

Table 5. Panel Regression Explaining Changes in Long-term Growth Estimates from 1982 to 2013. The dependent variable for the regression is the year-over-year change in analyst long-term growth forecasts ($LTG_{t+1} - LTG_t$) measured in the 3rd week of June of year t . EqDil (equity dilution) is the percentage change in split-adjusted shares outstanding from fiscal year-end in $t-2$ to $t-1$. Δ Sales (sales growth) is the percentage change in revenues per split-adjusted share from $t-2$ to $t-1$. Δ Assets (asset growth) is the percentage change in assets per split-adjusted share from $t-2$ to $t-1$. ROA (profitability) is operating income in $t-1$ divided by assets for $t-1$, Hard Growth is the fitted value from the last regression listed in Table 2. The independent variables are constructed using financial statement data from the fiscal period ending in year $t-1$. N is the average of firms each year. For brevity, the intercept is not reported. Robust standard errors are clustered by firm and industry.

	EQDIL	Δ SALES	Δ ASSETS	ROA	Hard Growth	R ²	Industry Fixed Effect?	Year Fixed Effect?	N
Coefficient	-0.02	-0.02	-0.01	0.00		0.03	No	No	1,929
<i>t-stat</i>	(7.81)	(5.91)	(8.21)	(0.31)					
Coefficient	-0.02	-0.02	-0.01	0.00		0.05	No	Yes	1,929
<i>t-stat</i>	(8.44)	(6.13)	(7.85)	(0.11)					
Coefficient	-0.02	-0.02	-0.01	0.00		0.03	Yes	No	1,929
<i>t-stat</i>	(7.62)	(5.74)	(7.82)	(0.41)					
Coefficient	-0.02	-0.02	-0.01	0.00		0.05	Yes	Yes	1,929
<i>t-stat</i>	(8.31)	(5.91)	(7.32)	(0.25)					
Coefficient					-0.24	0.02	No	No	1,929
<i>t-stat</i>					(5.40)				
Coefficient					-0.23	0.05	Yes	Yes	1,929
<i>t-stat</i>					(6.30)				

Table 6. Value-weighted Monthly Returns for Portfolios Formed on Long Term Growth Measures from July 1982 to December 2014. At the end of June of year t , stocks are allocated to ten portfolios based on the decile breakpoints for LTG (analyst long-term growth estimate), Hard Growth (fitted values from the last regression in Table 2) and Soft Growth (LTG minus Explained Growth). Panel A presents results for the original sample of firms with non-missing LTG. Panel B presents results for the bottom half of firms in the original sample based on market capitalization at the end of June of each year. Panel C reports results for all firms listed in CRSP/Compustat (including those with missing LTG data) that have valid data to construct EQDIL, Δ SALES, Δ ASSETS, ROA and positive book equity. T-statistics are reported in parentheses to the right of each estimate. Monthly returns are reported in percentages.

Panel A. Original Sample

	1	2	3	4	5	6	7	8	9	10	10-1	<i>t-stat</i>	n
LTG	1.14%	1.10%	1.15%	1.12%	1.03%	1.08%	1.13%	1.25%	0.89%	1.15%	0.01%	(0.02)	2,153
Hard Growth	1.19%	1.18%	1.07%	1.22%	1.08%	1.23%	0.95%	1.05%	1.04%	0.59%	-0.60%	(2.66)	2,153
Soft Growth	0.98%	1.06%	1.15%	1.06%	1.22%	0.96%	1.06%	1.21%	1.02%	1.31%	0.33%	(0.96)	2,153

Panel B. Small Firms Only

	1	2	3	4	5	6	7	8	9	10	10-1	<i>t-stat</i>	n
LTG	1.24%	1.29%	1.23%	1.30%	1.29%	1.39%	1.28%	1.10%	1.17%	1.06%	-0.18%	(0.54)	1,077
Hard Growth	1.41%	1.44%	1.49%	1.27%	1.28%	1.37%	1.13%	1.36%	1.12%	0.55%	-0.86%	(3.88)	1,077
Soft Growth	1.18%	1.18%	1.14%	1.24%	1.25%	1.28%	1.32%	1.32%	1.23%	1.22%	0.05%	(0.15)	1,077

Panel C. All Firms (Includes Missing LTG Data Firms)

	1	2	3	4	5	6	7	8	9	10	10-1	<i>t-stat</i>	n
Hard Growth	1.16%	1.18%	1.11%	1.12%	1.11%	1.20%	1.02%	0.99%	0.98%	0.37%	-0.79%	(3.38)	4,045

Table 7. Fama-MacBeth Regressions of Monthly Returns on Growth, Size and Book/Market Measures from July 1982 to December 2014. This table reports the results of a set of Fama-MacBeth regressions of monthly returns on lagged growth measures, equity dilution, sales and asset growth, profitability, size and the book-to-market ratio. N is the average number of firms in the sample each year. LTG is the mean estimate of all analysts' expectations of the EPS annual growth rate between year $t+2$ to year $t+5$ measured in the 3rd week of June of year t . EQDIL (equity dilution) is the percentage change in split-adjusted shares outstanding from fiscal year-end in $t-2$ to $t-1$. Δ SALES (sales growth) is the percentage change in revenues per split-adjusted share from $t-2$ to $t-1$. Δ ASSETS (asset growth) is the percentage change in assets per split-adjusted share from year $t-2$ to year $t-1$. ROA (profitability) is operating income in year $t-1$ divided by assets in year $t-1$. LN (Size) is the natural log of the market capitalization. LN (P/B) is the natural log of the price-to-book ratio. Hard Growth is the fitted value from the last regression listed in Table 2 and Soft Growth is equal to LTG minus Hard Growth. N is the average number of stocks each year. Certain regressions use industry dummies (based on GIC's 10 sector definitions). T-statistics are reported in parentheses to the right of each estimate and are based on Newey West corrected standard errors with a lag of 12 months. Monthly returns are reported in percentages.

	1		2		3		4		5		6	
Intercept	0.016	(2.18)	0.019	(2.52)	0.015	(2.16)	0.013	(2.33)	0.019	(2.72)	0.017	(3.19)
LTG	0.002	(0.17)			0.012	(1.25)	0.007	(1.11)				
EQDIL			-0.014	(5.25)	-0.015	(5.58)	-0.013	(5.62)				
ΔSALES			-0.002	(1.86)	-0.003	(2.12)	-0.003	(3.13)				
ΔASSETS			-0.005	(4.39)	-0.005	(4.51)	-0.005	(4.55)				
ROA			0.009	(1.66)	0.010	(2.18)	0.015	(2.96)				
Hard Growth									-0.072	(4.65)	-0.079	(5.54)
Soft Growth									0.012	(1.20)	0.007	(0.97)
Ln(SIZE)	0.000	(0.43)	0.000	(0.95)	0.000	(0.59)	0.000	(0.43)	0.000	(0.60)	0.000	(0.49)
Ln(P/B)	-0.001	(1.98)	-0.001	(1.01)	-0.002	(2.39)	-0.001	(1.98)	-0.002	(2.26)	-0.002	(2.81)
Ind Fixed Effect?	No		No		No		Yes		No		Yes	
R²	0.03		0.03		0.04		0.08		0.03		0.08	
N	2,154		2,154		2,154		2,154		2,154		2,154	

Table 8. Pre- and Post-Global Settlement (August 2002) Split-Sample Regressions and Value-weighted Portfolio Returns from July 1982 to December 2014. This table replicates key results in earlier tables for different sample periods. Pre-GS refers to the period from July 1982 to August 2002, and post-GS refers to the period from September 2002 to December 2014. Panel A displays panel regression results similar to Tables 3 and 4; Panels B and C display average value-weighted returns for portfolios formed on various growth forecasts similar to analysis presented in Table 5. LTG is the mean estimate of all analysts' expectations of the EPS annual growth rate between year $t+2$ to year $t+5$ measured in the 3rd week of June of year t . EQDIL (equity dilution) is the percentage change in split-adjusted shares outstanding from fiscal year-end in $t-2$ to $t-1$. Δ ASSETS (asset growth) is the percentage change in assets per split-adjusted share from year $t-2$ to year $t-1$. LN (Size) is the natural log of the market capitalization. LN (P/B) is the natural log of the price-to-book ratio. Hard Growth is the fitted value from the last regression listed in Table 2 and Soft Growth is equal to LTG minus Hard Growth. N is the average number of stocks each year. The regressions in Panel A include year and industry fixed effects (based on GIC's 10 sector definitions). T-statistics reported are double-clustered by firm and industry. Monthly returns shown in Panels B and C are reported in percentages.

Panel A. Panel Regression Split-Sample Results

	Dependent Variable	EQDIL	Δ ASSETS	Hard Growth	Soft Growth	LN (P/B)	R ²	Time Period	N	Table Reference
Coefficient	LN (P/B)	0.09	0.42				0.23	Pre-GS	2,250	3A
<i>t-stat</i>		(2.75)	(12.79)							
Coefficient	LN (P/B)	-0.37	0.62				0.20	Post-GS	2,140	3A
<i>t-stat</i>		(6.54)	(7.67)							
Coefficient	LN (P/B)			1.60	3.38		0.30	Pre-GS	2,250	3A
<i>t-stat</i>				(5.04)	(12.08)					
Coefficient	LN (P/B)			0.66	2.27		0.21	Post-GS	2,140	3A
<i>t-stat</i>				(0.49)	(8.18)					
Coefficient	LN (P/E _{t+1})	0.19	0.12				0.24	Pre-GS	2,078	3B
<i>t-stat</i>		(3.06)	(2.94)							
Coefficient	LN (P/E _{t+1})	0.36	-0.13				0.11	Post-GS	1,923	3B
<i>t-stat</i>		(3.85)	(2.57)							
Coefficient	LN (P/E _{t+1})			2.09	2.37		0.32	Pre-GS	2,078	3B
<i>t-stat</i>				(4.66)	(12.28)					
Coefficient	LN (P/E _{t+1})			2.36	3.18		0.18	Post-GS	1,923	3B
<i>t-stat</i>				(2.21)	(4.85)					
Coefficient	REALEPS	-0.10	-0.03			-0.01	0.05	Pre-GS	2,255	4

<i>t-stat</i>		(6.39)	(2.14)			(2.66)				
Coefficient	REALEPS	-0.13	-0.01			0.01	0.08	Post-GS	2,357	4
<i>t-stat</i>		(5.18)	(0.50)			(0.64)				
Coefficient	REALEPS			-0.57	0.04	-0.02	0.05	Pre-GS	2,255	4
<i>t-stat</i>				(4.77)	(0.90)	(3.70)				
Coefficient	REALEPS			-0.75	0.04	0.01	0.08	Post-GS	2,357	4
<i>t-stat</i>				(4.40)	(0.62)	(0.70)				
Coefficient	ΔLTG	-0.02	-0.02				0.04	Pre-GS	1,962	5
<i>t-stat</i>		(7.59)	(11.16)							
Coefficient	ΔLTG	-0.01	-0.02				0.03	Post-GS	1,842	5
<i>t-stat</i>		(3.54)	(11.54)							
Coefficient	ΔLTG			-0.24			0.05	Pre-GS	1,962	5
<i>t-stat</i>				(6.03)						
Coefficient	ΔLTG			-0.20			0.03	Post-GS	1,842	5
<i>t-stat</i>				(6.29)						

Panel B. Table 6 Pre-GS (July 1982 - August 2002)

	1	2	3	4	5	6	7	8	9	10	10-1	t-stat	N
LTG	1.30%	1.25%	1.37%	1.30%	1.23%	1.19%	1.35%	1.20%	0.84%	1.15%	-0.15%	(0.28)	2,173
Hard Growth	1.37%	1.31%	1.21%	1.37%	1.17%	1.46%	1.09%	1.22%	1.06%	0.63%	-0.74%	(2.25)	2,173
Soft Growth	1.15%	1.24%	1.36%	1.23%	1.37%	1.12%	1.12%	1.14%	1.11%	1.37%	0.23%	(0.48)	2,173
EQDIL	1.65%	1.40%	1.31%	1.21%	1.24%	1.43%	1.33%	1.05%	0.81%	0.75%	-0.90%	(4.47)	2,173
ΔASSETS	1.33%	1.21%	1.10%	1.48%	1.23%	1.22%	1.44%	1.29%	1.08%	0.81%	-0.53%	(1.78)	2,173

Panel C. Table 6 Post-GS (September 2002 – December 2014)

	1	2	3	4	5	6	7	8	9	10	10-1	t-stat	N
LTG	0.88%	0.85%	0.78%	0.83%	0.72%	0.91%	0.78%	1.35%	0.98%	1.15%	0.27%	(0.70)	2,122
Hard Growth	0.89%	0.98%	0.85%	0.98%	0.95%	0.87%	0.72%	0.76%	0.99%	0.53%	-0.36%	(1.49)	2,122
Soft Growth	0.72%	0.72%	0.80%	0.73%	0.92%	0.79%	1.02%	1.19%	0.98%	1.20%	0.48%	(1.20)	2,122
EQDIL	0.94%	0.68%	0.86%	0.92%	0.85%	1.10%	1.17%	0.80%	0.95%	0.51%	-0.43%	(1.81)	2,122
ΔASSETS	1.13%	1.26%	1.36%	1.26%	1.40%	1.07%	1.09%	1.22%	1.05%	1.38%	0.24%	(0.48)	2,122

Franklin Templeton Investment Solutions

2023 Capital Market Expectations

Brighter times ahead



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About capital market expectations

Every year we review the data that drive capital markets—current valuation measures, historical risk premia, economic growth and inflation prospects—to provide the foundation for our forecasts. We update the models that we use and review their continued appropriateness. Crucially, our models are based on first-principle economic relationships and reflect seasoned practitioner judgment.

We continue to include as part of every capital market forecast a measure of the expected volatility of that asset class, informed by long-term observed standard deviation of returns. Given that changes to global central banks' quantitative easing policies may have repressed both equity and bond market volatility over past years, but increased turbulence more recently, our approach to modeling volatility reduces recency bias and is particularly appropriate at a time when leading central banks are shifting to normalize policy.

Our capital market expectations (CMEs) are designed to provide annualized return expectations over a longer-term horizon, typically viewed as 10 years. Specifically, we calculate geometric mean return expectations over a 10-year period, which both fully captures the average length of a US business cycle and aligns with the strategic planning horizon of many institutional investors.¹

Our modeling approach is based on a blend of objective inputs, quantitative analysis and fundamental research, consistent with the skill set of our Franklin Templeton Investment Solutions (FTIS) business. Underpinning these inputs are assumptions on the sustained growth rates that developed and emerging economies can expect to achieve and the level of price inflation they will likely experience. This approach is forward looking, rather than being based on historical average returns. This is especially important in an evolving macroeconomic environment.

1. Since 1945, the National Bureau of Economic Research has defined 12 US business cycles, with an average duration of 75 months.

Summary

We believe riskier assets, such as global stocks and corporate bonds, have greater performance potential than global government bonds, despite slightly slower global growth and a marginal increase to global inflation expectations.

- We believe that maintaining a diversified portfolio of risk premia, in addition to the traditional benefits of a balanced portfolio between stocks and bonds, is the most likely path toward stable potential returns.
- Equity returns will likely be driven by earnings growth and yield, supported by some valuation uplift but offset by margin normalization that is likely to occur over our 10-year horizon.
- With global interest rates starting from relatively elevated levels and expected to rise a little further before normalizing, overall return expectations from all fixed income assets have become more attractive than has been the case in recent years, and notably higher than we anticipated in our 2022 CME forecasts.
- The risk premium contained within corporate bond yields appears to be more than adequate compensation for the likely level of default risk across the business cycle.
- Over the 10-year horizon used for our CMEs, we see relatively healthy alternative risk premia and a constructive environment for asset returns.

Our capital market expectations

Our 2023 CMEs are that the prospective returns of global equities and corporate bonds will be more attractive than the anticipated returns of global government debt.

Our geometric mean return expectation over a 10-year period for global equities is higher than last year and broadly in line with the historical annualized return. Overall, we expect global equities to return 8.3% annualized over the 10-year period, with developed markets returning 8.2%.²

By comparison, we expect global developed government bonds to return 4.3% in US-dollar terms.³

10-Year Annualized Capital Market Expectations (USD) Return Expectations

Equity Expectations

As of September 30, 2022

Asset Class Name	Expected Return (Geometric)	Expected Risk (Std. Dev)	Sharpe Ratio	Past 20-Yr Annualized Return
GLOBAL EQUITY	8.3%	16.3%	0.31	8.5%
Developed-Market Equity	8.2%	16.3%	0.30	8.6%
US	7.9%	16.0%	0.29	9.9%
Canada	8.4%	19.4%	0.26	9.3%
EAFE	8.9%	16.5%	0.34	6.3%
EMU	8.9%	20.6%	0.27	6.4%
UK	8.4%	17.1%	0.30	5.1%
Japan	9.8%	16.0%	0.41	4.5%
Pacific Ex-Japan	8.7%	19.4%	0.28	9.0%
Australia	8.4%	21.7%	0.24	9.5%
Emerging Market Equity	9.3%	19.8%	0.31	9.0%
China	9.8%	23.5%	0.28	10.0%
Specialty Equity				
Global Listed Infrastructure*	7.2%	16.2%	0.24	8.2%
US Listed Infrastructure	6.1%	13.0%	0.22	7.6%
Global REITS	8.0%	19.2%	0.25	6.4%
US REITS	8.0%	21.2%	0.23	7.7%

*Denotes where shorter average is used (20-yr unavailable), periods range from 92 to 237 months.
Source: Franklin Templeton Investment Solutions.

2. There is no assurance any forecast, projection or estimate will be realized.
3. Ibid.

Fixed Income Expectations

As of September 30, 2022

Asset Class Name	Expected Return (Geometric)	Expected Risk (Std. Dev)	Sharpe Ratio	Past 20-Yr Annualized Return
GLOBAL GOVERNMENTS				
Global Governments	4.3%	6.6%	0.16	2.4%
US Government	3.9%	4.6%	0.14	2.6%
Canadian Government*	4.0%	8.6%	0.09	4.0%
Euro Government	4.9%	10.0%	0.16	2.9%
UK Government	5.8%	10.8%	0.24	1.3%
Japanese Government	4.2%	9.3%	0.11	0.4%
Australian Government*	4.9%	10.6%	0.16	-0.3%
China Government*	3.6%	4.5%	0.08	4.8%
Inflation Linked				
Global Inflation Linked	4.5%	8.4%	0.14	3.5%
GLOBAL CREDIT				
Global Investment Grade Credit	5.9%	7.1%	0.37	3.5%
US Investment Grade	5.6%	6.4%	0.37	4.1%
EU Investment Grade	6.1%	10.5%	0.28	2.9%
UK Investment Grade	8.0%	12.7%	0.38	1.9%
Global High Yield	6.9%	9.8%	0.37	7.2%
US High Yield	6.6%	9.1%	0.37	7.4%
Euro High Yield	7.9%	14.9%	0.31	7.5%
UK High Yield	9.3%	14.6%	0.42	10.0%
US High Yield Loans	6.2%	8.8%	0.34	4.6%
US Securitized				
US MBS	4.5%	3.5%	0.34	2.8%
Municipal Bonds				
US Munis	4.5%	4.6%	0.24	3.4%
Emerging Markets Governments				
Emerging Market Debt-Corp (Hard)*	5.9%	9.8%	0.27	4.5%
Emerging Market Debt-Gov (Hard)*	6.4%	9.4%	0.33	5.8%
Emerging Market Debt-Gov (Local Fx)*	5.4%	11.6%	0.19	4.4%

Source: Franklin Templeton Investment Solutions.

Other Expectations

As of September 30, 2022

Asset Class Name	Expected Return (Geometric)	Expected Risk (Std. Dev)	Sharpe Ratio	Past 20-Yr Annualized Return
ALTERNATIVES				
US Private Credit	7.7%	14.0%	0.32	8.7%
US Private Real Estate	5.2%	13.5%	0.14	8.5%
US Private Equity	9.3%	22.3%	0.27	11.6%
Commodities	5.3%	16.2%	0.12	1.5%
Global Hedge Funds	5.9%	6.6%	0.36	5.7%
FX vs. USD				
AUD	0.9%	11.7%	—	0.8%
CAD	0.8%	8.5%	—	0.7%
CNY	0.7%	3.9%	—	0.8%
EUR	1.6%	8.6%	—	0.0%
GBP	1.5%	8.6%	—	-1.7%
JPY	3.3%	8.4%	—	-0.9%

Source: Franklin Templeton Investment Solutions.

Asset Class Name	Expected Return (Geometric)
CASH TREASURY RATES (3-MONTH)	
US Cash	3.3%
AUD Cash	3.3%
CAD Cash	2.6%
CNY Cash	2.8%
EUR Cash	1.5%
GBP Cash	2.5%
JPY Cash	0.4%

Themes driving long-term global growth

In creating these CMEs, we incorporate the FTIS team's views on longer-term investment themes that impact the global economy. We debate these themes at our Annual Investment Symposium, in collaboration with senior leaders from across Franklin Templeton's wide range of specialist investment managers.

At our fourth annual Investment Symposium in October 2022, we discussed a range of secular themes that ultimately feed into two foundational components of our CMEs—growth and inflation—while incorporating a parallel theme of “future threats to human existence,” which combines geopolitical with sustainability issues. We explore our views on these trends below, how they impact our gross domestic product (GDP) and consumer price inflation outlooks, and consequently our CMEs. For a more detailed review of the symposium discussions, please see our *Investment Symposium* paper.

1. Growth

We believe the next decade will look different than the one before, as technology and policy will prove disruptive and bailouts, if they occur, may be of more limited scope. In this age of disruption, will productivity rise or fall? As countries prioritize food and energy security in the next decade, changes will need to occur, and compromises will be made. Is this enough to ensure sufficient economic growth, or will structural headwinds, like aging demographics and global indebtedness, reassert themselves?

The last three years have been a period of enormous disruption. The practical interruption of supply chains because of COVID-19 and the war in Ukraine has had implications for prices of goods and driven the mass migration of people. Additionally, the process of globalization has been interrupted in reaction to geopolitical stress and the desire to ensure

security of supply. There are many other changes on the horizon, including the balance between energy security and progress toward a renewable energy transition. These types of changes seem to suggest that the resilience of global growth going forward may be challenged or, at least, desynchronized by region.

On the flip side, there are ongoing examples of technology firms moving production to other areas around the globe. Zeroing in on technological disruption, are we coming to an age of digital transformation? During the COVID pandemic, companies embraced technology to engage customers and become more efficient. In the years to come, artificial intelligence and machine learning could create new worker capacity and change the way work gets done. Ultimately, technological advancement in other areas such as quantum computing and cloud computing could drive productivity, boost growth and eventually be deflationary. **The positive impact of technology likely offsets the fracturing of global supply chains due to geopolitical stress, but the balance point may continue to shift over time.**

A long-term approach to estimating growth is to measure the number of hours worked in an economy and how productive each hour worked is. Demographics drive the number of hours worked for most economies, and the trend for most of the world's major economies is clear: populations are getting older. The dependency ratio has already doubled in Japan and is heading that way in the eurozone (see Exhibit 2). Immigration policy is unlikely to be sufficient to solve this, as nationalism has increased across most regions, limiting the prospect of immigration. **Our view is that demographics will likely be a small headwind to growth over the next decade.**

Productivity is the other driver of growth and the key to offsetting the weaker demographic outlook. Recent history is not especially encouraging. The business cycle that followed the global financial crisis was marred by weak productivity growth across OECD economies. Looking ahead, our forecast for productivity growth falls in the region of 1.5%, **as we expect productivity growth rates to rise to their long-run average, which is higher than the level seen in the most recent cycle but falls short of what many would hope for.**

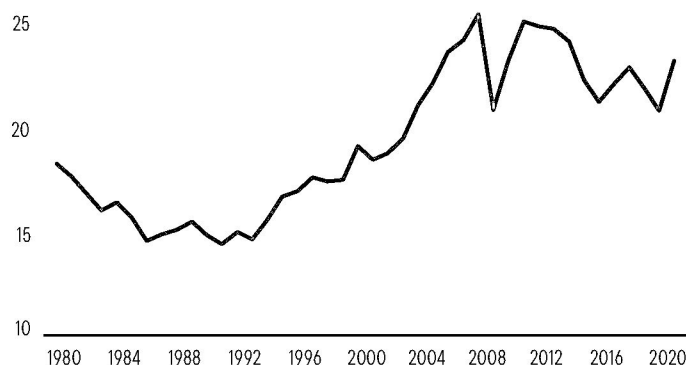
Capital investment is a major driver of productivity, and fiscal stimulus is a pillar for sustained above-trend growth. The fiscal stimulus response to the COVID-19 pandemic was staggering, reaching approximately 15% of global GDP in 2020. **We expect fiscal spending, particularly in areas such as green infrastructure, to provide tailwinds for years to come.**

Globalization May Evolve, But We Do Not Expect a Major Retrenchment

Exhibit 1: Global Goods Export

1980–2021

% of GDP
30

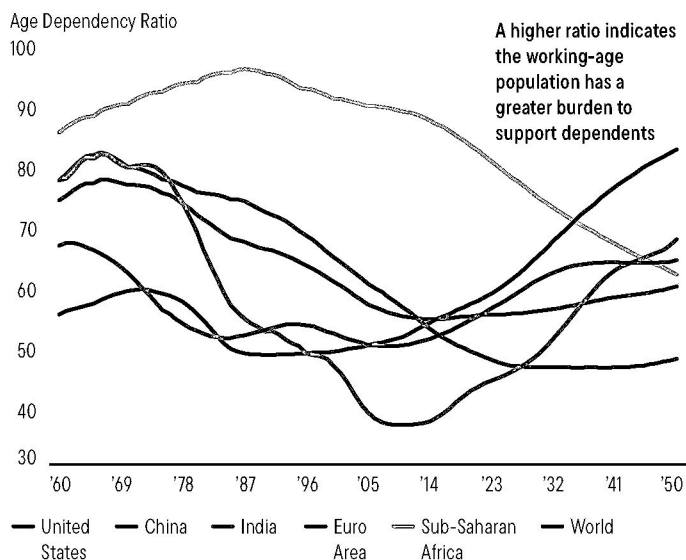


Sources: WTO, IMF, Macrobond. There is no assurance that any estimate, forecast or projection will be realized. Important data provider notices and terms available at www.franklinintempletondatasources.com.

The Ratio of Working-age Population (as a % of the Total Population) Will Shrink Over the Coming Decades

Exhibit 2: World Bank—Age Dependency Ratio Projections

January 1960–January 2050E



Sources: World Bank, Macrobond. There is no assurance that any estimate, forecast or projection will be realized. Important data provider notices and terms available at www.franklinintempletondatasources.com.

Both the United States and the eurozone, among others, have fiscal agendas that are geared toward decarbonization. In the shorter term, the war in Ukraine may complicate this transition, but it has provided another vivid example of the need for capital investment. The shift in Europe's oil and gas imports from Russia to other sources has highlighted the region's inadequate energy infrastructure. A multi-year investment cycle is required to build this infrastructure.

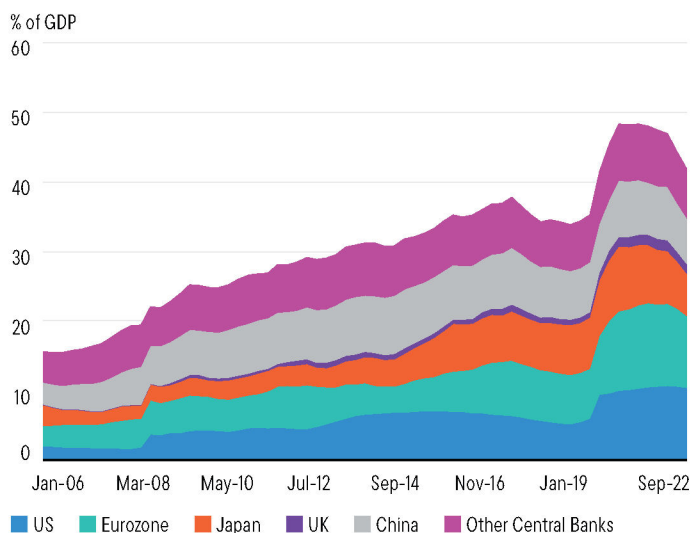
The war could also accelerate the development and adoption of renewable energy sources. One encouraging point on this front is the passage of the Inflation Reduction Act (IRA) in the United States, which provides material subsidies for green energy investments, including hydrogen production and geological storage. The country could also transition from being an importer of solar modules and wind turbines to an exporter of them, given the incentives and tax credits.

The flip side of proactive fiscal policy is that we are already in a world awash with debt. This is a recurring argument that we discussed in previous symposiums and has only deteriorated in the past 12 months. High debt levels can negatively impact growth while also muting the world's response to the next crisis. For instance, many emerging market countries have seen their credit ratings downgraded, which will make it harder to borrow in the next crisis. Debt levels are also leading to increased uncertainty about whether governments will be able to effectively react when the next calamity hits. The rise of political polarization within countries or regions may also place another hurdle in the path of fiscal support. The extent to which global central banks are willing to halt the early stages of quantitative tightening (i.e., the normalization of their balance sheets) (see Exhibit 3) and again act as a shock-absorber for debt markets remains to be seen. For now, **as monetary policy normalizes and balance sheets contract, debt levels and changes in who holds large chunks of them will be a modest drag on activity levels.**

Central Banks are Beginning to Reduce Their Balance Sheets

Exhibit 3: Central Bank Assets

As of September 30, 2022



Sources: Reserve Bank of Australia, BCB Community Bank, Statistics Canada, People's Bank of China, Central Bank of Denmark, European Central Bank, Central Bank of Ireland, Reserve Bank of India, Bank of Japan, Bank Negara Indonesia. Important data provider notices and terms available at www.franklinintempletondatasources.com.

Taking all of this into account, **we expect slightly slower global growth in the decade ahead. We see GDP expanding at a 2.8% annual rate**, with developed markets growing slightly more slowly, over the 10-year horizon used in our CMEs. (See Exhibit 5, on the next page, for a chart of growth expectations across key regions and countries).

2. Inflation

The era of the Great Inflation (1965–1982) was followed by the Great Moderation (mid-1980s to 2007). Since then, we've had the global financial crisis, the COVID pandemic and now near-synchronized rate hikes on the part of global central banks to battle inflation. The big question on everyone's mind is what are inflation expectations going forward? Can we return to the era of sustained economic growth and low inflation around 2%?

Perhaps the most pressing theme currently impacting consumers, businesses and markets is inflation. It has grown to dominate the discussion in our investment symposium in recent years and did so again this year. Inflation has a direct impact on consumer behavior, and expectations for future price rises are a big driver of central bank actions. We believe global inflation is close to its cyclical peak and will moderate from current levels, but how it will evolve remains uncertain. The key observation about central bank policy objectives is that their resolve to keep inflation expectations anchored appears to have been stiffened by the period of uncomfortably high inflation during the last two years. Previous discussions about targeting average levels of inflation, or incorporating medium-term forecasts into the process, have been downplayed. These factors have not gone away, but they have been overtaken by a singular focus on fighting inflation (often described as US Federal Reserve Chair Jerome Powell channeling one of his predecessors, Paul Volker). This has been accompanied by a willingness to accept the collateral damage caused by higher-than-anticipated interest rates, in the form of slower growth and potentially higher unemployment, in the years ahead. This clarification of objectives has gone some way to moderating market-observed levels of inflation expectations. **We believe medium-term inflation expectations remain well anchored and broadly compatible with central banks' established definitions of price stability.**

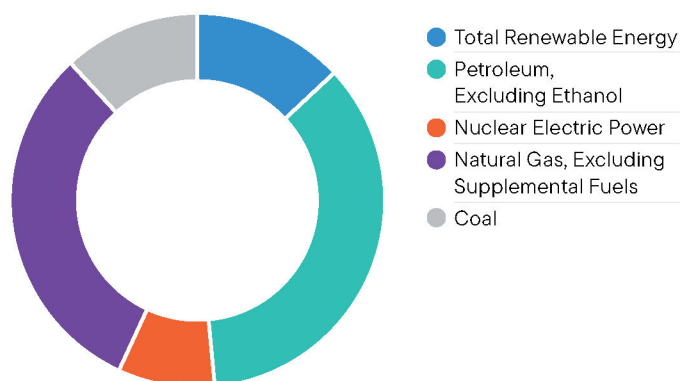
While we do not doubt central banks' desire to see inflation return to more normal levels in a timely manner, we view some of the elements of current inflation as somewhat sticky. Notably, wage inflation will remain elevated until labor markets return to a degree of balance. This probably feeds into slightly elevated levels of services inflation, even over the medium term. Similarly, the investment needed to complete a full transition to clean energy may boost demand for certain commodities, such as copper, as well as squeezing out other private sector investment that may have boosted productivity and held back inflation. The investment need to facilitate a green transition should not be underestimated, given the scale of non-renewable energy sources that are still being used in 2022 (see Exhibit 4), and the imperative to speed up their elimination. **Sticky components are likely to be responsible for inflation over-shooting target levels in the medium term.**

As we have discussed in previous years' CME publications, secular deflationary forces which dominated the last four decades are still in place. Even if the geopolitical environment argues for some roll-back of globalization, it has not gone away completely. Globalization remains an effective force for profitability that companies will not easily abandon. Technological innovation, as we discussed under the growth heading, is driving prices down around the world. Today's growth in debt, and the management of accumulated central bank balance sheets (as we showed in Exhibit 3), will limit future demand. **Disinflationary forces have changed, and their role may be diminished today, but they remain powerful factors keeping a lid on inflationary pressures.**

Green Energy is a Major Initiative for Most Developed Markets Over the Long-term

Exhibit 4: Energy Consumption by Source

As of July 31, 2022



Source: Macrobond. Important data provider notices and terms available at www.franklinintempletondatasources.com.

Those who believe inflation may be more persistent argue that demographic trends could prove to be an inflationary force. Additionally, current supply-side constraints and structural changes (some due to COVID-19, others due to the changed perspective on security of supply due to the war in Ukraine) could result in more persistent inflation and continued elevated levels of volatility in this measure. These fears point to higher inflation expectations potentially creating a wage-price spiral, with workers demanding higher wages and companies passing those costs on to consumers.

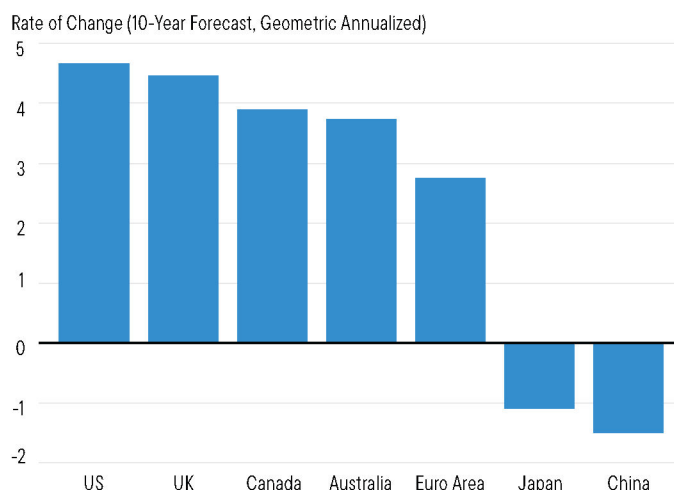
Monetary policy is the key governor of the relationship between growth and inflation, and with current core inflation remaining well above central bank targets (see Exhibit 5), this will keep policy tight in the near term. **While we see good reason for slightly higher levels of inflation, it seems unlikely that inflation will run far above central bank targets on a sustained basis.** The powerful tool of interest-rate hikes will be used as needed, with the potential consequence of increased growth volatility.

As we look ahead, we anticipate some longer-lasting impact on trend levels of inflation. These effects are likely to be stronger in economies such as the United States. However, with a notably elevated starting point, compared with the last two decades, inflation across the key developed and emerging economies is expected to moderate again in the medium term. Over the 10-year horizon used in our CMEs, **we expect global inflation to average 3.0%, a touch higher from last year's assumption** (see Exhibit 6 on the next page).

High Core Inflation is Affecting Central Bank Policy

Exhibit 5: Core Inflation Minus Central Bank Target

As of September 30, 2022



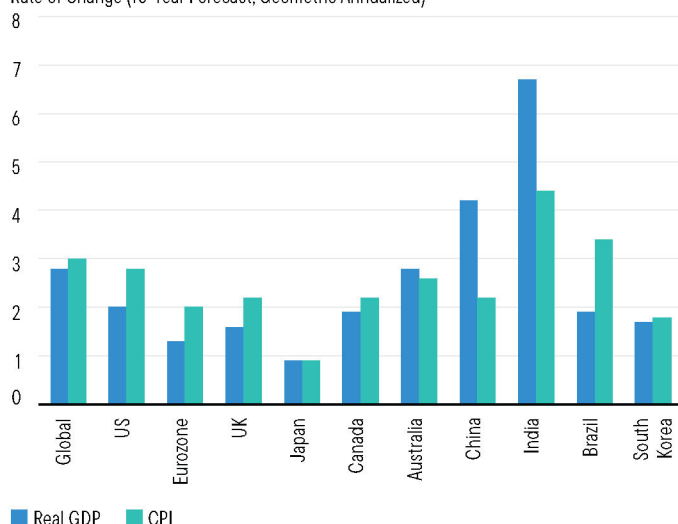
Source: FTIS, Macrobond. Important data provider notices and terms available at www.franklinintempletondatasources.com.

Stable Growth Projections While Inflation Forecasts Tick Slightly Higher

Exhibit 6: Growth and Inflation Forecasts

As of September 30, 2022

Rate of Change (10-Year Forecast, Geometric Annualized)



Source: Macrobond. There is no assurance that any estimate, forecast or projection will be realized. Important data provider notices and terms available at www.franklintempletondatasources.com.

Conclusion

We tackle numerous questions around the longer-term asset implications regarding growth and inflation. Our macroeconomic outlook is only modestly different than that of last year, with global growth slightly lower and a marginal increase in global inflation expectations. As usual, there is some variation across regions, as shown in Exhibit 6 on the next page.

These longer-term expectations are point forecasts that attempt to capture a broader range of different outcomes. We can encapsulate them in the four-quadrant matrix (see Exhibit 7) as been reduced over the past year—we do not place a higher level of confidence in any one particular outcome. At the same time, **we retain a preference toward inflation ultimately being driven by the level of demand, rather than supply constraints, leading us to favor outcomes on the minor diagonal (bottom left to top right).**

Global Growth and Inflation Scenarios

Exhibit 7: Describing Each Scenario

Goldilocks

High Growth / Low Inflation

- 4th industrial revolution increases productivity as businesses embrace digitization
- Globalization reorients, although largely remains intact, driven by businesses continual search to maintain profitability
- Central banks effectively anchor inflation expectations near target levels

Reflation

High Growth / High Inflation

- Fiscal policy remains proactive and sizeable, aimed at key populist issues like inequality
- Green energy transition creates durable investment impulse
- Globalization evolves, rather than retracts, as businesses' continue their pursuit of profitability

Stagnation

Low Growth / Low Inflation

- Global indebtedness weighs on growth, and increased debt service ratios limit demand
- Monetary and fiscal policy become overly reactive, marred by large balance sheets and increasing polarization between political parties
- Aging demographics and income inequality increase savings relative to investment

Stagflation

Low Growth / High Inflation

- Geopolitical uncertainty rises, leading to a reduction in globalization and increased business uncertainty
- Transition to green energy is volatile and mismanaged, leading to higher commodity prices
- Aging demographics limits supply-side production, proving to be inflationary

Sources: Franklin Templeton Investment Solutions.

Asset class return considerations

Fixed income—government bonds

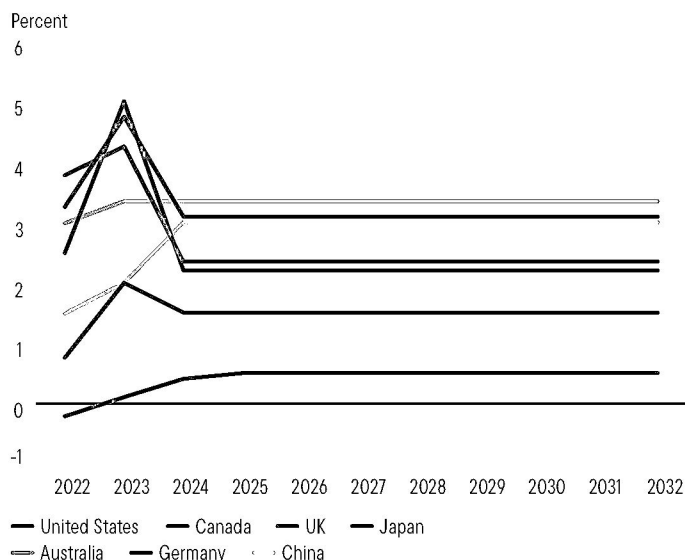
We view the prospective return from low-risk assets as being driven primarily by the starting level of government bond yields, which are themselves driven by anticipated policy rates. The starting yield can explain a large portion of the expected return forecast because any initial movement higher (lower) in bond price is offset by an ensuing lower (higher) yield in the following years of our time period. This yield base provides the first building block of portfolio return potential. On top of this we layer additional elements for asset class risk premia (which we discuss in the next section) and risk premia for illiquidity or complexity. Having seen policy rates rise quite sharply over the past year, the base levels for all our asset forecasts have increased. The total prospective returns from broadly diversified multi-asset portfolios have increased substantially due to this higher base yield, in our opinion.

This combination of slower growth and only slightly elevated inflation will likely drive many central banks to quickly reach a terminal policy rate that is somewhat restrictive, before normalizing official interest rates in the early part of our

Policy Rate Expectations

Exhibit 8: Regional Short Rate Forecasts

As of September 30, 2022



Sources: Bloomberg, FTIS Forecasts. There is no assurance that any estimate, forecast or projection will be realized. Important data provider notices and terms available at www.franklinintempletondatasources.com.

10-year forecast horizon (see Exhibit 8). However, a strong desire to support a full economic recovery, through the provision of plentiful liquidity, will persist for a longer time in certain large economies, notably Japan, where inflation has consistently undershot central bank targets. These conflicting forces have pushed government bond yields up sharply from the exceptionally low levels reached in 2020. Real short-term interest rates started from deeply negative levels in most markets, and although they have increased recently, in a longer-term comparison they remain depressed. We anticipate a further increase in real rates to mainly occur through inflation dropping back toward central banks' targets in the coming years.

With global interest rates starting from relatively elevated levels, and expected to rise further before normalizing, overall return expectations from all fixed income assets have become more attractive than has been the case in recent years, in our analysis, and notably higher than we anticipated in our prior forecasts.

The term premium is a measure of the extra yield that owners of bonds demand, in excess of the anticipated average level of short-term interest rates for the life of the bond, to compensate for making a longer-term investment. This premium reflects supply and demand factors, including central banks' quantitative tightening policies, which recently replaced quantitative easing in some markets. This has seen the term premium oscillate over the past year, giving an ambiguous signal. Although it remains well above its pandemic lows, further increases over the next few years may occur as we expect an eventual normalization in monetary policy, relative to the restrictive levels being reached in many developed markets at this time.

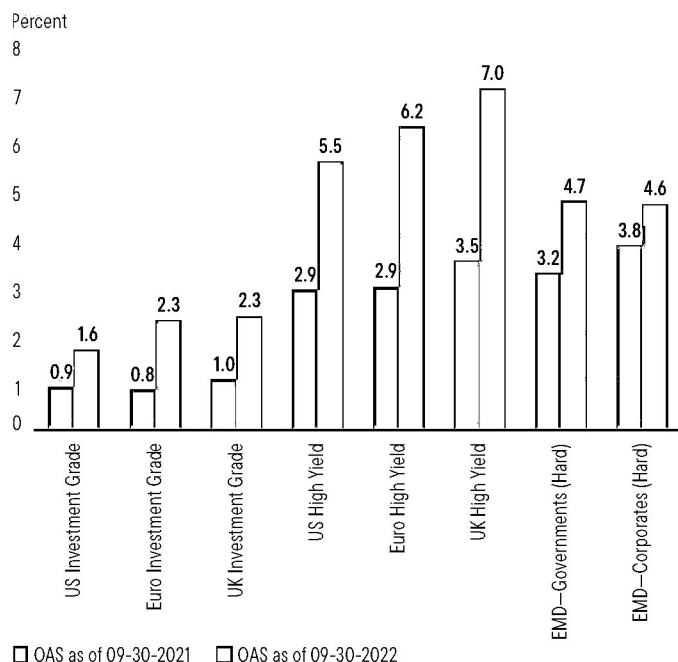
However, demographics and the investment behavior of an aging population continue to weigh on the term premium, as does the re-regulation of financial institutions, which has boosted demand for assets perceived as safe (Basel II). This may result in bond yields remaining lower than our historical experience, through this and the next cycle.

Within the fixed income asset class, the additional yield or spread that developed market corporate bonds provide has generally risen as fears of recession have mounted.

Credit Spreads Offer Adequate Compensation for Default Risk

Exhibit 9: Current Option Adjusted Spread (OAS)

As of September 30, 2022



Sources: Bloomberg. There is no assurance that any estimate, forecast or projection will be realized. Important data provider notices and terms available at www.franklin templetondatasources.com.

A desire to enhance portfolio return potential had seen many investors add to holdings of higher yielding securities, prior to the current rate hiking cycle, boosting demand for riskier fixed income assets. It appears the correlated rise in government bond yields and credit spreads that occurred during 2022 has re-based this “reach for yield” motivation. As a result, the current yield offered by corporate credit, especially lower-rated issues, is high by historical comparisons (see Exhibit 9). And compared with lower-risk government bonds, whose yield we have noted has risen to more appealing levels, the additional spread appears more normal. **Given our outlook for growth, the risk premium contained within corporate bond yields seems to be more than adequate compensation for the likely level of default risk over a full business cycle. The projected Sharpe Ratio is among the more attractive asset classes that we forecast, when we consider the balance of prospective return potential in relation to anticipated levels of volatility.**

Equity

Equity markets have corrected sharply during the past year, following a period of appreciation from pandemic-induced lows in 2020. They joined the correlated move seen in government bond yields and credit spreads, to create a

“sell everything” environment. This was driven by the aggressive policy tightening cycle adopted by many developed market central banks in response to multi-decade high levels of inflation. Developed market valuations, based on price-to-earnings (P/E) ratios, have dropped below their historical averages. They are, similarly, less expensive than they were last year when judged on a price-to-book basis. This remains the case even when we smooth out the effect of recent volatility in earnings, such as by using longer-term, cyclically adjusted metrics. Using CAPE (cyclically adjusted P/E) ratios, stocks appear fairly valued, in general. However, they are outright cheap in Japan and China, for example, and these markets may be supported by the valuation factor in the longer term. As a result, **we believe global equities can trade at slightly higher multiples than today, as some normalization is likely to occur over our 10-year horizon.**

This valuation tailwind might be slightly offset by prospective earnings growth that is undermined by an ongoing cyclical slowdown in the early part of our forecast horizon. In addition, corporate margins have expanded since the economic low point in 2020 and remain at elevated levels. We do not believe that margins will remain at such levels throughout our forecast horizon. As a result, a decline in margins may act as a headwind to earnings per share (EPS) growth and overall equity return.

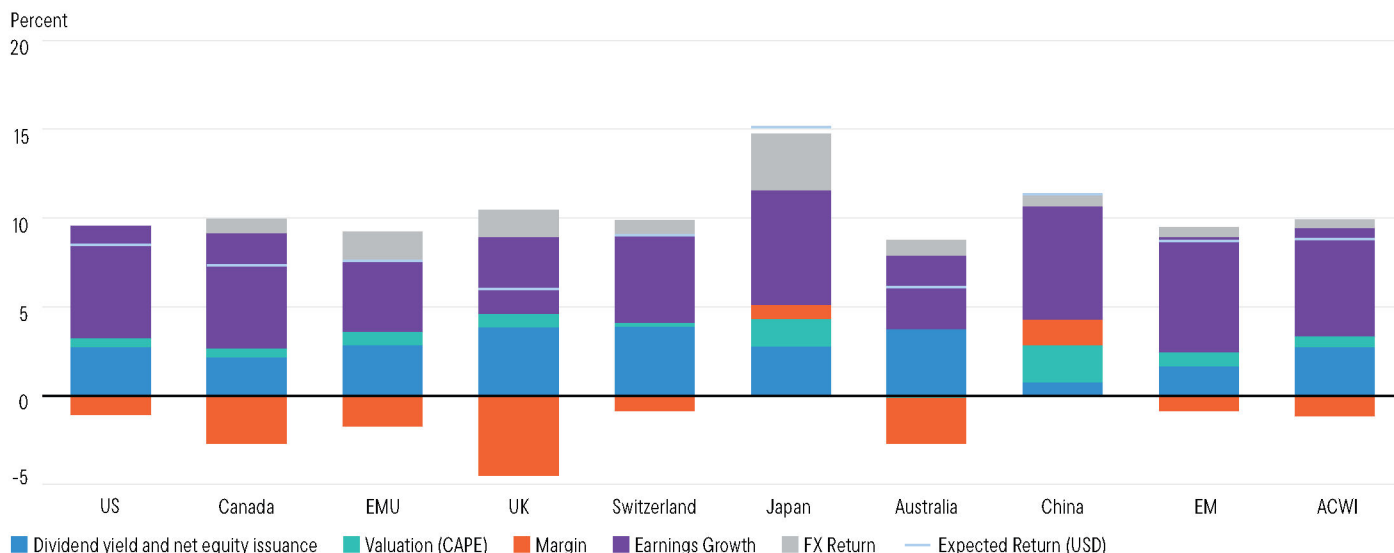
We break down the return potential of various stock markets into their key drivers of return: EPS growth, carving out margin adjustments; dividend yield and net share issuance; valuation normalization (CAPE); and anticipated foreign exchange movements. This is shown graphically (see Exhibit 10 on the next page). This highlights that over ten years, the key driver of returns is the level and growth of earnings and total shareholder yield. **Changes in valuation metrics are no longer a headwind to equity return potential even as margins act to offset this in our expected returns across most regions.**

When we analyze equities relative to lower-risk assets, we believe global stocks have greater risk-adjusted return potential than global bonds in an environment of continued global expansion, thereby earning their equity risk premium. When calculated using several approaches, we arrive at an **equity risk premium for global stocks in the region of 4% over government bonds.**

Valuations Are No Longer a Headwind to Equity Returns, Although We Still Expect Margins to Normalize

Exhibit 10: Building Blocks Model: Equity Return Decomposition

As of September 30, 2022



Sources: FTIS, Bloomberg, Macrobond. Important data provider notices and terms available at www.franklin templeton data sources.com.

Alternatives: private assets

Private assets may be a beneficial addition to multi-asset portfolios from several perspectives: they can offer a higher return potential, may include an illiquidity premium and provide access to a broad array of heterogeneous investments. We focus on the three primary private asset classes in the US market: US private real estate, US private credit and US private equity. Private asset expected returns and risk expectations are reflective of broad-based, core, institutional allocations to these asset classes. For instance, our US private real estate expectations are based on the typical exposure profile of an institutional core real estate fund in The National Council of Real Estate Investment Fiduciaries (NCREIF) Open-End Diversified Core Equity (ODCE) Index. Importantly, our estimates include assumptions for leverage and typical fund fees.

We generally estimate private asset return expectations by using both bottom-up and top-down modeling approaches. Bottom-up models use a build-up approach to estimating market implied discount rates based on prevailing fundamental data and forward-looking assumptions. Top-down models identify public asset proxies with common economic risks and growth sensitivities, with necessary adjustments to account for the idiosyncrasies that these private assets may have over their respective proxies, including the impact of their cost of financing.

Our private asset expected returns reflect the impact of asset pricing trends in public markets, most notably a higher risk-free rate environment, as noted above. For example, our US private real estate expected return faces a headwind due to relatively low starting appraisal-based capitalization rates. Unlike its public market counterparts, private real estate has yet to re-price to reflect an environment with negative leverage (financing rates exceeding cap rates) and low transaction activity. We capture this dynamic by assuming an expansion in terminal cap rates. The drag from multiple expansion is largely offset by our expectation for robust cash flow growth due to a favorable supply/demand environment in core real estate sectors such as industrial spaces and single/multi-family homes.

In contrast, our assumptions for private credit and private equity show a meaningful return premium over public markets. We capture several fundamental advantages to direct lending strategies based on attractive yield spreads and modest expected credit losses. And private equity continues to offer returns at least proportional to its higher risk profile relative to public equities. We caution that increasing competition and “dry powder” in the form of an overhang of uninvested capital can be expected to compress the future illiquidity premia in private markets relative to historical norms.

Importantly, our private asset expected returns capture broad-based exposures and are heavily dependent on our assumptions for strategy mix, valuations, leverage, cost of leverage, fees, etc. Investors should consider the exposure profile of their target managers and acknowledge any differences relative to our assumptions. Manager selection is critically important in the private asset space as investors cannot simply “buy the index” to capture unconditional beta returns. In selecting and deciding the size of potential allocations to underlying private asset managers, investors should further assess the potential for managers to add value (alpha) in addition to assessing whether managers can adequately capture the returns we expect at the asset class level.

Foreign exchange effects

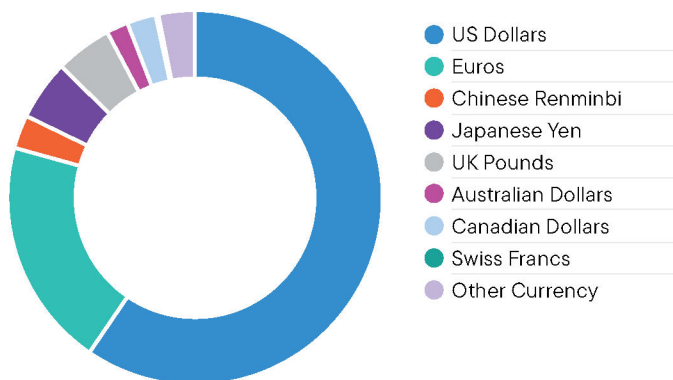
At the end of a period of unusually easy fiscal policy and with monetary policy tightening well underway, the US dollar’s preeminent position remains intact, but its current relative overvaluation has become more extreme in the past year. We believe the US dollar is likely to weaken over our 10-year horizon. We use purchasing power parity (PPP) approaches for developed market currencies, which support this correction of the US dollar’s overvaluation, enhancing the return potential for assets denominated in other currencies.

We continue to view the US dollar as the world’s reserve currency and see low probability of that changing over even a 10-year horizon. Given its preeminent position in the holdings of other central banks (see Exhibit 11), the US dollar is likely to continue to trade with an appropriate valuation premium embedded within it. However, the status of the euro and the Chinese renminbi may be somewhat enhanced over such a long view.

US Dollar Remains the Preeminent Reserve Currency

Exhibit 11: Reserve Currency

As of June 30, 2022



Sources: IMF, Macrobond. Important data provider notices and terms available at www.franklintempletondatasources.com.

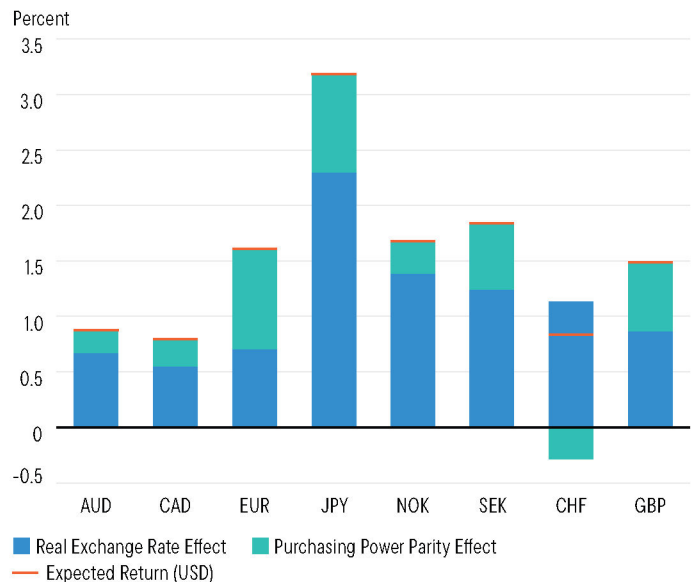
We also consider our relative inflation forecasts. Higher inflation can erode the purchasing power of a currency. Our view of marginally higher inflation in the United States generally acts as a headwind for US-dollar returns (see Exhibit 12). **The combination of high valuations and higher expected inflation results in our expectation that most developed market currencies will appreciate against the US dollar over the next decade.**

For emerging market currencies, we favor a real effective exchange rate (REER) approach. REER compares a nation’s currency value against an index of the currencies of its major trading partners, adjusted for inflation. The superior growth prospects of emerging market economies have led to more return potential in emerging market currencies, but this is matched by higher expected volatility. In general, **emerging market countries that have suffered the worst economic recoveries, usually with accompanying currency weakness, now have the brightest prospects.**

US Dollar is Expected to Depreciate vs. All Major Currencies

Exhibit 12: Developed Market FX Decomposition

As of September 30, 2022



Sources: Bloomberg, Macrobond. There is no assurance that any estimate, forecast or projection will be realized. Important data provider notices and terms available at www.franklintempletondatasources.com.

Multi-asset perspective

The expected return for multi-asset portfolios is appreciably higher than last year's projections. Government bond yields have risen and now provide a notably higher return, albeit still the lowest of the mix. Riskier assets are generally forecasted to produce similarly higher returns. Valuations for both equities and corporate credit have corrected and will act as a tailwind to longer-term return potential. Private assets' prospects are mixed but generally offer healthy prospective return premiums. Overall, risk premiums are slightly above average, with our projected equity risk premium estimated to be 4% above global government bonds. Similarly, excess returns in credit are now slightly above long-term averages, with some variation among the sectors.

Government bonds may appear more appealing from a return perspective, but this comes at the price of an additional risk: persistent inflation. Stock/bond correlations have been

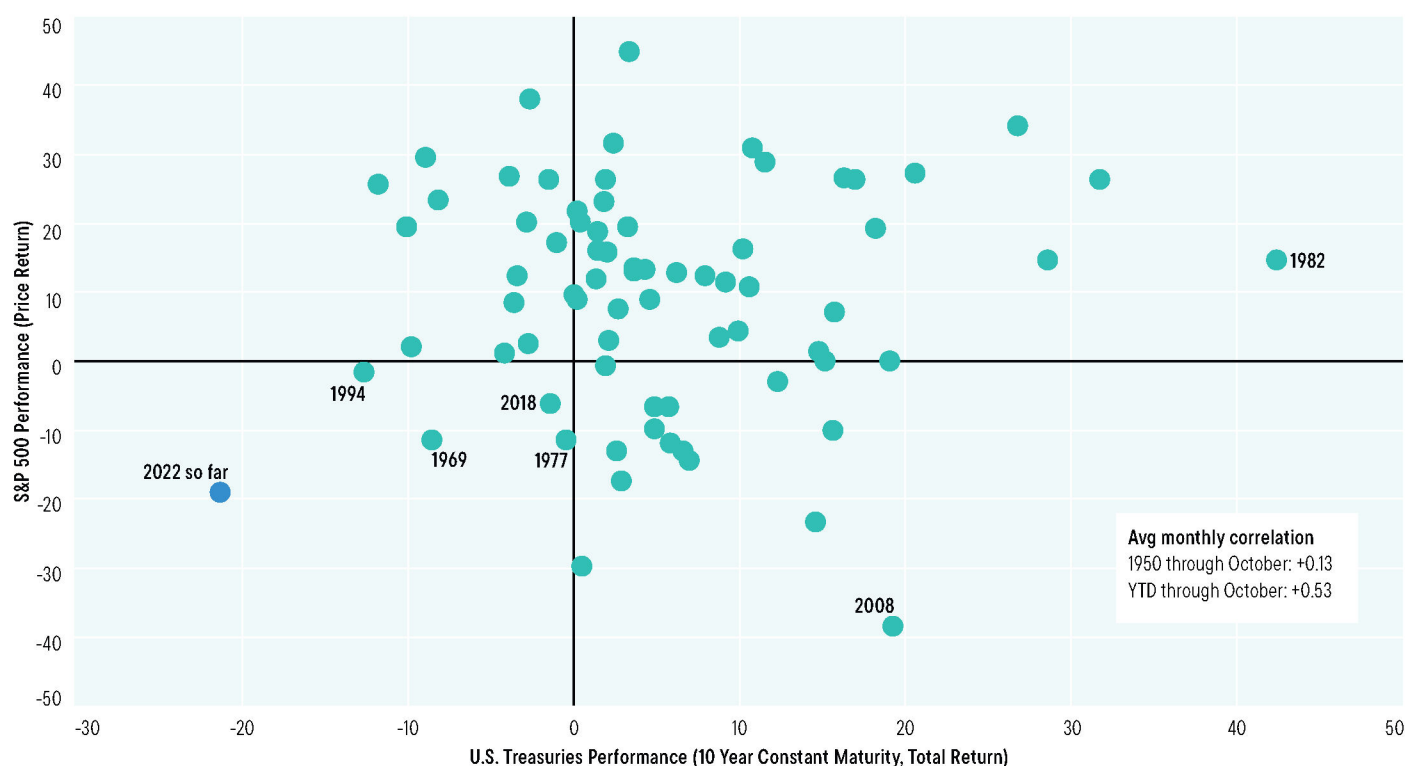
modestly negative for the last 20 years, led by lower-risk government bonds and risky equities. However, in the past year during the "sell everything" market that we described above, short-term correlations have risen sharply, and performance has been negative for both equities and government bonds (see Exhibit 13).

The primary underlying reason has been high inflation, which has dominated growth fluctuations in dictating the performance of both asset classes and thus the related correlations. We still expect growth to be the key macro driver over the next decade, but we are giving greater probability to slightly higher inflation and greater levels of volatility in this measure. This has led many commentators to argue that the role lower-risk government bonds can play in a balanced portfolio could be reduced, which lowers their attractiveness in a multi-asset portfolio. While our forecasts for correlations

Traditional Assets: No Place to Hide During Stagflation

Exhibit 13: US Equities vs. Treasuries, Annual Returns Since 1948

Data as of November 3, 2022



Sources: Standard and Poor's 500, U.S. Department of Treasury, Macrobond. Indexes are unmanaged and one cannot directly invest in them. They do not include fees, expenses or sales charges. Past performance is not an indicator or a guarantee of future results. Important data provider notices and terms available at www.franklintempletondatasources.com.

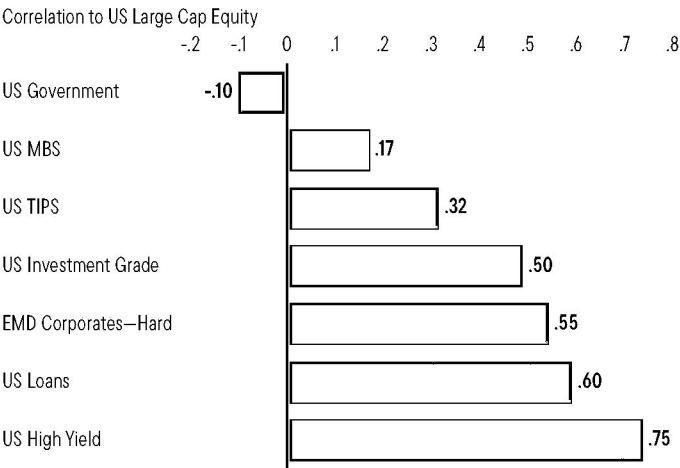
have evolved over the past year, we still believe that government bonds offer attractive diversification benefits. Combined with yields returning to some of the most attractive levels seen over the last 30 years, these assets remain important in multi-asset portfolios (see Exhibit 14).

More broadly, **we believe that maintaining a diversified portfolio of risk premia in addition to the traditional benefits of a balanced portfolio between stocks and bonds is the most likely path toward stable potential returns.** We also believe active management of this asset mix can enhance potential return and manage the level of total portfolio risk that is taken.

Higher Spread Fixed Income has Greater Correlation with Equities

Exhibit 14: Fixed Income Asset Class Correlations to US Equities (Unhedged USD)

As of September 30, 2022



Source: FTIS, Bloomberg. Important data provider notices and terms available at www.franklintempletondatasources.com.

Appendix

Historical Correlation

Long-term correlations between major asset classes, estimated using 20-year historical data. Expected correlations help quantify the relationships among asset classes. Expected correlation is as important as expected return and risk estimates when constructing portfolios.

		Asset Classes																					
Asset Classes		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20	21
1	Global Equities	1.0																					
2	Developed Market Equity	1.0	1.0																				
3	US Large Cap Equity	1.0	1.0	1.0																			
4	Canada Equity	0.9	0.9	0.8	1.0																		
5	EAFE Equity	1.0	1.0	0.9	0.9	1.0																	
6	EMU Equity	0.9	0.9	0.9	0.8	1.0	1.0																
7	UK Equity	0.9	0.9	0.8	0.9	0.9	0.9	1.0															
8	Japan Equities	0.8	0.8	0.7	0.6	0.8	0.7	0.7	1.0														
9	Pacific ex Japan Equity	0.9	0.9	0.8	0.9	0.9	0.8	0.9	0.7	1.0													
10	Australia Equities	0.9	0.9	0.8	0.8	0.9	0.8	0.8	0.7	1.0	1.0												
11	Emerging Market Equity	0.9	0.8	0.7	0.8	0.8	0.8	0.8	0.7	0.9	0.8	1.0											
12	China Equities	0.6	0.6	0.5	0.6	0.6	0.6	0.5	0.5	0.7	0.6	0.8	1.0										
13	Global Listed Infrastructure	0.9	0.9	0.8	0.8	0.9	0.8	0.9	0.7	0.9	0.9	0.8	0.5	1.0									
14	US Infrastructure	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.4	0.5	0.6	0.4	0.1	0.8	1.0								
15	Global REITs	0.8	0.8	0.8	0.7	0.8	0.7	0.7	0.6	0.8	0.8	0.6	0.4	0.8	0.7	1.0							
16	US REITs	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.5	0.7	0.7	0.6	0.3	0.7	0.7	1.0	1.0						
17	Global Treasury	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.2	0.4	0.3	0.4	0.3	1.0					
18	US Government Bond	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.1	-0.2	-0.1	-0.2	-0.1	-0.1	0.0	0.0	0.1	0.7	1.0				
19	Canada Government Bond	0.7	0.7	0.6	0.7	0.7	0.6	0.6	0.5	0.7	0.6	0.7	0.5	0.7	0.5	0.6	0.5	0.6	0.3	1.0			
20	Euro Government Bond	0.5	0.5	0.4	0.4	0.5	0.6	0.4	0.4	0.5	0.5	0.5	0.4	0.5	0.3	0.4	0.4	0.9	0.4	0.7	1.0		
21	UK Government Bond	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.4	0.3	0.5	0.4	0.7	0.5	0.6	0.7	1.0	
22	Japan Government Bond	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	-0.1	0.1	0.1	0.1	0.1	0.8	0.6	0.3	0.5	0.4	1.0
23	Australia Government Bond	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.5	0.8	0.7	0.7	0.5	0.7	0.5	0.7	0.6	0.7	0.2	0.9	0.7	0.6	0.5
24	China Government Bond	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.1	0.2	0.2	0.4	0.2	0.3	0.4	0.4	0.3
25	Global Inflation Linked Bonds	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.3	0.6	0.4	0.6	0.5	0.8	0.5	0.7	0.8	0.8	0.5
26	Global Investment Grade Bond	0.7	0.7	0.6	0.6	0.7	0.6	0.6	0.5	0.6	0.6	0.6	0.4	0.7	0.5	0.7	0.6	0.8	0.5	0.8	0.8	0.7	0.5
27	US Investment Grade	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.3	0.6	0.5	0.6	0.5	0.7	0.6	0.6	0.6	0.6	0.4
28	Euro Investment Grade	0.7	0.7	0.6	0.6	0.7	0.7	0.6	0.5	0.7	0.6	0.6	0.5	0.7	0.4	0.6	0.5	0.8	0.3	0.7	0.9	0.7	0.4
29	UK Investment Grade	0.7	0.7	0.6	0.6	0.7	0.6	0.7	0.5	0.6	0.6	0.6	0.4	0.7	0.5	0.6	0.5	0.6	0.2	0.7	0.7	0.9	0.3
30	Global High Yield	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.6	0.8	0.8	0.8	0.5	0.8	0.6	0.8	0.7	0.4	0.0	0.7	0.5	0.5	0.1
31	US High Yield	0.8	0.8	0.8	0.7	0.8	0.7	0.7	0.6	0.7	0.7	0.7	0.4	0.8	0.6	0.8	0.7	0.3	0.0	0.6	0.4	0.4	0.1
32	Euro High Yield	0.8	0.8	0.7	0.7	0.8	0.8	0.8	0.6	0.8	0.8	0.8	0.5	0.8	0.5	0.7	0.6	0.6	0.0	0.7	0.8	0.5	0.2
33	UK High Yield	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.5	0.7	0.7	0.7	0.5	0.7	0.4	0.6	0.5	0.4	-0.1	0.6	0.5	0.6	0.1
34	US High Yield Loans	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.3	0.7	0.5	0.6	0.6	0.0	-0.3	0.4	0.2	0.2	-0.1
35	US MBS	0.2	0.2	0.2	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.2	0.2	0.7	0.8	0.5	0.5	0.6	0.6
36	Munis	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.3	0.3	0.4	0.3	0.6	0.6	0.4	0.4	0.5	0.4
37	EMD—Corporates (Hard)	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.7	0.5	0.6	0.5	0.6	0.5	0.4	0.2	0.6	0.5	0.4	0.1
38	EMD—Governments (Hard)	0.7	0.7	0.6	0.6	0.7	0.7	0.6	0.5	0.7	0.7	0.7	0.4	0.7	0.6	0.7	0.6	0.6	0.3	0.7	0.6	0.5	0.3
39	EMD—Governments (Local)	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.8	0.5	0.7	0.5	0.6	0.5	0.6	0.1	0.7	0.7	0.5	0.3
40	US Private Credit	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.3	0.6	0.4	0.5	0.5	0.0	-0.3	0.3	0.2	0.2	-0.1
41	US Private Real Estate	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.4	0.6	0.6	0.5	0.3	0.6	0.6	0.8	0.9	0.3	0.0	0.5	0.3	0.4	0.1
42	US Private Equity	0.8	0.8	0.9	0.7	0.8	0.7	0.7	0.6	0.7	0.7	0.6	0.4	0.7	0.5	0.7	0.6	0.2	-0.1	0.5	0.4	0.4	0.0
43	Commodities	0.5	0.5	0.5	0.6	0.6	0.5	0.6	0.4	0.6	0.6	0.6	0.5	0.5	0.3	0.4	0.4	0.2	-0.2	0.5	0.4	0.2	0.0
44	Global Hedge Funds	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.6	0.8	0.8	0.7	0.5	0.8	0.5	0.7	0.6	0.1	-0.4	0.5	0.3	0.3	-0.1

Correlations continued

Asset Classes	Asset Classes																					
Asset Classes	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
23 Australia Government Bond	1.0																					
24 China Government Bond	0.4	1.0																				
25 Global Inflation Linked Bonds	0.7	0.7	1.0																			
26 Global Investment Grade Bond	0.8	0.3	0.7	1.0																		
27 US Investment Grade	0.6	0.2	0.8	0.7	1.0																	
28 Euro Investment Grade	0.8	0.3	0.8	0.9	0.7	1.0																
29 UK Investment Grade	0.7	0.4	0.8	0.8	0.7	0.7	1.0															
30 Global High Yield	0.7	0.2	0.7	0.8	0.7	0.7	0.7	1.0														
31 US High Yield	0.7	0.1	0.6	0.7	0.7	0.6	0.7	0.7	1.0													
32 Euro High Yield	0.7	0.2	0.7	0.8	0.6	0.9	0.8	0.9	0.7	1.0												
33 UK High Yield	0.6	0.2	0.6	0.7	0.5	0.7	0.8	0.8	0.7	0.7	1.0											
34 US High Yield Loans	0.4	0.0	0.4	0.5	0.5	0.4	0.5	0.8	0.8	0.7	0.7	1.0										
35 US MBS	0.5	0.3	0.6	0.6	0.6	0.4	0.4	0.2	0.2	0.2	0.1	0.7	1.0									
36 Munis	0.4	0.2	0.6	0.6	0.7	0.4	0.4	0.5	0.5	0.4	0.3	0.3	0.7	1.0								
37 EMD—Corporates (Hard)	0.7	0.1	0.6	0.7	0.7	0.6	0.6	0.8	0.8	0.7	0.6	0.6	0.3	0.7	1.0							
38 EMD—Governments (Hard)	0.7	0.2	0.7	0.8	0.8	0.7	0.7	0.8	0.8	0.7	0.6	0.6	0.5	0.6	0.7	1.0						
39 EMD—Governments (Local)	0.8	0.3	0.6	0.7	0.6	0.8	0.6	0.7	0.7	0.8	0.6	0.5	0.3	0.4	0.7	0.7	1.0					
40 US Private Credit	0.3	0.0	0.3	0.4	0.4	0.3	0.5	0.7	0.7	0.6	0.6	0.9	0.0	0.3	0.6	0.5	0.7	1.0				
41 US Private Real Estate	0.5	0.2	0.5	0.5	0.5	0.4	0.5	0.6	0.6	0.5	0.4	0.5	0.2	0.3	0.5	0.5	0.5	0.4	1.0			
42 US Private Equity	0.6	0.2	0.4	0.5	0.4	0.5	0.5	0.7	0.7	0.6	0.5	0.5	0.2	0.2	0.5	0.5	0.5	0.5	0.6	1.0		
43 Commodities	0.5	0.1	0.4	0.4	0.3	0.5	0.4	0.6	0.5	0.6	0.5	0.5	-0.2	0.1	0.5	0.4	0.5	0.4	0.3	0.7	1.0	
44 Global Hedge Funds	0.5	0.1	0.5	0.7	0.6	0.6	0.7	0.8	0.8	0.7	0.7	0.8	-0.2	0.3	0.7	0.6	0.6	0.7	0.5	0.7	0.7	1.0

Methodology

This section provides an overview of the methodology and models we use to develop long-term capital market expectations (CMEs) for various asset classes, including equities, fixed income, commodities and alternatives. In addition, we deliver expectations of three-month cash returns.

Our long-term return expectations are driven by current valuations, analyst expectations, expected growth rates and expected economic environments.

Equities

Our equity CME process generates 10-year forecasts for countries and regions. To develop our CMEs, we use three models: the “building blocks” model, the “residual income” model and the “global beta” model. We average the three models to arrive at expectations for country-level and regional equities.

Building blocks model

Derived from the classical dividend discount model (DDM) approach, the building blocks model is comprised of three components that collectively capture significant drivers of equity returns:

1. Current shareholder yield, which is based on the 12-month trailing dividend yield, adjusted for buybacks and share issuance. This building block represents income return.
2. Earnings growth, which we estimate as a blend of bottom-up and top-down views, adjusted for profit margin change. The bottom-up approach incorporates two-year analyst EPS growth forecasts and historical median EPS growth. The top-down approach derives growth forecasts from nominal GDP forecasts for the next 10 years. This forecast is then adjusted for current operating margin levels.

3. Multiple expansion, which is based on the deviation of current cyclically adjusted price to earnings (CAPE) from its trailing history. CAPE is a valuation method that reduces the volatility of earnings by averaging the previous 10-year earnings growth, adjusted for inflation. We assume that current CAPE levels’ convergence to historical median values over the 10-year horizon. Thus a high relative valuation is indicative of lower future returns and vice versa.

Residual income model

The residual income model estimates the value of common stock by discounting the future stream of net income, less all costs of all capital of a company, commonly referred to as residual income. The model analyzes the value of equity as the sum of two components:

1. The current book value of equity
2. The present value of expected future residual income

According to the model, the value of common stock can be inferred from the relation between current book value and projected return on equity (ROE) as follows:

$$V_0 = B_0 + \sum_{t=1}^{\infty} \frac{(ROE_t - r) * B_{t-1}}{(1+r)^t}$$

where:

- V_0 = current price of a share of stock
 B_0 = current per-share book value of equity
 B_t = expected per-share book value of equity at time t
 ROE_t = return on equity at time t
 DPR_t = dividend payout ratio at time t
 r = cost of equity or required rate of return

The key drivers of growth of residual income are ROE and growth of book value. For ROE, we assume convergence to a long-run steady state over a 10-year horizon, with steady state being an average of ROE derived from earnings growth (a blend of top-down and bottom-up views also used above in the building blocks model) and historic median ROE. Growth of book value reflects steady state assumptions according to the following:

$$B_t = B_{t-1} + B_{t-1} * ROE_t * (1 - DPR_t)$$

Assuming current equity valuations, current book value and forecasted future residual income, we derive equity return expectations as the required rate of return (cost of capital).

Global beta model

The global beta model assumes that the long-run expected active return of a country equity index is determined by its covariance with the global equity market portfolio, consistent with the classic definition of “beta.” We represent the global equity market portfolio by the MSCI All Country World Index (ACWI). Based on historical monthly US-dollar returns, we estimate regressions for each country’s equity index excess return against the MSCI ACWI excess return to derive individual country beta to the global equity portfolio. Based on this approach, each country’s equity CME is calculated as its beta multiplied by the global equity portfolio CME.

The global equity portfolio CME is calculated as an average of the building block approach and residual income methodology applied at the MSCI ACWI level, expressed in US-dollar terms. To convert resulting CMEs into local currencies, we apply our currency conversion methodology and our 10-year currency forecasts.

Specialty equities

To develop our expectations for real estate investment trusts (REITs) and listed infrastructure, we use a lasso regression⁴ approach to help identify relevant factors that drive expected returns of each asset category. As further validation, and to avoid spurious outcomes, we cross check statistical analyses with a curated approach that leans on the underlying economic rationale in selecting factors for each asset category.

For REITs, our statistical analysis strongly supports the intuition that this asset category has both equity and fixed income components. Bond-like features reflect the importance of rental income in the valuation of REITs. With respect to infrastructure equities, we find equities to be the dominant factor, with fixed income being important as well.

Additionally, we also develop a bottom-up building blocks model for REITs using inputs from our private direct real estate. The bottom-up model starts with the unlevered, gross of fee estimate for US private real estate and adjusts for leverage, general and administrative costs ("G&A"), and the prevailing price discount/premium to underlying asset value. We ultimately blend our bottom-up and top-down views to determine our final CME.

Fixed income

Our core fixed income CMEs are based on projections of key interest rates and the assumption for credit spreads to revert to their historical long-term averages. To improve model accuracy, we split each composite index into subindexes based on time to maturity and forecast the returns of each subindex separately. For composite indexes, we aggregate subindex projections using current market structure weights.

To develop government yield curve projections for an individual country, we start with three-month and 10-year yield forecasts and apply a three-factor yield curve model based on level, slope and curvature factors. Our curvature assumptions are based on long-run historical averages. The statistical yield curve model produces forecasts for one-, three-, five-, seven-, 20- and 30-year government bond yields.

Each composite index is divided into subindexes grouped by time to maturity. We assume that current market structure of the composite indexes will remain consistent over the forecast horizon. Return forecasts of each subindex are based on projections of matching by maturity the government yields and the evolution of the subindex spread. The forecast for subindex spread starts from the current spread level and evolves toward its long-term historical average. Based on projected yields, the total return for each subindex is calculated as the sum of price return and the coupon, where price return reflects the evolution of the yield curve, including the roll-down component.

The weighted sum of the subindex returns produces the index total return forecast. For bond indexes with default risk, we make a further adjustment for defaults based on historical averages of losses due to them.

For inflation-linked bonds, we modify our core pricing methodology to account for the difference between our 10-year inflation forecast and the 10-year breakeven inflation rate, an important component of valuation.

Our pricing methodology is extended to US mortgage-backed securities. We make assumptions about prepayments in the context of the interest-rate environment projected by our core government rates process.

Forecasting returns for high-yield loans is based on short rate projections from our core methodology combined with the assumption that discount margins revert to their historical long-term averages.

Commodities

To estimate commodity returns, we apply the building blocks approach to the commodity futures curve. We identify spot return, roll yield and return on collateral as building blocks. The spot return is determined by the change in the value of an individual commodity and is broken down into the real (inflation-adjusted) spot price return and inflation. Our 10-year estimates of the real spot price return are based on the long-term historical average of real spot monthly returns. We add back our 10-year inflation expectation to arrive at the estimate of spot return. Roll yield arises from rolling the commodity futures forward before the contract expires. Roll yield is estimated as the difference between historical excess returns and the historical spot returns. To estimate return on collateral, we assume that cash collateral is invested in three-month US Treasury bills and use our 10-year forecast of the three-month rate.

We also estimate commodity returns using a lasso regression approach that identifies public asset proxies with common return sensitivities, to form a "replicating portfolio" of these public proxies that best represents commodity return drivers. The composition of these replicating portfolios is guided by returns-based regressions, as well as intuition regarding which drivers are important.

We ultimately blend our bottom-up building blocks and top-down lasso regression approach to determine our final CME.

4. A regression method that performs variable selection to improve prediction accuracy and interpretability of the resulting model while mitigating overfitting.

Hedge funds

To estimate hedge fund returns, we use a lasso regression approach that identifies public asset proxies with common return sensitivities, to form a “replicating portfolio” of these public proxies that best represents hedge funds’ return drivers. The composition of these replicating portfolios is guided by returns-based regressions, as well as intuition regarding which drivers are important.

Alternatives: private assets

To forecast returns for private assets, we evaluate results from bottom-up and top-down models, respectively. Bottom-up models derive estimates for expected returns based on market fundamentals using a building blocks approach. Similar to the classical DDM building blocks model applied to equities, the private assets bottom-up models generally reflect current yields, growth rate forecasts and expected changes in valuation multiples. The models also capture practicalities of accessing private assets through fund vehicles, such as the use of leverage, cost of financing and manager fees.

Our top-down models identify public asset proxies with common economic risks, sources of yield, and growth sensitivities, and form a “replicating portfolio” of these public proxies that best represents private assets’ return drivers. The composition of these replicating portfolios is guided by returns-based regressions. First, to facilitate the comparison to public assets, we address the issue of the artificially low volatility of private asset returns—a well-known phenomenon arising from the lack of regular, mark-to-market pricing for illiquid assets. We “de-smooth” quarterly returns by fitting an autoregression model. In forming a replicating portfolio, we account for the underlying leverage of private assets, scaling regression coefficients and aligning volatilities of the proxy portfolio with its private counterpart.

Further additional considerations include the assessment of a potential illiquidity premium and the cost of financing. Our expected return estimates are net of fees.

Private direct real estate

Key drivers of private direct real estate (DRE) returns are rental income and price appreciation. Income is driven by cash flows from contractual rents and leases, which can provide a partial hedge against inflation over time. Price appreciation, a volatile component of returns, is pro-cyclical, like public equities. Our private DRE expected return and risk reflect an exposure profile typical of US core institutional private real estate funds included in the NCREIF ODCE Index. The estimate includes the use of leverage and is net of typical fund fees.

The bottom-up model starts with the prevailing broad market appraisal-based capitalization rate. We reduce this cash yield metric by expected capital expenditures to estimate the free cash flow yield. We include an expected real cash flow growth estimate to which we add our inflation assumption. Lastly, we assume a change in capitalization rates over the course of the next 10 years. Additional features of the bottom-up model include the assumption of a 10% exposure to value-add real estate activities, leverage and cost of leverage assumptions, and estimated fund fees of 100 basis points on average.

Reflecting the economic characteristics of the real estate sector, a broad DRE index can be viewed as a leveraged portfolio of equities, nominal and inflation-linked bonds, a sector-specific factor and an illiquidity factor. Our top-down framework captures the beta of DRE to the key return drivers. Based on mixed historical evidence on the magnitude of the illiquidity premium, we take a conservative approach and do not include it at the modeling stage.

Private credit

The US private credit (PC) expected return and risk represent a typical US core direct lending strategy comprised of senior secured loans with 80% first lien and 20% second lien loans. In effect, we model a typical “unitranche” loan portfolio. We assume all loans are floating rate.

The building blocks approach starts with our base US-dollar cash rate and adds a blended average expected spread. We further capture extra return in the form of an original issue discount (OID) and estimate average expected unlevered credit losses. To this unlevered expected return, we apply a leverage and cost of leverage assumption. Lastly, we reduce returns by assumptions for typical fund expenses inclusive of assumed incentive fees of 12.5% of the total return. Our replicating public markets portfolio approach yields a proxy portfolio of bank loans. We adjust for leverage, aligning the volatility of the replicating portfolio with the typical industry volatility profile of PC, and add an illiquidity premium prior to deducting fund expenses.

Private equity

For private equities (PE), we rely on the top-down approach to derive an estimate of the net, levered expected return and risk for a broad-based US private equity exposure. Based on the prevailing strategy composition of the PE market, our PE expected return is heavily influenced by data for the buyout sub-strategy. Our public market proxy is a leverage-adjusted US equity index. Based on our analysis of the broad PE market, the leverage ratio of PE is close to 1.4x as measured by differences in debt/enterprise value multiples. This implies a notably higher exposure to the equity risk premium compared to public equities. We add an illiquidity premium and make the broad-based assumption that incremental manager alpha and fund fees offset. Based on these findings, our net-of-fees 10-year expectation tightly tracks the outlook for US equity, adjusted for a premium and leverage differentials.

Our estimates for private asset volatility and correlations entail both art and science. We endeavor to capture the economic risk profile for the private assets such that our views are both statistically accurate and fit for use in common approaches to portfolio optimization. We use a combination of “de-smoothing” autoregressive models, sector and/or leverage adjusted public proxies, and fundamental judgement to correct for the challenges associated with high levels of autocorrelation exhibited by stated private asset index returns.

Currencies

For developed market (DM) countries, we combine forecasts from two models: purchasing power parity (PPP) and real exchange rate (RER). For DMs, we equally weight each of the models to derive our final currency forecast. For emerging market (EM) countries, we equally weight our forecasts from two models: real effective exchange rate (REER) and real exchange rate (RER).

Real exchange rate (all currencies)

Nominal exchange rate return forecasts can be written as a function of real exchange rate return forecasts and inflation differential forecasts.

In practice, we observe that exchange rates tend to mean-revert in the long run, typically after a shock. We use this concept to first compute a variable that measures the deviation of the current real exchange rate from its historical average; we then regress 10-year forward real exchange rate returns on this variable. The predicted result of this regression is our “deviation from fair value” factor and is a proxy for real exchange rate return forecasts.

The deviation from fair value is then added to our inflation differential forecasts, developed internally, for each country to compute the expected return of the currency (forward 10-year return).

Purchasing power parity (DM only)

PPP states that the nominal exchange rate between two currencies should be equal to the ratio of aggregate price levels

between the two countries, so that a unit of currency of one country will have the same purchasing power in a foreign country.

The basis for PPP is based on the “law of one price.” In the absence of any frictional costs, competitive markets should equalize the price of an identical good in two countries when the prices are expressed in the same currency.

Real effective exchange rate (EM only)

The REER is a weighted average of a country’s currency relative to an index of other currencies. The weights are determined by comparing the relative trade balance of a country’s currency against that of each country in the index. An increase in a nation’s REER is an indication that its exports are becoming more expensive and/or that its imports are becoming cheaper.

We utilize REER by calculating the deviation of REER from a trailing moving average. The larger the difference between current and trailing values, the larger the impact on expected return.

Indexes and proxies

Asset Class	Market Proxy
EQUITY	
Global Equity	MSCI AC World Daily TR Net
Developed-Market Equity	MSCI Daily TR Net World Local
US Large Cap	MSCI Daily TR Net USA Local
Canada	MSCI Daily TR Net Canada
EAFE	MSCI EAFE Net Total Return USD Index
EMU	MSCI Daily TR Net EMU USD
UK	MSCI Daily TR Net UK USD
Pacific ex Japan	MSCI Pacific ex Japan Net Total Return USD Index
Japan	MSCI Japan Net Total Return USD Index
Australia	MSCI Daily TR Net Australia USD Index
Emerging Markets	MSCI Emerging Net Total Return USD Index
China	MSCI China Net Total Return USD Index
Specialty Equity	
US REITS	FTSE NAREIT US Real Estate Index
Global REITS	S&P Global EIT USD Total Return Index
US Listed Infrastructure	MSCI UAS Infrastructure Net Total Return
Global Listed Infrastructure	S&P Global Infrastructure Total Return Index
FIXED INCOME	
Global Developed-Market Government	Bloomberg Global Agg Treasuries Total Return Index Value Unhedged USD
US Government	Bloomberg Barclays US Treasury Total Return Unhedged USD
Euro Government	Bloomberg Euro-Aggregate: Treasury Index
UK Government	Bloomberg Barclays Sterling Gilts Total Return Index Value Unhedged USD
China Government Bonds	Bloomberg China Aggregate Treasury Index
Japan Government	Bloomberg Barclays Global Japan Total Return Index Value Unhedged USD
Australia Government	Bloomberg Barclays Global: Australia Total Return Index Value Unhedged USD
Canada Government	Bloomberg Barclays Capital Global: Canada Total Return Index Value Unhedged USD
GLOBAL CREDIT	
Global Investment-Grade Credit	Bloomberg Barclays Global Agg Corporate Total Return Index Value Unhedged USD
Investment Grade USD	Bloomberg Barclays US Corporate Total Return Value Unhedged USD

Asset Class	Market Proxy
GLOBAL CREDIT continued	
Investment Grade EUR	Bloomberg Barclays Euro Aggregate Corporate Total Return Index Unhedged USD
Investment Grade GBP	Bloomberg Barclays Sterling Aggregate Corporate TR Value Unhedged USD
Global Corporate High Yield	Bloomberg Barclays Global High Yield Total Return Index Value Unhedged
US High Yield	Bloomberg Barclays US Corporate High Yield Total Return Index Value Unhedged USD
Euro High Yield	Bloomberg Barclays Pan-European High Yield Total Return Index Value Unhedged USD
UK High Yield	Bloomberg Pan-European High Yield: Sterling Total Return Index Unhedged GBP
US High Yield Loans	Credit Suisse Leveraged Loan Total Return
US Securitized	
US MBS	Bloomberg Barclays US MBS Index Total Return Value Unhedged USD
Municipal Bonds	
US Munis	Bloomberg Barclays Municipal Bond Index Total Return Index Value Unhedged USD
Inflation Linked	
Global inflation linked	Bloomberg Barclays Global Inflation-Linked Total Return Index Value Unhedged USD
TIPS USD	Bloomberg Barclays US Govt Inflation-Linked All Maturities Total Return Index
Emerging Markets Governments	
EMD—Hard	Bloomberg Barclays Emerging Markets Sovereign TR Index Value Unhedged USD
EMD—Local	Bloomberg Emerging Markets Local Currency Government Index
EMD—Corporate	Bloomberg Barclays: EM USD Aggregate: Corporate
ALTERNATIVES	
Commodities	
Composite Basket	Bloomberg Commodity Index
Global Hedge Funds	Hedge Fund Research HFRI Fund Weighted Composite Index
Private Assets*	
US Direct Real Estate	NCREIF ODCE
US Private Equity	Burgiss US Private Equity Index
US Private Credit	The Cliffwater Direct Lending Index

*Return assumptions incorporate leverage.

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GDP - Wikipedia

Definition

The OECD defines GDP as "an aggregate measure of production equal to the sum of the gross values added of all resident and institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs)."[5] An IMF publication states that "GDP measures the monetary value of final goods and services—that are bought by the final user—produced in a country in a given period of time (say a quarter or a year)."[6]

Total GDP can also be broken down into the contribution of each industry or sector of the economy.[7] The ratio of GDP to the total population of the region is the per capita GDP and the same is called Mean Standard of Living. GDP is considered the "world's most powerful statistical indicator of national development and progress".[8]

History

William Petty came up with a basic concept of GDP to attack landlords against unfair taxation during warfare between the Dutch and the English between 1654 and 1676 [9] Charles Davenant developed the method further in 1695.[10] The modern concept of GDP was first developed by Simon Kuznets for a US Congress report in 1934.[11] In this report, Kuznets warned against its use as a measure of welfare[1] (see below under limitations and criticisms). After the Bretton Woods conference in 1944, GDP became the main tool for measuring a country's economy.[12] At that time gross national product (GNP) was the preferred estimate, which differed from GDP in that it measured production by a country's citizens at home and abroad rather than its 'resident institutional units' (see OECD definition above). The switch from GNP to GDP in the US was in 1991, trailing behind most other nations. The role that measurements of GDP played in World War II was crucial to the subsequent political acceptance of GDP values as indicators of national development and progress.[13] A crucial role was played here by the US Department of Commerce under Milton Gilbert where ideas from Kuznets were embedded into governmental institutions.

The history of the concept of GDP should be distinguished from the history of changes in ways of estimating it. The value added by firms is relatively easy to calculate from their accounts, but the value added by the public sector, by financial industries, and by intangible asset creation is more complex. These activities are increasingly important in developed economies, and the international conventions governing their estimation and their inclusion or exclusion in GDP regularly change in an attempt to keep up with industrial advances. In the words of one academic economist "The actual number for GDP is therefore the product of a vast patchwork of statistics and a complicated set of processes carried out on the raw data to fit them to the conceptual framework." [14]

Determining gross domestic product (GDP)

An infographic explaining how GDP is calculated in the UK

GDP can be determined in three ways, all of which should, in principle, give the same result. They are the production (or output or value added) approach, the income approach, or the speculated expenditure approach.

The most direct of the three is the production approach, which sums the outputs of every class of enterprise to arrive at the total. The expenditure approach works on the principle that all of the product must be bought by somebody, therefore the value of the total product must be equal to people's total expenditures in buying things. The income approach works on the principle that the incomes of the productive factors ("producers," colloquially) must be equal to the value of their product, and determines GDP by finding the sum of all producers' incomes.[15]

Production approach

This approach mirrors the OECD definition given above.

Estimate the gross value of domestic output out of the many various economic activities;
Determine the [intermediate consumption], i.e., the cost of material, supplies and services used to produce final goods or services.

Deduct intermediate consumption from gross value to obtain the gross value added.

Gross value added = gross value of output – value of intermediate consumption.

Value of output = value of the total sales of goods and services plus value of changes in the inventory.

The sum of the gross value added in the various economic activities is known as "GDP at factor cost".

GDP at factor cost plus indirect taxes less subsidies on products = "GDP at producer price".

For measuring output of domestic product, economic activities (i.e. industries) are classified into various sectors. After classifying economic activities, the output of each sector is calculated by any of the following two methods:

By multiplying the output of each sector by their respective market price and adding them together

By collecting data on gross sales and inventories from the records of companies and adding them together

The value of output of all sectors is then added to get the gross value of output at factor cost.

Subtracting each sector's intermediate consumption from gross output value gives the GVA (=GDP) at factor cost. Adding indirect tax minus subsidies to GVA (GDP) at factor cost gives the "GVA (GDP) at producer prices".

Income approach

The second way of estimating GDP is to use "the sum of primary incomes distributed by resident producer units".[5]

If GDP is calculated this way it is sometimes called gross domestic income (GDI), or GDP (I). GDI should provide the same amount as the expenditure method described later. By definition, GDI is equal to GDP. In practice, however, measurement errors will make the two figures slightly off when reported by national statistical agencies.

This method measures GDP by adding incomes that firms pay households for factors of production they hire - wages for labour, interest for capital, rent for land and profits for entrepreneurship.

The US "National Income and Expenditure Accounts" divide incomes into five categories:

Wages, salaries, and supplementary labour income

Corporate profits

Interest and miscellaneous investment income

Farmers' incomes

Income from non-farm unincorporated businesses

These five income components sum to net domestic income at factor cost.

Two adjustments must be made to get GDP:

Indirect taxes minus subsidies are added to get from factor cost to market prices.

Depreciation (or capital consumption allowance) is added to get from net domestic product to gross domestic product.

Total income can be subdivided according to various schemes, leading to various formulae for GDP measured by the income approach. A common one is:

GDP = compensation of employees + gross operating surplus + gross mixed income + taxes less subsidies on production and imports

$GDP = COE + GOS + GMI + TP \& M - SP \& M$

Compensation of employees (COE) measures the total remuneration to employees for work done. It includes wages and salaries, as well as employer contributions to social security and other such programs.

Gross operating surplus (GOS) is the surplus due to owners of incorporated businesses. Often called profits, although only a subset of total costs are subtracted from gross output to calculate GOS.

Gross mixed income (GMI) is the same measure as GOS, but for unincorporated businesses. This often includes most small businesses.

The sum of COE, GOS and GMI is called total factor income; it is the income of all of the factors of production in society. It measures the value of GDP at factor (basic) prices. The difference between basic prices and final prices (those used in the expenditure calculation) is the total taxes and subsidies that the government has levied or paid on that production. So adding taxes less subsidies on production and imports converts GDP(I) at factor cost to GDP(I) at final prices.

Total factor income is also sometimes expressed as:

Total factor income = employee compensation + corporate profits + proprietor's income + rental income + net interest[16]

Expenditure approach

Expenditure

The third way to estimate GDP is to calculate the sum of the final uses of goods and services (all uses except intermediate consumption) measured in purchasers' prices.[5]

Market goods which are produced are purchased by someone. In the case where a good is produced and unsold, the standard accounting convention is that the producer has bought the good from themselves. Therefore, measuring the total expenditure used to buy things is a way of measuring production. This is known as the expenditure method of calculating GDP.

Components of GDP by expenditure

U.S. GDP computed on the expenditure basis.

GDP (Y) is the sum of consumption (C), investment (I), government spending (G) and net exports (X – M).

$$Y = C + I + G + (X - M)$$

Here is a description of each GDP component:

C (consumption) is normally the largest GDP component in the economy, consisting of private expenditures in the economy (household final consumption expenditure). These personal expenditures fall under one of the following categories: durable goods, nondurable goods, and services. Examples include food, rent, jewelry, gasoline, and medical expenses, but not the purchase of new housing.

I (investment) includes, for instance, business investment in equipment, but does not include exchanges of existing assets. Examples include construction of a new mine, purchase of software, or purchase of machinery and equipment for a factory. Spending by households (not government) on new houses is also included in investment. In contrast to its colloquial meaning, "investment" in GDP does not mean purchases of financial products. Buying financial products is classed as 'saving', as opposed to investment. This avoids double-counting: if one buys shares in a company, and the company uses the money received to buy plant, equipment, etc., the amount will be counted toward GDP when the company spends the money on those things; to also count it when one gives it to the company would be to count two times an amount that only corresponds to one group of products. Buying bonds or stocks is a swapping of deeds, a transfer of claims on future production, not directly an expenditure on products.

G (government spending) is the sum of government expenditures on final goods and services. It includes salaries of public servants, purchases of weapons for the military and any investment expenditure by a government. It does not include any transfer payments, such as social security or unemployment benefits.

X (exports) represents gross exports. GDP captures the amount a country produces, including goods and services produced for other nations' consumption, therefore exports are added.

M (imports) represents gross imports. Imports are subtracted since imported goods will be included in the terms G, I, or C, and must be deducted to avoid counting foreign supply as domestic.

Note that C, G, and I are expenditures on final goods and services; expenditures on intermediate goods and services do not count. (Intermediate goods and services are those used by businesses to produce other goods and services within the accounting year.[17])

According to the U.S. Bureau of Economic Analysis, which is responsible for calculating the national accounts in the United States, "In general, the source data for the expenditures components are considered more reliable than those for the income components [see income method, below]."[18]

GDP vs GNI

GDP can be contrasted with gross national product (GNP) or, as it is now known, gross national income (GNI). The difference is that GDP defines its scope according to location, while GNI defines its scope according to ownership. In a global context, world GDP and world GNI are, therefore, equivalent terms.

GDP is product produced within a country's borders; GNI is product produced by enterprises owned by a country's citizens. The two would be the same if all of the productive enterprises in a country were owned by its own citizens, and those citizens did not own productive enterprises in any other countries. In practice, however, foreign ownership makes GDP and GNI non-identical. Production within a country's borders, but by an enterprise owned by somebody outside the country, counts as part of its GDP but not its GNI; on the other hand, production by an enterprise located outside the country, but owned by one of its citizens, counts as part of its GNI but not its GDP.

For example, the GNI of the USA is the value of output produced by American-owned firms, regardless of where the firms are located. Similarly, if a country becomes increasingly in debt, and spends large amounts of income servicing this debt this will be reflected in a decreased GNI but not a decreased GDP. Similarly, if a country sells off its resources to entities outside their country this will also be reflected over time in decreased GNI, but not decreased GDP. This would make the use of GDP more attractive for politicians in countries with increasing national debt and decreasing assets.

Gross national income (GNI) equals GDP plus income receipts from the rest of the world minus income payments to the rest of the world.[19]

In 1991, the United States switched from using GNP to using GDP as its primary measure of production.[20] The relationship between United States GDP and GNP is shown in table 1.7.5 of the National Income and Product Accounts.[21]

International standards

The international standard for measuring GDP is contained in the book System of National Accounts (1993), which was prepared by representatives of the International Monetary Fund, European Union, Organisation for Economic Co-operation and Development, United Nations and World Bank. The publication is normally referred to as SNA93 to distinguish it from the previous edition published in 1968 (called SNA68) [22]

SNA93 provides a set of rules and procedures for the measurement of national accounts. The standards are designed to be flexible, to allow for differences in local statistical needs and conditions.

U.S GDP computed on the income basis

Within each country GDP is normally measured by a national government statistical agency, as private sector organizations normally do not have access to the information required (especially information on expenditure and production by governments).

Nominal GDP and adjustments to GDP

The raw GDP figure as given by the equations above is called the nominal, historical, or current, GDP. When one compares GDP figures from one year to another, it is desirable to compensate for changes in the value of money – for the effects of inflation or deflation. To make it more meaningful for year-to-year comparisons, it may be multiplied by the ratio between the value of money in the year the GDP was measured and the value of money in a base year.

For example, suppose a country's GDP in 1990 was \$100 million and its GDP in 2000 was \$300 million. Suppose also that inflation had halved the value of its currency over that period. To meaningfully compare its GDP in 2000 to its GDP in 1990, we could multiply the GDP in 2000 by one-half, to make it relative to 1990 as a base year. The result would be that the GDP in 2000 equals $\$300 \text{ million} \times \text{one-half} = \150 million , in 1990 monetary terms. We would see that the country's GDP had realistically increased 50 percent over that period, not 200 percent, as it might appear from the raw GDP data. The GDP adjusted for changes in money value in this way is called the real, or constant, GDP.

The factor used to convert GDP from current to constant values in this way is called the GDP deflator. Unlike consumer price index, which measures inflation or deflation in the price of household consumer goods, the GDP deflator measures changes in the prices of all domestically produced goods and services in an economy including investment goods and government services, as well as household consumption goods.[24]

Constant-GDP figures allow us to calculate a GDP growth rate, which indicates how much a country's production has increased (or decreased, if the growth rate is negative) compared to the previous year.

Real GDP growth rate for year n

$$= [(\text{Real GDP in year } n) - (\text{Real GDP in year } n - 1)] / (\text{Real GDP in year } n - 1)$$

Another thing that it may be desirable to account for is population growth. If a country's GDP doubled over a certain period, but its population tripled, the increase in GDP may not mean that the standard of living increased for the country's residents; the average person in the country is producing less than they were before. Per-capita GDP is a measure to account for population growth.

Cross-border comparison and purchasing power parity

The level of GDP in countries may be compared by converting their value in national currency according to either the current currency exchange rate, or the purchasing power parity exchange rate.

Current currency exchange rate is the exchange rate in the international foreign exchange market. Purchasing power parity exchange rate is the exchange rate based on the purchasing power parity (PPP) of a currency relative to a selected standard (usually the United States dollar). This is a comparative (and theoretical) exchange rate, the only way to directly realize this rate is to sell an entire CPI basket in one country, convert the cash at the currency market rate & then rebuy that same basket of goods in the other country (with the converted cash). Going from country to country, the distribution of prices within the basket will vary; typically, non-tradable purchases will consume a greater proportion of the basket's total cost in the higher GDP country, per the Balassa-Samuelson effect.

The ranking of countries may differ significantly based on which method is used.

The current exchange rate method converts the value of goods and services using global currency exchange rates. The method can offer better indications of a country's international purchasing power. For instance, if 10% of GDP is being spent on buying hi-tech foreign arms, the number of weapons purchased is entirely governed by current exchange rates, since arms are a traded product bought on the international market. There is no meaningful 'local' price distinct from the international price for high technology goods. The PPP method of GDP conversion is more relevant to non-traded goods and services. In the above example if hi-tech weapons are to be produced internally their amount will be governed by GDP (PPP) rather than nominal GDP. There is a clear pattern of the purchasing power parity method decreasing the disparity in GDP between high and low income (GDP) countries, as compared to the current exchange rate method. This finding is called the Penn effect.

For more information, see Measures of national income and output.

Standard of living and GDP: wealth distribution and externalities
GDP per capita is often used as an indicator of living standards.[25]

The major advantage of GDP per capita as an indicator of standard of living is that it is measured frequently, widely, and consistently. It is measured frequently in that most countries provide information on GDP on a quarterly basis, allowing trends to be seen quickly. It is measured widely in that some measure of GDP is available for almost every country in the world, allowing inter-country comparisons. It is measured consistently in that the technical definition of GDP is relatively consistent among countries.

GDP does not include several factors that influence the standard of living. In particular, it fails to account for:

Externalities – Economic growth may entail an increase in negative externalities that are not directly measured in GDP.[26][27] Increased industrial output might grow GDP, but any pollution is not counted.[28]

Non-market transactions– GDP excludes activities that are not provided through the market, such as household production, bartering of goods and services, and volunteer or unpaid services.

Non-monetary economy– GDP omits economies where no money comes into play at all, resulting in inaccurate or abnormally low GDP figures. For example, in countries with major business transactions occurring informally, portions of local economy are not easily registered. Bartering may be more prominent than the use of money, even extending to services.[27]

Quality improvements and inclusion of new products– by not fully adjusting for quality improvements and new products, GDP understates true economic growth. For instance, although computers today are less expensive and more powerful than computers from the past, GDP treats them as the same products by only accounting for the monetary value. The introduction of new products is also difficult to measure accurately and is not reflected in GDP despite the fact that it may increase the standard of living. For example, even the richest person in 1900 could not purchase standard products, such as antibiotics and cell phones, that an average consumer can buy today, since such modern conveniences did not exist then.

Sustainability of growth– GDP is a measurement of economic historic activity and is not necessarily a projection.

Wealth distribution – GDP does not account for variances in incomes of various demographic groups. See income inequality metrics for discussion of a variety of inequality-based economic measures.[27]

It can be argued that GDP per capita as an indicator standard of living is correlated with these factors, capturing them indirectly.[25][29] As a result, GDP per capita as a standard of living is a continued usage because most people have a fairly accurate idea of what it is and know it is tough to come up with quantitative measures for such constructs as happiness, quality of life, and well-being.[25]

Limitations and criticisms

[icon]

This section needs expansion. You can help by adding to it. (February 2012)

Limitations at introduction

Simon Kuznets, the economist who developed the first comprehensive set of measures of national income, stated in his first report to the US Congress in 1934, in a section titled "Uses and Abuses of National Income Measurements":[11]

The valuable capacity of the human mind to simplify a complex situation in a compact characterization becomes dangerous when not controlled in terms of definitely stated criteria. With quantitative measurements especially, the definiteness of the result suggests, often misleadingly, a precision and simplicity in the outlines of the object measured. Measurements of national income are subject to this type of illusion and resulting abuse, especially since they deal with matters that are the center of conflict of opposing social groups where the effectiveness of an argument is often contingent upon oversimplification. [...]

All these qualifications upon estimates of national income as an index of productivity are just as important when income measurements are interpreted from the point of view of economic welfare. But in the latter case additional difficulties will be suggested to anyone who wants to penetrate below the surface of total figures and market values. Economic welfare cannot be adequately measured unless the personal distribution of income is known. And no income

measurement undertakes to estimate the reverse side of income, that is, the intensity and unpleasantness of effort going into the earning of income. The welfare of a nation can, therefore, scarcely be inferred from a measurement of national income as defined above.

In 1962, Kuznets stated:[30]

Distinctions must be kept in mind between quantity and quality of growth, between costs and returns, and between the short and long run. Goals for more growth should specify more growth of what and for what.

Further criticisms

Ever since the development of GDP, multiple observers have pointed out limitations of using GDP as the overarching measure of economic and social progress.

Many environmentalists argue that GDP is a poor measure of social progress because it does not take into account harm to the environment.[31][32]

Although a high or rising level of GDP is often associated with increased economic and social progress within a country, a number of scholars have pointed out that this does not necessarily play out in many instances. For example, Jean Drèze and Amartya Sen have pointed out that an increase in GDP or in GDP growth does not necessarily lead to a higher standard of living, particularly in areas such as healthcare and education.[33] Another important area that does not necessarily improve along with GDP is political liberty, which is most notable in China, where GDP growth is strong yet political liberties are heavily restricted.[34]

GDP does not account for the distribution of income among the residents of a country, because GDP is merely an aggregate measure. An economy may be highly developed or growing rapidly, but also contain a wide gap between the rich and the poor in a society. These inequalities often occur on the lines of race, ethnicity, gender, religion, or other minority status within countries. This can lead to misleading characterizations of economic well-being if the income distribution is heavily skewed toward the high end, as the poorer residents will not directly benefit from the overall level of wealth and income generated in their country. Even GDP per capita measures may have the same downside if inequality is high. For example, South Africa during apartheid ranked high in terms of GDP per capita, but the benefits of this immense wealth and income were not shared equally among the country.[citation needed]

GDP does not take into account the value of household and other unpaid work. Some, including Martha Nussbaum, argue that this value should be included in measuring GDP, as household labor is largely a substitute for goods and services that would otherwise be purchased for value.[35] Even under conservative estimates, the value of unpaid labor in Australia has been calculated to be over 50% of the country's GDP.[36] A later study analyzed this value in other countries, with results ranging from a low of about 15% in Canada (using conservative estimates) to high of nearly 70% in the United Kingdom (using more liberal estimates). For the United States, the value was estimated to be between about 20% on the low end to nearly 50% on the high end, depending on the methodology being used.[37] Because many public policies are shaped by GDP calculations and by the related field of national accounts,[38] the non-

inclusion of unpaid work in calculating GDP can create distortions in public policy, and some economists have advocated for changes in the way public policies are formed and implemented.[39]

The UK's Natural Capital Committee highlighted the shortcomings of GDP in its advice to the UK Government in 2013, pointing out that GDP "focuses on flows, not stocks. As a result, an economy can run down its assets yet, at the same time, record high levels of GDP growth, until a point is reached where the depleted assets act as a check on future growth". They then went on to say that "it is apparent that the recorded GDP growth rate overstates the sustainable growth rate. Broader measures of wellbeing and wealth are needed for this and there is a danger that short-term decisions based solely on what is currently measured by national accounts may prove to be costly in the long-term".

It has been suggested that countries that have authoritarian governments, such as the People's Republic of China, and Russia, inflate their GDP figures.[40]

Proposals to overcome GDP limitations

In response to these and other limitations of using GDP, alternative approaches have emerged.

In the 1980s, Amartya Sen and Martha Nussbaum developed the capability approach, which focuses on the functional capabilities enjoyed by people within a country, rather than the aggregate wealth held within a country. These capabilities consist of the functions that a person is able to achieve.[41]

In 1990 Mahbub ul Haq, a Pakistani Economist at the United Nations, introduced the Human Development Index (HDI). The HDI is a composite index of life expectancy at birth, adult literacy rate and standard of living measured as a logarithmic function of GDP, adjusted to purchasing power parity.

In 1989, John B. Cobb and Herman Daly introduced Index of Sustainable Economic Welfare (ISEW) by taking into account various other factors such as consumption of nonrenewable resources and degradation of the environment. The new formula deducted from GDP (personal consumption + public non-defensive expenditures - private defensive expenditures + capital formation + services from domestic labour - costs of environmental degradation - depreciation of natural capital)

In 2005, Med Jones, an American Economist, at the International Institute of Management, introduced the first secular Gross National Happiness Index a.k.a. Gross National Well-being framework and Index to complement GDP economics with additional seven dimensions, including environment, education, and government, work, social and health (mental and physical) indicators. The proposal was inspired by the King of Bhutan's GNH philosophy.[42][43][44]

In 2009 the European Union released a communication titled GDP and beyond: Measuring progress in a changing world[45] that identified five actions to improve the indicators of progress in ways that make it more responsive to the concerns of its citizens: Introduced a proposal to complementing GDP with environmental and social indicators

In 2009 Professors Joseph Stiglitz, Amartya Sen, and Jean-Paul Fitoussi at the Commission on the Measurement of Economic Performance and Social Progress (CMEPSP), formed by French President, Nicolas Sarkozy published a proposal to overcome the limitation of GDP economics

to expand the focus to well-being economics with wellbeing framework consisting of health, environment, work, physical safety, economic safety, political freedom.

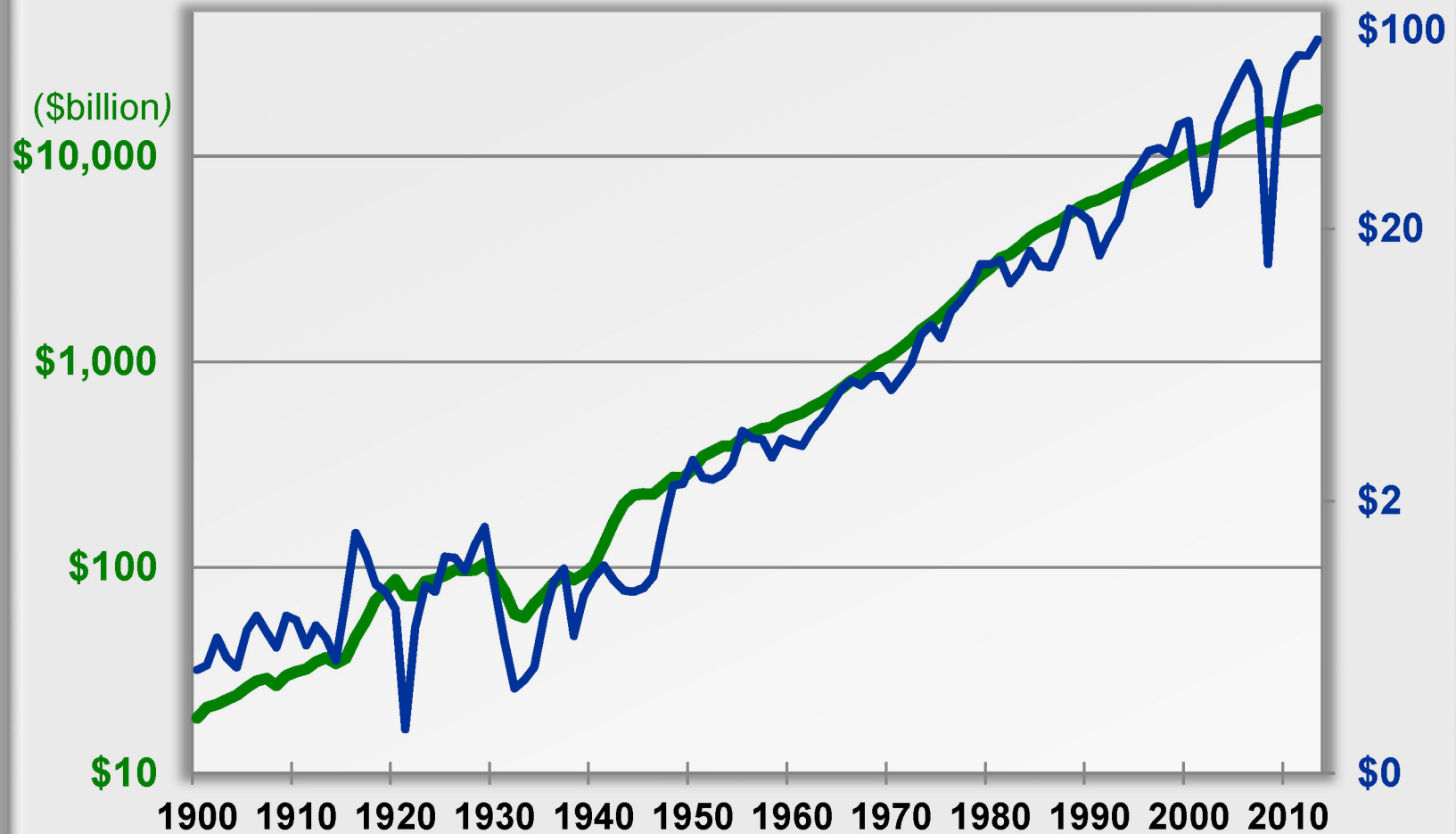
In 2012, the Karma Ura of the Center for Bhutan Studies published Bhutan Local GNH Index contributors to happiness—physical, mental and spiritual health; time-balance; social and community vitality; cultural vitality; education; living standards; good governance; and ecological vitality. The Bhutan GNH Index.[46]

In 2013 OECD Better Life Index was published by the OECD. The dimensions of the index included health, economic, workplace, income, jobs, housing, civic engagement, life satisfaction

In 2013 professors John Helliwell, Richard Layard and Jeffrey Sachs published World Happiness Report and proposed to measure other wellbeing indicators in addition to GDP. the evaluation framework included GDP per capita, Gini (income inequality), life satisfaction, health, freedom of life choices, trust and absence of corruption.

Lists of countries by their GDP

GDP-N (left–green) & EPS (right–blue)



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The real cost of equity

The inflation-adjusted cost of equity has been remarkably stable for 40 years, implying a current equity risk premium of 3.5 to 4 percent

Marc H. Goedhart, Timothy M. Koller, and Zane D. Williams

As central as it is to every decision at the heart of corporate finance, there has never been a consensus on how to estimate the cost of equity and the equity risk premium.¹

Conflicting approaches to calculating risk have led to varying estimates of the equity risk premium from 0 percent to 8 percent—although most practitioners use a narrower range of 3.5 percent to 6 percent. With expected returns from long-term government bonds currently about 5 percent in the US and UK capital markets, the narrower range implies a cost of equity for the typical company of between 8.5 and 11.0 percent. This can change the estimated value of a company by more than 40 percent and have profound implications for financial decision making.

Discussions about the cost of equity are often intertwined with debates about where the stock market is heading and whether it is over- or undervalued. For example, the run-up in stock prices in the late 1990s prompted two contradictory points of view. On the one hand, as prices soared ever higher, some investors expected a new era of higher equity returns driven by increased future productivity and economic growth. On the other hand, some analysts and academics suggested that the rising stock prices meant that the risk premium was declining. Pushed to the extreme, a few analysts even argued that the

premium would fall to zero, that the Dow Jones industrial average would reach 36,000 and that stocks would earn the same returns as government bonds. While these views were at the extreme end of the spectrum, it is still easy to get seduced by complex logic and data.

We examined many published analyses and developed a relatively simple methodology that is both stable over time and overcomes the shortcomings of other models. We estimate that the real, inflation-adjusted cost of equity has been remarkably stable at about 7 percent in the US and 6 percent in the UK since the 1960s. Given current, real long-term bond yields of 3 percent in the US and 2.5 percent in the UK, the implied equity risk premium is around 3.5 percent to 4 percent for both markets.

The debate

There are two broad approaches to estimating the cost of equity and market risk premium. The first is historical, based on what equity investors have earned in the past. The second is forward-looking, based on projections implied by current stock prices relative to earnings, cash flows, and expected future growth.

The latter is conceptually preferable. After all, the cost of equity should reflect the return expected (required) by investors. But forward-

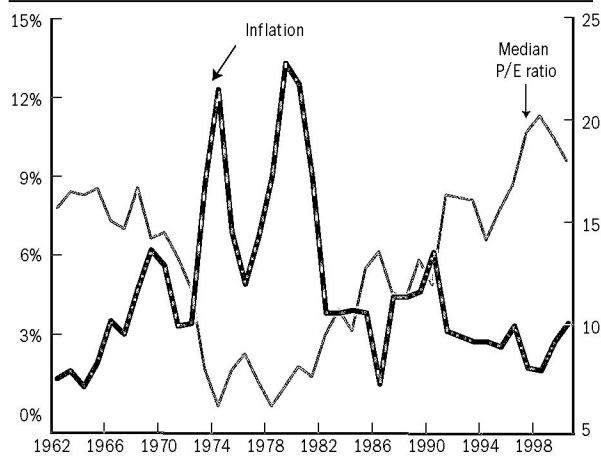
looking estimates are fraught with problems, the most intractable of which is the difficulty of estimating future dividends or earnings growth. Some theorists have attempted to meet that challenge by surveying equity analysts, but since we know that analyst projections almost always overstate the long-term growth of earnings or dividends,² analyst objectivity is hardly beyond question. Others have built elaborate models of forward-looking returns, but such models are typically so complex that it is hard to draw conclusions or generate anything but highly unstable results. Depending on the modeling assumptions, recently published research suggests market risk premiums between 0 and 4 percent.³

Unfortunately, the historical approach is just as tricky because of the subjectivity of its assumptions. For example, over what time period should returns be measured—the previous 5, 10, 20, or 80 years or more? Should average returns be reported as arithmetic or geometric means? How frequently should average returns be sampled? Depending on the answers, the market risk premium based on historical returns can be estimated to be as high as 8 percent.⁴ It is clear that both historical and forward-looking approaches, as practiced, have been inconclusive.

Overcoming the typical failings of economic models

In modeling the behavior of the stock market over the last 40 years,⁵ we observed that many real economic variables were surprisingly stable over time (including long-term growth in corporate profits and returns on capital) and that much of the variability in stock prices related to interest rates and inflation (Exhibit 1). Building on these findings, we

Exhibit 1. US median P/E vs. Inflation

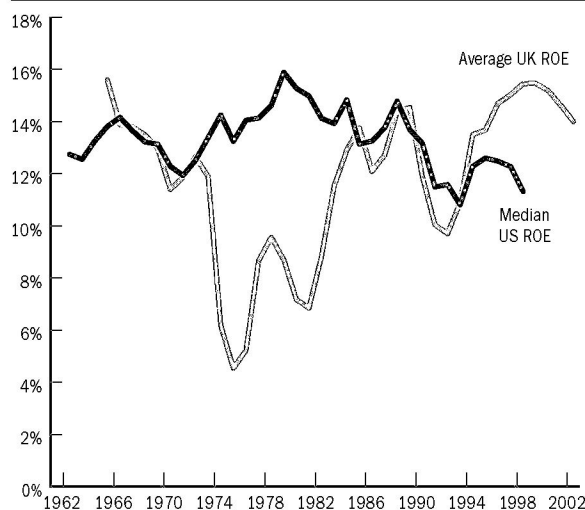


Source: McKinsey analysis

developed a simple, objective, forward-looking model that, when applied retrospectively to the cost of equity over the past 40 years, yielded surprisingly stable estimates.

Forward-looking models typically link current stock prices to expected cash flows by discounting the cash flows at the cost of equity. The implied cost of equity thus becomes a function of known current share values and estimated future cash flows (see sidebar, “Estimating the cost of equity”). Using this standard model as the starting point, we then added three unique characteristics that we believe overcome the shortcomings of many other approaches:

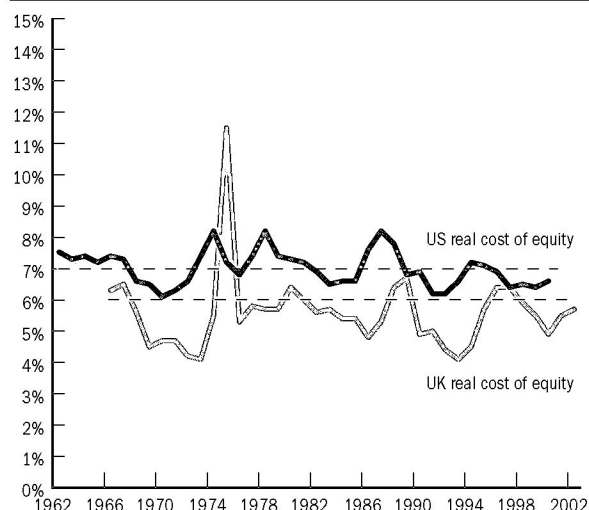
1. *Median stock price valuation.* For the US, we used the value of the median company in the S&P 500 measured by P/E ratio as an estimate of the market’s overall valuation at any point in time. Most researchers have used the S&P 500 itself, but we argue that the S&P 500 is a value-weighted index that has been distorted at times by a few highly valued companies, and therefore does not properly

Exhibit 2. Return on book equity (ROE)

Source: McKinsey analysis

reflect the market value of typical companies in the US economy. During the 1990s, the median and aggregate P/E levels diverged sharply. Indeed by the end of 1999, nearly 70 percent of the companies in the S&P 500 had P/E ratios below that of the index as a whole. By using the median P/E ratio, we believe we generate estimates that are more representative for the economy as a whole. Since UK indices have not been similarly distorted, our estimates for the UK market are based instead on aggregate UK market P/E levels.

2. Dividendable cash flows. Most models use the current level of dividends as a starting point for projecting cash flows to equity. However, many corporations have moved from paying cash dividends to buying back shares and finding other ways to return cash to shareholders, so estimates based on ordinary dividends will miss a substantial portion of what is paid out. We avoid this by discounting not the dividends paid but the cash flows available to shareholders after new investments

Exhibit 3. Annual estimates of the real cost of equity

Source: McKinsey analysis

have been funded. These are what we term “dividendable” cash flows to investors that might be paid out through share repurchases as ordinary dividends, or temporarily held as cash at the corporate level.

We estimate dividendable cash flows by subtracting the investment required to sustain the long-term growth rate from current year profits. This investment can be shown to equal the projected long-term profit growth (See sidebar, “Estimating the cost of equity”) divided by the expected return on book equity. To estimate the return on equity (ROE), we were able to take advantage of the fact that US and UK companies have had fairly stable returns over time. As Exhibit 2 shows, the ROE for both US and UK companies has been consistently about 13 percent per year,⁶ the only significant exception being found in UK returns of the late 1970s.

3. Real earnings growth based on long-term trends. The expected growth rate in cash flow

The stability of the implied inflation-adjusted cost of equity is striking. Despite a handful of recessions and financial crises over the past 40 years . . . equity investors have continued to demand about the same cost of equity in inflation-adjusted terms.

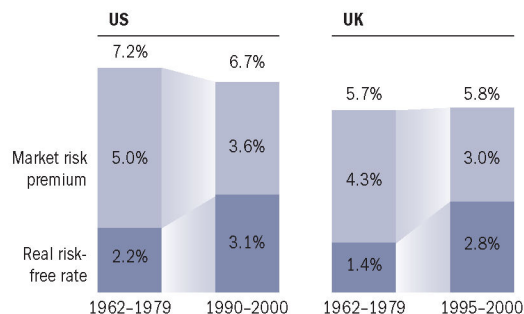
and earnings was estimated as the sum of long-term real GDP growth plus expected inflation. Corporate profits have remained a relatively consistent 5.5 percent of US GDP over the past 50 years. Thus, GDP growth rates are a good proxy for long-term corporate profit growth. Real GDP growth has averaged about 3.5 percent per year over the last 80 years for the US and about 2.5 percent over the past 35 years for the UK. Using GDP growth as a proxy for expected earnings growth allows us to avoid using analysts' expected growth rates.

We estimated the expected inflation rate in each year as the average inflation rate experienced over the previous five years.⁷ The nominal growth rates used in the model for each year were the real GDP growth combined with the contemporary level of expected inflation for that year.

Results

We used the above model to estimate the inflation-adjusted cost of equity implied by stock market valuations each year from 1963 to 2001 in the US and from 1965 to

Exhibit 4. Decomposition of the inflation-adjusted cost of equity



Source: McKinsey analysis

2001 for the UK (Exhibit 3). In the US, it consistently remains between 6 and 8 percent with an average of 7 percent. For the UK market, the inflation-adjusted cost of equity has been, with two exceptions, between 4 percent and 7 percent and on average 6 percent.

The stability of the implied inflation-adjusted cost of equity is striking. Despite a handful of recessions and financial crises over the past 40 years including most recently the dot.com bubble, equity investors have continued to demand about the same cost of equity in inflation-adjusted terms. Of course, there are deviations from the long-term averages but they aren't very large and they don't last very long. We interpret this to mean that stock markets ultimately understand that despite ups and downs in the broad economy, corporate earnings and economic growth eventually revert to their long-term trend.

We also dissected the inflation-adjusted cost of equity over time into two components: the inflation-adjusted return on government bonds and the market risk premium. As Exhibit 4 demonstrates, from 1962 to 1979 the expected

Estimating the cost of equity

To estimate the cost of equity, we began with a standard perpetuity model:

$$P_t = \frac{CF_{t+1}}{k_e - g} \quad (1)$$

where P_t is the price of a share at time t , CF_{t+1} is the expected cash flow per share at time $t + 1$, k_e is the cost of equity, and g is the expected growth rate of the cash flows. The cash flows, in turn, can be expressed as earnings, E , multiplied by the payout ratio:

$$CF = E(\text{payout ratio})$$

Since the payout ratio is the share of earnings left after reinvestment, replacing the payout ratio with the reinvestment rate gives:

$$CF = E(1 - \text{reinvestment rate})$$

The reinvestment rate, in turn, can be expressed as the ratio of the growth rate, g , to the expected return on equity:

$$\text{reinvestment rate} = \frac{g}{ROE}$$

And thus the cash flows can be expressed as:

$$CF = E \left(1 - \frac{g}{ROE} \right) \quad (2)$$

We then combined formulas (1) and (2) to get the following:

$$\frac{P_t}{E_{t+1}} = \frac{1 - \frac{g}{ROE}}{k_e - g} \Rightarrow k_e = \frac{E_{t+1}}{P_t} \left(1 - \frac{g}{ROE} \right) + g \quad (3)$$

If the inflation embedded in k_e and g is the same, we can then express equation 3 as:

$$k_{er} = \frac{E_{t+1}}{P_t} \left(1 - \frac{g}{ROE} \right) + g_r \quad (4)$$

Where k_{er} and g_r are the inflation-adjusted cost of equity and real growth rate, respectively. We then solved for k_{er} for each year from 1963 through 2001, using the assumptions described in the text of the article.

inflation-adjusted return on government bonds appears to have fluctuated around 2 percent in the US and around 1.5 percent in the UK. The implied equity risk premium was about 5 percent in both markets.⁸ But in the 1990s, it appears that the inflation-adjusted return on both US and UK government bonds may have risen to 3 percent, with the implied equity risk premium falling to 3 percent and 3.6 percent in the UK and US respectively.

We attribute this decline not to equities becoming less risky (the inflation-adjusted cost of equity has not changed) but to investors demanding higher returns in real terms on government bonds after the inflation shocks of the late 1970s and early 1980s. We believe

that using an equity risk premium of 3.5 to 4 percent in the current environment better reflects the true long-term opportunity cost for equity capital and hence will yield more accurate valuations for companies. **MoF**

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¹ Defined as the difference between the cost of equity and the returns investors can expect from supposedly risk-free government bonds.

² See Marc H. Goedhart, Brendan Russel, and Zane D. Williams, "Prophets and profits?" *McKinsey on Finance*, Number 2, Autumn 2001.

³ See, for example, Eugene Fama and Kenneth French, "The Equity Premium," *Journal of Finance*, Volume LVII, Number 2, 2002; and Robert Arnott and Peter Bernstein, "What Risk Premium is 'Normal'," *Financial Analysts Journal*, March/April, 2002; James Claus and Jacob Thomas, "Equity premia as low as three percent?" *Journal of Finance*, Volume LVI, Number 5, 2001.

⁴ See, for example, *Ibbotson and Associates*, Stock, Bonds, Bills and Inflation: 1997 Yearbook.

⁵ See Timothy Koller and Zane Williams, "What happened to the bull market?" *McKinsey on Finance*, Number 1, Summer 2001.

⁶ One consequence of combining a volatile nominal growth rate (due to changing inflationary expectations) with a stable ROE is that the estimated reinvestment rate varies tremendously over time. In the late 1970s, in fact, our estimates are near 100 percent. This is unlikely to be a true representation of actual investor expectations at the time. Instead, we believe it likely that investors viewed the high inflation of those years as temporary. As a result, in all of our estimates, we capped the reinvestment rate at 70 percent.

⁷ This assumption is the one that we are least comfortable with, but our analysis seems to suggest that markets build in an expectation that inflation from the recent past will continue (witness the high long-term government bond yields of the late 1970s).

⁸ There is some evidence that the market risk premium is higher in periods of high inflation and high interest rates, as was experienced in the late 1970s and early 1980s.

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and Strategy

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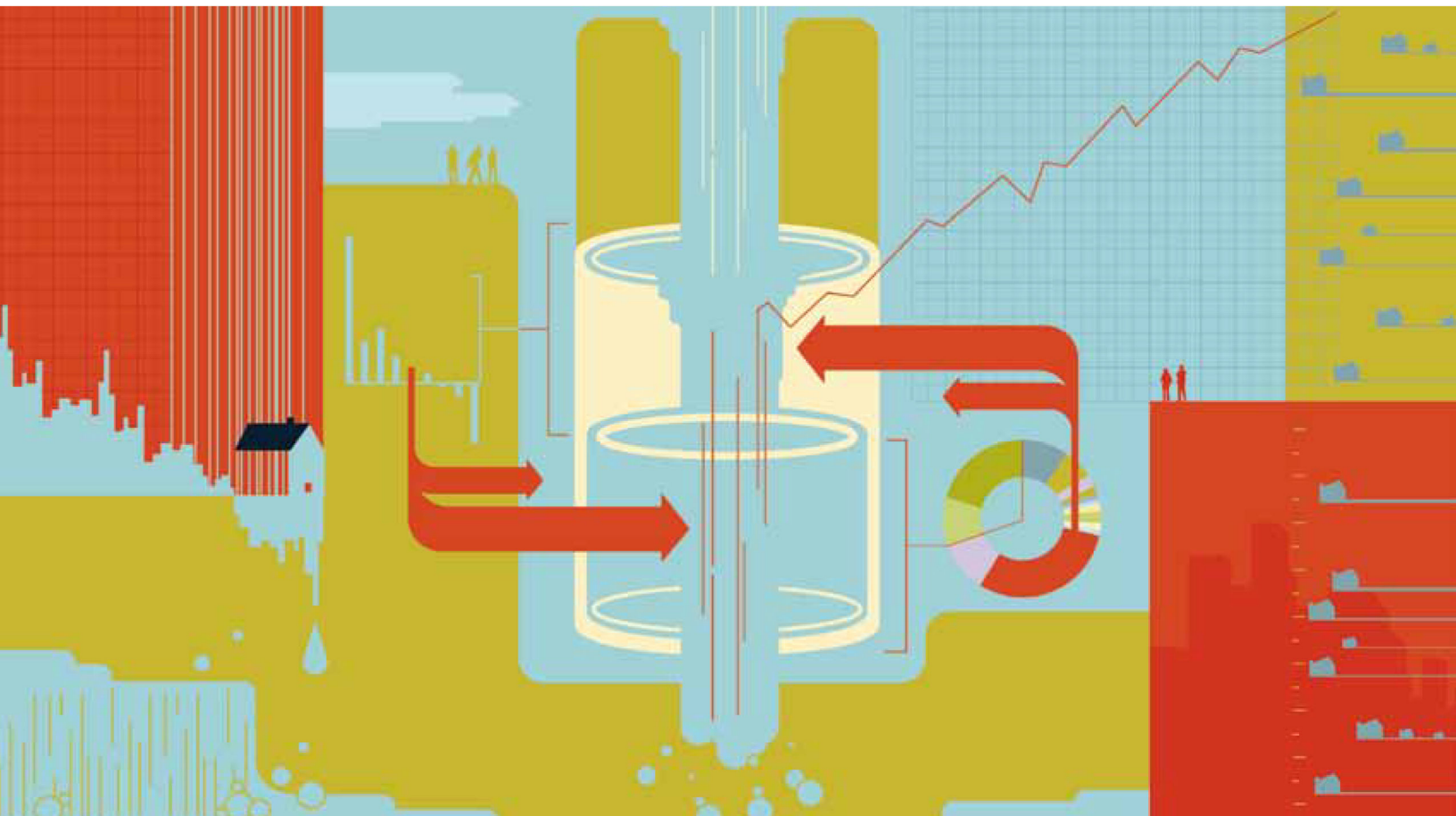
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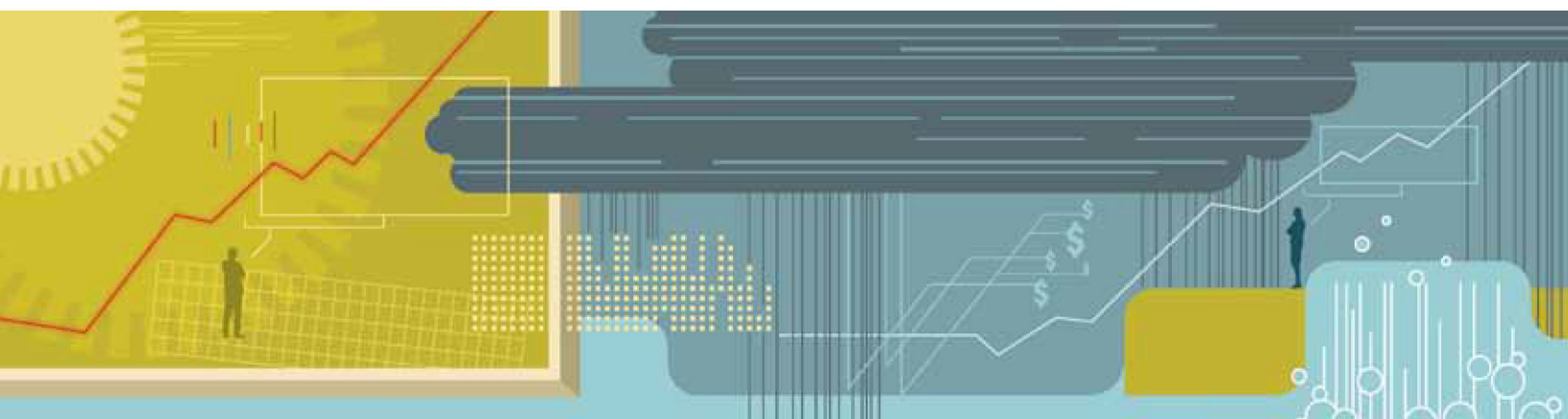
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Equity analysts: Still too bullish

After almost a decade of stricter regulation, analysts' earnings forecasts continue to be excessively optimistic.

**Marc H. Goedhart,
Rishi Raj, and
Abhishek Saxena**

No executive would dispute that analysts' forecasts serve as an important benchmark of the current and future health of companies. To better understand their accuracy, we undertook research nearly a decade ago that produced sobering results. Analysts, we found, were typically overoptimistic, slow to revise their forecasts to reflect new economic conditions, and prone to making increasingly inaccurate forecasts when economic growth declined.¹

Alas, a recently completed update of our work only reinforces this view—despite a series of rules and regulations, dating to the last decade, that were intended to improve the quality of the

analysts' long-term earnings forecasts, restore investor confidence in them, and prevent conflicts of interest.² For executives, many of whom go to great lengths to satisfy Wall Street's expectations in their financial reporting and long-term strategic moves, this is a cautionary tale worth remembering.

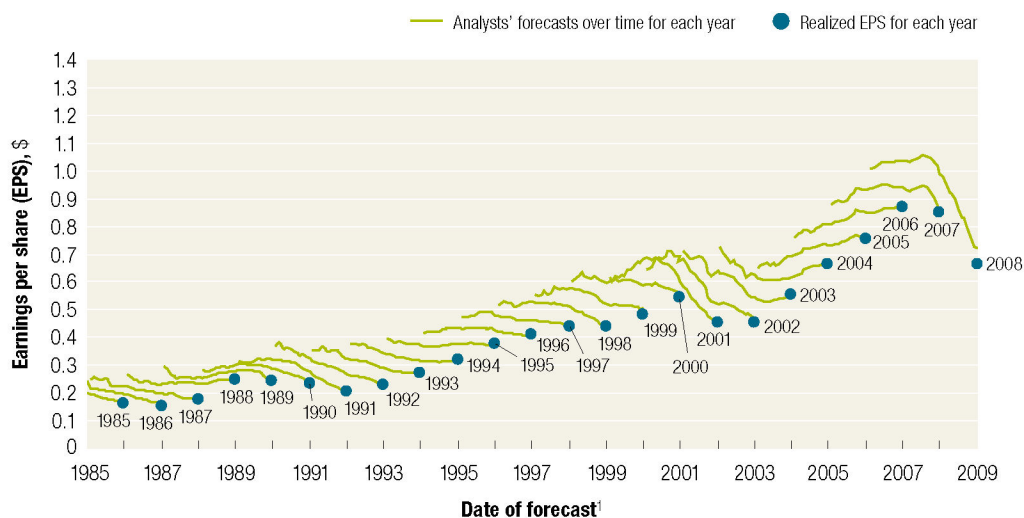
Exceptions to the long pattern of excessively optimistic forecasts are rare, as a progression of consensus earnings estimates for the S&P 500 shows (Exhibit 1). Only in years such as 2003 to 2006, when strong economic growth generated actual earnings that caught up with earlier predictions, do forecasts actually hit the mark.

Exhibit 1

S&P 500 companies

Off the mark

With few exceptions, aggregate earnings forecasts exceed realized earnings per share.



¹Monthly forecasts.

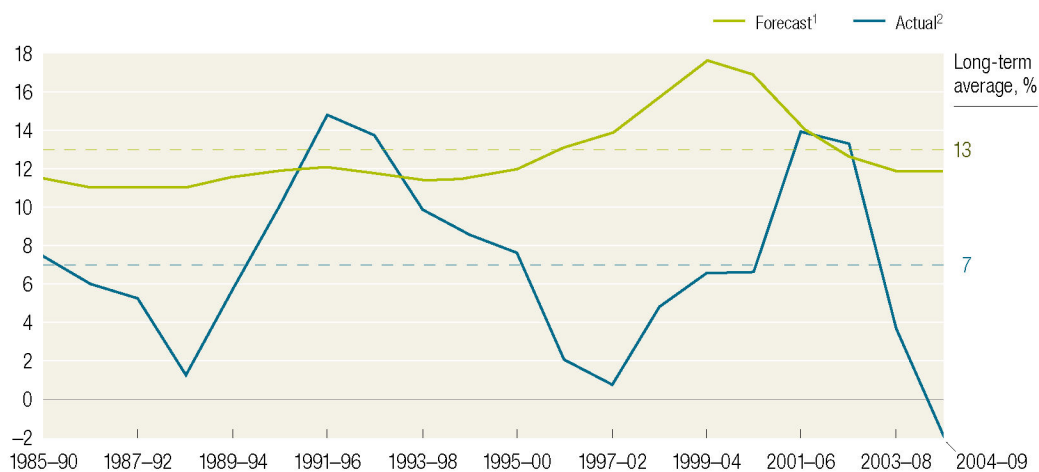
Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

Exhibit 2

Earnings growth for S&P 500 companies,
5-year rolling average, %

Overoptimistic

Actual growth surpassed forecasts only twice in 25 years—both times during the recovery following a recession.



¹Analysts' 5-year forecasts for long-term consensus earnings-per-share (EPS) growth rate. Our conclusions are same for growth based on year-over-year earnings estimates for 3 years.

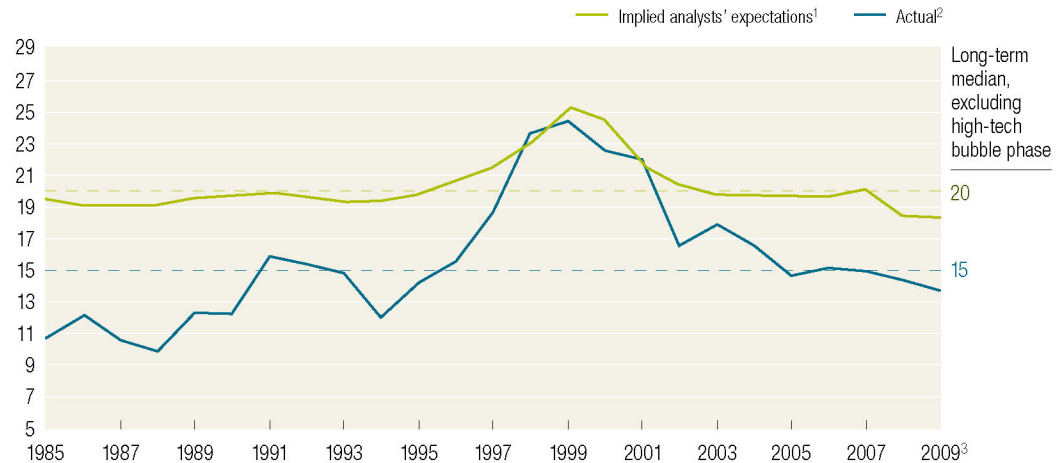
²Actual compound annual growth rate (CAGR) of EPS; 2009 data are not yet available, figures represent consensus estimate as of Nov 2009.

Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

Exhibit 3

Less giddy

Capital market expectations are more reasonable.

Actual P/E ratio vs P/E ratio implied by analysts' forecasts, S&P 500 composite index


¹P/E ratio based on 1-year-forward earnings-per-share (EPS) estimate and estimated value of S&P 500. Estimated value assumes: for first 5 years, EPS growth rate matches analysts' estimates then drops smoothly over next 10 years to long-term continuing-value growth rate; continuing value based on growth rate of 6%; return on equity is 13.5% (long-term historical median for S&P 500), and cost of equity is 9.5% in all periods.

²Observed P/E ratio based on S&P 500 value and 1-year-forward EPS estimate.

³Based on data as of Nov 2009.

Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

This pattern confirms our earlier findings that analysts typically lag behind events in revising their forecasts to reflect new economic conditions. When economic growth accelerates, the size of the forecast error declines; when economic growth slows, it increases.³ So as economic growth cycles up and down, the actual earnings S&P 500 companies report occasionally coincide with the analysts' forecasts, as they did, for example, in 1988, from 1994 to 1997, and from 2003 to 2006.

Moreover, analysts have been persistently overoptimistic for the past 25 years, with estimates ranging from 10 to 12 percent a year,⁴ compared with actual earnings growth of 6 percent.⁵

Over this time frame, actual earnings growth surpassed forecasts in only two instances, both during the earnings recovery following a recession (Exhibit 2). On average, analysts' forecasts have been almost 100 percent too high.⁶

Capital markets, on the other hand, are notably less giddy in their predictions. Except during the market bubble of 1999–2001, actual price-to-earnings ratios have been 25 percent lower than implied P/E ratios based on analyst forecasts (Exhibit 3). What's more, an actual forward P/E ratio⁷ of the S&P 500 as of November 11, 2009—14—is consistent with long-term earnings growth of 5 percent.⁸ This assessment is more

reasonable, considering that long-term earnings growth for the market as a whole is unlikely to differ significantly from growth in GDP,⁹ as prior McKinsey research has shown.¹⁰ Executives, as the evidence indicates, ought to base their strategic decisions on what they see happening in their industries rather than respond to the pressures of forecasts, since even the market doesn't expect them to do so. **o**

¹ Marc H. Goedhart, Brendan Russell, and Zane D. Williams, "Prophets and profits," *mckinseyquarterly.com*, October 2001.

² US Securities and Exchange Commission (SEC) Regulation Fair Disclosure (FD), passed in 2000, prohibits the selective disclosure of material information to some people but not others. The Sarbanes-Oxley Act of 2002 includes provisions specifically intended to help restore investor confidence in the reporting of securities' analysts, including a code of conduct for them and a requirement to disclose knowable conflicts of interest. The Global Settlement of 2003 between regulators and ten of the largest US investment firms aimed to prevent conflicts of interest between their analyst and investment businesses.

³ The correlation between the absolute size of the error in forecast earnings growth (S&P 500) and GDP growth is -0.55 .

⁴ Our analysis of the distribution of five-year earnings growth (as of March 2005) suggests that analysts forecast growth of more than 10 percent for 70 percent of S&P 500 companies.

⁵ Except 1998–2001, when the growth outlook became excessively optimistic.

⁶ We also analyzed trends for three-year earnings-growth estimates based on year-on-year earnings estimates provided by the analysts, where the sample size of analysts' coverage is bigger. Our conclusions on the trend and the gap vis-à-vis actual earnings growth does not change.

⁷ Market-weighted and forward-looking earnings-per-share (EPS) estimate for 2010.

⁸ Assuming a return on equity (ROE) of 13.5 percent (the long-term historical average) and a cost of equity of 9.5 percent—the long-term real cost of equity (7 percent) and inflation (2.5 percent).

⁹ Real GDP has averaged 3 to 4 percent over past seven or eight decades, which would indeed be consistent with nominal growth of 5 to 7 percent given current inflation of 2 to 3 percent.

¹⁰ Timothy Koller and Zane D. Williams, "What happened to the bull market?" *mckinseyquarterly.com*, November 2001.

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MARKETS

Corporate Bond Gauge Signals Dwindling Economic Risk

Speculative-grade bond spreads are narrow, a measure of investors' outlook for the economy



There is improving economic data, especially consumer spending on goods, as well as optimism for a broader economic rebound later in the year.

PHOTO: DAVID PAUL MORRIS/BLOOMBERG NEWS

By [Sam Goldfarb](#)

Updated April 22, 2021 2:25 pm ET



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A key measure of the perceived risk in low-rated corporate bonds is hovering around its lowest level in more than a decade, highlighting investors' mounting confidence in the economic outlook.

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Yields on low-rated corporate bonds already hit a record low of 3.89% in February. That data point is especially important for businesses, because it signals how cheaply they can borrow when they issue new bonds. Companies including Charter Communications Inc. [CHTR 2.39% ▲](#) and United Airlines Holdings Inc. [UAL -0.17% ▼](#) have issued a total of \$186.1 billion of speculative-grade bonds this year through Wednesday, the highest over that period on record, according to LCD, a unit of S&P Global Market Intelligence.

The spread relative to Treasuries, however, is arguably an even better measure of investors' outlook for the economy, since it shows how much investors feel they need to be compensated for the risk that companies may default on their debt.

The narrow speculative-grade bond spreads indicate debt investors think that the economic environment for businesses over the next several years could be better than at any time since the 2008-2009 financial crisis—a striking development after many feared a severe, long-lasting economic downturn just last year.

As of Wednesday, the average speculative-grade bond spread was 2.98 percentage points. That was slightly higher than earlier in the month but still down from 3.60 percentage points at the end of last year and 4.42 percentage points on Nov. 6, the last full trading session before Pfizer Inc. [PFE -1.02% ▼](#) announced highly encouraging results from its coronavirus-vaccine trial.

Investors and analysts say that two major factors have been responsible for that decline. One is improving economic data, especially consumer spending on goods, which analysts closely link to the two economic relief measures that Congress passed in recent months. The other is optimism for a broader economic rebound later in the year, as people feel more comfortable spending money on services, such as airline travel and restaurant dining.

Despite the setback last week when U.S. health authorities recommended a pause in the use of Johnson & Johnson's [JNJ +0.62% ▲](#) Covid-19 vaccine, many investors and analysts

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Some analysts take a skeptical view of the corporate bond rally.

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How confident do you feel about the economic outlook? Why? Join the conversation below.

Speculative-grade bond spreads should be about twice their current level based on a fair-value model that takes into account current economic conditions and other factors, said Marty Fridson, chief investment officer at Lehmann Livian Fridson Advisors LLC.

According to the Federal Reserve, manufacturers, miners and utilities were using about 74% of their theoretical production capacity in March, he noted, well below the more than 81% level reached in 2007 when corporate bond spreads were at comparable levels. Current spreads suggest investors aren't just optimistic about the economy but feel emboldened that the Fed will protect them from significant losses after the central bank's extraordinary interventions last year, he said.

Others, though, say the economic trajectory does justify strong demand for corporate bonds. Aneta Markowska, chief economist at Jefferies LLC, said that industrial production is still being suppressed by pandemic-related supply challenges and could reach 80% of capacity by the summer just by catching up to current demand.

Overall, she said, the economy is better poised now than it was for years after the financial crisis because households "are sitting on tons of cash," and the government has been pumping trillions of dollars into the economy.

If anything, debt investors may be in a more comfortable position than equity investors because they won't worry if growth slows substantially two years from now, as long as it remains positive.

"If you've accumulated massive earnings in the last two years that you haven't spent, that also creates a big buffer on your balance sheet," Ms. Markowska said. "That's what's going

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THE WALL STREET JOURNAL.

Treasury Yield Curve Inverts To Deepest Level Since 1981

BY SAM GOLDFARB

Yields on longer-term U.S. Treasuries have fallen further below those on short-term bonds than at any time in decades, a sign that investors think the Federal Reserve is close to winning its inflation battle regardless of the cost to economic activity.

A scenario in which short-term yields exceed long-term yields is known on Wall Street as an inverted yield curve and is often seen as a red flag that a recession is looming.

Yields on Treasuries largely reflect investors' expectations for what short-term interest rates set by the Fed will average over the life of a bond. Longer-term yields are generally higher than shorter-term yields because investors want to guard against the risk of unexpected inflation and rate increases.

At a basic level, an inverted curve means that investors are confident that short-term rates will be lower in the longer term than they will be in the near term. Typically, that is because they think the Fed will need to slash borrowing costs to revive a faltering economy.

The yield curve is more than just a little bent out of shape at the moment.

Last week, the yield on the 10-year U.S. Treasury note dropped to 0.78 percentage point below that of the two-year yield, the largest negative gap since late 1981, at the start of a recession that pushed the unemployment rate even higher than it would later reach in the 2008 financial crisis.

Still, many investors and analysts see reasons to think that the current yield curve might presage waning inflation and a return to a more normal economy, rather than an approaching economic disaster.

The current yield curve is "the market saying: I think inflation is going to come down," said Gene Tannuzzo, global head of fixed income at the asset management firm Columbia Threadneedle.

Investors, he said, believe "the Fed does have credibility. Ultimately the Fed will win this inflation

by early next year, up from its current level between 3.75% and 4%. However, the encouraging CPI report has led many to believe the Fed will start cutting rates later in 2023—a bet that officials will be able to shift to promoting economic growth without worrying too much about prolonging the inflation problem.

Treasury yields shape the economic outlook as much as they reflect it. Longer-term yields, in particular, play a role in determining borrowing costs across the economy. They also heavily influence stock prices, with rising yields often causing stocks to fall as investors demand more attractive prices to reflect the better returns they can now get by simply holding ultrasafe government debt to maturity.

Stubbornly high inflation and rapidly rising expectations for short-term interest rates have already led to huge increases in Treasury yields this year, with the prices of existing bonds dropping to reflect higher rates offered on new bonds. That in turn has led to the worst returns for major bond indexes in records going back to the 1970s.

The S&P 500 has also lost 17% this year. But, as longer-term yields have fallen, it too has stabilized in recent weeks, gaining 6% since the day before the Nov. 10 inflation report.

One threat for investors: The recent decline in yields and gains in stocks might not last precisely because they have made it a little easier for businesses to raise and spend money—undermining the conditions that led to the possible moderation of inflation in the first place.

On more than one occasion this year, Fed Chairman Jerome Powell has snuffed out rallies in stocks and bonds by delivering the message that the central bank is likely to not just raise rates higher but keep them at elevated levels for longer.

At a news conference following the Fed's Nov. 1-2 meeting, Mr. Powell emphasized that inflation remained a major threat and that, even though the Fed might raise rates in smaller increments going forward,

fight and in the meantime, we have to bear higher short-term interest rates.”

Notably, the yield curve has become more deeply inverted in recent weeks due largely to good economic news.

For months starting in the summer, the 10-year yield had repeatedly failed to drop much further than 0.5 percentage point below the two-year yield. That only changed earlier this month, when the Labor Department released better-than-expected consumer-price index data, raising hopes that inflation might be easing.

The October CPI report did cause short-term yields to fall a little, with the two-year yield slipping to around 4.47% as of Tuesday from 4.63% earlier in the month. Investors, though, haven't adjusted their near-term rate expectations nearly as much as their longer-term bets, with the 10-year yield sliding to 3.75% from 4.15%.

Taking cues from Fed officials, investors still expect the central bank to raise the federal-funds rate to about 5%

it was still likely to lift them higher than officials had signaled in their last official forecast in September.

That November meeting, though, took place before the latest inflation data, and investors are now eagerly looking forward to what Mr. Powell has to say when he speaks at an event hosted by the Brookings Institution think tank on Wednesday.

Bonds “have rallied significantly since the last meeting,” so there is a risk that Mr. Powell could use Wednesday's event as “an opportunity to push back,” said Jan Nevruzi, U.S. rates strategist at NatWest Markets.

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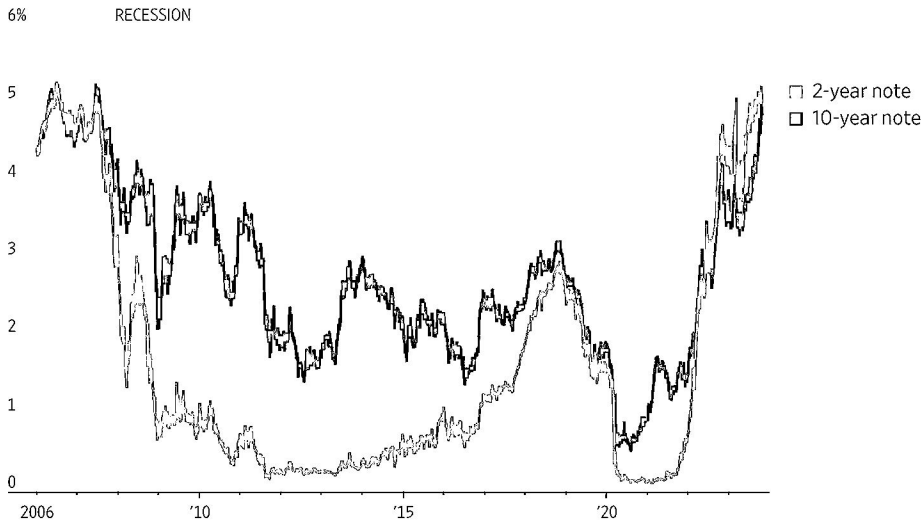
<https://www.wsj.com/finance/investing/decoding-the-almost-5-10-year-treasury-yield-9cb86b27>

FINANCE | INVESTING

Decoding the (Almost) 5% 10-Year Treasury Yield

Investors debate whether borrowing benchmark has finally topped out

Treasury yields



Sources: Ryan ALM; Tradeweb ICE Closes

By *Sam Goldfarb* [Follow](#)

Updated Oct. 30, 2023 12:33 pm ET

The yield on the benchmark 10-year U.S. Treasury note touched 5% for the first time in 16 years last week, spurring debate about whether it has peaked or just taken another step in its long and disruptive climb.

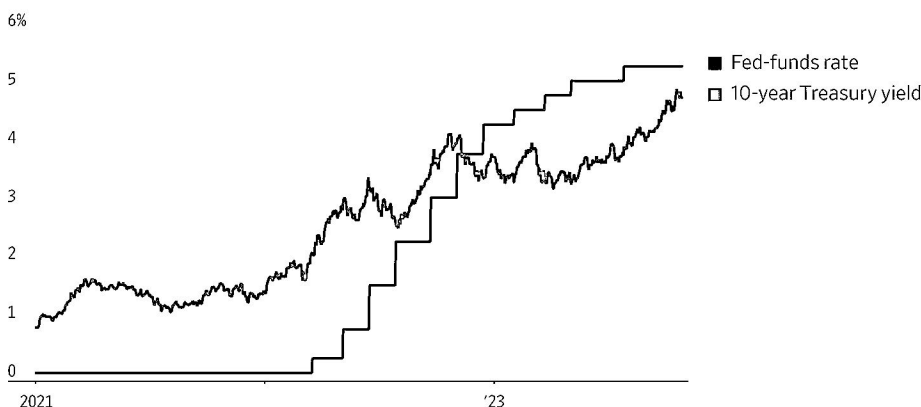
Treasury yields play a critical role in determining borrowing costs across the economy. Their nearly two-year surge has driven 30-year mortgage rates close to 8%, weighed on stocks and stirred anxieties that the surprisingly resilient economy could finally fall into a recession.

Here is a look at how yields got here and their possible paths forward:

The Fed sets the tone

Yields on Treasuries largely reflect investors' expectations for what short-term interest rates set by the Federal Reserve will average over the life of a bond. As a result, the 10-year yield never quite got all the way down to zero, where short-term rates effectively sat during most of 2020 and 2021. And they started climbing in 2022 before the Fed ever raised rates.

Borrowing benchmarks



Note: Fed-funds rate reflects midpoint of target range

Sources: Tradeweb ICE Closes (10-year yield); St. Louis Fed (fed-funds rate)

Since late last year, the 10-year yield has been sitting below the federal-funds rate, reflecting bets that the Fed will cut rates in the future. But the overnight borrowing rate still establishes its rough parameters.

The inverted yield curve and the forces against it

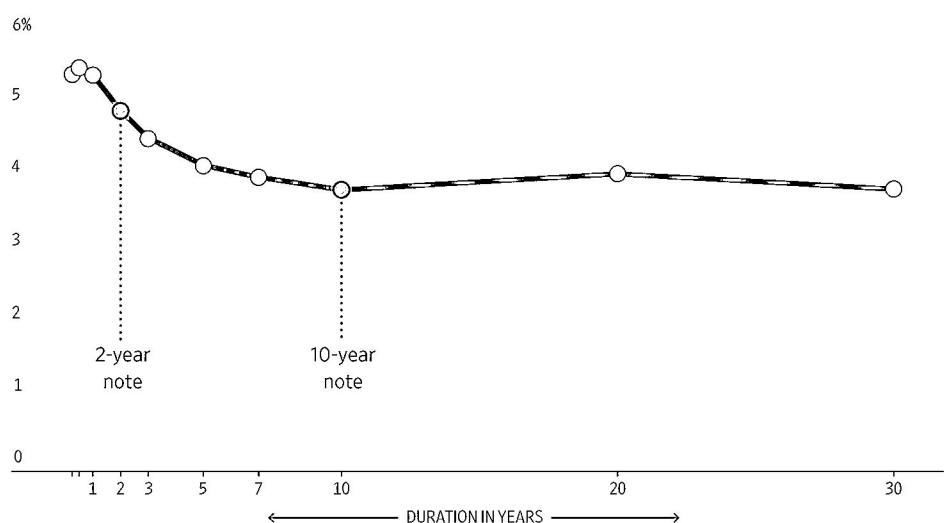
For much of 2022 and 2023, longer-term Treasury yields were well below short-term ones.

That anomaly, known as an inverted yield curve, is infamous for a reason. To accept lower yields on longer-term Treasuries, investors need to have a strong conviction that interest rates will fall in the future, most likely because of a recession.

Even modest doubts, or impatience, can tempt investors into the higher-yielding short-term Treasuries, driving longer-term yields up and shorter-term yields down.

Another reason to avoid longer-term bonds under these conditions: Holding them can cause investors to lose money just because of the passage of time. Bonds become increasingly short-term as their maturity dates draw closer. With the curve inverted, that means, for example, that the price of a three-year note will fall as it becomes a higher-yielding two-year note.

Treasury yield curve as of July 3, 2023



Source: Treasury Department

Even so, betting that the curve would become even more inverted was one of the most popular trades on Wall Street earlier this year.

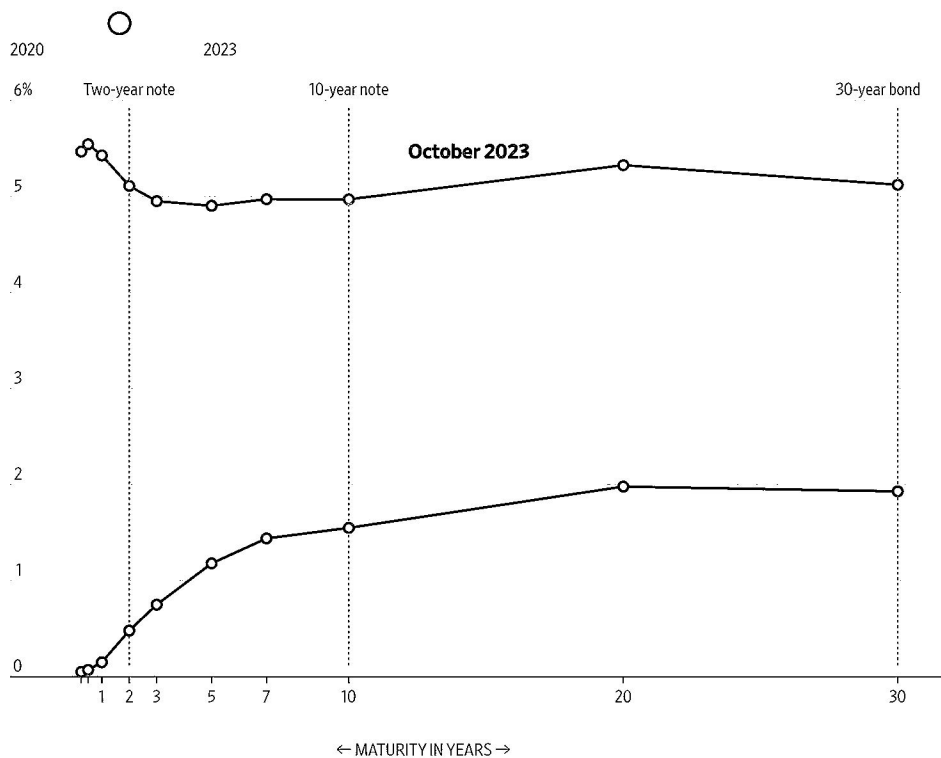
Some investors didn't have a firm view on how high bond yields should be on their own. But they did feel safe wagering on their relative levels. With Fed officials raising rates to fight inflation—and openly acknowledging the risk that their efforts could cause a recession—many thought it was an easy call that rates would be higher in the near term than over the long term.

The unwinding of a popular bet

Unexpectedly, however, economic growth started to show signs of accelerating over the summer, right around the same time that data was showing a slowdown in gauges of underlying inflation. A recession seemed simultaneously both farther off and less inevitable.

As can often happen on Wall Street, what is called crowded trade provided fuel for a huge swing in the opposite direction. Investors, having already sacrificed short-term returns by favoring longer-term Treasuries, started reducing those positions. That led to losses for those who weren't early to pivot, pushing more to throw in the towel and a big jump in longer-term yields.

Yield curve, U.S. Treasurys

As of October 2021As of October 2023

Note: Values are as of month-end, except the most recent month, which is as of Oct. 23.

Source: Treasury Department

The experience of recent months is unusual. Typically, inverted yield curves un-invert because the Fed is cutting rates or close to doing so in response to a slowing economy. That, in turn, causes short-term yields to fall sharply, dropping them back down below longer-term yields.

This time, though, the gap is collapsing because of economic strength, not weakness, with longer-term yields rising instead of short-term yields falling.

Supply-demand mismatch?

Other factors beyond interest-rate expectations may also be pushing up yields.

Over the course of just three trading sessions starting at the end of July, the Bank of Japan said that it was lifting its cap on Japan's 10-year government bond to 1% from 0.5%; the U.S. Treasury Department announced a much larger than expected borrowing forecast; and Fitch Ratings downgraded the U.S. credit rating to one notch below triple-A, citing a worsening budget outlook and governance concerns.

All three developments sparked worries that a growing supply of Treasurys might meet insufficient demand. With higher yields now available on Japan's bonds, investors in the world's third-largest economy may now have less need to invest overseas, including in the U.S.

A 5% ceiling?

Investors have long hoped that certain key levels would serve as a ceiling for the 10-year yield, whether 2.5% early in 2022, 4% later that year, or 5% now.

Indeed, reaching 5% in early trading last Monday sparked a rally in Treasurys, with the yield dropping to 4.84% by the end of the trading session. In recent trading, it was hovering around 4.9%, according to Tradeweb.

A 5% yield strikes some investors as high, given potential threats to the economy from wars overseas to the increase in borrowing costs.

Others argue that the 10-year yield could realistically rise to the level of the fed-funds rate, which is currently around 5.3%. Any more could be difficult, with Fed officials signaling that they expect to cut rates at some point, even absent a recession, to reduce the risk of an unintentionally severe slowdown.

Uncertainty remains, however, about how much the Fed would cut rates and how quickly. Given how well economic growth has held up so far, many see a decent chance that the cuts would be modest. That, in turn, argues for yields to stay roughly where they are now—a vote of confidence in the economy, if disappointing for borrowers.

Write to Sam Goldfarb at sam.goldfarb@wsj.com

Appeared in the October 31, 2023, print edition as 'What's Next for Bond Yield After Hitting 5%'.

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<https://www.wsj.com/articles/treasury-yields-signal-investors-waning-economic-exuberance-11625024471>

CREDIT MARKETS

Treasury Yields Signal Investors' Waning Economic Exuberance

Yield on 10-year note fell roughly a quarter-percentage point in second quarter as traders scaled back expectations for fiscal and monetary stimulus



Shoppers on Rodeo Drive in Beverly Hills, Calif., earlier in June.

PHOTO: JILL CONNELLY/BLOOMBERG NEWS

By [Sam Goldfarb](#)

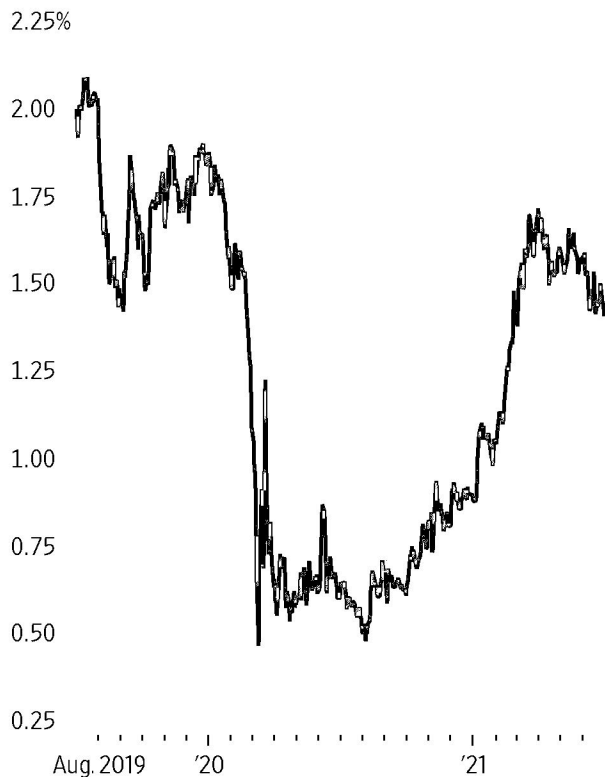
Updated June 30, 2021 4:10 pm ET

The recent drop in U.S. Treasury yields reveals some investors' doubts about how strong the economy will be in the coming years, even as inflation pushes to its highest level in more than a decade.

Yields, which fall when bond prices rise, have surprised many by sliding in the second quarter of the year. That marks a reversal from the sharp rise of the year's first three months, when markets generally rode a wave of optimism that stimulus and reopenings would spur a roaring '20s type of acceleration.

The yield on the benchmark 10-year U.S. Treasury note settled Wednesday at 1.443%, up from 0.913% at the end of last year but down from 1.749% at the end of March.

Yield on 10-year U.S. Treasury note



Source: Tradeweb

Treasury yields play an important function in the economy, helping set borrowing costs on everything from mortgages to corporate bonds. They are also a closely watched economic barometer, with longer-term yields in particular tending to rise when the growth outlook improves and decline when it falters.

Yields on conventional and inflation-protected Treasuries still suggest the economy will grow at a healthy pace in the coming years. But expectations aren't as buoyant as they were in March. Back then, yields reflected forecasts that the Federal Reserve's benchmark federal-funds rate would remain near zero this year but start climbing by 2023 and steady at around 2.5%—without causing the inflation rate to fall to below the central bank's 2% target.

Today, investors still expect the Fed to raise rates at roughly the same time, if possibly a little sooner. But projections for rates over the longer term have subsided somewhat, as have inflation expectations—indicating a slightly weaker economy, less able to withstand interest-rate increases.

Investors' economic confidence has been eroded by waning expectations for both fiscal and monetary stimulus, some investors and analysts said.

From the start of the year, many investors have bet that large-scale government spending, near-zero short-term interest rates and continued bond buying by the Fed would lift an economy already rebounding from the pandemic.

SHARE YOUR THOUGHTS

How optimistic are you feeling about the economy? Join the conversation below.

Expectations reached their recent peak in March, when Democrats passed a larger-than-expected coronavirus-relief bill with no Republican votes, fueling bets that they could have similar success in passing other priorities such as spending on infrastructure.

Since then, however, progress has been slow, with moderate Democrats insisting on a bipartisan infrastructure bill. Meanwhile, Fed officials have started discussions about tapering bond purchases and have pushed forward the time frame when they expect to raise interest rates.

Such developments have more than offset the recent increase in inflation. Over the course of April and May alone, the consumer-price index jumped 1.4%, with core prices, excluding volatile food and energy categories, logging their biggest year-over-year gain in May since 1992. Many investors, though, have largely dismissed such gains as aberrations related to the reopening of the economy. Fed Chairman Jerome Powell recently pointed to the recent decline in sky-high lumber prices as a possible sign of things to come.

“Markets are forward looking,” said John Bellows, a portfolio manager at Western Asset. “Even with high inflation prints, forward inflation has been reassessed lower.”



The TCL Chinese Theatre in Los Angeles reopened in March.

PHOTO: MARIO ANZUONI/REUTERS

A good number of investors still expect unusually strong growth over the next couple of years and argue that inflation may also remain elevated, eventually driving a more aggressive response by the Fed.

As of April, economists surveyed by The Wall Street Journal anticipated that the economy —after shrinking 3.5% last year—will grow 6.4% this year and 3.2% in 2022.

In a June report, the Jefferies economists Aneta Markowska and Thomas Simons forecast 5% growth next year, thanks in part to the lingering impact of recent stimulus payments that “have left household finances in the best shape in decades.”

Core inflation should “remain well above 3% through at least April of next year,” as consumers keep spending, the economists wrote in another report. By then, they added, a tight labor market could be leading to wage increases, so that “any easing of inflationary pressures is likely to be transitory.”

Caught off guard by the recent decline in yields, some investors and analysts have blamed idiosyncratic factors such as demand from pensions and foreign central banks.

One popular explanation is that the bet on higher yields became too crowded. “When everybody is short and the market just rallies a little bit,” hedge funds can be forced to buy bonds to reduce their risk of further losses, said Zhiwei Ren, a portfolio manager at Penn Mutual Asset Management. That causes yields to fall even further.

Still, investors and analysts generally agree that Treasury yields are at least eventually determined more by economic fundamentals and the outlook for interest-rates set by the

Fed than by technical factors.

“There is a growing contingent of market participants that are buying into the idea that we’ve reached peak growth—essentially that the most impressive days of the recovery are behind us,” said Mr. Simons of Jefferies.

His view, he said, is that investors have just become too pessimistic and that the 10-year yield could still rise to 2% by the end of the year.

Appeared in the July 1, 2021, print edition as ‘Treasurys Signal Waning Exuberance.’

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Analysts see stable utility sector stocks poised to ride out potential recession

Tuesday, July 5, 2022 6:02 AM ET

By Allison Good
Market Intelligence



Fears of a recession are rising as the S&P 500 index extends its losses, but industry experts anticipate the utilities sector will remain an important flight to safety.

Source: Spencer Platt/Getty Images News via Getty Images

Performance by U.S. utility stocks during previous economic downturns, a decreasing sensitivity to interest rates and stable earnings and dividend growth suggest the sector could see substantial price upside despite signs of a looming recession, industry experts said.

Utility share prices' recent deconsolidation from inflation has transformed the industry from a steady-growth, defensive play to a higher-growth sector that can increase earnings and return material capital to investors during economic dips. So far in 2022, the S&P 500 Utilities index has lost just 3% of its value as of the June 28 market close, compared to the broader S&P 500 index's nearly 20% drop.

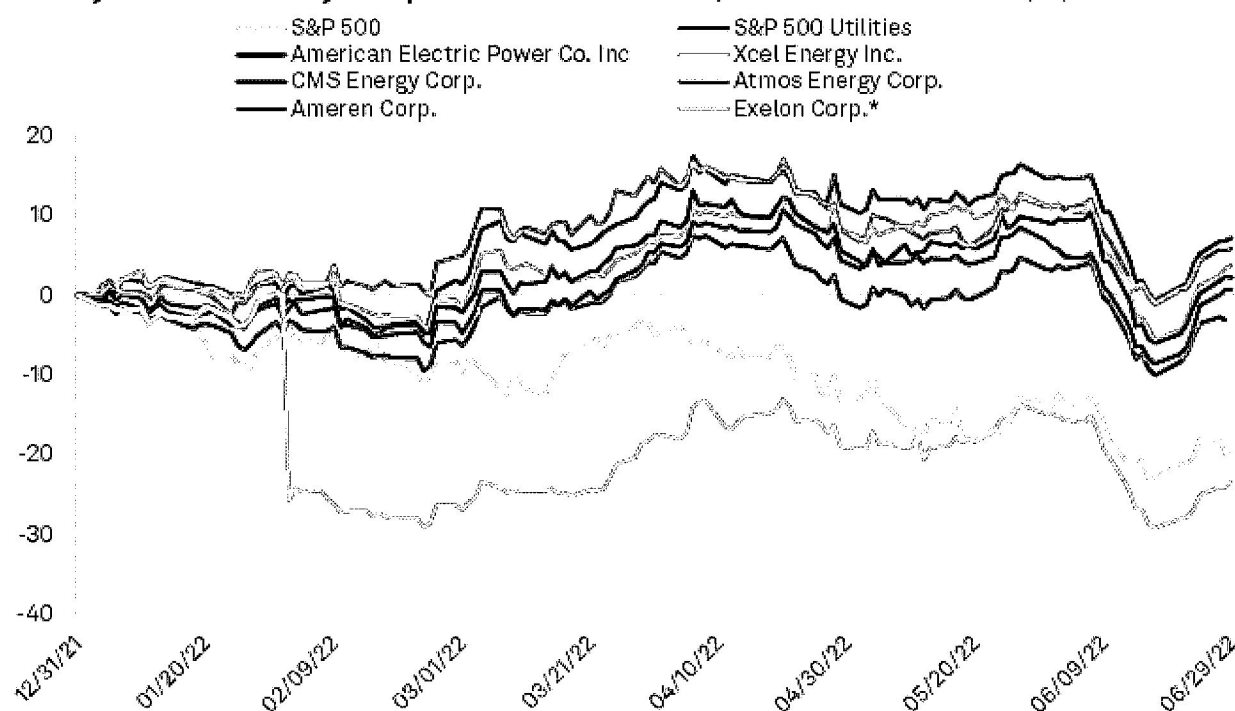
Historically, according to analysts at Morgan Stanley, the utility sector's highest stock market outperformance has occurred 12 months before a recession and three months into a recession, suggesting that "the space trades higher on a relative basis well in advance of an actual recession, holds its value on a relative basis until the recession hits, then

sees another period of outperformance shortly after a recession begins."

Morgan Stanley said it does not expect utility stocks to rise "on an absolute basis," but thinks "relative performance will be favorable in a downturn." Utilities' price-to-earnings ratios, Morgan Stanley added in a June 29 note to clients, also offer "a neutral risk/reward proposition from a valuation standpoint when compared to other defensive cohorts."

UBS analysts wrote June 30 that investors should still orient their North American utility and power stock picks toward "valuation and yield in stocks with lower risk fundamentals to the accelerating growth from the clean energy transition." This strategy, in UBS' view, sets investors up over the long term to own the stocks most likely "to emerge as the new top-quartile names at the next (price-to-earnings ratio) valuation spread peak."

Utility stocks steady despite market turmoil, recession worries (%)



As of June 29, 2022.

* Exelon Corp.'s share price was affected by the Feb. 23, 2022 spin-off of Constellation Energy.

Source: S&P Global Market Intelligence

Morgan Stanley sees investors increasingly attracted to "low-risk, discounted" utility companies like American Electric Power Co. Inc., Exelon Corp. and Atmos Energy Corp., and that CMS Energy Corp., Ameren Corp. and Xcel Energy Inc. still have untapped stock price upside as well.

John Bartlett, president of utilities-focused investment portfolio manager Reaves Asset Management, said in an interview he expects the industry to grow earnings per share by 5% to 6% and pay dividend yields of 3% to 3.5% per year on average even during a recession.

"The backdrop for them providing that consistent earnings growth and an above-market dividend rate is very sustainable," Bartlett explained. "You can count on the sort of slow stair steps of value added to shareholder returns over time ... you probably have better visibility into how you're going to get rewarded for your patience" compared to other sectors that investors might turn to as the possibility of a recession rises

Analysts at Scotiabank agreed that utility stocks should be less volatile than the overall market during a downturn, though Morgan Stanley does anticipate earnings growth will slow into 2023 even without a recession.

During a June 14 investor conference, NextEra Energy Inc. President and CEO John Ketchum said the company will

have the same cash flow and capital access advantages despite inflation and a potential downturn.

"Don't ever forget we are a cash flow machine. ... If you were ever concerned about the growth maybe slipping a bit, which we are not, then remember the [capital expenditure] opportunities would go down at the same time," Ketchum said. "We'd be enormously free-cash-flow positive, and we'd be able to buy back shares and achieve our EPS expectations."

A high interest-rate environment also gives NextEra "even more headroom when we go to compete against the unrated wind developers, the unrated solar developers, the unrated storage developers" for debt and equity, he continued.

At the Edison Electric Institute's recent annual conference, top utility executives reiterated plans to spend tens of billions on transitioning to cleaner energy sources, with the vast majority of that spending allocated toward regulated assets, even in the face of economic headwinds.

Still, utilities grappling with issues ranging from regulatory support to climate, and slower load and earnings growth could face a higher stock price risk during a recession, according to Morgan Stanley, which named PG&E Corp., Edison International, Entergy Corp., Consolidated Edison Inc., Pinnacle West Capital Corp. and PPL Corp. as utility holdings companies unlikely to perform as well.

UBS agreed that "taking a valuation-driven, low-risk approach and moving to a stock-picking focus versus a defensive sector approach is key to navigating the less bullish backdrop moving forward."

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The Finite Horizon Expected Return Model

Author(s): Joseph R. Gordon and Myron J. Gordon

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The Finite Horizon Expected Return Model

Joseph R. Gordon and Myron J. Gordon

The finite horizon expected return model (FHERM), a new method for estimating the expected return on a share, states that (1) forecasts of abnormal performance have a finite horizon, N, beyond which investors expect a corporation to earn for all future time a return on equity investment equal to the expected return on its shares; and (2) the expected return on a share is the discount rate that equates the share's current price with a dividend expectation for which the dividend in each period from 1 to N is equal to its forecast and the dividend in each period from N + 1 to infinity is equal to the forecast for normalized earnings in Period N + 1. The capital asset pricing model (CAPM) states that the expected return on a share varies with beta and dividend yield, but empirical tests of the CAPM using previous methods for estimating expected return have failed. Empirical evidence strongly supports the joint hypothesis that the FHERM and the CAPM are both true.

Two of the three corecipients of the 1990 Nobel Prize in Economics were Harry Markowitz and William Sharpe. The prize recognized their work in portfolio theory, work that culminated in the capital asset pricing model (CAPM) (see Markowitz 1959, Sharpe 1964, Lintner 1965, and Mossin 1966). The CAPM established that under intuitively attractive assumptions, the expected return (EXR) on a share varies with the share's systematic risk (BETA). The EXR could be a very important capital market statistic because investors would find it useful in choosing among shares and, to the extent that capital markets are perfectly competitive, corporations would find it useful in choosing among investment opportunities.

A considerable body of empirical work during the past 30 years has been devoted to testing the CAPM under the assumption that an average of the realized holding-period returns (ARHPR) on a share over a number of prior time periods is a satisfactory estimate of its EXR. This empirical work has provided little support for the truth of the CAPM. Some of the most painstaking and sophisticated research has not even found a positive correlation between EXR and BETA (see Reinganum 1981, Coggin and Hunter 1985, Lakonishok and Shapiro 1986, and Fama and French 1992).¹ Fama and French summarized their empirical results with the statement: "In short, our tests do not support the most basic prediction of the SLB model

[CAPM], that average stock returns are positively related to market β s."

Why has this empirical work, which assumes investors' expectations are simply some average of what was realized in the past, found little or no correlation between EXR and BETA? A plausible explanation is the very high variance of short-term realized holding-period returns. As Black (1993) observed, the averaging process needed to eliminate the noise may leave little information in the average as an estimate of the EXR at any point in time. Regardless, these empirical results force us either to abandon a theorem that contributed significantly to the only Nobel Prize in financial economics or to use a different method for the estimation of EXR.²

A share's holding-period return (HPR), by definition, is the sum of its dividend yield (DYD) for the period and its growth rate in price for the period; that is, for any future period,

$$\text{HPR}(T) = \frac{\text{DIV}(T)}{\text{PPS}(T-1)} + \frac{\text{PPS}(T) - \text{PPS}(T-1)}{\text{PPS}(T-1)}, T > 0, \quad (1)$$

where

DIV(T) = dividend

PPS(T) = end-of-period price

PPS(T - 1) = start-of-period price

The expected return on a share, by definition, is Equation 1 with T equal to 1. PPS(0) is simply the current price, and the accurate estimation of expected DIV(1) is trivial, but the accurate estimation of expected PPS(1) is elusive.

A database available from the Institutional Brokers Estimate System (I/B/E/S International) contains averages of security analyst forecasts of

Joseph R. Gordon is a systems analyst and Myron J. Gordon is a professor of finance at the University of Toronto.

earnings per share and of the long-term growth rate in earnings. From the I/B/E/S glossary of terms:

Long Term Growth Forecasts are received directly from contributing analysts, they are not calculated by I/B/E/S. While different analysts apply different methodologies, the Long Term Growth Forecast generally represents an expected *annual* increase in operating earnings over the company's next full business cycle. In general, these forecasts refer to a period of between three to five years.

Using the I/B/E/S long-term growth forecast as an estimate of a share's expected growth rate in price for the coming period, Harris and Marston (1992) and Gordon (1993) found positive correlation between EXR and BETA. The correlations were very low, however, so either BETA explains very little of the variation in EXR among shares or there is still considerable room for improvement in the estimation of EXR.

The finite horizon expected return model (FHERM) represents a new method for estimating EXR. The motivation for the FHERM is the assumption that investors believe that current forecasts can be used to predict, with acceptable accuracy, abnormal performance up to but not beyond a finite point in the future. The FHERM states that (1) forecasts of abnormal performance have a finite horizon, N , beyond which investors expect a corporation to earn for all future time a return on equity investment equal to the expected return on its shares; and (2) the expected return on a share is the discount rate that equates the share's current price with a dividend expectation, where the dividend in each period from 1 to N is equal to its forecast and the dividend in each period from $N + 1$ to infinity is equal to the forecast for normalized earnings in Period $N + 1$.

If both the FHERM and the CAPM are true, then the multiple correlation of EXR with BETA and DYD (which becomes significant when the CAPM is adjusted for taxes) should be significantly high within a single, small interval of N that includes the true horizon of investors and, within this interval, the regression coefficients and predicted values should be reasonable and stable. Empirical evidence shows this to be the case—maximum correlation of EXR with BETA and DYD occurs in Year 7, which is very reasonable considering that we used the I/B/E/S average of security analyst forecasts of the long-term growth rate in earnings. Regressions of the seven-year-horizon estimate of EXR on beta, dividend yield, and skewness explain a comparatively large fraction of the variation in EXR among shares and, of course, a much larger fraction

of the variation in EXR among portfolios. Furthermore, the risk-free interest rate implicit in the constant term, the price of risk implicit in the coefficient of BETA, and the tax cost of dividends implicit in the coefficient of DYD are reasonable, if not in complete agreement with the CAPM, and are remarkably stable from one quarter to the next.

DERIVATION OF THE FHERM

The derivation of the FHERM starts with the well-known proposition that the expected return on a share is the discount rate that equates the share's current price with its dividend expectation; that is,

$$PPS = \sum_{T=1}^{\infty} \frac{DIV(T)}{(1 + EXR)^T} \quad (2)$$

On the assumption that the dividend expectation may be represented with its first-period value and one growth rate for all future time, Equation 2 becomes

$$PPS = \sum_{T=1}^{\infty} \frac{DIV(1) * (1+GRR)^{T-1}}{(1 + EXR)^T} = \frac{DIV(1)}{EXR - GRR} \quad (3)$$

where

PPS = current price per share
 DIV(1) = expected dividend per share in Period 1
 GRR = expected growth rate in the dividend

Retained earnings are the primary and frequently the sole source of funds for equity investment, and dividends are the primary and frequently the sole means for distributing funds to shareholders. Assuming for the present that retained earnings and dividends are the sole means for realizing their respective objectives, Gordon (1962) showed that the value of EXR that satisfies Equation 3 is

$$EXR = DYD(1) + GRR = \frac{NEPS(1) * (1 - RTR)}{PPS} + RTR * REI \quad (4)$$

where

DYD(1) = DIV(1)/PPS = expected dividend yield in Period 1
 NEPS(1) = expected normalized earnings per share in Period 1
 RTR = the retention rate
 REI = the corporation's return on equity investment

Normalized earnings are what earnings would be without influence from abnormal events.

Equation 4 assumes that a corporation can be expected to earn for all future time an REI that is not necessarily equal to the return investors require on its shares. Under the opposite assumption, that a corporation's REI for all future time must equal its EXR, Equation 4 becomes

$$\text{EXR} = \text{EYD} = \frac{\text{NEPS}(1)}{\text{PPS}}, \quad (5)$$

where EYD is the current earnings yield. It should also be noted that when REI equals EXR, the PPS is independent of dividend policy.³

Holt (1962), Brigham and Pappas (1966), and others have argued that a corporation cannot be expected to have an abnormally high or low growth rate forever. Brigham and Pappas established the price of a hypothetical share, given the duration of abnormal growth, the abnormal growth rate, the normal growth rate, and the EXR. Assuming the CAPM is true, however, the FHERM can be used to establish the finite horizon of investors and the expected return of an actual share.

The FHERM states that forecasts of abnormal performance have a finite horizon, N , beyond which investors expect a corporation to earn for all future time a return on equity investment equal to the expected return on its shares; that is,

$$\text{REI}(T) = \text{EXR}, T > N. \quad (6)$$

From Equation 6 and Equations 2 and 5, it follows that the expected return on a share is the discount rate that equates the share's current price with a dividend expectation, where the dividend in each period from 1 to N is equal to its forecast and the dividend in each period from $N + 1$ to infinity is equal to the forecast for normalized earnings in Period $N + 1$; that is,

$$\text{PPS} = \sum_{T=1}^N \frac{\text{DIV}(T)}{(1 + \text{EXR})^T} + \frac{\text{NEPS}(N + 1)}{\text{EXR}(1 + \text{EXR})^N}. \quad (7)$$

In addition, given that forecasts of abnormal performance have a finite horizon, N , investors expect dividends, with last year's actual as the base, and normalized earnings, with next year's forecast as the base, both to grow for N periods at the rate forecast for long-term growth in earnings; that is, if $\text{DIV}(0)$ equals the dividend in the most recently realized period, then

$$\text{DIV}(T) = \text{DIV}(0) * (1 + \text{GRR})^T, 0 \leq T \leq N, \quad (8)$$

and

$$\text{NEPS}(T + 1) = \text{NEPS}(1) * (1 + \text{GRR})^T, 0 \leq T \leq N, \quad (9)$$

and Equation 7 becomes

$$\begin{aligned} \text{PPS} = & \sum_{T=1}^N \frac{\text{DIV}(0) * (1 + \text{GRR})^T}{(1 + \text{EXR})^T} \\ & + \frac{\text{NEPS}(1) * (1 + \text{GRR})^N}{\text{EXR} * (1 + \text{EXR})^N}. \end{aligned} \quad (10)$$

Equation 10 is the basis for the empirical work in this study, and it can be solved for EXR given PPS, $\text{DIV}(0)$, $\text{NEPS}(1)$, GRR, and N . PPS and $\text{DIV}(0)$ are realized values, and $\text{NEPS}(1)$ and GRR can be estimated from averages of security analyst forecasts of earnings and of the long-term growth rate in earnings. These realized and forecast values are available in a database from I/B/E/S International. But what about N ? Analysts do not predict earnings beyond five years, which suggests that any consensus of opinion among investors probably deteriorates quickly after five years. So, a value between 5 and 10 for N is probably reasonable. Note that the value of N suggested by the FHERM is data dependent, which is the way it should be because investors might alter their horizons over time. Also, when N equals zero, EXR is the share's earnings yield, and when N approaches infinity, EXR approaches the share's dividend yield plus its dividend growth rate.

Several possible sources of error in this article's use of the FHERM to estimate EXR are the following:

- Investors may not have the same horizon for all corporations.
- Investors may not expect constant abnormal growth of dividends and normalized earnings.
- Investors may not expect the same abnormal growth rate for both dividends and normalized earnings.
- Investors may expect that corporations will issue or repurchase shares rather than using only retained earnings and dividends to finance equity investment and to distribute profits.

Insofar as these sources of error are material, the estimation of EXR and N and the explanation of how EXR varies among shares will be impaired.

TEST OF THE JOINT HYPOTHESIS

For the empirical evidence to be consistent with the joint hypothesis that the FHERM and the CAPM are both true, what must be demonstrated is that when the FHERM is used to estimate EXR, the CAPM explains a large amount of the variation in EXR among shares if and only if the value assigned to N approximates the finite horizon for forecasts of abnormal performance.

Under the strong assumptions that capital markets are perfectly competitive, including the assumption that there are no taxes, the CAPM states

$$\text{EXR} = \text{RFR} + (\text{EXRM} - \text{RFR})\text{BETA}, \quad (11)$$

where RFR is the risk-free short-term interest rate and EXRM is the expected return on the market portfolio.

Taxes and other market imperfections, however, complicate the explanation of the variation in EXR among shares, and therefore, the regression equation that will be used here is

$$\text{EXR} = \alpha_0 + \alpha_1 \text{BETA} + \alpha_2 \text{DYD} + \alpha_3 \text{SKEW}, \quad (12)$$

where BETA is as defined earlier, DYD equals $\text{DIV}(0)/\text{PPS}$, and SKEW is the right skewness in the share's holding-period returns.

When the CAPM is adjusted for market imperfections, as in Equation 12, the CAPM states that the constant term, α_0 , and the beta coefficient, α_1 , will be positive, but it does not predict their values. The tax system treats price appreciation more favorably than it does dividends, so the expectation would be to find $\alpha_2 > 0$ (see Litzenberger and Ramaswamy 1982 and Miller and Scholes 1982 for previous research on the relation between EXR and DYD). The popularity of both lotteries and insurance suggests the hypothesis that investors prefer a small probability of a large gain and a large probability of a small loss to the opposite skewness in holding-period returns. So, the expectation would be to find $\alpha_3 < 0$.

Hence, a positive outcome for a test of the CAPM that uses Equation 12 on real data is (1) high multiple correlation, (2) values for α_0 , α_1 , and α_2 that are positive and statistically significant, and (3) a value for α_3 that is negative if it is statistically significant. The SKEW coefficient turns out not to be statistically significant, and therefore, the proof of the CAPM does not depend on the value of α_3 .

Equation 12 does not include among its independent variables sources of risk such as debt-equity ratio or size, because the CAPM claims BETA is a measure of systematic risk from all sources. Insofar as BETA fails to capture completely the influence of each source of risk on EXR, inclusion of source variables would improve the explanation of the variation in EXR among shares. The objective here, however, is to establish how EXR varies with BETA, and the inclusion of variables that represent sources of risk would reduce the level and the significance of the correlation between EXR and BETA, because BETA and the sources of risk are correlated to some degree.⁴ Equation 12 includes

DYD and SKEW among the independent variables because they are possible nonrisk sources of variation in EXR among shares. Their inclusion should not dilute the relation between EXR and BETA. Rather, it could improve the estimate of the relation between EXR and BETA, and the variation of EXR with DYD and SKEW is also of interest.

We tested many values of N to find the "best" one—that is, the value for N that results in the best estimate of EXR, the estimate of EXR that best explains how EXR varies with the independent variables of Equation 12. This best value for N is considered the consensus among investors of the finite horizon for forecasts of abnormal performance. Is it data mining or sound empirical research to find the consensus among investors in this manner? The latter is true if

- the CAPM test results are positive when and only when the value assigned to N is within a small interval that contains the best value for N ,
- the constant term and the statistically significant coefficients do not change radically among the positive tests of the CAPM,
- the best value for N is also a reasonable approximation of the longevity of long-term forecasts by security analysts, and
- these results are obtained over many independent and large samples.

The results do satisfy all these conditions.

ESTIMATION OF VARIABLES

A database for corporations that trade on the NYSE or the Amex, available from the CRSP, was used to identify corporations that were in the S&P 500 at the end of March 1985. A BETA was calculated for each of these corporations on the basis of the monthly holding-period returns during the prior 60 months. This step was repeated every three months until December 1991 so that a value for BETA was obtained for each corporation in 28 quarterly subsets of S&P 500 corporations. The data used to calculate BETA were also used to calculate SKEW for each corporation.

All the other variables were obtained from the I/B/E/S database. For PPS and $\text{DIV}(0)$ at the end of each quarter, the values used were the price per share and the annualized quarterly dividend reported for the beginning of April 1985 and every three months thereafter until January 1992. The value used for GRR was the average of the security analysts' forecasts of the long-term growth rate in earnings. The value used for NEPS(1) was derived from the average of the security analysts' forecasts of earnings per share three years hence, EPS(3), as follows:

$$\text{NEPS}(1) = \frac{\text{EPS}(3)}{(1 + \text{GRR})^2} \quad (13)$$

The I/B/E/S forecast for EPS(3) was used to arrive at NEPS(1) instead of actual earnings or the I/B/E/S forecast for EPS(1) in the belief that the Year 3 forecast results in a better estimate of normalized earnings than do the other data.

Some corporations in the S&P 500 were excluded from the sample for the following reasons:

- S&P 500 corporations that were not traded on the NYSE or the Amex were not in the CRSP database.
- Companies were excluded if the computation of BETA was based on fewer than 45 holding-period returns during the prior 60 months.
- Companies were excluded if any data required from the I/B/E/S database were missing.
- Companies were excluded if forecast GRR was based on fewer than three security analyst estimates.
- Companies were excluded if forecast EPS(3) was based on fewer than three analyst estimates, unless forecast EPS(2) was based on at least three analyst estimates, in which case NEPS(1) equals EPS(2)/(1 + GRR).
- Companies were excluded if DYD equals DIV(0)/PPS was in excess of 13 percent, on the

grounds that DIV(0) cannot be a normal dividend if it results in such a high dividend yield.

- Companies were excluded if EYD equals NEPS(1)/PPS was below 2 percent, on the grounds that the estimate of normalized earnings cannot be accurate if it results in such a low earnings yield. Note that forecast earnings for some of these companies were negative.

Table 1 presents the number of companies excluded for each reason in each quarter.⁵

EXPLANATION OF RESULTS

Table 2 presents the mean EXR, the adjusted multiple correlation squared (AJR^2), and other regression statistics for Equation 12 in each of the 28 quarters when EXR is based on a horizon of seven years. With few exceptions, the AJR^2 s fluctuate in a very narrow range around their mean, which is 0.270. These values of AJR^2 are a striking improvement over the results obtained by Harris and Marston (1992) and by Gordon (1993). In their work, EXR was simply $\text{DYD} + \text{GRR}$, which is the value that EXR approaches in Equation 10 as N approaches infinity with BETA as the sole explanatory variable. The AJR^2 obtained here with N equal to 7 is three to five times larger than the values they obtained.⁶

Table 1. Reasons for and Number of Exclusions to 28 S&P 500 End-of-Quarter Samples, 1985–91

Date	NYSE/Amex Not Traded	BETA #obs < 45	I/B/E/S Missing Data	Excluded				Accepted
				GRR #ests < 3	NEPS #ests < 3	DYD Value > 13%	EYD Value < 2%	
1985								
Q1	19	23	10	25	33	1	1	388
Q2	18	22	10	23	8	–	3	416
Q3	21	22	12	28	14	–	3	400
Q4	21	22	7	29	31	–	7	383
1986								
Q1	22	21	8	24	34	–	7	384
Q2	22	19	9	25	1	–	6	418
Q3	24	20	12	26	9	–	7	402
Q4	24	20	13	20	25	–	12	386
1987								
Q1	25	21	12	13	38	2	6	383
Q2	26	22	16	30	1	–	5	400
Q3	25	24	14	30	7	–	6	394
Q4	26	14	13	31	20	2	6	388
1988								
Q1	26	15	21	27	24	–	3	384
Q2	25	17	18	24	3	–	3	410
Q3	26	17	10	22	10	2	4	409
Q4	26	20	10	15	32	–	5	392
1989								
Q1	26	22	10	18	6	–	3	415
Q2	27	23	9	13	3	–	5	420
Q3	28	24	7	16	12	–	4	409
Q4	30	23	5	16	13	–	7	406
1990								
Q1	29	24	6	21	6	1	4	409
Q2	29	23	6	25	6	–	3	408
Q3	30	19	8	20	10	7	5	401
Q4	32	18	7	19	28	1	9	386
1991								
Q1	33	16	9	20	5	–	5	412
Q2	33	17	8	21	1	–	8	412
Q3	33	16	7	22	6	–	10	406
Q4	32	16	8	21	6	–	10	407

Table 2. Statistics from the Regression of EXR on BETA, DYD, and SKEW, with a Seven-Year Horizon and for 28 S&P 500 End-of-Quarter Samples, 1985–91

Date	EXR Value	Constant Term	BETA		DYD		SKEW		Adjusted R^2
			Coefficient	<i>t</i> -Statistic	Coefficient	<i>t</i> -Statistic	Coefficient	<i>t</i> -Statistic	
1985									
Q1	12.98%	0.1042	0.0068	2.69	0.50	10.60	−0.0020	−1.02	0.240
Q2	11.96	0.0955	0.0056	2.44	0.53	11.04	−0.0004	−0.22	0.244
Q3	12.09	0.0930	0.0063	2.60	0.59	12.84	−0.0006	−0.28	0.312
Q4	11.05	0.0829	0.0070	2.82	0.60	12.64	0.0018	0.88	0.309
1986									
Q1	10.42	0.0792	0.0092	3.98	0.50	11.41	0.0018	0.96	0.257
Q2	10.57	0.0726	0.0174	7.32	0.47	10.46	−0.0007	−0.38	0.229
Q3	10.26	0.0685	0.0186	6.75	0.47	9.11	−0.0009	−0.46	0.193
Q4	9.60	0.0653	0.0157	5.42	0.47	8.27	0.0034	1.59	0.162
1987									
Q1	10.17	0.0705	0.0131	4.10	0.57	10.08	0.0042	1.81	0.213
Q2	9.46	0.0569	0.0193	6.91	0.62	12.36	0.0005	0.28	0.284
Q3	9.81	0.0608	0.0180	6.70	0.61	12.20	0.0030	1.61	0.279
Q4	11.42	0.0690	0.0238	6.20	0.58	11.16	−0.0021	−0.93	0.253
1988									
Q1	11.07	0.0694	0.0222	6.07	0.59	12.29	−0.0053	−3.11	0.311
Q2	11.36	0.0818	0.0160	4.72	0.46	9.77	−0.0034	−1.84	0.207
Q3	11.32	0.0716	0.0237	6.92	0.53	10.59	−0.0050	−2.69	0.246
Q4	11.13	0.0746	0.0196	5.60	0.50	9.77	−0.0022	−1.23	0.202
1989									
Q1	11.20	0.0682	0.0246	7.65	0.56	11.98	−0.0038	−2.27	0.275
Q2	10.58	0.0638	0.0246	7.33	0.54	10.25	−0.0043	−2.48	0.223
Q3	10.65	0.0616	0.0258	8.75	0.55	12.15	−0.0022	−1.42	0.285
Q4	10.71	0.0565	0.0296	9.15	0.58	11.82	−0.0010	−0.60	0.282
1990									
Q1	11.24	0.0578	0.0303	8.83	0.65	14.31	−0.0026	−1.52	0.349
Q2	10.89	0.0519	0.0312	8.99	0.69	15.89	−0.0003	−0.15	0.392
Q3	12.71	0.0470	0.0482	12.01	0.67	14.79	−0.0056	−2.48	0.435
Q4	11.62	0.0653	0.0288	9.19	0.53	12.86	−0.0054	−3.22	0.349
1991									
Q1	10.17	0.0654	0.0194	7.52	0.50	12.13	−0.0042	−3.21	0.287
Q2	10.13	0.0700	0.0157	5.47	0.48	10.24	−0.0041	−2.88	0.215
Q3	10.11	0.0660	0.0188	7.53	0.49	10.91	−0.0042	−3.13	0.256
Q4	9.53	0.0589	0.0183	7.23	0.57	11.86	−0.0021	−1.52	0.267
Mean	10.86	0.0696	0.0199	6.46	0.55	11.56	−0.0017	−1.07	0.270

Turning to the coefficients of the independent variables at N equals 7 in Table 2, the coefficients of BETA are all positive and have t -statistics greater than 2. Both the coefficients and the t -statistics rise sharply over the first six quarters, and thereafter, with few exceptions fluctuate in fairly narrow ranges around their means, 0.02 and 6.46, respectively. The DYD coefficients and t -statistics fluctuate in narrow ranges around their means, 0.55 and 11.56, respectively. SKEW does not do as well. Its coefficients do not become consistently negative until the last 17 quarters, and even then its t -statistics are not always above 2.

Table 3 presents, for each of six EXRs ($N = 0, 5, 7, 10, 20$, and $N \rightarrow \infty$) and for each of the independent variables of Equation 12, the mean of the 28 sample means and the mean of the 28 sample standard deviations. Note the FHERM states that N is finite; however, under the version of the FHERM

used here and stated in Equation 10, as N approaches infinity, EXR approaches DYD + GRR. Also note that the EXR for corporations paying no dividend is undefined when using Equation 3 or Equation 4, but it is defined for all finite values of N when using Equation 10. As N rises from zero to infinity, the mean EXRs rise by decreasing amounts from 8.47 percent to 14.70 percent; at N equals 7, the mean EXR is equal to 10.86 percent. For comparison, Harris and Marston (1992) reported a mean EXR equal to 16.31 percent, and Ibbotson Associates (1996) reported a mean of the monthly realized holding-period returns on the S&P 500 equal to 11.7 percent based on the years 1926 to 1994 and 10.6 percent based on the years 1965 to 1994.

In Table 3, the 28 standard deviations of EXR fluctuate in a very narrow range around their mean of 2.12 percent at N equals 7. Hence, practically all of the 400 or so corporations in each quarter have

Table 3. Average Mean and Average Standard Deviation of EXR, BETA, DYD, and SKEW, with Six Horizons and for 28 S&P 500 End-of-Quarter Samples, 1985–91

Average	EXR Horizon						BETA	DYD	SKEW
	0 Years	5 Years	7 Years	10 Years	20 Years	$\rightarrow \infty$			
Mean	8.47%	10.28%	10.86%	11.59%	13.06%	14.70%	1.11	3.14%	0.229
Standard deviation	3.00	2.24	2.12	2.08	2.35	3.21	0.35	2.14	0.508

values of EXR that are equal to 10.86 percent plus or minus 4.24 percent. The means of the standard deviations and hence the range of variation in EXR among shares is considerably higher than 2.12 percent at N equals zero and as N approaches infinity. With regard to the independent variables, the mean of the BETA means is above 1, perhaps because equal weights and not value weights were used, and the mean of the SKEW standard deviations is quite large.

Table 4 presents summary numbers for the important regression statistics obtained for Equation 12 when EXR is based on N equal to 0, 5, 7, 10, and 20 and N approaching infinity. The table shows the mean and standard deviation of the indicated statistic over the 28 quarterly regressions. The AJR^2 s rise from 0.180 at N equals zero to 0.270 at N equals 7, and they fall sharply to 0.061 as N approaches infinity. Over the interval $5 \leq N \leq 10$, the AJR^2 s change little. The BETA coefficients change little as N rises from zero to infinity, but their t -statistics are materially larger in the interval $5 \leq N \leq 10$ than at N equals zero or as N approaches infinity. The DYD coefficients decline continuously to zero as N rises from zero to infinity, but their t -statistics reach a maximum at N equals 7. The SKEW coefficients do not perform as well as the other coefficients. The mean of their t -statistics is not significantly different from zero at N equals zero, and it only becomes statistically significant when N is greater than 12.

There are two reasons for the striking improvement in these results over those reported in Harris

and Marston (1992) and in Gordon (1993). One is the recognition that forecasts of growth have a finite horizon, and the other is the addition of dividend yield as an independent variable. Either one alone, however, does not materially improve the results, as can be seen from the simple correlations in Table 5 and the AJR^2 s in Table 4. Note that the average simple correlation between EXR and BETA is 0.182 as N approaches infinity, which is about what Harris and Marston and Gordon obtained, and it decreases to 0.056 at N equals 7. Note also that the average simple correlation between EXR and DYD as N approaches infinity is negative and that the addition of DYD as an independent variable causes the AJR^2 as N approaches infinity to increase only slightly, from $(0.182)^2$ equals 0.033 to 0.061. The two innovations combined, however, result in the high AJR^2 of 0.270 at N equals 7. Why? Because BETA and DYD have a very high negative correlation; the average at N equals 7 is -0.449 .

The high simple correlation between EXR and DYD when N is small may be attributed to the correlation between EYD and DYD and to the fact that EXR becomes EYD when N becomes zero. The average simple correlation between EXR and DYD, however, rises from 0.366 to 0.421 as N rises from zero to 7, and the average t -statistic for the DYD coefficient is maximized at N equals 7. Hence, the partial correlation between EXR and DYD seems to be partly, if not entirely, the result of the tax advantage of capital gains over dividends.

Table 4. Mean and Standard Deviation of Statistics from the Regression of EXR on BETA, DYD, and SKEW, with Six Horizons and for 28 S&P 500 End-of-Quarter Samples, 1985–91

Statistic	Horizon					
	0 Years	5 Years	7 Years	10 Years	20 Years	$\rightarrow \infty$
<i>Adjusted R^2</i>						
Mean	0.180	0.261	0.270	0.254	0.153	0.061
Standard deviation	0.046	0.054	0.061	0.069	0.061	0.022
<i>Constant term</i>						
Mean	0.0428	0.0629	0.0696	0.0780	0.0968	0.1287
<i>BETA coefficient</i>						
Mean	0.0191	0.0197	0.0199	0.0201	0.0199	0.0180
<i>BETA t-statistic</i>						
Mean	3.957	5.947	6.460	6.641	5.521	3.544
Standard deviation	2.015	2.278	2.320	2.244	1.713	1.164
<i>DYD coefficient</i>						
Mean	0.644	0.576	0.549	0.512	0.405	-0.000
<i>DYD t-statistic</i>						
Mean	9.010	11.392	11.563	10.881	7.176	0.101
Standard deviation	1.405	1.496	1.686	1.889	1.779	1.399
<i>SKEW coefficient</i>						
Mean	0.0017	-0.0008	-0.0017	-0.0027	-0.0048	-0.0082
<i>SKEW t-statistic</i>						
Mean	0.619	-0.535	-0.068	-1.674	-2.344	-2.712
Standard deviation	0.971	1.387	1.559	1.679	1.545	1.167

Table 5. Simple Correlations among EXR, BETA, and DYD, with Three Horizons and for 28 S&P 500 End-of-Quarter Samples, 1985–91

Date	EXR and BETA			EXR and DYD			BETA and DYD
	0 Years	7 years	→ ∞	0 Years	7 Years	→ ∞	
1985							
Q1	-0.196	-0.122	0.187	0.457	0.474	-0.112	-0.475
Q2	-0.181	-0.131	0.231	0.420	0.482	-0.092	-0.463
Q3	-0.177	-0.130	0.167	0.447	0.548	0.024	-0.416
Q4	-0.188	-0.133	0.173	0.491	0.541	-0.062	-0.448
1986							
Q1	-0.088	-0.047	0.164	0.327	0.473	-0.021	-0.437
Q2	0.058	0.144	0.219	0.289	0.359	-0.091	-0.402
Q3	0.073	0.139	0.227	0.308	0.316	-0.136	-0.429
Q4	0.026	0.103	0.232	0.343	0.302	-0.169	-0.426
1987							
Q1	-0.052	-0.021	0.144	0.428	0.414	-0.099	-0.455
Q2	0.018	0.074	0.182	0.439	0.444	-0.096	-0.431
Q3	-0.016	0.062	0.234	0.425	0.436	-0.109	-0.452
Q4	-0.032	0.029	0.148	0.334	0.422	0.027	-0.491
1988							
Q1	-0.051	-0.033	0.103	0.392	0.478	0.028	-0.525
Q2	-0.050	-0.041	0.096	0.315	0.396	-0.011	-0.544
Q3	0.054	0.053	0.101	0.269	0.377	-0.008	-0.533
Q4	0.007	0.007	0.117	0.246	0.368	-0.016	-0.551
1989							
Q1	0.063	0.043	0.068	0.330	0.405	-0.056	-0.549
Q2	0.049	0.084	0.152	0.341	0.338	-0.169	-0.534
Q3	0.048	0.121	0.208	0.362	0.386	-0.159	-0.504
Q4	0.109	0.175	0.198	0.331	0.364	-0.115	-0.459
1990							
Q1	0.085	0.127	0.161	0.394	0.472	-0.016	-0.408
Q2	0.060	0.109	0.203	0.425	0.520	-0.023	-0.405
Q3	0.247	0.345	0.296	0.360	0.473	0.102	-0.204
Q4	0.107	0.236	0.261	0.295	0.433	0.030	-0.293
1991							
Q1	-0.009	0.115	0.219	0.400	0.416	-0.142	-0.404
Q2	-0.054	0.052	0.195	0.371	0.379	-0.110	-0.425
Q3	0.007	0.132	0.222	0.344	0.371	-0.129	-0.417
Q4	-0.014	0.065	0.184	0.367	0.411	-0.127	-0.488
Mean	-0.003	0.056	0.182	0.366	0.421	-0.066	-0.449

AGREEMENT WITH THE TAX-ADJUSTED CAPM

How closely do the empirical values for the constant term, the BETA coefficient, and the DYD coefficient in Equation 12 obtained with N equal to 7 agree with those predicted by the tax-adjusted CAPM? When the favorable treatment of capital gains under the personal income tax is recognized, the expression for EXR becomes

$$\text{EXR} = \gamma_0 + \gamma_1 \text{BETA} + \gamma_2 \text{DYD} . \quad (14)$$

Unfortunately, the coefficients of Equation 14 depend in a complicated way on how marginal tax rates vary with income and on the distribution of income among investors. All that can be said is that γ_0 , γ_1 , and γ_2 are all positive under the tax-adjusted CAPM.

Under the simplifying assumptions that dividends and interest are taxed at a uniform rate regardless of income and that capital gains, both realized and unrealized, are tax-free, it can be shown that

$$\begin{aligned} \gamma_0 &= \text{RFR}(1 - \text{TRP}), \\ \gamma_1 &= \text{EXRM} - \text{RFR} - (\text{DYDM} - \text{RFR}) \text{TRP}, \\ \text{and} \end{aligned}$$

$$\gamma_2 = \text{TRP}$$

(see Elton and Gruber 1991). Here, TRP equals the tax rate on interest and dividend payments, DYDM equals the dividend yield on the market portfolio, and RFR and EXRM are as defined earlier.

These values of γ may be compared with the values of α_0 , α_1 , and α_2 in Table 4 at N equals 7. The skewness term may be ignored because it is comparatively unimportant. The marginal tax rate on the highest level of personal income was 50 percent from 1985 to 1986 and 31 percent from 1987 to 1991. Realized capital gains during the same years were taxed at varying rates, including the same rates as other income, and unrealized capital gains were tax free of course. Setting TRP equal to 0.31 and ignoring the taxation of realized capital gains,

$$\gamma_2 = 0.31 < 0.55 = \alpha_2 .$$

Using the average rate of 6.69 percent on 90-day Treasury bills over the sample period for RFR,

$$\begin{aligned} \gamma_0 &= 6.69\% * (1 - 0.31) \\ &= 0.0462 < 0.0696 = \alpha_0 . \end{aligned}$$

Finally, with EXRM and DYDM equal to the average sample values from Table 3 at N equals 7,

$$\begin{aligned}\gamma_1 &= 10.86\% - 6.69\% - (3.14\% - 6.69\%)0.31 \\ &= 0.0527 > 0.0199 = \alpha_1.\end{aligned}$$

Therefore, the constant term and the coefficients obtained for Equation 12 depart materially from the values predicted by the tax-adjusted CAPM under the tax assumptions stated above. Differences should be expected, however, as a result of some combination of (1) error in the tax assumptions stated above, (2) error in the estimation of the independent variables for Equation 12, and (3) departures in capital markets from the assumptions of the CAPM and the FHERM. Consequently, because the empirical values α_0 , α_1 , and α_2 are within an order of magnitude of their predicted values, γ_0 , γ_1 , and γ_2 , this exercise has demonstrated that the constant term and the coefficients obtained for Equation 12 are reasonable.

CONCLUSION

The finite horizon expected return model is a new method for estimating the EXR on a share. The FHERM states that

- forecasts of abnormal performance have a finite horizon, N , beyond which investors expect a corporation to earn for all future time a return on equity investment equal to the expected return on its shares; and
- the expected return on a share is the discount rate that equates the share's current price with a dividend expectation, where the dividend in each period from 1 to N is equal to its forecast and the dividend in each period from $N + 1$ to infinity is equal to the forecast for normalized earnings in Period $N + 1$.

Other methods of estimating EXR have been criticized because they do not recognize that investment decisions are primarily based on current forecasts and that those forecasts have a limited horizon. Those maxims are the very foundation of the FHERM, however, and hence, the FHERM is, at least intuitively, a very accurate description of

investors' expected return.

The evidence strongly supports the joint hypothesis that the FHERM and the CAPM are both true. For the estimation of EXR, a version of the FHERM modified for I/B/E/S forecasts was used—it assumes that investors also expect dividends, with last year's actual as the base, and normalized earnings, with next year's forecast as the base, both to grow for N years at the rate forecast for long-term growth in earnings.

For the explanation of how EXR varies among shares, a version of the CAPM modified for market imperfections was used—it assumes that EXR depends not only on beta but also on dividend yield and skewness. Multiple tests in which each test used a different value for the horizon, N , produced the proof—a single, small interval of high correlation, with its maximum at N equals 7. Hence, the consensus among investors is that the future has a finite horizon of approximately seven years. Over all shares and all periods, the mean value of EXR equal to 10.86 percent at N equals 7 is more reasonable for the sample years than either the mean value of EXR equal to 8.47 percent at N equals zero, which represents the earnings yield model and forecasts of normal performance only, or the mean value of EXR equal to 14.70 percent as N approaches infinity, which represents the dividend growth model and forecasts of eternal abnormal performance.

Compared with previous efforts at estimating the expected return on a share and at explaining its variation among shares—especially the empirical work in which average realized return is used as the estimate of EXR and shares are grouped in portfolios—the FHERM performed exceptionally well. Consequently, the FHERM has promising potential to be the basis for further research on the estimation of EXR and on the explanation of how EXR varies among shares. Possibly, with this research, EXR will realize its potential to be a very important capital market statistic.⁷

NOTES

1. There are exceptions to this conclusion. For instance, Kothari, Shanken, and Sloan (1995) found significant positive correlation between average realized return and beta using annual data with the shares grouped in portfolios. Nevertheless, they found "virtually no relation between beta and average return over the relatively short post-1962 period." See also Jagannathan and Wang (1996), who tested a multifactor model in which betas were obtained not only for the market portfolio but also for human capital, measured by the growth rate in employment income, and for the yield spread between high- and low-grade bonds. They found the

coefficient on the market portfolio to be negative but barely different from zero, while the betas on the other two risk variables were significantly positive. Kan and Zhang (1996) showed that "useless factors" are found to be useful under this two-pass methodology.

2. The estimates of BETA seem fairly good and have become widely used. High-BETA stocks rise and fall with the market more than low-BETA stocks and are, therefore, said to be riskier.

3. Note that under either of two conditions, the price of a share is independent of the corporation's dividend policy. One is

the condition used here and stated above that REI equals EXR. The other condition is the Miller–Modigliani theorem, under which a distinction is drawn between retained earnings and the sale of shares as a source of equity capital (and between dividends and repurchase as a means of distribution) and one is a perfect substitute for the other. When retained earnings are the sole source of equity funds, dividends are the sole means of distributions, and capital structure is given, dividend policy is investment policy.

4. The limitations of BETA as a measure of risk from all sources have been investigated extensively by others, and further examination will not be attempted here.
5. The reasons for excluding firms and the number excluded for each reason are presented so that our empirical results can be verified by replication and the comparative consequences of different bases for exclusion can be established. The first three bases for exclusion are beyond our control, the next two bases for exclusion represent a judgment call on our part that we consider sound, and the last two bases for exclusion result in only a few exclusions that are quite justifiable.
6. The contrast between this article's results and those obtained

using average realized returns as the estimate of EXR are far more striking. As noted earlier, results obtained using average realized returns find either (1) no correlation at all between EXR and BETA, (2) no correlation for long subperiods between EXR and BETA, or (3) betas for other variables such as human capital are far more important than the beta for the market portfolio. Furthermore, statistical work using average realized returns has been based on shares being grouped in portfolios, so that the methodology does not estimate the EXR on an individual actual share, precisely what is needed to use the CAPM. This article's AJR² at N equals 7 would have been much higher if the shares had been grouped in portfolios.

7. The authors benefited from comments on earlier drafts by Don Brean, Raymond Kan, and Alan White. We gratefully acknowledge the contribution of I/B/E/S International in providing forecast data for earnings per share and growth rate, available through the Institutional Brokers Estimate System. These data have been provided as part of a broad academic program to encourage earnings expectation research.

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BEFORE THE FEDERAL COMMUNICATIONS COMMISSION

IN THE MATTER OF
AMERICAN TELEPHONE AND TELEGRAPH COMPANY
PETITION FOR MODIFICATION OF
PRESCRIBED RATE OF RETURN

)
)
) CC DOCKET NO. 13-80
)
)
)

PREPARED BY: TESTIMONY

DR. MURRAY J. GORDON

AND

DR. LAWRENCE I. GOULD

APRIL, 1980

III. COST OF EQUITY CAPITAL

It is widely accepted that a public utility should earn a return on capital that allows it to raise the capital necessary to meet the demand for its services without an adverse effect on current shareholder stock. Such a rate of return is called the utility's cost of capital. A return in excess of that rate burdens the consumer with prices which are excessive and causes an unjustified transfer of income from the consuming public to the shareholders of the utility. It also encourages the utility to increase costs and prices further by overinvesting in plant facilities. On the other hand, a return on capital below the required return may discourage the utility from raising sufficient capital to meet demands for service, causing consumers to suffer an impairment in the quantity and quality of service. Therefore, if the return allowed by the Commission is either too high or too low, the result is less than satisfactory to the consumer. The testimony which follows is offered with a view to estimating as closely as possible the actual required return on capital (also called the cost of capital) and, with some care, to avoiding any bias in either direction.

In measuring the cost of capital from each source, the cost of debt and the cost of preferred capital pose few problems. It is clear that the utility must pay the

embedded interest on its outstanding debt and the prescribed dividend on the preferred stock. Both of these measurements involve perfectly straightforward calculations. Somewhat more controversial is the problem of determining the cost of common equity capital.

A. General Principles

A utility's cost of common equity capital is the return or yield that investors on average require on its common stock as implied in the price that they are willing to pay to hold the stock. This implied yield is the cost of common equity capital, because the existing shareholders neither gain nor lose as a consequence of additional investment and financing, regardless of the method of financing, as long as the return the company earns on its common equity is equal to the return investors require on the stock. By contrast, when the allowed return on common is above the return investors require, each dollar of additional financing raises the value of the existing shares. Conversely, when the utility's operating income less interest on debt, income taxes, and preferred dividends does not leave a return on common equity equal to the return investors require on the stock, we not only have a depressed stock price because of the low return, but, in addition, each dollar of additional investment and financing

further depresses the price.

The theoretical basis for the conclusion just stated has been fully developed,¹ but a simple analogy goes a long way in demonstrating the point. Ignoring operating costs, a bank that borrows at 8% and lends at 10% adds 2% of the amount borrowed and loaned to the earnings of the bank's shareholders. The more the bank borrows and lends with this 2% spread, the more it increases future earnings on and the current value of its common stock. The return that investors require on a utility's common stock is, in one form or another, what must be paid for additional equity funds, and if the company earns more on the money than it must pay to get the funds, the excess adds to the earnings on and value of the existing shares. Conversely, if the company earns a lower rate of return than it pays on additional funds, the difference comes out of the pockets of the existing shareholders.

While the management of a utility ~~may not be able to~~ prevent a regulatory agency from allowing it a rate of return on capital below its costs of capital, it will, quite understandably, be reluctant to compound the mis-

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For an extensive discussion, see M.J. Gordon, The Cost of Capital to a Public Utility, Michigan State University, East Lansing, Michigan, 1974.

fortunes of its shareholders by further depressing the stock price through undertaking further investment in the face of an inadequate return on capital. A difference between the return on capital and its cost is fully reflected in the return on common equity, since the bondholders and preferred shareholders are assured of receiving their prescribed returns on capital regardless of the allowed rate on total capital. However, the long-run dependence of the value of a public utility's stock on the service provided to its customers could make it advisable for the company to undertake essential capital expenditures in the face of a small and hopefully temporary unfavorable difference between the allowed rate of return and the cost of capital.

Management's own commitment to continued growth or its reluctance to face the problems of a sharp curtailment in growth may persuade it to continue a high rate of investment in the face of an unsatisfactory rate of return. However, this amounts to an appropriation of shareholder wealth in pursuit of managerial objectives, and sooner or later the shareholders may turn to a new management that is more solicitous of stockholder welfare.

B. Measurement of DCF Cost of Equity Capital

The principles used to measure the cost of common

equity are the same as those used in measuring the yield which investors require on debt or the yield required on outstanding preferred stock. However, in the case of debt and preferred stock, the payments to investors are relatively certain and, thus, amenable to objective calculation. However, the future dividend payments on a share of stock are uncertain, and determination of the expected yield required by investors requires the use of a more complex, yet still relatively simple and very reliable, method for dealing with the problem at hand.

This method is called the DCF (Discounted Cash Flow) Method for computing the cost of equity capital.¹ It represents the valuation of a share of stock by the expression:

$$P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \dots + \frac{D_t}{(1+k)^t} + \dots + \frac{D_{\infty}}{(1+k)^{\infty}} \quad (1)$$

In this expression:

P_0 = the current price per share;

D_t = the expected value of the dividend the share will pay at the end of period t ; and

k = the yield or return investors require on the share.

¹ This method was developed by Myron J. Gordon in an article in Management Science in 1956 and was first introduced in testimony in the American Telephone and Telegraph Co. Case, F.C.C. Docket 16238, 1966.

If the future dividends are expected to grow at the rate of g each period, Equation (1) reduces to:

$$P_0 = \frac{D_1}{k-g} \quad (2)$$

Solving Equation (2) for k results in an expression for the yield that investors require:

$$k = \frac{D_1}{P_0} + g. \quad (3)$$

In other words, to measure the expected return that investors require we may take the sum of the dividend yield and the expected rate of growth in the dividend.

An alternate approach to Equation (1) for the price of a share is:

$$P_0 = \frac{D_1 + P_1}{1+k}. \quad (4)$$

Here, we take as the future payments the next period's dividend and the end-of-period price. However, $P_1 = P_0(1+g)$, and this substitution plus a little algebra results in Equation (2). Hence, the two approaches to share valuation result in the same measurement equation for share yield.

In order to use Equation (3), we need to measure both

the dividend yield and the expected rate of growth in the dividend.

1. Measurement of Dividend Yield

The term for dividend yield in the Eq. (3) expression for a share's yield is the forecast dividend for the coming period, D_1 , divided by the current price, P_0 . The value assigned to P_0 should be the price of the share at the time the share yield is being estimated. The rationale for using the current price is that at each point in time it reflects all the information available to a company's investors regarding future dividends. Hence, the yield investors require on any date is the discount rate that equates on that date the current price and the expected stream of future dividends. To use an average of share prices over some prior time period for P_0 would result in a value for k without meaning, that is, it would not provide the average value for k over the prior time period. Furthermore, to obtain an average value for k over some prior time period, one must average the values of share yield -- not of share price.

D_1 is the forecast dividend for the coming year if dividends are paid annually. Common practice, however, is to pay dividends quarterly, in which case D_1 in Eq. (1), the fundamental expression for share price, is a quarterly

dividend. The value of k that satisfies Eq. (1) is the quarterly yield on the share, and the g in Eqs. (2) and (3) is the quarterly rate at which the dividend is expected to grow.

Because it is customary and convenient to think in terms of annual and not quarterly figures for rate of return and growth statistics, annualized figures will be used here. Annualized figures are simply four times quarterly figures. That is, if the current price of a share is $P_0 = \$50.00$, and if its forecast dividend for the coming quarter is $D_1 = \$1.25$, the quarterly dividend yield is $\$1.25/\$50.00 = 2.5\%$, and the annualized dividend yield is 10%.

We all know from bank advertisements that when interest is compounded more frequently than once a year, two annual interest rates may be computed. To illustrate, an interest rate of 15% per year with the interest compounded quarterly means that a dollar left on deposit for a year will have 3.75% added to the balance at the end of each quarter, and the balance in the account at the end of the year will be \$1.1587. In other words, a 15% interest rate compounded quarterly will earn interest equal to 15.87% of the balance at the start of the year.

What does this imply for arriving at a rate of return equal to the cost of equity capital? If the quarterly yield at which a public utility share sells is 3.75%, should the utility be allowed to earn for the year a rate of return on

common equity of 15% or something more? The answer is:
 (1) more than 15%, if the rate of return the company earns is calculated on the basis of the common equity at the start of the year; and (2) only 15%, if the rate of return on common equity is calculated by averaging its values at the start and at the end of the year. This statement is proved in Schedule 27. The latter method represents common practice and the practice followed here. Hence, in arriving at the cost of equity capital, the correct figure for the dividend-yield term in Eq. (3) is the annualized value of the forecast dividend for the coming quarter divided by the current price.

2. Measurement of Expected Growth

A difficult problem is the determination of the long-run dividend growth expectations of investors. In other words, what is the expected rate of growth in future dividends per share, g , in which investors on average believe?

To solve the problem, it is essential to understand the determinants of long-run expected dividend growth. If a company is expected to earn a rate of return of r on its common equity, and if it retains the fraction b of its earnings, then each year its earnings per share can be expected to increase by the fraction br of its earnings per share in

the previous year. Thus, br is an excellent measure of the expected rate of growth in future earnings per share. If the company is expected to have a stable retention ratio and, therefore, a stable dividend payout ratio, it follows that br is also an excellent measure of the expected rate of growth in future dividends per share. That is:

$$g = br. \quad (5)$$

This relationship is illustrated in Schedule 18. There the hypothetical initial common equity or book value per share = \$10.00, $r = .10$ and $b = .4$. The first period earnings are expected to be \$1.00 per share and the expected dividend is \$.60. The retained earnings raise the book value of equity to \$10.40 at the start of the second year, and r times that is \$1.04, which is equal to the earnings per share the second year. The dividend in the second year is expected to be \$.624, and so on through time. The earnings, dividends, and stock price are expected to grow at the rate $br = (.4) (.10) = .04$ in every future year.

If investors require an 8% return on the stock, the initial price is:

$$P_0 = \frac{D_1}{k-g} = \frac{\$.60}{.08-.04} = \$15.00. \quad (6)$$

Similarly, the expected share price after one year is:

$$P_1 = \frac{D_2}{k-g} = \frac{\$5.624}{.08-.04} = \$15.60 \quad (7)$$

The price in subsequent periods rises by 4% as long as the yield investors require on the share remains equal to 8%.

In fact, a company's return and retention rates do not remain constant over time. However, if investors expect that a company will on average earn a return of r and retain the fraction b of its earnings, they will expect the dividends, earnings, and price to grow at a rate br due to retention of earnings.

Stock financing will be a further cause of expected growth if the company is expected to issue new shares and if the stock's market price is greater than book value. Conversely, when a company is expected to engage in stock financing through the sale of stock at share prices below book value, ignoring the stock financing results in an overestimate of growth and share yield. If the company is expected to engage in little or no stock financing, or if stock financing is expected to occur only when the market value is close to book value, the expected rate of growth in the earnings, dividends, and price per share is $g = br$. As will be shown later, we may ignore stock financing and only consider growth due to retention of earnings.

If two conditions are satisfied, the best estimate of g is obtained either from the company's current values of b and r or from weighted averages of their recent values. These two conditions are: stock financing may be ignored for either of the reasons stated above, and there is no information other than the past values of b and r which can be used to forecast their future values.

The sharp rise in energy prices and other costs over the past decade have had a disruptive influence on the electric utility industry, and they have created situations in which there are obvious reasons why past values of b and r should not be projected into the future. In two recent cases, the DCF formula was adapted to deal with the peculiar circumstances of each case.¹ Similarly, as will be shown below, the recent dramatic change in anticipated inflation provides information which should be used to modify the past values of b and r in order to obtain a more accurate forecast of expected growth.

3. Alternative Measures of Expected Growth

It might be thought that past rates of growth in

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Testimony of Myron J. Gordon, Boston Edison Company Case No. DPU 19300, Commonwealth of Massachusetts, Department of Public Utilities, 1977; and Testimony of Myron J. Gordon, Public Service Company of New Mexico Case No. 1419, New Mexico Public Service Commission, 1979.

either earnings, dividends, or price could be used as estimates of g , the forecast rate of future growth in dividends. However, these past rates of growth are most unreliable due to extraneous influences on them, such as changes in the rate of return on common equity; changes in the retention rate, or changes in the yield required by investors in the case of price changes. The potential error in using past growth in earnings to estimate g is illustrated in Schedule 19, where the hypothetical company's return on common equity is 10% in the first three periods and 15% in the last three periods. With a retention rate of 40% and a return rate of 15% the growth rate is 6% in the last three years. This is a reasonable estimate of the expected future growth rate as of the end of the 6th year. However, with the 36% growth rate due to the rise in the return rate in the fourth year, a simple average of the five annual past growth rates in earnings is in excess of 15%. Clearly, this type of estimate of future growth rates cannot be used with any reliability at all, especially now when public utilities have received frequent upward adjustments in their allowed rates of return over the past five years. To do so would be to expect the company's rate of return on common equity to increase by 50% about every five years. This would be a ridiculous forecast, which the use of b and r would make readily apparent.

It can also be demonstrated that a change in the dividend payout rate makes the past rate of growth in dividends an incorrect basis for predicting g . Assume that a company has been earning a rate of return on its common stock of $r = .10$, that it has been retaining the fraction $b = .60$ of its earnings, and that, as a consequence, its dividend has been growing at the rate $br = (.60)(.10) = .06$. If the company were to raise the fraction of earnings it pays in dividends so that b falls to $.25$, the rate of growth in the dividend would then fall to $br = (.25)(.10) = .025$. However, over the period that spans the rise in the dividend payout rate, the dividend would have grown at an even higher rate than the prior 6%. It would only be correct to project the past rate of growth in the dividend into the future on the highly implausible assumption that the company is expected periodically to raise its payout rate. Therefore, unless there is convincing evidence to the contrary, current expectations of b and r provide the best basis for forecasting future growth.

C. Cost of Equity Capital for AT&T

Under the method we have advocated for estimating future growth, the DCF formula for a company's cost of equity capital is:

$$k = \frac{D_1}{P_0} + br. \quad (8)$$

To arrive at a company's current value of k , the current value of each of the quantities on the right-hand side of Equation (8) must be determined. This is done below for AT&T. As we will see, obtaining estimates of these values is extremely difficult in the turbulence of today's capital markets.

1. Dividend Yield

We argued above that the projected dividend yield is appropriate for setting the allowed rate of return on equity. The current quarterly dividend payable on April 1, 1980, is \$1.25. The Value Line forecast for dividends over the next 12 months has been reduced from \$5.20 in June, 1979, to a current forecast of \$5.00.¹ Value Line reduced its forecast dividend even though it was aware of AT&T's stated intent to maintain shareholders real dividend income against inflation.² For the last few years AT&T has followed a policy of raising its dividend in the first quarter. With the recent declaration of the dividend to be paid on April 1, 1980 maintained at \$1.25,

¹ Value Line, March 13, 1980.

² Value Line, February 1, 1980.

the Value Line estimate appears reasonable, and we will use a dividend of \$5.00, equal to the annualized value of the current quarterly dividend of \$1.25.¹

We have also argued that we should use the share price on the date for which the estimate was made. Since this testimony was finalized on March 29, 1980, we will use the company's closing price on the previous day, that is, $P_0 = \$48.50$, which results in a dividend yield of $\$5.00 / \$48.50 = 10.31\%$.

Ordinarily, for periods of up to a few months, the price of a public utility share only fluctuates in a narrow range, and the choice among the prevailing prices is usually of no particular significance. However, the impact of inflation during the second half of 1979 and the actions and statements of the Federal Reserve Board and other government officials (beginning in October and culminating in President Carter's recent anti-inflation program) have had a striking impact on the capital markets. Short-term interest rates have risen sharply, and the yields and prices on long-term securities have fluctuated dramatically. In particular, as can be seen in Schedule 20, AT&T's stock fell from \$57.83 on June 30, 1979, to \$55 on September 30, 1979. Since then it has decreased steadily to a low of \$45 on March 7, 1980, before rising to the current price of \$48.50 on March 28, 1980. During the same period its dividend

¹ Projection of a higher dividend in the current economic environment would require a downward revision in the growth rate forecasts below.

yield rose steadily from 8.99% on June 30, 1979, to the current projected yield of 10.31%. This was due mainly to the effects of its dropping share price, but also to the reduction in its projected dividend from \$5.20 to \$5.00.

Through their impact on the dividend yield, the date and the share price used to arrive at AT&T's cost of equity capital have a material impact on the value obtained for k . In other words, in a period over which interest rates fluctuate widely, share prices and the cost of equity capital also fluctuate widely. At the time this testimony was prepared, the reaction to President Carter's anti-inflation program was unknown. Although our estimated dividend yield of 10.31% represents our best estimate at this time, the unfolding reaction to the President's program may cause AT&T's dividend yield to vary considerably over the next few months.

2. Growth Rate - Past Financial Data

In order to arrive at AT&T's growth rate, we require the retention rate, b , and the rate of return on common equity, r , that investors may reasonably expect.

As a first step, let us estimate b and r using only historical data. Schedule 21 shows the underlying data for the years 1973 to 1979 that is needed to calculate b and r .

For the rate of return on common equity that investors expect, we first note that a simple average of the