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Via Overnight Mail

January 26, 2006

RECEIVED
JAN 27 2006
PUBLIC SERVICE COMMISSION

Beth A. O'Donnell, Executive Director
Kentucky Public Service Commission
211 Sower Boulevard
Frankfort, Kentucky 40602

Re: Case No. 2005-00341

Dear Ms. O'Donnell:

Please find enclosed the original and twelve (12) copies each of: 1) Response of the Kentucky Industrial Utility Customers, Inc. to Kentucky Power Company; and 2) Response of the Kentucky Industrial Utility Customers, Inc. the Commission Staff to be filed in the above-referenced matter. Due the voluminous nature of the attachments to the data responses, only one copy is being provided to the Commission. Copies have also been served electronically. By copy of this letter, all parties listed on the Certificate of Service have been served.

Please place this document of file.

Very Truly Yours,

David F. Boehm, Esq.
Michael L. Kurtz, Esq.
BOEHM, KURTZ & LOWRY

MLKkew
Attachment
cc: Certificate of Service

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing was served by mailing a true and correct copy, by first-class postage prepaid mail, and electronic mail, (when available) to all parties on the 26th day of January, 2005.

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COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

GENERAL ADJUSTMENTS IN ELECTRIC RATES OF KENTUCKY POWER COMPANY

CASE NO. 2005-00341

RECEIVED
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KENTUCKY POWER COMPANY'S FIRST SET OF DATA REQUESTS TO KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.

LANE KOLLEN

1. Please reference Kollen testimony at p. 3, lines 5-9. Please provide copies of base rate testimony filed by Mr. Kollen in the referenced cases as well as transcripts of Mr. Kollen's testimony in each such proceeding.

RESPONSE:

Copies of the testimonies have been provided only to the Company due to voluminous nature of the response.

2. Please reference Kollen testimony at p. 11, lines 5-7. Please state the basis for Mr. Kollen's assumption that "ratepayers are required to pay 100% of the costs of off-system sales . . . ." Please further confirm that Mr. Kollen believes that 100% of such costs are borne by the ratepayers. If 100% of costs are not borne by ratepayers, please describe those costs not borne by ratepayers, and identify the payor of such costs.

RESPONSE:

Please refer to the footnote at the bottom of page 11, which provides the explanation requested.

3. Please refer to the schedule on p. 6 of Mr. Kollen's testimony. Please explain (and present the appropriate calculations for) the derivation of the $2.121 million revenue amount associated with "Reduce PJM Net Congestion Costs."

RESPONSE:

Please refer to the testimony, exhibits, and workpapers of Mr. Baron on the revenue effect of this issue. In addition, refer to Mr. Kollen's workpapers provided in response to Staff 1-1 to KIUC for the gross-up of the revenue amounts to included uncollectible accounts expense.

KE057:KE180:13513:1:FRANKFORT

4. Please reference Kollen testimony at p. 14, lines 6-17. Is the KIUC proposing that the Kentucky Commission adopt or incorporate into KPC's rate recovery mechanisms a clause identical to the Expanded Net Energy Cost (ENEC) recovery clause being proposed to the West Virginia Public Service Commission by Appalachian Power Company? If not, please describe the KIUC proposal in detail. Further, please prepare a comparison between the KIUC proposal and the West Virginia ENEC clause, and explain the reasons and/or bases for any differences.

RESPONSE:

No. Mr. Kollen simply noted that AEP has been inconsistent on the treatment of the off-system sales margins, arguing in West Virginia that ratepayers should receive 100% and arguing in Kentucky that ratepayers should receive only 50%. The KIUC proposal is described on page 7 line 3 through page 15 line 12 of Mr. Kollen's testimony in this proceeding. The Appalachian Power Company proposal for the ENEC is described in the AEP testimony attached as Exhibit___(LK-2) to Mr. Kollen's testimony in this proceeding. It is AEP that has proposed different recovery mechanisms in Kentucky and West Virginia and that apparently has some reasons and/or bases for those differences, not KIUC. As such, KIUC has not prepared the analysis requested by the Company.

5. Please reference Kollen testimony at p. 16, lines 17-19. Please advise if Mr. Kollen has any formal and/or recognized manual (or guidelines) that describes the proper method for the allocation of generation plant investment, including but not limited to allocations made on a revenue basis, allocations made on a kWh basis, and allocations made on a demand (kw) basis. If so, please identify and provide copies of each such manual (or guidelines).

RESPONSE:

Mr. Kollen does not address cost allocation issues in this proceeding other than the effects on the ECR due to the Company's proposed ECR roll-in to base rates.

6. Please reference Kollen testimony at p. 16, lines 17-20. Please provide appropriate citations and references to the "Commission precedent" referred to.

RESPONSE:

Refer to page 17 lines 3-5 of Mr. Kollen's testimony. In addition, please refer to the KIUC response to Staff 1-4(a).

7. Please reference Kollen testimony at p. 19, line 4. Please provide the basis and calculation for Mr. Kollen's statement that the Company has "an average ECR jurisdictional factor of approximately 65%." In addition, please describe the allocation of the remaining 35%, and provide the basis for such allocation.

RESPONSE:

The 65% was an approximation, as noted in the testimony, to illustrate the point that the Company's request for ECR roll-in would have an additional hidden rate increase effect of millions of dollars that was not disclosed to the Commission or otherwise quantified. The actual ECR jurisdictional allocation factor for the period April 2004 through March 2005 was 67.1%. Mr. Kollen does not have the information in his possession to quantify the actual test year ECR jurisdictional allocation factor.

8. Please reference Kollen testimony at p. 20, lines 18-20. Please first describe how the Section 199 deduction is applied for tax purposes; then further describe how KIUC proposes to apply the Section 199 deduction for ratemaking purposes. If the two applications differ, please explain why the KIUC proposes a different application for ratemaking purposes.

RESPONSE:

The Section 199 deduction for tax return purposes is governed by the IRC of 1986. In addition, the IRS has issued proposed regulations that provide guidance for the computation of the deduction. The Section 199 deduction for tax return purposes is quantified on a consolidated tax return basis. The tax expense accounting effects on individual operating companies which are part of an affiliated group filing a consolidated tax return are the result of tax allocation agreements among those companies, which may or may not reflect standalone separate return computations for income and deduction items, including the Section 199 deduction. Regardless of the tax expense accounting for individual operating companies such as Kentucky Power Company, the Commission historically has utilized a separate standalone tax computation for ratemaking purposes. This standalone tax computation reflects the ratemaking quantifications of all revenue and expense items, including interest synchronized with the ratemaking quantification of capitalization. This standalone tax computation also reflects normalization accounting. When revenues and expenses are netted against each other on a normalized basis, the remaining taxable income is due to the equity return on capitalization. Thus, the Section 199 deduction for ratemaking purposes can be computed directly based on the production component of the equity return in the manner proposed by Mr. Kollen in his testimony and utilized by the Commission in the ECR filings of the Company, LG&E and KU.

9. Please reference Kollen testimony at p. 21, lines 13-15. Please provide any tax authority (IRS rulings, regulations, guidelines, etc.) which supports Mr. Kollen's statement that an increase in the ECR ratebase and the related revenue requirement will inherently increase the Section 199 deduction.

RESPONSE:

First and foremost, this is a ratemaking issue that is not controlled by the IRC, IRS rulings, regulations, guidelines, etc. The ratemaking recovery determines the taxable income. Then the provisions of the tax code and regulations impact the actual amount of the Section 199 for tax return purposes. The tax code and regulations do not address the amount of ECR rate base or the related revenue requirement; however the ECR rate base and related revenue requirement cause the Section 199 deduction in the manner described by Mr. Kollen. The income tax computation for ratemaking purposes is generally limited to the income tax gross-up on equity return because there is no income tax expense effect on operating expenses, which are pass-throughs, although there are some limited exceptions. The §199 deduction is based on the level of domestic production income. For ratemaking purposes, this deduction can be computed using the equity return on production rate base. If that production rate base is increased, there is a corresponding increase in the overall revenue requirement. This increase would produce additional taxable income related to production income. The increase in production income would in turn represent a higher §199 deduction.

10. Please reference Kollen testimony at p. 21, lines 13-15. Does the KIUC acknowledge that the revenue effect of applying the Section 199 deduction as a reduction to the gross revenue conversion factor will not necessarily be equivalent to the actual Section 199 deduction, if any, available to the Company in any particular year.

RESPONSE:

Yes. There is never an exact match between the revenues, expenses, capitalization, or any other costs used by the Commission for ratemaking purposes and the costs actually incurred in any particular year.

11. Please reference Kollen testimony at p. 48, lines 12-13. Please advise if Mr. Kollen's testimony would be different if the FERC has not ruled on the proposed reallocation of the off-system sales margins of AEP East and West Companies by the time that retail rates are set in this proceeding.

RESPONSE:

No.

12. Please reference Kollen testimony at p. 59, lines 17-18. Please explain, in greater detail, your statement that "Depreciation is a closed-loop and is continually adjusted to reflect the most recent estimates to prevent harm either to the Company or its ratepayers." Specifically, describe the "closed-loop" concept, the continuous adjustment, and the prevention of harm.

RESPONSE:

Authorized depreciation rates determine the depreciation expense or the amount of the Company's recovery of invested capital for ratemaking purposes. Depreciation rates are a matter of judgment, in part because they rely on imperfect assumptions such as retirement dates of generating units and in part because they rely on Company plans and Commission decisions on other issues such as the dismantling of power plants. These assumptions, plans, and decisions change over time and consequently, depreciation rates change to reflect the underlying changes. Meanwhile, the undepreciated plant investment is included in rate base and the utility earns a rate of return on the undepreciated investment. Consequently, in every base rate proceeding, the depreciation expense and undepreciated investment are re-synchronized in the test year through the revenue requirement. Thus, the process is a closed-loop and subject to continual adjustment in rate proceedings.

13. Please reference Kollen testimony at p. 66, lines 11-12. Please state the basis for Mr. Kollen's statement that "The Company utilized only the most recent 15 years of data because it resulted in increased depreciation rates." In answering this question, please specifically identify any document, testimony or other information, if any, in Mr. Kollen's possession that would corroborate such an assertion, and provide a copy of such reference with your response.

RESPONSE:

Mr. Kollen reached this conclusion based on the responses, or lack thereof, to KIUC data requests on the issue. KIUC-1-57 asked why the Company chose to use the 15-year period 1990-2004 to determine the net salvage percentages. The answer provided by Mr. Henderson was "In Mr. Henderson's judgement, the 15-year period is representative of the net salvage expected to be experienced by the Company over the next several years." For all practical purposes that is a non-answer. When asked in KIUC 1-58 to describe the process and application of the decision criteria employed by the Company in using "judgement" to determine the use of this period of historical data, the Company referenced the response to Staff question No. 83. This response was non conclusive and simply made reference to the study itself. In the depreciation study and in the responses to discovery, the Company failed to justify its use of the last 15 years. Use of the entire history of net salvage would result in a decrease in the rates proposed by Mr. Henderson. As such, Mr. Kollen concluded that the selection of only the most recent 15 years of data was intentional, not accidental, and that the only rationale for this means was the end of increased depreciation rates.

14. Please explain why your method of calculating the Section 199 Manufacturing Deduction is not a violation of the IRC Normalization Rules. Include excerpts of all authoritative literature relied on in arriving at this conclusion in your response.

RESPONSE:

The §199 deduction is not subject to any specific normalization requirements or rules. The only provision of the IRC that addresses normalization requirements is §168, which requires that a normalization method of accounting for accelerated tax deprecation be used and also reflected in ratemaking in order for the utility to use the accelerated tax depreciation as a deduction for income tax return purposes. The 224 page proposed regulation and overview issued by the IRS makes no reference to §168 in terms of normalization violations, nor does it refer to possible normalization violations. To Mr. Kollen's knowledge, there have been no private letter rulings issued on this subject to date.

In Mr. Kollen's experience, claims of normalization violations are often alleged by utilities in ratemaking proceedings to influence the Commission to decide tax issues in the utility' favor, but generally such claims are without merit. Mr. Kollen does not know what the Company's belief is in this proceeding, but it did not raise this issue either in the ECR proceeding in Case No. 2005-00068 before the Commission or in an AEP sister company proceeding in Louisiana where the §199 deduction also is an issue for base ratemaking purposes.

15. Please provide electronic copies of the functional spreadsheets for Exhibits LK-4, LK-15, LK-16 and LK-17 with all formulae intact.

RESPONSE:

Refer to the response to Staff 1-1 addressed to KIUC.

STEPHEN J. BARON

16. Please refer to Exhibit SJB-10. Please provide all workpapers with formulae intact employed in the production of this exhibit.

RESPONSE:

See attached excel file.

17. Please refer to Exhibit SJB-10. Please provide the source data and an explanation of the calculations used in this exhibit, including the AEP Internal portion for both the FTR Revenue Forecast and the Congestion Cost Forecast.

RESPONSE:

Please see workpapers provided in response to Q16. As shown in these workpapers, Mr. Baron followed the methodology used by the Company to develop his estimate of pro-formed test year net congestion costs, except that he computed the 2006 average monthly FTR revenue and implicit congestion costs using the monthly average historic data for the 12 month period November 2004 through October 2005.

18. Please reference Baron testimony at p. 12, line 6. Please explain in greater detail how Mr. Baron independently developed a 12 CP cost of service model using the input data provided by the Company.

RESPONSE:

Mr. Baron utilized the input data files provided by the Company, together with the output reports to develop a 12 CP cost allocation model that replicated the Company's results. The Company provided the costs for each of the plant, expense and revenue accounts that were allocated, the method used to allocate each of the accounts, the allocation factor data used to develop each allocation factor, and the formulas used to develop internal allocation factors. From this information, it is possible, as shown in Mr. Baron's testimony, to replicate the Company's model.

19. Please reference Baron testimony at p. 13, line 9. Please provide a copy of the NARUC electric cost Allocation Manual referenced in Mr. Baron's testimony.

RESPONSE:

The NARUC Electric Utility Cost Allocation Manual can be obtained from NARUC, at its website.

20. Please reference Baron testimony at p. 21, lines 4-7. Mr. Baron states that KIUC recognizes that it is not feasible, from a rate impact standpoint, to eliminate all subsidies in a single rate proceeding. In his opinion, what is the maximum reasonable rate impact to the residential class in this proceeding?

RESPONSE:

Mr. Baron has not done a specific study of the maximum reasonable rate impact for the residential class in this case. However, he believes, that a maximum percentage increase of about 1.5 times the system average increase is reasonable in this case, given the very large cost of service disparities among rate classes and the fact that the residential class is producing a negative rate of return under the 12 CP cost of service study.

21. Please reference Baron testimony at p. 28, lines 13-15. Please explain why Mr. Baron's analysis regarding PJM related expenses (FTR Revenue and congestion costs) were based on the 12-month period November 2004 through October 2005 instead of the 12-month period October 2004 through September 2005 (which is the 12-month period following AEP's integration into PJM).

RESPONSE:

Mr. Baron relied on the most recent 12 months of data available at the time of the preparation of his testimony.

22. Please reference Baron testimony at p. 28, lines 11-16, and Exhibit SJB-10. Please identify the model, and provide the input and output data from the model used (Promod TAMS or other model) to backcast the FTR revenues as was completed by Company Witness Bradish. Please include the historical LMP utilized in the analysis.

RESPONSE:

Mr. Baron performed no such analysis, as referenced in this question.

RICHARD A. BAUDINO

23. Please reference Baudino testimony at p. 6, lines 17-21 and Exhibit RAB-2. Please provide the numerical data in both hardcopy and electronic form of the historical interest rate volatility.

RESPONSE:

Mr. Baudino provided the KPCo a copy of the underlying data for Exhibit ____(RAB-2) in response to the Company's informal data request. Mr. Baudino's statement regarding interest rate volatility was based on his review of this data, as well as the *SBBI 2005 Yearbook* published by Ibbotson Associates, pp. 108 – 111.

24. Please reference Baudino testimony, at page 17, lines 20-21. Please provide a complete copy of the December 2005 issue of "AUS Utility Reports."

RESPONSE:

Please refer to the attached documents, which provide the AUS data used by Mr. Baudino. A complete copy of the December 2005 report may be obtained from AUS Utility Reports.

25. Please reference Baudino testimony, at page 18, lines 8. Please provide numerical quantification of "significant earnings fluctuations."

RESPONSE:

Mr. Baudino did not perform a numerical quantification of significant earnings fluctuations.

26. Please reference Baudino testimony, at page 18, lines 12-29. Please provide a list of the companies that were not included in the comparison group, and identify the criteria that warranted their exclusion.

RESPONSE:

Please refer to the work papers that were supplied by Mr. Baudino in response to KPCo's informal data request. The Excel file that contains Mr. Baudino's ROE analyses also contains a sheet that lists all of the companies that were considered by Mr. Baudino and the reasons that certain companies were excluded.

27. Please reference Baudino testimony, at page 19, lines 5-13 and Exhibit RAB-3. Please provide the source documents from Yahoo! Finance that were employed in this schedule. Also, identify the instances where the S&P Stock Guide was used. Also explain why the S&P Stock Guide was not used as an exclusive source.

RESPONSE:

Please refer to the attached documents.

Mr. Baudino referred to the S&P Stock Guide if the subject company increased its dividend during the 6-month period to ensure that the dividend increase was reflected in the appropriate month. Those companies included Avista, Energy East, First Energy, Pinnacle West, and PPL Corp.

Yahoo! Finance was used because monthly high/low prices can be downloaded into a spreadsheet.

28. Please reference Baudino testimony, at page 20, lines 6-8. Is Mr. Baudino aware of any additional sources for analysts' forecasts of growth. If so, name them and explain why they were not considered.

RESPONSE:

Mr. Baudino is aware of Reuters/Market Guide that was used by Mr. Moul. Mr. Baudino believes that two widely recognized sources of consensus forecasts, Zack's and Thomson/First Call, as well the Value Line forecasts were sufficient and appropriate sources to use as inputs into his DCF analysis.

29. Please reference Baudino testimony, at page 21 and footnote 5. Please provide a complete copy of the articles by Rozeff; Brown & Rozeff; and Moyers, Chatfield and Kelley; and the study by Vander Weide and Carleton that are listed in footnote (5).

RESPONSE:

Please refer to the attached documents.

30. Please reference Baudino testimony, at page 21, line 16-18 and Exhibit RAB-4. Please provide the source documents for the Zacks and First Call/Thomson growth rates.

RESPONSE:

Please refer to the attached documents.

31. Please reference Baudino testimony, at page 22 lines 1-2. Please provide documentation to support the assertion that the Zacks and First Call/Thomson earnings growth rate forecasts are for the next three to five years.

RESPONSE:

Please refer to the Zack's and First Call/Thomson documents that were provided in response to Data Request No. 30. The "LTG" in the First Call/Thomson forecasts refers to 5-year projected growth.

32. Please reference Baudino testimony, at page 23-24 and Exhibit RAB-4. Would Mr. Baudino agree that if he had employed the 3.69% retention growth method in his DCF analysis, his result would have been 7.79%? Would Mr. Baudino agree that a 7.79% DCF return represents an unrealistic indication of the cost of equity?

RESPONSE:

Mr. Baudino agrees that using the 3.69% retention growth estimate would result in a DCF cost of equity result of 7.79%. Given the DCF results from the other growth estimates, Mr. Baudino would not recommend that the Commission adopt a 7.79% cost of equity for Kentucky Power in this proceeding because it appears to be too low.

33. Please reference Baudino testimony, at page 26 and footnote 6. Please provide a complete copy of the chapter from the source document which contains the referenced quote.

RESPONSE:

Please refer to the attached document

34. Please reference Baudino testimony, at page 27 lines 13-14. Please provide the source documents for the 12.84% average Value Line growth rate.

RESPONSE:

Please refer to the attached document

35. Please reference Baudino testimony, at page 27 lines 13-15. Please provide the source document for the 1.29% dividend yield for the Value Line companies.

RESPONSE:

Please refer to the documents provided in response to Data Request No. 34, which shows the current dividend yield of 1.21%. Multiplying 1.21% by 1 + ½ the growth rate results in the expected dividend yield of 1.29%.

36. Please reference Baudino testimony, at page 28 lines 8-18 and Exhibit RAB-1. Please provide a complete copy of the testimony and exhibits, as well as rebuttal testimony and exhibit filed by Mr. Baudino in Aquila Networks – WPC Case 046-035E and Southwestern Electric Power Company U-23327 Subdocket B. Also, provide the Commission orders issued in those cases.

RESPONSE:

Please refer to the attached documents. The Louisiana Public Service Commission has not issued a final order in the SWEPCO proceeding.

37. Please reference Baudino testimony, at page 29 line 1. Please provide the source document for the 10.50% earnings growth rate for the S&P 500.

RESPONSE:

Please refer to the attached document.

38. Please reference Baudino testimony, at page 30 and footnote 8. Please provide a complete copy of the article by Brigham, Shome and Vinson that is listed in footnote (8).

RESPONSE:

Please refer to the attached document.

39. Please reference Baudino testimony, at page 30, lines 19-20. Please quantify in basis points of yield the "significant amount of interest rate risk" that is contained in 20-year Treasury bonds.

RESPONSE:

Mr. Baudino has not performed the requested quantification.

40. Please reference Baudino testimony, at page 33, lines 18-21. Please provide the status of the restructuring, deregulation and increase of unregulated investments for each company that is included in Mr. Baudino's comparison group of electric companies.

RESPONSE:

Mr. Baudino did not prepare in writing a discussion of the status of restructuring, deregulation, and increase of unregulated investments for his comparison group in preparing his analysis and testimony in this proceeding.

41. Please reference Baudino testimony, at page 34 and footnote 9. Please provide a complete copy of the source document.

RESPONSE:

Please refer to the attached PDF file.

42. Please reference Baudino testimony, at page 36 line 5. Please provide a workpaper for the 1.6656 figure.

RESPONSE:

Please refer to the attached document.

43. Please reference Baudino testimony, at Exhibits RAB-2 through RAB-7. Please provide an electronic copy of all schedules in their native format with all formulae intact.

RESPONSE:

These files have already been provided to the Company.

44. Please reference Baudino testimony, at Exhibit RAB-5. Please provide the source document for the 20-year and 5- year Treasury bond yields.

RESPONSE:

Please refer to the attached computer files entitled "5-Year Treasury Yields" and "20-Year Treasury Yields".

45. To the extent not provided in response to any prior request by Kentucky Power, please provide on diskette or CD all non-proprietary tabulations included in the Baudino's testimony and all data necessary to recreate in their entirety, all analyses and calculations performed for the preparation of his testimony. Please provide this and all electronic data in Excel (or .txt format if appropriate), with all formulae intact. Please provide any

record layouts necessary to interpret the data. Please include in the response electronic spreadsheet copies of all of the schedules and/or tables included in the testimony, with all formulae intact.

RESPONSE:

These files have already been provided to the Company.

ATTACHMENT TO RESPONSE NO. 41

Long-Run Stock Returns: Participating in the Real Economy

Roger G. Ibbotson and Peng Chen

In the study reported here, we estimated the forward-looking long-term equity risk premium by extrapolating the way it has participated in the real economy. We decomposed the 1926–2000 historical equity returns into supply factors—inflation, earnings, dividends, the P/E, the dividend-payout ratio, book value, return on equity, and GDP per capita. Key findings are the following. First, the growth in corporate productivity measured by earnings is in line with the growth of overall economic productivity. Second, P/E increases account for only a small portion of the total return of equity. The bulk of the return is attributable to dividend payments and nominal earnings growth (including inflation and real earnings growth). Third, the increase in the equity market relative to economic productivity can be more than fully attributed to the increase in the P/E. Fourth, a secular decline has occurred in the dividend yield and payout ratio, rendering dividend growth alone a poor measure of corporate profitability and future growth. Our forecast of the equity risk premium is only slightly lower than the pure historical return estimate. We estimate the expected long-term equity risk premium (relative to the long-term government bond yield) to be about 6 percentage points arithmetically and 4 percentage points geometrically.

Numerous authors are directing their efforts toward estimating expected returns on stocks incremental to bonds.[1] These equity risk premium studies can be categorized into four groups based on the approaches the authors took. The first group of studies has attempted to derive the equity risk premium from the historical returns of stocks and bonds; an example is Ibbotson and Sinquefield (1976a, 1976b). The second group, which includes our current work, has used fundamental information—such as earnings, dividends, or overall economic productivity—to measure the expected equity risk premium. The third group has adopted demand-side models that derive expected equity returns through the payoff demanded by investors for bearing the risk of equity investments, as in the Ibbotson, Diermeier, and Siegel (1984) demand framework and, especially, in the large body of literature following the seminal work of Mehra and Prescott (1985).[2] The fourth group has relied on opinions of investors and financial professionals garnered from broad surveys.

In the work reported here, we used supply-side models. We first used this type of model in Diermeier, Ibbotson, and Siegel (1984). Numerous other authors have used supply-side models, usually with a focus on the Gordon (1962) constant-dividend-growth model. For example, Siegel (1999) predicted that the equity risk premium will shrink in the future because of low current dividend yields and high equity valuations. Fama and French (2002), studying a longer time period (1872–1999), estimated a historical expected geometric equity risk premium of 2.55 percentage points when they used dividend growth rates and a premium of 4.32 percentage points when they used earnings growth rates.[3] They argued that the increase in the P/E has resulted in a realized equity risk premium that is higher than the *ex ante* (expected) premium. Campbell and Shiller (2001) forecasted low returns because they believe the current market is overvalued. Arnott and Ryan (2001) argued that the forward-looking equity risk premium is actually negative. This conclusion was based on the low

Roger G. Ibbotson is professor of finance at Yale School of Management, New Haven, Connecticut. Peng Chen, CFA, is vice president and director of research at Ibbotson Associates, Chicago.

current dividend yield plus their forecast for very low dividend growth. Arnott and Bernstein (2002) argued similarly that the forward-looking equity risk premium is near zero or negative (see also Arnott and Asness 2003).

The survey results generally support somewhat higher equity risk premiums. For example, Welch (2000) conducted a survey of 226 academic financial economists about their expectations for the equity risk premium. The survey showed that they forecasted a geometric long-horizon equity risk premium of almost 4 pps.[4] Graham and Harvey (2001) conducted a multiyear survey of chief financial officers of U.S. corporations and found their expected 10-year geometric average equity risk premium to range from 3.9 pps to 4.7 pps.[5]

In this study, we linked historical equity returns with factors commonly used to describe the aggregate equity market and overall economic productivity. Unlike some studies, ours portrays results on a per share basis (per capita in the case of GDP). The factors include inflation, EPS, dividends per share, P/E, the dividend-payout ratio, book value per share, return on equity, and GDP per capita.[6]

We first decomposed historical equity returns into various sets of components based on six methods. Then, we used each method to examine each of the components. Finally, we forecasted the equity risk premium through supply-side models using historical data.

Our long-term forecasts are consistent with the historical supply of U.S. capital market earnings and GDP per capita growth over the 1926–2000 period. In an important distinction from the forecasts of many others, our forecasts assume market efficiency and a constant equity risk premium.[7] Thus, the current high P/E represents the market's forecast of higher earnings growth rates. Furthermore, our forecasts are consistent with Miller and Modigliani (1961) theory, in that dividend-payout ratios do not affect P/Es and high earnings-retention rates (usually associated with low yields) imply higher per share future growth. To the extent that corporate cash is not used for reinvestment, we assumed it to be used to repurchase a company's own shares or, perhaps more frequently, to purchase other companies' shares. Finally, our forecasts treat inflation as a pass-through, so the entire analysis can be done in real terms.

Six Methods for Decomposing Returns

We present six different methods for decomposing historical equity returns. The first two methods (especially Method 1) are based entirely on historical returns. The other four methods are methods of the supply side. We evaluated each method and its components by applying historical data for 1926–2000. The historical equity return and EPS data used in this study were obtained from Wilson and Jones (2002).[8] The average compound annual return for the stock market over the 1926–2000 period was 10.70 percent. The arithmetic annual average return was 12.56 percent, and the standard deviation was 19.67 percent. Because our methods used geometric averages, we focus on the components of the 10.70 percent geometric return. When we present our forecasts, we convert the geometric average returns to arithmetic average returns.

Method 1. Building Blocks. Ibbotson and Sinquefield developed a "building blocks" model to explain equity returns. The three building blocks are inflation, the real risk-free rate, and the equity risk premium. Inflation is represented by changes in the U.S. Consumer Price Index (*CPI*). The equity risk premium for year t, ERP_t, and the real risk-free rate for year t, RRf_t, are given by, respectively,

$$\begin{aligned} ERP_t &= \frac{1+R_t}{1+Rf_t}-1 \\ &= \frac{R_t-Rf_t}{1+Rf_t} \end{aligned} \tag{1}$$

and

$$\begin{aligned} RRf_t &= \frac{1+Rf_t}{1+CPI_t}-1 \\ &= \frac{Rf_t-CPI_t}{1+CPI_t}, \end{aligned} \tag{2}$$

where R_t, the return of the U.S. stock market, represented by the S&P 500 Index, is

$$R_t=(1+CPI_t)(1+RRf_t)(1+ERP_t)-1 \tag{3}$$

and Rf_t is the return of risk-free assets, represented by the income return of long-term U.S. government bonds.

The compound average for equity return was 10.70 percent for 1926–2000. For the equity risk premium, we can interpret that investors were compensated 5.24 pps a year for investing in common stocks rather than long-term risk-free assets (such as long-term U.S. government bonds). This calculation also shows that roughly half of the total historical equity return has come from the equity risk premium; the other half is from inflation and the long-term real risk-free rate. Average U.S. equity returns from 1926 through 2000 can be reconstructed as follows:[9]

$$\bar{R} = (1+\overline{CPI})(1+\overline{RRf})(1+\overline{ERP})-1$$
$$10.70\% = (1+3.08\%)\times(1+2.05\%)\times(1+5.24\%)-1.$$

The first column in **Figure 1** shows the decomposition of historical equity returns for 1926–2000 according to the building blocks method.

Method 2. Capital Gain and Income. The equity return, based on the form in which the return is distributed, can be broken into capital gain, *cg*, and income return, *Inc*. Income return of common stock is distributed to investors through dividends, whereas capital gain is distributed through price appreciation. Real capital gain, *Rcg*, can be computed by subtracting inflation from capital gain. The equity return in period t can then be decomposed as follows:

$$R_t = [(1+CPI_t)(1+Rcg_t)-1]+Inc_t+Rinv_t, \tag{4}$$

where *Rinv* is reinvestment return.

The average income return was calculated to be 4.28 percent in the study period, the average capital gain was 6.19 percent, and the average real capital gain was 3.02 percent. The reinvestment return averaged 0.20 percent from 1926 through 2000. For Method 2, the average U.S. equity return for 1926–2000 can thus be computed according to

$$\bar{R} = [(1+\overline{CPI})(1+\overline{Rcg})-1]+\overline{Inc}+\overline{Rinv}$$
$$10.70\% = [(1+3.08\%)\times(1+3.02\%)-1]+4.28\%+0.20\%.$$

The second column in Figure 1 shows the decomposition of historical equity returns for 1926–2000 according to the capital gain and income method.

Method 3. Earnings. The real-capital-gain portion of the return in the capital gain and income method can be broken into growth in real EPS, g_{REPS}, and growth in P/E, $g_{P/E}$:

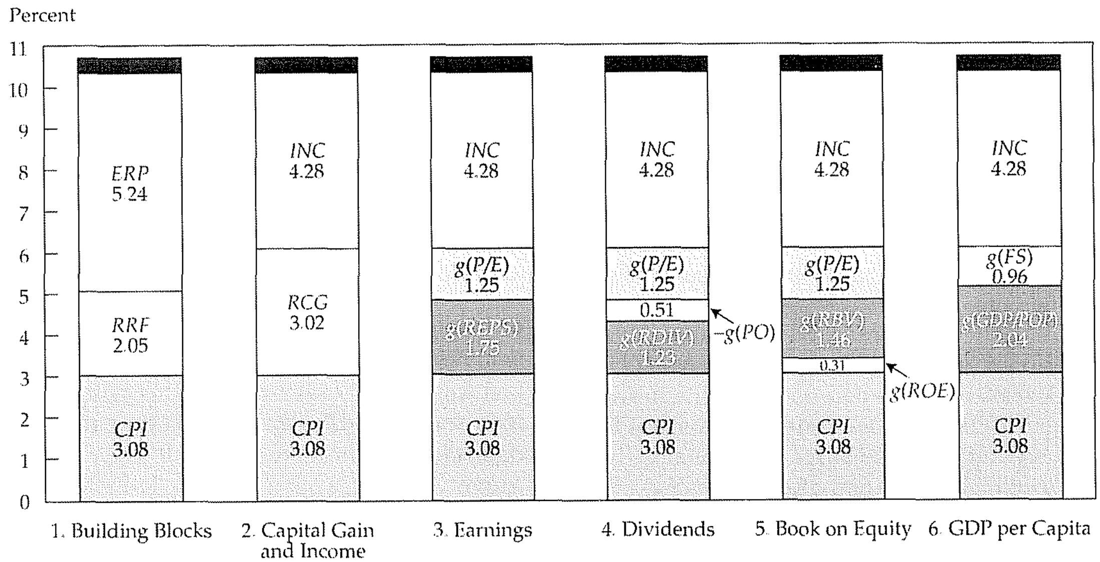
$$\begin{aligned} Rcg_t &= \frac{P_t}{P_{t-1}}-1 \\ &= \frac{P_t/E_t}{P_{t-1}/E_{t-1}}\left(\frac{E_t}{E_{t-1}}\right)-1 \\ &= (1+g_{P/E,t})(1+g_{REPS,t})-1. \end{aligned} \tag{5}$$

Therefore, equity's total return can be broken into four components—inflation, growth in real EPS, growth in P/E, and income return:

$$\begin{aligned} R_t &= [(1+CPI_t)(1+g_{REPS,t})(1+g_{P/E,t})-1] \\ &\quad + Inc_t + Rinv_t. \end{aligned} \tag{6}$$

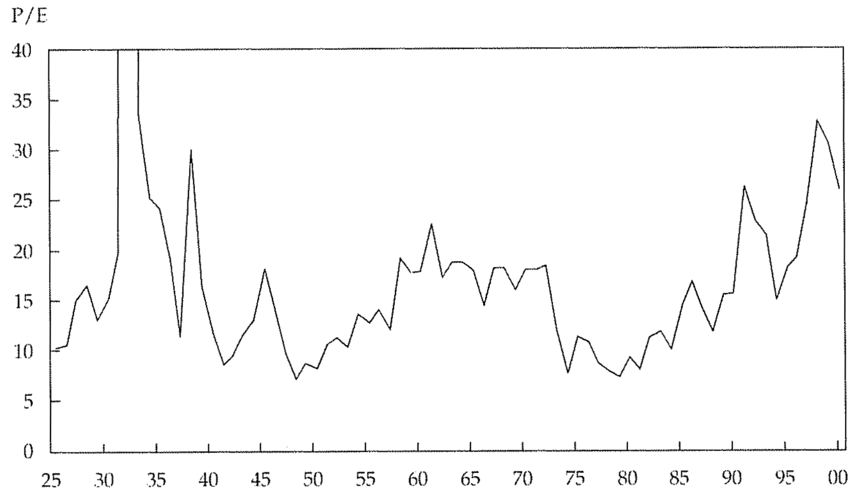
The real earnings of U.S. equity increased 1.75 percent annually between 1926 and 2000. The P/E, as **Figure 2** illustrates, was 10.22 at the beginning of 1926 and 25.96 at the end of 2000. The highest P/E (136.50 and off the chart in Figure 2) was recorded during the Great Depression, in December 1932, when earnings were near zero, and the lowest in the period (7.07) was recorded in 1948. The average year-end P/E was 13.76.[10]

Figure 1. Decomposition of Historical Equity Returns by Six Methods, 1926–2000



Notes: The block on the top of each column is the reinvestment return plus the geometric interactions among the components. Including the geometric interactions ensured that the components summed to 10.70 percent in this and subsequent figures. The table that constitutes Appendix A gives detailed information on the reinvestment and geometric interaction for all the methods.

Figure 2. P/E, 1926–2000



The U.S. equity returns from 1926 and 2000 can be computed according to the earnings method as follows:

$$\bar{R} = [(1+\overline{CPI})(1+\overline{g_{REPS}})(1+\overline{g_{P/E}})-1] + \overline{Inc} + \overline{Rinv}$$

$$10.70\% = [(1+3.08\%)\times(1+1.75\%)\times(1+1.25\%)-1] + 4.28\% + 0.20\%.$$

The third column in Figure 1 shows the decomposition of historical equity returns for 1926–2000 according to the earnings method.

Method 4. Dividends. In this method, real dividends, *RDiv*, equal the real earnings times the dividend-payout ratio, *PO*, or

$$REPS_t = \frac{RDiv_t}{PO_t}; \tag{7}$$

therefore, the growth rate of earnings can be calculated by the difference between the growth rate of real dividends, g_{RDiv}, and the growth rate of the payout ratio, g_{PO}:

$$(1+g_{REPS,t}) = \frac{(1+g_{RDiv,t})}{(1+g_{PO,t})}. \tag{8}$$

If dividend growth and payout-ratio growth are substituted for the earnings growth in Equation 6, equity total return in period *t* can be broken into (1) inflation, (2) the growth rate of P/E, (3) the growth rate of the dollar amount of dividends after inflation, (4) the growth rate of the payout ratio, and (5) the dividend yield:

$$R_t = \left[(1+CPI_t)(1+g_{P/E,t})\left(\frac{1+g_{RDiv,t}}{1+g_{PO,t}}\right)-1\right] + Inc_t + Rinv_t. \tag{9}$$

Figure 3 shows the annual income return (dividend yield) of U.S. equity for 1926–2000. The dividend yield dropped from 5.15 percent at the beginning of 1926 to only 1.10 percent at the end of 2000. **Figure 4** shows the year-end dividend-payout ratio for 1926–2000. On average, the dollar amount of dividends after inflation grew 1.23 percent a year, while the dividend-payout ratio decreased 0.51 percent a year. The dividend-payout ratio was 46.68 percent at the beginning of 1926. It had decreased to 31.78 percent at the end of 2000. The highest dividend-payout ratio was recorded in 1932, and the lowest was the 31.78 percent recorded in 2000.

The U.S. equity returns from 1926 through 2000 can be computed in the dividends method according to

$$\bar{R} = \left[(1+\overline{CPI})(1+\overline{g_{P/E}})\left(\frac{1+\overline{g_{RDiv}}}{1+\overline{g_{PO}}}\right)-1\right] + \overline{Inc} + \overline{Rinv}$$

$$10.70\% = \left[(1+3.08\%)\times(1+1.25\%)\times\left(\frac{1+1.23\%}{1-0.51\%}\right)-1\right] + 4.28\% + 0.20\%.$$

The decomposition of equity return according to the dividends method is given in the fourth column of Figure 1.

Method 5. Return on Book Equity. Earnings can be broken into the book value of equity, *BV*, and return on the book value of equity, *ROE*:

$$EPS_t = BV_t(ROE_t). \tag{10}$$

The growth rate of earnings can be calculated from the combined growth rates of real book value, g_{RBV}, and of *ROE*:

$$1+g_{REPS,t} = (1+g_{RBV,t})(1+g_{ROE,t}). \tag{11}$$

Figure 3. Income Return (Dividend Yield), 1926–2000

Figure 4. Dividend-Payout Ratio, Year-End 1926–2000

Note: The dividend-payout ratio was 190.52 percent in December 1931 and 929.12 percent in December 1932.

In this method, BV growth and ROE growth are substituted for earnings growth in the equity return decomposition, as shown in the fifth column of Figure 1. Then, equity's total return in period t can be computed by

$$R_t = [(1 + CPI_t)(1 + g_{P/E,t})(1 + g_{RBV,t})(1 + g_{ROE,t}) - 1] + Inc_t + Rinv_t. \quad (12)$$

We estimated that the average growth rate of the book value after inflation was 1.46 percent for 1926–2000.[11] The average ROE growth a year during the same time period was calculated to be 0.31 percent:

$$\bar{R} = [(1 + \overline{CPI})(1 + \overline{g_{P/E}})(1 + \overline{g_{BV}})(1 + \overline{g_{ROE}}) - 1] + \overline{Inc} + \overline{Rinv}$$

$$10.70\% = [(1 + 3.08\%)(1 + 1.25\%)(1 + 1.46\%)(1 + 0.31\%) - 1] + 4.28\% + 0.20\%.$$

Method 6. GDP per Capita. Diermeier et al. proposed a framework to analyze the aggregate supply of financial asset returns. Because we were interested only in the supply model of the equity returns in this study, we developed a slightly different supply model based on the growth of economic productivity. In this method, the market return over the long run is decomposed into (1) inflation, (2) the real growth rate of overall economic productivity (GDP per capita, $g_{GDP/POP}$), (3) the increase in the equity market relative to overall economic productivity (the increase in the factor share of equities in the overall economy, g_{FS}), and (4) dividend yields.[12] This model is expressed by the following equation:

$$R_t = [(1 + CPI_t)(1 + g_{GPD/POP,t})(1 + g_{FS,t}) - 1] + Inc_t + Rinv_t. \tag{13}$$

Figure 5 shows the growth of the U.S. stock market, GDP per capita, earnings, and dividends initialized to unity ($1.00) at the end of 1925. The level of all four factors dropped significantly in the early 1930s. For the whole period, GDP per capita slightly outgrew earnings and dividends, but all four factors grew at approximately the same rate. In other words, overall economic productivity increased slightly faster than corporate earnings or dividends over the past 75 years. Although GDP per capita outgrew earnings and dividends, the overall stock market price grew faster than GDP per capita. The primary reason is that the market P/E increased 2.54 times during the same time period.

Average equity market return can be calculated according to this model as follows:

$$\begin{aligned}\bar{R} &= [(1 + \overline{CPI})(1 + \overline{g_{GDP/POP}})(1 + \overline{g_{FS}}) - 1] + \overline{Inc} + \overline{Rinv} \\ 10.70\% &= [(1 + 3.08\%)(1 + 2.04\%)(1 + 0.96\%) - 1] + 4.28\% + 0.20\%.\end{aligned}$$

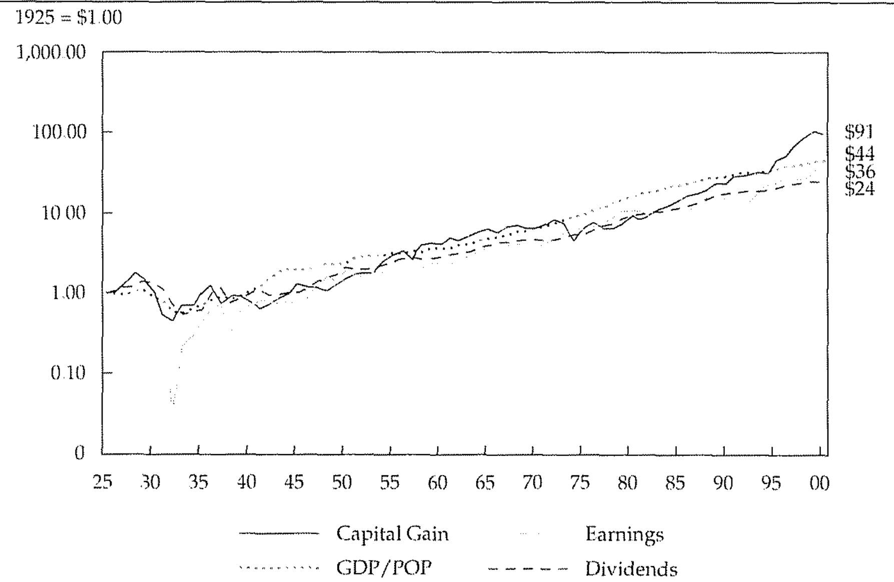
We calculated the average annual increase in the factor share of the equity market relative to the overall economy to be 0.96 percent. The increase in this factor share is less than the annual increase of the P/E (1.25 percent) over the same time period. This finding suggests that the increase in the equity market share relative to the overall economy can be fully attributed to the increase in its P/E.

The decomposition of historical equity returns by the GDP per capita model is given in the last column of Figure 1.

Summary of Equity Returns and Components. The decomposition of the six models into their components can be compared by looking at Figure 1. The differences among the five models arise from the different components that represent the capital gain portion of the equity returns.

This analysis produced several important findings. First, as Figure 5 shows, the growth in corporate earnings has been in line with the growth of overall economic productivity. Second, P/E increases accounted for only 1.25 pps of the 10.70 percent total equity return. Most of the return has been attributable to dividend payments and nominal earnings growth (including inflation and real earnings growth). Third, the increase in the relative factor share of equity can be fully attributed to the increase in P/E. Overall, economic productivity outgrew both corporate earnings and dividends from 1926 through 2000. Fourth, despite the record earnings growth in the 1990s, the dividend yield and the payout ratio declined sharply, which renders dividends alone a poor measure for corporate profitability and future earnings growth.

Figure 5. Growth of $1 from the Beginning of 1926 through 2000



Long-Term Forecast of Equity Returns

Supply-side models can be used to forecast the long-term expected equity return. The supply of stock market returns is generated by the productivity of the corporations in the real economy. Over the long run, the equity return should be close to the long-run supply estimate. In other words, investors should not expect a much higher or a much lower return than that produced by the companies in the real economy. Therefore, we believe investors' expectations for long-term equity performance should be based on the supply of equity returns produced by corporations.

The supply of equity returns consists of two main components—current returns in the form of dividends and long-term productivity growth in the form of capital gains. In this section, we focus on two of the supply-side models—the earnings model and the dividends model (Methods 3 and 4).[13] We studied the components of these two models by identifying which components are tied to the supply of equity returns and which components are not. Then, we estimated the long-term, sustainable return based on historical information about these supply components.

Model 3F. Forward-Looking Earnings. According to the earnings model (Equation 6), the historical equity return can be broken into four components—the income return, inflation, the growth in real EPS, and the growth in P/E. Only the first three of these components are historically supplied by companies. The growth in P/E reflects investors' changing predictions of future earnings growth. Although we forecasted that the past supply of corporate growth will continue, we did not forecast any change in investor predictions. Thus, the supply side of equity return, *SR*, includes only inflation, the growth in real EPS, and income return:[14]

$$SR_t = [(1+CPI_t)(1+g_{REPS,t})-1]+Inc_t+Rinv_t. \quad (14)$$

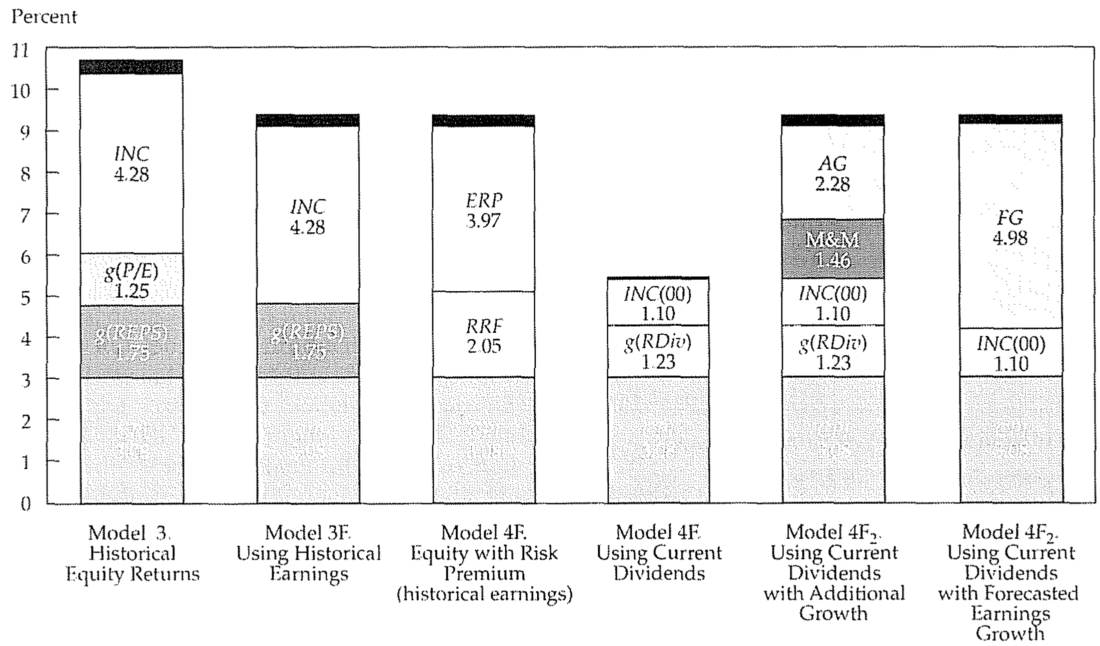
The long-term supply of U.S. equity returns based on the earnings model is 9.37 percent, calculated as follows:

$$\overline{SR} = [(1+\overline{CPI})(1+\overline{g_{REPS}})-1]+\overline{Inc}+\overline{Rinv}$$

$$9.37\% = [(1+3.08\%)(1+1.75\%)-1]+4.28\%+0.20\%.$$

The decomposition according to Model 3F is compared with that of Method 3 (based on historical data plus the estimated equity risk premium) in the first two columns of **Figure 6**.

Figure 6. Historical vs. Current Dividend-Yield Forecasts Based on Earnings and Dividends Models



Notes: *Inc*(00) is the dividend yield in year 2000. *FG* is the real earnings growth rate, forecasted to be 4.98 percent. Model 4F$_2$ corrects Model 4F as follows: add 1.46 pps for M&M consistency and add 2.24 pps for the additional growth, *AG*, implied by the high current market P/E.

The supply-side equity risk premium, *ERP*, based on the earnings model is calculated to be 3.97 pps:

$$\begin{aligned}\overline{ERP} &= \frac{(1+\overline{SR})}{(1+\overline{CPI})(1+\overline{RRf})} - 1 \\ &= \frac{1+9.37\%}{(1+3.08\%)(1+2.05\%)} - 1 \\ &= 3.97\%.\end{aligned}$$

The *ERP* is taken into account in the third column of Figure 6.

Model 4F. Forward-Looking Dividends. The forward-looking dividends model is also referred to as the constant-dividend-growth model (or the Gordon model). In it, the expected equity return equals the dividend yield plus the expected dividend growth rate. The supply of the equity return in the Gordon model includes inflation, the growth in real dividends, and dividend yield.

As is commonly done with the constant-dividend-growth model, we used the current dividend yield of 1.10 percent instead of the historical dividend yield of 4.28 percent. This decision reduced the estimate of the supply of equity returns to 5.44 percent:

$$\begin{aligned}\overline{SR} &= [(1+\overline{CPI})(1+\overline{g_{RDiv}}) - 1] + Inc(00) + \overline{Rinv} \\ 5.54\% &= [(1+3.08\%)(1+1.23\%) - 1] + 1.10\% + 0.20\%,\end{aligned}$$

where $Inc(00)$ is the dividend yield in year 2000. The equity risk premium was estimated to be 0.24 pps:

$$\begin{aligned}\overline{ERP} &= \frac{(1+\overline{SR})}{(1+\overline{CPI})(1+\overline{RRf})} - 1 \\ &= \frac{1+5.54\%}{(1+3.08\%)+(1+2.05\%)} - 1 \\ &= 0.24\%.\end{aligned}$$

Figure 6 allows a comparison of forecasted equity returns including the equity risk premium estimates based on the earnings model and the dividends model. In the next section, we show why we disagree with the dividends model and prefer to use the earnings model to estimate the supply-side equity risk premium.

Differences between the Earnings Model and the Dividends Model. The earnings model (3F) and the dividends model (4F) differ in essentially two ways. The differences relate to the low current payout ratio and the high current P/E. These two differences are reconciled in what we will call Model $4F_2$ shown in the two right-hand columns of Figure 6. First, to reflect growth in productivity, the earnings model uses historical earnings growth whereas the dividend model uses historical dividend growth. Historical dividend growth underestimates historical earnings growth, however, because of the decrease in the payout ratio. Overall, the dividend growth underestimated the increase in earnings productivity by 0.51 pps a year for 1926–2000. Today's low dividend yield also reflects the current payout ratio, which is at a historical low of 31.8 percent (compared with the historical average of 59.2 percent). Applying such a low rate to the future would mean that even more earnings would be retained in the future than in the historical period studied. But had more earnings been retained, the historical earnings growth would have been 0.95 pps a year higher, so (assuming the historical average dividend-payout ratio) the current yield of 1.10 percent would need to be adjusted upward by 0.95 pps.

By using the current dividend-payout ratio in the dividend model, Model 4F creates two errors, both of which violate Miller and Modigliani theory. A company's dividend-payout ratio affects only the form in which shareholders receive their returns (i.e., dividends versus capital gains), not their total returns. The *current* low dividend-payout ratio should not affect our forecast. Companies today probably have such low payout ratios to reduce the tax burden on their investors. Instead of paying dividends, many companies reinvest earnings, buy back shares, or use the cash to purchase other companies.[15] Therefore, the dividend growth model has to be upwardly adjusted by 1.46 pps (0.51 pp plus 0.95 pp) so as not to violate M&M theory.

The second difference between Model 3F and Model 4F is related to the fact that the current P/E (25.96) is much higher than the historical average (13.76). The current yield (1.10 percent) is at a historic low—because of the previously mentioned low payout ratio and because of the high P/E. Even assuming the historical average payout ratio, the current dividend yield would be much lower than its historical average (2.05 percent versus 4.28 percent). This difference is geometrically estimated to be 2.28 pps a year. In Figure 6, the additional growth, *AG*, accounts for 2.28 pps of the return; in the last column, the forecasted real earnings growth rate, *FG*, accounts for 4.98 pps. The high P/E could be caused by (1) mispricing, (2) a low required rate of return, and/or (3) a high expected future earnings growth rate. Mispricing as a cause is eliminated by our assumption of market efficiency, and a low required rate of return is eliminated by our assumption of a constant equity risk premium through the past and future periods that we are trying to estimate. Thus, we interpret the high P/E as the market expectation of higher earnings growth and the following equation is the model for

Model $4F_2$, which reconciles the differences between the earnings model and the dividends model:[16]

$$\begin{aligned}\overline{SR} &= [(1+\overline{CPI})(1+\overline{g_{RDiv}})(1-\overline{g_{PO}})-1] \\ &\quad + Inc(00) + AY + AG + \overline{Rinv} \\ 9.67\% &= [(1+3.08\%)(1+1.23\%)(1+0.51\%)-1] \\ &\quad + 1.10\% + 0.95\% + 2.28\% + 0.20\%.\end{aligned}$$

To summarize, the earnings model and the dividends model have three differences. The first two differences relate to the dividend-payout ratio and are direct violations of M&M. The third difference results from the expectation of higher-than-average earnings growth, which is predicted by the high current P/E. Reconciling these differences reconciles the earnings and dividends models.

Geometric vs. Arithmetic. The estimated equity return (9.37 percent) and equity risk premium (3.97 pps) are geometric averages. The arithmetic average, however, is often used in portfolio optimization. One way to convert the geometric average into an arithmetic average is to assume the returns are independently lognormally distributed over time. Then, the arithmetic average, R_A, and geometric average, R_G, have roughly the following relationship:

$$R_A = R_G + \frac{\sigma^2}{2}, \qquad (15)$$

where σ^2 is the variance.

The standard deviation of equity returns is 19.67 percent. Because almost all the variation in equity returns is from the equity risk premium, rather than the risk-free rate, we need to add 1.93 pps to the geometric estimate of the equity risk premium to convert the returns into arithmetic form, so $R_A = R_G + 1.93$ pps. The arithmetic average equity risk premium then becomes 5.90 pps for the earnings model.

To summarize, the long-term supply of equity return is estimated to be 9.37 percent (6.09 percent after inflation), conditional on the historical average risk-free rate. The supply-side equity risk premium is estimated to be 3.97 pps geometrically and 5.90 pps arithmetically.[17]

Conclusions

We adopted a supply-side approach to estimate the forward-looking, long-term, sustainable equity return and equity risk premium. We analyzed historical equity returns by decomposing returns into factors commonly used to describe the aggregate equity market and overall economic productivity—inflation, earnings, dividends, P/E, the dividend-payout ratio, BV, ROE, and GDP per capita. We examined each factor and its relationship to the long-term supply-side framework. We used historical information in our supply-side models to forecast the equity risk premium. A complete tabulation of all the numbers from all models and methods is presented in Appendix A.

Contrary to several recent studies on the equity risk premium declaring the forward-looking premium to be close to zero or negative, we found

Appendix A. Summary Tabulations for Forecasted Equity Return

Method/Model	Sum	Inflation	Real Risk-Free Rate	Equity Risk Premium	Real Capital Gain	g(Real *EPS*)	g(Real *Div*)	$-g$(Payout Ratio)
A. Historical								
Method 1	10.70	3.08	2.05	5.24				
Method 2	10.70	3.08			3.02			
Method 3	10.70	3.08				1.75		
Method 4	10.70	3.08					1.23	0.51
Method 5	10.70	3.08						
Method 6	10.70	3.08						
B. Forecast with historical dividend yield								
Model 3F	9.37	3.08				1.75		
Model 3F (*ERP*)	9.37	3.08	2.05	3.97				
C. Forecast with current dividend yield								
Model 4F	5.44	3.08					1.23	
Model 4F (*ERP*)	5.44	3.08	2.05	0.24				
Model $4F_2$	9.37	3.08					1.23	0.51
Model $4F_2$ (*FG*)	9.37	3.08						

[a]2000 dividend yield.
[b]Assuming the historical average dividend-payout ratio, the 2000 dividend yield is adjusted up 0.95 pps.

the long-term supply of the equity risk premium to be only slightly lower than the straight historical estimate. We estimated the equity risk premium to be 3.97 pps in geometric terms and 5.90 pps on an arithmetic basis. These estimates are about 1.25 pps lower than the historical estimates. The differences between our estimates and the ones provided by several other recent studies result principally from the inappropriate assumptions those authors used, which violate the M&M theorem. Also, our models interpret the current high P/E as the market forecasting high future growth rather than a low discount rate or an overvaluation. Our estimate is in line with both the historical supply measures of public corporations (i.e., earnings) and overall economic productivity (GDP per capita).

The implication of an estimated equity risk premium being far closer to the historical premium than zero or negative is that stocks are expected to outperform bonds over the long run. For long-term investors, such as pension funds and individuals saving for retirement, stocks should continue to be a favored asset class in a diversified portfolio. Because our estimate of the equity risk premium is lower than historical performance, however, some investors should lower their equity allocations and/or increase their savings rate to meet future liabilities.

Notes

1. In our study, we defined the equity risk premium as the difference between the long-run expected return on stocks and the long-term risk-free (U.S. Treasury) yield. [Some other studies, including Ibbotson and Sinquefield (1976a, 1976b) used short-term U.S. T-bills as the risk-free rate.] We did all of our analysis in geometric form, then converted to arithmetic data at the end, so the estimate is expressed in both arithmetic and geometric forms.
2. See also Mehra (2003).
3. Comparing estimates from one study with another is sometimes difficult because of changing points of reference. The equity risk premium estimate can be significantly different simply because the authors used arithmetic versus geometric returns, a long-term risk-free rate versus a short-term risk-free rate, bond income return (yield) versus bond total return, or long-term strategic forecasting versus short-term market-timing estimates. We provide a detailed discussion of arithmetic versus geometric returns in the section "The Long-Term Forecast."
4. Welch's survey reported a 7 pp equity risk premium measured as the arithmetic difference between equity and T-bill returns. To make an apples-to-apples comparison, we converted the 7 pp number into a geometric equity risk premium relative to the long-term U.S. government bond income return, which produced an estimate of almost 4 pps.
5. For further discussion of approaches to estimating the equity risk premium, see the presentations and discussions at www.aimrpubs.org/ap/home.html from AIMR's *Equity Risk Premium Forum*.
6. Each per share quantity is per share of the S&P 500 portfolio. Hereafter, we will merely refer to each factor without always mentioning "per share"—for example, "dividends" instead of "dividends per share."
7. Many theoretical models suggest that the equity risk premium is dynamic over time. Recent empirical studies (e.g., Goyal and Welch 2001; Ang and Bekaert 2001) found no evidence, however, of long-horizon return predictability by using either earnings or dividend yields. Therefore, instead

g(*BV*)	*g*(*ROE*)	*g*(*P/E*)	*g*(Real *GDP/POP*)	*g*(*FS-GDP/POP*)	Income Return	Reinvestment + Interaction	Additional Growth	Forecasted *Earnings* Growth
						0.33		
					4.28	0.32		
		1.25			4.28	0.34		
		1.25			4.28	0.35		
1.25	0.31	1.25			4.28	0.31		
			2.04	0.96	4.28	0.32		
					4.28	0.26		
						0.27		
					1.10[a]	0.03		
						0.07		
					2.05[b]	0.21	2.28	
					1.10[a]	0.21		4.98

of trying to build a model for a dynamic equity risk premium, we assumed that the long-term equity risk premium is constant. This assumption provided a benchmark for analysis and discussion.

8. We updated the series with data from Standard and Poor's to include the year 2000.
9. Appendix A summarizes all the tabulations we discuss.
10. The average P/E was calculated by reversing the average earnings-to-price ratio for 1926–2000.
11. Book values were calculated from the book-to-market ratios reported in Vuolenteenaho (2000). The aggregate book-to-market ratio was 2.0 in 1928 and 4.1 in 1999. We used the growth rate in book value calculated for 1928–1999 as the proxy for the growth rate for 1926–2000. The average ROE growth rate was calculated from the derived book value and the earnings data.
12. Instead of assuming a constant equity factor share, we examined the historical growth rate of the equity factor share relative to the overall growth of the economy.
13. We did not use Methods 1, 2, and 5 in forecasting because the forecasts of Methods 1 and 2 would be identical to the historical estimate reported in the previous section and because the forecast of Method 5 would require more complete BV and ROE data than we currently have available. We did use Method 6 to forecast future stock returns but found the results to be very similar to those for the earnings model; therefore, we do not report the results here.
14. This model uses historical income return as an input for reasons that are discussed in the section "Differences between the Earnings Model and the Dividends Model."
15. The current tax code provides incentives for companies to distribute cash through share repurchases rather than through dividends. Green and Hollifield (2001) found that the tax savings through repurchases are on the order of 40–50 percent of the taxes that investors would have paid if dividends were distributed.
16. Contrary to efficient market models, Shiller (2000) and Campbell and Shiller argued that the P/E appears to forecast future stock price change.
17. We could also use the GDP per capita model to estimate the long-term equity risk premium. This model implies long-run stock returns should be in line with the productivity of the overall economy. The equity risk premium estimated by using the GDP per capita model would be slightly higher than the *ERP* estimate from the earnings model because GDP per capita grew slightly faster than corporate earnings in the study period. A similar approach can be found in Diermeier et al., who proposed using the growth rate of the overall economy as a proxy for the growth rate in aggregate wealth in the long run.

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ATTACHMENT TO RESPONSE NO. 16

Kentucky Power Company
Forecasted Net Cogestion Costs

FTR Revenue Forecast for 2006

19.28% Reduction in FTR revenue due to Wyoming - Jackson Ferry 765 kV

Account	**Jan-06**	**Feb-06**	**Mar-06**	**Apr-06**	**May-06**	**Jun-06**	**Jul-06**	**Aug-06**	**Sep-06**	**Oct-06**	**Nov-06**	**Dec-06**	**Total**
AEP Internal	18,623,793	18,623,793	18,623,793	18,623,793	18,623,793	15,033,125	15,033,125	15,033,125	15,033,125	15,033,125	15,033,125	15,033,125	198,350,840
96% Received	17,878,841	17,878,841	17,878,841	17,878,841	17,878,841	14,431,800	14,431,800	14,431,800	14,431,800	14,431,800	14,431,800	14,431,800	190,416,806
KPCo MLR (7.413%)	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	
KPCo LSE Share	1,325,358	1,325,358	1,325,358	1,325,358	1,325,358	1,069,829	1,069,829	1,069,829	1,069,829	1,069,829	1,069,829	1,069,829	14,115,598

Congestion Cost Forecast for 2006

29.66% Reduction in congestion cost due to Wyoming - Jackson Ferry 765 kV

	Jan-06	**Feb-06**	**Mar-06**	**Apr-06**	**May-06**	**Jun-06**	**Jul-06**	**Aug-06**	**Sep-06**	**Oct-06**	**Nov-06**	**Dec-06**	**Total**
AEP Internal	12,195,956	12,195,956	12,195,956	12,195,956	12,195,956	8,578,636	8,578,636	8,578,636	8,578,636	8,578,636	8,578,636	8,578,636	121,030,229
Total	12,195,956	12,195,956	12,195,956	12,195,956	12,195,956	8,578,636	8,578,636	8,578,636	8,578,636	8,578,636	8,578,636	8,578,636	121,030,229
KPCo MLR (7.413%)	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	0.07413	
KPCO LSE Share	904,086	904,086	904,086	904,086	904,086	635,934	635,934	635,934	635,934	635,934	635,934	635,934	8,971,971

Net Congestion Cost

	Jan-06	**Feb-06**	**Mar-06**	**Apr-06**	**May-06**	**Jun-06**	**Jul-06**	**Aug-06**	**Sep-06**	**Oct-06**	**Nov-06**	**Dec-06**	**Total**
Total AEP	(6,427,836)	(6,427,836)	(6,427,836)	(6,427,836)	(6,427,836)	(6,454,490)	(6,454,490)	(6,454,490)	(6,454,490)	(6,454,490)	(6,454,490)	(6,454,490)	(77,320,611)
Total w/96%	(5,682,885)	(5,682,885)	(5,682,885)	(5,682,885)	(5,682,885)	(5,853,165)	(5,853,165)	(5,853,165)	(5,853,165)	(5,853,165)	(5,853,165)	(5,853,165)	(69,386,577)
KPCo Net MLR Amount	(421,272)	(421,272)	(421,272)	(421,272)	(421,272)	(433,895)	(433,895)	(433,895)	(433,895)	(433,895)	(433,895)	(433,895)	**(5,143,627)**
As Filed Net Congestion Costs													**(3,002,352)**
Difference													**(2,141,275)**

Historical Congestion Cost

		Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05
KPCO Actual		167,192	889,823	986,232	474,176	145,739	299,854	659,383	714,526	2,380,276	1,643,685	658,971	2,036,827
MLR - Actual		0.07207	0.07207	0.07537	0.07838	0.07838	0.07838	0.07838	0.07838	0.07647	0.07508	0.07423	0.07423
AEP Implicit Congestion	LSE	2,319,856	12,346,649	13,085,206	6,049,707	1,859,390	3,825,644	8,412,644	9,116,178	31,126,926	21,892,448	8,877,422	27,439,405

Nov'04 - Oct'05	
Total	*Avg*
146,351,473	12,195,956

Source: Bradish workpaper, response to Staff 2nd set, Item No. 33, page 3 of 7and page 7 of 7; response to AG 1st, Item No. 62, page 5 of 10.

FTR Revenue Backcast

		Nov-04	Dec-04	Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05
KPCO Actual		$177,232	$483,005	$573,604	$732,773	($83,344)	$347,233	$501,351	$1,496,781	$3,608,806	$2,985,666	$ 2,945,415	$ 2,444,200
MLR - Actual		0.07207	0.07207	0.07537	0.07838	0.07838	0.07838	0.07838	0.07838	0.07647	0.07508	0.07423	0.07423
AEP Internal	($)	2,561,629	6,981,138	7,927,613	9,738,525	(1,107,633)	4,614,709	6,662,930	19,892,154	49,158,793	41,423,398	41,332,893	34,299,362

Nov'04 - Oct'05	
Total	Avg
223,485,510	18,623,793

Source: Bradish workpaper, response to Staff 2nd set, Item No. 33, page 3 of 7, page 7 of 7, response to AG 1st, Item No. 62, page 5 of 10.

ATTACHMENT TO RESPONSE NO. 44

,Instrument,"U.S. government securities/Treasury constant maturities/Nominal"
,Maturity,"5-year"
,Frequency,"Monthly"
,Description,"Market yield on U.S. Treasury securities at 5-year^ constant maturity, quoted on investment basis"
,Note,"Yields on actively traded non-inflation-indexed issues adjusted to constant maturities. Source: U.S. Treasury."

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,Note,"Yields on actively traded non-inflation-indexed issues adjusted to constant
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