Illinois-American Water Company
Derivation Implied Return on Common Equity (ROE) Based upon ICC Staff's
Recommended Overall Rate of Return

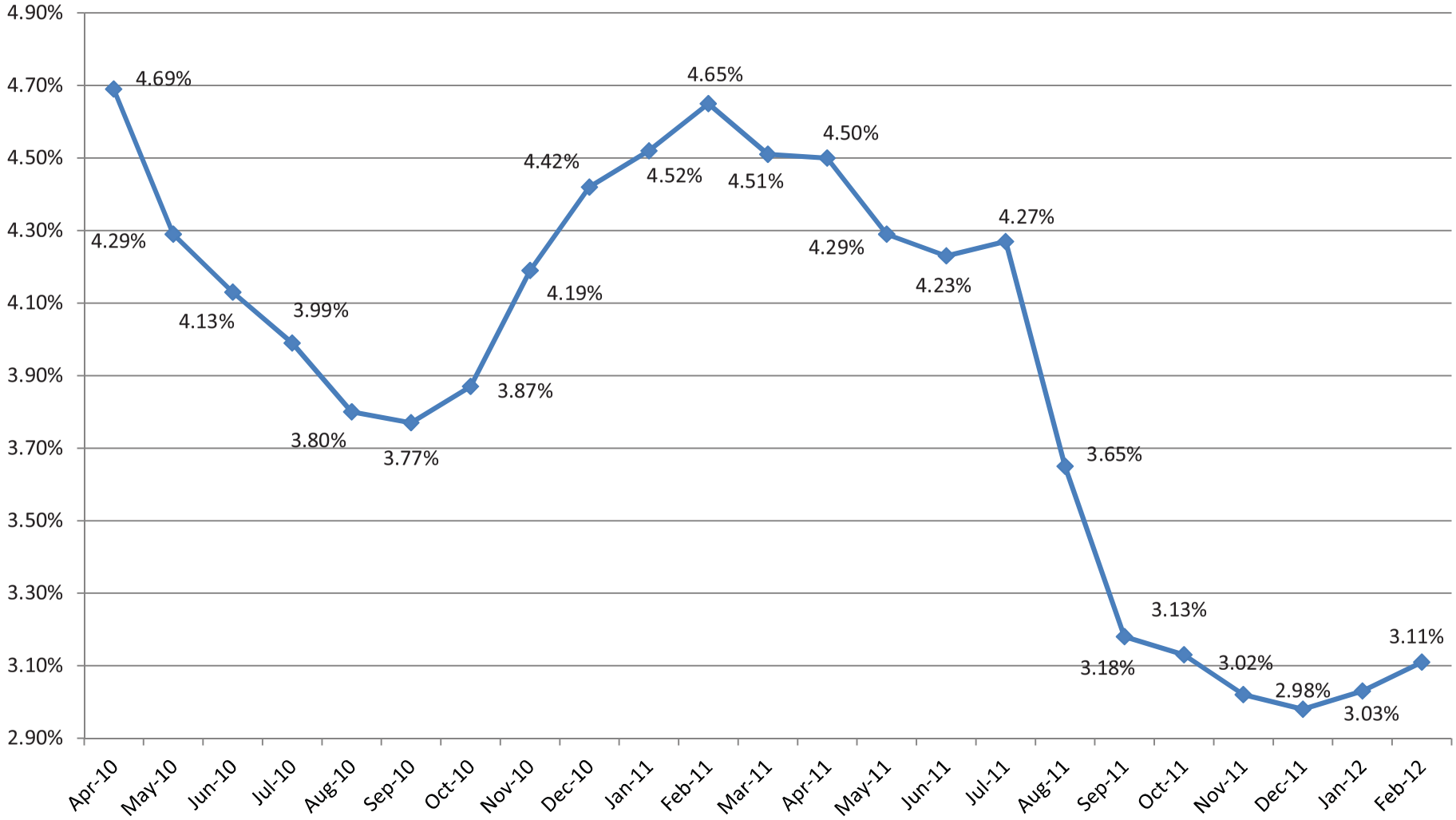
		ICC Staff's Recommended Overall Rate of Return			
		Capital Structure		Weighted Cost Rate	
Line No.		Ratios (1)	Cost Rate (1)	After-Inc. Tax	Before Inc. Tax
1.	Short-Term Debt	1.30%	0.52%	0.01%	0.01%
2.	Long-Term Debt	56.70%	6.07%	3.44%	3.44%
3.	Common Equity'	42.00%	9.35%	3.93%	6.33% (2)
4.		100.00%		7.38%	9.78%

		Illinois-American Water Co.'s Requested Capital Structure Ratios (3)	Illinois-American Water Co.'s Requested Cost Rate (3)	Weighted Cost Rate	
				After-Inc. Tax	Before Inc. Tax
5.	Short-Term Debt	0.26%	0.76%	0.00%	0.00%
6.	Long-Term Debt	48.92%	6.07%	2.97%	2.97%
7.	Common Equity'	50.82%	**8.32%** (4)	4.23% (5)	6.81% (6)
8.		100.00%		7.20%	9.78% (7)

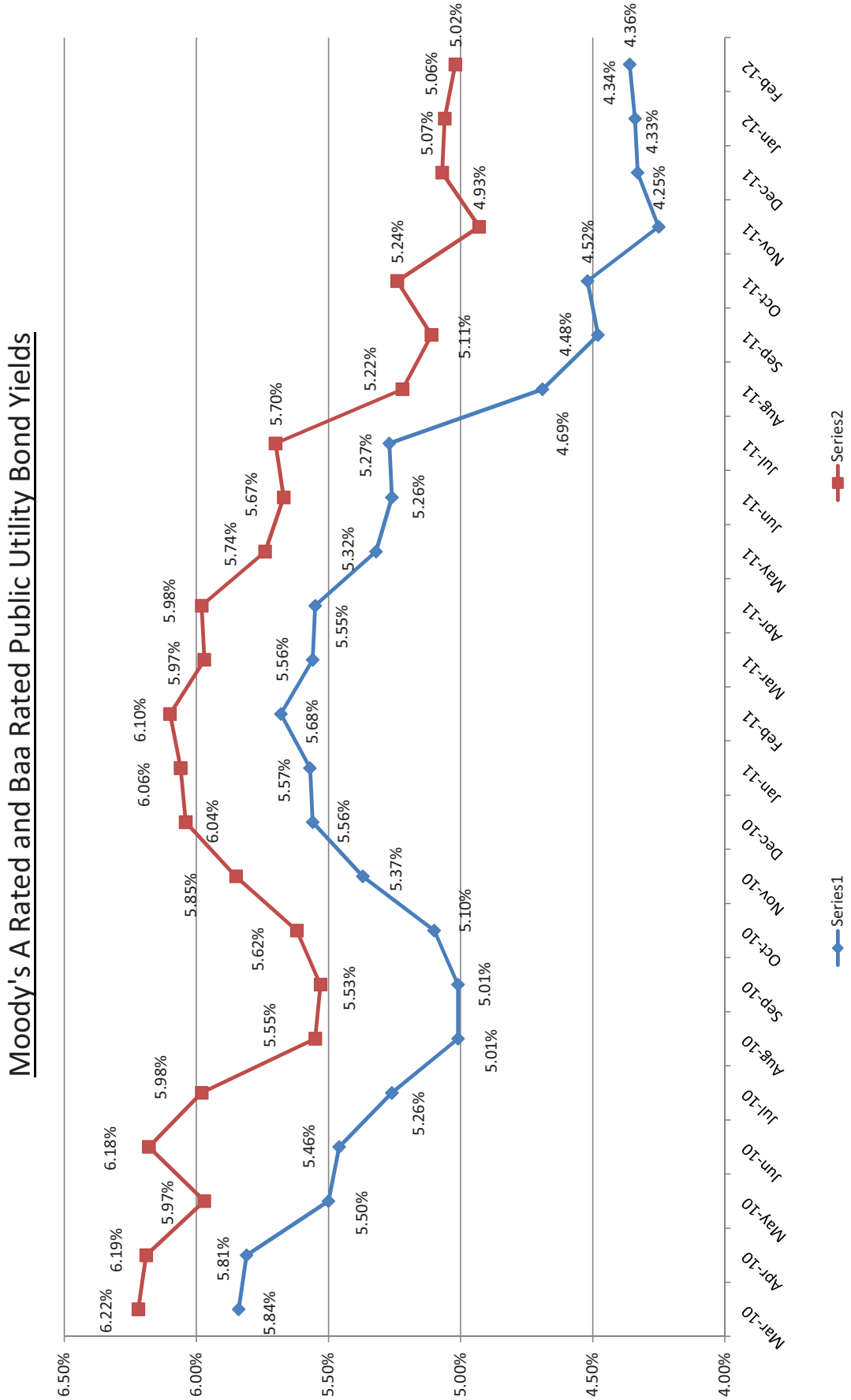
Notes:

(1) From ICC Staff Exhibit 6.0, Schedule 6.1.
(2) Before income tax weighted cost rate of common equity. 6.24% = (3.93% / (1 - 0.3788)).
(3) From Schedule D-1, page 1, First Revised.
(4) Implied return on common equity based upon ICC Staff's recommended overall rate of return. 8.32% = (4.23% / 50.84%).
(5) After income tax weighted cost of common equity based upon ICC Staff's recommended overall rate of return. 4.23% = (6.81% * (1 - 0.3788)).
(6) Before income tax weighted cost of common equity based upon ICC Staff's recommended overall rate of return. 6.81% = 9.78% - 2.97% -0.00%.
(7) From Line No. 4 above.

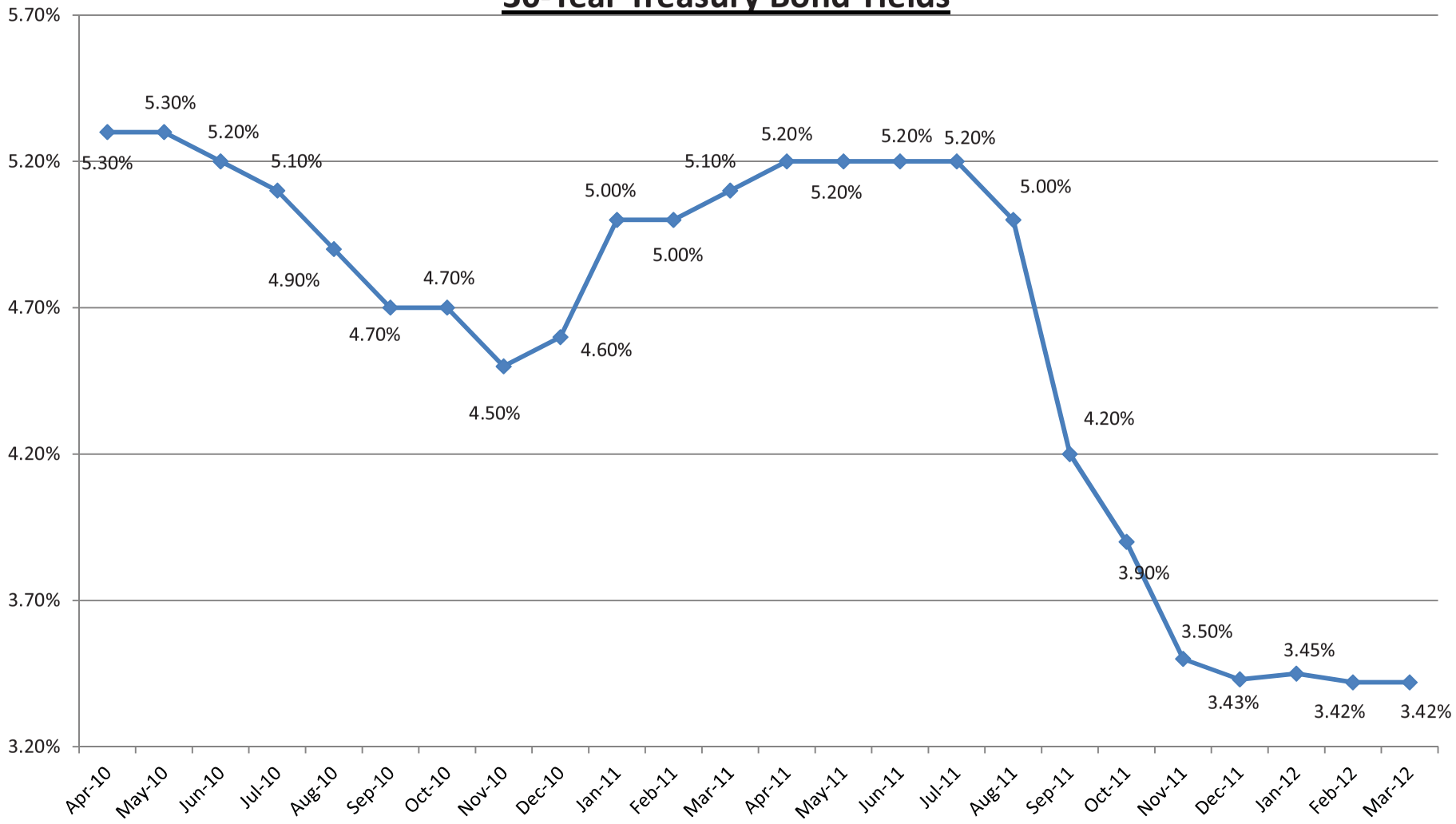
Average Yield on 30 Year U.S. Treasury Bonds



Source: www.federalreserve.gov, Statistical Release H.15, Historical Data

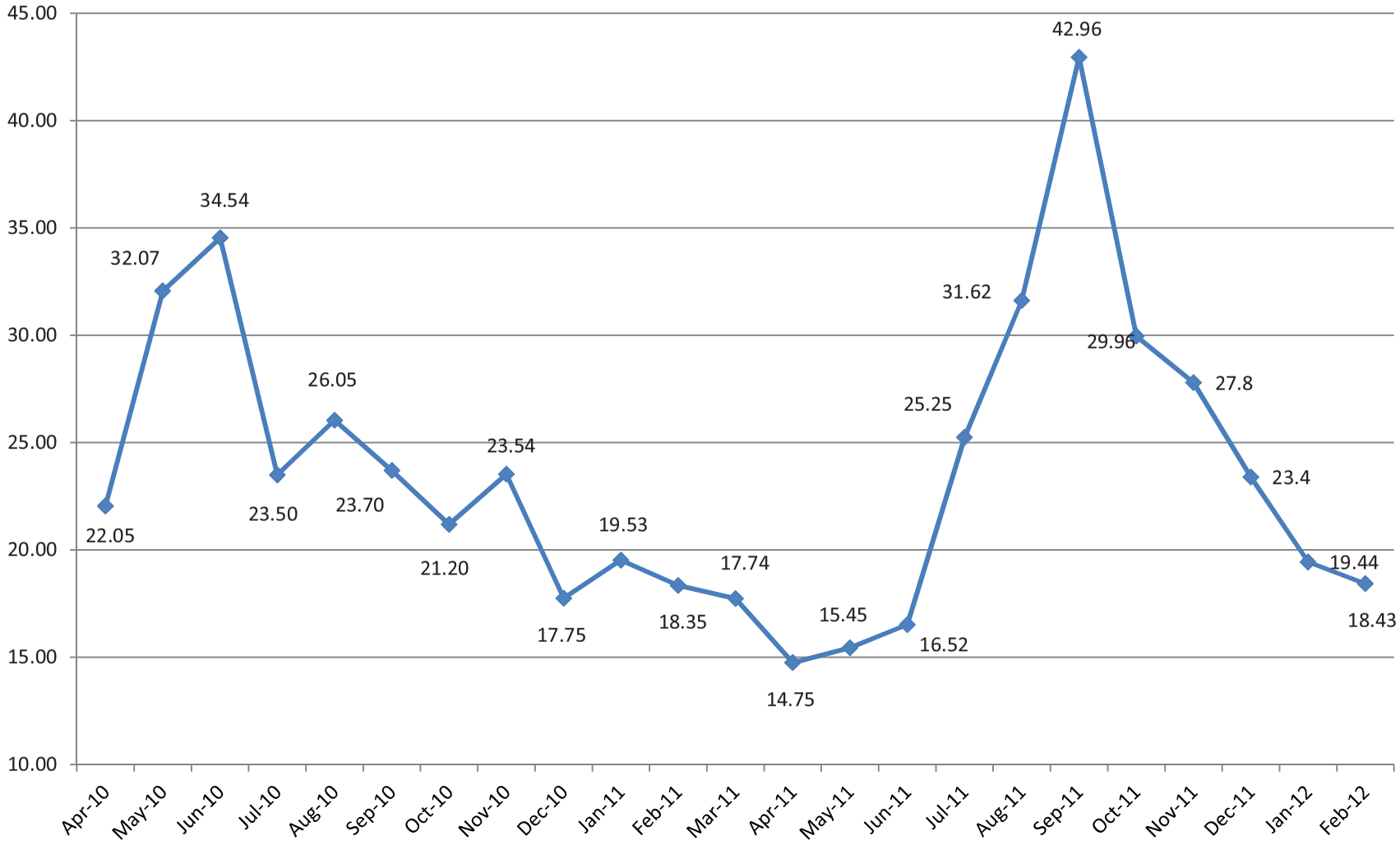

Moody's A Rated and Baa Rated Public Utility Bond Yields
6.50%
6.00%
5.50%
5.00%
4.50%
4.00%
Mar-10
Apr-10
May-10
Jun-10
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10
Jan-11
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12
Feb-12
6.22%
6.19%
6.18%
5.97%
5.98%
5.55%
5.62%
5.85%
6.04%
6.06%
6.10%
5.97%
5.98%
5.74%
5.67%
5.70%
5.22%
5.24%
5.11%
4.93%
5.07%
5.06%
5.02%
5.84%
5.81%
5.50%
5.46%
5.26%
5.01%
5.01%
5.10%
5.37%
5.56%
5.57%
5.68%
5.56%
5.55%
5.32%
5.27%
5.26%
4.69%
4.48%
4.52%
4.25%
4.33%
4.34%
4.36%
Series1
Series2

Blue Chip Financial Forecasts Consensus Estimated 30-Year Treasury Bond Yields



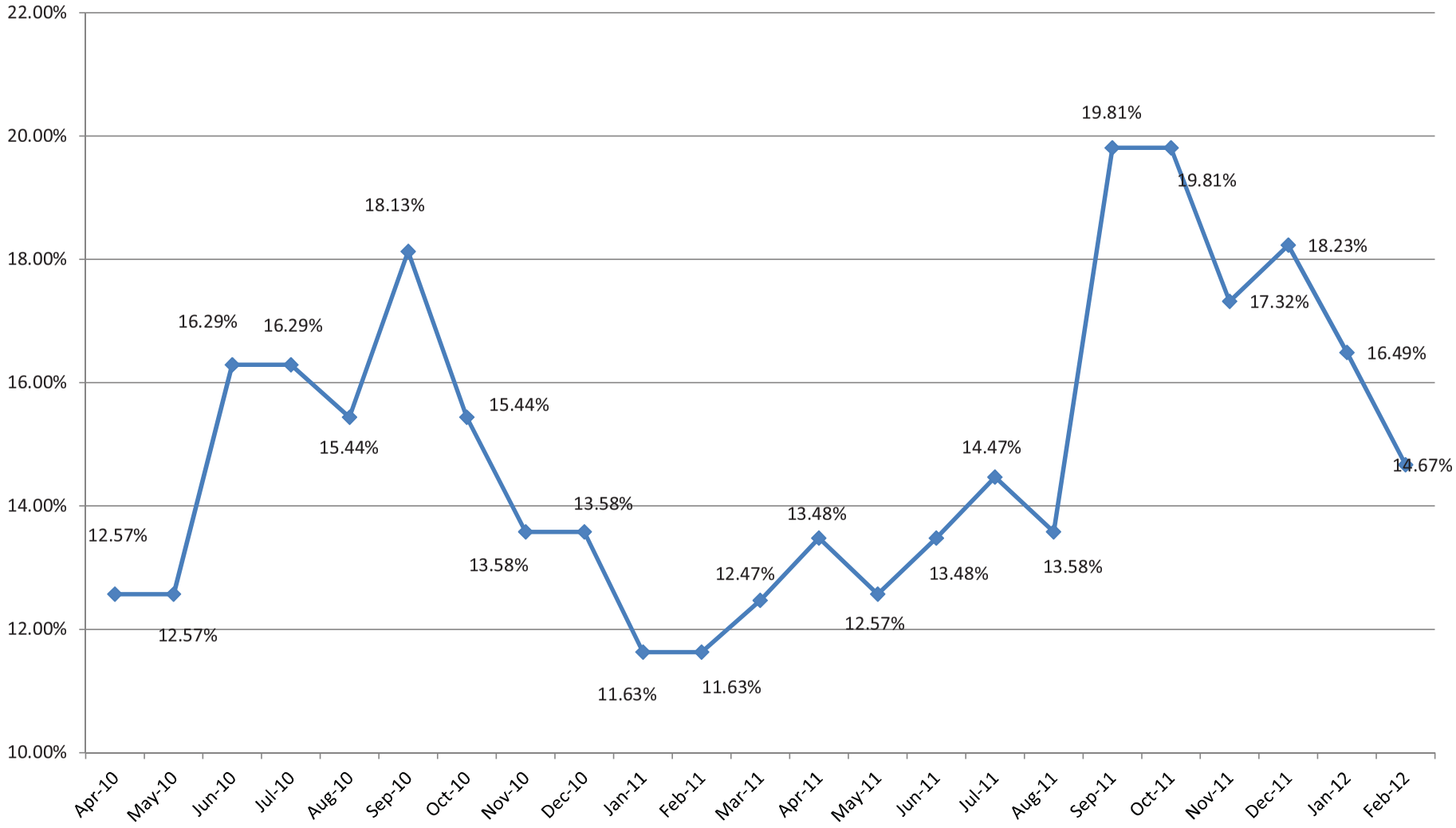
Source: Blue Chip Financial Forecasts, Various Issues

Volatility of S&P 500 Index Options (VIX Index)



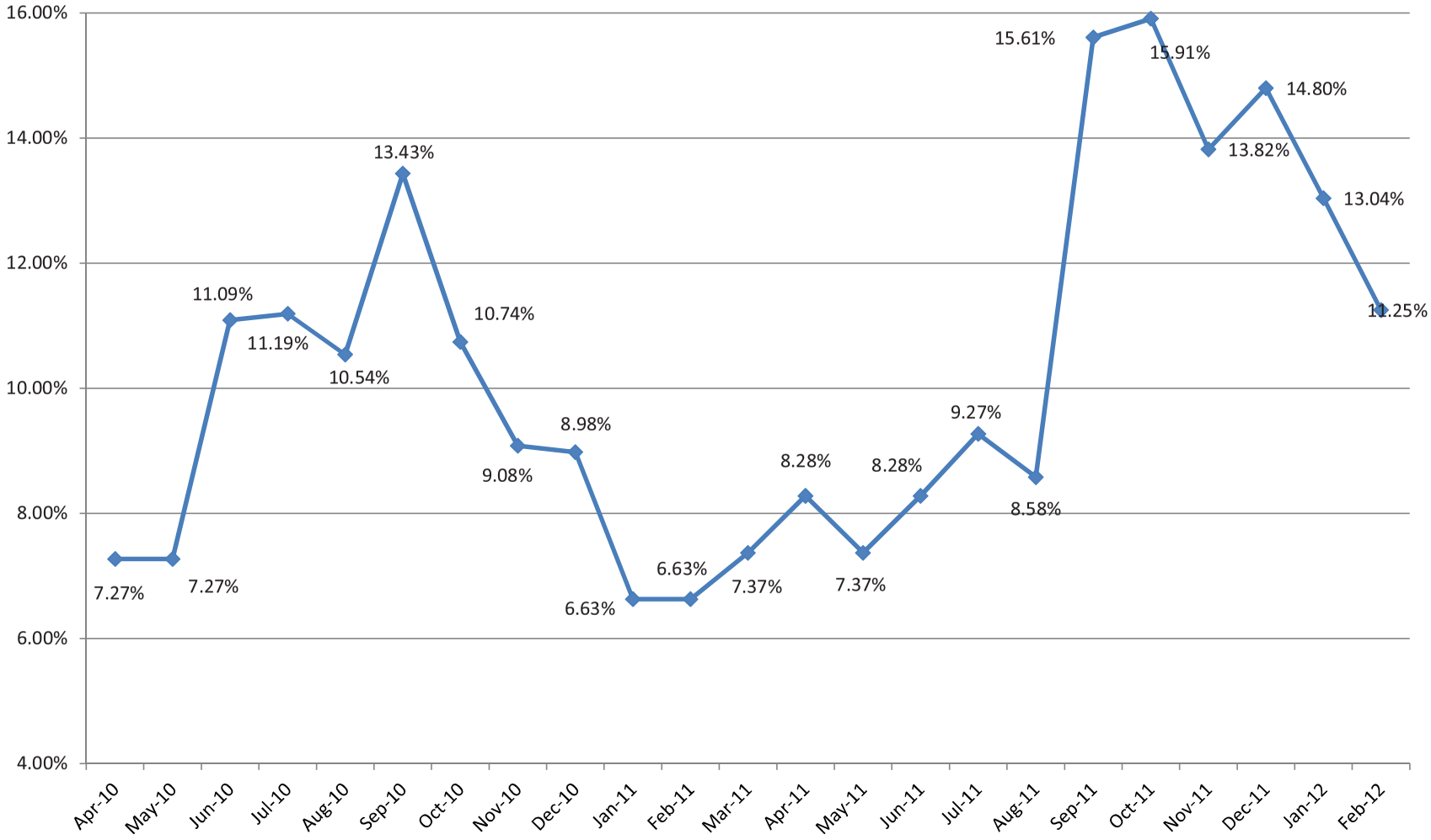
Source: www.finance.yahoo.com

Value Line Forecasted Total Annual Return



Source: Value Line Summary and Index, Various Issues

Equity Risk Premium: Value Line Forecasted Total Annual Return Over 30-Year U.S. Treasury Yields (1)



(1) Derived from pages 3 and 5 of this Exhibit.

Illinois-American Water Company
Calculation of the Predictive Risk Premium Model (PRPM™)
For Ms. Freetly's Sample Water Group

	AWR	WTR	ARTNA	CWT	CTWS	MSEX	YORW
Average	0.38%	0.49%	0.31%	0.17%	0.29%	0.27%	0.50%
GARCH Coefficient	1.41953	2.1114	1.90548	2.84528	1.67851	1.87033	1.79575
Projected Company Equity Risk Premium	6.62%	13.11%	7.40%	5.84%	6.09%	6.35%	11.32%
Risk-Free Rate (1)	3.42%	3.42%	3.42%	3.42%	3.42%	3.42%	3.42%
PRPM Indicated Cost Rate	10.04%	16.53%	10.82%	9.26%	9.51%	9.77%	14.74%
						Average	11.53%

Notes:
(1) From page 20 of IAWC Exhibit 10.21R.

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ORIGINAL ARTICLE

New approach to estimating the cost of common equity capital for public utilities

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Abstract The regulatory process for setting public utilities' allowed rate of return on common equity has generally used the Gordon DCF, CAPM and Risk Premium specifications to estimate the cost of common equity. Despite the widely known problems with these models, there has been little movement to adopt more recently developed asset pricing models to provide additional evidence for estimating the cost of capital. This paper presents, validates empirically and applies a general yet simple consumption-based asset pricing specification to model the risk-return relationship for stocks and estimate the cost of common equity for public utilities. The model is not necessarily superior to other models in its practical results, yet these results do indicate that it should be used to provide additional estimates of the cost of common equity. Additionally, the model raises doubts as to whether assets such as utility stocks are a consumption (business cycle) hedge.

Keywords Public utilities · Cost of capital · GARCH · Consumption asset pricing model

JEL Classification G12 · L94 · L95

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1 Introduction

Following electricity deregulation with the National Energy Policy Act of 1992, the estimation of the cost of common equity capital remains a critical component of the utility rate-of-return regulatory process. Since the cost of common equity is not observable in capital markets, it must be inferred from asset pricing models. The models that are commonly applied in regulatory proceedings are the Gordon (1974) Discounted Cash Flow (DCF), the Capital Asset Pricing (CAPM) and Risk Premium Models. There are other tools used to estimate the cost of common equity such as comparable earnings or earnings-to-price ratios, but they are not asset pricing models. The empirical literature on the CAPM is vast {Fama and French (2004)} and the CAPM is used by a number of US regulatory jurisdictions. The DCF model has not been empirically tested to the same extent as the CAPM, yet it is considered by many US regulatory jurisdictions.

The purpose of this paper is to present, test empirically and apply a recently developed general consumption-based asset pricing model that estimates the risk-return relationship directly from asset pricing data and, when estimated with recently developed time series methods, produces a prediction of the equity risk premium that is driven by its predicted volatility. The predicted risk premium is then added to a risk-free rate of return to provide an estimate of the cost of common equity. We predict two forms of the equity risk premium with the model, the risk premium net of the risk-free rate and the equity-to-debt risk premium (equity risk premium net of the relevant bond yield for the company's stock). Either can be applied to predict the common equity cost of capital for a public utility. Although the model is tested and applied to public utilities for rate of return regulation, it can be used to estimate the cost of capital for any stock. Section 2 reviews the asset pricing models typically used in public utility rate cases and the generalized consumption asset pricing model we propose to estimate the cost of common equity. Section 3 discusses the data and the empirical testing of the consumption asset pricing model. Section 4 reviews the application of the model and compares it with the DCF and CAPM results. Section 5 is the conclusion.

2 DCF, CAPM and consumption asset pricing model

2.1 DCF and CAPM approaches

The standard DCF model frequently used in estimative the cost rate of common equity in regulatory proceedings is defined by the following equation:

$$k = D_0 (1 + g) / P_0 + g,$$

where k is the expected return on common equity; D_0 is the current dividend per share; g is the expected dividend per share growth rate; and P_0 is the current market price.

The DCF was developed by Gordon (1974) specifically for regulatory purposes. Underlying the DCF model is the theory that the present value of an expected future stream of net cash flows during the investment holding period can be determined

by discounting those cash flows at the cost of capital, or the investors' capitalization rate. DCF theory indicates that an investor buys a stock for an expected total return rate which is derived from cash flows received in the form of dividends plus appreciation in market price (the expected growth rate) over the investment holding period. Mathematically, the expected dividend yield $(D_0(1+g)/P_0)$ on market price plus an expected growth rate equals the capitalization rate, i.e., the expected return on common equity.

The standard DCF contains several restrictive assumptions, the most contentious of which during utility cost of capital proceedings is typically that dividends per share (DPS), book value per share (BVPS), earnings per share (EPS) as well as market price grow at the same rate in perpetuity. There is also considerable contention over the proper proxy for g, prospective or historical growth in DPS, BVPS, EPS and market price and over what time period. In addition, although the standard DCF described above is a single stage annual growth model, there is considerable discussion over the use of multiple stage growth models during regulatory proceedings. Some analysts use the discrete version and others use the continuous version of the DCF model. Solving these models for k, the cost of common equity, results in differing equations to solve for k. The equation above is from the discrete version. The continuous version uses the current dividend yield and is not adjusted by g, which results in a lower estimate for k. Because of these and other restrictive assumptions that require numerous subjective judgments in application, it is often difficult for regulatory commissions to reconcile the frequently large disparities in rates of return on common equity recommended by various parties in a public utility rate case.

The CAPM model is defined by the following equation:

$$k = R_f + \beta\left(R_m - R_f\right),$$

where k is the expected return on common equity; R_f is the expected risk-free rate of return; β is the expected beta; and R_m is the expected market return.

CAPM theory defines risk as the co-variability of a security's returns with the market's returns or β, also known as systematic or market risk, with the market beta being defined as 1.0. Because CAPM theory assumes that all investors hold perfectly diversified portfolios, they are presumed to be exposed only to systematic risk and the market (according to the model) will not reward them a risk premium for unsystematic or non-market risk. In other words, the CAPM presumes that investors require compensation only for systematic or market risks which are due to macroeconomic and other events that affect the returns on all assets. Mathematically, the CAPM is applied by adding a forward-looking risk-free rate of return to an expected market equity risk premium adjusted proportionately by the expected beta to reflect the systematic risk.

As with the DCF, there is considerable contention during regulatory cost of capital proceedings as to the proper proxies for all components of the CAPM: the R_f, the R_m, as well as β. In addition, the CAPM assumption that the market will only reward investors for systematic or market risk is extremely restrictive when estimating the expected return on common equity for a single asset such as a single jurisdictional regulated operating utility. Additionally, this assumption requires that the investor have a perfectly diversified portfolio, that is, one with no unsystematic risk. Since

this assumption is not applicable, estimating the cost of common equity capital for a single utility's common equity undoubtedly will not reflect the risk actually faced by the imperfectly diversified investor.

As will be discussed in the next section, our application of the risk premium approach, the consumption asset pricing model and GARCH[1] rest on minimal assumptions and restrictions and therefore requires considerably less judgment in its application.

2.2 Risk premium approach, consumption asset pricing models, and GARCH

A widely used model to estimate the cost of common equity capital for public utilities is the risk premium approach. This approach often estimates the expected rate of return as the long-term historic mean of the realized risk premium above an historic yield plus the current yield of the relevant bond applicable to a specific utility or peer group of utilities. Litigants in public utility rate proceedings debate the choice of inputs to estimate the risk premium as well as how far back to reach into history to collect data for calculating an average that is representative of a forward-looking premium.

It is surprising that, as popular as the risk premium method is in public utility rate cases, the intuitively appealing general consumption-based asset pricing model, with its minimal assumptions and strong theoretical foundation, has not been applied to estimate the cost of common equity capital for public utilities. The model provides projections of the conditional expected risk premium on an asset based on its relation to its predicted conditional volatility. This model generalizes the well known special case asset pricing models such as the Merton (1973) intertemporal capital asset pricing model, Campbell (1993) intertemporal asset pricing model, and the habit-persistence model of Campbell and Cochrane (1999), which are special cases of the general model. The relation of the model to their specialized cases can be found in Cochrane (2006) and Cochrane (2007). The approach of consumption asset pricing models is to make investment decisions that maximize investors' utility from the consumption that they ultimately desire, not returns.

Even if the model is not used to project directly the expected risk premium, it can, at a minimum, be used to verify that the risk premia data chosen for estimating the cost of capital is empirically validated by fitting the model well. The model can be used to predict the equity risk premia net of the risk-free rate (equity risk premium) or to predict the equity-to-debt risk premium for a firm. We perform both of these empirical tests in this paper. The general consumption-based asset pricing model developed in Michelfelder and Pilotte (2011) and based on Cochrane (2004) provides the relationship of the ex ante risk premium to an asset's own volatility in return:

$$E_t[R_{i,t+1}] - R_{f,t} = -\frac{vol_t[M_{t+1}]}{E_t\left[M_{t+1}\right]} vol_t[R_{i,t+1}] corr_t[M_{t+1}, R_{i,t+1}]. \tag{1}$$

[1] GARCH refers to the generalized autoregressive conditional heteroskedasticity regression model which is discussed below.

where vol_t is the conditional volatility, $corr_t$ is the conditional correlation, and M_{t+1} is the stochastic discount factor (SDF).

The SDF is the intertemporal marginal rate of substitution in consumption, or, $M_{t+1} = \beta \frac{U_{c,t+1}}{U_{c,t}}$, where the U_c's are the marginal utilities of consumption in the next period, $t+1$, and the current period, t, and β is the discount factor for period t to $t+1$. Equation 1 shows that the algebraic sign of the relation between the expected risk premium and the conditional volatility of an asset's risk premium is determined by the correlation between the asset's return and the SDF. That is, the direction of the relation between the asset return and the ratio of intertemporal marginal utilities in consumption inversely determines the relation between the expected risk premium and conditional volatility. When the correlation is equal to negative one, the asset's conditional expected risk premium is perfectly positively correlated with its conditional volatility. A positive relation between the conditionally expected risk premium and volatility obtains when $-1 < corr_t < 0$. A negative relation obtains when $0 < corr_t < 1$. For an asset that represents a perfect hedge against shocks to the marginal utility of consumption, with $corr_t = 1$, there will be a perfect negative correlation between the conditionally expected risk premium and its volatility.[2] Therefore, estimates of the relation between the first two conditional moments of a public utility stock's returns provide a direct test of the effectiveness of a public utility stock, or any asset, as a consumption hedging asset. In Eq. 1, $vol_t[M_{t+1}]/E_t[M_{t+1}]$ is the slope of the mean-variance frontier. If this slope changes over time, the estimated relation between the stock's risk and return will vary over time. This model can also be viewed simplistically as the projected expected risk premium as a function of its own projected risk, given information available at time t.

Note that the model allows for the expected risk premium to be negative if the asset hedges shocks to the marginal utility of consumption. Investors are willing to accept an expected rate of return lower than the risk-free rate of return if the pattern of volatility is such that returns are expected to rise with expected reductions in consumption. Simply, investors are willing to *pay* a premium for a higher level of returns volatility that has the desired pattern of returns. These desired returns patterns have a tendency to offset drops in consumption. Therefore, this model shows that investors may not be averse to volatility, but rather to the timing of expected changes in returns.

Summarizing, several conclusions can be drawn from the general model of asset pricing. First, the sign of the relation between a stock's risk premium and conditional volatility depends on the extent to which the stock serves as an intertemporal hedge against shocks to the marginal utility of consumption. Second, the relation between stock risk and return may be time-varying depending on changes in the slope of the mean-variance frontier. Third, hedging assets have desired patterns of volatility that result in expected rates of return that are less than the risk-free rate. We do not expect

[2] A hedging asset is one that has a positive increase in returns that is coincident with a positive shock in the ratio of intertemporal marginal utilities of consumption. Note that if we assume a concave utility function in consumption, as consumption declines, the marginal utility of consumption rises relative to last period marginal utility. If we think of a decline in consumption as a contraction in the business cycle, the hedging asset delivers positive changes in returns when the business cycle is moving into a contraction, and therefore the asset is a business cycle hedge.

that public utility stocks serve as a hedging asset as they are not viewed as defensive stocks (they do not rise in value during downturns in the stock market) due to asymmetric regulation and returns as discussed in detail in Kolbe and Tye (1990). Under asymmetric regulation, utility regulators have a tendency to allow the return on equity to fall below the allowed return during downturns in the business cycle and to reduce the return should it rise above the allowed return during expansions. Therefore we expect that the parameter estimates of the return-risk relationship to be positive as utility stocks are hypothesized to not be hedges.

We use the GARCH model to estimate the general asset pricing model since the GARCH model accommodates ARCH effects that improve the efficiency of the parameter estimates. It also provides a volatility forecasting model for the conditional volatility of the asset's risk premium. The conditional volatility projection is used, in turn to predict the expected risk premium. We also use the GARCH-in-Mean model (GARCH-M) since it specifies that the conditional expected risk premium is a linear function of its conditional volatility. There is a vast body of literature that estimates asset pricing models with the GARCH and GARCH-M methods and therefore we will not attempt to summarize them here.

The GARCH-M model was initially developed and tested by Engle et al. (1987) to estimate the relationship between US Treasury and corporate bond risk premia and their expected volatilities. The GARCH-M model is specified as:

$$R_{t+1} - R_{f,t+1} = \alpha\sigma_{t+1}^2 + \varepsilon_{t+1} \tag{2}$$

$$\sigma_{t+1}^2 = \beta_0 + \beta_1\sigma_t^2 + \beta_2\varepsilon_t^2 + \eta_{t+1} \tag{3}$$

$$\varepsilon_t \,|\psi_{t-1} \sim T(0, \sigma_t^2) \tag{4}$$

where R_{t+1} is the expected total return on the public utility stock index or individual utility stock; $R_{f,t+1}$ is the risk-free rate of return or the yield on an index of public utility bonds of a specified bond rating for the equity-to-debt premium; σ_{t+1}^2 is the conditional or predicted variance of the risk premium that is conditioned on past information (ψ_{t-1}); and ε_t is the error term that is conditional on ψ_{t-1}.

The conditional distribution of the error term is specified as the non-unitary variance T-distribution due to the thick-tailed distribution of the risk premia data. If the error distribution is thick-tailed, using an approximating distribution that accommodates thick tails improves the efficiency of the estimates. The parameter, α, is the return-to-risk coefficient as specified in Eq. 1 as:

$$\alpha = -\frac{vol_t[M_{t+1}]}{E_t\left[M_{t+1}\right]} corr_t[M_{t+1}, R_{i,t+1}] \tag{5}$$

Note that the coefficient will be positive if the conditional correlation between the SDF and the asset return is negative, indicating that the stock is not a hedging asset. Recall that the SDF is the ratio of intertemporal marginal utilities. Assuming a concave utility function, an upward shock in the ratio implies falling consumption, therefore an associated rise (positive correlation) in the return (R_i) would offset the reduction

in consumption, thereby causing the sign of α to be negative. The parameter, α, is also the ratio of risk premium to variance, or, the Sharpe ratio.

The intercept in Eq. 2 is restricted to zero as specified by the general asset pricing model specification. The restriction on the intercept equal to zero has been found to be robust in producing consistently positive and significant relationships between equity risk premia and risk in GARCH-M models. This is discussed in Lanne and Saikkonen (2006) and Lanne and Luoto (2007). We have found the same results in our modeling in this paper, although we have excluded these results for brevity (available upon request). Therefore we specify the prior assumption that the intercept or the "excess" return, i.e., the return not associated with risk to be equal to zero and drop the intercept from the model.

The consumption asset pricing model is estimated in the empirical section of the paper and applied in the applications section of the paper. The model is tested to (1) determine if equity-to-debt risk premium indices for utilities of differing risk specified by differing bond ratings are validated by the asset pricing model and therefore have some empirical support for risk premium prediction and application to utility cost of capital estimation, (2) determine whether equity risk premia can be predicted and fit the model and therefore be used to estimate the cost of common equity, (3) empirically test the consumption asset pricing model, and (4) ascertain whether utility stocks are assets that hedge shocks to the marginal utility of consumption.

If utility stocks are hedging assets then the cost of common equity should reflect a downward adjustment to a specified risk-free rate to reflect investors' preferences for a hedge and the compensation that they are willing to pay for it.

3 Data and empirical results

We use portfolios as represented by public utility stock and bond indices to estimate the conditional return-risk relationship for the equity-to-debt premium. The equity-to-debt risk premium data employed for estimating Eq. 1 with the GARCH-M conditional return-risk regressions are monthly total returns on the Standard and Poor's Public Utilities Stock Index (utility portfolio), and the monthly Moody's Public Utility Aa, A, and Baa yields for the debt cost. We also obtained equity risk premia for the utility portfolio using the Fama-French specified risk-free rate of return, which is the holding period return on a 1-month US Treasury Bill. The data range from January 1928 to December 2007 with 960 observations. The return-risk relationships for the equity-to-debt premia are risk-differentiated by their own bond rating.

As a check, we also estimate Eq. 1 with the GARCH-M for large common stock returns using the monthly Ibbotson Large Company Common Stocks Portfolio total returns and the Ibbotson US Long-Term Government income returns as the risk-free rate. Additionally, as another check, we do the same for the University of Chicago's Center for Research in Security Prices value-weighted stock index (CRSP) using the Fama-French risk-free rate. This is the Fama-French specification of the market equity risk premium. The data range from January 1926 to December 2007 with 984 observations for the Large Company Common Stock estimation and the data ranges

Table 1 Descriptive statistics: public utility and large company common stocks equity-to-debt and equity risk premia

Utility bond rating	Mean	Std. Dev.	Skewness	Kurtosis	JB
Aa	0.0037	0.0568	0.0744	10.07	2,001.2***
A	0.0035	0.0568	0.0632	10.06	1,991.8***
Baa	0.0031	0.0568	0.0375	10.02	1,973.6***
Ibbotson					
Large common stocks	0.0054	0.0554	0.4300	12.84	3,954.7***
CRSP value-weighted stock index	0.0062	0.0544	0.2309	10.92	2,519.1***

The public utility equity-to-debt risk premia monthly time series is from January 1928 to December 2007 with 960 observations. The equity risk premium monthly time series for the Large Common Stocks and the CRSP index are January 1926 to December 2007 with 984 observations, and January 1926 to December 2007 with 984 observations, respectively. The public utility stocks equity-to-debt risk premia are calculated as the total return on the S&P Public Utilities Index of stocks minus the Moody's Public Utility Aa, A, and Baa Indices yields to maturity. The Large Company Common Stock equity risk premia are the monthly total returns on the Ibbotson Large Company Common Stocks Portfolio minus the Ibbotson Long-Term US Government Bonds Portfolio income yield. The CRSP equity risk premia, or the Fama-French market risk premia are the CRSP total returns on the value-weighted equity index minus the 1-month holding period return on a 1 month Treasury Bill. The Jarque-Bera (JB) statistic is a goodness-of-fit measure of the departure of the distribution of a data series from normality, based on the levels of skewness and excess kurtosis. The JB statistic is χ^2 distributed with 2° of freedom. *** Significant at 0.01 level, one-tailed test

from January 1928 to January 2007 with 960 observations (same as the utilities) for the CRSP estimation.

Table 1 displays the descriptive statistics for these data. We have estimated the mean, standard deviation, skewness and kurtosis parameters, as well as the Jarque-Bera (JB) statistic to test the distribution of the data. The means of the utility equity-to-debt risk premia fall as the risk (bond rating) declines. This is consistent with the notion that larger yields are subtracted from stock returns the lower the bond rating. Intertemporally, there is an inverse relationship between risk premia and interest rates (See Brigham et al. (1985) and Harris et al. (2003)). The mean for risk premia will have a tendency to be larger during low interest rate periods.

Not surprisingly, large company common stocks have the highest mean risk premia as the majority of these firms are not rate-of-return regulated firms with a ceiling on their ROE's close to their cost of capital. Interestingly, the standard deviations of the utility stock returns are similar and slightly higher than large company common stocks. Skewness coefficients are small and positive except for Ibbotson large company common stock returns and CRSP returns that have large positive skewness. This suggests that large unregulated stocks have a tendency to have more and larger positive shocks in returns than do utilities that are rate of return regulated. The kurtosis values show that all of the risk premia are thick-tail distributed. This is also found in the significant JB statistics that test the null hypothesis that the data are normally distributed. The null hypothesis is rejected for all assets. The high kurtosis, low skewness, and significant JB statistics show that the risk premia data are substantially thick-tailed, except for non-utility stocks that are both skewed and thick-tailed. Therefore, robust estimation methods are required to produce efficient regression estimates with non-normal data. Additionally, although not shown but available upon request, the serial correlation and

ARCH Lagrange Multiplier tests show that residuals from OLS regressions of risk premia on volatilities follow an ARCH process. Therefore, the GARCH-M method will improve the efficiency of the estimates. We specify the regression error distribution as a non-unitary variance T-distribution so that thick-tails could be accommodated in the estimation and therefore produce increasingly efficient parameter estimates.

We used maximum likelihood estimation with the likelihood function specified with the non-unitary-variance T-distribution as the approximating distribution of the residuals to accommodate the thick-tailed nature of the error distribution. The equations are estimated as a system using the Marquardt iterative optimization algorithm. The chosen software for estimating the model was EViews© version 6.0 (2007).

Table 2 shows the GARCH-M estimations for the consumption asset pricing Eq. 1. We have estimated Eq. 1 for the utility equity risk premia using the Fama-French risk-free rate in addition to the equity-to-debt risk premia risk-differentiated by bond ratings and the two measures of the market equity risk premium. The chosen measure of volatility is the variance of risk premium (in contrast to other such measures such as the standard deviation or the log of variance. Although these results are not shown for brevity, they are robust to these other measures of volatility). The slope, which is the predicted return-to-predicted risk coefficient and Sharpe ratio, is positive and significant at the 99% level for all assets except the utility stock returns with Baa bonds, which is significant at the 95% level. Given that all slopes are positive, public utility stocks are not found to hedge shocks to the marginal utility of consumption. Note that the reward-to-risk slope rises as bond rating rises. This suggests that lower risk utility stocks provide a higher incremental risk-premium for an increase in conditional volatility. This is consistent with other studies that find that lower risk assets, such as shorter maturity bonds, have higher Sharpe Ratios than long-term bonds and stocks. See Pilotte and Sterbenz (2006) and Michelfelder and Pilotte (2011).

The variance equation shows that all GARCH coefficients (β's) are significant at the 1% level and the sums of β_1 and β_2 are close to, but less than 1.0, indicating that the residuals of the risk premium equation follow a GARCH process and that the persistence of a volatility shock on returns and stock prices for utility stocks is temporary. The estimates of the non-unitary variance T-distribution degrees of freedom parameter are low and statistically significant, indicating that the residuals are well approximated by the T. Similar values for the log-likelihood functions (Log-L) show that each of the regressions has a similar goodness-of-fit. Chi-squared distributed likelihood ratio tests (not shown but available upon request) that compare the goodness of fit among the T and normal specifications of the likelihood function of the GARCH-M regressions show that the T has a significantly better fit than the normal distribution.

The GARCH-M results for the large company common stocks portfolio are similar to those of the utility stocks. Not surprisingly, large company common stocks do not hedge shocks to the marginal utility of consumption and volatility shocks temporarily affect their valuations. The exception is that the return-risk slope is substantially higher than utility stock slopes. This is partially due to the risk-free nature of the risk-free rates used with the non-utility equity risk premia compared to the

Table 2 Estimation of return-risk relation: public utility and large company common stocks

Utility bond rating	α	β_0	β_1	β_2	Log-L	T dist. D.F.
Aa	1.5183*** (0.5308)	0.0000** (0.0000)	0.8791*** (0.0230)	0.1031*** (0.0219)	1,604.4	9.9254*** (3.0272)
A	1.4536*** (0.5308)	0.0000** (0.0000)	0.8790*** (0.0230)	0.1033*** (0.0220)	1,605.0	9.9381*** (3.0408)
Baa	1.3318** (0.5303)	0.0000** (0.0000)	0.8789*** (0.0229)	0.1040*** (0.0220)	1,605.2	10.0*** (3.0540)
Fama-French R_f	2.1428*** (0.5318)	0.0000** (0.0000)	0.8811*** (0.0232)	0.0979*** (0.0212)	1,601.0	9.8773*** (2.9700)
Ibbotson						
Large company common stocks	2.7753*** (0.5513)	0.0001*** (0.0000)	0.8381*** (0.0269)	0.1186*** (0.0332)	1,620.8	8.8457*** (2.1613)
CRSP value-weighted stock index	3.3873*** (0.5673)	0.0001*** (0.0000)	0.8330*** (0.0270)	0.1149*** (0.0358)	1,598.9	8.8571*** (1.9505)

The results below are the GARCH-in-Mean regressions for the risk premium $(R_{t+1} - R_{f,t+1})$ on the conditional variance of the risk premium (σ^2_{t+1}) in the mean equation. The intercept in the mean equation is restricted to be equal to zero. The public utility equity-to-debt risk premia monthly time series is from January 1928 to December 2007 with 960 observations. The equity risk premium monthly time series for the Large Company Common Stocks and the CRSP index are January 1926 to December 2007 with 984 observations, and January 1926 to December 2007 with 984 observations, respectively. The public utility stocks equity-to-debt risk premia are calculated as the total return on the S&P Public Utilities Index of stocks minus the Moody's Public Utility Aa, A, and Baa Indices yields to maturity. The Large Company Common Stock equity risk premia are the monthly total returns on the Ibbotson Large Company Common Stocks Portfolio minus the Ibbotson Long-Term US Government Bonds Portfolio income yield. The CRSP equity risk premia, or the Fama-French market risk premia are the CRSP total returns on the value-weighted equity index minus the 1-month holding period return on a 1 month Treasury Bill. The estimated model is:

$R_{t+1} - R_{f,t+1} = \alpha\sigma^2_{t+1} + \varepsilon_{t+1}$ where $\alpha = -\frac{vol_t[M_{t+1}]}{E_t[M_{t+1}]} corr_t[M_{t+1}, R_{i,t+1}]$

$\sigma^2_{t+1} = \beta_0 + \beta_1\sigma^2_t + \beta_2\varepsilon^2_t + \eta_{t+1}$

The conditional distribution of the error term is the non-unitary variance T-distribution to accommodate the kurtosis of the risk premia and error term. Standard errors are in parentheses. ***, **, * denote significance at the 0.01, 0.05, and 0.10 levels, respectively for two-tail tests

utility bond yields that reflect risk. The utility stocks slope value of 2.1428 using the Fama-French risk-free rate is closer to the higher CRSP value of 3.3873 that is also based on the Fama-French risk-free rate. This is inconsistent with previous results herein and in other papers that find that Sharpe Ratios are lower for higher risk assets unless this finding can be interpreted as utility stocks having more risk than non-regulated stocks. The standard deviations on Table 1 suggest that utility stock return volatilities are as high as the stock returns of non-regulated firms. However, similar model estimates of portfolios of common stocks yield unstable results, such as negative as well as positive return-risk slopes when the intercept is not restricted to zero. See Campbell (1987), Glosten et al. (1993), Harvey (2001), and Whitelaw (1994).

Stock market results are highly sensitive to empirical model specification. Many studies do not consider the impact of a zero-intercept prior restriction on the stability of their results. This simple innovation has led to more consistent results in modeling stock market risk-return relationships, and therefore we have included it in this paper.

The estimation of the consumption asset pricing model for utility stock equity-debt risk premia shows that the use of bond-rating risk-differentiated risk premia are validated as their risk-return relationships are well-fitted by theoretical and empirical models of risk and return. Therefore, these data impound good representations of the risk and reward relationship.

One concern is the intertemporal stability of the alphas. Figure 1 plots the utility stock portfolio alpha (using the Fama-French R_f to calculate the premium) and its standard error for 240 month rolling regressions of the model estimated with GARCH-M in the same manner as described above to review the intertemporal stability of the alpha. A 20-year period was used for each estimation to trade off timeliness with sufficient observation of up and down stock market regimes and business cycles. This resulted in 720 estimated alphas from 1947 to 2007. The results show that the utility alpha is stable to the extent that the algebraic sign is always positive and generally significant, therefore the nature of utility stocks are assets that are not and have never been hedges during the second half of the twentieth century up to the present. The value of the alpha does change substantially. The mean of the alpha is 4.40 with a range from -0.11 (insignificantly different from 0) to 11.66. As a comparison, the alpha for the CRSP value-weighted stock index was also estimated with rolling regressions in the same manner and for the same time period. Figure 2 is a plot of the CRSP alpha and standard error. Note that the general stock market alpha is similar to that of utility stocks. They are all positive and almost all statistically significant and follow a strikingly similar cycle. Figure 3 plots both the utility and stock market alphas and demonstrates the similarity. The correlation coefficient between the utility and stock market alphas is 0.88. Recalling that the alpha is a Sharpe Ratio, we see that return to risk ratio does change substantially. This is consistent with the results in Pilotte and Sterbenz (2006).

One other interesting observation is that the standard errors of the alphas are highly stable over the study period and are very similar in magnitude regardless of the size of the corresponding alpha. Whereas the alpha follows a cyclical pattern, the volatility in alpha is highly stationary around a constant, long-run mean.

The GARCH-M model estimations of the consumption asset pricing model were specified with variance as the measure of volatility. We also performed the same model estimations with alternative specifications of volatility such as the standard deviation and the log of variance and the results were not sensitive to this specification.

4 Application

We apply the model in this section to compare the cost of common equity capital estimates with the DCF and CAPM models. Using EViews© Version 6.0, we estimated the model coefficients (α, $\beta's$) over rolling 24 month periods ending December 2008.

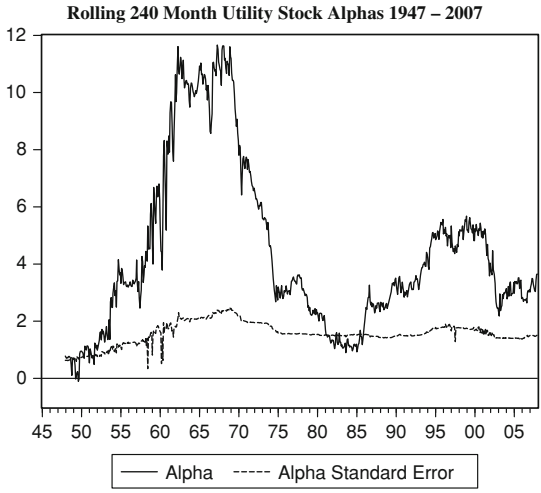


Fig. 1 Rolling 240 month utility stock alphas 1947–2007

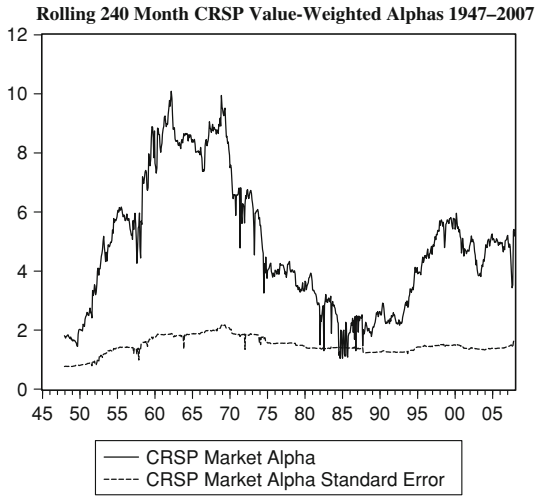


Fig. 2 Rolling 240 month CRSP value-weighted alphas 1947–2007

We repeated the estimation over 5, 10, 15, 20 and 79 year periods.[3] Predicted monthly variances (σ^2_{t+1}) were generated from these estimations to produce predicted risk premiums that were calculated by multiplying the predicted variance by the "α" slope

[3] We did not include the results of the 10 and 15 year estimations to abbreviate the amount of empirical results presented since they added no material insights beyond those already presented.

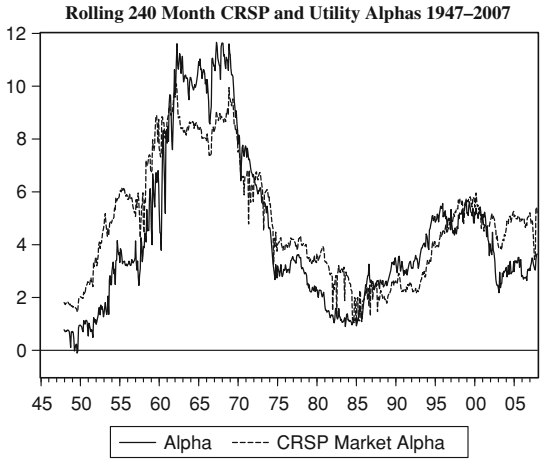


Fig. 3 Rolling 240 month CRSP and utility alphas 1947–2007

Table 3 Estimates of expected risk premia

	Mean (%)		Range (%)		Standard deviation (%)	
	Average	Spot	Average	Spot	Average	Spot
Ibbotson Associates data						
79-years	9.59	5.76	8.74–9.96	2.62–22.60	0.32	5.24
20-years	6.77	6.94	4.99–8.50	2.24–28.95	0.95	6.88
5-years	4.20	10.25	−98.49–11.62	−100.00–39.65	22.00	26.61
S&P Utility Index						
79-years	5.28	2.90	4.30–5.28	1.65–8.15	0.32	1.60
20-years	3.93	3.51	2.78–5.03	2.18–6.88	0.57	1.11
5-years	31.82	326.63	7.77–156.97	6.12–6465.74	31.47	1283.51

coefficient. To test the stability of the predicted risk premia over time, the predicted risk premia were calculated using either the predicted variance over each entire time period or the last monthly (spot) predicted variance. Table 3 presents the mean predicted risk premia, the range of predicted premia and the standard deviations for each time period. It is clear from the results that the risk premia are more stable over the rolling 24 month period when calculated using the average predicted variance compared with using the spot variance. Secondly, the 20 and 79 year means are substantially more stable and reasonable in magnitude than the 5 year means.

Next, given the lessons from the analyses above, we apply the model to mechanically[4] estimate the cost of common equity for 8 utility companies using the model and

[4] The term "mechanically" in this context means that the resulting values have been developed in a consistent manner with the same inputs across all utility stocks but no subjective judgment was used to develop final values for each specific utility stock application.

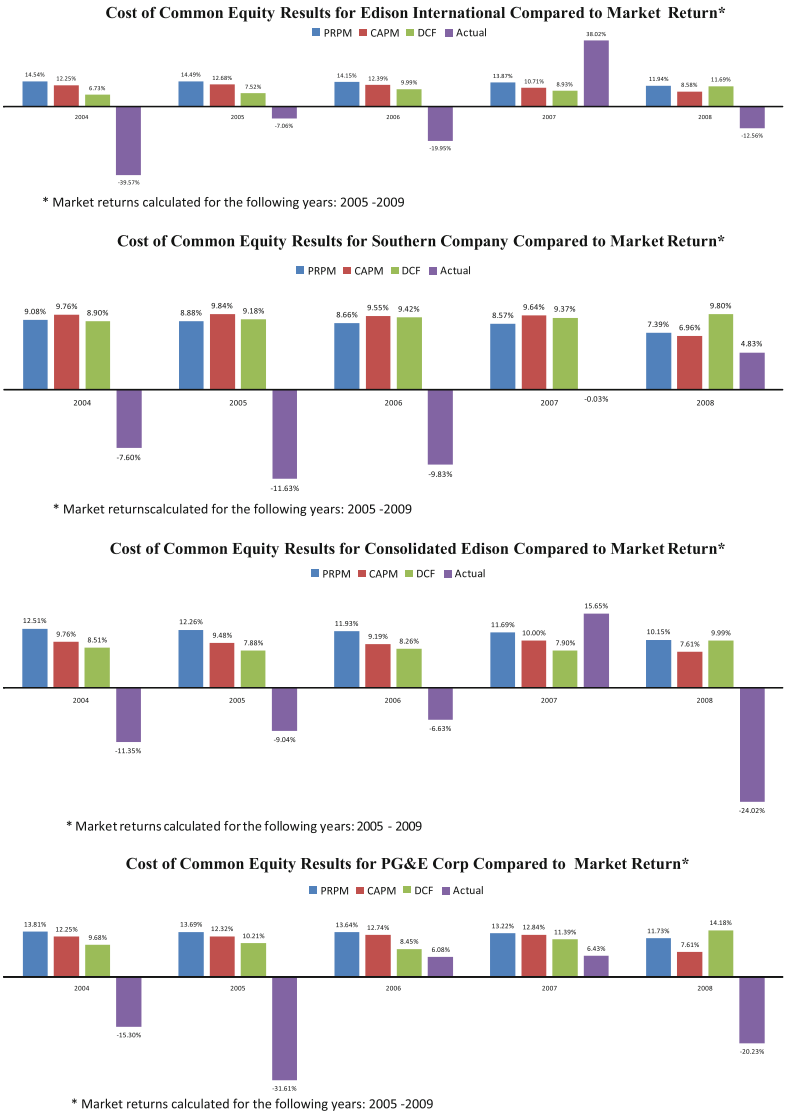
the DCF and CAPM as comparisons. We also calculated the realized market return for comparison. Two publicly-traded electric, electric and gas combination, gas, and water utilities respectively were chosen for the application. The Gordon (1974) DCF and CAPM models are used in many utility regulatory jurisdictions in the US.

The DCF was applied using a dividend yield, D_0/P_0, derived by dividing the year-end indicated dividend per share (D_0) by the year-end spot market price (P_0). The dividend yield is grown by the year-end I/B/E/S five year projected earnings per share growth rate (g) to derive $D_0(1+g)/P_0$. The one-year predicted dividend yield is then added to the I/B/E/S five-year projected EPS growth rate to obtain the DCF estimate of the cost of common equity capital, k. This study was conducted for the 5 years ending 2008.

The CAPM was applied by multiplying the Value Line beta (β) available at year-end for each company by the long-term historic arithmetic mean market risk premium ($R_m - R_f$). $R_m - R_f$ is derived as the spread of the total return of large company common stocks over the income return on long-term government bonds from the Ibbotson SBBI 2009 Valuation Yearbook. The resulting company-specific market equity risk premium is then added to a projected consensus estimate of the yield on 30-year U.S. Treasury rate provided by Blue Chip Financial Forecasts as the risk-free rate (R_f) to obtain the CAPM result. This study was also conducted over the 5 years ending 2008.

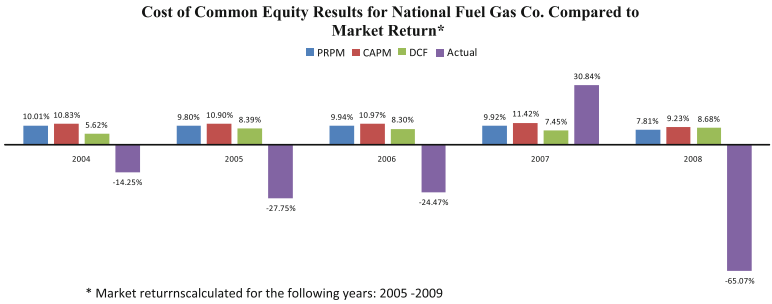
Figures 4–11 show the histograms of the cost of common equity capital estimations for each of the eight public utility stocks and the realized market returns in the forthcoming year. The consumption asset pricing model appears to track more consistently with the CAPM than with the DCF which seems to produce generally lower values than the other methods. The consumption asset pricing model results are similar to the CAPM. The model and the CAPM compete as the best predictor of the rate of return on the book value of common equity (not shown but available upon request), but none of the expected returns were good predictors of market returns. That does not infer that they were not good predictors of *expected* market returns. These results are an initial indicator that the consumption asset pricing model provides reasonable and stable results. This paper does not suggest at this early juncture that the consumption asset pricing model is superior to the CAPM or DCF, although it is based on far less restrictive assumptions than these other models. For example, both the DCF and CAPM assume that markets are efficient. Many assume that the DCF requires that the market-to-book ratio to always equal one, whereas the long-term value for the Standard and Poor's 500 is equal to 2.34. The CAPM assumes that investors demand higher returns for higher volatility and that the minimum required return is the risk-free rate, whereas the consumption asset pricing model allows for investors to require returns less than the risk-free rate for stocks that may have relatively higher volatility but are hedging assets that have desirable return fluctuation patterns that offset downturns in the business cycle. Unlike the CAPM, the model prices the risk to which investors are actually exposed, whether it's systematic risk or not. Some investors are diversified and some are not; the model prices whatever risk to which the aggregate of investors of the specific stock is exposed.

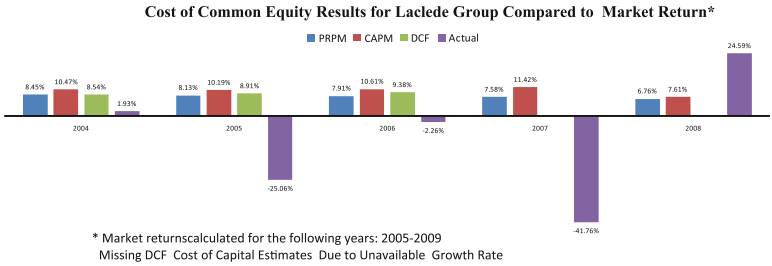
We find that the consumption asset pricing model should be used in combination with other cost of common equity pricing models as additional information in the devel-

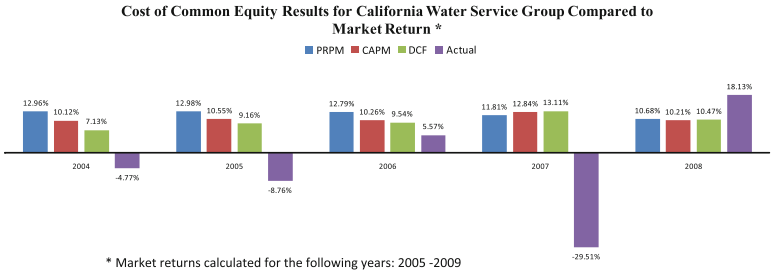


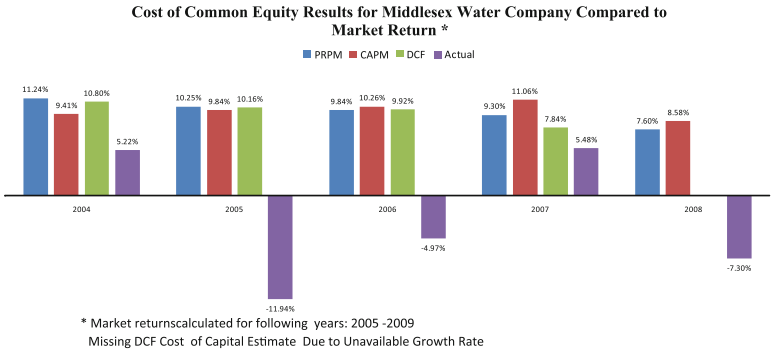
Figs. 4–11 Comparison of the cost of common equity estimates and market

opment of a cost of common equity capital recommendation. Practitioners may find the modeling methods and the use of relatively advanced econometric methods rather cumbersome. The software for performing these estimations is readily available from EViews© and SAS©; two commonly available software packages at utilities, consult-









Figs. 4–11 continued

ing firms and financial firms. Recent Ph.D. and M.S. holding members of research departments of investment and consulting firms have ready access to the model and methods discussed in this paper, although it will require years for these tools, like any "new" technology, to diffuse into standard use. Another problem is that the model requires a substantial time series history on stock returns data to develop stable estimates of risk premia This is problematic especially for the electric and gas utility industries that have consolidated with many mergers in the recent past. This problem can be addressed by developing and predicting the value-weighted risk premium of a portfolio of similar stocks such as electric utilities that have nuclear generating assets. The specific stock in question would be included in the returns index with a weight based on market capitalization that would go to 0 when the stock price history is no longer existent reaching back into the past.

5 Conclusion

The purpose of this paper is to introduce, test empirically and apply a general consumption based asset pricing model that is based on a minimum of assumptions and restrictions that can be used to predict the risk premium to be applied in estimating the cost of common equity for public utilities in regulatory proceedings. The results support the simple consumption-based asset pricing model that predicts the ex ante risk premium with a conditionally predicted volatility in risk premium. The estimates of the cost of common equity from the consumption asset pricing model compare well with rates of return on the book value of common equity and with the CAPM, although both the model and the CAPM results are substantially higher than the DCF. This is quite common in the practice of the cost of common equity in the utility industry. The results of the model are stable and consistent over time. Therefore the model should be considered as it provides additional evidence on the cost of common equity in general and specifically in public utility regulatory proceedings. Secondly, the use of bond-rated yields to predict risk differentiated equity-to-debt risk premia is supported by the empirical evidence and therefore should be applied in estimating the cost of common equity. Finally, the robust empirical evidence on the positive risk-return relationship also shows that utility stocks are not a consumption hedge and are not good hedging securities against contractions in the economy. The model and estimation methodology presented in this paper provide a relatively simple tool to determine whether any asset is a hedge to adverse changes in the business cycle through the level of consumption in the economy.

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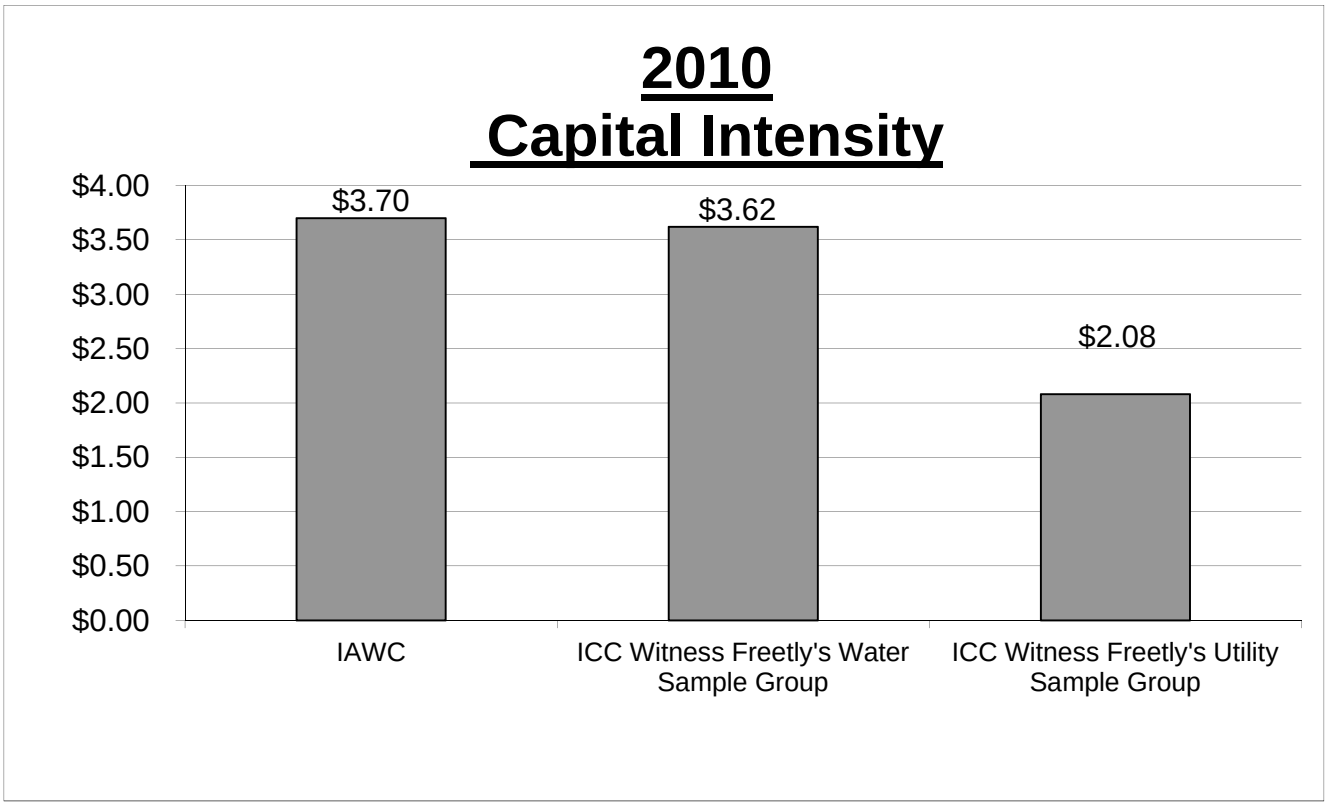
Illinois American Water Company
2010 Capital Intensity of Illinois American Water Company and
AUS Utility Reports Utility Companies Industry Averages

	Average Net Plant ($ mill)	Average Operating Revenue ($ mill)	Capital Intensity ($)	Capital Intensity of IAWC v. Other Industries (times)
Illinois American Water Company	$ 840.26	$ 227.00	$ 3.70	- -
ICC Witness Freetly's Water Sample Group	$ 960.88	$ 265.49	$ 3.62	102.21%
ICC Witness Freetly's Utility Sample Group	$ 12,592.09	$ 6,055.38	$ 2.08	177.88%



Notes:
Capital Intensity is equal to Net Plant divided by Total Operating Revenue.

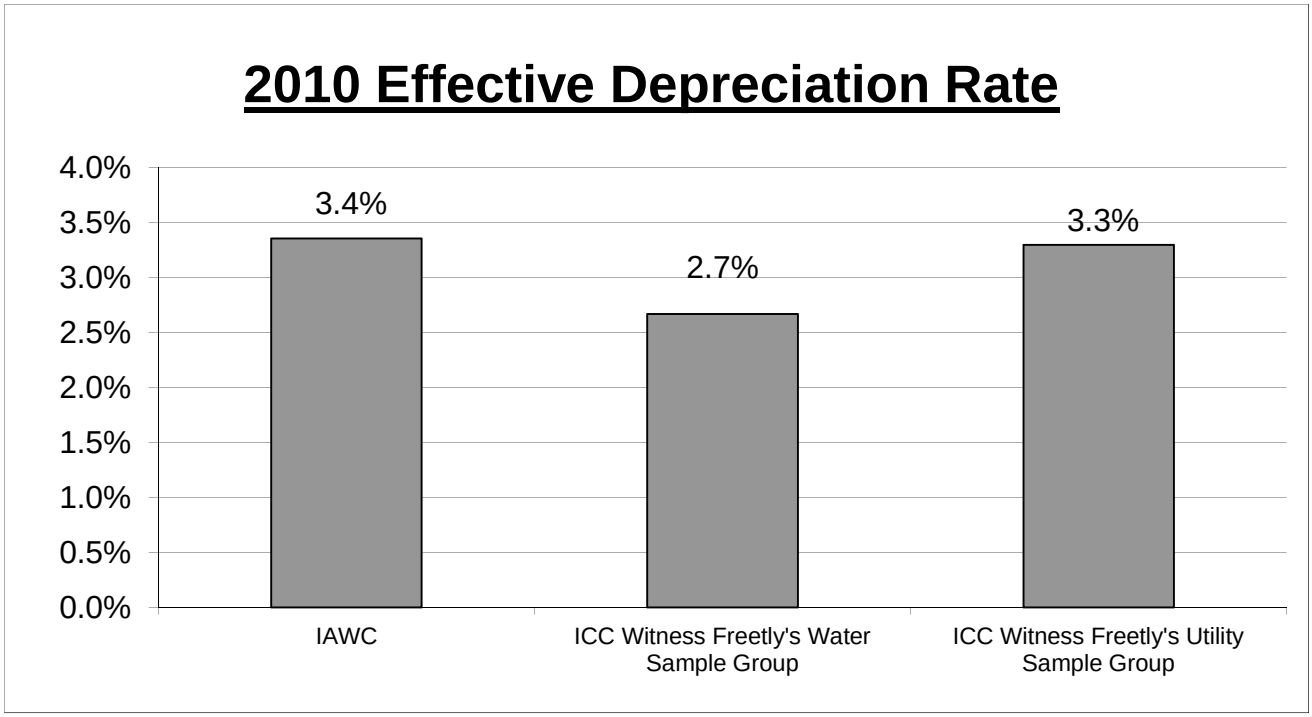
Source of Information:
EDGAR Online's I-Metrix Database
Company Annual Forms 10-K

AUS Utility Reports - May 2011
Published By AUS Consultants

Company Provided Information

Illinois American Water Company
2010 Depreciation Rate of Illinois American Water Company and
AUS Utility Reports Utility Companies Industry Averages

	Depreciation Depletion & Amort. Expense ($ mill)	Average Total Gross Plant Less CWIP ($ mill)	Depreciation Rate (%)	Depreciation Rate of IAWC v. Other Industries (times)
Illinois American Water Company	$ 42.01	$ 1,252.08	3.4%	- -
ICC Witness Freetly's Water Sample Group	$ 32.81	$ 1,229.88	2.7%	125.93%
ICC Witness Freetly's Utility Sample Group	$ 556.45	$ 16,878.76	3.3%	103.03%



Notes:
Effective Depreciation Rate is equal to Depreciation, Depletion and Amortization Expense divided by average beginning and ending year's Gross Plant minus Construction Work in Progress.

Source of Information:
EDGAR Online's I-Metrix Database
Company Annual Forms 10-K

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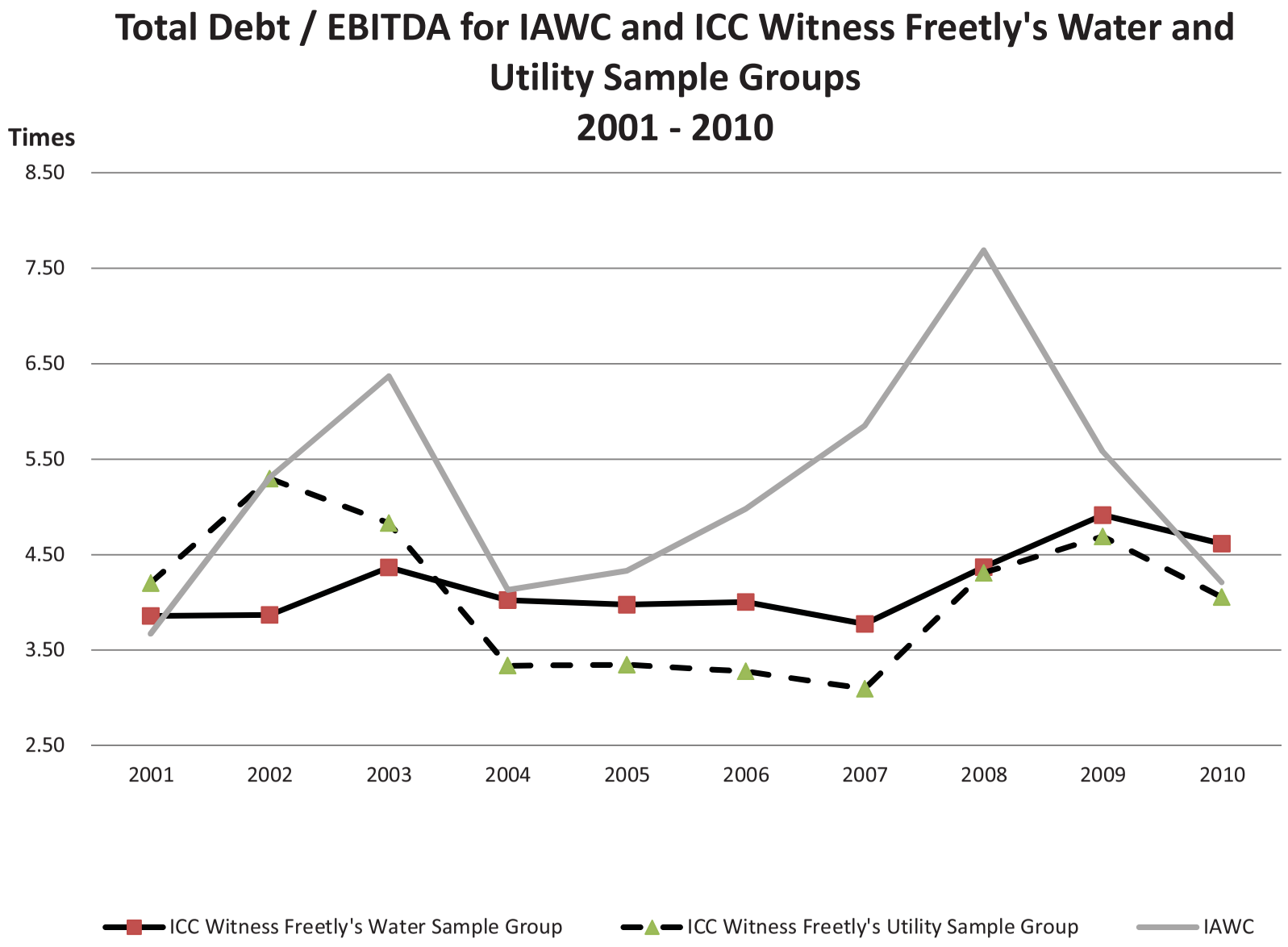
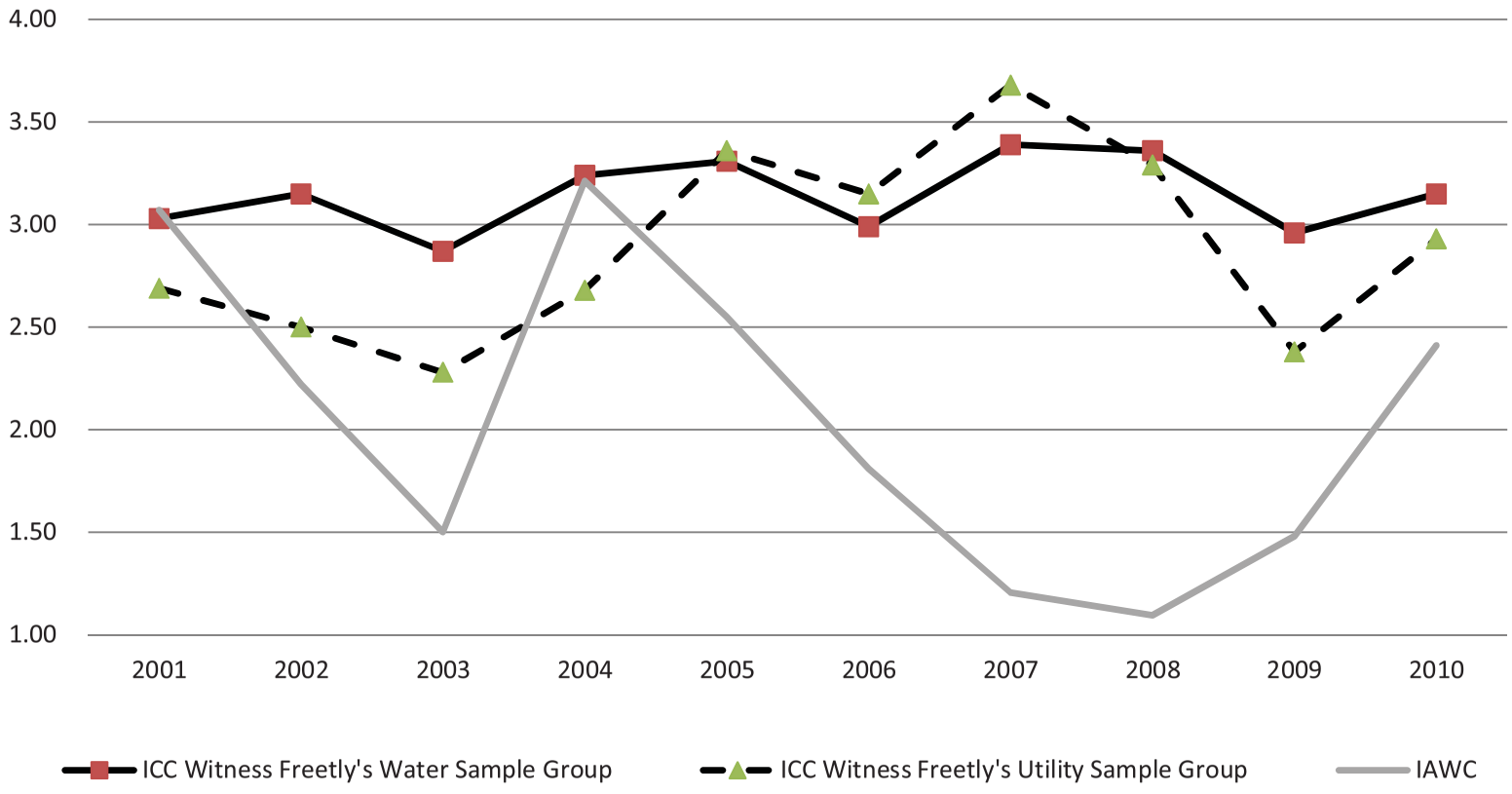
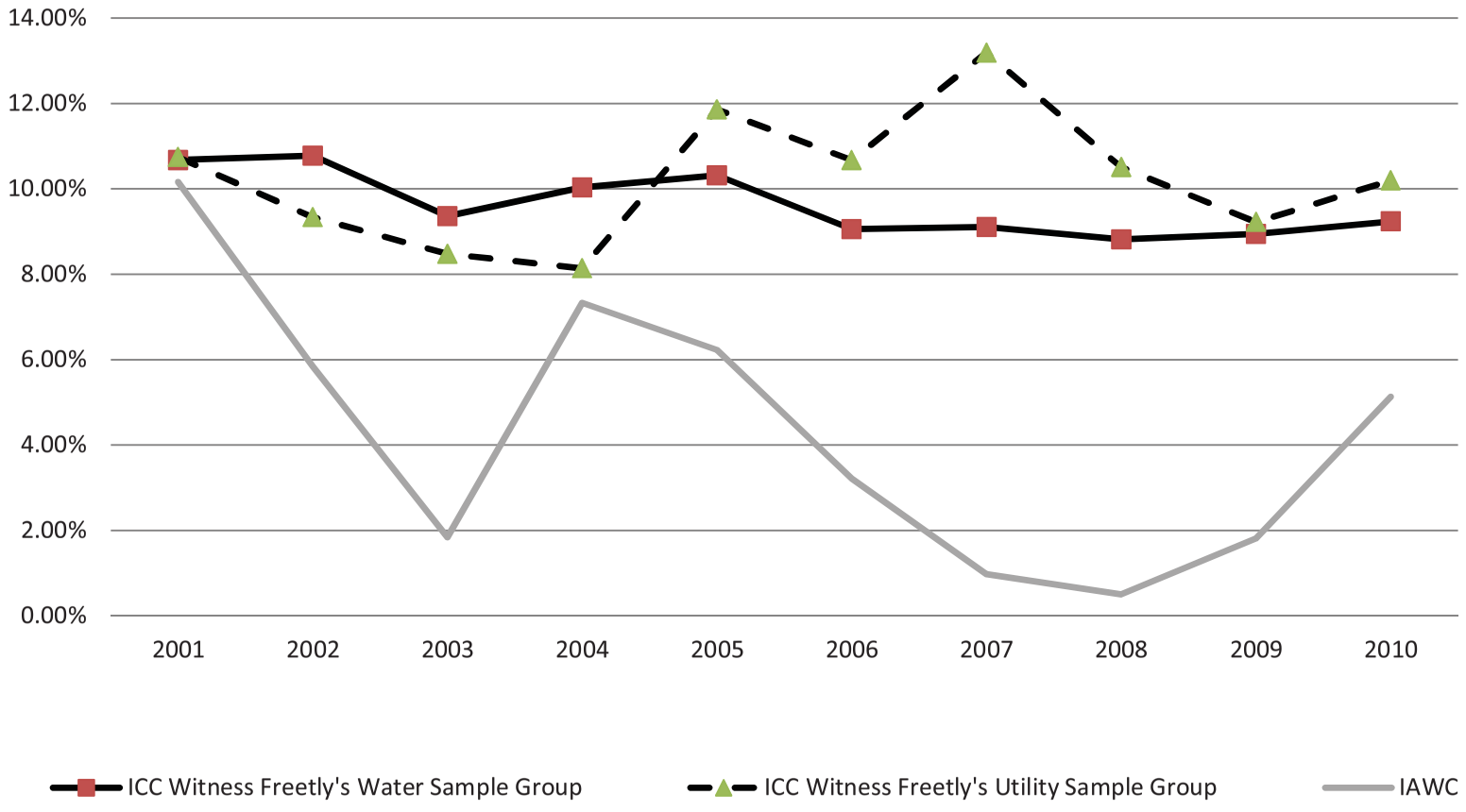

Total Debt / EBITDA for IAWC and ICC Witness Freetly's Water and Utility Sample Groups
2001 - 2010
Times
8.50
7.50
6.50
5.50
4.50
3.50
2.50
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
ICC Witness Freetly's Water Sample Group
ICC Witness Freetly's Utility Sample Group
IAWC

Before-Inc. Tax / Interest Cov. for IAWC and ICC Witness Freetly's Water and Utility Sample Groups 2001 - 2010



Earned Returns on Common Equity for IAWC and ICC Witness Freetly's Water and Utility Sample Groups 2001 - 2010



Illinois-American Water Company
Gross Domestic Product - Value Added by Industry

Industry Title	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Change 2009 - 2010	Change 2001 - 2010
Value added (Millions of dollars)												
Gross domestic product	10,286,167	10,642,316	11,142,143	11,867,800	12,638,400	13,398,900	14,061,800	14,369,100	14,119,000	14,660,400	3.83%	4.73%
Private industries	9,010,772	9,289,346	9,706,821	10,360,100	11,052,500	11,731,100	12,301,900	12,514,000	12,196,500	12,696,500	4.10%	4.54%
Agriculture, forestry, fishing, and hunting	98,554	94,405	115,556	142,700	127,100	122,500	144,700	160,100	133,100	154,100	15.78%	6.26%
Farms	76,214	72,304	92,412	118,300	102,000	93,100	114,900	131,100	104,000	...		
Forestry, fishing, and related activities	22,340	22,101	23,144	24,500	25,100	29,400	29,800	29,000	29,200	...		
Mining	119,296	109,462	134,761	159,300	192,000	229,000	254,200	317,100	240,800	281,400	16.86%	15.10%
Oil and gas extraction	72,914	66,598	89,248	106,600	128,600	147,800	162,900	210,800	141,700	...		
Mining, except oil and gas	27,567	27,552	27,988	31,000	36,300	40,700	41,900	47,900	48,900	...		
Support activities for mining	18,815	15,312	17,525	21,700	27,200	40,500	49,400	58,400	50,200	...		
Utilities	177,579	180,973	191,852	208,000	205,700	236,200	248,800	262,600	268,100	275,700	2.83%	6.14%
Construction	490,525	494,328	515,929	554,400	611,700	651,100	657,200	623,400	537,500	505,600	-5.93%	0.34%
Manufacturing	1,343,930	1,355,537	1,374,012	1,482,700	1,568,000	1,651,500	1,698,900	1,647,600	1,584,800	1,717,500	8.37%	3.09%
Durable goods	758,754	767,751	766,154	822,000	877,600	923,100	942,800	927,300	867,200	961,200	10.84%	2.96%
Wood products	27,541	27,277	28,277	31,700	33,000	30,200	28,200	25,100	20,900	...		
Nonmetallic mineral products	40,714	41,446	40,479	42,700	45,300	45,400	44,400	39,400	38,200	...		
Primary metals	39,551	41,352	37,811	52,200	53,700	59,700	59,000	61,500	43,400	...		
Fabricated metal products	110,035	105,210	104,332	112,700	120,400	125,600	134,300	135,100	121,900	...		
Machinery	103,119	95,897	92,849	100,400	109,500	116,600	125,300	125,300	112,700	...		
Computer and electronic products	128,239	132,573	136,948	159,600	183,300	200,000	196,400	204,100	206,400	...		
Electrical equipment, appliances, and components	42,970	42,568	42,465	38,900	39,900	45,600	45,800	50,600	51,700	...		
Motor vehicles, bodies and trailers, and parts	107,684	121,309	125,550	117,600	112,600	107,600	103,400	81,100	78,200	...		
Other transportation equipment	69,575	67,349	65,092	67,200	76,000	81,500	92,400	95,700	90,700	...		
Furniture and related products	31,744	31,280	30,334	31,100	34,300	36,600	34,700	28,800	24,200	...		
Miscellaneous manufacturing	57,583	61,489	62,016	67,900	69,600	74,500	78,800	80,600	79,000	...		
Nondurable goods	585,176	587,786	607,858	660,600	690,400	728,400	756,100	720,300	717,600	756,300	5.39%	3.25%
Food and beverage and tobacco products	173,463	176,942	174,005	168,900	172,100	181,400	179,900	181,200	206,100	...		
Textile mills and textile product mills	25,282	24,094	19,410	26,800	23,500	21,200	21,700	22,400	17,600	...		
Apparel and leather and allied products	18,953	18,269	16,414	16,400	16,000	15,500	14,900	13,500	11,700	...		
Paper products	53,722	53,531	49,844	54,200	53,800	59,300	58,600	53,800	56,100	...		
Printing and related support activities	38,890	37,437	36,753	37,000	37,500	37,900	38,500	37,000	32,800	...		
Petroleum and coal products	59,698	44,927	77,499	106,300	139,300	140,000	149,700	151,900	120,000	...		
Chemical products	153,163	169,567	171,402	186,800	182,700	207,900	223,200	201,100	216,500	...		
Plastics and rubber products	62,005	63,018	62,532	64,300	65,600	65,100	69,500	59,400	56,700	...		
Wholesale trade	613,304	614,892	638,065	684,500	725,300	769,600	813,300	822,900	780,800	807,700	3.45%	3.52%
Retail trade	703,893	731,156	768,924	794,700	838,800	875,000	886,100	840,200	819,600	862,800	5.27%	2.51%
Transportation and warehousing	302,591	302,405	319,754	347,000	369,700	395,500	405,400	418,700	389,500	406,500	4.36%	3.82%
Air transportation	45,195	46,796	53,231	56,100	55,700	59,700	60,200	61,000	61,900	...		
Rail transportation	22,576	21,740	23,121	24,300	27,000	30,600	31,700	34,800	30,800	...		
Water transportation	8,233	7,409	8,336	8,700	9,300	12,400	13,500	14,800	14,300	...		
Truck transportation	97,801	97,196	101,997	110,200	118,900	125,300	127,000	124,700	113,100	...		
Transit and ground passenger transportation	18,447	19,198	19,641	20,900	21,200	22,600	24,000	23,400	23,400	...		
Pipeline transportation	14,700	10,340	10,227	11,500	10,400	11,300	12,400	16,200	12,000	...		
Other transportation and support activities	70,335	73,383	75,986	83,900	91,900	96,400	96,500	102,000	94,700	...		
Warehousing and storage	25,303	26,343	27,214	31,400	35,300	37,200	40,000	41,700	39,400	...		
Information	451,078	499,693	508,606	564,100	592,600	593,300	633,300	652,500	639,300	670,300	4.85%	5.40%
Publishing industries (includes software)	100,072	121,772	127,979	140,800	151,200	133,900	151,200	155,400	147,700	...		
Motion picture and sound recording industries	47,504	51,613	48,164	56,300	56,300	59,600	62,700	61,000	59,800	...		
Broadcasting and telecommunications	267,286	267,916	268,631	289,000	311,400	317,600	347,700	359,100	355,800	...		
Information and data processing services	36,215	58,393	63,831	78,000	73,600	82,100	71,700	77,000	76,000	...		
Finance, insurance, real estate, rental, and leasing	2,154,790	2,222,273	2,316,138	2,409,700	2,606,500	2,777,600	2,891,300	2,974,900	3,040,300	3,093,700	1.76%	4.84%
Finance and insurance	838,678	863,537	903,149	929,200	1,028,500	1,105,500	1,110,400	1,100,400	1,171,600	1,235,200	5.43%	5.25%
Federal Reserve banks, credit intermediation, and related activities	376,573	436,009	461,626	433,300	470,700	483,500	476,900	514,300	514,000	...		
Securities, commodity contracts, and investments	178,174	153,512	139,840	144,000	183,000	214,500	199,700	188,900	175,200	...		
Insurance carriers and related activities	260,391	248,565	272,985	319,600	337,500	367,400	392,400	350,900	424,500	...		
Funds, trusts, and other financial vehicles	23,540	25,451	28,697	32,400	37,300	40,200	41,500	46,300	57,800	...		
Real estate and rental and leasing	1,316,113	1,358,736	1,412,989	1,480,400	1,577,900	1,672,100	1,780,800	1,874,500	1,868,700	1,858,500	-0.55%	4.58%
Real estate	1,163,925	1,210,895	1,267,747	1,337,600	1,424,900	1,488,600	1,595,100	1,688,900	1,686,500	...		
Rental and leasing services and lessors of intangible assets	152,188	147,841	145,242	142,800	153,100	183,400	185,700	185,500	182,100	...		

Illinois-American Water Company
Gross Domestic Product - Value Added by Industry

Industry Title	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Change 2009 - 2010	Change 2001 - 2010
Professional and business services	1,170,671	1,198,309	1,259,374	1,346,800	1,461,800	1,571,400	1,700,500	1,768,800	1,701,300	1,771,900	4.15%	5.71%
Professional, scientific, and technical services	701,126	718,942	745,479	810,500	875,600	952,200	1,028,700	1,093,600	1,068,500	1,103,900	3.31%	6.38%
Legal services	147,957	153,874	163,531	180,700	194,500	201,900	215,300	225,600	219,200	...		
Computer systems design and related services	116,245	109,835	109,653	117,700	129,300	144,300	160,900	170,600	169,600	...		
Miscellaneous professional, scientific, and technical services	436,924	455,234	472,295	512,100	551,800	606,000	652,500	697,400	679,700	...		
Management of companies and enterprises	174,551	178,324	192,219	203,100	217,700	234,300	257,300	260,100	246,500	256,300	3.98%	5.20%
Administrative and waste management services	294,995	301,044	321,676	333,200	368,500	385,000	414,500	415,100	386,300	411,800	6.60%	4.40%
Administrative and support services	266,163	270,403	287,870	299,000	331,300	350,400	375,700	374,100	347,600	...		
Waste management and remediation services	28,831	30,641	33,806	34,300	37,200	34,600	38,800	40,900	38,700	...		
Educational services, health care, and social assistance	729,193	789,798	847,263	906,400	953,400	1,015,200	1,078,300	1,148,900	1,212,900	1,274,400	5.07%	8.31%
Educational services	88,692	98,855	106,063	116,000	120,100	128,700	137,300	147,000	154,900	162,600	4.97%	9.26%
Health care and social assistance	640,500	690,943	741,200	790,400	833,300	886,500	941,000	1,001,900	1,057,900	1,111,700	5.09%	8.17%
Ambulatory health care services	313,504	335,271	357,840	381,400	406,100	432,300	458,200	486,100	514,200	...		
Hospitals and nursing and residential care facilities	272,008	296,068	318,996	341,200	354,400	377,700	400,000	428,800	452,700	...		
Social assistance	54,989	59,605	64,363	67,800	72,800	76,400	82,900	87,000	91,000	...		
Arts, entertainment, recreation, accommodation, and food services	391,174	411,149	426,918	456,700	481,600	511,300	545,200	535,400	513,100	531,100	3.51%	3.97%
Arts, entertainment, and recreation	94,816	102,140	105,752	113,300	117,300	126,600	134,400	135,200	127,300	131,200	3.06%	4.26%
Performing arts, spectator sports, museums, and related activities	49,826	55,338	59,005	62,200	63,800	68,100	72,400	73,200	70,900	...		
Amusements, gambling, and recreation industries	44,990	46,802	46,747	51,100	53,500	58,400	62,000	62,000	56,400	...		
Accommodation and food services	296,358	309,010	321,166	343,400	364,300	384,700	410,800	400,200	385,800	399,900	3.65%	3.88%
Accommodation	91,314	92,764	93,791	100,600	108,700	113,600	123,200	118,100	108,700	...		
Food services and drinking places	205,044	216,246	227,376	242,800	255,600	271,100	287,600	282,100	277,100	...		
Other services, except government	264,193	284,966	289,672	303,000	318,500	332,000	344,600	340,900	335,400	343,800	2.50%	3.35%
Government	1,275,395	1,352,970	1,435,322	1,507,700	1,585,900	1,667,800	1,759,900	1,855,100	1,922,500	1,963,900	2.15%	6.00%
Federal	385,084	416,585	447,295	478,400	501,800	526,500	552,300	580,200	611,500	637,700	4.28%	7.29%
General government	324,936	351,840	382,921	412,000	438,700	460,600	486,000	517,100	551,700	...		
Government enterprises	60,148	64,745	64,374	66,400	63,100	65,900	66,200	63,100	59,900	...		
State and local	890,311	936,385	988,027	1,029,300	1,084,100	1,141,300	1,207,600	1,274,900	1,311,000	1,326,100	1.15%	5.44%
General government	814,699	859,593	909,258	947,300	997,700	1,051,300	1,118,600	1,180,500	1,208,500	...		
Government enterprises	75,612	76,792	78,769	81,900	86,400	90,000	89,100	94,400	102,500	...		
Addenda:												
Private goods-producing industries[2]	2,052,305	2,053,732	2,140,258	2,339,200	2,498,800	2,654,100	2,755,000	2,748,200	2,496,300	2,658,600	6.50%	3.28%
Private services-producing industries[3]	6,958,467	7,235,615	7,566,564	8,020,900	8,553,700	9,077,000	9,546,900	9,765,800	9,700,300	10,038,000	3.48%	4.92%
Information-communications-technology-producing industries[4]	380,771	422,572	438,412	496,200	537,400	560,300	580,200	607,100	599,800	684,100	14.05%	8.85%