | 0.8 | 0.3 | 1.5 | -0.2 |
| AUD | 0.3 | 0.7 | 0.8 | 0.2 |
| CNY | -0.2 | -0.5 | 0.0 | -1.3 |
| **Index Baskets** | | | | |
| Dev Mkt Eq x US | 1.1 | 1.9 | 1.8 | 0.4 |
| Global Equity | 0.4 | 0.4 | 0.7 | -0.1 |
| Global Eq x US | 0.9 | 0.9 | 1.5 | -0.2 |
| EME | 0.2 | -1.9 | 0.7 | -2.0 |
| Global Gov | 0.9 | 1.4 | 1.4 | 0.4 |
| Global Gov x US | 1.4 | 2.2 | 2.1 | 0.6 |
| Global Credit | 0.2 | 0.3 | 0.4 | 0.0 |
| EMD Local | 0.3 | -2.1 | 1.3 | -2.9 |

Source: UBS Asset Management. Data as of 30 April 2020.

## Alternatives

The prospects for real estate are highly uncertain. Some segments suddenly have a questionable future—is there a permanent hit to malls and central business district office buildings? We expect a lot of turnover and adjustment, but potential for great opportunities exist as well. We projected a relatively low return for real estate in 2019 (4.9%) and see little rationale for returns to be much higher, though we expect the dispersion of returns across funds to be higher.

We have updated our methodology for hedge funds and will use some factor adjustments to the returns. We would expect that with better valuation and an increased opportunity set, the expected hedge fund alpha has increased, though financing constraints may limit the scalability of opportunities. Although these returns appear to be low, they are net-of-fees and provide a fairly high premium over cash interest rates and should beat most bond markets (with the exception of high yield). Even with these low returns, if hedge funds can provide low correlation with other asset classes, they can play important roles in moderate and low risk portfolios.

In private equity, we expect a large discrepancy by vintage year. Vintages in the 2017 to 2019 years should start to see significant write-downs of NAVs over the next three quarters along with lower than expected distributions; however, vintages starting in 2020 are investing in a brighter market environment. Distressed debt investing and buy-out funds suddenly have a plethora of opportunities and could do quite well.

**Alternatives: 5-yr expected returns in USD terms**

| | June 2019 | April 2020 |
|---|---|---|
| US Real Estate (unlevered) | 4.9 | 4.8 |
| Hedge Funds (Low Vol) | 3.9 | 3.5 |
| Hedge Funds (High Vol) | 4.5 | 4.0 |
| US Private Equity | 7.7 | 7.5 |
| Global Private Equity (unhedged) | 9.1 | 9.0 |

Source: UBS Asset Management. Data as of 30 April 2020.

## Summary

The pandemic of 2020 has dramatically shifted the starting point and path of the economy. More than ever, investors face a wider array of economic outcomes to prepare for. Along with bouts of volatility and normal rotations of performance, we need to prepare for regime shifts that alter some fundamental relationships in the markets.

Given the uncertainty in the markets, scenario analysis is another tool to evaluate the range of outcomes across specific economic and capital market paths. This analysis allows us to explore the downsides as well as the upsides in the different asset classes and allow investors to understand the driving forces. Complementing this with standard tools and modern risk control analytics should help prepare investors to build better, more resilient portfolios.

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**Americas**
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Vanguard

MARCH 2023

# Market perspectives

## Vanguard's monthly economic and market update

**Note:** Vanguard's views are as of February 27, 2023, unless otherwise stated.

**KEY HIGHLIGHTS**

- Vanguard has **revised its views for U.S. economic growth**, inflation, and how high the Fed will ultimately need to raise its interest-rate target.
- Our base case remains that there will be a **shallow recession in late 2023**, but that the odds of a "later landing" have increased.
- We expect the Personal Consumption Expenditures Price Index to **end 2023 around 3%**.

### Asset-class return outlooks

Our 10-year annualized nominal return projections are shown below. The projections listed below are based on the December 31, 2022, running of the Vanguard Capital Markets Model® (VCMM). Please note the figures are based on a 2-point range around the 50th percentile of the distribution of return outcomes for equities and a 1-point range around the 50th percentile for fixed income.

| EQUITIES | RETURN PROJECTION | MEDIAN VOLATILITY |
|---|---|---|
| U.S. equities | **4.4%–6.4%** | 17.2% |
| U.S. value | **4.5%–6.5%** | 19.8% |
| U.S. growth | **2.4%–4.4%** | 18.3% |
| U.S. large-cap | **4.3%–6.3%** | 16.9% |
| U.S. small-cap | **4.7%–6.7%** | 22.6% |
| U.S. real estate investment trusts | **4.6%–6.6%** | 20.3% |
| Global equities ex-U.S. (unhedged) | **6.7%–8.7%** | 18.5% |
| Global ex-U.S. developed markets equities (unhedged) | **6.5%–8.5%** | 16.7% |
| Emerging markets equities (unhedged) | **6.3%–8.3%** | 26.3% |

| FIXED INCOME | RETURN PROJECTION | MEDIAN VOLATILITY |
|---|---|---|
| U.S. aggregate bonds | **4.0%–5.0%** | 5.5% |
| U.S. Treasury bonds | **3.6%–4.6%** | 5.8% |
| U.S. credit bonds | **4.5%–5.5%** | 5.2% |
| U.S. high-yield corporate bonds | **6.1%–7.1%** | 10.2% |
| U.S. Treasury Inflation-Protected Securities | **3.0%–4.0%** | 5.0% |
| U.S. cash | **3.4%–4.4%** | 1.4% |
| Global bonds ex-U.S. (hedged) | **3.9%–4.9%** | 4.4% |
| Emerging markets sovereign bonds | **5.6%–6.6%** | 10.6% |
| **U.S. inflation** | **2.0%–3.0%** | 2.3% |

The probabilistic return assumptions depend on market conditions at the time of the running of the VCMM and, as such, can change with each running over time.

**IMPORTANT: The projections or other information generated by the Vanguard Capital Markets Model regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from the VCMM are derived from 10,000 simulations for each modeled asset class. Simulations are as of December 31, 2022. Results from the model may vary with each use and over time. For more information, see the Important information section.**

**Source**: Vanguard Investment Strategy Group.

## Strong data could push U.S. recession down the road

"We're stuck in the messy middle." That's how Josh Hirt, Vanguard senior U.S. economist, described a U.S. economy that hasn't fully reacted to sharp Federal Reserve interest rate increases over the last year. It's a state that has led Vanguard to revise its views for U.S. economic growth, inflation, and how high the Fed will ultimately need to raise its interest-rate target.

"Activity has weakened in the most interest rate-sensitive sectors of the economy," Hirt said. "But core areas are still showing resilience. We are in this in-between period where the impact of rates has not fully worked through the economy."

That analysis is informed by a proprietary model, the Vanguard Leading Economic Indicators Index (VLEI), created to infer developing economic trends. VLEI incorporates a broad array of the most significant variables on housing, the consumer, manufacturing, financials, expectations surveys, price levels, interest rate spreads, and major economic indexes compiled by the Federal Reserve and other agencies. Within VLEI, each variable is assigned a weight based on its historical correlation with economic activity and its lead-time predictive power.

## What VLEI is signaling now

Our index shows that the most interest-rate-sensitive indicators have reacted to the Fed's changes in policy rate and started to turn red and yellow (top right section of the dashboard shown on page 3 indicating weak and slowing activity, respectively). Notably, they include indicators on home prices, financial conditions, and the purchase of big-ticket items. What we haven't seen yet is a deterioration in indicators that respond to more restrictive policy later in a business cycle, such as consumption and the labor market. They continue to indicate strong activity.

"With the Fed expected to continue raising rates and the hikes it has already made working their way through the economy, we expect to see more red and yellow among these indicators in the months to come," said Vytas Maciulis, a Vanguard U.S. economist who works closely with the model. (See the bottom right section of the dashboard.)

For context, the left side of the chart reflects activity leading up to and during the global financial crisis. The Fed began raising rates in the second half of 2004 and we started to see significantly more red and yellow at the top of the VLEI dashboard two years later. We see a similar pattern developing in recent data.

## Implications for our outlook

Given the above-trend activity in some core leading indicators, it could take longer for the business cycle to turn, and we have adjusted our outlook to reflect that.

Our base case remains that there will be a shallow recession in late 2023, but that the odds of a "later landing" have increased. The economy should nevertheless post GDP growth of around 0.75% this year—half a percentage point higher than our previous expectation—and just shy of 2% next year.

## Unemployment slated to climb slightly

Stronger economic activity could lead to fewer job losses and more stubborn inflation readings. We expect the unemployment rate to climb a little more modestly from its current 54-year low to around 4.5%–5.0% by the end of this year and to be at a similar level at the end of 2024.

## More rate hikes ahead

The Fed will need to keep raising rates given this backdrop. We now see its rate target peaking in a range of 5.50%–5.75%. "Our outlook has held that stubborn inflation would require restrictive policy well into 2024," said Hirt. "We believe the current state of the economy is providing evidence that this will indeed be necessary."

## It will take longer to meet the Fed's inflation target

We expect the Personal Consumption Expenditures Price Index (the Fed's preferred inflation yardstick) to end 2023 around 3% before falling closer to the Fed's 2% target in 2024.

## Core of the economy is showing resilience

### Dashboard of Vanguard Leading Economic Indicators Index


**Notes:** For a given positively correlated variable in VLEI: red indicates weak activity, yellow indicates slowing activity, and green indicates strong activity. (The relationship is reversed for negatively correlated variables, or those that move in the opposite direction from that of the activity being measured.)

Data are from January 2006 through December 2009 and from January 2020 through February 2023.

**Source:** Vanguard.

All investing is subject to risk, including the possible loss of the money you invest.

Investments in bonds are subject to interest rate, credit, and inflation risk.

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The VCMM projections are based on a statistical analysis of historical data. Future returns may behave differently from the historical patterns captured in the VCMM. More important, the VCMM may be underestimating extreme negative scenarios unobserved in the historical period on which the model estimation is based.

The Vanguard Capital Markets Model® is a proprietary financial simulation tool developed and maintained by Vanguard's primary investment research and advice teams. The model forecasts distributions of future returns for a wide array of broad asset classes. Those asset classes include U.S. and international equity markets, several maturities of the U.S. Treasury and corporate fixed income markets, international fixed income markets, U.S. money markets, commodities, and certain alternative investment strategies. The theoretical and empirical foundation for the Vanguard Capital Markets Model is that the returns of various asset classes reflect the compensation investors require for bearing different types of systematic risk (beta). At the core of the model are estimates of the dynamic statistical relationship between risk factors and asset returns, obtained from statistical analysis based on available monthly financial and economic data from as early as 1960. Using a system of estimated equations, the model then applies a Monte Carlo simulation method to project the estimated interrelationships among risk factors and asset classes as well as uncertainty and randomness over time. The model generates a large set of simulated outcomes for each asset class over several time horizons. Forecasts are obtained by computing measures of central tendency in these simulations. Results produced by the tool will vary with each use and over time.

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# Capital Market Assumptions 2023

Our long-term return expectations for capital markets serve as key inputs into our strategic asset allocation process for multi-asset portfolios and provide context for shorter-term forecasting.


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Head of Asset Allocation

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Portfolio Specialist


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## Contents

# Foreword

Our annual capital market forecasting process is always a time for looking ahead and looking back for our investment teams. Looking ahead to define the trends and underlying forces that will determine asset class returns over the next decade and looking back to see whether our forecasting methodology and statistical techniques are still relevant and cutting edge.

In this document, we present our 10-year ahead forecasts for risk, return and correlation of returns for mainstream asset classes in the global investable universe. This year, we have modified our process to incorporate climate change, a subsegment of environmental, social and governance (ESG) factors, into our return forecasts. We specifically choose climate change as the most tangible factor within ESG-related considerations, as it can affect consumer behavior, investment needs, financing, supply chain organization, cross-border trade and stranded assets. Climate change's effect on these variables flows directly into GDP growth and inflation, the magnitude of which will be partly driven by increases in productivity-enabling technologies. For further discussion of climate change in our capital market forecasts please see page 14.

**Our analysis points to a decade of subdued returns for most major asset classes.**

The return profile for many assets classes remains below historical averages. For example, global equities are forecast to have an arithmetic return of 6%. The economy being mired in a low productivity regime leaves equity in solid shape, but offering what most investors consider somewhat limited upside potential. By contrast, fixed income is forecast to deliver decent returns. Global fixed income assets are forecast to gain 3.6% and we expect US long government bonds to return 4.5%. The rationale behind stronger than previously forecast fixed income gains is the starting point for real yields, which are positive for the first time since 2009. The more normal investment environment that positive real yields bring to investors is a welcome development.

We hope that you find our capital market forecasts useful and look forward to the year ahead. We wish you the very best for a successful 2023.

Sincerely,

**Paul Zemsky, CFA**
Chief Investment Officer,
Multi-Asset Strategies and Solutions

**Barbara Reinhard, CFA**
Head of Asset Allocation

## Summary of findings

**Compared to last year's projections, our 2023–2032 forecast calls for similar equity returns (6.0% for the S&P 500) and higher bond returns (4.2% for the US Agg).**

Our capital market assumptions (CMA) 2023 report details our research on asset class returns, standard deviations of returns and correlations over the 10-year horizon from 2023 through 2032. These estimates represent key inputs into strategic asset allocation decisions for our multi-asset portfolios and provide context for shorter-term macroeconomic and financial forecasting.

Our forecasts were informed by historically low potential GDP growth, reduced labor supply and elevated inflation. To avoid using a single-point estimate forecast, we incorporate an alternative scenario, which has slightly better or worse macro inputs. This year, the alternative-case scenario was again based on inputs of marginally higher productivity and a lower terminal fed funds rate.

Some key results of our analysis:

- The next decade will likely be characterized by returns below historical averages across all major asset classes.
- Developed market equities are likely to deliver mid-single-digit returns, with returns for most non-US market assets lower than those for comparable US assets.
- Emerging market equities should outperform developed markets, albeit with higher expected volatility given a more uncertain path to growth than that of developed markets.
- Bond return assumptions have increased from last year but remain in the low single digits. These projections assume that moves in both bond term premiums and real interest rates will cap upside returns available to fixed income assets.

## Forecast environment: Still a low-growth world, with upside for the US

Our forecast models an explicit process of convergence to a steady-state equilibrium for global economies and financial markets through 2032. In our modeling process, we worked with the economic consulting group at S&P Global, which provided quantitative support for our macro inputs.[1]

Cyclical fluctuations are an inevitable aspect of market economies, and we recognize that the steady-state equilibrium incorporated as the terminal point of our forecast is unlikely to be fully attained over any point-to-point 10-year period under real-world conditions. Nonetheless, we find that this theoretical construct is useful for anchoring the forecast. As a result, the forecast does not assume a recession or contraction over the 2023–2032 horizon.

Over the period covered by our forecasts, we believe the US will be constrained by labor force growth, but has the ability to move to a somewhat higher, sustained growth path than it experienced in the previous business cycle. The key is for the US to exit the current low-productivity regime that has constrained the economy.

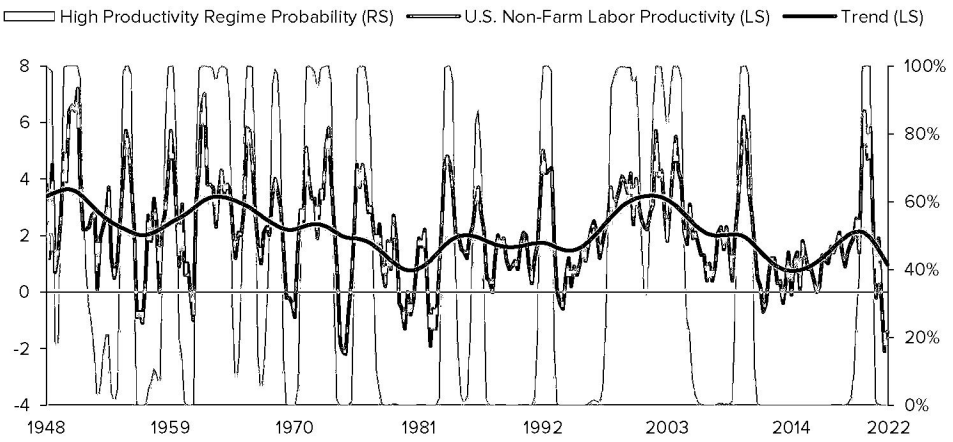
Productivity growth essentially comes from capital deepening and total factor productivity (TFP). The latter is an unobservable measure taken from the decomposition of real GDP growth — the remainder after accounting for the contributions of capital and labor, called the Solow residual. This residual could reflect improvements in technology, growth in the effectiveness of labor, strength in property rights and quality of labor. It also incorporates cultural attitudes, including risk and high levels of confidence in the outlook, which can contribute to a revival in productivity through the TFP channel.

[1] S&P Global is an independent research firm that provides a comprehensive global macroeconomic model, linking 68 individual country models with key global drivers of performance. The model accounts for 95% of global GDP, covering 250–500 time series per country.

Labor-force productivity growth typically alternates between high- and low-productivity regimes over time. To determine the current regime, we fit productivity data through a Markov model (Exhibit 1). The latest data show that US productivity growth has declined from –0.2% year-over-year in 3Q21 to –1.4% in 3Q22, signaling a "low-productivity" regime. The system had been in high-productivity equilibrium for four quarters following the Covid recession. (High-productivity regimes, indicated below in gray shading, average 3.8%, while low-productivity regimes average 1.1%.) A Hodrick-Prescott filter-based decomposition of year-over-year productivity growth into trend and cycle components also shows that the current trend of US productivity growth is 1.0%.

**Over the next decade, the US has greater potential for higher, sustained growth than in the previous business cycle.**

### Exhibit 1. Productivity growth has decelerated




As of 06/30/22. Source: Voya Investment Management. Non-shaded areas in the chart denote low-productivity regimes.

As in the past, our CMA 2023 forecast is predicated on a "base" and an "alternative" scenario. The alternative scenario assumes that the US exhibits modest improvement in output per hour, largely the result of gains in total factor productivity as the labor share shifts away from brick-and-mortar to more productive firms. We generate our forecast based on a 60/40 weight to the base/alternative scenarios. Our forecast is for US GDP growth over the 10-year period to attain 1.9%. Exhibit 2 shows the 2032 values from this forecast, which are consistent with our estimates of longer-term, steady-state values for key US economic variables.

### Exhibit 2. Our 2032 forecast for US economic and financial variables

| | 2032 Forecast |
|---|---|
| **US GDP growth** | **1.9%** |
| Inflation (CPI-U) | 2.3% |
| CPI ex food and energy | 2.4% |
| Federal funds rate | 2.4% |
| 10-year US Treasury yield | 3.0% |
| Profit share | 8.4% |
| Savings rate | 9.4% |

As of 11/21/22. Source: Voya Investment Management, S&P Global. Forecasts are subject to change.

## Long-run assumptions

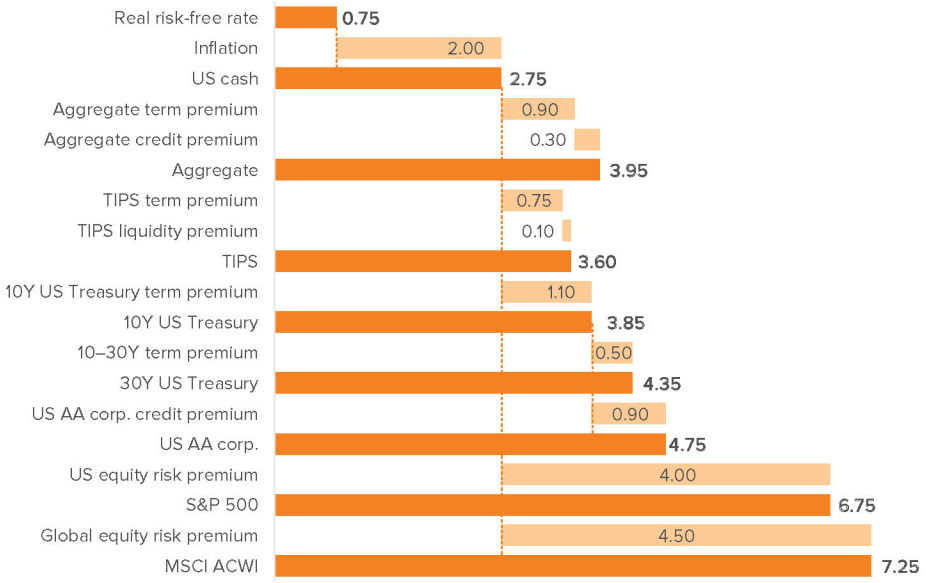
While 10-year forecasts guide our strategic asset allocations, our glidepath assumptions for target date strategies are based on long-run equilibrium return assumptions over much longer horizons, typically 40 years (Exhibit 3). At that point, we think of the economy as being in a steady state where GDP grows at its trend rate, inflation is at target, unemployment equals the non-accelerating inflation rate of unemployment, the real interest rate equals the "natural" rate of interest — neither contractionary nor inflation inducing — and all capital and goods markets are in equilibrium.[2]

These forecasts use a building block methodology. Starting with our expectations for real short-term yield and inflation, we generate a risk-free rate forecast and, from that, derive all equity and fixed income assets by adding the relevant risk premium:

- We derive the risk premium for US equities from the Gordon growth model, representing the sum of the dividend yield and the nominal earnings growth rate in excess of the risk-free rate. International equities add an international equity risk premium.
- Government bond return forecasts are the sum of the risk-free rate and an appropriate term premium. Corporate bond return forecasts add a credit-risk premium.

From a theoretical perspective, all risk premiums mean revert towards a long-run equilibrium, as the economy is in a steady state. The reason for mean reversion is that investment opportunities are time varying. Since the rate of arrival of new information is time varying, return volatility and covariance are time varying as well in the short run. Our econometric work (and that of academic researchers) confirms the stationarity of a number of risk premiums, which, in turn, justifies our assumption of constant average risk premiums, term premiums and credit spreads in the long-run equilibrium.

**Exhibit 3. Long-run equilibrium return assumptions (%)**




As of 11/21/22. Source: Voya Investment Management. Assumptions are subject to change.

[2] "Understanding Glide Path Design: Distribution of Labor Income among Participant Populations," Sinha, A. and Yuen, R., Voya Investment Management, 2Q18.

## How we forecast returns

Our process for determining asset class risk and return estimates begins with a top-down forecast of economic growth, using a 60/40 blend of base-case and alternative scenarios. To develop these forecasts, we leverage S&P Global's economic modeling capabilities. These two scenarios capture the most important upside and downside risks facing the global economy and markets over the forecast horizon. Furthermore, in response to client demand and following guidance from organizations such as the Task Force on Climate-Related Financial Disclosures (TCFD), we have integrated climate scenarios into our economic forecasts this year, described on page 16 in Methodological considerations.

Our base-case scenario forecasts 2.6% US GDP growth through 2032, driven by strong consumer spending, below-trend productivity growth and subdued labor force growth. The alternative scenario incorporates slightly faster productivity growth, a higher dividend payout ratio, more inflation and an assumption that the Federal Reserve lets the economy run a little hotter than in the base case. Under these assumptions, returns for risk assets are modestly higher in the alternative scenario than in the base case.

**For US stocks,** we estimate earnings and dividends for the S&P 500 Index using our blended macroeconomic assumptions. Earnings growth is constrained by the neoclassical assumption that profits as a share of GDP cannot increase without limit but will converge to a long-run equilibrium. We then use a dividend discount model to determine fair value for the index each year during the forecast period. We construct returns for other US equity indexes, including REITs, using a single-index factor model in which beta sensitivities of each asset class, with respect to the market portfolio, are derived from our forward-looking covariance matrix estimation. Beta is by definition covariance over variance. (For additional detail, see "Covariance and correlation matrices methodology" on page 10.) Each equity asset class return is the sum of the risk-free interest rate and a specific risk premium determined from our estimate of beta sensitivity and market-risk premium forecasts.

**For US bonds,** we use the blended-scenario interest rate expectations to calculate expected returns for various durations. We model bond expected returns as the sum of current yield and a capital gain (or loss) based on duration and expected change in yields. For non-US bonds, the process is similar and includes an adjustment for expected currency movements. Return expectations for credit-related fixed income reflect yield spreads and expected default and recovery rates.

## Exhibit 4. Ten-year return forecasts, 2023–2032

| | Expected returns | | Volatility (%) | Skewness | Kurtosis | Sharpe ratio |
|---|---|---|---|---|---|---|
| | Geometric mean return (%) | Arithmetic mean return (%) | | | | |
| **Stocks** | | | | | | |
| S&P 500 | 4.8 | 6.0 | 15.8 | -0.53 | 1.2 | 0.23 |
| S&P 500 Growth | 4.1 | 5.6 | 18.0 | -0.45 | 0.9 | 0.18 |
| S&P 500 Value | 5.4 | 6.4 | 15.3 | -0.64 | 1.9 | 0.26 |
| MSCI US Minimum Volatility | 4.9 | 5.5 | 11.7 | -0.66 | 1.4 | 0.26 |
| Russell 3000 | 4.9 | 6.1 | 16.2 | -0.58 | 1.4 | 0.23 |
| Russell Midcap | 4.8 | 6.3 | 17.8 | -0.65 | 1.8 | 0.22 |
| Russell 2000 | 4.2 | 6.7 | 22.2 | -0.58 | 1.7 | 0.19 |
| MSCI EAFE | 3.6 | 5.3 | 18.7 | -0.28 | 0.4 | 0.16 |
| MSCI World | 4.7 | 5.8 | 15.6 | -0.61 | 1.3 | 0.22 |
| MSCI EM | 3.8 | 7.0 | 25.4 | -0.34 | 0.8 | 0.18 |
| MSCI ACWI | 4.8 | 6.0 | 15.7 | -0.63 | 1.3 | 0.22 |
| **Bonds** | | | | | | |
| Bloomberg US Aggregate | 4.0 | 4.2 | 6.8 | 0.56 | 5.1 | 0.27 |
| Bloomberg US Government Long | 3.8 | 4.5 | 12.7 | 0.23 | 0.7 | 0.17 |
| Bloomberg US TIPS | 3.5 | 3.6 | 5.4 | -0.89 | 4.4 | 0.23 |
| Bloomberg US High Yield | 6.9 | 7.3 | 11.2 | -0.44 | 4.5 | 0.41 |
| Credit Suisse Leveraged Loan | 7.2 | 7.2 | 7.3 | -1.67 | 22.9 | 0.26 |
| Bloomberg Global Aggregate | 3.3 | 3.6 | 7.7 | 0.14 | 1.0 | 0.16 |
| Bloomberg Global Aggregate ex US | 2.7 | 3.1 | 9.9 | 0.04 | 0.1 | 0.08 |
| JPMorgan EMBI+ | 7.5 | 8.3 | 13.9 | -1.09 | 7.9 | 0.37 |
| US Treasury Bill 3M | 2.3 | 2.3 | 1.0 | 1.02 | 1.4 | 0.00 |
| **Real assets** | | | | | | |
| Bloomberg Commodity | 2.2 | 3.4 | 15.6 | -0.47 | 1.8 | 0.07 |
| FTSE EPRA Nareit Developed | 3.4 | 5.5 | 20.6 | -0.52 | 2.4 | 0.15 |

As of 11/21/22. Source: Voya Investment Management. Returns shown are in US dollar terms. Forecasts are subject to change.

**Exhibit 5. Ten-year forecasted correlations matrix, 2023–2032**

| | S&P 500 | Russell 1000 Growth | Russell 1000 Value | MSCI US Minimum Volatility | Russell 3000 | Russell Midcap | Russell 2000 | MSCI EAFE | MSCI World | MSCI EM | MSCI ACWI | Bloomberg Commodity | FTSE EPRA Nareit Developed | Bloomberg US Aggregate | Bloomberg US Government Long | Bloomberg US TIPS | Bloomberg US High Yield | Credit Suisse Leveraged Loan | Bloomberg Global Aggregate | Bloomberg Global Aggregate ex US | JPMorgan EMBI+ | US Treasury Bill 3M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S&P 500 | 1.00 | | | | | | | | | | | | | | | | | | | | | |
| Russell 1000 Growth | 0.96 | 1.00 | | | | | | | | | | | | | | | | | | | | |
| Russell 1000 Value | 0.95 | 0.83 | 1.00 | | | | | | | | | | | | | | | | | | | |
| MSCI US Minimum Volatility | 0.90 | 0.83 | 0.89 | 1.00 | | | | | | | | | | | | | | | | | | |
| Russell 3000 | 1.00 | 0.96 | 0.95 | 0.89 | 1.00 | | | | | | | | | | | | | | | | | |
| Russell Midcap | 0.95 | 0.92 | 0.93 | 0.86 | 0.97 | 1.00 | | | | | | | | | | | | | | | | |
| Russell 2000 | 0.84 | 0.83 | 0.81 | 0.73 | 0.88 | 0.93 | 1.00 | | | | | | | | | | | | | | | |
| MSCI EAFE | 0.69 | 0.65 | 0.68 | 0.64 | 0.70 | 0.69 | 0.62 | 1.00 | | | | | | | | | | | | | | |
| MSCI World | 0.96 | 0.93 | 0.92 | 0.87 | 0.97 | 0.94 | 0.84 | 0.86 | 1.00 | | | | | | | | | | | | | |
| MSCI EM | 0.53 | 0.51 | 0.50 | 0.47 | 0.54 | 0.55 | 0.52 | 0.56 | 0.58 | 1.00 | | | | | | | | | | | | |
| MSCI ACWI | 0.95 | 0.91 | 0.91 | 0.85 | 0.95 | 0.93 | 0.84 | 0.86 | 0.99 | 0.70 | 1.00 | | | | | | | | | | | |
| Bloomberg Commodity | 0.29 | 0.26 | 0.31 | 0.24 | 0.30 | 0.34 | 0.32 | 0.35 | 0.34 | 0.35 | 0.36 | 1.00 | | | | | | | | | | |
| FTSE EPRA Nareit Developed | 0.66 | 0.60 | 0.68 | 0.68 | 0.67 | 0.68 | 0.63 | 0.70 | 0.73 | 0.56 | 0.75 | 0.27 | 1.00 | | | | | | | | | |
| Bloomberg US Aggregate | 0.21 | 0.20 | 0.20 | 0.30 | 0.21 | 0.20 | 0.13 | 0.18 | 0.22 | 0.03 | 0.20 | -0.04 | 0.25 | 1.00 | | | | | | | | |
| Bloomberg US Government Long | 0.06 | 0.07 | 0.03 | 0.18 | 0.05 | 0.04 | -0.02 | 0.02 | 0.05 | -0.10 | 0.02 | -0.16 | 0.12 | 0.88 | 1.00 | | | | | | | |
| Bloomberg US TIPS | 0.22 | 0.22 | 0.21 | 0.27 | 0.22 | 0.23 | 0.16 | 0.20 | 0.23 | 0.14 | 0.23 | 0.19 | 0.26 | 0.56 | 0.54 | 1.00 | | | | | | |
| Bloomberg US High Yield | 0.58 | 0.56 | 0.57 | 0.54 | 0.59 | 0.61 | 0.59 | 0.51 | 0.60 | 0.47 | 0.62 | 0.27 | 0.55 | 0.21 | 0.06 | 0.29 | 1.00 | | | | | |
| Credit Suisse Leveraged Loan | 0.33 | 0.31 | 0.35 | 0.34 | 0.35 | 0.38 | 0.35 | 0.31 | 0.36 | 0.30 | 0.37 | 0.28 | 0.35 | 0.01 | -0.18 | 0.18 | 0.57 | 1.00 | | | | |
| Bloomberg Global Aggregate | 0.23 | 0.22 | 0.23 | 0.31 | 0.23 | 0.23 | 0.17 | 0.42 | 0.32 | 0.14 | 0.31 | 0.15 | 0.36 | 0.78 | 0.67 | 0.56 | 0.21 | 0.03 | 1.00 | | | |
| Bloomberg Global Aggregate ex US | 0.21 | 0.19 | 0.20 | 0.27 | 0.20 | 0.21 | 0.16 | 0.47 | 0.32 | 0.18 | 0.31 | 0.22 | 0.36 | 0.54 | 0.45 | 0.47 | 0.18 | 0.03 | 0.95 | 1.00 | | |
| JPMorgan EMBI+ | 0.44 | 0.42 | 0.43 | 0.47 | 0.44 | 0.45 | 0.39 | 0.38 | 0.45 | 0.57 | 0.50 | 0.19 | 0.50 | 0.38 | 0.27 | 0.33 | 0.43 | 0.21 | 0.35 | 0.28 | 1.00 | |
| US Treasury Bill 3M | 0.06 | 0.04 | 0.07 | 0.09 | 0.06 | 0.05 | 0.02 | 0.06 | 0.07 | 0.06 | 0.07 | 0.01 | 0.04 | 0.16 | 0.07 | -0.03 | 0.05 | 0.05 | 0.12 | 0.08 | 0.09 | 1.00 |

As of 11/21/22. Source: Voya Investment Management. Projections are subject to change.

## Appendix: Methodological considerations

### Covariance and correlation matrices methodology

Asset class covariance and correlation matrices are crucial components of our capital market assumptions process, serving as the pillars of asset class standard deviation forecasts. This is a different process than forecasting returns, as correlations tend to wander over time. If we were to use a historical average or exponentially weighted methodology — which takes a long-run history and puts a heavier weight on recent observations — it could lead to risk forecasts that may represent the past but bear little resemblance to the future.

An example using stocks and bonds illustrates this point. Over the past 20 years, the correlation of returns between the S&P 500 Index and the Bloomberg US Aggregate Bond Index was –0.02; however, this offers little insight into the relationship between these two asset classes during unusual periods or when financial markets are in euphoric or pessimistic states. For example, over that same 20-year interval, the correlation of stocks and bonds was –0.10 during normal periods of returns, but 0.07 during unusual periods (Exhibit 6). Incorporating these periods of unusual correlation patterns can lead to a truer estimate of the durability of diversification between asset classes. We capture these unusual periods in our standard deviation and correlation forecasts using an academic framework called *turbulence*.

**Our methodology incorporates periods of unusual correlation to develop truer estimates of the durability of diversification between asset classes.**

### Turbulence: An evolution from skull measurements to finance

The turbulence framework we use to estimate correlations and standard deviations of returns is derived from the academic work of the applied statistician Prasanta Chandra Mahalanobis. In the early 20th century, Mahalanobis analyzed human skull resemblances among castes and tribes in India. He created a formula to capture differences in skull size, which incorporated the standard deviation of measures of various skull parts. He then squared and summed the normalized differences, generating a single composite distance measure.[3]

This formula evolved into a statistical measure called the "Mahalanobis distance." The measure was groundbreaking in that it helped analyze data across standard deviations but also incorporated the correlations among data sets. More than 70 years later, the Mahalanobis distance was used by Kritzman and Li to formulate a concept called financial turbulence.[4] They postulated financial turbulence as a condition in which asset prices, given their historical patterns of returns, behave in an uncharacteristic way including extreme price moves. They further noted that financial turbulence often coincides with excessive risk aversion, illiquidity and price declines for risky assets. It is this turbulence framework (or unusualness of returns and correlations of returns) that we have used to forecast risk measures in our capital market assumptions.

### Observing turbulence

Turbulence can be calculated for any given set of asset classes. Back to our example of US stocks and bonds, the two dimensions can be visualized as the equation of an ellipse using the returns of the S&P 500 Index and the Bloomberg US Aggregate Index (Exhibit 6). The center of the ellipse represents the average of the joint returns of the two assets. The boundary is a level of tolerance that separates normal from turbulent observations. This boundary takes the form of an ellipse rather than a circle because it accounts for the covariance of the asset classes.

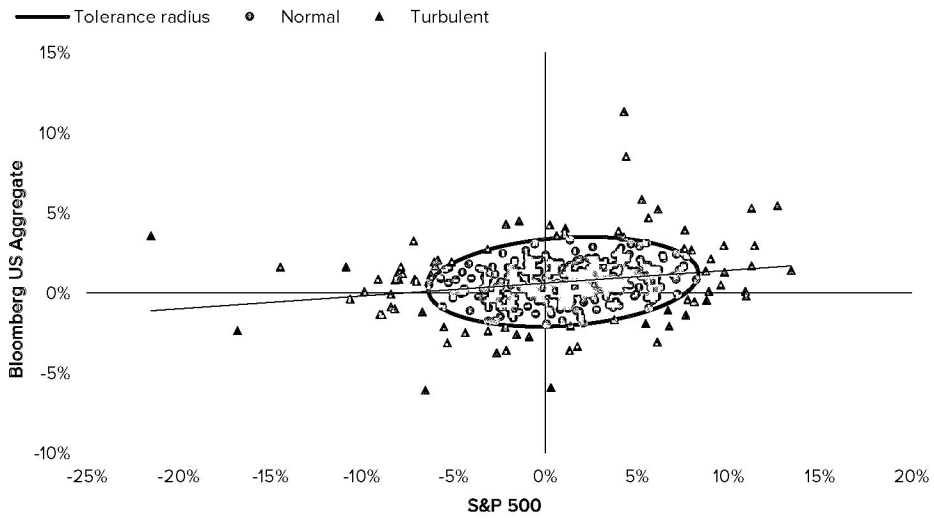
The idea captured by this measure is that certain periods are considered turbulent not only because returns are unusually high or low, but also because they moved in the opposite direction of what would have been expected based on the average correlation.

[3] Mahalanobis, P., "On the Generalized Distance in Statistics," *Proceedings of the National Institute of Sciences of India* vol. 2 no. 1 (1936): 49–55.

[4] Kritzman, M. and Y. Li, "Skulls, Financial Turbulence, and Risk Management," Financial Analysts Journal, vol. 66 no. 5 (2010): 30–41.

### Exhibit 6. We account for non-normal observations by considering correlations

Normal and turbulent periods of stock and bond correlations, 20 years ended 09/30/22



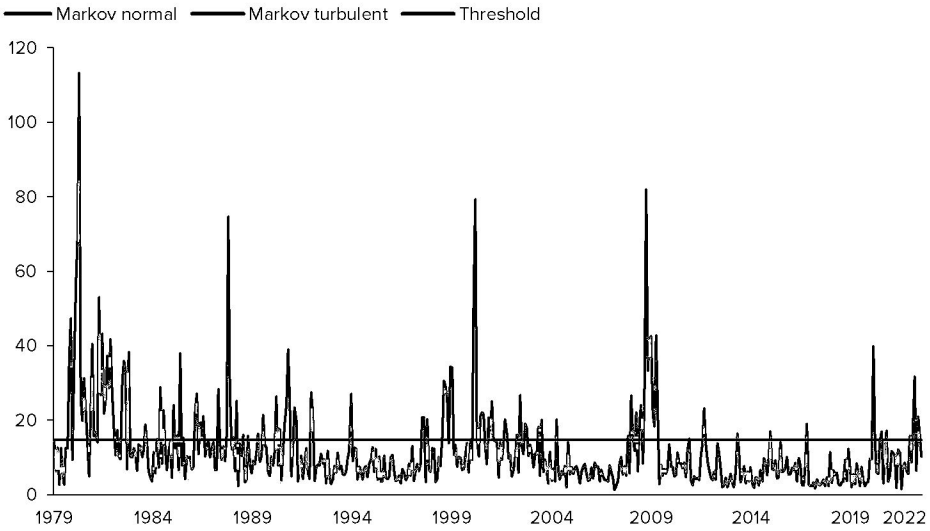

As of 09/30/22. Source: Voya Investment Management.

### Using turbulence to create portfolios

The threshold for normalcy and turbulence shown in Exhibit 6 is not static; rather, it changes over time. Our process identifies turbulent market regimes by estimating a covariance matrix covering those periods of market stress alone, and is the outcome of a Markov model. The model classifies regimes rather than arbitrary thresholds, because thresholds would fail to capture the persistence of shifts in volatility. The Markov model output in Exhibit 7 illustrates turbulent and normal regimes.

### Exhibit 7. Means and variances both matter when determining whether observations are turbulent

Markov normal and turbulent regimes over time




As of 08/31/22. Source: Voya Investment Management.

For turbulent market regimes, we make use of the concept of multivariate outliers in a return distribution. That is, we take into account not only the deviation of a particular asset class's return from the average, but also its volatility and correlation with other asset classes. We subsequently estimate a covariance matrix based on periods of normal and turbulent market performance. Finally, we blend these two covariance matrices using weights that allow us to express both views about the likelihood of each normal or turbulent regime and to capture the differential risk attitudes toward each. The weights we use to create our strategic asset allocation portfolios are 60% normal and 40% turbulent.

Although turbulent regimes have an observed frequency of only 30%, we overweight them at 40% to account for structural issues such as globalization, demographics and worldwide central bank intervention, which are prevalent today. Furthermore, overweighting turbulent periods increases the assumed risk, providing a more conservative matrix that emphasizes diversification during volatile periods. From this blended covariance matrix, we then extract the implied correlation matrix and standard deviations for each asset class. In our view, this process helps create a strategic asset allocation portfolio that can account for the empirical evidence that correlations will deviate through time.

**Time dependency of asset returns and its impact on risk estimation**

Recent research suggests that expected asset returns change over time in somewhat predictable ways, and that these changes tend to persist over long periods. Thus, changes among investment opportunities — all possible combinations of risk and return — are found to be persistent. This Appendix will set out the economic reasons for return predictability, its consequences for strategic asset allocation and the adjustments we have made to control for it in our estimation process.

**Research suggests that expected asset returns change in somewhat predictable ways, which are persistent over time.**

In our view, the common source of predictability in financial asset returns is the business cycle. The business cycle itself is persistent, and this makes real economic growth predictable, to some extent. The fundamental reason for the business cycle's persistence is that its components share the same quality. Consumers, for example, tend to smooth consumption since they dislike abrupt changes in their lifestyles. Research on permanent income and lifecycle consumption provides the theoretical basis for consumers' desire for a stable consumption path. When income is affected by transitory shocks, consumption should not change since consumers can use savings or borrowing to adjust consumption in well-functioning capital markets.

Robert Hall has formalized these ideas by showing that consumers will optimally choose to keep a stable path of consumption equal to a fraction of their present discounted value of human and financial wealth.[5] Investment, the second component of GDP, is sticky, as corporate investment in projects is usually long term in nature. Finally, government expenditures also have a low level of variability. Over a medium-term horizon, negative serial correlation sets in, as the growth phase of the cycle is followed by a contraction, and then that contraction is followed by renewed growth.[6]

How does this predictability of economic variables affect the predictability of asset returns? Consider stocks as an example.

Equity values are determined as the present discounted value of future cash flows, and they depend on four factors: expected cash flows, expected market risk premium, expected market risk exposure and the term structure of interest rates.

- Cash flows and corporate earnings tend to move with the business cycle.
- The market risk premium is high at business cycle troughs, when consumers are trying to smooth consumption and are less willing to take risks with their income, and it is low at business cycle peaks, when people are more willing to take risks. The market risk premium is a component of the discount rate in the present value calculation of the dividend discount model.

[5] Hall, R., "Stochastic Implications of the Life-Cycle-Permanent Income Hypothesis: Theory and Evidence," *Journal of Political Economy* 86 (1978): 971–988.

[6] Poterba, J. and Summers, L., "Mean Reversion in Stock Prices: Evidence and Implications," *Journal of Financial Economics* 22 (1988): 27–60.

- A firm's risk exposure (beta), another component of the discount rate, changes through time and is a function of its capital structure. Thus, a firm's risk increases with leverage, which is related to the business cycle.
- The last component of the discount rate is the risk-free rate, which is determined by the term structure of interest rates. The term structure reflects expectations of real interest rates, real economic activity and inflation, which are connected to the business cycle.

Thus, equity returns, and financial asset returns in general, are predictable to a certain extent. Expected returns of many assets tend to be high in bad macroeconomic times and low in good times.

This predictability of returns manifests itself statistically through *autocorrelation*. Autocorrelation in time series of returns describes the correlation between values of a return process at different points in time. Autocorrelation can be positive when high returns tend to be followed by high returns, implying momentum in the market. Conversely, negative autocorrelation occurs when high returns tend to be followed by low returns, implying mean reversion. In either case, autocorrelation induces dependence in returns over time.

**Empirical persistence of the business cycle makes financial asset returns somewhat predictable.**

Traditional mean-variance analysis focused on short-term expected return and risk assumes that returns do not exhibit time dependence and that prices follow a random walk. In a random walk, expected returns are constant, exhibiting zero autocorrelation; realized short-term returns are unpredictable. Volatilities and cross-correlations among assets are independent of the investment horizon. Thus, the annualized volatility estimated from monthly return data, scaled by the square root of 12, should be equal to the volatility estimated from quarterly return data, scaled by the square root of 4.

In the presence of autocorrelation, the scaling rule described above (using the square root of time) is invalid, since the sample standard deviation estimator is biased and the sign of autocorrelation matters for its impact on volatility and correlations. **Positive autocorrelation leads to an underestimation of true volatility.** A similar result holds for the cross-correlation matrix bias when returns exhibit autocorrelation. For long investment horizons, the risk/return tradeoff can be very different than for short investment horizons.

In a multi-asset portfolio, in which different asset classes display varying degrees of autocorrelation, failure to correct for the bias of volatilities and correlations will lead to suboptimal mean variance-optimized portfolios in which asset classes that appear to have low volatilities receive excessive allocations. Such asset classes include hedge funds, emerging market equities and non-public market assets such as private equity and private real estate, among others.

There are at least two ways to correct for autocorrelation:

- A direct method that adjusts the sample estimators of volatility, correlation and all higher moments
- An indirect method that cleans the data first, allowing us to subsequently estimate the moments of the distribution using standard estimators

Given that the direct methods become quite complex beyond the first two moments, our choice is to follow the second method and clean the return data of autocorrelation. Before we do that, we estimate and test the statistical significance of autocorrelation in our data series.

We estimate first-order autocorrelation as the regression slope of a first-order autoregressive process. We use monthly return data for the period 1979–2014. We subsequently test the statistical significance of the estimated parameter using the Ljung-Box Q-statistic.[7] The Q-statistic is a statistical test for serial correlation at any number of lags. It is distributed as a chi-square with k degrees of freedom, where k is the number of lags. Here we test for first-order serial correlation, thus k = 1. About 80% of our return series exhibit positive and statistically significant first-order serial correlation based on associated p-values at the 10% level of significance.[8]

Khandani and Lo provide empirical evidence that positive return autocorrelation is a measure of illiquidity exhibited among a broad set of financial assets including small-cap stocks, corporate bonds, mortgage-backed securities and emerging market investments.[9] The theoretical basis is that in a frictionless market, any predictability in asset returns can be immediately exploited, thus eliminating such predictability. While other measures of illiquidity exist, autocorrelation is the only measure that applies to both publicly and privately traded securities and requires only returns to compute.

**Removing return autocorrelation prevents underestimation of volatility.**

Since most of the return series we estimate exhibit autocorrelation, we apply the Geltner unsmoothing process to all series. This process corrects the return series for first-order serial correlation by subtracting the product of the autocorrelation coefficient ρ and the previous period's return from the current period's return and dividing by 1-ρ. This transformation has no impact on the arithmetic return, but the geometric mean is impacted since it depends on volatility. This correction is thus important to make for long-horizon asset allocation portfolios.

### Accounting for climate change

The vast majority of research concludes climate change is a significant risk to our planet's ecosystem and, according to the IMF and many other well-respected institutions, is set to have major economic impacts on many countries.[10] While we believe global economic outcomes will continue to be dominated by the business cycle and event stresses, climate change is a material issue, and its importance could increase going forward. Therefore, we believe climate change risks – both physical and transition[11] – should be considered when making forecasts of the future. Physical risks, for the most part, are best incorporated at the security level, although there are certain countries and asset classes (e.g., real estate) for which it is easier to make a clear, broad connection.

There are a few channels through which climate change could theoretically influence capital market assumptions: macro, fundamentals and repricing.

**Macro:** Climate-related considerations impact consumer behavior, investment needs, financing, supply chain organization, cross-border trade and stranded assets. These are mostly transition-risk related, driven by government policy and market forces. Climate change's effect on these variables flows directly to GDP growth and inflation; the magnitude of the effect will be driven partly by the increase in productivity-enabling technologies.

**Fundamentals:** Top-line output establishes the base for what companies can earn. Profit margins form the other component of the equation. The transition is certain to affect industries to different degrees, but the consequences are difficult to forecast in aggregate, so we retain our tried-and-true approach of assuming profit margins in mean revert to equilibrium.

**Repricing:** Changes in valuation are the most difficult to gauge. Determinants of valuation at any one point and across time are highly uncertain, especially for broad asset classes (e.g., US large cap equities), which is the level at which we forecast CMAs. We acknowledge that certain sectors generally deserve higher valuations than others, and subscribe to the idea that capital will flow to more "sustainable" investments over time, but we argue that it is difficult to predict changes in relative pricing across sectors based on inherent "greenness," especially across countries. Instead of comparing asset class carbon footprints based on sector compositions, we think sustainability characteristics should be defined at or below the industry level. Therefore, premiums and discounts for those factors, including climate change, should

[7] Ljung, G.M. and Box, G.E.P., "On a Measure of Lack of Fit in Time Series Models," *Biometrika*, 65, (1978): 297–303.

[8] The p-value is the probability of rejecting the null hypothesis of no serial correlation when it is true (i.e., concluding that there is serial correlation in the data when in fact serial correlation does not exist). We set critical values at 10% and thus reject the null hypothesis of no serial correlation for p-values <10%.

[9] Khandani, A.E. and Lo, A., "Illiquidity Premia in Asset Returns: An Empirical Analysis of Hedge Funds, Mutual Funds, and US Equity Portfolios," Quarterly Journal of Finance 1 (2011): 205–264.

[10] International Monetary Fund, https://www.imf.org/en/Topics/climate-change/climate-and-the-economy#publications, accessed 10/31/22.

[11] Climate change risks can be divided into two categories: 1) physical risks, which result from climatic events such as wildfires, storms and floods; and 2) transition risks, which result from policy actions taken to shift the economy away from fossil fuels.

be applied to individual companies within their respective groups. As a result, our efforts are centered on macro and (to a lesser degree) fundamental inputs.

To define and evaluate the impact of changes in climate-related macro and fundamental inputs, we leaned on our partners at S&P Global to develop plausible climate scenarios and expected economic outcomes. Although countless climate scenarios are plausible and investors would be well served to stress-test portfolios against some of those possibilities, only one will actually occur. Therefore, we took the most likely climate scenario, called "Inflections" in Exhibit 8A, and integrated those assumptions into the global economic model for the base case and alternative scenarios that form the backbone of our CMA.

The climate scenarios (Exhibits 8A and 8B) are developed within the context of achieving net-zero carbon emissions by 2050. This places them on a different time horizon than our economic scenarios used for our 10-year CMA, so they need to be rescaled; still, they enable us to capture important developments along various temperature pathways. Unfortunately, given the lack of legally binding climate commitments by countries, daunting technological gaps and recent geopolitical strains, the current trajectory appears to have us on a path for a 2.4° Celsius increase in global average temperatures by 2050 (Exhibit 9). In this base-case scenario, the energy transition delivers fundamental change at the global emissions level, but geopolitical relations are likely to force adaptation rather than facilitate international cooperation and technological disruption. In all cases, a critical variable influencing emission paths is the price of carbon (Exhibit 10) as well as government taxation, regulation and international coordination around it. To get to zero, emitting greenhouse gases must become expensive relative to alternative means of production.

**The difference in economic outcomes between most climate scenarios tested was modest. Thus, the impact of climate change in our capital market assumptions is minor.**

Like climate change itself, the impact on the economy is one that will be felt gradually. The difference in economic outcomes among most climate scenarios tested was modest. Thus, the impact of considering climate change in our capital market assumptions is minor. The exception, however, is the "Discord" scenario, in which countries become more inwardly focused, climate policies are inconsistent, and decarbonization efforts lose momentum, resulting in limited meaningful action. In this case, global growth takes a sizable hit. Over the 10-year forecast horizon, the economic damage would be mostly due to the series of crises that underly the geopolitical rancor preventing climate change mitigation as opposed to the negative effects of climate change itself. As the time horizon extends, however, so too does the risk of major and potentially irreversible physical costs.

What is clear from our analysis is that striving to address this negative externality will lead to an improved outlook for growth and most risk assets, relative to taking no action. Moreover, incorporating views on climate change into our forecasts provides us with a more comprehensive picture of the world, which will help us generate better estimates going forward.

## Exhibit 8A. Summary of base, optimistic and pessimistic climate scenarios

| | Green rules<br>A revolutionary transformation toward a sustainable low-carbon economy | Inflections<br>Base case view of the energy future | Discord<br>A stagnant world with weak markets and policies |
|---|---|---|---|
| **General themes** | **Crisis backlash and strong government policy**<br>Societal reactions to chronic crises drive strong government actions that result in revolutionary change in energy markets and emissions levels | **Market forces and national self-interest**<br>A mix of social, market, and government forces drives fundamental change in energy use and emissions pathways. | **Weak markets and policies**<br>Political instability, combined with isolationist trends, inhibits governments, causes market uncertainty and slows the energy transition. |
| **International cooperation** | **Strong**<br>International cooperation strengthens in response to strong public demands to address security concerns — which are increasingly linked to climate change. | **Mixed**<br>The global balance of power is more broadly distributed than it has been in almost a century. National interests are central. | **Weak**<br>International relations suffer from chronic domestic political division and weakness, sowing mistrust and isolationism. |
| **Economic environment** | **Mixed**<br>Initial policy disorder, combined with the costs of forced energy transition, causes economic disruptions and hardships over the short term, but eventually establishes conditions that encourage private investment.<br>Average growth: 2.5% | **Moderate**<br>Recovery from the Covid crisis is uneven; an eventual return to pre-2020 average growth rates masks underlying long-term structural shifts in the global economy.<br>Average growth: 2.6% | **Weak**<br>The world emerges from the Covid crisis battered by uncertainty and facing ongoing political and economic fallout, which weakens governments and market confidence.<br>Average growth: 2.1% |
| **Climate policy** | **Very strong**<br>Political pressure and national security interests eventually drive nations to cooperate on global standards and protocols for GHG emissions across the world and promote clean energy technologies, business models, and lifestyles.<br>**Some G20 countries move much closer to net-zero goals but do not meet them.** | **Strong**<br>Climate policy moves forward strongly but remains driven more by national interests than global goals, hindering the effectiveness of international coordination on standards and conventions and the consistency of net-zero programs and efforts.<br>**G20 countries do not meet net-zero goals.** | **Weak to moderate**<br>Climate policy is fragmented as many countries become more inwardly focused and decarbonization efforts lose political momentum in the face of chronic economic uncertainty and weakness.<br>**Many countries abandon net-zero goals.** |

As of 09/30/22. Source: S&P Global. Forecasts are subject to change.

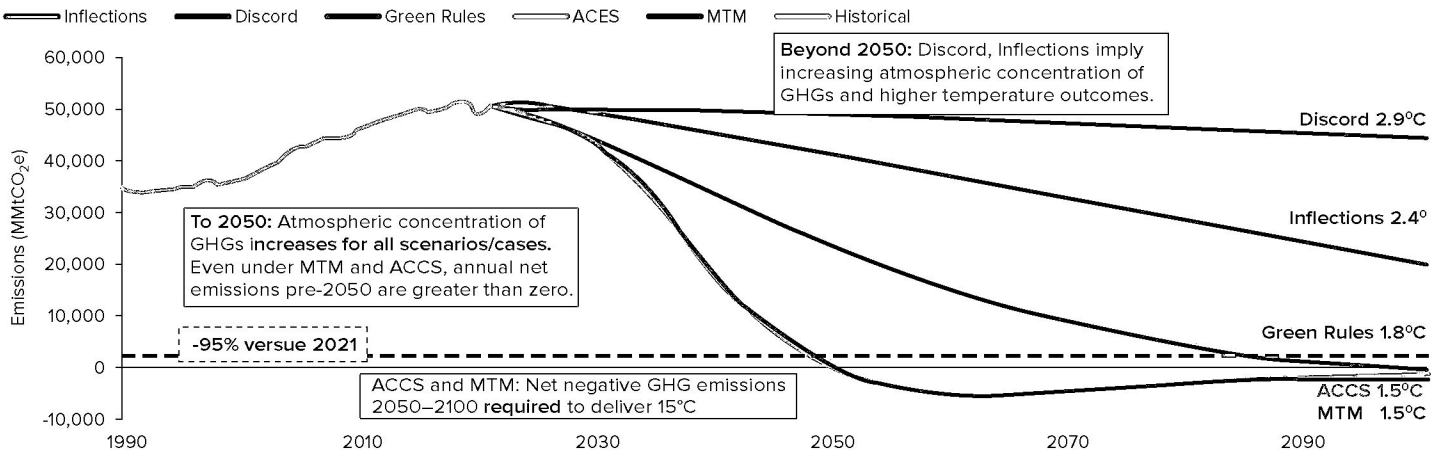
## Exhibit 8B. Summary of net-zero climate scenarios

| | Accelerated carbon capture systems (CCS)<br>Net zero 2050 with high carbon capture | Multi-tech mitigation (MTM)<br>Net zero 2050 with low carbon capture |
|---|---|---|
| **General themes** | **Broad global use of CCS in the energy and non-energy sectors** | **Supply diversification, electrification, and renewables dominate as key drivers, as well as a moral imperative to move away from hydrocarbons** |
| **International cooperation** | **Strong**<br>Recognition that CCS can help accomplish decarbonization goals, use existing infrastructure and save jobs. | **Strong**<br>Intense policy and societal intent to minimize fossil fuel use across all sectors. Incentives widely used to foster green hydrogen. |
| **Economic environment** | **Moderate**<br>Costs of rapid acceleration of expensive carbon capture keep economic growth slightly below that of the "green rules" scenario.<br>*Average growth: 2.5%* | **Moderate**<br>Costs of a rapid shift away from hydrocarbons and abandonment of existing facilities keep economic growth below that of the "green rules" scenario for some period.<br>*Average growth: 2.5%* |
| **Climate policy** | **Very strong**<br>Very strong and coordinated climate policies globally. High carbon prices to incentivize use of carbon capture, with global carbon markets reaching $200 per metric ton of $CO_2$ (real 2020 US$) by 2040. | **Very strong**<br>Very strong and coordinated climate policies globally. Moderately high carbon prices, reaching $150 per metric ton of $CO_2$ (real 2020 US$) by 2040, supplemented by incentives and mandates to reduce fossil fuels. |

As of 09/30/22. Source: S&P Global. Forecasts are subject to change.

**Exhibit 9. The path to 2050 and beyond: Emission trends and implied temperatures**

Only the back-cast cases achieve the net-zero target of the Paris Agreement

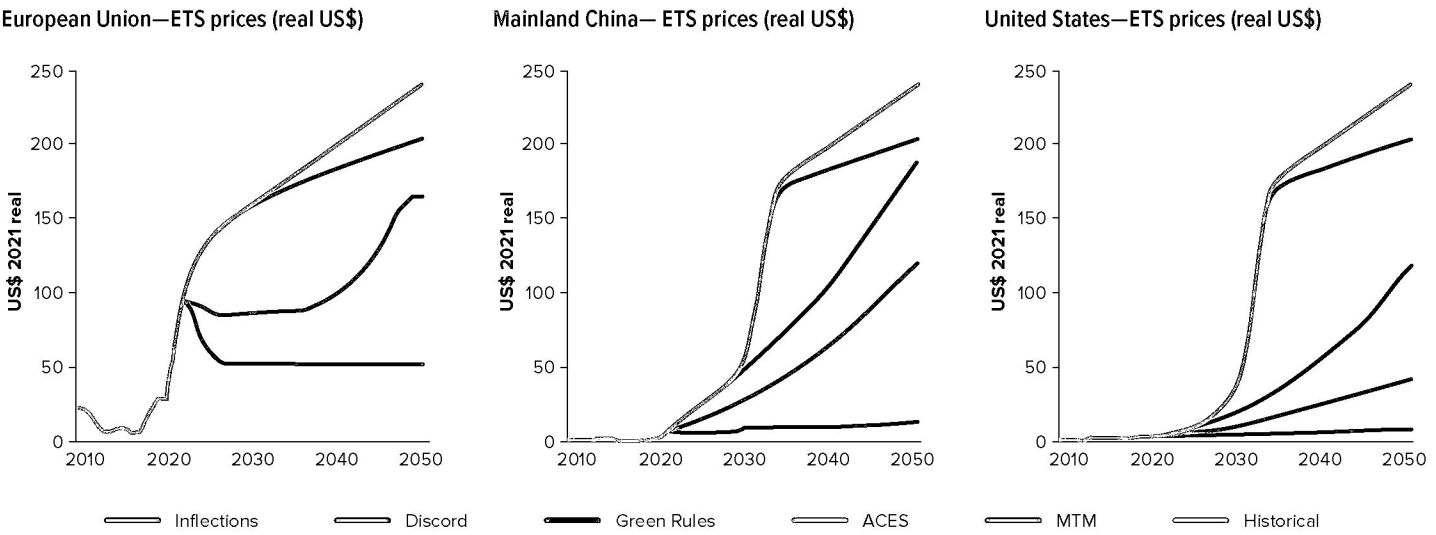



Note: *MtCO2e = million metric tons of CO2 equivalent.*

As of 09/30/22. Source: S&P Global. Forecasts are subject to change.

**Exhibit 10. Lower-carbon outlooks see emissions trading systems expand and prices rise**

Net-zero cases assume global convergence of carbon pricing by 2050




As of 09/30/22. Source: S&P Global. Forecasts are subject to change.

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BUSINESS INSIDER

# CHART OF THE DAY: Tepper, Birinyi, Damodaran, O'Neill, Ritholtz All Love This Bullish Stock Market Metric

Sam Ro
May 14, 2013, 12:36 PM

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With the S&P 500 at an all-time high, many stock market pundits have grown increasingly cautious.

However, the savviest experts are reiterating their bullishness, and they are all pointing to one metric: the equity risk premium.

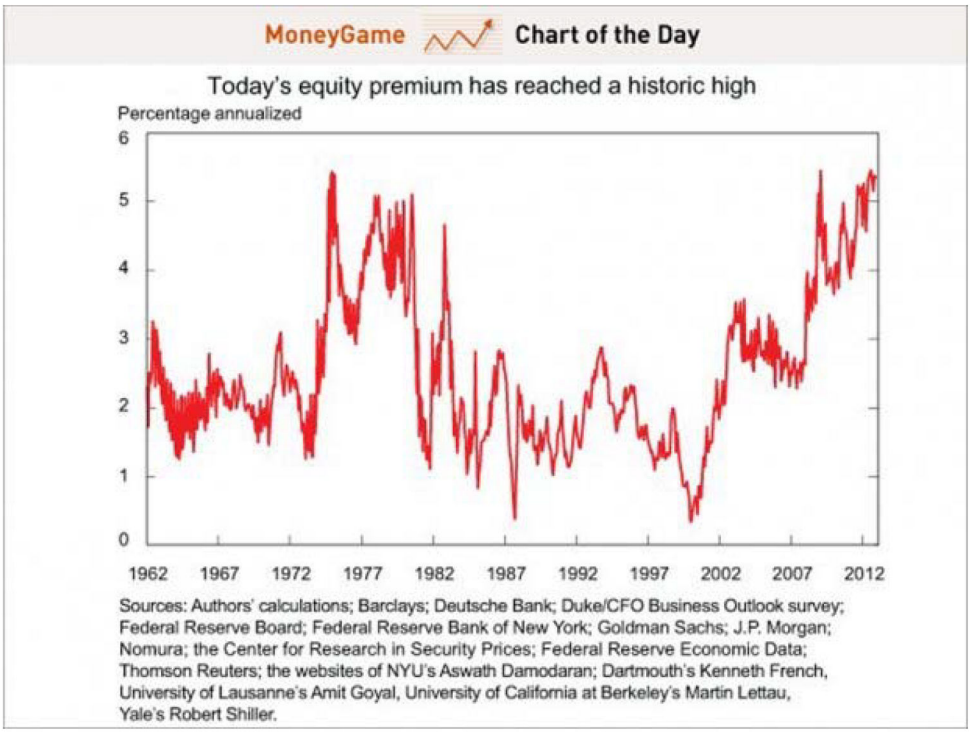
"The equity risk premium is the key to investing and valuation," says legendary NYU finance professor Aswath Damodaran,

The equity risk premium can be defined simply as the expected return on a broad stock market index in excess of the long-term risk-free rate, which is often measured by a government bond yield.

Markets spiked this morning when influential hedge fund manager David Tepper held up a chart of the equity risk premium as he presented his uber-bullish case for stocks during a CNBC appearance.

Blogger extraordinaire Barry Ritholtz and stock market legend Laszlo Birinyi each pointed us to Tepper's exact chart last week. Birinyi confident we'll see the S&P 500 pass 1,700 this year, and 1,900 relatively soon.

Jim O'Neill, the now retired economist from Goldman Sachs, has long been bullish on stocks thanks to the equity risk premium. In the final slide of his final presentation, O'Neill argued, "Current ERP levels continue to indicate that equity markets are still quite attractive in many parts of the world."

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Industry Update — July 15, 2022

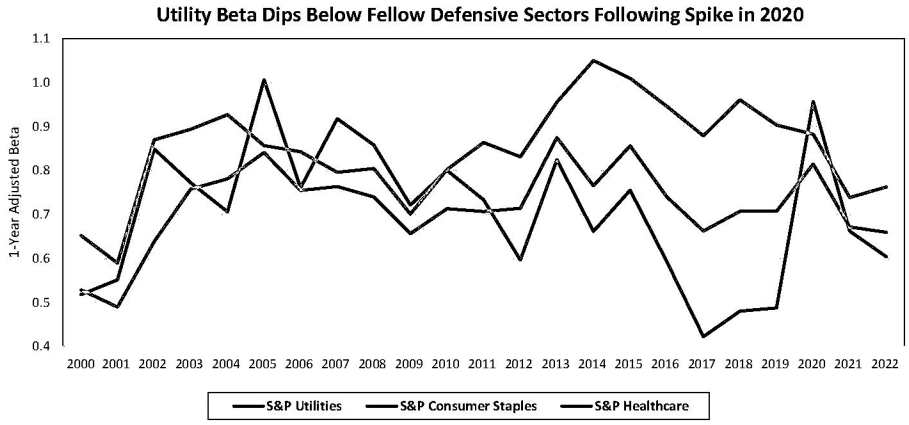
**Utilities**

# Figure of the Week: Utility 1-Year Beta Continues Downward Trajectory

## Our Call

Figure of the Week

*Click image to enlarge in HTML view.*




Note: 2022 beta based on trailing twelve months through 6/30/22
Source: Factset and Wells Fargo Securities, LLC

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# Rate of Return Regulation Revisited

Karl Dunkle Werner and Stephen Jarvis *

September 2022

**Abstract**

Utility companies recover their capital costs through regulator-approved rates of return on debt and equity. In the US the costs of risky and risk-free capital have fallen dramatically in the past 40 years, but utility rates of return have not. Using a comprehensive database of utility rate cases dating back to the 1980s, we estimate that the current average return on equity could be around 0.5–5.5 percentage points higher than various benchmarks and historical relationships would suggest. We discuss possible mechanisms and show that regulated rates of return respond more quickly to increases in market measures of the cost of capital than they do to decreases. We then provide empirical evidence that higher regulated rates of return lead utilities to own more capital – the Averch–Johnson effect. A 1 percentage point rise in the return on equity increases new capital investment by about 5%. Overall we find that consumers may be paying $2–20 billion per year more than they would otherwise if rates of return had fallen in line with capital market trends.

**JEL Codes:** Q4, L5, L9

**Keywords:** Utility, Rate of Return, Regulation, Electricity, Natural Gas, Capital Investment

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# 1 Introduction

In the two decades from 1997 to 2017, real annual capital spending on electricity distribution infrastructure by major utilities in the United States has doubled (EIA 2018a). Over the same time period annual capital spending on electricity transmission infrastructure increased by a factor of seven (EIA 2018b). The combined total is now more than $50 billion per year. This trend is expected to continue. Bloomberg New Energy Finance predicts that between 2020 and 2050, North and Central American investments in electricity transmission and distribution will likely amount to $1.6 trillion, with a further $1.7 trillion for electricity generation and storage (Henbest et al. 2020).[1]

These large capital investments could be due to the prudent actions of utility companies modernizing an aging grid. They may also be a necessary response to the clean energy transition underway in much of the gas and electric utility sector. However, it is noteworthy that over recent years, utilities have earned sizeable regulated rates of return on their capital assets, particularly when set against the unprecedented low interest rate environment post-2008. When the economy-wide cost of capital fell, utilities' regulated rates of return did not fall nearly as much. This gap raises the prospect that at least some of the growth in capital spending could be driven by utilities earning excess regulated returns.

Utilities over-investing in capital assets as a result of excess regulated returns is an age old concern in the sector (Averch and Johnson 1962). The resulting costs from "gold plating" are then passed on to consumers in the form of higher bills. Capital markets and the utility industry have undergone significant changes over the past 50 years since the early studies of utility capital ownership (Joskow 1972, 1974). In this paper we use new data to revisit these issues. We do so by exploring

1. North and Central American generation/storage are reported directly. Grid investments are only reported globally, so we assume the ratio of North and Central America to global is the same for generation/storage as for grid investments.

three main research questions. First, to what extent are utilities being allowed to earn excess returns on equity by their regulators? Second, how has this return on equity affected utilities' capital investment decisions? Third, what impact has this had on the costs paid by consumers?

To answer our research questions, we use data on the utility rate cases of all major electricity and natural gas utilities in the United States spanning the past four decades (Regulatory Research Associates 2021). We combine this with a range of financial information on credit ratings, corporate borrowing, and market returns. To examine possible sources of over-investment in more detail we also incorporate data from annual regulatory filings on individual utility capital spending.

We start our analysis by estimating the size of the gap between the allowed rate of return on equity (RoE) that utilities earn and some measure of the cost of equity they face. A central challenge here, both for the regulator and for the econometrician, is estimating the cost of equity. We proceed by considering a range of approaches to simulating the actual cost of equity based on available measures of capital market returns, the capital asset pricing model (CAPM) and a comparison with regulatory decisions in the United Kingdom. None of these are perfect comparisons; but taken together, our various estimation approaches result in a consistent trend of excess rates of return. These results are necessarily uncertain, and depending on our chosen benchmark the premium ranges from 0.5 to 5.5 percentage points. Importantly though, even our most conservative benchmarks come in below the allowed rates of return on equity that regulators set today.

The existence of a persistent gap between the return on equity that utilities earn and some measure of the cost of capital they face could have a number of explanations. Recent work by Rode and Fischbeck (2019) ruled out a number of financial reasons we might see increasing RoE spreads, such as changes to utilities' debt/equity ratio, asset-specific risk, or the market's overall risk premium. This leaves them looking for other explanations – for example, they highlight that

regulators seem to follow some ad-hoc approaches that make them reluctant to set RoE below a nominal 10%. Azgad-Tromer and Talley (2017) also find that allowed rates of return diverge significantly from what would be expected by a standard CAPM approach. They point to a range of non-financial factors that may play an important role, including political goals and regulatory capture. Using data from a field experiment they show that providing finance training to regulatory staff does have a moderate effect on moving rates of return closer to standard asset pricing predictions.

These insights point to the broader challenges inherent in the ratemaking process. Regulators face an information asymmetry with the utilities they regulate when determining whether costs are prudent and necessary (Joskow, Bohi, and Gollop 1989). Utilities have a clear incentive to request rate increases when their costs go up, but do not have much incentive to request a rate decrease when their costs go down. If regulators are too deferential to the demands of the utilities they regulate – perhaps due to a insufficient expertise or regulatory capture (Dal Bó 2006) – we would expect rates to become detached from underlying costs.

We explore this issue by drawing on the literature on asymmetric price adjustments. It has been documented in various industries that positive shocks to firms' input costs can feed through into prices faster than negative shocks (Bacon 1991; Borenstein, Cameron, and Gilbert 1997; Peltzman 2000). This is the so-called "rockets and feathers" phenomenon. We test this hypothesis by estimating a vector error correction model for the relationship between utilities' return on equity and some benchmark measures of the cost of capital (e.g. US Treasury Bond yields). Here we do indeed find evidence of asymmetric adjustment. Increases to the benchmark cost of capital lead to rapid rises in utilities' return on equity, while decreases lead to less rapid falls.

Excess regulated returns on equity will distort the incentives for utilities to invest in capital. To consider the change in the capital base, we turn to a regression analysis.

Here we aim to identify how a larger RoE gap translates into over-investment in capital. Identification is challenging in this setting, so we again employ several different approaches, with different identifying assumptions. In addition to a basic within-utility comparison, we examine instrumental variables. For our preferred approach we draw on the intuition that after a rate case is decided, the utility's RoE is *fixed* at a particular nominal percentage for several years. The cost of capital in the rest of the economy, and therefore the cost of equity for the utility, will shift over time. We use these shifts in the timing and duration of rate cases as an instrument for changes in the RoE gap. We also examine a second instrument that exploits an apparent bias of regulators rounding the RoE values they approve, though ultimately this instrument is too weak for us to use.

Across the range of specifications used, we find a broadly consistent picture. In our preferred specification we find that increasing the RoE gap by one percentage point leads to a five percent increase in the approved change in the rate base. We observe similar effects for the overall size of the approved rate base.

Combining our measures of the RoE gap with the distortions to capital investment, we estimate the cost to consumers from excess rates of return reached around $2–20 billion per year by 2020, with the majority of these costs coming from the electricity sector. These costs have important distributional effects, representing a sizeable transfer from consumers to investors. Increasing the price of electricity also has important implications for environmental policy and efforts to encourage electrification (Borenstein and Bushnell 2022).

# 2 Background

Electricity and natural gas utility companies are typically regulated by government utility commissions, which allow the companies a geographic monopoly and, in exchange, regulate the rates the companies charge. These utility commissions are

state-level regulators in the US. They set consumer rates and other policies to allow investor-owned utilities (IOUs) a designated rate of return on their capital investments, as well as recovery of non-capital costs. This rate of return on capital is almost always set as a nominal percentage of the installed capital base. For instance, with an installed capital base worth $10 billion and a rate of return of 8%, the utility is allowed to collect $800 million per year from customers for debt service and to provide a return on equity to shareholders. State utility commissions typically update these nominal rates every 3–6 years.

Utilities own physical capital (power plants, gas pipelines, repair trucks, office buildings, etc.). The capital depreciates over time, and the set of all capital the utility owns is called the rate base (the base of capital that rates are calculated on). Properly accounting for depreciation is far from straightforward, but we will not focus on that challenge in this paper. This capital rate base has an opportunity cost of ownership: instead of buying capital, that money could have been invested elsewhere. IOUs fund their operations through issuing debt and equity, typically about 50%/50%. For this paper, we focus on common stocks (utilities issue preferred stocks as well, but those form a very small fraction of utility financing). The weighted average cost of capital is the weighted average of the cost of debt and the cost of equity.

Utilities are allowed to set rates to recover all of their costs, including this cost of capital. For some expenses, like fuel purchases, it's easy to calculate the companies' costs. For others, like capital, the state public utilities commissions are left trying to approximate the capital allocation at a cost that competitive capital markets would provide if the utility had been a competitive company rather than a regulated monopoly. The types of capital utilities own, and their opportunities to add capital to their books, varies depending on market and regulatory conditions. Utilities that are vertically integrated might own a large majority of their own generation, the transmission lines, and the distribution infrastructure. Other utilities are "wires only," buying power from independent power producers and transporting it over

their lines. Natural gas utilities are typically pipeline only – the utility doesn't own the gas well or processing plant.

In the 1960s and 70s, state public utilities commissions (PUCs) began adopting automatic fuel price adjustment clauses. Rather than opening a new rate case, utilities used an established formula to change their customer rates when fuel prices changed. The same automatic adjustment has generally not been the norm for capital costs, despite large swings in the nominal cost of capital over the past 50 years. A few jurisdictions have introduced limited automatic updating for the cost of equity, and we discuss those approaches in more detail in section 4.1, where we consider various approaches of estimating the RoE gap.

Regulators typically employ a "test year", a single 12-month period in the past or future that will be used as the basis for the rate case analysis. Expenses and capital costs in this test year, except those with automatic update provisions, are the values used for the entire rate case.

The cost of debt financing is easier to estimate than the cost of equity financing. For historical debts, it is sufficient to use the cost of servicing those debts. For forward-looking debt issuance, the cost is estimated based on the quantity and cost of expected new debt. Issues remain for forward looking decisions – e.g. what will bond rates be in the future test year? – but these are *relatively* less severe. In our data, we see both the utilities' requested and approved return on debt. It's notable that the requested and approved rates are very close for debt, and much farther apart for equity.

The cost of equity financing is more challenging. Theoretically, it's the return shareholders require in order to invest in the utility. The Pennsylvania Public Utility Commission's ratemaking guide notes this difficulty (Cawley and Kennard 2018):

> Regulators have always struggled with the best and most accurate method to use in applying the [*Federal Power Commission v. Hope Nat-*

> *ural Gas Company* (1944)] criteria. There are two main conceptual approaches to determine a proper rate of return on common equity: "cost" and "the return necessary to attract capital." It must be stressed, however, that no single one can be considered the only correct method and that a proper return on equity can only be determined by the exercise of regulatory judgment that takes all evidence into consideration.

Unlike debt, where a large fraction of the cost is observable and tied to past issuance, the cost of equity is the ongoing, forward-looking cost of holding shareholders' money. Put differently, the RoE is applied to the entire rate base – unlike debt, there's typically no notion of paying a specific RoE for specific stock issues.

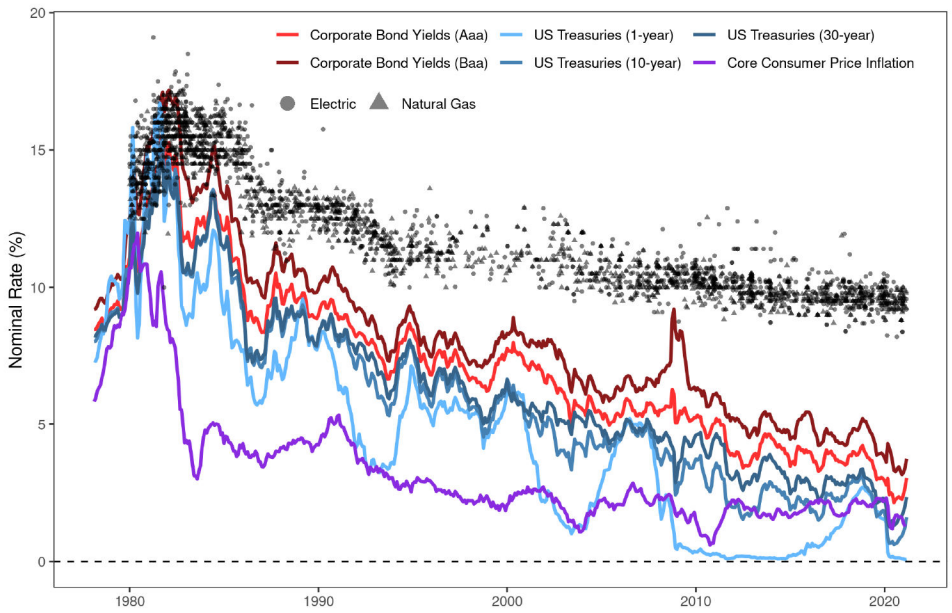
Regulators employ a mixture of models and subjective judgment. Typically, these approaches involve benchmarking against other US utilities (and often utilities in the same geographic region). There are advantages to narrow benchmarking, but when market conditions change and everyone is looking at their neighbors, rates will update very slowly.

In Figure 1 we plot the approved return on equity over 40 years, with various risky and risk-free rates for comparison. The two panels show nominal and real rates.[2] Consistent with a story where regulators adjust slowly, approved RoE has fallen slightly (in both real and nominal terms), but much less than other costs of capital. This price stickiness by regulators also manifests in peculiarities of the rates regulators approve. For instance, Rode and Fischbeck (2019) note an apparent reluctance from to set RoE below a nominal 10%.

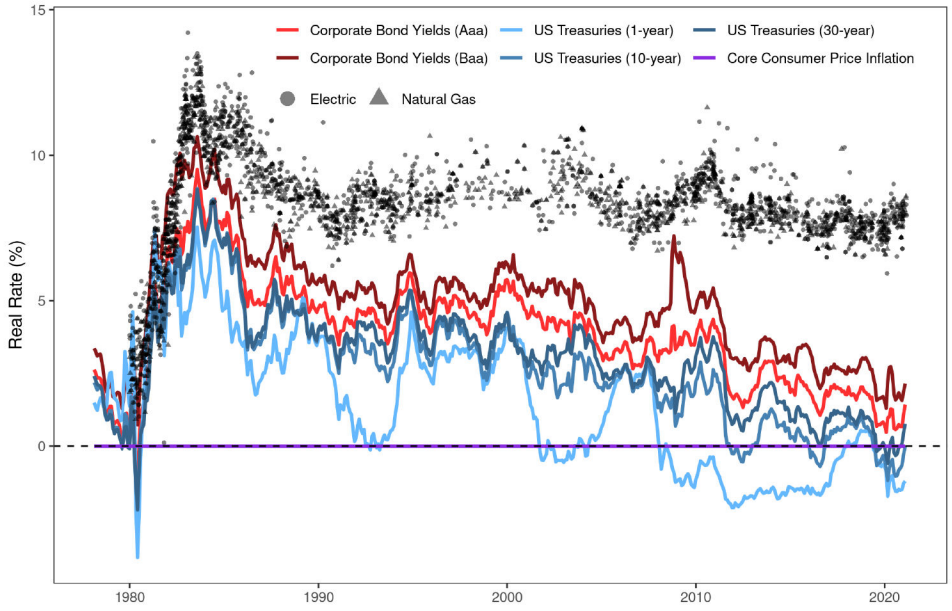
That paper, Rode and Fischbeck (2019), is the closest to ours in the existing literature. The authors use the same rate case dataset we do, and note a similar widening of the spread between the approved return on equity and 10-year Treasury rates. That paper, unlike ours, dives into the financial modeling, using the standard

2. We calculate real values by subtracting the monthly core CPI.

*Figure 1: Return on Equity and Financial Indicators*




*(a) Nominal*




*(b) Real*

**Notes:** These figures show the approved return on equity for investor-owned US electric and natural gas utilities. Each dot represents the resolution of one rate case. Real rates are calculated by subtracting core CPI. Between March 2002 and March 2006 30-year Treasury rates are extrapolated from 1- and 10-year rates (using the predicted values from a regressing the 30-year rate on the 1- and 10-year rates).
Sources: Regulatory Research Associates (2021), Moody's (2021a, 2021b), Board of Governors of the Federal Reserve System (2021a, 2021b, 2021c), and US Bureau of Labor Statistics (2021).

capital asset pricing model (CAPM) to examine potential causes of the increase the RoE spread. In contrast, we consider a wider range of financial benchmarks (beyond 10-year Treasuries) and ask more pointed questions about the implications of this growing RoE gap for utilities' investment decisions and costs for consumers.

Using CAPM, Rode and Fischbeck (2019) rule out a number of financial reasons we might see increasing RoE spreads. Possible reasons include utilities' debt/equity ratio, the asset-specific risk (CAPM's $\beta$), or the market's overall risk premium. None of these are supported by the data. A pattern of steadily increasing debt/equity could explain an increasing gap, but debt/equity has fallen over time. Increasing asset-specific risk could explain an increasing gap, but asset risk has (largely) fallen over time. An increasing market risk premium could explain an increased spread between RoE and riskless Treasuries, but the market risk premium has fallen over time.

Prior research has highlighted the importance of macroeconomic changes, and that these often aren't fully included in utility commission ratemaking (Salvino 1967; Strunk 2014). Because rates of return are typically set in fixed nominal percentages, rapid changes in inflation can dramatically shift a utility's real return. This pattern is visible in figure 1 in the early 1980s. Until 2021, inflation has been lower and much more stable.

Many authors have written a great deal about modifying the current system of investor-owned utilities. Those range from questions of who pays for fixed grid costs to the role of government ownership or securitization (Borenstein, Fowlie, and Sallee 2021; Farrell 2019). For this project, we assume the current structure of investor-owned utilities, leaving aside other questions of how to set rates across different groups of customers or who owns the capital.

# 3 Data

To answer our research questions, we use a database of resolved utility rate cases from 1980 to 2021 for every electricity and natural gas utility that either requested a nominal-dollar rate base change of $5 million or had a rate base change of $3 million authorized (Regulatory Research Associates 2021). Summary statistics on these rate cases can be seen in Table 1. Our primary variables of interest are the rates of return and the rate base. [3] We also merge data on annual number of customers, quantity supplied and sales revenue for the electric utilities in our sample (US Energy Information Administration 2022).

We transform this panel of rate case events into an unbalanced utility-by-month panel, filling in the rate base and rate of return variables in between each rate case. There are some mergers and splits in our sample, but our SNL data provider lists each company by its present-day (2021) company name, or the company's last operating name before it ceased to exist. With this limitation in mind, we construct our panel by (1) not filling data for a company before its first rate case in a state, and (2) dropping companies five years after their last rate case. In contexts where a historical comparison is necessary, but the utility didn't exist in the benchmark year, we use average of utilities that did exist in that state, weighted by rate base size.

We match with data on S&P credit ratings, drawn from SNL's *Companies (Classic) Screener* (2021) and WRDS' *Compustat S&P legacy credit ratings* (2019). Most investor-owned utilities are subsidiaries of publicly traded firms. We use the former data to match as specifically as possible, first same-firm, then parent-firm, then same-ticker. We match the latter data by ticker only. Then, for a relatively small number of firms, we fill forward.[4] Between these two sources, we have ratings data available

3. We focus here on proposed and approved rates of return. It is possible that utility's actual rate of return or return on equity might differ from the approved level. In general though, actual returns do tend to track allowed returns quite closely.

4. When multiple different ratings are available, e.g. different ratings for subsidiaries trading

*Table 1: Summary Statistics*

| Characteristic | N | Electric[1] | Natural Gas[1] |
|---|---|---|---|
| Rate of Return Proposed (%) | 3,324 | 9.95 (1.98) | 10.07 (2.07) |
| Rate of Return Approved (%) | 2,813 | 9.59 (1.91) | 9.53 (1.95) |
| Return on Equity Proposed (%) | 3,350 | 13.22 (2.69) | 13.06 (2.50) |
| Return on Equity Approved (%) | 2,852 | 12.38 (2.40) | 12.05 (2.24) |
| Return on Equity Proposed Spread (%) | 3,350 | 6.72 (2.18) | 6.95 (1.99) |
| Return on Equity Approved Spread (%) | 2,852 | 5.62 (2.27) | 5.68 (2.10) |
| Return on Debt Proposed (%) | 3,247 | 7.48 (2.11) | 7.47 (2.16) |
| Return on Debt Approved (%) | 2,633 | 7.54 (2.06) | 7.44 (2.16) |
| Equity Funding Proposed (%) | 3,338 | 45 (7) | 48 (7) |
| Equity Funding Approved (%) | 2,726 | 44 (7) | 47 (7) |
| Customers (thous) | 1,177 | 693 (929) | NA (NA) |
| Quantity (TWh) | 1,177 | 17 (21) | NA (NA) |
| Revenue ($ mn) | 1,177 | 1,470 (2,086) | NA (NA) |
| Rate Base Increase Proposed ($ mn) | 3,686 | 84 (132) | 24 (41) |
| Rate Base Increase Approved ($ mn) | 3,672 | 40 (84) | 12 (25) |
| Rate Base Proposed ($ mn) | 2,366 | 2,239 (3,152) | 602 (888) |
| Rate Base Approved ($ mn) | 1,992 | 2,122 (2,991) | 583 (843) |
| Case Length (yr) | 3,364 | 3.11 (3.97) | 3.01 (3.34) |
| Rate Case Duration (mo) | 3,713 | 9.1 (5.1) | 8.1 (4.3) |

[1]Mean (SD)

**Notes:** This table shows the rate case variables in our rate case dataset. Values in the Electric and Natural Gas columns are means, with standard deviations in parenthesis. Approved values are approved in the final determination, and are the values we use in our analysis. Some variables are missing, particularly the approved rate base. The RoE spread in this table is calculated relative to the 10-year Treasury rate.
Source: Regulatory Research Associates (2021), US Energy Information Administration (2022), and author calculations.

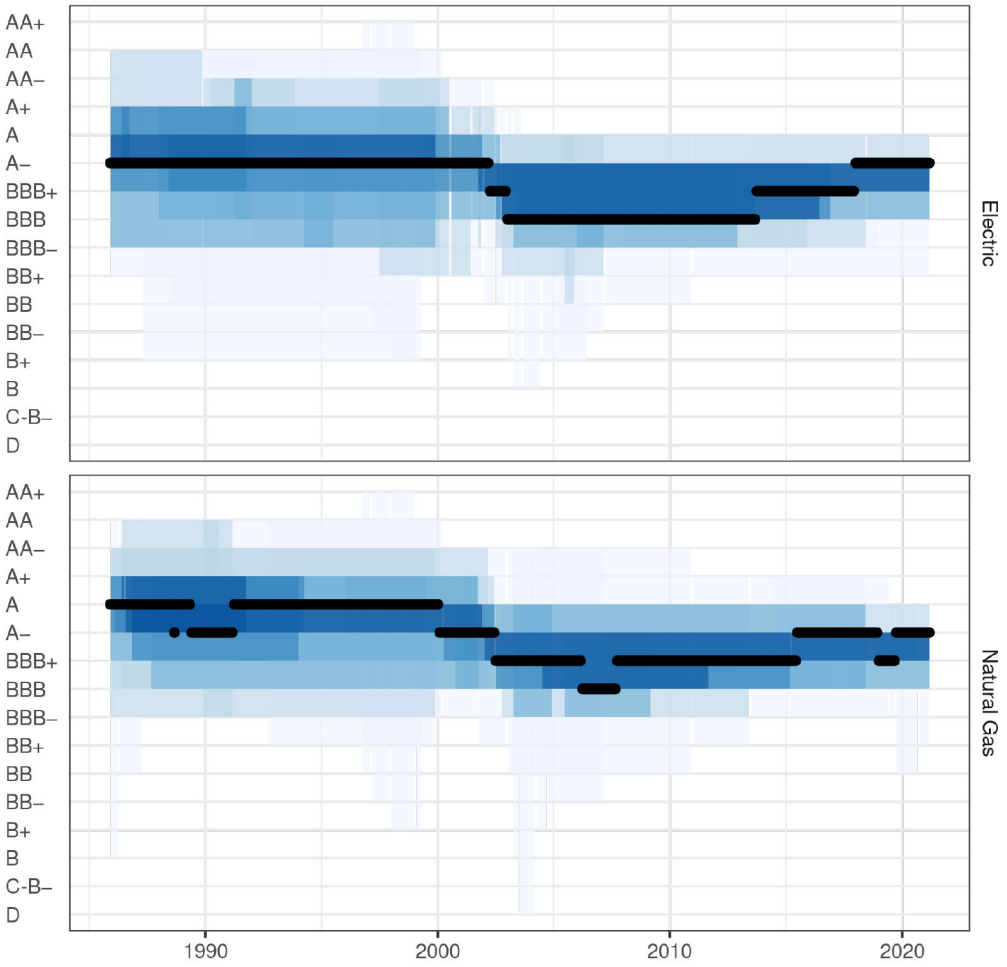
from December 1985 onward. Approximately 80% of our utility–month observations are matched to a rating. Match quality improves over time: approximately 89% of observations after 2000 are matched.

These credit ratings have changed little over 35 years. In figure 2 we plot the median (in black) and various percentile bands (in shades of blue) of the credit rating for utilities active in each month. We note that the median credit rating has

under the same ticker, we take the median rating. We round down (to the lower rating) in the case of an even number of ratings.

seen modest movements up and down over the past decades. The distribution of ratings is somewhat more compressed in 2021 than in the 1990s. While credit ratings are imperfect, we would expect rating agencies to be aware of large changes in riskiness.[5] Instead, the median credit rating for electricity utilities is A–, as it was for all of the 1990s. The median credit rating for natural gas utilities is also A–, down from a historical value of A.

*Figure 2: Credit ratings have changed little in 35 years*




NOTE: Black lines represent the median rating of the utilities active in a given month. We also show bands, in different shades of blue, that cover the 40–60 percentile, 30–70 percentile, 20–80 percentile, 10–90 percentile, and 2.5–97.5 percentile ranges. (Unlike later plots, these *are not* weighted by rate base.) Ratings from C to B– are collapsed to save space.
SOURCE: *Companies (Classic) Screener* (2021) and *Compustat S&P legacy credit ratings* (2019).

5. For utility risk to drive up the firms' cost of equity but not affect credit ratings, one would need to tell a very unusual story about information transmission or the credit rating process.

Beyond credit ratings, we also use various market rates pulled from FRED. These include 1-, 10-, and 30-year Treasury yields, the core consumer price index (CPI), bond yield indexes for corporate bonds rated by Moody's as Aaa or Baa, as well as those rated by S&P as AAA, AA, A, BBB, BB, B, and CCC or lower.[6]

Matching these two datasets – rate cases and macroeconomic indicators – we construct the timeseries shown in Figure 1. A couple of features jump out, as we mentioned in the introduction. The gap between the approved return on equity and other measures of the cost of capital have increased substantially over time. At the same time, the return on equity has decreased over time, but much more slowly than other indicators. This is the key stylized fact that motivates our examination of the return on equity that utilities earn and the implications this may have for their incentives to invest in capital and the costs they pass on to consumers.

# 4 Empirical Strategy

## 4.1 The Return on Equity Gap

Knowing the size of the return on equity (RoE) gap is a challenge, and we take a couple of different approaches. None are perfect, but collectively, they shed light on the question.

### 4.1.1 Benchmarking to a Baseline Spread

We first consider a benchmark index of corporate bond yields. The idea here is to ask: what would the RoE be today if the average spread against corporate bond yields had not changed since some baseline date? Here we compare all utilities to the corporate bond index that is closest to that utility's own, contemporaneous debt

6. Board of Governors of the Federal Reserve System (2021a, 2021b, 2021c), US Bureau of Labor Statistics (2021), Moody's (2021a, 2021b), and Ice Data Indices, LLC (2021b, 2021a, 2021f, 2021d, 2021c, 2021g, 2021e).

rating. [7] To calculate the RoE gap we first find the spread between the approved return on equity and the bond index rate for each utility in each state in a baseline period. We then take this spread during the baseline period and apply it to the future evolution of the bond index rate to get an estimate of the baseline RoE. The RoE gap is the difference between a given utility's allowed return on equity at some point in time and this baseline RoE.

The choice of the baseline period is also worth considering here. Throughout our analysis we use January 1995 as the baseline period. The date chosen determines where the gap between utilities' RoE and baseline RoE is zero. Changing the baseline date will shift the overall magnitude of the gap. As long as the baseline date isn't in the middle of a recession, our qualitative results don't depend strongly on the choice. Stated differently, the baseline year determines when the average gap is zero, but this is a constant shift that does not affect the overall trend. While January 1995 is not special, we note that picking a much more recent baseline would imply that utilities were substantially under-compensated for their cost of equity for many continuous years.

Our second measure adopts a similar approach to the first but benchmarks against US Treasuries. The idea here is to ask: what would the RoE be today if the average spread against US Treasuries had not changed since some baseline date? This measure is calculated in exactly the same way as our first approach except the spread is measured against the 10-year Treasury bond yield in the baseline period, rather than the relevant corporate bond index.

Our third measure continues with using US Treasuries but does so using an RoE update rule. This rule is consistent with the approach taken by the Vermont

7. We also examined a comparison against a single Moodys' Baa corporate bond index. Moody's Baa is approximately equivalent to S&P's BBB, a rating equal to or slightly below most of the utilities in our data (see figure 2). This avoids issues where utilities' bond ratings may be endogenous to their rate case outcomes. Using a single index also faces fewer data quality challenges. The findings using the single Moody's Baa bond index are broadly equivalent to those using a same rated bond index and our later approach using US Treasuries.

PUC, and similar approaches have been used in the past in California and Canada. Relative to some baseline period the automatic update rule adjusts the RoE at half the rate that the yield on the 10-year US Treasury bond changes over that time period. [8] The Vermont PUC uses 10-year US Treasuries and set the baseline period as December 2018, for their plan published in June 2019. (*Green Mountain Power: Multi-Year Regulation Plan 2020–2022* 2020). In our case we also use 10-year Treasuries and set the baseline to January 1995. We simulate the gap between approved RoE and what RoE would have been if every state's utilities commission followed this rule from 1995 onward. [9]

### 4.1.2 Benchmarking to the Capital Asset Pricing Model

Our fourth and fifth measures draw directly on the Capital Asset Pricing Model (CAPM) approach. The CAPM approach is widely used by regulators to support their decisions on utility equity returns, alongside other methods such as Discounted Cash Flow (DCF). In principle the CAPM provides an objective way to quantify the expected returns for an asset given the risk of that asset and the returns available in the market over-and-above some risk-free rate. In practice its application remains open to a significant degree of subjective interpretation, in large part through the choice of values for its key parameters. As such, even CAPM calculations can form part of the negotiation process between regulators and utilities, with the latter having a clear incentive to lobby for assumptions that result in the CAPM producing higher estimates of the cost of equity.

We calculate predictions of the equity returns for each utility using the standard CAPM formula.

$$RoE = R_f + (\beta \times MRP)$$

8. Define $RoE'$ as the baseline RoE, $B'$ as the baseline 10-year Treasury bond yield, and $B_t$ as the 10-year Treasury bond yield in year $t$. RoE in year $t$ is then: $RoE_t = RoE' + (0.5 \times (B_t - B'))$

9. Pre-1995 values are not particularly meaningful, but we can calculate them with the same formula.

Here $R_f$ is the risk-free rate, $MRP$ is the market risk premium and $\beta$ is the equity beta for the asset in question – namely each utility in our sample. Our assumed values for each of these parameters are broadly in line with published data (Damodaran 2022a) and values used by regulators in the UK, Europe, Australia and at the federal level for the US (Australian Energy Regulator 2020; Economic Consulting Associates 2020; UK Regulatory Network 2020). The parameter values used by state PUCs in the US tend to fall at the higher end of the range we examine. We calculate the RoE gap by taking the contemporaneous difference between our CAPM estimate of RoE and each utility's allowed RoE.

*Risk-free rate*

The risk-free rate, $R_f$, is intended to capture the base level of returns from an effectively zero risk investment. Yields on government bonds are the common source for this information, although practitioners can differ over the choice of maturity (e.g. 10-year or 30-year) and the use of forecast future yields instead of past or current rates. These decisions can significantly affect the final cost of equity. [10] We use the contemporaneous yield on US Treasury Bonds for our measure of the risk-free rate. In our "low" case we use 10-year Treasuries and in our "high" case we use 30-year Treasuries.

*Market risk premium*

The market risk premium, $MRP$, captures the difference between the expected equity market rate of return and the risk-free rate. [11] This is generally calculated by taking the average of the difference in returns for some market-wide stock index and the returns for the risk-free rate. While this appears relatively straightforward, the final value can vary significantly depending on numerous factors. These can include: the choice of stock market index (e.g. S&P 500, Dow Jones, Wilshire 5000

10. For instance, in January 2018 the current yield on 10-year US Treasury Bonds was 2.58%, the average yield from the past 2 years was 2.09%, and the forecast yield from Wolters Klewer (2022) for the next 2 years was 2.97%.

11. $MRP = R_m - R_f$, where $R_m$ is the market return and $R_f$ is the risk-free return.

etc.); the choice of averaging period (e.g. previous 10, 20, 50 years etc.); the return frequency (e.g. monthly, quarterly or annual returns), and the method of averaging (arithmetic, geometric). These decisions can significantly affect the final cost of equity. [12] To capture the uncertainty in the market risk premium, in our "low" case we assume a constant *MRP* of 6 percent and in our "high" case we assume a constant *MRP* of 8 percent.

*Beta*

A firm's equity beta, $\beta$, is a measure of systematic risk and thus captures the extent to which the returns of the firm in question move in line with overall market returns. [13] Regulated firms like gas and electricity utilities are generally viewed as low risk, exhibiting lower levels of volatility than the market as a whole. The calculation of beta is subject to many of the same uncertainties mentioned above, including: the choice of stock market index; the choice of calculation period, and the return frequency.

It is also common to take beta estimates from existing data vendors such as Merrill Lynch, Value Line and Bloomberg. The choice of beta depends on the bundle of comparable firms used and how they are averaged. Furthermore, these vendors generally publish beta values that incorporate the so-called Blume adjustment to deal with concerns about mean reversion. [14] While plausible for many non-regulated firms, its applicability to regulated firms like utilities has been questioned (Michelfelder and Theodossiou 2013). Because utilities generally have betas below one the adjustment serves to increase beta and thus increase the estimated cost of equity produced by the CAPM calculation.

Lastly, the decision on setting beta is complicated by the fact that betas calculated

12. For instance, in January 2018 using annual returns for the S&P 500 compared to the 10-year US Treasury Bond and taking the arithmetic average over the past 5, 25 and 75 years produces market risk premiums of 14.8%, 5.2% and 7.3% respectively (Damodaran 2022b).

13. Beta is calculated by estimating the covariance of the returns for the firm in question, $R_i$, and the market returns, $R_m$, and then dividing by the variance of the market returns: $\beta = \frac{Cov(R_i, R_m)}{Var(R_m)}$

14. The Blume Adjustment equation is: $\beta_{adjusted} = 0.333(1) + 0.667(\beta)$

using observed stock returns are dependent on each firm's debt holdings and tax rate, which may differ from the particular utility being studied. To deal with this, an unlevered beta can be estimated and then the corresponding levered beta can be calculated for a specific debt-to-equity ratio, $D/E$, and tax rate, $\tau$. [15] Here we take $\tau$ to be the federal marginal corporate tax rate and we can directly observe the debt-to-equity ratio, $D/E$, in our data.

To capture the uncertainty in beta, in our "low" case we assume a constant $beta_{unlevered}$ of 0.3 and in our "high" case we assume a constant $beta_{unlevered}$ of 0.5. This generally produces levered betas ranging from 0.6 to 0.9.

### 4.1.3 Benchmarking to UK utilities

Finally, our sixth measure involves benchmarking against allowed returns on equity for gas and electric utilities in the United Kingdom. Here we consider the contemporaneous gap in nominal allowed RoE between the US and UK. Of course many things are different between these countries, and it's not fair to say all US utilities should adopt UK rate making, but we think this benchmark provides an interesting comparison. The data on UK RoE are taken from various regulatory reports published by the Office of Gas and Electricity Markets (Ofgem). We were able to find information on allowed rates of return dating back to 1996. The relevant disaggregation into return on debt and return on equity was more readily available for electric utilities over this entire time period. For natural gas utilities we have this information from 2013 onwards. Importantly, UK rates are set in real terms and so we converted to nominal terms using the inflation indexes cited by the UK regulator.

15. The Hamada equation relates levered to unlevered beta as follows: $\beta = \beta_{unlevered} \times \left[1 + (1 - \tau)\frac{D}{E}\right]$

## 4.2 Asymmetric Adjustment

The existence of a persistent gap between the return on equity that utilities earn and various measures of the cost of capital they face could have a number of explanations. One we examine here focuses on whether regulators are more responsive to the demands of the utilities they regulate than to pressures from consumer advocates. To do so we draw on the literature on asymmetric price adjustments.

It has been documented in many industries that positive shocks to firms' input costs can feed through into prices faster than negative shocks. This has been most extensively studied in the gasoline sector – see Kristoufek and Lunackova (2015) and Perdiguero-García (2013) for reviews of the literature. Building on early work by Bacon (1991) and Borenstein, Cameron, and Gilbert (1997), there are now a wealth of studies examining how positive shocks to crude oil prices lead to faster increases in retail gasoline prices than negative shocks to crude oil prices lead to decreases in retail gasoline prices. This is the so-called "rockets and feathers" phenomenon. A range of explanations for this have been explored, most notably tacit collusion and market power or the dynamics of consumer search.

In our setting we do observe that a change in some benchmark index (e.g. US Treasuries or corporate bonds) appears to feed through into the allowed return on equity for utilities. This can be seen most clearly in Figure 1 where relatively short-run spikes in US Treasuries or corporate bond yields correlate strongly with corresponding spikes in allowed returns on equity. We have also already discussed the sluggish pace at which allowed returns on equity have come down over the longer-term when compared to various benchmark measures of the cost of capital. It therefore seems plausible to think that this relationship may function differently depending on whether it is a positive or a negative shock. To test this we follow the literature on asymmetric price adjustments and estimate a vector error correction model. First we estimate the long-run relationship between the return on equity

for utility $i$ in period $t$ ($RoE_{i,t}$) and a lagged benchmark index of the cost of capital ($Index_{i,t-1}$). [16]

$$RoE_{i,t} = \beta Index_{i,t-1} + \varepsilon_{i,t}$$

In the second step we then run a regression of the change in RoE on three sets of covariates: (1) $m$ lags of the past changes in RoE, (2) $n$ lags of the past change in the index, and (3) the residuals from the long-run relationship, $\hat{\varepsilon}_{i,t}$, lagged from the previous period. To examine potential asymmetric adjustment, each of these three sets of covariates is split into positive and negative components to allow the coefficients for positive changes to differ from the coefficients for negative changes.

$$\begin{aligned}\Delta RoE_{i,t} = &\sum_{j=1}^{m} \alpha_j^{+} \Delta RoE_{i,t-j}^{+} + \sum_{j=1}^{m} \alpha_j^{-} \Delta RoE_{i,t-j}^{-} + \\ &\sum_{j=1}^{n} \gamma_j^{+} \Delta Index_{i,t-j}^{+} + \sum_{j=1}^{n} \gamma_j^{-} \Delta Index_{i,t-j}^{-} + \\ &\theta^{+} \hat{\varepsilon}_{i,t-1}^{+} + \theta^{-} \hat{\varepsilon}_{i,t-1}^{-} + \upsilon_{i,t}\end{aligned}$$

The key coefficients of interest are the $\theta$ coefficients on the residual error correction terms. If these coefficients are statistically different from one another, we take this as evidence of asymmetric adjustment. [17]

## 4.3 Rate Base Impacts

Next, we turn to the rate base the utilities own. To the extent a utility's approved RoE is higher than their actual cost of equity, they will have a too-strong incentive to have capital on their books. In this section, we investigate the change in rate base

16. It is notable that the coefficient estimates we find for $\beta$ are generally close to the adjustment factors used in the automatic update rules employed by the Vermont PUC and California PUC (discussed earlier). This suggest these rules appear to largely formalize existing trends.

17. That is, our null hypothesis is $\theta^{+} = \theta^{-}$.