to specify their exact magnitude at a specific point in time; considerable ficulty and possible measurement errors will be avoided.

The second approach is to run a regression between the observed systema risk of a stock and a number of accounting and leverage variables in an attempt to explain this observed systematic risk. Unfortunately, without a theory, we do not know which variables to include and which variables to exclude and whether the relationship is linear, multiplicative, exponential, curvilinear, etc. Therefore, this method will also not be used.

A third approach is to measure the systematic risk before and after a new debt issue. The difference can then be attributed to the debt issue directly. An attractive feature of this procedure is that a good estimate of the market value of the incremental debt issue can be obtained. A number of disadvantages, unfortunately, are associated with this direct approach. The difference in the systematic risk may be due not only to the additional debt, but also to the reason the debt was issued. It may be used to finance a new investment project, in which case the project's characteristics will also be reflected in the new systematic risk measure. In addition, the new debt issue may have been anticipated by the market if the firm had some long-run target leverage ratio which this issue will help maintain; conversely, the market may not fully consider the new debt issue if it believes the increase in leverage is only temporary. For these reasons, this seemingly attractive procedure will not be employed.

The last approach, which will be used in this study, is to assume the validity of the MM theory from the outset. Then the observed rate of return of a stock can be adjusted to what *it would have been* over the same time period had the firm no debt and preferred stock in its capital structure. The difference between the observed systematic risk, ${}_{B}\beta$, and the systematic risk for this adjusted rate of return time series, ${}_{A}\beta$, can be attributed to leverage, if the MM theory is correct. The final step, then, is to test the MM theory.

To discuss this more specifically, consider the following relationship for the dollar return to the common shareholder from period $t-1$ to t:

$$(X - I)_t(1 - \tau)_t - p_t + \Delta G_t = d_t + cg_t \qquad (1)$$

EBIT X_c
Int I
tax τ
Pref P

where X_t represents earnings before taxes, interest, and preferred dividends and is assumed to be unaffected by fixed commitment obligations; I_t represents interest and other fixed charges paid during the period; τ is the corporation income tax rate; p_t is the preferred dividends paid; ΔG_t represents the change in capitalized growth over the period; and d_t and cg_t are common shareholder dividends and capital gains during the period, respectively.

Equation (1) relates the corporation finance types of variables with the market holding period return important to the investors. The first term on the left-hand-side of (1) is profits after taxes and after interest which is the earnings the common and preferred shareholders receive on their investment for the period. Subtracting out p_t leaves us with the earnings the common shareholder would receive from currently-held assets.

To this must be added any change in capitalized growth since we are trying to explain the common shareholder's market holding period dollar return. ΔG_t

must be added for growth firms to the current period's profits from existing assets since capitalized growth opportunities of the firm—future earnings from new assets over and above the firm's cost of capital which are already reflected in the stock price at (t − 1)—should change over the period and would accrue to the common shareholder. Assuming shareholders at the start of the period estimated these growth opportunities on average correctly, the expected value of ΔG_t would not be zero, but should be positive. For example, consider growth opportunities five years from now which yield more than the going rate of return and are reflected in today's stock price. These growth opportunities will become one year closer to fruition at time t than at time t − 1 so that their present value would become larger. ΔG_t then represents this increase in the present value of these future opportunities simply because it is now four years away rather than five.[3]

Since the systematic risk of a common stock is:

$$_B\beta = \frac{\operatorname{cov}(R_{B_t}, R_{M_t})}{\sigma^2(R_{M_t})} \tag{2}$$

where R_{B_t} is the common shareholder's rate of return and R_{M_t} is the rate of return on the market portfolio, then substitution of (1) into (2) yields:

$$_B\beta = \frac{\operatorname{cov}\left[\dfrac{(X - I)(1 - \tau)_t - p_t + \Delta G_t}{S_{B_{t-1}}}, R_{M_t}\right]}{\sigma^2(R_{M_t})} \tag{2a}$$

where $S_{B_{t-1}}$ denotes the market value of the common stock at the beginning of the period.

The systematic risk for the same firm over the same period *if* there were no debt and preferred stock in its capital structure is:

$$_A\beta = \frac{\operatorname{cov}(R_{A_t}, R_{M_t})}{\sigma^2(R_{M_t})}$$

$$= \frac{\operatorname{cov}\left[\dfrac{X(1 - \tau)_t + \Delta G_t}{S_{A_{t-1}}}, R_{M_t}\right]}{\sigma^2(R_{M_t})} \tag{3}$$

where R_{A_t} and $S_{A_{t-1}}$ represent the rate of return and the market value, respectively, to the common shareholder if the firm had no debt and preferred stock. From (3), we can obtain:

$$_A\beta S_{A_{t-1}} = \frac{\operatorname{cov}[X(1 - \tau)_t + \Delta G_t, R_{M_t}]}{\sigma^2(R_{M_t})} \tag{3a}$$

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[3] Continual awareness of the difficulties of estimating capitalized growth, or changes in growth, especially in conjunction with leverage considerations, for purposes such as valuation or cost of capital is a characteristic common to students of corporation finance. This is the reason for the emphasis on growth in this paper and for presenting a method to neutralize for differences in growth when comparing rates of return.

Next, by expanding and rearranging (2a), we have:

$$ {}_B\beta S_{B_{t-1}} = \frac{\operatorname{cov}[X(1-\tau)_t + \Delta G_t, R_{M_t}]}{\sigma^2(R_{M_t})} - \frac{\operatorname{cov}[I(1-\tau)_t, R_{M_t}]}{\sigma^2(R_{M_t})} - \frac{\operatorname{cov}(p_t, R_{M_t})}{\sigma^2(R_{M_t})} \tag{2b} $$

If we assume as an empirical approximation that interest and preferred dividends have negligible covariance with the market, at least relative to the (pure equity) common stock's covariance, then substitution of the LHS of (3a) into the RHS of (2b) yields:[4]

$$ {}_B\beta S_{B_{t-1}} = {}_A\beta S_{A_{t-1}} \tag{4} $$

or

$$ {}_A\beta = \left(\frac{S_B}{S_A}\right)_{t-1} {}_B\beta \tag{4a} $$

Because $S_{A_{t-1}}$, the market value of common stock *if* the firm had no debt and preferred stock, is not observable since most firms do have debt and/or preferred stock, a theory is required in order to measure what this quantity *would have been* at $t-1$. The MM theory [10] will be employed for this purpose, that is:

$$ S_{A_{t-1}} = (V - \tau D)_{t-1}. \tag{5} $$

Equation (5) indicates that if the Federal government tax subsidy for debt financing, τD, where D is the market value of debt, is subtracted from the observed market value of the firm, V_{t-1} (where V_{t-1} is the sum of S_B, D and the observed market value of preferred), then the market value of an unleveraged firm is obtained. Underlying (5) is the assumption that the firm is near its target leverage ratio so that no more or no less debt subsidy is capitalized already into the observed stock price. The conditions under which this relationship hold are discussed carefully in [4].

It is at this point that problems in obtaining satisfactory estimates of ${}_A\beta$ develop, since (4) theoretically holds only for the next period. As a practical matter, the accepted, and seemingly acceptable, method of obtaining estimates of a stock's systematic risk, ${}_B\beta$, is to run a least squares regression between a stock's and market portfolio's *historical* rates of return. Using past data for ${}_B\beta$, it is not clear which *period's* ratio of market values to apply in (4a) to estimate the firm's systematic risk, ${}_A\beta$. There would be no problem if the market value ratios of debt to equity and preferred stock to equity remained relatively stable over the past for each firm, but a cursory look at these data reveals that this is not true for the large majority of firms in our sample. Should we use the market value ratio required in (4a) that was observed at the start of our regression period, at the end of our regression period, or some kind of average over the period? In addition, since these different observed ratios will give us different estimates for ${}_A\beta$, it is not clear, without some criterion, how we should select from among the various estimates.

This general method of arriving at (4) was suggested by the comments of William Sharpe, one of the discussants of this paper at the annual meeting. A much more cumbersome and less general derivation of (4) was in the earlier version.

It is for this purpose—to obtain a standard—that a more cumbersome and more data demanding approach to obtain estimates of ${}_A\beta$ is suggested. Given the large fluctuations in market leverage ratios, intuitively it would appear that the firm's risk is more stable than the common stock's risk. In that event, a leverage-free rate of return time series for each firm should be derived and the market model applied to this time series directly. In this manner, the beta coefficient would give us a *direct* estimate of ${}_A\beta$ which can then be used as a criterion to determine if any of the market value ratios discussed above can be applied to (4a) successfully.

For this purpose, the "would-have-been" rate of return for the common stock if the firm had no debt and preferred is:

$$R_{A_t} = \frac{X_t(1-\tau)_t + \Delta G_t}{S_{A_{t-1}}}. \tag{6}$$

The numerator of (6) can be rearranged to be:

$$X_t(1-\tau)_t + \Delta G_t = [(X-I)_t(1-\tau)_t - p_t + \Delta G_t] + p_t + I_t(1-\tau)_t.$$

Substituting (1):

$$X_t(1-\tau)_t + \Delta G_t = [d_t + cg_t] + p_t + I_t(1-\tau)_t.$$

Therefore, (6) can be written as:

$$R_{A_t} = \frac{d_t + cg_t + p_t + I_t(1-\tau)_t}{S_{A_{t-1}}}. \tag{7}$$

Since $S_{A_{t-1}}$ is unobservable for the firms with leverage, the MM theory, equation (5), will be employed; then:

$$R_{A_t} = \frac{d_t + cg_t + p_t + I_t(1-\tau)_t}{(V-\tau D)_{t-1}}. \tag{8}$$

The observed rate of return on the common stock is, of course:

$$R_{B_t} = \frac{(X-I)_t(1-\tau)_t - p_t + \Delta G_t}{S_{B_{t-1}}} = \frac{d_t + cg_t}{S_{B_{t-1}}}. \tag{9}$$

Equation (8) is the rate of return to the common shareholder of the same firm and over the same period of time as (9). However, in (8) there are the underlying assumptions that the firm never had any debt and preferred stock and that the MM theory is correct; (9) incorporates the exact amount of debt and preferred stock that the firm actually did have over this time period and no leverage assumption is being made. Both (8) and (9) are now in forms where they can be measured with available data. One can note that it is unnecessary to estimate the change in growth, or earnings from current assets, since these should be captured in the market holding period return, $d_t + cg_t$.

Using CRSP data for (9) and both CRSP and Compustat data for the components of (8), a time series of yearly R_{A_t} and R_{B_t} for $t = 1948$-1967 were derived for 304 different firms. These 304 firms represent an exhaustive sample of the firms with complete data on both tapes for all the years.

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A number of "market model" [1, 12] variants were then applied to these data. For each of the 304 firms, the following regressions were run:

$$R_{Ait} = {}_{A}\alpha_i + {}_{A}\beta_i R_{Mt} + {}_{A}u_{it} \qquad (10a)$$

$$R_{Bit} = {}_{B}\alpha_i + {}_{B}\beta_i R_{Mt} + {}_{B}u_{it} \qquad (10b)$$

$$\ln(1 + R_{Ait}) = {}_{AC}\alpha_i + {}_{AC}\beta_i \ln(1 + R_{Mt}) + {}_{AC}u_{it} \qquad (10c)$$

$$\ln(1 + R_{Bit}) = {}_{BC}\alpha_i + {}_{BC}\beta_i \ln(1 + R_{Mt}) + {}_{BC}u_{it} \qquad (10d)$$

$$i = 1, 2, \ldots, 304$$
$$t = 1948\text{-}1967$$

where R_{Mt} is the observed NYSE arithmetic stock market rate of return with dividends reinvested, α_i and β_i are constants for each firm-regression, and the usual conditions are assumed for the properties of the disturbance terms, u_{it}. Equations (10c) and (10d) are the continuously-compounded rate of return versions of (10a) and (10b), respectively.[5]

III. The Results

An abbreviated table of the regression results for each of the four variants, equations (10a)-(10d), summarized across the 304 firms is shown in Table 1.

The first column designated "mean" is the average of the statistic (indicated by the rows) over all 304 firms. Therefore, the mean ${}_{A}\hat{\alpha}$ of 0.0221 is the intercept term of equation (10a) averaged over 304 different firm-regressions. The second and third columns give the deviation measures indicated, of the 304 point estimates of, say, ${}_{A}\hat{\alpha}$. The mean standard error of estimate in the last column is the average over 304 firms of the individual standard errors of estimate.

The major conclusion drawn from Table 1 is the following mean β comparisons:

$${}_{B}\hat{\beta} > {}_{A}\hat{\beta}, \text{ i.e., } 0.9190 > 0.7030$$
$${}_{BC}\hat{\beta} > {}_{AC}\hat{\beta}, \text{ i.e., } 0.9183 > 0.7263.$$

The directional results of these betas, assuming the validity of the MM theory, are not imperceptible and clearly are not negligible differences from the investor's point of view. This is obtained in spite of all the measurement and data problems associated with estimating a time series of the RHS of (8) for

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[5] Because the R_{Mt} used in equations (10) is defined as the observed stock market return, and since adjusting for capital structure is the major purpose of this exercise, it was decided that the same four regressions should be replicated on a leverage-adjusted stock market rate of return. The major reason for this additional adjustment is the belief that the rates of return over time and their relationship with the market are more stable when we can abstract from all changes in leverage and get at the underlying risk of all firms.

For the 221 firms (out of the total 304) whose fiscal years coincide with the calendar year, average values for the components of the RHS of (8) were obtained for each year so that R_{Mt} could be adjusted in the same way as for the individual firms—a yearly time series of stock market rates of return, if all the firms on the NYSE had no debt and no preferred in their capital structure, was derived. The results, when using this adjusted market portfolio rate of return time series, were not very different from the results of equations (10), and so will not be reported here separately.

TABLE 1

SUMMARY RESULTS OVER 304 FIRMS OF EQUATIONS (10a)-(10d)

	Mean	Mean Absolute Deviation*	Standard Deviation	Mean Standard Error of Estimate
${}_{A}\hat{\alpha}$	0.0221	0.0431	0.0537	0.0553
${}_{A}\hat{\beta}$	0.7030	0.2660	0.3485	0.2130
${}_{A}\hat{R}^2$	0.3799	0.1577	0.1896	
${}_{A}\hat{\rho}$	0.0314			
${}_{B}\hat{\alpha}$	0.0187	0.0571	0.0714	0.0720
${}_{B}\hat{\beta}$	0.9190	0.3550	0.4478	0.2746
${}_{B}\hat{R}^2$	0.3864	0.1578	0.1905	
${}_{B}\hat{\rho}$	0.0281			
${}_{AC}\hat{\alpha}$	0.0058	0.0427	0.0535	0.0461
${}_{AC}\hat{\beta}$	0.7263	0.2700	0.3442	0.2081
${}_{AC}\hat{R}^2$	0.3933	0.1586	0.1909	
${}_{AC}\hat{\rho}$	0.0268			
${}_{BC}\hat{\alpha}$	−0.0052	0.0580	0.0729	0.0574
${}_{BC}\hat{\beta}$	0.9183	0.3426	0.4216	0.2591
${}_{BC}\hat{R}^2$	0.4012	0.1602	0.1922	
${}_{BC}\hat{\rho}$	0.0262			

* Defined as: $\frac{\sum_{i=1}^{N}|x_i - \bar{x}|}{N}$, where $N = 304$. $\hat{\rho}$ = first order serial correlation coefficient.

each firm. One of the reasons for the "traditional" theory position on leverage is precisely this point—that small and reasonable amounts of leverage cannot be discerned by the market. In fact, if the MM theory is correct, leverage has explained as much as, roughly, 21 to 24 per cent of the value of the mean β.

We can also note that if the covariance between the asset and market rates of return, as well as the market variance, was constant over time, then the systematic risk from the market model is related to the expected rate of return by the capital asset pricing model. That is:

$$E(R_{A_t}) = R_{F_t} + {}_{A}\beta[E(R_{M_t}) - R_{F_t}] \tag{11a}$$

$$E(R_{B_t}) = R_{F_t} + {}_{B}\beta[E(R_{M_t}) - R_{F_t}] \tag{11b}$$

Equation (11a) indicates the relationship between the expected rate of return for the common stock shareholder of a debt-free and preferred-free firm, to the systematic risk, ${}_{A}\beta$, as obtained in regressions (10a) or (10c). The LHS of (11a) is the important ρ^{τ} for the MM cost of capital. The MM theory [9, 10] also predicts that shareholder expected yield must be higher (for the same real firm) when the firm has debt than when it does not. Financial risk is greater, therefore, shareholders require more expected return. Thus, $E(R_{B_t})$ must be greater than $E(R_{A_t})$. In order for this MM prediction to be true, from (11a) and (11b) it can be observed that ${}_{B}\beta$ must be greater than ${}_{A}\beta$, which is what we obtained.

Using the results underlying Table 1, namely the firm and stock betas, as the criterion for selecting among the possible observed market value ratios that can be used, if any, for (4), the following cross-section regressions were run:

$$({}_B\beta)_i = a_1 + b_1\left(\frac{S_A}{S_B}\,{}_A\beta\right)_i + u_{1i} \qquad i = 1, 2, \ldots, 102 \qquad (12a)$$

$$({}_{BC}\beta)_i = a_2 + b_2\left(\frac{S_A}{S_B}\,{}_{AC}\beta\right)_i + u_{2i} \qquad i = 1, 2, \ldots, 102 \qquad (12b)$$

$$({}_A\beta)_i = a_3 + b_3\left(\frac{S_B}{S_A}\,{}_B\beta\right)_i + u_{3i} \qquad i = 1, 2, \ldots, 102 \qquad (13a)$$

$$({}_{AC}\beta)_i = a_4 + b_4\left(\frac{S_B}{S_A}\,{}_{BC}\beta\right)_i + u_{4i} \qquad i = 1, 2, \ldots, 102 \qquad (13b)$$

Because the preferred stock market values were not as reliable as debt, only the 102 firms (out of 304) that did not have preferred in any of the years were used. The test for the adequacy of this alternative approach, equation (4), to adjust the systematic risk of common stocks for the underlying firm's capital structure, is whether the intercept term, a, is equal to zero, and the slope coefficient, b, is equal to one in the above regressions (as well as, of course, a high R^2)—these requirements are implied by (4). The results of this test would also indicate whether future "market model" studies that only use common stock rates of return without adjusting, or even noting, for the firm's debt-equity ratio will be adequate. The total firm's systematic risk may be stable (as long as the firm stays in the same risk-class), whereas the common stock's systematic risk may not be stable merely because of unanticipated capital structure changes—the data underlying Table 3 indicate that there were very few firms which did not have major changes in their capital structure over the twenty years studied.

The results of these regressions, when using the average S_A and average S_B over the twenty years for each firm, are shown in the first column panel of Table 2. These regressions were then replicated twice, first using the December 31, 1947 values of S_{A_t} and S_{B_t} instead of the twenty-year average for each firm, and then substituting the December 31, 1966 values of S_{A_t} and S_{B_t} for the 1947 values. These results are in the second and third panels of Table 2.[6]

From the first panel of Table 2, it appears that this alternative approach via (4a) for adjusting the systematic risk for the firm's leverage is quite

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[6] The point should be made that we are not merely regressing a variable on itself in (12) and (13). (12a) and (12b) can be interpreted as correlating the ${}_B\beta_1$ obtained from (10b) and (10d)—the LHS variable in (12a) and (12b)—against the ${}_B\beta_1$ obtained from rearranging (4)—the RHS variable in (12a) and (12b)—to determine whether the use of (4) is as good a means of obtaining ${}_B\beta_1$ as the direct way via the equations (10). We would be regressing a variable on itself only if the ${}_A\beta_1$ were calculated using (4a), and then the ${}_A\beta_1$ thus obtained, inserted into (12a) and (12b).

Instead, we are obtaining ${}_A\beta_1$ using the MM model in each of the twenty years so that a leverage-adjusted 20 year time series of R_{A_t} is derived. Of course, if there were no data nor measurement problems, and if the debt-to-equity ratio were perfectly stable over this twenty year period for each firm, then we should obtain perfect correlation in (12a) and (12b), with a = 0 and b = 1, as (4) would be an identity.

TABLE 2

RESULTS FOR THE EQUATIONS (12a), (12b), (13a), AND (13b)*

	Using 20-Year Average for $\left(\frac{S_A}{S_B}\right)_t$			Using 1947 Value for $\left(\frac{S_A}{S_B}\right)_t$			Using 1966 Value for $\left(\frac{S_A}{S_B}\right)_t$		
	a	b	R^2	a	b	R^2	a	b	R^2
Eq. (12a)	−0.022 (0.021)	1.062 (0.021)	0.962	0.150 (0.048)	0.842 (0.045)	0.781	0.085 (0.041)	0.905 (0.038)	0.849
	constant suppressed	1.042 (0.009)	0.962	constant suppressed	0.966 (0.021)	0.781	constant suppressed	0.976 (0.017)	0.849
Eq. (12b)	−0.003 (0.013)	1.016 (0.013)	0.984	0.159 (0.017)	0.816 (0.044)	0.773	0.124 (0.037)	0.843 (0.034)	0.859
	constant suppressed	1.014 (0.005)	0.984	constant suppressed	0.952 (0.019)	0.773	constant suppressed	0.947 (0.015)	0.859

	Using 20-Year Average for $\left(\frac{S_B}{S_A}\right)_t$			Using 1947 Value for $\left(\frac{S_B}{S_A}\right)_t$			Using 1966 Value for $\left(\frac{S_B}{S_A}\right)_t$		
	a	b	R^2	a	b	R^2	a	b	R^2
Eq. (13a)	0.030 (0.016)	0.931 (0.017)	0.969	0.112 (0.028)	0.843 (0.030)	0.888	0.080 (0.027)	0.898 (0.030)	0.902
	constant suppressed	0.960 (0.007)	0.969	constant suppressed	0.948 (0.015)	0.888	constant suppressed	0.976 (0.014)	0.902
Eq. (13b)	0.007 (0.010)	0.979 (0.011)	0.988	0.119 (0.026)	0.852 (0.028)	0.902	0.063 (0.026)	0.942 (0.029)	0.911
	constant suppressed	1.004 (0.012)	0.911	constant suppressed	0.967 (0.013)	0.902	constant suppressed	1.005 (0.012)	0.911

* Standard error in parentheses.

(13b)	constant suppressed	0.960 (0.007)	0.969	constant suppres.	0.948 (0.015)	0.888	constant suppressed	0.976 (0.014)	0.902
	0.007 (0.010)	0.979 (0.011)	0.988	0.119 (0.026)	0.852 (0.028)	0.902	0.063 (0.026)	0.942 (0.029)	0.911
	constant suppressed	1.004 (0.012)	0.911	constant suppressed	0.967 (0.013)	0.902	constant suppressed	1.005 (0.012)	0.911

Standard error in parentheses.

satisfactory (at least with respect to our sample of firms and years) only if long-run averages of S_A and S_B are used. The second and third panels indicate that the equations (8) and (10) procedure is markedly superior when only one year's market value ratio is used as the adjustment factor. The annual debt-to-equity ratio is much too unstable for this latter procedure.

Thus, when forecasting systematic risk is the primary objective—for example, for portfolio decisions or for estimating the firm's cost of capital to apply to prospective projects—a long-run forecasted leverage adjustment is required. Assuming the firm's risk is more stable than the common stock's risk,[7] and if there is some reason to believe that a better forecast of the firm's future leverage can be obtained than using simply a past year's (or an average of past years') leverage, it should be possible to improve the usual extrapolation forecast of a stock's systematic risk by forecasting the total firm's systematic risk first, and then using the independent leverage estimate as an adjustment.

IV. TESTS OF THE MM VS. TRADITIONAL THEORIES OF CORPORATION FINANCE

To determine if the difference, ${}_B\beta - {}_A\beta$, found in this study is indeed the correct effect of leverage, some confirmation of the MM theory (since it was assumed to be correct up to this point) from the systematic risk approach is needed. Since a direct test by this approach seems impossible, an indirect, inferential test is suggested.

The MM theory [9, 10] predicts that for firms in the same risk-class, the capitalization rate if all the firms were financed with only common equity, $E(R_A)$, would be the same—regardless of the actual amount of debt and preferred each individual firm had. This would imply, from (11a), that if $E(R_A)$ must be the same for all firms in a risk-class, so must ${}_A\beta$. And if these firms had different ratios of fixed commitment obligations to common equity, this difference in financial risk would cause their observed ${}_B\beta$s to be different.

The major competing theory of corporation finance is what is now known as the "traditional theory," which has contrary implications. This theory predicts that the capitalization rate for common equity, $E(R_B)$, (sometimes called the required or expected stock yield, or expected earnings-price ratio) is constant, as debt is increased, up to some critical leverage point (this point being a function of gambler's ruin and bankruptcy costs).[8] The clear implication of this constant, horizontal, equity yield (or their initial downward sloping cost of capital curve) is that changes in market or covariability risk are assumed not to be discernible to the shareholders as debt is increased. Then the traditional theory is saying that the ${}_B\beta$s, a measure of this covariability risk, would be the same for all firms in a given risk-class irregardless of differences in leverage, as long as the critical leverage point is not reached.

Since there will always be unavoidable errors in estimating the β's of indi-

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[7] A faint, but possible, empirical indication of this point may be obtained from Table 1. The ratio of the mean point estimate to the mean standard error of estimate is less for the firm β than for the stock β in both the discrete and continuously compounded cases.

[8] This interpretation of the traditional theory can be found in [9, especially their figure 2, page 275, and their equation (13) and footnote 24 where reference is made to Durand and Graham and Dodd].

TABLE 3
INDUSTRY MARKET VALUE RATIOS OF PREFERRED STOCK (P) AND DEBT (D) TO COMMON STOCK (S)

Industry Number	Industry	Number of Firms		P/S			D/S			$\frac{P+D}{S}$		
20	Food and Kindred Products	30	Mean*		0.22			0.81			1.04	
			ROM**	0.00		1.18	0.00		3.55	0.00		4.13
			ROCR***	0.00		2.52	0.00		8.10	0.00		10.01
28	Chemicals and Allied Products	30	Mean		0.07			0.25			0.33	
			ROM	0.00		0.51	0.00		0.90	0.00		1.20
			ROCR	0.00		1.54	0.00		2.07	0.00		2.92
29	Petroleum and Coal Products	18	Mean		0.06			0.22			0.27	
			ROM	0.00		0.26	0.00		0.55	0.03		0.57
			ROCR	0.00		0.83	0.00		1.54	0.00		2.30
33	Primary Metals	21	Mean		0.14			0.54			0.68	
			ROM	0.00		1.31	0.00		1.95	0.00		3.04
			ROCR	0.00		4.69	0.00		6.20	0.00		7.49
35	Machinery, except Electrical	28	Mean		0.07			0.33			0.40	
			ROM	0.00		0.49	0.00		1.92	0.00		2.32
			ROCR	0.00		1.28	0.00		6.92	0.00		7.62

Electrical

				0.33		0.40	
ROM	0.00	0.49	0.00	1.92	0.00		2.32
ROCR	0.00	1.28	0.00	6.92	0.00		2.62

TABLE 3 (*Continued*)

Industry Number	Industry	Number of Firms		P/S		D/S		$\frac{P+D}{S}$	
36	Electrical Machinery & Equipment	13	Mean	0.06		0.35		0.41	
			ROM	0.00	0.29	0.00	1.31	0.01	1.33
			ROCR	0.00	1.13	0.00	2.53	0.00	2.53
37	Transportation Equipment	24	Mean	0.08		0.38		0.47	
			ROM	0.00	0.54	0.00	0.93	0.00	1.32
			ROCR	0.00	2.33	0.00	3.76	0.00	6.09
49	Utilities	27	Mean	0.25		1.03		1.28	
			ROM	0.00	0.53	0.49	2.64	0.52	3.12
			ROCR	0.00	3.12	0.12	16.40	0.12	19.52
53	Dep't Stores, Order Houses & Vending Mach. Operators	17	Mean	0.13		0.49		0.62	
			ROM	0.00	0.38	0.01	1.52	0.01	1.87
			ROCR	0.00	1.09	0.00	3.19	0.00	3.66

* "Mean" refers to the average ratio over 20 years and over all firms in the industry.

** "Range of Means" (ROM) refers to the lowest firm's mean (over 20 years) ratio and the highest firm's mean (over 20 years) ratio in the industry.

*** "Range of Company Ranges" (ROCR) refers to the lowest and highest ratio in the industry, regardless of the year.

vidual firms and in specifying a risk-class, we would not expect to find a set of firms with identical systematic risk. But by specifying reasonable a priori risk-classes, if the individual firms had closer or less scattered $_1\beta$s than $_3\beta$s then this would support the MM theory and contradict the traditional theory. If, instead, the $_3\beta$s were not discernibly more diverse than the $_1\beta$s, and the leverage ratio differed considerably among firms, then this would indicate support for the traditional theory.[9]

In order to test this implication, risk-classes must be first specified. The SEC two-digit industry classification was used for this purpose. Requiring enough firms for statistical reasons in any given industry, nine risk-classes were specified that had at least 13 firms; these nine classes are listed in Table 3 with their various leverage ratios.[10] It is clear from this table that our first requirement is met—that there is a considerable range of leverage ratios among firms in a risk-class and also over the twenty-year period.

Three tests will be performed to distinguish between the MM and traditional theories. The first is simply to calculate the standard deviation of the unbiased β estimates in a risk-class. The second is a chi-square test of the distribution of β's in an industry compared to the distribution of the β's in the total sample. Finally, an analysis of variance test on the estimated variance of the β's between industries, as opposed to within industries, is performed. In all tests, only the point estimate of β (which should be unbiased) for each stock and firm is used.[11]

The first test is reported in Table 4. If we compare the standard deviation of $_{1C}\beta$ with the standard deviation of $_{3C}\beta$ by industries (or risk-classes), we can note that $\sigma(_{1C}\beta)$ is less than $\sigma(_{3C}\beta)$ for eight out of the nine classes. The probability of obtaining this is only 0.0195, given a 50% probability that $\sigma(_{1C}\beta)$ can be larger or smaller than $\sigma(_{3C}\beta)$. These results indicate that the systematic risk of the firms in a given risk-class, if they were all financed only with common equity, is much less diverse than their observed stock's systematic risk. This supports the MM theory, at least in contrast to the traditional theory.[12]

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[9] The traditional theory also implies that $E(R_1)$ is equal to $E(R_3)$ for all firms. Unfortunately, we do not have a functional relationship between these traditional theory capitalization rates and the measured βs of this study. Clearly, since the $_1\beta$s were obtained assuming the validity of the MM theory, they would not be applicable for the traditional theory. In fact, no relationship between the $_1\beta$ and $_3\beta$ for a given firm, or for firms in a given risk-class, can be specified as was done for the capitalization rates.

[10] The tenth largest industry had only eight firms. For our purpose of testing the uniformity of firm βs relative to stock βs within a risk-class, the use of the two-digit industry classification as a proxy does not seem as critical as, for instance, its use for the purpose of performing an MM valuation model study [8] wherein the ρ^r must be pre-specified to be exactly the same for all firms in the industry.

[11] Since these βs are estimated in the market model regressions with error, precise testing should incorporate the errors in the β estimation. Unfortunately, to do this is extremely difficult and more importantly, requires the normality assumption for the market model disturbance term. Since there is considerable evidence that is contrary to this required assumption [see 3], our tests will ignore the β measurement error entirely. But ignoring this is partially corrected in our first and third tests since means and variances of these point estimate βs must be calculated, and this procedure will "average out" the individual measurement errors by the factor 1/N.

[12] Of course, there could always be another theory, as yet not formulated, which could be even

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TABLE 4
MEAN AND STANDARD DEVIATION OF INDUSTRY β'S

Industry Number	Industry	Number of Firms		${}_1\beta$	${}_3\beta$	${}_{1c}\beta$	${}_{3c}\beta$
20	Food & Kindred Products	30	Mean β	0.515	0.815	0.528	0.806
			σ(β)	0.232	0.448	0.227	0.424
28	Chemicals & Allied Products	30	Mean β	0.747	0.928	0.735	0.946
			σ(β)	0.237	0.391	0.216	0.329
29	Petroleum & Coal Products	18	Mean β	0.633	0.747	0.656	0.756
			σ(β)	0.144	0.188	0.148	0.176
33	Primary Metals	21	Mean β	1.036	1.399	1.106	1.436
			σ(β)	0.223	0.272	0.197	0.268
35	Machinery, except Electrical	28	Mean β	0.878	1.037	0.917	1.068
			σ(β)	0.262	0.240	0.271	0.259
36	Electrical Machinery and Equipment	13	Mean β	0.940	1.234	0.951	1.164
			σ(β)	0.320	0.505	0.283	0.363
37	Transportation Equipment	24	Mean β	0.860	1.062	0.875	1.048
			σ(β)	0.225	0.313	0.225	0.289
49	Utilities	27	Mean β	0.160	0.255	0.166	0.254
			σ(β)	0.086	0.133	0.098	0.147
53	Department Stores, etc.	17	Mean β	0.652	0.901	0.692	0.923
			σ(β)	0.187	0.232	0.198	0.279

Our second test, the chi-square test, requires us to rank our 300 ${}_1\beta$s into ten equal categories, each with 30 ${}_1\beta$s (four miscellaneous firms were taken out randomly). By noting the value of the highest and lowest ${}_1\beta$ for each of the ten categories, a distribution of the number of ${}_1\beta$s in each category, by risk-class, can be obtained. This was then repeated for the other three betas. To test whether the distribution for each of the four β's and for each of the risk-classes follows the expected uniform distribution, a chi-square test was performed.[13]

Even with just casual inspection of these distributions of the betas by risk-class, it is clear that two industries, primary metals and utilities, are so highly skewed that they greatly exaggerate our results.[14] Eliminating these

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more strongly supported than the MM theory. If we compare σ(${}_1\beta$) to σ(${}_3\beta$), by risk-classes in Table 4, precisely the same results are obtained as those reported above for the continuously-compounded betas.

[13] By risk-classes, seven of the nine chi-square values of ${}_1\beta$ are larger than those of ${}_3\beta$, as are eight out of nine for the continuously-compounded betas. This would occur by chance with probabilities of 0.0898 and 0.0195, respectively, if there were a 50% chance that either the firm or stock chi-square value could be larger. Nevertheless, if we inspect the individual chi-square values by risk-class, we note that most of them are large so that the probabilities of obtaining these values are highly unlikely. For all four βs, the distributions for most of the risk-classes are nonuniform.

[14] Primary metals have extremely large betas; utilities have extremely small betas.

two industries, and also two miscellaneous firms so that an even 250 firms are in the sample, new upper and lower values of the β's were obtained for each of the ten class intervals and for each of the four β's.

In Table 5, the chi-square values are presented; for the total of all risk-classes, the probability of obtaining a chi-square value less than 120.63 is over 99.95% (for ${}_1\beta$), whereas the probability of obtaining a chi-square value less than 99.75 is between 99.5% and 99.9% (for ${}_3\beta$). More sharply contrasting results are obtained when ${}_{1c}\beta$ is compared to ${}_{3c}\beta$. For ${}_{1c}\beta$, the probability of obtaining less than 128.47 is over 99.95%, whereas for ${}_{3c}\beta$, the probability of obtaining less than 78.65 is only 90.0%. By abstracting from financial risk, the underlying systematic risk is much less scattered when grouped into risk-classes than when leverage is assumed not to affect the systematic risk. The null hypothesis that the β's in a risk-class come from the same distribution as all β's is rejected for ${}_{1c}\beta$, but not for ${}_{3c}\beta$ (at the 90% level). Although this, in itself, does not tell us *how* a risk-class differs from the total market, an inspection of the distributions of the betas by risk-class underlying Table 5 does indicate more clustering of the ${}_{1c}\beta$s than the ${}_{3c}\beta$s so that the MM theory is again favored over the traditional theory.

The analysis of variance test is our last comparison of the implications of the two theories. The ratio of the estimated variance between industries to the estimated variance within the industries (the F-statistic) when the seven

TABLE 5
CHI-SQUARE RESULTS FOR ALL β'S AND ALL INDUSTRIES
(EXCEPT UTILITIES AND PRIMARY METALS)

Industry		${}_1\beta$	${}_3\beta$	${}_{1c}\beta$	${}_{3c}\beta$
Food and Kindred	Chi-Square	18.67	11.33	26.00	9.33
	$P\{\chi^2 < \}^* =$	95-97.5%	70-75%	99.5-99.9%	50-60%
Chemicals	Chi-Square	9.33	10.67	12.00	7.33
	$P\{\chi^2 < \} =$	50-60%	60-70%	75-80%	30-40%
Petroleum	Chi-Square	17.56	25.33	18.67	22.00
	$P\{\chi^2 < \} =$	95-97.5%	99.5-99.9%	95-97.5%	99-99.5%
Machinery	Chi-Square	19.14	12.00	24.86	9.14
	$P\{\chi^2 < \} =$	97.5-98%	75-80%	99.5-99.9%	50-60%
Electrical Machinery	Chi-Square	13.92	7.77	12.38	9.31
	$P\{\chi^2 < \} =$	80-90%	40-50%	80-90%	50-60%
Transportation Equipment	Chi-Square	15.17	16.33	13.50	6.33
	$P\{\chi^2 < \} =$	90-95%	90-95%	80-90%	30-40%
Dep't Stores	Chi-Square	14.18	3.59	14.18	3.59
	$P\{\chi^2 < \} =$	80-90%	5-10%	80-90%	5-10%
Miscellaneous	Chi-Square	12.67	12.22	6.89	11.11
	$P\{\chi^2 < \} =$	80-90%	80-90%	30-40%	70-75%
Total	Chi-Square	120.63	99.75	128.47	78.65
	$P\{\chi^2 < \} =$	over 99.95%	99.5-99.90%	over 99.95%	90.0%

* Example: $P\{\chi^2 < 18.67\} = 95\text{-}97.5\%$ for 9 degrees of freedom [illegible]

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$_{AC}\beta$	$_{BC}\beta$
26.00 -99.9%	9.33 50-60%
12.00 -30%	7.33 30-40%
8.67 7.5%	22.00 99-99.5%
4.86 -99.9%	9.14 50-60%
2.33 -90%	9.31 50-60%
5.50 -90%	6.53 30-40%
4.18 -90%	3.59 5-10%
6.89 -40%	11.11 70-75%
3.47 9.95%	73.65 90.0%

industries are considered (again, the two obviously skewed industries, primary metals and utilities, were eliminated) is less for $_{B}\beta$ ($F=3.90$) than for $_{A}\beta$ ($F=9.99$), and less for $_{BC}\beta$ ($F=4.18$) than for $_{AC}\beta$ ($F=10.83$). The probability of obtaining these F-statistics for $_{A}\beta$ and $_{AC}\beta$ is less than 0.001, but for $_{B}\beta$ and $_{BC}\beta$ greater than or equal to 0.001. These results are consistent with the results obtained from our two previous tests. The MM theory is more compatible with the data than the traditional theory.[15]

V. CONCLUSIONS

This study attempted to tie together some of the notions associated with the field of corporation finance with those associated with security and portfolio analyses. Specifically, if the MM corporate tax leverage propositions are correct, then approximately 21 to 24% of the observed systematic risk of common stocks (when averaged over 304 firms) can be explained merely by the added financial risk taken on by the underlying firm with its use of debt and preferred stock. Corporate leverage does count considerably.

To determine whether the MM theory is correct, a number of tests on a contrasting implication of the MM and "traditional" theories of corporation finance were performed. The data confirmed MM's position, at least vis-à-vis our interpretation of the traditional theory's position. This should provide another piece of evidence on this controversial topic.

Finally, if the MM theory and the capital asset pricing model are correct, and if the adjustments made in equations (8) or (4a) result in accurate measures of the systematic risk of a leverage-free firm, the possibility is greater, without resorting to a fullblown risk-class study of the type MM did for the electric utility industry [8], of estimating the cost of capital for individual firms.

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[15] All of our tests, it should be emphasized, although consistent, are only inferential. Aside from assuming that the two-digit SEC industry classification is a good proxy for risk-classes and that the errors in estimating the individual βs can be safely ignored, the tests rely on the two theories exhausting all the reasonable theories on leverage. But there is always the use of another line of reasoning. If the results of the MM electric utility study [8] are correct, and if these results can be generalized to all firms and to all risk-classes, then it can be claimed that the MM theory is universally valid. Then our result in Section III does indicate the correct effect of the firm's capital structure on the systematic risk of common stocks.

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KENTUCKY POWER COMPANY
American Electric Power
FIRST SET OF DATA REQUESTS OF
KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.
Case No. 2005-00341

Question No. 13

Is Mr. Moul aware of any regulatory commissions that employ the comparable earnings approach in setting the allowed rate of return? If so, please provide the following:

a. Names of the regulatory commissions.

b. Citations to recent orders that adopted the use of the comparable earnings approach in setting the allowed return on equity.

c. Copies of the cited orders.

Response

a. The NARUC survey lists those commissions that consider the comparable earnings approach. A copy of an excerpt from that survey is attached.

b. Mr. Moul does not possess such orders.

c. Mr. Moul does not possess such orders.

Witness: Paul R. Moul

1889

UTILITY REGULATORY POLICY IN THE UNITED STATES AND CANADA

COMPILATION 1994-1995

OF THE

NATIONAL ASSOCIATION OF REGULATORY UTILITY COMMISSIONERS

Paul Rodgers
Administrative Director and
General Counsel

Karon Bauer
Editor

Price: $75.00

SECTION 45

RATE OF RETURN

ELECTRIC UTILITIES

The rate of return established as fair and reasonable by an agency is the return that a utility may earn on its rate base - net investment in plant, equipment and working capital. A utility company is not guaranteed a specific rate of return by a regulatory authority but it is given an opportunity to earn a rate of return which is determined appropriate by an agency.

Table 249 shows the methods used by the agencies in determining the rate of return.

Table 250 displays the most recently approved rate of return on rate base for electric utilities and, when reported, the actual rate of return earned by the utilities. Table 251 displays the most recently approved rate of return on common equity for electric utilities and, when reported, the actual rate of return earned by the utilities.

Table 252 describes actions to move the industry away from the traditional rate base, rate of return model of regulation.

TABLE 249 - AGENCY AUTHORITY OVER RATE OF RETURN - ELECTRIC UTILI

AGENCY	Agency determines rate of return under its general authority	Capital structure is adjusted to exclude non-utility financing when it is traceable	Method Agency favors in determining rate of return								Duration of call protection provision influences judgment in determining rate of return
			No ONE method ALL are considered	** Discounted cash flow	** Comparable earnings test	** Earnings/price ratio	** Midpoint approach	** Capital asset pricing model	** Risk premium	Other	
FERC	X	X	X	X							
ALABAMA PSC	X	X		X							
ALASKA PUC	X	X			X						Possible.
ARIZONA CC	X	X	X 2/	X 7/							
ARKANSAS PSC	X		X	X 11/							
CALIFORNIA PUC	X	X 1/	X 2/	X	X			X	X	X	Possible.
COLORADO PUC	X	X		X 9/	X						
CONNECTICUT DPUC	X	X		X							
DELAWARE PSC	X		X 2/	X	X					X	
D.C. PSC	X	X		X							
FLORIDA PSC	X	X 1/	X 2/								
GEORGIA PSC	X	X	X 2/	X					X	X 8/	
HAWAII PUC	X	X	X 2/		X					X	
IDAHO PUC	X	X		X 9/	X	X					
ILLINOIS CC	X	X	X 2/				X			X	
INDIANA URC	X		X								
IOWA UB	X	X 1/	X	X					X	X 6/	
KANSAS SCC	X	X		X							
KENTUCKY PSC	X	X	X 2/	X	X	X	X			X	
LOUISIANA PSC	X			X							
MAINE PUC	X	10/	X 9/	X							
MARYLAND PSC	X	X		X						X 6/	
MASSACHUSETTS DPU	X	X		X 5/						X 5/	
MICHIGAN PSC	X	X	2/	X	X		X	X	X	X	
MINNESOTA PUC	X	X		X							
MISSISSIPPI PSC	X	X		X	X						
MISSOURI PSC	X	X		X							
MONTANA PSC	X	X		X	X						
NEBRASKA PSC 4/											
NEVADA PSC	X	X		X	X	X					
NEW HAMPSHIRE PUC	X	X		X							Yes
NEW JERSEY BPU 12/	X	X	X					X	X	X	
NEW MEXICO PUC	X	X	X 2/	X						X	
NEW YORK PSC	X	X	X	X 7/						X	
NORTH CAROLINA UC	X	X	X 2/	X	X			X	X	X	
NORTH DAKOTA PSC	X			X							
OHIO PUC	X	X	X	X 7/						X 7/	No decision.
OKLAHOMA CC	X	X		X	X			X	X		
OREGON PUC	X	X 1/		X				X			
PENNSYLVANIA PUC	X	X	X 2/	X	X	X	X			X	Maybe, if soon
RHODE ISLAND PUC	X	X	X	X	X					X 3/	
SOUTH CAROLINA PSC	X	X	X	X				X	X		
SOUTH DAKOTA PUC	X	X		X	X						
TENNESSEE PSC	X	X	X 2/	X	X	X	X	X	X		
TEXAS PUC	X	X	X 2/	X	X				X	X	
UTAH PSC	X	X		X							
VERMONT PSB 12/	X	X		X	X					X	
VIRGINIA SCC	X	X	X 2/								
WASHINGTON UTC	X	X		X							
WEST VIRGINIA PSC	X	X	X 2/	X	X			X	X	X	
WISCONSIN PSC	X	X	X 2/	X				X		X	
WYOMING PSC	X		X 2/	X	X			X	X	X	
PUERTO RICO PSC	Does not regulate electric utilities.										
VIRGIN ISLANDS PSC	X	10/	X 2/	X	X					X	
ALBERTA EUB	X	X	X 2/	X	X					X	
NOVA SCOTIA UARB	X	X	X 2/	X	X				X	X	
ONTARIO EB 12/	X	X	X 2/		X					X	

** For definitions of terms, please consult the Glossary of Terms at the back of this book. ICB=Case-by-Case Basis

FOOTNOTES - TABLE 249
AGENCY AUTHORITY OVER RATE OF RETURN

1/ Non-utility investment dollars are always excluded from rate base. Where non-utility investment is comparatively small, capital ratios are not adjusted. When non-utility investment is large, we usually remove non-utility investment from equity.
2/ Commission favors no single method, but rather that which produces the most reasonable results.
3/ It may use any method it desires especially in the case of a small company.
4/ No Commission regulation of electric or gas utilities.
5/ DCF is preferred, but Department approves other methods which check DCF result; risk spread analysis preferred by a slight margin. Financial condition of utility also given serious consideration.
6/ DCF is preferred; all methods are considered including econometric modeling approach.
7/ No single method, however, discounted cash flow is frequently used.
8/ Discounted cash flow most often used, but risk premium method used also. Determined case by case.
9/ DCF has been the preferred method, but its results should be checked with other methods.
10/ Never an issue before this agency.
11/ Agency favors DCF, but any method presented is considered.
12/ Commission did not respond to request for update information; this data may not be current.

KENTUCKY POWER COMPANY
American Electric Power
FIRST SET OF DATA REQUESTS OF KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.
Case No. 2005-00341

Question No. 14

Please provide a copy of the Standard and Poor's guidelines cited on page 48 of Mr. Moul's Direct Testimony.

Response

Please refer to the attachment to the response to AG First Set Data Request, Item No. 223.

Witness: Paul R. Moul

KPSC Case No. 2005-00341
KIUC First Set Data Request
Dated November 10, 2005
Item No. 15
Page 1 of 1

Kentucky Power Company

REQUEST

Please provide a copy of all work papers and source documents relied on for the company's filing, including, but not limited to , all electronic spreadsheets on CD(with formulas intact) supporting each of the Company's Schedules and Workpapers in Sections III and V of the filing and all Exhibits to the Company's Testimony.

RESPONSE

Please see response to KIUC-1st Set, Item No. 92 for electronic spreadsheets used by Witness Foust for Exhibit LCF-1.

Please see response to AG-1st Set, Item 105 for electronic source documents relied upon by Witness Henderson.

Please see response to response to KIUC-1st Set, Item No. 78 for electronic spreadsheets used by Witness Bethel for DWB-1 through DWB-3.

Please see response to KIUC-1st Set, Item No. 3 for electronic copy of workpapers relied upon by Witness Moul.

Please see the Company's response to Commission Staff -1st Set, Item No. No. 8-c and Attorney General-1st Set, Item No. 200 for rate design workpapers; Attorney General-1st Set, Item No. 198 for Section III, pages 33 through 57; KIUC-1st Set, Item No. 99 for Exhibit DMR-2, Commission Staff-2nd Set Item No. 66; and the attached CD for a workpaper to Witness Roush's Exhibit DMR-1; and the attached CD for files for Exhibit DMR-1 and Section III, pages 1 through 32.

Please see attached CD for electronic spreadsheets used by Witness Wagner for Exhibits EKW-1 through EKW-13.

Please see attached CD for electronic workpapers and documents relied upon by Witness Bradish for Exhibits RWB-1 through RWB-5.

WITNESS: Errol K Wagner

KPSC Case No. 2005-00341
KIUC First Set Data Request
Dated November 10, 2005
Item No. 16
Page 1 of 1

Kentucky Power Company

REQUEST

Refer to Section V Schedule 4 page 3 and the Adjust State Issues Revenues in column 10. Please explain why there are no concomitant reductions to expense.

RESPONSE

There was no concomitant expense reduction stipulated to pursuant to the Stipulation and Settlement Agreement in Case No. 2004-00420.

WITNESS: Errol K Wagner

Kentucky Power Company

REQUEST

Please provide a history of O & M expense by FERC account for the most recent five calendar years and for the twelve months ending June 30, 2005.

RESPONSE

Please see the attached pages.

WITNESS: Errol K Wagner

KENTUCKY POWER CONSOL
Electric Operation and Maintenance Expenses

	2000	2001	2002	2003	2004	Test Year
POWER PRODUCTION EXPENSES						
Steam Power Generation						
Operation						
(500) Operation Supervision and Engineering	1,741,463	2,191,064	1,899,540	2,052,993	3,624,551	4,007,829
(501) Fuel	74,637,843	70,635,346	65,043,136	74,148,004	99,455,912	111,921,499
(502) Steam Expenses	2,208,222	2,508,617	2,204,442	3,430,575	1,927,389	2,115,485
(505) Electric Expenses	345,659	330,813	266,084	208,747	92,324	78,426
(506) Miscellaneous Steam Power Expenses	2,322,288	2,003,539	3,403,250	2,178,427	2,554,749	2,893,753
(507) Rents	196	0	0	900	0	0
(509) Allowances	7,038,871	6,475,962	4,440,815	4,279,055	3,641,952	3,285,510
Maintenance						
(510) Maintenance Supervision and Engineering	3,022,850	1,565,703	1,381,331	1,279,808	1,353,937	1,295,525
(511) Maintenance of Structures	349,901	702,973	1,016,790	417,625	210,819	471,513
(512) Maintenance of Boiler Plant	6,589,593	5,701,726	12,790,978	4,949,567	9,180,356	8,158,660
(513) Maintenance of Electric Plant	1,883,140	571,172	4,290,079	1,303,682	1,771,567	1,949,978
(514) Maintenance of Misc Steam Plant	579,101	646,272	504,184	477,504	379,127	516,962
Other Power Supply Expenses						
(555) Purchased Power	149,344,921	1,409,759,941	133,030,823	142,652,848	144,164,065	168,699,873
(556) System Control and Load Dispatching	398,636	501,332	106,161	112,314	1,039,844	2,808,317
(557) Other Expenses	5,138,915	6,551,786	3,419,793	3,021,047	3,577,433	3,636,696
TRANSMISSION EXPENSES						
Operation						
(560) Operation Supervision and Engineering	676,212	566,070	498,005	360,761	356,557	315,824
(561) Load Dispatching	201,966	464,795	553,097	450,553	438,788	423,544
(562) Station Expenses	296,420	200,999	426,389	192,644	143,602	155,683
(563) Overhead Lines Expenses	143,208	235,376	227,449	302,265	500,076	407,215
(564) Underground Lines Expenses	0	64	6	40	531	169
(565) Transmission of Electricity by Others	-4,364,107	-3,032,776	-5,262,025	-5,538,749	-5,963,841	-4,196,752
(566) Miscellaneous Transmission Expenses	940,401	1,302,026	872,835	962,380	1,042,822	1,026,101
(567) Rents	148,547	76,785	-14,568	1,734	3,159	1,626
Maintenance						
(568) Maintenance Supervision and Engineering	134,520	73,396	135,609	115,234	123,713	90,533
(569) Maintenance of Structures	18,624	1,238	485	13,065	10,853	7,898
(570) Maintenance of Station Equipment	478,600	507,840	398,305	533,264	698,790	730,223
(571) Maintenance fo Overhead Lines	1,567,210	1,533,483	1,690,090	1,660,872	1,300,271	1,551,588
(572) Maintenance of Underground Lines	1,918	3,104	59	615	0	-1
(573) Maintenance of Misc Transmission Plant	37,160	8,488	5,830	1,288	1,984	8,447
DISTRIBUTION EXPENSES						
Operation						
(580) Operation Supervision and Engineering	1,294,906	834,495	982,288	941,673	861,900	892,446
(581) Load Dispatching	169,493	88,488	246,791	253,963	332,738	340,226
(582) Station Expenses	182,851	116,980	155,621	182,781	236,891	207,238
(583) Overhead Line Expenses	301,680	524,199	588,024	290,311	172,972	71,125
(584) Underground Line Expenses	11,389	193,922	22,808	25,763	30,162	30,992
(585) Street Lighting and Signal System Expenses	1,281	169,487	105,155	82,708	14,091	11,447
(586) Meter Expenses	318,247	300,228	331,223	288,508	518,466	508,323
(587) Customer Installations Expenses	271,573	244,465	180,026	178,421	197,030	267,029
(588) Misc Expenses	3,347,295	3,860,924	4,923,770	2,688,932	2,699,274	2,697,924
(589) Rent	1,650,011	1,281,259	1,310,955	1,242,379	1,300,911	1,373,964
Maintenance						
(590) Maintenance Supervision	102,631	17,071	-11,498	2,585	19,928	12,378
(591) Maintenance of Structures	5,865	5,699	526	34,686	10,277	7,643
(592) Maintenance of Station Equipment	496,996	314,853	574,382	345,922	743,177	671,676
(593) Maintenance fo Overhead Lines	7,694,012	8,404,111	9,828,569	13,183,960	13,965,042	11,169,968
(594) Maintenance of Underground Lines	165,320	152,385	102,358	78,218	108,487	104,073
(595) Maintenance of Line Transformers	433,947	391,244	172,765	308,013	800,199	605,456
(596) Maintenance of Street Lighting and Signal Systems	36,213	33,751	27,083	5,432	71,655	86,645
(597) Maintenance of Meters	113,531	97,499	97,295	72,811	65,099	70,804
(598) Maintenance of Misc Distribution Plant	455,082	217,232	227,153	533,168	492,889	469,543
CUSTOMER ACCOUNTS EXPENSES						
Operation						
(901) Supervision	229,083	250,170	364,448	405,264	495,738	481,962
(902) Meter Reading Expenses	1,723,846	1,636,802	1,909,790	2,145,633	2,293,915	2,067,815
(903) Customer Records and Collection Expenses	6,833,748	6,933,323	5,939,656	5,194,576	6,111,240	5,721,586
(904) Uncollectible Accounts	-131,355	0	303,862	-354,661	18,470	-20,325
(905) Misc Customer Accounts Expenses	110,384	99,581	129,581	19,596	18,731	15,976

KENTUCKY POWER CONSOL
Electric Operation and Maintenance Expenses

	2000	2001	2002	2003	2004	Test Year
CUSTOMER SERVICE AND INFORMATION EXPENSES						
Operation						
(907) Supervision	366,097	240,229	179,590	123,434	267,303	310,894
(908) Customer Assistance Expenses	1,683,226	1,297,377	835,111	796,786	954,082	946,389
(909) Information and Instructional Expenses	1,182	0	481	775	95,141	103,610
(910) Misc Customer Service and Informational Expenses	-1,707	196,158	171,958	332,391	1,819	1,937
SALES EXPENSES						
Operation						
(911) Supervision	33,526	1,418	338	24	25	25
(912) Demonstrating and Selling Expenses	90,616	5,727	4,319	6,808	11,145	5,525
(913) Advertising Expenses	36,780	50	39	26	0	0
(916) Miscellaneous Sales Expenses	63,780	7,100	0	0	0	0
ADMINSTRATIVE AND GENERAL EXPENSES						
Operation						
(920) Administrative and General Salaries	5,454,910	6,930,716	8,966,860	7,479,705	6,446,547	7,074,494
(921) Office Supplies and Expenses	2,635,747	3,001,853	2,413,551	1,032,782	669,744	879,789
(Less) Administrative Expenses Transferred - Credit	-245175	-281,877	-241,964	-246,414	-515,211	-729,880
(923) Outside Services Employed	4,677,894	2,521,468	3,524,798	2,501,624	7,241,789	6,806,009
(924) Property Insurance	301,313	306,211	428,953	388,920	315,460	314,058
(925) Injuries and Damages	1,035,647	1,713,555	2,130,685	1,015,491	962,365	1,122,581
(926) Employee Pensions and Benefits	3,289,637	4,129,395	4,551,631	4,397,549	3,849,173	3,528,053
(927) Franchise Requirements	116,231	125,106	125,461	172,146	151,836	135,682
(928) Regulatory Commission Expenses	374,978	136,530	201,891	275,988	154,951	30,211
(929) Duplicate Charges-Cr.	0	69	0	0	0	0
(930.1) General Advertising Expenses	150,214	176,490	125,064	193,159	115,401	109,628
(930.2) Misc Gneral Expenses	1,609,893	2,301,549	1,473,416	1,512,443	2,185,785	1,975,378
(931) Rents	772,559	966,087	359,462	609,650	854,159	892,351
Maintenance						
(935) Maintenance of General Plant	1,699,690	1,495,074	1,856,411	2,010,572	1,493,702	1,681,476
TOTAL OPERATION & MAINTENANCE EXPENSES	305,847,345	1,563,525,587	288,949,658	290,323,563	328,465,828	365,416,245

Kentucky Power Company

REQUEST

Please provide a history of costs incurred by FERC plant account (capital expenditures) and O & M expense account for the Company's vegetation management program and for each of the nine T & D asset management programs for the most recent five calendar years and for the twelve months ending June 30, 2005

RESPONSE

The attached pages show calendar year 2002, 2003, 2004 and twelve months ended June 30, 2005 T&D asset management programs by FERC O&M expense account. Capital expenditures (Account 107 Construction Work In Progress) are also shown on this schedule. Each program is identified by a unique project number. Prior to 2002, the accounting databases and the general ledger systems used to provide this information did not have a project field to capture these costs.

Tables 3 and 4 of Everett Phillips testimony provides the T&D vegetation management O&M and Capital costs for the 2000-2004 calendar years and 12 months ended June 30, 2005. Distribution vegetation O&M expenses were recorded in FERC Account 593 –Maintenance of Overhead Lines. Transmission vegetation expenses were recorded in FERC Account 571 – Maintenance of Overhead Lines. T&D vegetation capital was recorded in FERC Account 107 – Construction Work In Progress.

The specific FERC plant account (Distribution 360-373, Transmission 350-359) for capital is not being provided because this information is unavailable except by conducting a study to review each work order and summarize the data.

WITNESS: Everett Phillips

Kentucky Power Co - 12 mo's ending June 2005

Project	Proj Desc	Account	Acct Desc	Total	Capital	O&M
000004737	Asset Improvement - Sectionalizing Program/KP	1070	Capital & Retirement	826,878.94	826,878.94	
		5930	Distribution Maintenance	40,387.06		40,387.06
		5950	Distribution Maintenance	5,619.74		5,619.74
		5980	Distribution Maintenance	339.69		339.69
000004737 Total				**873,225.43**	**826,878.94**	**46,346.49**
000006104	Pole Inspection	5930	Distribution Maintenance	19,906.01		19,906.01
000006104 Total				**19,906.01**	**0.00**	**19,906.01**
EDN014673	Asset Improvement - Pole Reinforcement/KP	1070	Capital & Retirement	74,131.83	74,131.83	
EDN014673 Total				**74,131.83**	**74,131.83**	**0**
EDN014680	Asset Improvement - Pole Replacement/KP	1070	Capital & Retirement	521,590.38	521,590.38	
		5800	Distribution Operation	281.44		281.44
		5930	Distribution Maintenance	41,175.51		41,175.51
		5940	Distribution Maintenance	523.67		523.67
		5950	Distribution Maintenance	16,665.96		16,665.96
		5960	Distribution Maintenance	320.76		320.76
		5970	Distribution Maintenance	179.46		179.46
		5980	Distribution Maintenance	1,157.42		1,157.42
EDN014680 Total				**581,894.59**	**521,590.38**	**60,304.22**
EDN014720	Asset Improvement - Line Reclosers/KP	1070	Capital & Retirement	743,277.56	743,277.56	
		5830	Distribution Operation	48.00		48.00
		5930	Distribution Maintenance	1,055.23		1,055.23
		5940	Distribution Maintenance	(1,401.00)		(1,401.00)
		5950	Distribution Maintenance	2,690.98		2,690.98
EDN014720 Total				**745,670.76**	**743,277.56**	**2,393.20**
EDN015042	Asset Improvement - Small Wire Repl OVHD/KP	1070	Capital & Retirement	49,330.86	49,330.86	
		5930	Distribution Maintenance	7,770.85		7,770.85
		5950	Distribution Maintenance	1,406.00		1,406.00
		5960	Distribution Maintenance	194.94		194.94
EDN015042 Total				**58,702.64**	**49,330.86**	**9,371.79**

EDN100075	Aseet Improvement - Lightning Mitigation/KP	1070 Capital & Retirement	32,033.94	32,033.94	
		5930 Distribution Maintenance	1,221.10		1,221.10
		5960 Distribution Maintenance	6.71		6.71
		5980 Distribution Maintenance	13.42		13.42
EDN100075 Total			**33,275.16**	**32,033.94**	**1,241.22**
EDN100104	Pole Inspection	5830 Distribution Operation	2,479.60		2,479.60
		5880 Distribution Operation	376.61		376.61
		5930 Distribution Maintenance	1,035.34		1,035.34
EDN100104 Total			**3,891.55**	**0.00**	**3,891.55**
EDN100189	Asset Improvement - Animal Mitigation/KP	5950 Distribution Maintenance	18,303.58		18,303.58
EDN100189 Total			**18,303.58**	**0**	**18,303.58**
EDN100232	Asset Improvement - URD Inspection/Repair Prog/KP	5960 Distribution Maintenance	30.93		30.93
EDN100232 Total			**30.93**	**0**	**30.93**
EDN100296	Asset Improvement - Small Wire Repl URD/KP	1070 Capital & Retirement	75,809.85	75,809.85	
		5930 Distribution Maintenance	294.79		294.79
		5940 Distribution Maintenance	811.37		811.37
EDN100296 Total			**76,916.01**	**75,809.85**	**1,106.16**
EDN100577	Asset Improvement - CKT Inspection/Repair Program/KP	1070 Capital & Retirement	132,989.73	132,989.73	
		5830 Distribution Operation	44,258.31		44,258.31
		5930 Distribution Maintenance	58,572.79		58,572.79
		5940 Distribution Maintenance	80.46		80.46
		5950 Distribution Maintenance	6,407.12		6,407.12
		5960 Distribution Maintenance	341.95		341.95
		5980 Distribution Maintenance	2,555.19		2,555.19
EDN100577 Total			**245,205.55**	**132,989.73**	**112,215.82**
Grand Total			**2,731,154.03**	**2,456,043.07**	**275,110.96**

Kentucky Power Co - Year to Date December 2004

Project	Proj Desc	Account	Acct Desc	Total	Capital	O&M
000004737	Asset Improvement - Sectionalizing Program/KP	1070	Capital & Retirement	1,218,665.33	1,218,665.33	
		5830	Distribution Operation	783.43		783.43
		5930	Distribution Maintenance	70,880.11		70,880.11
		5950	Distribution Maintenance	5,259.05		5,259.05
		5980	Distribution Maintenance	1,906.95		1,906.95
000004737 Total				**1,297,494.87**	**1,218,665.33**	**78,829.53**
000006104	Pole Inspection	5930	Distribution Maintenance	166,270.00		166,270.00
000006104 Total				**166,270.00**	**0.00**	**166,270.00**
EDN014673	Asset Improvement - Pole Reinforcement/KP	1070	Capital & Retirement	83,589.46	83,589.46	
		5930	Distribution Maintenance	(1,458.74)		(1,458.74)
EDN014673 Total				**82,130.73**	**83,589.46**	**(1,458.74)**
EDN014680	Asset improvement - Pole Replacement/KP	1070	Capital & Retirement	590,973.24	590,973.24	
		5830	Distribution Operation	965.73		965.73
		5880	Distribution Operation	699.50		699.50
		5930	Distribution Maintenance	67,021.59		67,021.59
		5940	Distribution Maintenance	1,175.30		1,175.30
		5950	Distribution Maintenance	21,334.90		21,334.90
		5960	Distribution Maintenance	513.97		513.97
		5970	Distribution Maintenance	179.46		179.46
		5980	Distribution Maintenance	1,551.30		1,551.30
EDN014680 Total				**684,414.97**	**590,973.24**	**93,441.73**
EDN014720	Asset Improvement - Line Reclosers/KP	1070	Capital & Retirement	1,328,520.00	1,328,520.00	
		5830	Distribution Operation	109.10		109.10
		5930	Distribution Maintenance	13,734.73		13,734.73
		5950	Distribution Maintenance	455.25		455.25
EDN014720 Total				**1,342,819.08**	**1,328,520.00**	**14,299.09**
EDN015042	Asset Improvement - Small Wire Repl OVHD/KP	1070	Capital & Retirement	104,135.13	104,135.13	
		5930	Distribution Maintenance	12,954.87		12,954.87
		5950	Distribution Maintenance	4,661.69		4,661.69
		5960	Distribution Maintenance	204.07		204.07
EDN015042 Total				**121,955.76**	**104,135.13**	**17,820.63**
EDN100075	Aseet Improvement - Lightning Mitigation/KP	1070	Capital & Retirement	38,996.41	38,996.41	
		5930	Distribution Maintenance	7,921.59		7,921.59
EDN100075 Total				**46,918.00**	**38,996.41**	**7,921.59**

EDN100104	Pole Inspection	5830	Distribution Operation	3,294.36		3,294.36
		5880	Distribution Operation	376.61		376.61
		5930	Distribution Maintenance	5,221.61		5,221.61
		5960	Distribution Maintenance	81.41		81.41
EDN100104 Total				**8,973.99**	**0.00**	**8,973.99**
EDN100189	Asset Improvement - Animal Mitigation/KP	5930	Distribution Maintenance	1,553.32		1,553.32
		5950	Distribution Maintenance	5,749.86		5,749.86
EDN100189 Total				**7,303.18**	**0.00**	**7,303.18**
EDN100232	Asset Improvement - URD Inspection/Repair Prog/KP	1070	Capital & Retirement	(7,322.25)	(7,322.25)	
		5940	Distribution Maintenance	811.33		811.33
		5960	Distribution Maintenance	90.12		90.12
		5980	Distribution Maintenance	77.41		77.41
EDN100232 Total				**(6,343.39)**	**(7,322.25)**	**978.86**
EDN100296	Asset Improvement - Small Wire Repl URD/KP	1070	Capital & Retirement	68,931.76	68,931.76	
		5930	Distribution Maintenance	321.86		321.86
		5940	Distribution Maintenance	85.91		85.91
EDN100296 Total				**69,339.53**	**68,931.76**	**407.77**
EDN100577	Asset Improvement - CKT Inspection/Repair Program/KP	1070	Capital & Retirement	132,364.64	132,364.64	
		5830	Distribution Operation	96,111.42		96,111.42
		5880	Distribution Operation	799.14		799.14
		5930	Distribution Maintenance	201,077.18		201,077.18
		5940	Distribution Maintenance	678.68		678.68
		5950	Distribution Maintenance	6,390.74		6,390.74
		5960	Distribution Maintenance	556.81		556.81
		5970	Distribution Maintenance	1,101.81		1,101.81
		5980	Distribution Maintenance	145.11		145.11
EDN100577 Total				**439,225.53**	**132,364.64**	**306,860.89**
Grand Total				**4,260,502.24**	**3,558,853.72**	**701,648.52**

Kentucky Power Co - Year to Date December 2003

Project	Proj Desc	Account	Acct Desc	Total	Capital	O&M
000004737	Asset Improvement - Sectionalizing Program/KP	1070	Capital & Retirement	645,196.37	645,196.37	
		5830	Distribution Operation	1,213.65		1,213.65
		5930	Distribution Maintenance	36,183.94		36,183.94
		5950	Distribution Maintenance	438.95		438.95
		5970	Distribution Maintenance	4.29		4.29
000004737 Total				**683,037.20**	**645,196.37**	**37,840.83**
EDN014673	Asset Improvement - Pole Reinforcement/KP	1070	Capital & Retirement	(6,000.86)	(6,000.86)	
		5930	Distribution Maintenance	81,238.08		81,238.08
EDN014673 Total				**75,237.23**	**(6,000.86)**	**81,238.08**
EDN014680	Asset Improvement - Pole Replacement/KP	1070	Capital & Retirement	453,464.11	453,464.11	
		5830	Distribution Operation	3,539.56		3,539.56
		5930	Distribution Maintenance	56,926.40		56,926.40
		5940	Distribution Maintenance	2,996.93		2,996.93
		5950	Distribution Maintenance	13,802.21		13,802.21
		5960	Distribution Maintenance	274.16		274.16
		5980	Distribution Maintenance	2,096.62		2,096.62
EDN014680 Total				**533,099.99**	**453,464.11**	**79,635.88**
EDN014720	Asset Improvement - Line Reclosers/KP	1070	Capital & Retirement	721,076.59	721,076.59	
		5830	Distribution Operation	44.49		44.49
		5930	Distribution Maintenance	5,725.33		5,725.33
		5950	Distribution Maintenance	209.02		209.02
EDN014720 Total				**727,055.43**	**721,076.59**	**5,978.84**
EDN015042	Asset Improvement - Small Wire Repl OVHD/KP	1070	Capital & Retirement	84,585.18	84,585.18	
		5830	Distribution Operation	113.31		113.31
		5930	Distribution Maintenance	18,171.02		18,171.02
		5940	Distribution Maintenance	495.78		495.78
		5950	Distribution Maintenance	494.04		494.04
		5960	Distribution Maintenance	140.75		140.75
		5980	Distribution Maintenance	114.37		114.37
EDN015042 Total				**104,114.45**	**84,585.18**	**19,529.26**

EDN100075	Aseet Improvement - Lightning Mitigation/KP	1070	Capital & Retirement	40,481.52	40,481.52	
		5930	Distribution Maintenance	792.05		792.05
EDN100075 Total				**41,273.57**	**40,481.52**	**792.05**
EDN100104	Pole Inspection	5830	Distribution Operation	15,613.55		15,613.55
		5880	Distribution Operation	73.74		73.74
		5930	Distribution Maintenance	219,051.51		219,051.51
EDN100104 Total				**234,738.80**	**0.00**	**234,738.80**
EDN100189	Asset Improvement - Animal Mitigation/KP	5930	Distribution Maintenance	53.42		53.42
		5950	Distribution Maintenance	15,376.40		15,376.40
EDN100189 Total				**15,429.82**	**0.00**	**15,429.82**
EDN100232	Asset Improvement - URD Inspection/Repair Prog/KP	1070	Capital & Retirement	2,850.22	2,850.22	
		5840	Distribution Operation	1,263.23		1,263.23
		5940	Distribution Maintenance	21.35		21.35
EDN100232 Total				**4,134.80**	**2,850.22**	**1,284.58**
EDN100296	Asset Improvement - Small Wire Repl URD/KP	1070	Capital & Retirement	60,761.75	60,761.75	
		5930	Distribution Maintenance	310.86		310.86
		5940	Distribution Maintenance	4,176.11		4,176.11
		5950	Distribution Maintenance	7,423.27		7,423.27
EDN100296 Total				**72,671.98**	**60,761.75**	**11,910.23**
EDN100577	Asset Improvement - CKT Inspection/Repair Program/KP	1070	Capital & Retirement	225,870.68	225,870.68	
		5830	Distribution Operation	76,377.34		76,377.34
		5880	Distribution Operation	1,368.22		1,368.22
		5930	Distribution Maintenance	144,212.02		144,212.02
		5940	Distribution Maintenance	438.47		438.47
		5950	Distribution Maintenance	3,465.73		3,465.73
		5980	Distribution Maintenance	207.94		207.94
EDN100577 Total				**451,940.41**	**225,870.68**	**226,069.73**
Grand Total				**2,942,733.65**	**2,228,285.56**	**714,448.09**

Kentucky Power Co - Year to Date December 2002

Project	Proj Desc	Account	Acct Desc	Total	Capital	O&M
EDN014673	Asset Improvement - Pole Reinforcement/KP	1070	Capital & Retirement	44,661.96	44,661.96	
		5930	Distribution Maintenance	390.61		390.61
EDN014673 Total				**45,052.57**	**44,661.96**	**390.61**
EDN014680	Asset Improvement - Pole Replacement/KP	1070	Capital & Retirement	396,537.66	396,537.66	
		5830	Distribution Operation	6,358.85		6,358.85
		5840	Distribution Operation	24.00		24.00
		5860	Distribution Operation	3.35		3.35
		5880	Distribution Operation	289.80		289.80
		5930	Distribution Maintenance	59,589.55		59,589.55
		5940	Distribution Maintenance	863.36		863.36
		5950	Distribution Maintenance	10,988.77		10,988.77
		5960	Distribution Maintenance	1,200.72		1,200.72
		5970	Distribution Maintenance	20.65		20.65
		5980	Distribution Maintenance	2,726.63		2,726.63
EDN014680 Total				**478,603.34**	**396,537.66**	**82,065.68**
EDN014720	Asset Improvement - Line Reclosers/KP	1070	Capital & Retirement	1,515,498.97	1,515,498.97	
		5830	Distribution Operation	100.26		100.26
		5930	Distribution Maintenance	15,842.97		15,842.97
		5950	Distribution Maintenance	990.96		990.96
EDN014720 Total				**1,532,433.16**	**1,515,498.97**	**16,934.19**
EDN015042	Asset Improvement - Small Wire Repl OVHD/KP	1070	Capital & Retirement	152,927.31	152,927.31	
		5830	Distribution Operation	294.00		294.00
		5930	Distribution Maintenance	37,022.21		37,022.21
		5940	Distribution Maintenance	288.70		288.70
		5950	Distribution Maintenance	1,337.81		1,337.81
		5960	Distribution Maintenance	97.95		97.95
		5980	Distribution Maintenance	165.61		165.61
EDN015042 Total				**192,133.59**	**152,927.31**	**39,206.29**
EDN100075	Aseet Improvement - Lightning Mitigation/KP	1070	Capital & Retirement	72,016.88	72,016.88	
		5880	Distribution Operation	58.71		58.71
		5930	Distribution Maintenance	6,141.16		6,141.16
EDN100075 Total				**78,216.75**	**72,016.88**	**6,199.87**

EDN100104	Pole Inspection	5830	Distribution Operation	202,819.80		202,819.80
		5880	Distribution Operation	47,295.28		47,295.28
		5930	Distribution Maintenance	129,498.39		129,498.39
		5950	Distribution Maintenance	382.60		382.60
		5960	Distribution Maintenance	17,774.99		17,774.99
		5980	Distribution Maintenance	174.83		174.83
EDN100104 Total				**397,945.89**	**0.00**	**397,945.89**
		5930	Distribution Maintenance	2,519.71		2,519.71
		5950	Distribution Maintenance	6,843.02		6,843.02
EDN100189 Total				**9,362.73**	**0.00**	**9,362.73**
EDN100232	Asset Improvement - URD Inspection/Repair Prog/KP	1070	Capital & Retirement	4,668.92	4,668.92	
		5840	Distribution Operation	2,838.30		2,838.30
		5880	Distribution Operation	1,491.61		1,491.61
		5940	Distribution Maintenance	3,114.59		3,114.59
EDN100232 Total				**12,113.42**	**4,668.92**	**7,444.50**
EDN100296	Asset Improvement - Small Wire Repl URD/KP	1070	Capital & Retirement	22,167.43	22,167.43	
		5830	Distribution Operation	2,194.30		2,194.30
		5940	Distribution Maintenance	69.71		69.71
EDN100296 Total				**24,431.43**	**22,167.43**	**2,264.00**
EDN100577	Asset Improvement - CKT Inspection/Repair Program/KP	1070	Capital & Retirement	114,002.72	114,002.72	
		5830	Distribution Operation	85,826.20		85,826.20
		5840	Distribution Operation	2,842.28		2,842.28
		5880	Distribution Operation	336.28		336.28
		5930	Distribution Maintenance	51,656.76		51,656.76
		5940	Distribution Maintenance	373.10		373.10
		5950	Distribution Maintenance	1,615.65		1,615.65
		5980	Distribution Maintenance	170.40		170.40
EDN100577 Total				**256,823.38**	**114,002.72**	**142,820.66**
Grand Total				**3,027,116.27**	**2,322,481.86**	**704,634.41**

Transmission Asset Management Programs

			Capital			
Project		Account	!2 Months Ended June 30, 2005	Year 2004	Year 2003	Year 2002
000003118	TS/KP/EHV STATIC RELAY REPL	1070000			53,831	
000003118	TS/KP/EHV STATIC RELAY REPL	1070001			377,651	
ETN104092	DS/KyP-VAR SITES SPILL PREVENT	1070001				
ETN104092	DS/KyP-VAR SITES SPILL PREVENT	1070000	1,129	1,129		
000010420	DS/KP/CI - RTU/ALARM REPL	1070000	1,890			
ETN104047	TS/KyP-VAR SITES SPILL PREVENT	1070001	1,491	1,491		
ETN104047	TS/KyP-VAR SITES SPILL PREVENT	1070000	9,651	9,827	964	
000010649	DS/KYP/Air Blast 138kV Brea	1070000	1,965			
000010421	TS/KP/CI - RTU/ALARM REPL	1070000	29,684	1,515		
000010421	TS/KP/CI - RTU/ALARM REPL	1070001	40,440			
000009976	TS/KYP/Relay Rehab-Replace	1070000	58,106			
000010459	DS/KP/CI - DIST RELAY REPL	1070000	81,650	6,290		
000010448	DS/KY/CI - DIST CIR BKR REPL	1070000	33,357	1,508		
000009976	TS/KYP/Relay Rehab-Replace	1070001	200,213			
			459,576	21,760	432,446	0

Kentucky Power Company

REQUEST

Please provide a complete copy of the Company's two most recent pension and OPEB atuarial reports. Please reconcile the amounts reflected in these reports to the per books amounts reflected in the Company's historic test year (expense and capitalization) and to the amounts reflected in the proforma ratemaking amounts (expense and capitalization). Provide all work papers, including electronic spreadsheets with formulas intact that were utilized to allocate or adjust amounts form the actuarial reports. In addition please explain all adjustments to and /or allocations from the amounts included in the atuarial reports to the per books and ratemaking amounts reflected in the Company's filing.

RESPONSE

Refer to the response to KPSC Staff 1st Set of data requests, Item Numbers 50 and 51 for copies of the most recent pension and OPEB actuarial reports. Please see the enclosed CD for copies of the following documents:

2004 pension actuarial reports for the American Electric Power System Retirement Plan (labeled as the East Plan) (Attachment 1) and the Central and South West Corporation Cash Balance Retirement Plan (labeled as the West Plan), which includes costs for KPCo (Attachment 2)

the 2004 postretirement benefit actuarial report for the American Electric Power System Non-UMWA Postretirement Plan (Attachment 3)

a supplemental page to the 2004 pension actuarial report (Attachment 4)

updated estimates used to record the Medicare D subsidy credits as an offset to OPEB costs (Attachment 5 and Attachment 6)

a reconciliation of the test year per books pension expense to the actuarial reports (Attachment 7)

a reconciliation of the test year per books OPEB expense to the actuarial reports (Attachment 8)

See AG 1 Item No. 35 for a reconciliation of the proforma ratemaking amounts for pension expense to the actuarial reports. See AG 1 Item No. 36 for a reconciliation of the proforma ratemaking amounts for OPEB expense to the actuarial reports.

WITNESS: Errol K Wagner and Hugh E McCoy

Kentucky Power Company

REQUEST

Refer to Section V Work paper S-4 page 30. Please provide all assumptions, data, computations, and workpapers, including electronic spreadsheets with formulas intact.

RESPONSE

Please see attached work papers Item No. 20; Pages 6 – 37. Please see KIUC Item No. 15 for electronic spreadsheets.

Page 6 Work paper is a summary of pages - Pages 7 - 12.

Page 7 There are no assumptions made in this work paper as all numbers are historic actuals obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements - Pages 13 – 36.

Page 8 Columbus Southern Power Company (CSP) closed on the existing Waterford generation plant on September 28, 2005.

All calculations presented in sections "Peak Load During Preceding 12-Month (MW)" and "MLR", plus "Primary Capacity (kW)" lines "APCO", "KPCO", "I&M", and "OPCO" utilize actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements.

Section "Primary Capacity" line "CSP" is the summation of the actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements and Waterford's capacity.

Section "Primary Capacity" line "Total" is the summation of the actual values of "APCO", "KPCO", "I&M" and "OPCO" and the adjusted value of "CSP".

Sections "Capacity Payment – Credit / (Charge)", "Capacity Rate ($/kW)", and "Capacity Surplus" are calculations made based on the adjusted CSP Primary Capacity and the known formula for the AEP System Pool Interchange Power Statement.

Page 9 Appalachian Power Company (APCO) expects to close on the existing Ceredo generation plant in December 2005. Therefore, the generation capacity should be added to the section "Primary Capacity (kW)" line "APCO" on a monthly basis for the test year to accurately reflect the know and measurable adjustment to APCO's Primary Capacity (kW).

All calculations presented in sections "Peak Load During Preceding 12-Month (MW)" and "MLR", plus "Primary Capacity (kW)" lines "KPCO", "I&M", and "OPCO" utilize actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements.

Section "Primary Capacity (kW)" line "APCO" is the summation of the actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements and Ceredo's capacity.

Section "Primary Capacity (kW)" line "CSP" is the summation of the actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements and Waterford's capacity.

Section "Primary Capacity" line "Total" is the summation of the actual values of "KPCO", "I&M" and "OPCO" and the adjusted values of "APCO" and "CSP".

Sections "Capacity Payment – Credit / (Charge)", "Capacity Rate ($/kW)", and "Capacity Surplus" are calculations made based on the adjusted APCO and CSP Primary Capacity (kW) and the known formula for the AEP System Pool Interchange Power Statement.

Page 10 Based on the PUCO's order issued November 9, 2005, in case 05-765-EL-UNC AEP's Columbus Southern Power Company (CSP) will, on January 1, 2006, assume the obligation to serve Monongahela Power Company's approximately 29,000 Ohio customers. The transfer will become effective January 1, 2006. Therefore, Mon Power's forecasted peak load needs to be added on a monthly basis to the section "Peak Load During Preceding 12-Months (MW)" line "CSP" to accurately reflect the known and measurable impact of the Mon Power load acquisition on the test year. Additionally, CSP has signed a full requirements contract with Mon Power to provide generation capacity for the Mon Power acquisition customers. Therefore, this full requirements capacity contract between Mon Power and CSP needs to be added on a monthly basis to section "Primary Capacity (kW)" line "CSP" to accurately reflect the known and measurable impact of the CSP capacity addition via the Mon Power full requirements contract.

All data presented in section "Peak Load During Preceding 12-Month (MW)" lines "APCO", "KPCO", "I&M", and "OPCO", plus "Primary Capacity (kW)" lines "KPCO", "I&M", and "OPCO" utilize actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements.

Section "Peak Load During Preceding 12-Months (MW)" line "CSP" is the summation of the actual settlement data obtained from July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements and forecasted peak load contributed to CSP's peak through the acquisition of Mon Power's approximately 29,000 Ohio customers.

Section "MLR" all rows, all columns are calculated by taking the monthly actual or projected load from corresponding row and column of section "Peak Load During Preceding 12-Months (MW)" and dividing it by the "Peak Load During Preceding 12-Months (MW)" line "Total".

Section "Primary Capacity" line "APCO" is the summation of the actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements and Ceredo's capacity.

Section "Primary Capacity" line "CSP" is the summation of the actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements and Waterford's capacity.

Section "Primary Capacity" line "Total" is the summation of the actual values of "KPCO", "I&M" and "OPCO" and the adjusted values of "APCO" and "CSP".

Section "Capacity Payment – Credit / (Charge)", "Capacity Rate ($/kW)", and "Capacity Surplus" are calculations made based on the adjusted lines "APCO" and "CSP" section "Primary Capacity (kW)" plus the adjusted line "CSP" section "Peak Load During Preceding 12-Months (MW)" and the associated adjustment based "MLR" percentages and the known formula for the AEP System Pool Interchange Power Statement.

Page 11 Based on CSP's letter dated September 20, 2005, to PJM wherein CSP requests authorization from PJM to deactivate Conesville Units 1 and 2 and PJM's subsequent response letter dated October 21, 2005, providing initial approval of said deactivation. Therefore, it is proper to reduce section "Primary Capacity (kW)" line "CSP" by the aforementioned Conesville capacity to properly reflect said known and measurable Primary Capacity (kW) reductions in the test year.

All data presented in section "Peak Load During Preceding 12-Month (MW)" lines "APCO", "KPCO", "I&M", and "OPCO", plus "Primary Capacity (kW)" lines "KPCO", "I&M", and "OPCO" utilize actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements.

Section "Peak Load During Preceding 12-Months (MW)" line "CSP" is the summation of the actual settlement data obtained from July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements and the forecasted peak load contributed to CSP's peak through the acquisition of Mon Power's approximately 29,000 Ohio customers.

Section "MLR" all rows, all columns are calculated by taking the monthly actual or projected load from corresponding row and column of section "Peak Load During Preceding 12-Months (MW)" and dividing it by the "Peak Load During Preceding 12-Months (MW)" line "Total".

Section "Primary Capacity" line "APCO" is the summation of the actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements and Ceredo's capacity.

Section "Primary Capacity" line "CSP" is the summation of the actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements, Waterford's capacity, and the deactivation of Conesville Units 1 and 2.

Section "Primary Capacity" line "Total" is the summation of the actual values of "KPCO", "I&M" and "OPCO" and the adjusted values of "APCO" and "CSP".

Section "Capacity Payment – Credit / (Charge)", "Capacity Rate ($/kW)", and "Capacity Surplus" are calculations made based on the adjusted lines "APCO" and "CSP" section "Primary Capacity (kW)" plus the adjusted line "CSP" section "Peak Load During Preceding 12-Months (MW)" and the associated adjustment based "MLR" percentages and the known formula for the AEP System Pool Interchange Power Statement.

Page 12 Based on the Public Service Commission of West Virginia's approval on March 16, 2005, Appalachian Power Company (APCO) will begin serving an industrial customer and Ohio Power Company (OPCO) will cease serving said industrial customer. Therefore, it is proper to increase section "Forecasted Peak Load (MW)" line "APCO" by an amount equal to said industrial customer's forecasted peak demand and to decrease line "OPCO" by an equal amount.

Section "Primary Capacity" line "APCO" is the summation of the actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements and Ceredo's capacity.

Section "Primary Capacity" line "CSP" is the summation of the actual settlement data obtained from the July 2004 to June 2005 monthly AEP System Pool Interchange Power Statements, Waterford's capacity, and the deactivation Conesville Unit 1 and 2.

Section "Primary Capacity" line "Total" is the summation of the actual values of "KPCO", "I&M" and "OPCO" and the adjusted values of "APCO" and "CSP".

Section "Capacity Payment – Credit / (Charge)", "Capacity Rate ($/kW)", and "Capacity Surplus" are calculations made based on the adjusted lines "APCO" and "CSP" section "Primary Capacity (kW)" plus the forecasted peak load contained in section "Forecasted Peak Load (MW)" and the associated adjustment based section "MLR" percentages and the known formula for the AEP System Pool Interchange Power Statement.