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:

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

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 regression[4] 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 Unhedge
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 Goverments	
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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At Franklin Templeton Investment Solutions, we translate a wide variety of investor goals into portfolios powered by Franklin Templeton's best thinking around the globe. We serve a variety of institutional clients, ranging from sovereign wealth funds to public and private pension plans in addition to retail multi-asset clients around the world.

The hallmark of our approach is a central forum—the Investment Strategy & Research Committee—which generates a top-down view across asset classes and regions, and connects and synthesizes the bottom-up sector and regional insights of the global investment teams at Franklin Templeton.

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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 million × 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

= [(Real GDP in year n) − (Real GDP in year n − 1)] / (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 noninclusion 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]

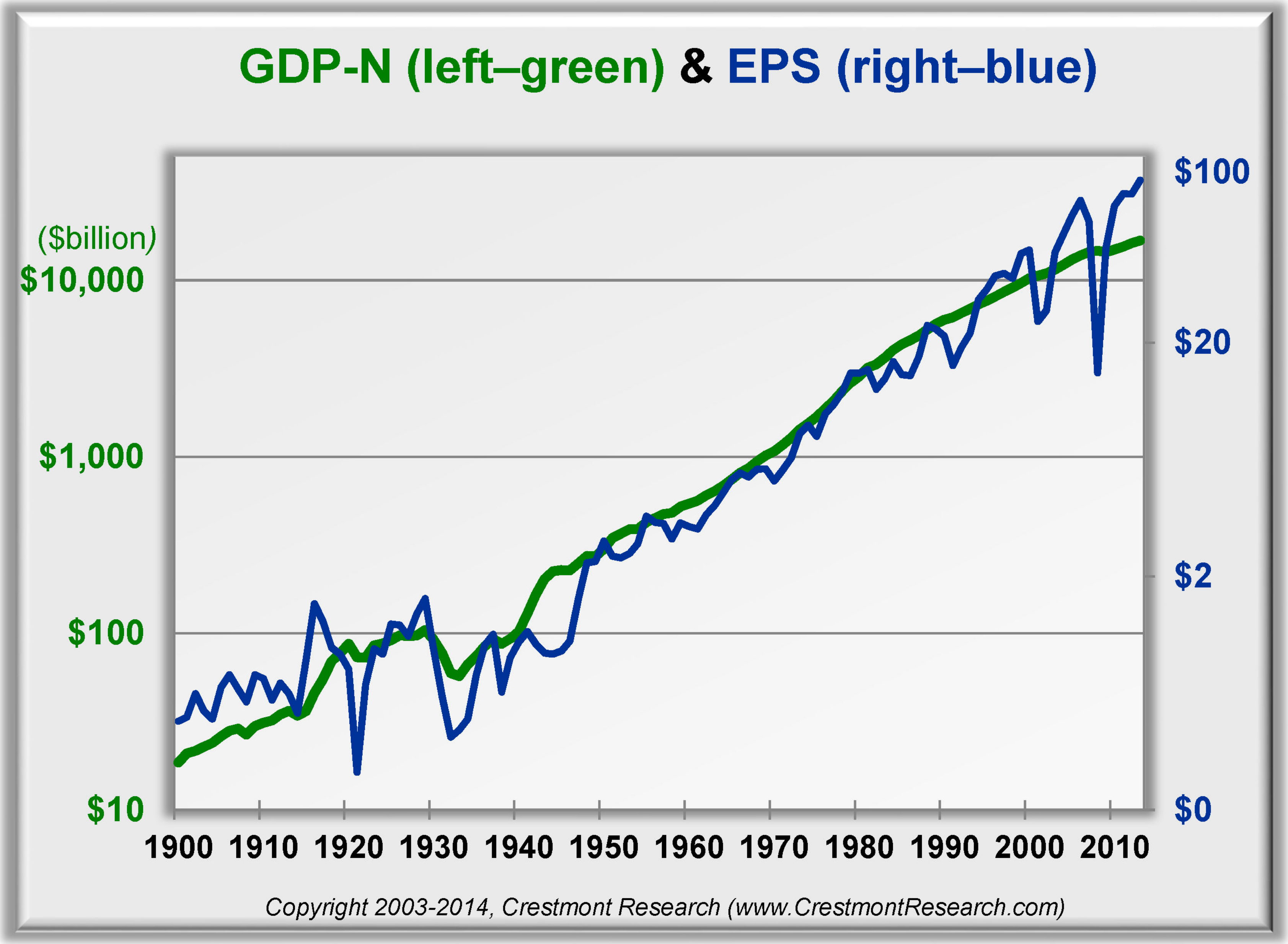
The UK's Natural Capital Committee highlighted the shortcomings of GDP in its advice to the UK Government in 2013, pointing out that GDP "focuses on flows, not stocks. As a result, an economy can run down its assets yet, at the same time, record high levels of GDP growth, until a point is reached where 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)
($billion)
$10,000
$1,000
$100
$10
$100
$20
$2
$0
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
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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.

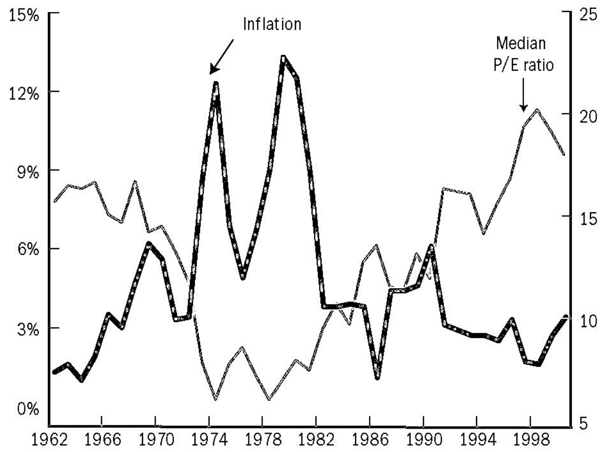
The latter is conceptually preferable. After all, the cost of equity should reflect the return expected (required) by investors. But forward-looking estimates are fraught with problems, the most intractable of which is the difficulty of estimating future dividends or earnings growth. Some theorists have 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 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.

Exhibit 1. US median P/E vs. inflation

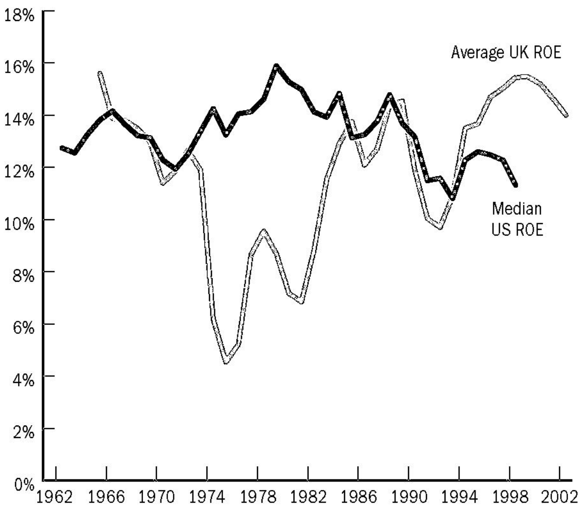


Source: McKinsey analysis

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:

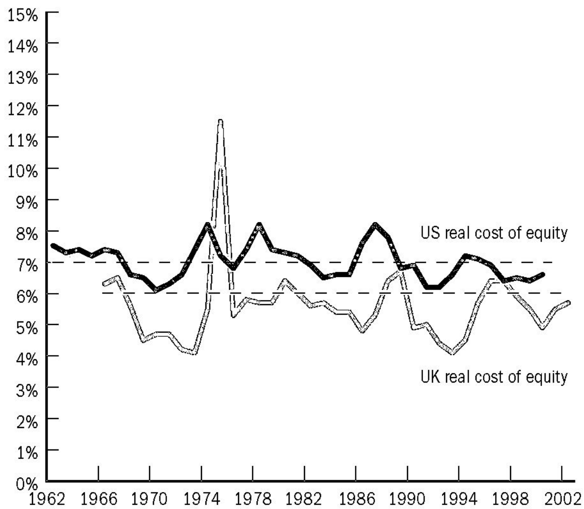
1. *Median stock price valuation.* For the US, we used the value of the median company in the S&P 500 measured by P/E ratio as an estimate of the market's overall valuation at any point in time. Most researchers have used the S&P 500 itself, but we argue that the S&P 500 is a value-weighted index that 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

Exhibit 3. Annual estimates of the real cost of equity



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.

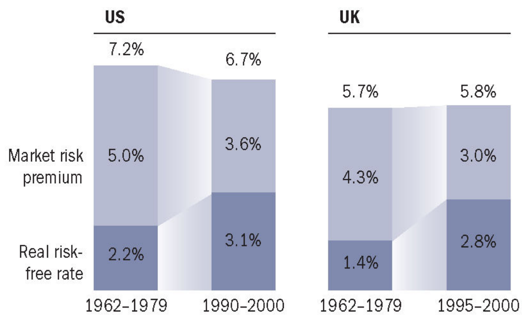
2. *Dividendable cash flows.* Most models use the current level of dividends as a starting point for projecting cash flows to equity. However, many corporations have moved from paying cash dividends to buying back shares and finding other ways to return cash to shareholders, so estimates based on ordinary 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 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.

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



Source: McKinsey analysis

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 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:

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

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:

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

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

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

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

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

And thus the cash flows can be expressed as:

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

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

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

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

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

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

Marc H. Goedhart (Marc_Goedhart@McKinsey.com) *is associate principal in McKinsey's Amsterdam office,* ***Timothy M. Koller*** (Tim_Koller@McKinsey.com) *is a principal in McKinsey's New York office, and* ***Zane D. Williams*** (Zane_Williams @McKinsey.com) *is a consultant in McKinsey's Washington, D.C., office,*

[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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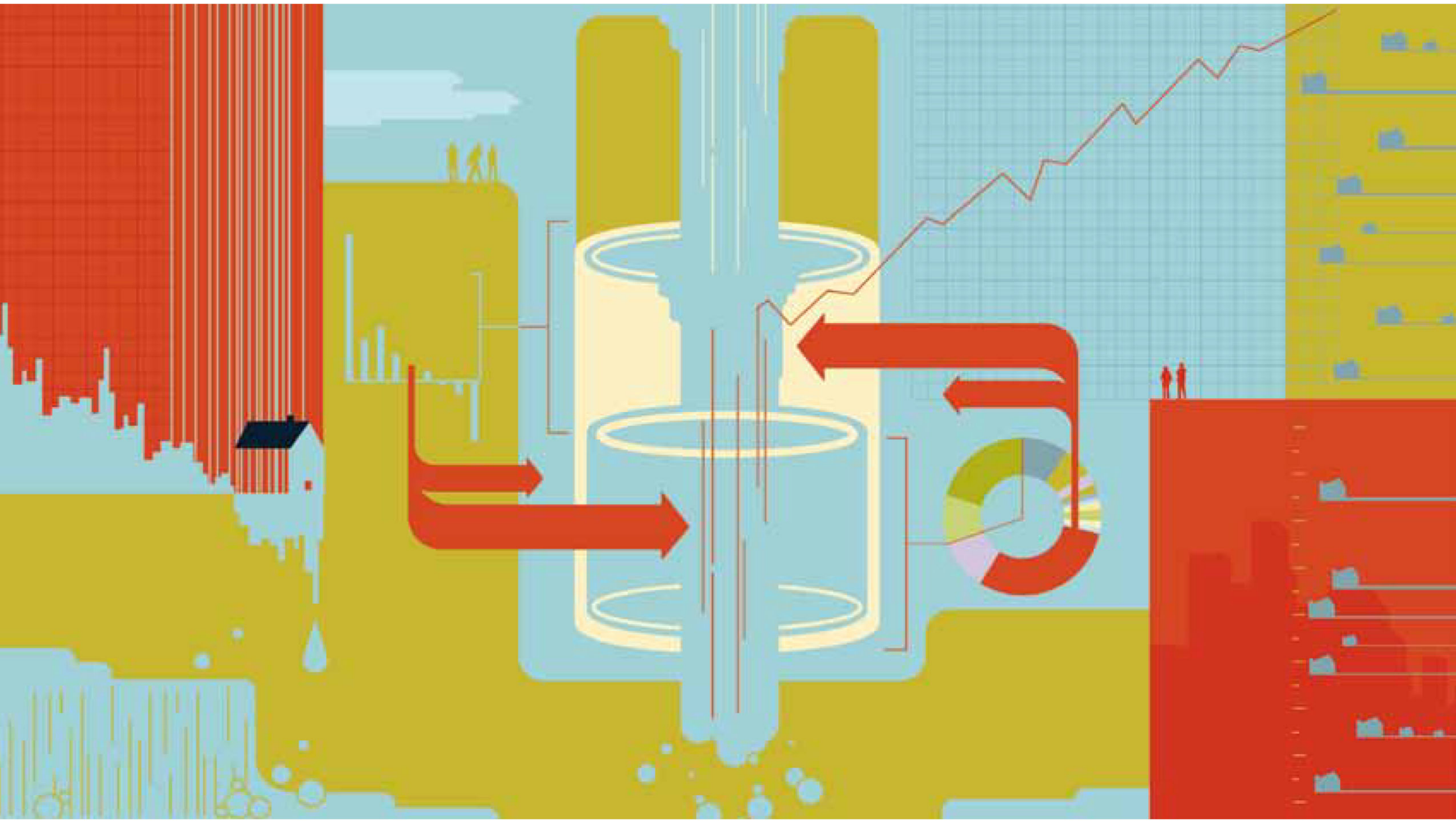
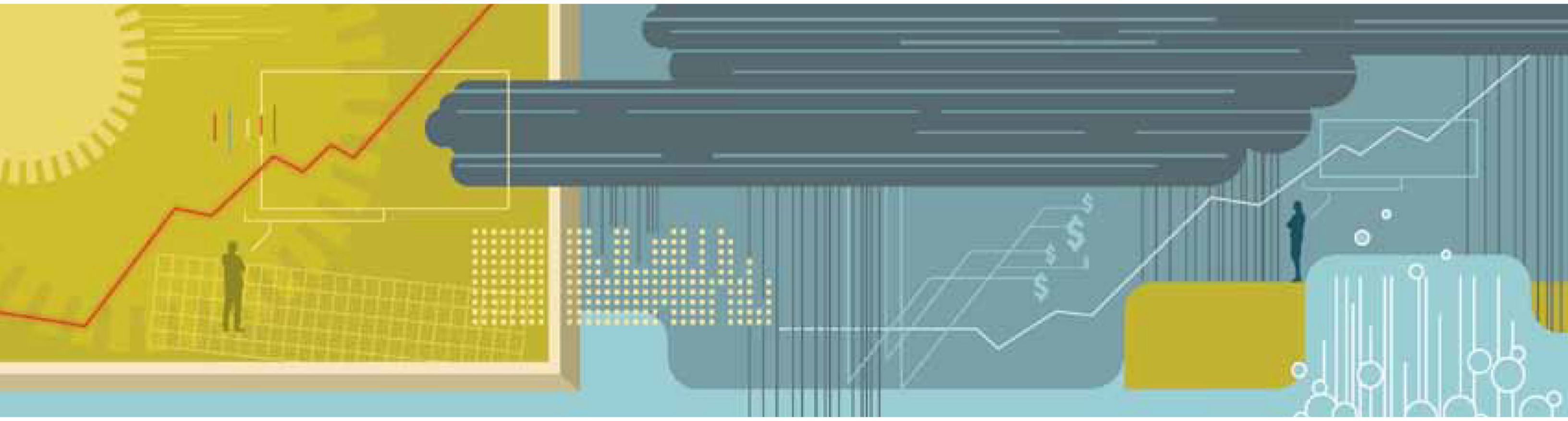




Equity analysts: Still too bullish

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.

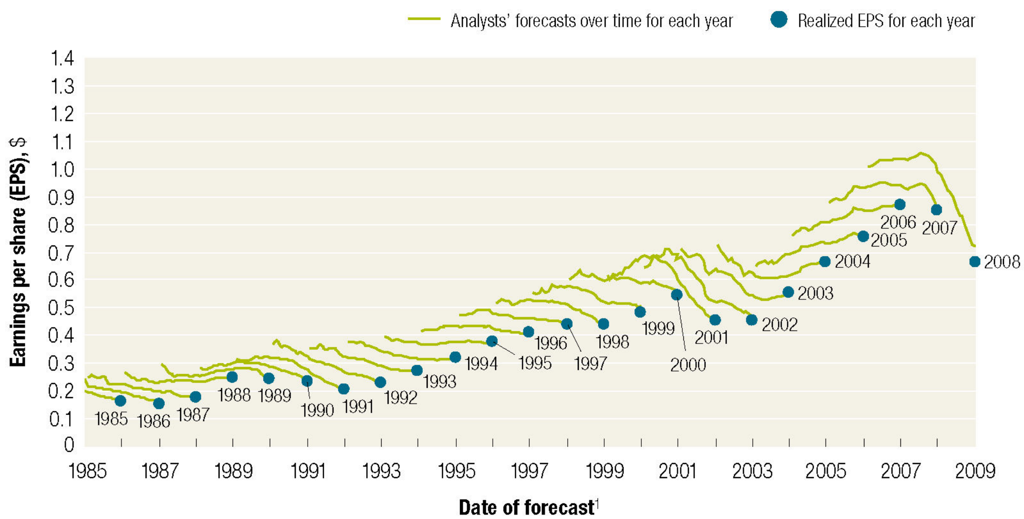
Exceptions to the long pattern of excessively optimistic forecasts are rare, as a progression of consensus earnings estimates for the S&P 500 shows (Exhibit 1). Only in years such as 2003 to 2006, when strong economic growth generated actual earnings that caught up with earlier predictions, do forecasts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

Exhibit 1

Off the mark

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

S&P 500 companies



[1] Monthly forecasts.

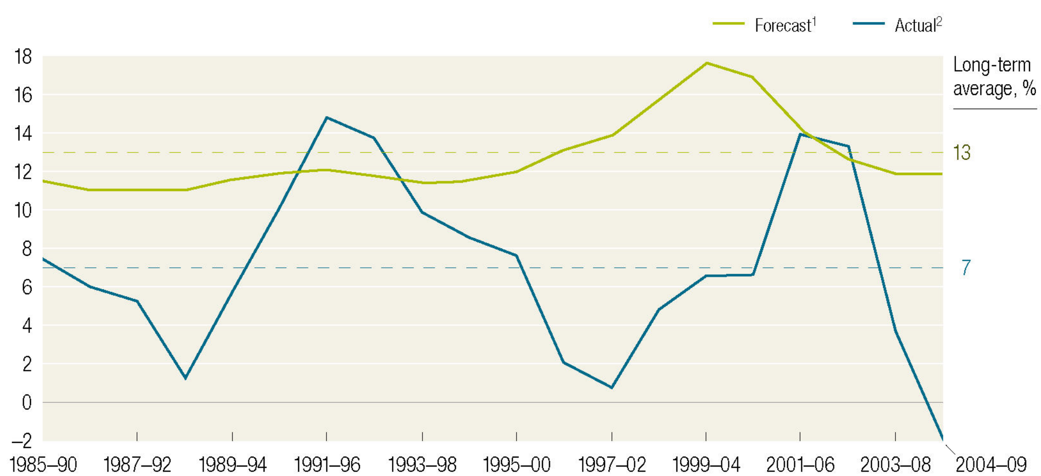
Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

Exhibit 2

Overoptimistic

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

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



[1] Analysts' 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.

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

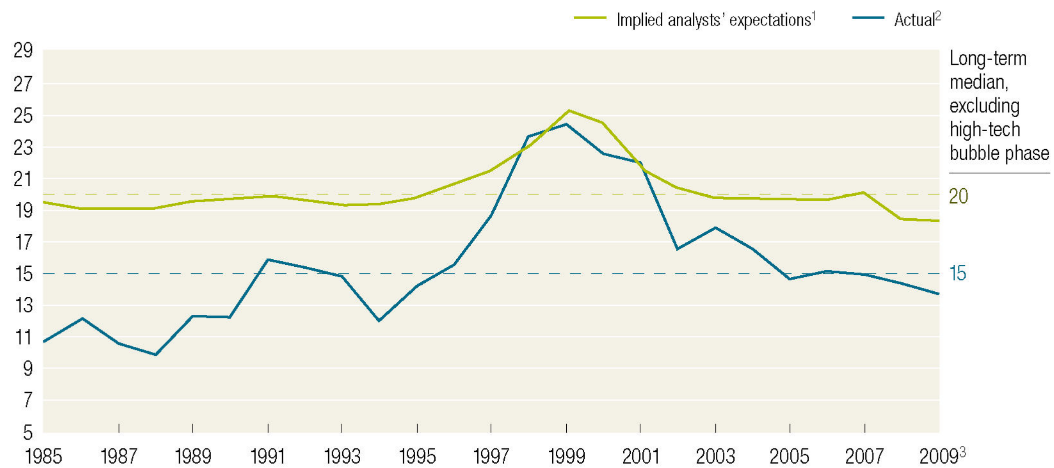
Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

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



[1] P/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.
[2] Observed P/E ratio based on S&P 500 value and 1-year-forward EPS estimate.
[3] Based 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 ratio[7] 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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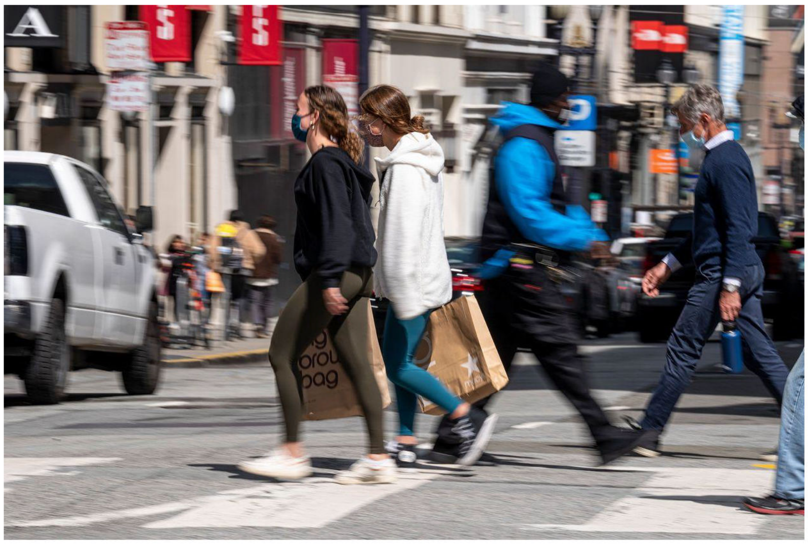
https://www.wsj.com/articles/corporate-bond-gauge-signals-dwindling-economic-risk-11619083800

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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5 minutes

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.

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 Treasurys, 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

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

SHARE YOUR THOUGHTS

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

THE WALL STREET JOURNAL.

Treasury Yield Curve Inverts To Deepest Level Since 1981

BY SAM GOLDFARB

Yields on longer-term U.S. Treasurys 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 Treasurys 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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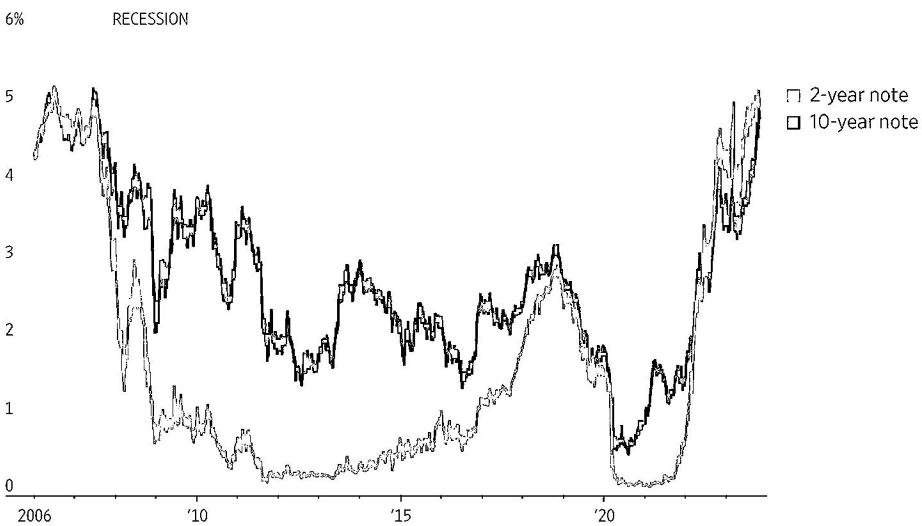
FINANCE | INVESTING

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.

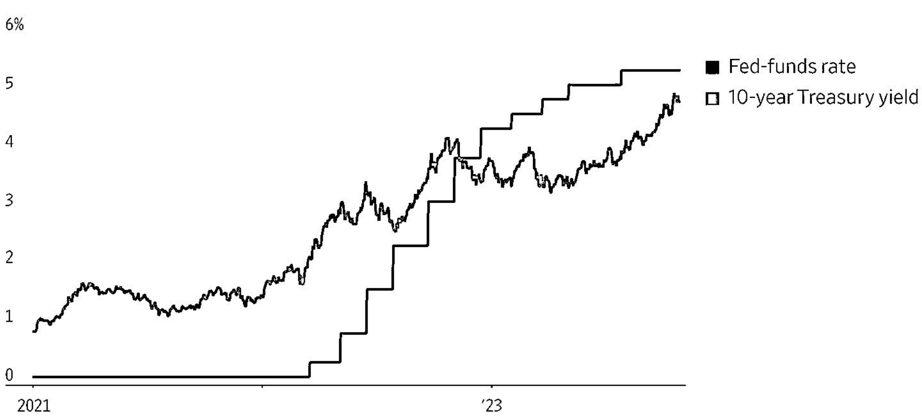
Treasury yields play a critical role in determining borrowing costs across the economy. Their nearly two-year surge has driven 30-year mortgage rates close to 8%, weighed on stocks and stirred anxieties that the surprisingly resilient economy could finally fall into a recession.

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

The Fed sets the tone

Yields on Treasurys 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

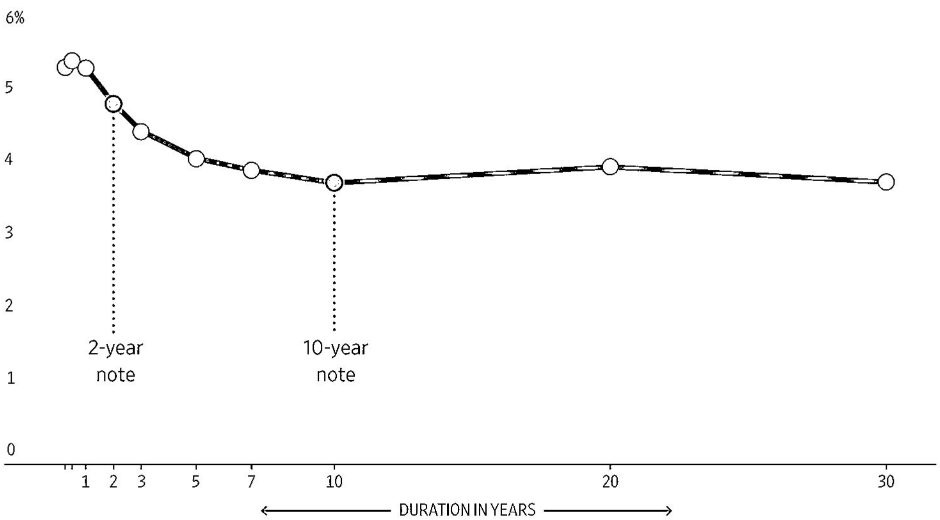
For much of 2022 and 2023, longer-term Treasury yields were well below short-term ones.

That anomaly, known as an inverted yield curve, is infamous for a reason. To accept lower yields on longer-term Treasurys, 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 Treasurys, 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.

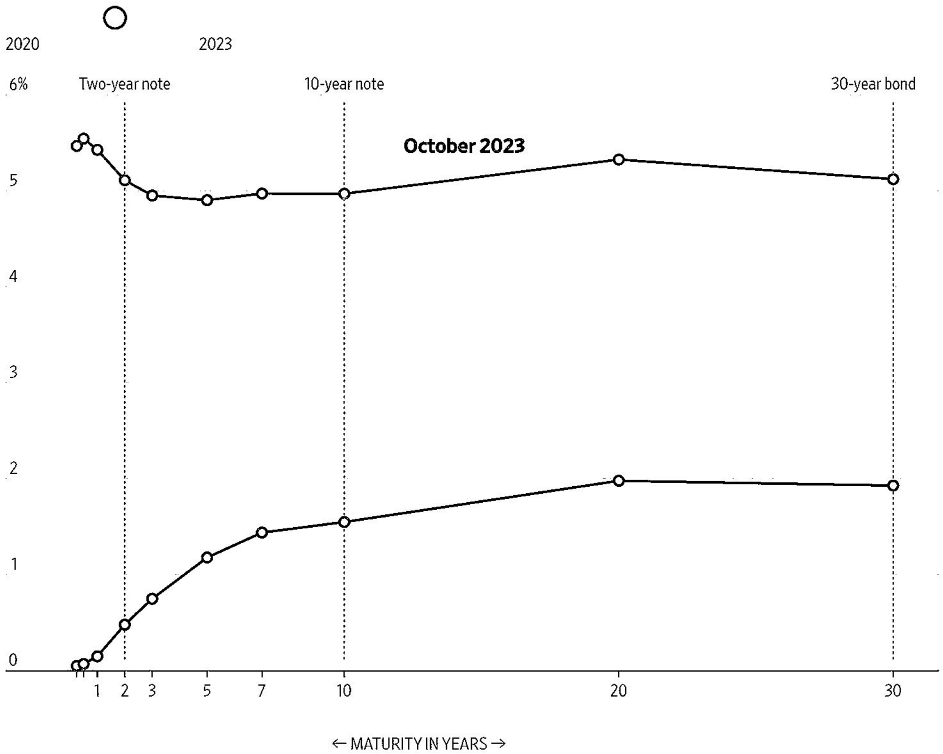
The unwinding of a popular bet

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 Treasurys, 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 2021 As 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%'.

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

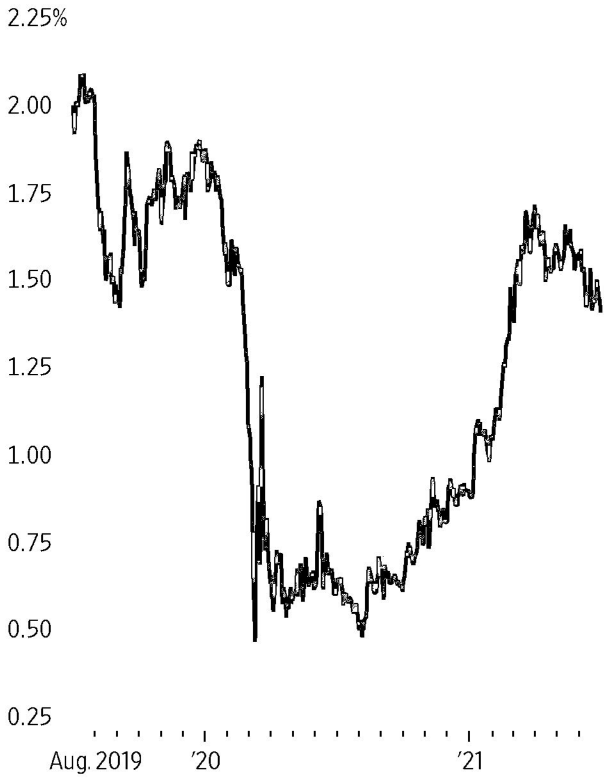
Updated June 30, 2021 4:10 pm ET

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 Treasurys 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.

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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.

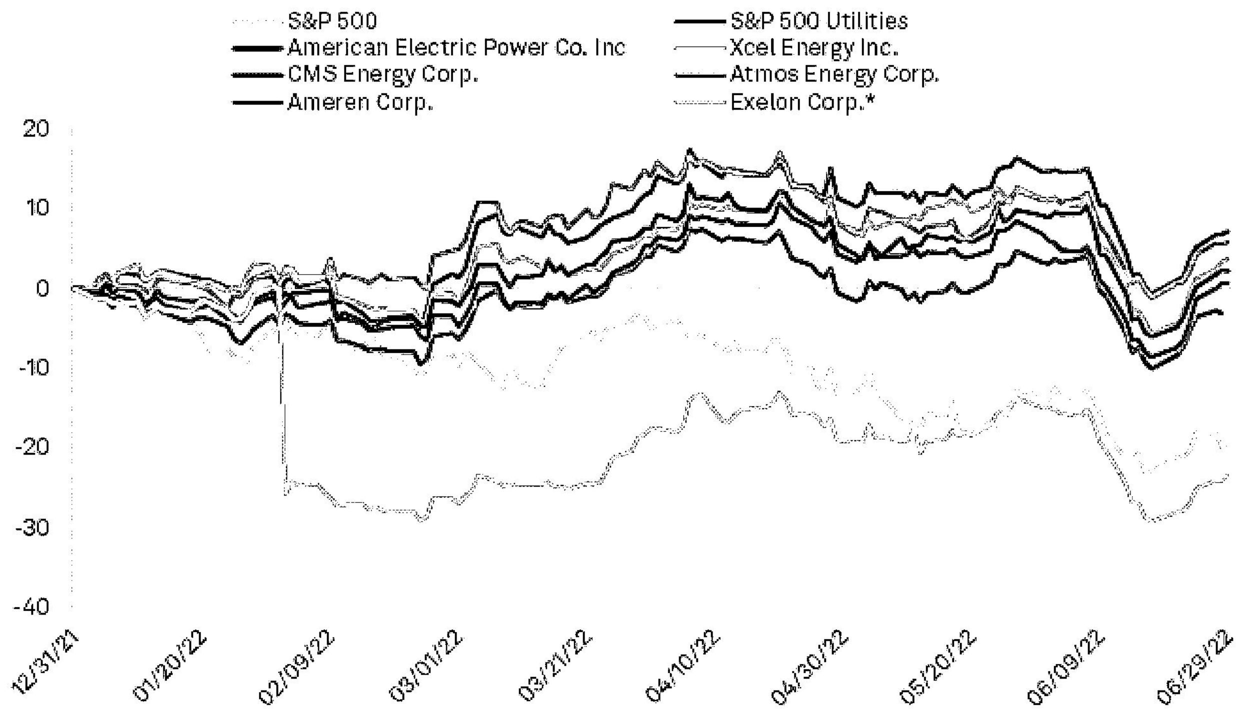
Utility share prices' recent deconsolidation from inflation has transformed the industry from a steady-growth, defensive play to a higher-growth sector that can increase earnings and return material capital to investors during economic dips. So far in 2022, the S&P 500 Utilities index has lost just 3% 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 Gloal 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

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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 βs."

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,

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

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

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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,

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

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

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

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

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

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

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

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,

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

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,

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

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 DIV(0) equals the dividend in the most recently realized period, then

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

and

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

and Equation 7 becomes

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

Equation 10 is the basis for the empirical work in this study, and it can be solved for EXR given PPS, DIV(0), NEPS(1), GRR, and N. PPS and DIV(0) are realized values, and 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

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

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

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

where BETA is as defined earlier, DYD equals DIV(0)/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 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:

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

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^2s 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 DYD + 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

	Excluded							
Date	NYSE/Amex Not Traded	BETA #obs < 45	I/B/E/S Missing Data	GRR #ests < 3	NEPS #ests < 3	DYD Value > 13%	EYD Value < 2%	Accepted
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

			BETA		DYD		SKEW		
Date	EXR Value	Constant Term	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Adjusted R^2
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 $N \to \infty$) 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

	EXR Horizon								
Average	0 Years	5 Years	7 Years	10 Years	20 Years	$\to \infty$	BETA	DYD	SKEW
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

	Horizon					
Statistic	0 Years	5 Years	7 Years	10 Years	20 Years	$\rightarrow \infty$
Adjusted R^2						
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
Constant term						
Mean	0.0428	0.0629	0.0696	0.0780	0.0968	0.1287
BETA coefficient						
Mean	0.0191	0.0197	0.0199	0.0201	0.0199	0.0180
BETA t-statistic						
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
DYD coefficient						
Mean	0.644	0.576	0.549	0.512	0.405	–0.000
DYD t-statistic						
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
SKEW coefficient						
Mean	0.0017	–0.0008	–0.0017	–0.0027	–0.0048	–0.0082
SKEW t-statistic						
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

	EXR and BETA			EXR and DYD			
Date	0 Years	7 years	→ ∞	0 Years	7 Years	→ ∞	BETA and DYD
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

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

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

$$\gamma_0 = RFR(1 - TRP),$$
$$\gamma_1 = EXRM - RFR - (DYDM - RFR)\,TRP,$$

and

$$\gamma_2 = TRP$$

(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,

$$\gamma_0 = 6.69\%*(1 - 0.31)$$
$$= 0.0462 < 0.0696 = \alpha_0.$$

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

$$\gamma_1 = 10.86\% - 6.69\% - (3.14\% - 6.69\%)0.31$$
$$= 0.0527 > 0.0199 = \alpha_1 .$$

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 AJR^2 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	)	CC DOCKET NO. 79-63
	)	
PETITION FOR MODIFICATION OF	)	
PRESCRIBED RATE OF RETURN	)	

PREPARED DIRECT TESTIMONY

OF

DR. MYRON 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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1 For an extensive discussion, see M.J. Gordon, <u>The Cost of Capital to a Public Utility</u>, 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. <u>Measurement of DCF Cost of Equity Capital</u>

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:

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

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.

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[1]This method was developed by Myron J. Gordon in an article in <u>Management Science</u> in 1956 and was first introduced in testimony in the American Telephone and Telegraph Co. Case, F.C.C. Docket 16258, 1966.

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

$$P_0 = \frac{D_1}{k-g} \tag{2}$$

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

$$k = \frac{D_1}{P_0} + g. \tag{3}$$

In other words, to measure the expected return that investors require we may take the sums 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:

$$P_0 = \frac{D_1 + P_1}{1 + k}. \tag{4}$$

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_t 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=$50,000, 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:

$$g = br. \tag{5}$$

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:

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

Similarly, the expected share price after one year is:

$$P_1 = \frac{D_2}{k-g} = \frac{\$.624}{.08-.04} = \$15.60 \qquad (7)$$

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. Altarnative Measures of Expected Growth

It might be thought that past rates of growth in

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1 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 56% 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, <u>current expectations of b and r provide the best basis for forecasting future growth.</u>

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:

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

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,

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[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_o = $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

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[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 1975 to 1979 that is needed to calculate b and r.

For the rate of return on common equity that investors expect, we first not that a simple average of the five values of r_t (row 5) from 1975 to 1979 is 11.81%. However, inspection of the annual values reveal that although r was abnormally depressed in 1975, its values for the next three years exhibited a definite upward trend, and then only declined slightly in 1979. Investors now might well believe that the material rise in the cost of capital between 1975 and 1979 justifies the rates of return the company realized in the more recent years, in which case they would rely primarily on the 1978 and 1979 figures in forecasting the company's future rate of return. A simple average of these figures is 13.05% and it seems reasonable that investors might conclude that 13% represents the best estimate of the long-term return AT&T is expected to earn on common equity.

For the retention rate that investors expect, we first note that a simple average of the five values of b_t (row 9) from 1975 to 1979 is 37.23%. However, this average is affected by the low retention rate in 1975, and in recent years, 1977-1979, the retention rate has averaged 38.93%. It seems reasonable that on the basis of this data, investors might use these recent years, and arrive at 39% as the best estimate of AT&T's retention ratio.

Combining the above values (obtained by using historical values in Equation (8) for P_0, D_1, b, and r) provides an estimate of AT&T's cost of equity capital as of March 28, 1980, of:

$$k = \frac{D_1}{P_o} + br$$

$$= \frac{\$\ 5.00}{\$48.50} + (.39)(.13)$$

$$= .1031 + .0507 = 15.38\% \ .$$

However, before accepting this result it may be instructive to pose the following question: What would have been the estimate for k as of June 30, 1979?

3. Growth Rate - Recent Developments

On June 30, 1979, Value Line estimated that AT&T's 1979 earnings would be $8.00 per share. The actual value of earnings per share for 1979 was $8.04. Since we would have been reluctant to estimate k at that time without 1979 data, we would have relied on the Value Line forecast to complete the 1979 annual data, a procedure we have used in the past. Since the Value Line estimates were extremely close to the actual 1979 results, using these estimates and the historical data would have produced the same estimates of b and r obtained previously. It is obvious that if the data and analysis do not change materially, we would obtain the same measurement of the growth rate at any point between June 30, 1979, and March 28, 1980.

The estimates which would have been obtained on two previous dates are provided below:

Date	D_1/P_0	+	br	=	k
June 30, 1979	8.99%		5.07%		14.06%
November 19, 1979	9.39%		5.07%		14.46%

An estimate is provided for November 19, 1979, for comparative purposes, since an estimate of k was obtained for Rochester Telephone Co. on that date of 14.85%.[1] The difference in k between Rochester Telephone and AT&T may be attributed to AT&T's slightly lower business risk due to its greater diversification.

The problem can now be easily seen. The estimate of 15.38% obtained for AT&T is correct only if we assume that the large increase in the expected rate of inflation (which raised the dividend yield on AT&T from 8.99% on June 30, 1979, to 10.31% on March 28, 1980) had no effect on the anticipated growth in the dividend.

It is extremely unlikely that investors believe that to be true. The rise in the expected rate of inflation has not only increased interest rates, but also the expected rate at which AT&T's other costs of production, such as materials and labor, will grow. A continued expectation that the company will earn a return on common of 13% and retain 39% of earnings would require the belief that the rate of growth in its revenues will rise to match

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1 Myron J. Gordon, Direct Testimony, Before the State of New York Public Utility Commission, In the Matter of Rochester Telephone Co., November 20, 1979.

the rise in the rate of growth of its costs. However, if investors fear that the regulatory process will not be fully responsive to the increase in the rate at which the company's costs are rising, they will revise their growth estimate downward. That is, with any regulatory lag in the pass through of higher costs, a rise in the expected inflation rate would reduce investor estimates of long-run return on common equity, and would, therefore, result in a downward revision of expected growth. In that event, simply raising the estimate of AT&T's cost of equity capital by the increase in the dividend yield would result in an overstatement of the required return.

It is our judgment that the response of investors to the rise in the expected rate of inflation has been a downward revision in expectations regarding AT&T's rate of return on common equity, implying a downward revision in its retention rate also. In support of this position, we note that Value Line lowered its prediction of 1980 earnings per share for AT&T to $7.50, and lowered its predicted 1980 dividend per share to $5.00.[1] This implies for 1980 an estimate for r of 11.60% and an estimate for b of 33.33%.

Under the present turbulent economic conditions it is extremely difficult to estimate with precision the extent

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[1] Value Line, February 1, 1980.

to which these rates have been revised downward. If the revised figures are a 12.50% return on common equity and a 37% retention rate, then the estimated growth rate must be reduced from 5.07% to 4.63%.[1] Adding the latter figure to the current dividend yield of 10.31% results in a cost of equity capital of 14.94%. On the other hand, the rise in interest rates over the past six months may be taken as evidence that the cost of equity capital has gone up over the same time period. Hence, in some measure, this rise in interest [illegible] will lead to an upward revision in the [illegible] of return allowed by the numerous regulatory commissions that set rates for AT&T. A generous allowance for the favorable impact of increases in the allowed rates of return on invest[illegible] forecasts of the AT&T growth rate is a rise in its value from the above 4.63% to 5.25%. This latter growth rate [illegible] with the 10.31% dividend yield re[illegible] equity capital of 15.56%. In our judg[illegible] the AT&T cost of equity capital may well be as low as 14.0%, [illegible] likely to be above 15.5%, and 15.25% represents our base estimate as of March 28, 1980.

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[1] Using this reasoning, the growth rate was adjusted downward by 69 basis points for Rochester Telephone. Ibid., Supplemental Prepared Direct Testimony, March 24, 1980.

A Comprehensive Look at the Empirical Performance of Equity Premium Prediction II

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Abstract

Our paper reexamines whether 29 variables from 26 papers published after Goyal and Welch (2008), as well as the original 17 variables, were useful in predicting the equity premium in-sample and out-of-sample. Our samples include the original periods in which these variables were identified, but ends later (in 2020). Most variables have already lost their empirical support, but a handful still perform reasonably well. Overall, the predictive performance remains disappointing.

Reader Please Note: Our paper examines many papers with many different variables in many different ways — over a thousand numbers altogether. Therefore, this draft contains myriads of formatting (color, background color, and font-sizing) that are intended to draw the reader's eye towards important results and away from unimportant ones. This is *not* standard journal formatting and will change before the paper is to be submitted to a journal. We also thank the authors of many papers reexamined here for corrections and feedback. Please bring any other errors to our attention. Amit Goyal's website at https://sites.google.com/view/agoyal145 contains a long and detailed appendix of variable definitions and results when the dependent variable is not logged.

Since Goyal and Welch (2008), henceforth GW, a large number of papers predicting the equity premium have been published in top finance journals. It thus seems that academic finance has conquered the problem of investors' predicting time-varying future stock market rates of returns. Many of these papers have further offered strong theoretical foundations for their proposed variables, presumably increasing faith in their forward-looking stability.

Our own paper here reexamines 29 variables proposed in 26 prominent recently published papers (Table 1), for which we could relatively easily reconstruct or obtain the predictive variable. The data in these papers ended between 2000 and 2017. We can replicate and confirm the principal in-sample findings for all but two of the papers, using a simple but consistent predictive framework based on uncontrolled OLS forecasting regressions. (Two papers had data issues.)

We then extend the samples by a few years, ending with stock market returns in December 2020—typically about ten extra years of data.. Because our paper reuses the data that the authors themselves had originally used to discover and validate their variables and theories, all that the predictors had to do in the few added years was not to "screw up" badly. The original results should still hold.

Yet, we find that most variables have already lost their predictive ability. Of 29 variables, 25 variables show lower in-sample significance when we use our extended sample period instead of the authors' original sample period. Only four variables predicted about equally well or better. The widespread deterioration in predictive performance partly reflects the fact that the added years offered great variety. There were three recessions, one in the early 2000s (with 9/11 and the dot-com end), one in 2008 (the Great Recession) and one in 2020 (the Covid-19 recession); and there were two major bear markets from 2000–2002 and in 2008 (plus a minor one in 2018). These (perhaps in-retrospect unusually remarkable) episodes could influence either the independent predictor variable or the dependent predicted equity premium enough to make a difference in the apparent forecasting ability, even though we also included and thus recycled the authors' discovery samples.[1]

Our paper investigates not only whether variables had good and statistically significant in-sample and out-of-sample performance, but also the investment timing performance in some simple investment strategies.

Our first investment strategy was long $1 in the equity premium when the predictive variable was bullish (relative to its prevailing median) and short otherwise. Not a single variable meaningfully (much less statistically) beat the buy-and-hold equity investment (*all-equity-all-the-time*). One can object that being invested in the stock market over the last 20-50 years was a remarkable positive experience that was tough to beat—though doing so is of course the point of market-timing. But good *all-equity-all-the-time* was not the only reason. Half of the predictors performed so poorly that they not only failed to beat *all-equity-all-the-time*, they even *lost* money in absolute terms. Our second investment strategy tilted far more towards equity. It was long the equity premium *unless* the predictor signal was extremely bearish (worse than the

[1] The recycling obviously gives a large advantage to the considered predictors and does not make our reexaminations true independent out-of-sample confirmations. However, rather than reflecting type-I errors in the original sample, the in-retrospect perhaps unusual economic and market performance could also have led to more type-II errors. Both are limitations of empiricism that are not possible to overcome within our expected lifetimes.

prevailing 25th percentile). Our third and fourth strategies also scaled the investment based on the Z-magnitude of the signal relative to preceding signals.

Of all variables, only one performed as well the *all-equity-all-the-time* investment strategy on the first strategy untilted unscaled timing strategy. On the equity-tilted strategy, 9 variables had higher returns than *all-equity-all-the-time* (and of these 9, only half were still significant in-sample). With both tilt and scale, the tally improved to 13 variables. Even then, not a single variable outperformed *all-equity-all-the-time* in a statistically significant manner—in fact, none could muster an absolute T-statistic above 1.3. Again, this is despite the fact that all timing strategies could invest during the sample periods in which the variables were identified to begin with.

As already hinted, not all variables performed poorly. The empirical analysis suggests some good candidates. The best and most consistent variable was:

Fourth-Quarter Growth Rate in Personal Consumption Expenditures (gpce**)** was introduced in Møller and Rangvid (2015). High personal consumption growth rates this year predict poor stock-market returns next year.

Empirically, since the 1970s, gpce has only made one modest misstep in its predictive ability (which was missing the Great Recession bear market). Otherwise, gpce has been a steady performer. (Nevertheless, a risk-averse investor, as defined by Campbell and Thompson (2008), would still not have been better off using gpce.)

A number of other variables have good performance on some but not all criteria. Thus, one could put them on a "watchlist" to monitor whether their performance will improve or deteriorate in the future. In no particular order:

(Aggressive) Accruals (accrul**)** was introduced by Hirshleifer, Hou, and Teoh (2009). Aggressive corporate accruals predict low future stock returns.

Tempering our enthusiasm, accrul's performance was episodic. In fact, it had only one—though singularly stellar—prediction. In 1999-2001, it strongly and correctly forecast the post-Tech stock market decline of 2000-2002. Since then, accrul has not moved much. Thus, its single outlier performance was enough to at first obtain and subsequently avoid losing its performance in our extended sample. (Incidentally, a risk-averse investor would not have been better off using accrul.)

Credit Standards (crdstd**)** was introduced by Chava, Gallmeyer, and Park (2015). Optimistic credit standards predict poor stock market returns. It had good OOS performance and usually was the best performer on our investment strategies. Tempering our enthusiasm, crdstd's in-sample T-statistic as of 2020 is only –1.65.

The Investment-Capital Ratio (i/k**)** was introduced in Cochrane (1991) and included in Goyal and Welch (2008). High investment this quarter predicts poor stock-market returns next quarter. Interestingly, like gpce, i/k associates more outlays today with lower market performance in the future—almost as if the alternative had been stockpiling funds today to allow for more market investment later.

For the 13 years from 1975 to 1998, i/k was a poor predictor. In the 22 years since then, i/k has consistently performed well. Thus, it performs better today than it did in Goyal and Welch (2008). Tempering our enthusiasm, its estimated IS coefficient in our sample has declined from –2.17 in the first half to –0.93 in the second half; and i/k could not outperform *all-equity-all-the-time* in three of our four timing strategies.

Again, finding that one handful of variables among nine handfuls have good predictive ability is somewhat disappointing, given not only that these variables were not randomly selected but also that they were already validated in much of the same sample that we are merely recycling. In a sense, within a decade or so, most variables have already become dubious or obsolete.

Our paper now proceeds as follows. Section I lays out our performance criteria. Section II briefly describes the variables and lays out the tables that our analysis refers to. Section III runs through the performance of each of the variables, in alphabetical order of authors. Section IV briefly looks at the performance of the most promising variables from the perspective of a risk-averse investor. Section V takes some liberty in offering some more subjective thoughts on the overall performance tally.

I Performance Criteria

We first needed a set of variables for which we could confirm the basic predictive results from papers that published them. This means that we had to be able first confirm the authors' results within their sample periods and then be able to extend the variable to 2020. This means we had to exclude variables that are proprietary and not available to us.[2]

In our opinion, to be considered a reliable and useful predictor of the equity premium on a forward-looking basis, a variable should satisfy at least the following set of criteria:

1. The variable should be able to predict the equity premium at a conventional statistical significance level using OLS in an in-sample regression in our extended sample period. The absolute T-statistic should at least be 1.65. If this fails, there is little reason to proceed.

2. The model should be reasonably stable, i.e., a variable should *not* have statistically significantly different IS coefficients and/or a sign change in predicting the equity premium in our sample's first half and second half—for us, at least at the ≈5% level. If this fails, there is little reason to proceed.

3. The variable should have positive rolling OOS R^2, suggesting basic improvement of the conditional residuals over the unconditional residuals (the latter from a simple prevailing equity-premium average model).[3] If this fails, there is little reason to proceed.

[2]We admit to giving the original paper the benefit of the doubt in trying to follow its methods somewhat more closely in Table 2 than we do in subsequent tables. Thus, we may use the preferred data frequency and overlap handling of the authors.

[3]We note that Campbell and Thompson (2008) discuss reasons when a researcher may want to focus on IS prediction rather than both IS and OOS prediction, as we do. These reasons usually apply when testing theories in which the researcher is sure that the model is stable and known by market participants in time.

4. On our four simple timing investment strategies (untilted and equity-tilted; unscaled and scaled), the variable should earn higher rates of return than the *all-equity-all-the-time* unconditional strategy.

Furthermore, we take into account two heuristic concerns, though they are not "make-or-break":

7. The variable's performance should not be driven almost entirely by its performance in one or two unusual years only. It should also show reasonably good performance over the last 20-30 years.

8. The variable should offer positive ex-post utility improvement for a quadratic-utility investor with parameter 5, as suggested by Campbell and Thompson (2008).

We are however tolerant of two problems:

1. We ignore the fact that a variable that has the choice to be statistically significant in one of three frequencies (say, monthly, quarterly, annually) should be viewed more critically. Simulations suggest that one should use not the 10% significance level of 1.65 when allowing consideration of monthly, quarterly, and annual frequencies, but more appropriately a 10% level of 2.1 on the best of the three. Our failure to impose this more stringent criterion is partly counterbalanced by the fact that we expect variables to offer performance not just on IS prediction, but also on other criteria.

2. We ignore the fact that, collectively, the profession has examined many more variables and that the variables we observe are themselves already highly selected (Lo and MacKinlay (1990), Harvey, Liu, and Zhu (2016)).

A sufficiently skeptical researcher may therefore want to impose even more stringent criteria. Of course, a researcher with sufficiently strong positive priors on the model may want to discount our empirical evidence altogether.

II Variables and Tables

A. Variables

[Table 1 here: 'Glossary of Recently Published Papers and Variables']

Table 1 contains the glossary of recently published papers and variables that we investigate. It explains their meaning and sample availability briefly. This will be followed, in more detail, in our paper by a paper discussion below; and in most detail in the appendix.

The variables can broadly be grouped into six categories:

Macroeconomic: sbdlev, pce, govik, crdstd, ogap, ndrbl, gpce (and gip), house.

Sentiment: accrul (and cfacc), sntm, ygap, shtint.

Variance-Related: impvar, vrp.

Stock Cross-Section: lzrt, skew, skvw, tail, fbm, rdsp, avgcor.

Other Stock Market: tchi, dtoy (and dtoat), disag;

Commodities: wtexas.

Most stock-market related variables are monthly, most macroeconomic variables are quarterly or annual.

In addition, our paper also looks again at the performance of 17 variables already investigated in Goyal and Welch (2008): the dividend-price ratio (d/p), the dividend-yield (d/y), the earnings-price ratio (e/p), the dividend-payout ratio (d/e), as in Campbell and Shiller (1988); stock volatility (svar), as in Guo (2006); book-market (b/m), as in Kothari and Shanken (1997) and Pontiff and Schall (1998); net issuing activity (ntis), as in Boudoukh, Michaely, Richardson, and Roberts (2007); equity issuing activity (eqis), as in Baker and Wurgler (2000); the T-Bill rate (tbl), as in Campbell (1987); the long-term yield (lty), the long-term bond rate of return (ltr), the term-spread (tms), the default yield (dfy), the default rate of return (dfr), as in Fama and French (1989), the inflation rate (infl), as in Fama and Schwert (1977); private investment (i/k), as in Cochrane (1991), and "cay, " as in Lettau and Ludvigson (2001). For precise definitions, please refer to Goyal and Welch (2008).

B. Tables

To examine the predictive performance of 46 variables while fitting into the space of a standard article, we have to be frugal in our descriptions. This is best accomplished by following a standard format discussing each variable, while referring to a set of common tables. We will do so as follows.

[Table 2 here: 'Basic-Replication IS Sample Results']

Our first task is to confirm that we can create variables that match the performance proposed by the original papers. In most cases, the authors have posted or shared their data series, allowing us to confirm their key results using our own calculations.[4]

Table 2 shows our ability to replicate the basic results of the original paper using the original sample period, and (where possible) the same controls.

Once we have confirmed that we can obtain similar results, we can extend the sample to 2020. Our key results examining IS and OOS performance appear in four tables:

[Table 3 here: 'Predicting Monthly Log Equity Premia']

Table 3 shows the prediction performance of log equity premia for variables available on monthly frequency.[5]

[Table 4 here: 'Predicting Quarterly Log Equity Premia']

Table 4 does the same, but for variables available only on a quarterly frequency;

[Table 5 here: 'Predicting Annual Calendar-Year (Jan-Dec) Log Equity Premia']

[Table 6 here: 'Predicting Annual Mid-Year (Jul-Jun) Log Equity Premia, With Reporting Delay']

Tables 5 and 6 do the same, but for variables available only on annual frequency—Table 5 for the calendar year, Table 6 for July-to-June performance with a 6-month recording lag (i.e., the predictor being measured as of the previous December).

For the IS performance, we predict the equity-premium based on each variable using a standard OLS regression. We also look at the stability of the model by dividing the sample into two halves and estimating the coefficients separately. This gives equal billing to the first and the second half, thereby not disadvantaging the first few predictions as in our OOS prediction. For the OOS performance, we focus on the in-time OOS R^2,

$$R^2_{\text{OOS}} = 1 - \frac{\sum_t (r_t - \hat{r}_{t-1})^2}{\sum_t (r_t - \bar{r}_{t-1})^2},$$

where $\hat{r}_{t-1}$ is the conditional forecast at time $t-1$ and $\bar{r}_{t-1}$ is the prevailing mean at time $t-1$. We star this "OOS R^2" using the MSE-F statistic of McCracken (2007).[6] The variables are *always* constructed on a real-time basis—for example, when variables require filters or regression coefficients for construction (such as pce), these coefficients are always based only on prevailing historical values.

[4]The exceptions were Kelly and Jiang (2014), Piazzesi, Schneider, and Tuzel (2007), and Pollet and Wilson (2010).

[5]We are not predicting lower-frequency stock returns with higher-frequency predictors. Thus we need not worry about overlapping observations. In a previous draft, we found that higher frequency variables generally did not do better predicting lower-frequency equity premia, either with or without overlap.

[6]We use MSE-F statistic because we are interested in population-level predictive ability (whether a variable has any predictive content). One can test finite-sample predictive ability (whether a variable has useful predictive content given that parameters are estimated). Giacomini and White (2006) study such a question in the context of rolling regressions (where the null hypothesis then, necessarily, depends on window length).

The results are almost the same if we predict simple rather than log equity premia (available upon request). We experimented with more sophisticated forecasting, but the inference was similar enough to recommend the brevity and simplicity of an exposition based on plain OLS forecasting techniques. This includes our consideration of forecasting and techniques from Kostakis, Magdalinos, and Stamatogiannis (2015) and Cederburg, Johnson, and O'Doherty (2019).[7]

Our OOS period always starts 20 years after the IS period, but never earlier than 1946. Authors can (perhaps legitimately) complain that there are good reasons why they started their own analyses earlier or later. Obviously, different starting periods can lead to different results, just like different ending periods. Our choice was the same as that in Goyal and Welch (2008), and dictated by the desire to keep the same scheme across our 29 variables. Importantly, our figures make it easy to assess how different starting period would affect the results.

Next, we show the performance of a risk-neutral investor who seeks to time her investments. Performance is always based on zero-investment strategies (i.e., either the value-weighted stock market financed with bills, or bills financed by shorting value-weight stocks).[8] The unconditional investment strategy is earning the equity premium itself. We name this *all-equity-all-the-time*. The other investment strategy is timed, i.e., conditioned on the variable. When the timing investor is bullish (i.e., in the market), the unconditional and conditional strategies invest and earn the same. When the timing investor is bearish, the conditional strategy earns the opposite of the unconditional strategy.

We consider four variants based on *scaled* and *unscaled* timing strategies, and *equity-tilted* and *untilted* timing strategies in Tables 7-10.

[Table 7 here: 'Untilted $1-Unscaled Investment Strategy']

[Table 8 here: 'Untilted Z-Scaled Investment Strategy']

[Table 9 here: 'Equity-Tilted $1-Unscaled Investment Strategy']

[Table 10 here: 'Equity-Tilted Z-scaled Investment Strategy']

The *untilted, unscaled* timed investment strategy (**Table 7**) invests either +$1 in the market (financed by bills) when it is bullish or –$1 in the stock market (saved in bills) when it is bearish. This conditional strategy decides based on whether the variable is bullish or bearish by looking above or below its historical median in time, according to the sign of the prevailing coefficient. The *equity-tilted* strategy (**Tables 9 and 10**) switches from long stocks to long bills only if the signal is very bearish, i.e., at the 25th percentile rather than the median. The *scaled* strategy (**Tables 8 and 10**) first calculates a Z-score in time, i.e., it subtracts the prevailing median (untilted) or first-quartile (tilted) from the x variable and then divides by the prevailing standard deviation. It then scales the investment by this Z-score. For example, when the prevailing forecasting coefficient is positive (so being above the x cutoff [median or first quartile] means bullish), if the Z-score calculates –0.5, the conditional strategy would short $0.50 in the market and purchase $0.50 of T-bills. The comparative unconditional strategy would long $0.50 in the market and purchase $0.50 in T-bills.

[7]We do however highly recommend both. The latter further looks at a good number of recent prediction variables. Recent finance literature investigates the pitfalls associated with multiple hypothesis testing. The common approaches are to control family-wise error rate (Romano and Wolf (2005) and White (2001)) or false discovery rate (Benjamini and Hochberg (1995) and Benjamini and Yekutieli (2001)). **However, these approaches are not suitable for the nested models that we study here.** We thank Todd Clark and Michael McCracken for clarifying these issues for us.

[8]Zero-investment strategies can always be viewed as "overlays." Thus, they are comparable but never mutually exclusive.

C. Results Preview

There are only five variables that have both a statistically significant in-sample coefficient and a positive OOS R^2 (all of which happen to be statistically significant at least at the 10% level). On a monthly frequency, this is only the T-bill rate (tbl), as in Campbell (1987). On a quarterly frequency, these are credit standards (crdstd), as in Chava, Gallmeyer, and Park (2015); and the investment-capital ratio (i/k), as in Cochrane (1991). On an annual frequency, these are corporate accruals (accrul), as in Hirshleifer, Hou, and Teoh (2009), and the fourth-quarter growth-rate of personal consumption (gpce), as in Møller and Rangvid (2015).

Of these five variables, the T-bill rate does not help much in our investment strategies. The other five are somewhat inconsistent in how much they help—it depends on their exact deployment. Credit standards and accruals are usually the best performers. However, none yields returns that are statistically significant

Of these five variables, only three would have made a risk-averse investor no better off: the T-bill rate, credit standards, and the investment-capital ratio. Only one would have left the risk-averse investor statistically significantly better off: credit standards.

Of these five variables, accruals was a "one-trick pony." It helped greatly in the dot-com aftermath bear market. Sentiment was somewhat similar. gpce was most consistent.

III Empirical Performance

We are now ready to describe the performance of the variables proposed in each recent paper, in alphabetical order of authors. Our standard discussion template for papers presents each variable as follows:

1. A modified version of the original abstract that focuses on relevant aspects. For the complete version, please refer to the original paper.

2. A basic intuitive explanation of the variable and sample period. This explanation is almost always insufficient to replicate our version of the variable. The fully detailed discussion appears in our appendix.

3. A discussion of the performance in four parts: [A] IS performance, including stability statistics (first half vs second half); [B] OOS R^2; [C] OOS investment performance; and [D] graphical performance.

4. Our somewhat subjective assessment.

1. AMP: Atanasov, Møller, and Priestley (2020)

We are now prepared to begin our discussion of AMP.

Abstract: *[AMP] introduce a novel consumption-based variable, cyclical consumption, and examine its predictive properties for stock returns. Future expected stock returns are high (low) when aggregate consumption falls (rises) relative to its trend and marginal utility from current consumption is high (low). [They] show that the empirical evidence ties consumption decisions of agents to time-variation in returns in a manner consistent with asset pricing models based on external habit formation.*

Variable: The key variable, pce, measures NIPA seasonally adjusted consumption on nondurables and services, provided by the Bureau of Economic Analysis, relative to a trend that is identified by using a filter. pce is available quarterly.

Performance: The performance of pce is as follows:

[A (IS)] We can confirm the strong negative and statistically significant IS coefficient of pce prior to 2017 in their sample also in our own data (Table 2). We then investigate our extended sample, which ends in December 2020. Being of quarterly frequency, our key results appear in Table 4. The two left-most columns show IS performance. We can confirm that pce also has negative IS significance in our extended sample. The three middle columns show that the AMP model is reasonably stable across its two halves. (The IS coefficient is modestly weaker in the second half but not statistically significantly so.) Given good IS performance, it makes sense to continue and consider OOS performance.

[B (OOS)] pce performed poorly on OOS prediction, as shown in the two right-most column in Table 4. The OOS R^2 is a negative −3.44% in our sample.[9]

[C (Investment)] Table 7 shows that the unbiased untilted OOS annual timing strategy underperformed the *all-equity-all-the-time* non-timing equivalent by about 2.5% per year. The three other investment strategies do not show performance better than *all-equity-all-the-time*, either. The scaled strategies in Tables 8 and 10 suggest slightly negative (–0.2%/year) performance, while the equity-tilted but unscaled strategy suggests slightly positive performance (0.1%/year).

[D (Graphical)] Our performance figures (Goyal and Welch (2008)) show when a variable performed well and when it did not. Intuitively, in these figures, when the prediction based on the conditioning variable (here pce) does well, the line increases; when the variable underperforms (the prevailing mean for the OOS lines), the line decreases. The solid lines use simple returns, the dashed lines use log returns. The black lines are IS predictions, the blue lines are OOS predictions (which means the conditional prediction in time is compared to the unconditional prediction at time t, the prevailing mean). A variable that

[9] In the original paper, the authors began OOS prediction in 1980. This avoided the first 7 years of poor OOS performance in our sample. It was enough to keep pce out of the red zone, though not enough to show meaningfully positive OOS performance (much less with statistical significance). Further unreported investigation shows that our OOS starting forecasting quarter was particularly unfortunate for pce. The OOS turns positive with later starting points, though not statistically significantly so.

is statistically significant should lie solidly above the 0 line.[10] The authors' original end of sample is shown with a vertical dotted red line.

Figure 1 shows that the predictive performance of pce was quite good in-sample (IS), although much of its good IS performance appeared in the first 20 years. Since about 1975, the IS performance has been more modest. In contrast, the OOS performance was poor for the first 10 years, reaching its lowest cumulative point when (mis-)predicting the equity-premium in Q2-1982 with pce of Q1-1982. It was largely unremarkable thereafter. The red line shows that the variable did perform well OOS in 2020, which was after the original sample had ended in 2017.

Evaluation: We dismiss pce as a useful predictor of equity premia, based on poor and insignificant OOS performance. Presumably, if the evidence in Atanasov, Møller, and Priestley (2020) was consistent with asset pricing models based on habit formation, the extended evidence should now be viewed as unsupportive.

[Figure 1 here: 'IS and OOS Predictive Performance of AMP pce (quarterly)']

2. AMS: Adrian, Mönch, and Shin (2010)

Abstract: *[AMS] document that financial intermediary balance sheet aggregates contain strong predictive power for excess returns on a broad set of equity ... portfolios. [These] results provide support to the hypothesis that financial intermediary balance sheet quantities matter in the determination of risk premia...Our findings point to the importance of financing frictions in macroeconomic dynamics and asset pricing.*

Variable: AMS entertain a number of potential variables and use Lasso to select, as their strongest candidate, the quarterly variable 'ySBRDLRlevg'. Unfortunately, their definition of ySBRDLRlevg can and does cause negative denominators in their ratio, raising doubts about its definitional validity. We modify their definition to a variant, sbdlev.[11] sbdlev is available quarterly.

[10] The blue range is the ±2 standard deviation range for OOS prediction, based on an MSE-T statistic Diebold and Mariano (1995), which is related to but not identical to the MSE-F statistic used to star the OOS R^2 in the tables.

[11] AMS do not want to measure the ratio of world assets over world equity, but (presumably a proxy for) the ratio of domestic assets over domestic equity. They thus calculate

$$\text{ySBRDLRlevg} \equiv \log\left(\underbrace{\frac{\text{World Domestic \& Foreign Financial Assets}}{\text{World SBD Equity} - \underbrace{(\text{FDI Equity} + \text{FDI Non-Equity})}_{\text{FDI Assets}}}}_{\text{Domestic Equity Proxy If FDI Non-Equity is small}}\right),$$

where SBD is "security-broker-dealer" and FDI is "foreign direct investment." FDI equity alone is unfortunately not available, making it impossible to accurately calculate Domestic Equity. They thus subtract FDI total assets (not just equity) in the denominator, which is reasonable if FDI non-equity investment is very small. (It is also not clear to us why they use world assets in the numerator.) We can modestly improve on their variable and avoid zero or negative denominators by using "World SBD equity - RoW FDI Equity * (SBD FDI/RoW FDI)" where RoW is the result of the world. We dub our variable sbdlev. sbdlev has good correlation with a version of ySBRDLRlevg emailed to us by the authors.

Performance: **[A]** Table 2 shows that our coefficient of –0.03 (T of –1.04) cannot replicate AMS' significant negative coefficient of –0.09 (T of –3.01) in the same sample (–2009). The table also shows that the sbdlev model was unstable. The IS coefficient switches sign from positive in the first half ("H1") to negative in the second half ("H2") in our sample. This is also the case in our extended sample ending in 2020. Table 4 shows that the IS coefficient switched from positive to negative, with the overall coefficient having a T-statistic of 0.87. Thus, with poor IS performance, further OOS investigation seems unwarranted. (**[B-D]** The OOS and investment performance is always poor, too. Thus, we also do not graph pce's performance.)

Evaluation: We dismiss sbdlev as a useful predictor of equity premia, due to lack of replicability and both poor IS and OOS performance. Presumably, if the evidence in Adrian, Mönch, and Shin (2010) was consistent with a role for financial intermediary frictions, the extended evidence should now be viewed as inconsistent.

3. BPS: Bakshi, Panayotov, and Skoulakis (2011)

Abstract: *[BPS] present an option positioning that allows [them] to infer forward variances from option portfolios. The forward variances [they] construct from equity index options help to predict … (iii) stock market returns… .*

Variable: BPS synthesize the exponential of integrated variance using a strip of European calls and puts, written on the market index. impvar is available monthly.

Performance: **[A]** We can confirm the strong positive and statistically significant IS coefficient of impvar in the original sample period (–2008). In our extended sample (–2020), the IS coefficient is no longer statistically significant (Table 3). Moreover, the model was always unstable: The IS coefficient switches sign from the first half (H1) to the second half, both in the original and in our own sample. Thus, with poor IS performance, further OOS investigation seems unwarranted. (**[B]** The OOS R^2 of impvar is negative. **[C]** The investment performance of impvar was poor. When not tilted towards equity, impvar not only does not beat *all-equity-all-the-time*, it even loses money in absolute terms. When tilted towards equity and unscaled, it barely manages to avoid such exceptionally bad performance.) **[D]** Figure 2 shows why our results are so different from the authors': impvar collapsed completely in the Great Recession, just after the BPS sample had ended in Sep 2008. Specifically, impvar's Sep and Oct 2008 values failed to predict the –18% and –8.5% drops in the value-weighted market rate of return in Oct and Nov 2008.

Evaluation: We dismiss impvar as a useful predictor of equity premia, based on poor IS and OOS performance. Presumably, if the evidence in Bakshi, Panayotov, and Skoulakis (2011) was consistent with a role for implied volatility, the extended evidence should now be viewed as inconsistent.

[Figure 2 here: 'IS and OOS Predictive Performance of BPS **impvar** (monthly)']

4. BTZ: Bollerslev, Tauchen, and Zhou (2009)

Abstract: *Motivated by the implications from a stylized self-contained general equilibrium model incorporating the effects of time-varying economic uncertainty, [BTZ] show that the difference between implied and realized variation, or the variance risk premium, is able to explain a nontrivial fraction of the time-series variation in post-1990 aggregate stock market returns, with high (low) premia predicting high (low) future returns. [The] empirical results depend crucially on the use of "model-free," as opposed to Black-Scholes, options implied volatilities, along with accurate realized variation measures constructed from high-frequency intraday as opposed to daily data. The magnitude of the predictability is particularly strong at the intermediate quarterly return horizon...* BTZ is the most-cited paper in our set, with about 1,500 Google scholar citations..

Variable: Unlike other variables, we did not compute vrp ourselves. Instead, it is updated regularly by the authors themselves and posted on their website. vrp is available monthly.

Performance: **[A]** We can confirm the strong positive and statistically significant IS coefficient of vrp in the original sample period (–2007). In our extended sample (–2020), the IS coefficient is no longer statistically significant. The IS T-statistic is now 0.12. Moreover, the model has become unstable. The coefficient is now negative in the second half of the extended sample. Thus, with poor IS performance, further OOS investigation seems unwarranted. (**[B]** The OOS R^2 of vrp is negative. **[C]** The investment performance of vrp was poor. In fact, it is between –0.7%/year and 4.3%/year, always greatly underperforming *all-equity-all-the-time* (6.4%/year and 7.7%/year).)

[D] Figure 3 shows that vrp did well following the Great Recession. However, it collapsed badly in early 2020. In Feb 2020, vrp predicted +3.52%, much above the prevailing mean of +0.66%. Because the actual Mar 2020 equity premium was –12.32%, the relative errors were –15.84% vs. –12.98%, with a squared difference of about –0.8%. In Mar 2020, vrp reversed itself, predicting –14.57% for Apr 2020 (vs. 0.62%). Because the actual Apr 2020 equity premium was +12.89%, the relative errors were 27.46% vs. 12.26%. This increased the cumulative squared difference by a further dramatic 6%, thereby falling off our common (monthly return) chart scale of –3% to +3%. Obviously, this poor performance after their sample had ended explains why our inference is different.

Evaluation: We dismiss vrp as a useful predictor of equity premia, based on poor IS and OOS performance.

Presumably, if the evidence in Bollerslev, Tauchen, and Zhou (2009) was consistent with their stylized self-contained general-equilibrium model with time-varying economic uncertainty, the extended evidence should now be viewed as inconsistent.

[Figure 3 here: 'IS and OOS Predictive Performance of BTZ **vrp** (monthly)']

5. BY: Belo and Yu (2013)

Abstract: *[BY find that] high rates of government investment in public sector capital forecast high risk premiums.... This result is in sharp contrast with the well-documented negative relationship between the private sector investment rate and risk premiums. To explain the empirical findings, [BY] extend the neoclassical q-theory model of investment and specify public sector capital as an additional input in the firm's technology. [They] show that the model can quantitatively replicate the empirical facts with reasonable parameter values if public sector capital increases the marginal productivity of private inputs.* Naturally, their finding has a strong policy implication, in that it suggests that governments may want to tax and invest more in infrastructure on the margin.

Variable: Their key variable, govik, measures government investment (in contrast to i/k described later, which measures corporate investment). Their original paper's Figure 1 also shows that govik peaked in 1950, then declined until 1982, increased sharply during the Reagan years, then stayed constant, and finally declined again from 2002 to 2010. govik is available quarterly.

Performance: **[A]** We can confirm the (small) positive and statistically significant IS coefficient of govik in the original sample period (–2010). In our extended sample, the T-statistic drops to 1.67 (Table 4). The model was always unstable. Both in the original and our own sample period, the IS coefficent turned negative in the second half. Thus, with poor IS performance, further OOS investigation seems unwarranted. (**[B]** The OOS R^2 of govik is negative. **[C]** The investment performance of govik was poor—indeed exceptionally poor. Except for the unscaled equity-tilted strategy, not only did govik not beat *all-equity-all-the-time*, it even lost money.)

[D] Figure 4 shows that all of the good IS performance was due to early performance. Since about 1960, govik has not had any good IS power. The OOS performance had some good predictions, specifically in 1970 and again during the oil-crisis from 1973 to 1974, but has underperformed ever since.

Evaluation: We dismiss govik as a useful predictor of equity premia, based on "ancient-only" IS performance and poor OOS performance. Presumably, if the evidence in Belo and Yu (2013) was consistent with a role for useful government infrastructure investment, the extended evidence should now be viewed as inconsistent.

[Figure 4 here: 'IS and OOS Predictive Performance of BY govik (quarterly)']

6. CEP: Chen, Eaton, and Paye (2018)

Abstract: *[CEP] constructs and analyzes various measures of trading costs in US equity markets covering the period 1926-2015. These measures contain statistically and economically significant predictive signals for stock market returns and real economic activity. [They]...find strong evidence that the component of illiquidity uncorrelated with volatility forecasts stock market returns...*

Variable: lzrt is the log of the number of zero returns. The series has structural break adjustments for tick-size reductions in 1997 and 2001 (these are included by regressing the series on binary variables that take the value of 1 after the tick-size reductions, and 0 otherwise, then taking the residuals as the final series). lzrt is available monthly.

Performance: **[A]** We can confirm the strong positive and statistically significant IS coefficient of lzrt in the original sample period (–2015). In our extended sample (–2020), the IS coefficient is no longer statistically significant. The T-statistic falls to 0.96. Thus, with poor IS performance, further OOS investigation seems unwarranted. (**[B]** The OOS R^2 was positive (Table 3). **[C]** The investment performance of lzrt was poor. Without the heavy equity tilt, lzrt even loses money in absolute terms. With equity tilt, lzrt still greatly underperforms *all-equity-all-the-time*.) **[D]** Figures 5 illuminates the performance. On a monthly basis, Chen, Eaton, and Paye (2018) caught the variable nearly at its best. It had outperformed in the Great Recession. However, lzrt collapsed in the Covid year of 2020. Otherwise, lzrt was fairly unremarkable.

Evaluation: We dismiss lzrt as a useful predictor of equity premia, due to poor IS performance, poor investment performance, and only-episodic superior OOS R^2 performance (in the Great Recession). Presumably, if the evidence in Chen, Eaton, and Paye (2018) was consistent with a role for illiquidity, the extended evidence should now be viewed as unsupportive.

[Figure 5 here: 'IS and OOS Predictive Performance of CEP lzrt (monthly)']

7. CGMS: Colacito, Ghysels, Meng, and Siwasarit (2016)

Abstract: *[CGMS] document that the first and third cross-sectional moments of the distribution of GDP growth rates made by professional forecasters can predict equity excess returns, a finding that is robust to controlling for a large set of well-established predictive factors...time-varying skewness in the distribution of expected growth prospects in an otherwise standard endowment economy can substantially increase the model-implied equity Sharpe ratios, and produce a large amount of fluctuation in equity risk premiums.*

Variable: CGMS kindly worked with us to isolate the cause for the difference between their data series and our own recalculation. The principal reason is that the data provided by the vendor are different than the data used by CGMS.

Performance: [A] We cannot confirm the significant IS coefficient of skew with the correct vendor data. Our own skew calculation shows no useful predictive ability.

Evaluation: We dismiss skew as a useful predictor of equity premia, due to irreproducibility.

8. CGP: Chava, Gallmeyer, and Park (2015)

Abstract: *[CGP analyze] U.S. stock return predictability using a measure of credit standards ('Standard') derived from the Federal Reserve Board's Senior Loan Officer Opinion Survey on Bank Lending Practices. Standards is a strong predictor of stock returns at a business cycle frequency, especially in the post-1990 data period. Empirically, a tightening of Standards predicts lower future stock returns. Standards perform well both in-sample and out-of-sample and is robust to a host of consistency checks. Standards captures stock return predictability at a business cycle frequency and is driven primarily by the ability of Standards to predict cash flow news.*

Variable: crdstd is as obtained from the survey data by the Fed. crdstd is available quarterly.

Performance: **[A]** We can confirm the positive and statistically significant IS coefficient of crdstd in the original sample period (–2013). However, in our extended sample (–2020), the IS T-statistic drops to 1.65. Moreover, the coefficient is also not climbing but falling, having declined from the first to the second half of the sample (albeit not statistically significantly so). **[B]** The OOS R^2 of crdstd is positive. **[C]** The investment performance of crdstd was mostly good. With either scaling or equity-tilting, crdstd performed well, earning between 2%/year and 6%/year more than *all-equity-all-the-time*. Only in a no-scaling no-equity-tilt strategy did it modestly underperform *all-equity-all-the-time*. **[D]** Figure 6 shows that crdstd had great performance early on—predicting well from 2000 to mid-2002. Since 2003, crdstd performance has been unremarkable, with a short temporary spike around the time of the Great Recession (predicting Q1-Q2 2009).

Evaluation: We are concerned that crdstd has an IS T-statistic this low, and that practically all its good performance originates from its first four years in the sample. However, we consider crdstd worth watching. It is one of the variables mentioned in our introduction.

[Figure 6 here: 'IS and OOS Predictive Performance of CGP crdstd (quarterly)']

9. CP: Cooper and Priestley (2009)

Abstract: *[CP show that] the output gap, a production-based macroeconomic variable, is a strong predictor of U.S. stock returns. It is a prime business cycle indicator that does not include the level of market prices, thus removing any suspicion that returns are forecastable due to a "fad" in prices being washed away. The output gap forecasts returns both in-sample and out-of-sample, and it is robust to a host of checks...*

Variable: The output gap (ogap) is the deviation of the log of industrial production from a trend that incorporates both a linear and a quadratic term. ogap is available monthly.

Performance: **[A]** We can confirm the strong positive and statistically significant IS coefficient of ogap in the original sample period (–2005). In our extended sample (–2020), the IS coefficient is no longer statistically significant. The IS T-statistic is now –0.62. Thus, with poor IS performance, further OOS investigation seems unwarranted. (**[B]** The OOS R^2 of ogap is negative. **[C]** The investment performance of ogap was poor. It always underperforms *all-equity-all-the-time*.[12]) **[D]** Figure 7 shows that the IS performance was steady. However, the OOS performance early on was very poor, so the (unremarkable) improvements from 1950 to 2020 are insufficient to make much difference one way or another. The variable simply did not move much.

Evaluation: We dismiss ogap as a useful predictor of equity premia, based on its insignificant IS coefficient (and poor OOS performance). Presumably, if the evidence in Cooper and Priestley (2009) was consistent with a role for the output gap, the extended evidence should now be viewed as unsupportive

[Figure 7 here: 'IS and OOS Predictive Performance of CP ogap (monthly)']

10. DJM: Driesprong, Jacobsen, and Maat (2008)

Abstract: *[DJM show that] changes in oil prices predict stock market returns worldwide...These results cannot be explained by time-varying risk premia as oil price changes also significantly predict negative excess returns. Investors seem to underreact to information in the price of oil. A rise in oil prices drastically lowers future stock returns. Consistent with the hypothesis of a delayed reaction by investors, the relation between monthly stock returns and lagged monthly oil price changes strengthens once we introduce lags of several trading days between monthly stock returns and lagged monthly oil price changes.*

[12]The authors showed positive OOS significance, because they started predicting in 1948 rather than 1926.

Variable: wtexas is the price of West-Texas Intermediate crude oil, as obtained from *Global Financial Data* services. We also extend the sample backward from 1973, when Driesprong, Jacobsen, and Maat (2008) begin. wtexas is available monthly.

Performance: **[A]** We can confirm the strong positive and statistically significant IS coefficient of wtexas in the original sample period (–2004). In our extended sample (–2020), the IS coefficient is no longer statistically significant, with a T-statistic of –1.47. Thus, with poor IS performance, further OOS investigation seems unwarranted. (**[B]** The OOS R^2 of wtexas is negative (–0.12). **[C]** The investment performance of wtexas was inconsistent. When unscaled, it performed terribly, even losing money in absolute terms. When scaled, it performed about as well as *all-equity-all-the-time*, even beating it by a tiny 0.3% per year.) **[D]** Figure 8 shows that wtexas had good annual OOS R^2 performance in the 1973 oil crisis, specifically in Oct and Nov 1973, when the oil price went from \$3.51/b to \$13.37/b. It collapsed in June 2008, when the oil price dropped from \$139/b to \$39/b. The latter occurred just after Driesprong, Jacobsen, and Maat (2008) was published, which explains the difference between their results and our own.

Evaluation: We dismiss wtexas as a useful predictor of equity premia, based on its insignificant IS coefficient and poor OOS R^2. Presumably, if the evidence in Driesprong, Jacobsen, and Maat (2008) was consistent with models of delayed reaction by investors (offering simple high trading profits), the extended evidence should now be viewed as inconsistent

[Figure 8 here: 'IS and OOS Predictive Performance of DJM wtexas (monthly)']

11. HHT: Hirshleifer, Hou, and Teoh (2009)

Abstract: *[HHT] examine whether the firm-level accrual and cash flow effects extend to the aggregate stock market. In sharp contrast to previous firm-level findings, aggregate accruals is a strong positive time series predictor of aggregate stock returns, and cash flows is a negative predictor...These findings suggest that innovations in accruals and cash flows contain information about changes in discount rates, or that firms manage earnings in response to marketwide undervaluation.*

Variable: HHT introduce two variables: cfacc and accrul. The latter is the difference between earnings and cash flows. HHT use these variables only on annual frequency. For our purposes, it is important to recognize that the two variables are reported by corporations only a few months *after* the closing of their fiscal years. (Our Jan-to-Dec numbers assume no reasonable reporting lag.) Ergo, our focus are on the Jul-to-Jun numbers reported below, which are the only investable ones.

➤ The Accruals Component (accrul)

[Figure 9 here: 'Time-Series of Accruals (accrul) and Equity Premia']

Performance: **[A]** We can confirm the strong positive and statistically significant IS coefficient of accrul in the original sample period (–2005). Tables 5 and 6 shows that this also holds in our extended sample (–2020) and especially in our Jul-Jun mid-years. **[B]** Remarkably, accrul offers good OOS R^2, too. Somewhat unexpectedly, the OOS R^2 is higher than the IS R^2. **[C]** Only the untilted and unscaled timing strategy underperformed *all-equity-all-the-time* (Table 7). (Because of its stability (low standard deviation), with its negative investment performance, accrul also had the single-worst Sharpe ratio in our \$1 investment table.) However, as soon as accrul is scaled (Table 8) or tilted towards equity (Table 9), accrul timing outperforms *all-equity-all-the-time*. Intuitively, Both tilting and scaling place more emphasize on accrul's strong and decisive calls from 1999–2001, with good prediction of the poor market performance in 2000–2002. **[D]** Figures 9 and 10 explain why accrul performed so well. Figure 9 shows that aggregate accruals were perennially quite flat, with two stark exceptions: 1973–1974 (conservative) and 1999–2001 (aggressive). The former occurred before our OOS analysis begins. Figure 10 shows that the latter was a great call. The market declined greatly in 2000–2002, following the dot-com years. In "ordinary years," aggregate accruals were unremarkable. They barely budged.

Evaluation: accrul is a difficult variable to assess due to its episodic performance.

One can share the view of HHT that managers' over-optimism or over-pessimism anticipated the (opposite) reversal of investors' sentiment in a particular kind of market exuberance followed by its predictable collapse. (Of course, corporate managers would have had to have the appropriate prescience, ignored by funds and other market participants.)

Or one can take the view that the 1999–2001 event was too singular a period to make it likely that accrul will help again predict equity premia in the future. (We will also briefly discuss below that a risk-averse investor would not want to use accrul for timing.)

[Figure 10 here: 'IS and OOS Predictive Performance of HHT **accrul** (annual/jun)']

➤ The Cash Flow Component (cfacc)

Performance: **[A]** We can confirm the strong positive and statistically significant IS coefficient of cfacc in the original sample period (–2005). The key problem for cfacc is that it performs well only if there is no reporting lag (Jan-Dec but not Jul-Jun). With a reporting lag, the IS T-statistic falls from –3.08 to –1.42. **[B]** The OOS R^2 of cfacc is negative in the investible Jul-Jun version.

Evaluation: We dismiss cfacc as a useful predictor of equity premia, based on poor IS and OOS performance in the investable Jul-to-Jun data set.

[Figure 11 here: 'IS and OOS Predictive Performance of HHT **cfacc** (annual/jun)']

12. HJTZ: Huang, Jiang, Tu, and Zhou (2015)

Abstract: *[HJTZ] propose a new investor sentiment index that is aligned with the purpose of predicting the aggregate stock market. By eliminating a common noise component in sentiment proxies, the new index has much greater predictive power than existing sentiment indices have both in and out of sample, and the predictability becomes both statistically and economically significant. In addition, it outperforms well-recognized macroeconomic variables and can also predict cross-sectional stock returns sorted by industry, size, value, and momentum. The driving force of the predictive power appears to stem from investors' biased beliefs about future cash flows.*

HJTZ can be viewed as combining the sentiment measure of Baker and Wurgler (2007), which was designed for the cross-section and not for market timing, with the in-sample optimization method of Kelly and Pruitt (2013).

[Figure 12 here: 'Time-Series of Sentiment (**sntm**) and Equity Premia']

Variable: sntm uses the Baker and Wurgler (2007) six sentiment variables, but weights them to optimize the predictive performance in sample using the technique pioneered in Kelly and Pruitt (2013).

Figure 12 plots the time-series of sntm. Sentiment was very pessimistic in 1968–1969, 1982, and 2000–2001; and very optimistic in 1974–1976. Oddly, sentiment does not have intuitive time-series behavior. Figure 12 shows that sntm was not particularly optimistic in 1998–1999