AQUA EXHIBIT 6.2

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of	)	
Aqua Ohio, Inc. to Increase Its Rates and	)	Case No. 13-2124-WW-AIR
Charges for Its Waterworks Service.	)	

REBUTTAL TESTIMONY
OF
PAULINE M. AHERN
ON BEHALF OF
AQUA OHIO, INC.

___ Management policies, practice and organization

___ Operating income

___ Rate base

___ Allocations

_X_ Rate of return

___ Rates and tariffs

___ Other

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Rebuttal Testimony of
Pauline M. Ahern

I. INTRODUCTION

Q1. PLEASE STATE YOUR NAME, OCCUPATION AND BUSINESS ADDRESS.

A. My name is Pauline M. Ahern. I am Managing Principal of AUS Consultants. My business address is 155 Gaither Drive, Suite A, Mt. Laurel, New Jersey 08054.

Q2. ARE YOU THE SAME PAULINE M. AHERN WHO PREVIOUSLY SUBMITTED PREPARED DIRECT AND SUPPLEMENTAL TESTIMONIES IN THIS PROCEEDING?

A. Yes, I am.

Q3. HAVE YOU PREPARED SCHEDULES THAT SUPPORT YOUR REBUTTAL TESTIMONY?

A. Yes. They are attached to my testimony as Schedules PMA-R1 through PMA-R5. Unless otherwise noted, all Schedules referenced in this Rebuttal Testimony will be from this Exhibit.

II. PURPOSE

Q4. WHAT IS THE PURPOSE OF THIS TESTIMONY?

A. The purpose of this testimony is to comment upon the Testimony in Opposition to the Stipulation and Recommendation of Daniel A. Duann, Ph. D. on behalf of The Office of the Ohio Consumers' Counsel (OCC) concerning rate of return. Specifically, I will show that, contrary to OCC's assertions, the stipulated return on common equity (ROE) is just, reasonable, in the public interest and consistent with regulatory principles and practices, being the result of arm's length negotiations between Aqua Ohio, Inc. (Aqua Ohio or the Company) and the Staff of the Public Utilities Commission of Ohio (the Commission). I will also address Dr. Duann's assertion that the stipulated ROE of 9.8% far exceeds "what would be considered just and reasonable" (page 5, lines 4 - 5 of Dr. Duann's testimony). In doing so, I will address Dr. Duann's recommended 9.28% ROE based upon his disagreement with Staff's proposed risk-free rate. Finally, I will address Dr. Duann's claim that Aqua Ohio's current position is that the risk-free rate is 6.75% as it is a mischaracterization of my supplemental testimony. In the course of this rebuttal testimony, I will demonstrate that the stipulated ROE of 9.8% is indeed consistent, if not conservative, relative to current and *expected* capital market conditions and the ROEs expected to be earned by the water utilities in both Staff's and my proxy groups.

III. BENEFITS AND PUBLIC INTEREST

Q5. IN YOUR OPINION, IS THE STIPULATED ROE OF 9.8%, AGREED UPON BY AQUA OHIO AND THE STAFF, JUST AND REASONABLE?

A. Yes. The stipulated ROE of 9.8% benefits customers and advances the public interest. Although, in my opinion, this ROE may not represent the market-based investor required return as demonstrated in my direct testimony, it is nevertheless a lower ROE and one that the Company has agreed to. By signing the Stipulation, the Company is stating that it will be able to maintain safe and reliable water service to its customers even given the lower ROE. While I believe that a higher ROE was justified, the lower ROE agreed to in the Stipulation accordingly benefits both the Company and its customers.

In my opinion, the Stipulation, including the stipulated 9.8% ROE, satisfies the second prong of the Commission's three-part test and benefits customers and is in the public interest. Moreover, as will be demonstrated below, the stipulated 9.8% ROE is also consistent with the third prong, and does not violate any important regulatory principle or practice.

IV. JUSTNESS AND REASONABLENESS OF THE STIPULATED ROE

Q6. DR. DUANN STATES ON PAGE 5, LINES 4 – 5 OF HIS TESTIMONY THAT THE STIPULATED ROE OF 9.8% FAR EXCEEDS "WHAT WOULD BE CONSIDERED JUST AND REASONABLE." PLEASE COMMENT.

A. Dr. Duann is incorrect. A fair (or just) and reasonable return must be consistent with the mandates of *Hope* and *Bluefield*[1] regarding the maintenance of the financial integrity of presently invested capital and the attraction of needed new capital. A fair and reasonable return must also be consistent with and reflect current capital market conditions as well as current investor expectations. To maintain existing capital and to attract new capital, the authorized rate of return on common equity must be sufficient to meet investors' requirements. In my opinion, the stipulated ROE of 9.8% is just and reasonable satisfying the Commission's third prong. Also, in my opinion, when compared with the market-based investor required return developed in my direct testimony of 10.7% and the Company's originally requested 10.3%, a 9.8% ROE is not only reasonable, it is extremely conservative, which both benefits customers and is in the public interest. In contrast, the 9.28% recommended ROE of Dr. Duann violates the *Hope* and *Bluefield* mandates, is neither consistent with nor reflective of current capital market conditions and investor expectations, and is grossly inadequate. His recommendation fails this test due, in part, to the error he has made in his "correction" of Staff's ROE analysis as contained in the Staff Report.

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1 *Federal Power Commission v. Hope Natural Gas Co.*, 320 U.S. 591 (1944); *Bluefield Water Works Improvement Co. v. Public Serv. Comm'n*, 262 U.S. 679 (1922).

Q7. HOW DO BOTH THE STIPULATED ROE OF 9.8% AND DR. DUANN'S RECOMMENDED 9.28% ROE COMPARE WITH THE EXPECTED ROES OF WATER UTILITIES?

A. The cost of capital, as well as ratemaking, is prospective. The cost of capital, including the cost of common equity, is prospective as it is based upon investors' collective perception of *expected* risk, as measured by the investor required *expected* rate of return, including common equity. Ratemaking is prospective because rates set in this proceeding will be collected in the future. Therefore, it is appropriate to compare the stipulated 9.8% and Dr. Duann's recommended 9.28% ROEs with those *expected* for water utilities of similar risk consistent with the corresponding risk standard of *Hope* and *Bluefield*. Dr. Duann agrees with this standard when he quotes *Bluefield* at lines 13 – 18 on page 11 of his testimony:

> "A public utility is entitled to such a rate as will permit it to earn a return on the value of the property which it employs for the convenience of the public **equal to that generally made at the same time and in the same general part of the country** on investments in other business undertakings which are attended by corresponding risks and uncertainties (emphasis added)"

Both Staff and I chose proxy groups of water utilities in our respective ROE analyses. I chose a group of nine water companies while Staff chose a group of four water companies all of which are contained in my group. These companies are listed on page 1 of Schedule PMA-R1. As shown on page 1, *Value Line Investment Survey (Value Line)* is projecting the nine water companies in my proxy group to earn an ROE of 10.1% for 2014 and the four water companies in Staff's proxy group to earn an ROE of 10.8%. For 2017 – 2019, *Value Line* is projecting the nine water companies to earn an ROE of 10.6% and the four water companies to earn 11.8%. Note that all of these water companies are overwhelmingly invested in regulated operating water subsidiaries, as one of the selection criteria for inclusion in my nine company group was that they have 70%

or greater of 2012 total operating income derived from and 70% or greater of 2012 total assets devoted to regulated water operations. Hence, *Value Line's* projected ROEs are based primarily and significantly on currently and expected regulatory authorized ROEs for water utilities. As such, the stipulated ROE of 9.8% is closer to *Value Line's* projections (being nearly identical to its 2014 projection of 10.1% for the entire group) than to Dr. Duann's recommended ROE of 9.28%. Indeed, it is clearly *Dr. Duann's* 9.28% recommended ROE that violates the "long-standing regulatory principle that a reasonable rate of return shall be based on the returns earned by comparable companies at the same time and in the same general part of the country" (line 9 – 1 on page 11 of his testimony) and not the 9.8% stipulated ROE.

In view of all of the foregoing, the stipulated ROE is just, reasonable, benefits customers, and is in the public interest.

V. DR. DUANN'S CONCERN WITH STAFF'S CAPITAL ASSET PRICING MODEL

Q8. DR. DUANN STATES THAT THE STIPULATED 9.8% IS CLEARLY THE MID-POINT OF STAFF'S PROPOSED RANGE (9.29% - 10.31%) AT LINES 7 – 8 ON PAGE 7 OF HIS TESTIMONY. PLEASE COMMENT.

A. While the stipulated 9.8% appears to be the midpoint of Staff's proposed range of recommended ROE of 9.29% - 10.31%, the Stipulation states otherwise. The Stipulation states on page 5, Item 9 that:

> "This Stipulation is entered into as an overall compromise and resolution of all issues presented in this proceeding, and does not necessarily represent the position any Signatory Party would have taken absent its execution."

I question his assumption that the 9.8% ROE was intended to represent a specific judgment on ROE, as opposed to (for example) being a compromise that coincidentally fell on the midpoint. Thus, even if Dr. Duann could justify an adjustment to Staff's

CAPM analysis, it would not follow that the stipulated ROE required an adjustment. Nevertheless, I will show that Dr. Duann's critique of the CAPM analysis is flawed.

Q9. WHAT IS DR. DUANN'S CONCERN WITH STAFF'S CAPM ANALYSIS?

A. Dr. Duann disagrees with Staff's risk-free rate of 5.86% for four reasons: (1) it "is inconsistent with the long-established methodology used by the PUCO Staff" (page 8, lines 4 – 5 of his testimony); (2) "it is much higher than the many current estimates of 'risk-free return' by rate of return experts" (page 8, lines 15 – 16 of his testimony); (3) it is "higher than Aqua's embedded cost (4.99%) of long-term debt" (page 9, lines 6 – 7 of his direct testimony); and (4) that the "use of a long-term average rate instead of the most current one-year average is unreasonable and violates a long-standing regulatory principle" (page 10, lines 5 – 7 of his testimony).

Q10. PLEASE COMMENT UPON THE DR. DUANN'S CHARACTERIZATION OF THE METHODOLOGY USED BY THE COMMISSION'S STAFF.

A. Dr. Duann asserts on lines 7 – 9 on page 8 of his testimony that the Commission has "typically used the average daily yields of 10-year and 30-year U.S. Treasury bonds over the last twelve months before the Staff Report" to estimate the risk-free rate for a CAPM analysis. I cannot concede whether and to what extent Staff has "typically" used this methodology in the past, but this methodology is incorrect for three reasons and I agree with Staff's decision not to use it in the Staff Report.

First, the use of 10-year U.S. Treasury bond yields is not consistent with the long-term cost of capital to public utilities measured by the yields on A-rated public utility bonds, the long-term investment horizon inherent in utilities' common stocks, the long-term investment horizon presumed in the standard DCF model employed in regulatory ratemaking, and the long-term life of the jurisdictional rate base to which the allowed fair rate of return, *i.e.*, cost of capital, will be applied.

Second, as stated previously, both the cost of capital and ratemaking are prospective in nature. Therefore, the use of historical yields, even for 30-year U.S. Treasury Bonds, is inappropriate for cost of capital purposes.

Third, current capital market conditions are consistent with neither long-term historical nor projected market conditions, especially interest rate levels. Interest rates are currently artificially and historically low[2], being maintained at such low levels by the Federal Reserve Bank's (Fed) Federal Open Market Committee (FOMC) policy. This is corroborated by the FOMC's own statements in the press release it issued following its latest meeting on July 29–30, 2014, in which the FOMC stated that its "sizable and still-increasing holdings of longer-term securities should maintain downward pressure on longer-term interest rates" and that "economic conditions may, for some time, warrant keeping the target federal funds rate below levels the Committee views as normal in the longer run." (See Schedule PMA-R2.) These artificially low interest rates have led some analysts to the faulty conclusion that current capital costs are low. These analysts are mistaken.

Their conclusion only holds true under the hypothesis of Perfectly Competitive Capital Markets (PCCM) and the classical valuation framework that underpins the traditional cost of common equity models. PCCM are capital markets in which no single trader has the power to change the prices of goods or services, including bond and stock

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[2] Dr. Duann admits as much when he notes that in recent years "interest rates for all types of U.S. government bonds and corporate debts were at [a] historically low level" on page 10, lines 17 – 19 of his direct testimony.

securities. In other words, no single trader can have a significant impact on market prices. Classic valuation theory means that investors trade securities rationally with prices reflecting their perceptions of value. However, although the Fed has always had the ability to set the Fed Funds and discount rates, by its own admission, it has been maintaining low interest rates, below what it believes to be normal levels, to encourage economic and capital market recovery. The Fed is thus acting like a single trader, which has a significant impact on market prices of both bonds and stocks. As noted by Michael K. Farr in "Goldilocks lives! Time for Fed to stand down" on CNBC.com[3]:

> It seems like an eternity since the markets have behaved "normally." For at least the past 6-7 years, there has been a wholly different driver of supply and demand in the stock market. Market peaks and valleys have been clearly and unambiguously correlated to the various pronouncements of monetary support by the Federal Reserve. The financial market distortions created by the Fed will have a lasting impact on the economy for years to come.

These realities undercut the assumptions undergirding the PCCM and classic valuation theories.

Moreover, interest rates are expected to rise, and sooner rather than later in my opinion. Dallas Federal Reserve President Richard Fisher told CNBC on August 1, 2014, that "the date for interest rate 'liftoff' has been moved forward . . . interest rates could start rising early in 2015 if the economic data keep coming in stronger. 'Sometime early next year,' he continued, 'personally I do believe it's possible.' "

Therefore, the 3.1908% average daily yield for the twelve months ending March 7, 2014, is inappropriate for cost of capital purposes, and Dr. Duann's "correction" to Staff's CAPM analysis to reflect the 3.1908% is invalid. As a result, his recommended

[3] *See* http://www.cnbc.com/id/101888234

9.28% ROE, the midpoint of the “corrected” range of Staff’s common equity cost rate, is also invalid.

Q11. DR. DUANN ALSO STATES THAT THE 5.86% RISK-FREE RATE USED BY STAFF IS “MUCH HIGHER THAN THE MANY CURRENT ESTIMATES OF “RISK-FREE RETURN” BY RATE OF RETURN EXPERTS ON PAGE 8, LINES 14 – 15 OF HIS TESTIMONY. PLEASE COMMENT.

A. Dr. Duann’s reference to the risk-free rates used by other rate of return experts, namely Dr. Woolridge in May 2014 and Dr. Avera in December 2013, are irrelevant to this proceeding. All of the risk-free rates of the rate of return experts noted by Dr. Duann, including myself, are especially irrelevant to the 9.8% stipulated ROE because that ROE was the result of lengthy negotiations and resulted in a compromise that does not represent the position any individual Signatory Party would have taken absent the Stipulation. Moreover, my CAPM analysis using the 4.31% resulted in a CAPM-derived ROE of 10.62%, which was even *greater* than Staff’s CAPM-derived ROE of 10.31% with which Dr. Duann takes issue in his testimony. In addition, as discussed above, interest rates are expected to rise, sooner rather than later, and the ROE is a function of investors’ collective expectations because both the cost of capital and ratemaking are prospective.

Q12. ON PAGE 9, LINES 6 -7 OF HIS TESTIMONY, DR. DUANN STATES THAT STAFF’S RISK-FREE RATE OF 5.86% IS “UNREASONABLE BECAUSE IT IS HIGHER THAN AQUA’S EMBEDDED COST (4.99%) OF LONG-TERM DEBT.” PLEASE COMMENT.

A. Aqua Ohio’s embedded cost of long-term debt of 4.99% is also irrelevant to the cost of capital in this proceeding, including the risk-free rate for a CAPM analysis. It is irrelevant because the embedded cost of long-term debt comprises many issues of long-term debt of different legacies. The embedded long-term debt cost rate is a weighted average of long-term debt which was issued at varying dates, from July 1990 through May 2013, as shown on Schedule D-3 sponsored by Robert A. Kopas, witness for Aqua Ohio, representing different capital market conditions and interest rate levels. Thus, any comparison of Aqua Ohio's 4.99% embedded long-term debt cost rate to Staff's 5.86% risk-free rate is an apples and oranges comparative exercise and irrelevant.

Q13. ON PAGE 9, LINE 13 THROUGH PAGE 10, LINE 7, DR. DUANN DISCUSSES HIS DISAGREEMENT WITH THE USE OF A LONG-TERM AVERAGE RETURN AND COMMON EQUITY RISK PREMIUM. IS HIS DISAGREEMENT VALID?

A. No. It is a well-known statistical principle that the arithmetic mean long-term return and common equity risk premium is appropriate for cost of capital purposes. As discussed in my direct testimony at page 31, lines 1 - 17, only arithmetic mean return rates and yields are appropriate for cost of capital purposes because ex-post (historical) total returns and equity risk premiums differ in size and direction over time, providing insight into the variance and standard deviation of returns. Because the arithmetic mean captures the prospect for variance in returns and equity risk premiums, it provides the valuable insight needed by investors in estimating *risk* in the future when making a current investment. Absent such valuable insight into the potential variance of returns, investors cannot meaningfully evaluate prospective risk. The most current one-year average equity risk premium provides no insight into the potential variance of future returns because it represents the equity risk premium for a single year, which by definition cannot show year-to-year fluctuations, or the variance, which are *critical to risk analysis*. Therefore, a current single year average premium has little or no value to investors seeking to measure risk. Moreover, from a statistical perspective, stock returns and equity risk premiums are randomly generated. Thus, the arithmetic mean is also *expectational*, as is the cost of capital and ratemaking as noted above.

The financial literature is clear that the arithmetic mean return and not the geometric mean return is appropriate for cost of capital purposes as noted in *Ibbotson® SBBI® – 2014 Classic Yearbook – Market Results for Stocks, Bonds, Bills and Inflation – 1926-2013 (SBBI – 2014)*[4] (Page 16 of Schedule PMA-R3):

> The equity risk premium data presented in this book are arithmetic average risk premiums as opposed to geometric average risk premiums. The arithmetic average equity risk premium can be demonstrated to be most appropriate when discounting future cash flows. For use as the expected equity risk premium in either the CAPM or the building block approach, the arithmetic mean or the simple difference of the arithmetic means of stock market returns and riskless rates is the relevant number. This is because both the CAPM and the building block approach are additive models, in which the cost of capital is the sum of its parts.

In addition, Weston and Brigham[5] provide the standard financial textbook definition of the riskiness of an asset when they state on page 3 of Schedule PMA-R4:

> The riskiness of an asset is defined in terms of the <u>likely variability of future returns from the asset</u>. (Emphasis added)

In addition, Brealey and Myers[6] note (pages 3-4 of Schedule PMA-R5):

> The proper uses of arithmetic and compound rates of return from past investments are often misunderstood . . . . Thus the arithmetic average of the returns correctly measures the opportunity cost of capital for investments . . . . *Moral*: If the cost of capital is estimated from historical returns or risk premiums, use arithmetic averages . . . . (Italics in original)

As previously discussed, investors gain insight into relative riskiness by analyzing expected future variability. This is accomplished by the use of the arithmetic mean of a distribution of returns and premiums. Only the arithmetic mean takes into account all of the returns and premiums, hence, providing meaningful insight into the variance and

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[4] *Ibbotson® SBBI® – 2014 Classic Yearbook – Market Results for Stocks, Bonds, Bills and Inflation 1926-2013* (Morningstar, Inc., 2014) 153.

[5] J. Fred Weston and Eugene F. Brigham, *Essentials of Managerial Finance Third Edition* (The Dryden Press, 1974) 272.

[6] R.A. Brealey and S.C. Myers, *Principles of Corporate Finance Fifth Edition* (McGraw-Hill Publications, Inc., 1996) 146-147.

standard deviation of those returns and premiums. Therefore, it is inappropriate to use a current or recent one-year average equity risk premium in a CAPM analysis.

In addition, Dr. Duann criticizes staff for using the period 1963 – 2012 from *Duff & Phelps Risk Premium Report 2013 (D&P 2013)* and not 1963 – 2013. The 1963 – 2013 data are now published in Duff & Phelps' *2014 Valuation Handbook - Guide to Cost of Capital – Market Results Through 2013 (2014 Handbook)*[7]. The market equity risk premium is still 5.86% as shown on Exhibit A-5 of the 2014 Handbook.

Q14. FINALLY, DR. DUANN DISAGREES WITH AQUA OHIO'S CURRENT POSITION THAT THE RISK-FREE RATE SHOULD BE 6.75%. PLEASE COMMENT.

A. Dr. Duann misunderstands Aqua Ohio's position and my testimony. It is not Aqua Ohio's nor my position that the risk-free rate should be 6.75%. The testimony Dr. Duann refers to was in support of Aqua Ohio's position that the Staff Report understated the proper allowed ROE for Aqua Ohio. Any disagreement on that front is now a moot point, given that Aqua and Staff have stipulated to the lower rate of return.

In addition, as discussed previously, the long-term average equity risk premium, derived using a long-term average return and risk-free rate is appropriate for cost of capital purposes and not the risk-free return of 2012, 2013 or 2014 which was and is, as admitted to by Dr. Duann, when "interest rates for all types of U.S. government bond and corporate debts were at a historically low level" on lines 17 – 19 on page 10 of his direct testimony and acknowledged by the FOMC as noted above as being below normal levels.

7 Formerly *Ibbotson® SBBI® – Valuation Yearbook*, purchased by Duff & Phelps from Morningstar, Inc. in 2014.

In view of all of the foregoing, the stipulated ROE should be adopted by the Commission, and both Dr. Duann's disagreement with the Stipulation and his "corrected" ROE should be rejected by the Commission.

Q15. DOES THIS END YOUR REBUTTAL TESTIMONY?

A. Yes.

CERTIFICATE OF SERVICE

The PUCO's e-filing system will electronically serve notice of the filing of this document on the following parties:

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AQUA EXHIBIT 6.2

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Aqua Ohio, Inc. to Increase Its Rates and Charges for Its Waterworks Service.	)))	Case No. 13-2124-WW-AIR

EXHIBIT TO ACCOMPANY THE
REBUTTAL TESTIMONY
OF
PAULINE M. AHERN
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___ Management policies, practice and organization

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Aqua Ohio, Inc.
Value Line Investment Survey Returns on Common Equity for Water Utilities
Projected for 2014 and for 2017 - 2019

Value Line Investment Survey - Water Utility Group	2014	2017 - 2019
American States Water Co. *	12.5%	12.5%
American Water Works Co., Inc. *	9.0%	10.5%
Aqua America, Inc.*	13.5%	14.0%
Artesian Resources Corp.	NA	NA
California Water Service Group *	8.0%	10.0%
Connecticut Water Service, Inc.	10.0%	8.5%
Middlesex Water Company	8.5%	9.0%
SJW Corporation	7.5%	8.0%
York Water Company	11.5%	12.0%
Average - all companies	10.1%	10.6%
Average - Staff's Proxy Group	10.8%	11.8%

* Staff's Proxy Group

Source of Information: Value Line Investment Survey, July 18, 2014

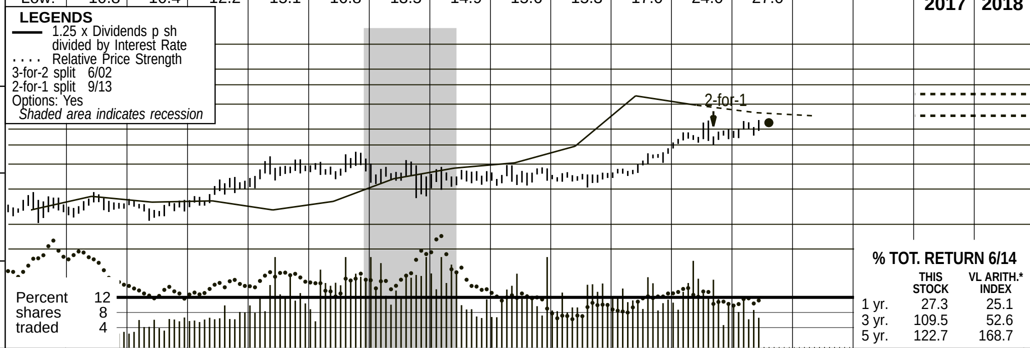
AMER. STATES WATER NYSE-AWR

RECENT PRICE **32.29** | P/E RATIO **20.2** (Trailing: 21.0 Median: 21.0) | RELATIVE P/E RATIO **1.07** | DIV'D YLD **2.7%** | VALUE LINE

TIMELINESS 3 Lowered 5/16/14
SAFETY 2 Raised 7/20/12
TECHNICAL 2 Lowered 7/11/14
BETA .70 (1.00 = Market)

High:	14.5	13.4	17.3	21.9	23.1	21.0	19.4	19.8	18.2	24.1	33.1	34.0
Low:	10.8	10.4	12.2	15.1	16.8	13.5	14.9	15.6	15.3	17.0	24.0	27.0

Target Price Range
2017 | 2018 | 2019



2017-19 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	45	(+40%)	11%
Low	35	(+10%)	5%

Insider Decisions

	A	S	O	N	D	J	F	M	A
to Buy	0	1	0	0	0	0	0	0	0
Options	0	0	0	1	0	0	0	1	0
to Sell	0	0	0	2	0	0	0	2	0

Institutional Decisions

	3Q2013	4Q2013	1Q2014
to Buy	72	79	79
to Sell	90	72	72
Hld's(000)	23953	23188	23233

% TOT. RETURN 6/14

	THIS STOCK	VL ARITH.* INDEX
1 yr.	27.3	25.1
3 yr.	109.5	52.6
5 yr.	122.7	168.7

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	© VALUE LINE PUB. LLC	17-19
5.51	6.45	6.08	6.53	6.89	6.99	6.81	7.03	7.88	8.75	9.21	9.74	10.71	11.12	12.12	12.19	**12.50**	**13.35**	Revenues per sh	**15.05**
1.02	1.13	1.10	1.26	1.27	1.04	1.11	1.32	1.45	1.65	1.69	1.70	2.11	2.13	2.48	2.65	**2.75**	**2.80**	"Cash Flow" per sh	**3.35**
.54	.60	.64	.67	.67	.39	.53	.66	.67	.81	.78	.81	1.11	1.12	1.41	1.61	**1.60**	**1.65**	Earnings per sh A	**1.95**
.42	.43	.43	.43	.44	.44	.44	.45	.46	.48	.50	.51	.52	.55	.64	.76	**.84**	**.92**	Div'd Decl'd per sh B■	**1.10**
1.56	2.15	1.51	1.59	1.34	1.88	2.51	2.12	1.95	1.45	2.23	2.09	2.12	2.13	1.77	2.52	**2.30**	**2.25**	Cap'l Spending per sh	**2.50**
5.74	5.91	6.37	6.61	7.02	6.98	7.51	7.86	8.32	8.77	8.97	9.70	10.13	10.84	11.80	12.72	**12.90**	**13.35**	Book Value per sh	**15.35**
26.87	26.87	30.24	30.24	30.36	30.42	33.50	33.60	34.10	34.46	34.60	37.06	37.26	37.70	38.53	38.72	**38.00**	**37.50**	Common Shs Outst'g C	**37.50**
15.5	17.1	15.9	16.7	18.3	31.9	23.2	21.9	27.7	24.0	22.6	21.2	15.7	15.4	14.3	17.2	*Bold figures are*	*Value Line*	Avg Ann'l P/E Ratio	**20.0**
.81	.97	1.03	.86	1.00	1.82	1.23	1.17	1.50	1.27	1.36	1.41	1.00	.97	.91	.97	*estimates*		Relative P/E Ratio	**1.25**
5.0%	4.2%	4.2%	3.9%	3.6%	3.5%	3.6%	3.1%	2.5%	2.5%	2.9%	2.9%	3.0%	3.2%	3.1%	2.7%			Avg Ann'l Div'd Yield	**2.8%**

CAPITAL STRUCTURE as of 3/31/14
Total Debt $356.3 mill. **Due in 5 Yrs** $7.6 mill.
LT Debt $326.0 mill. **LT Interest** $21.0 mill.
(LT interest earned: 5.7 x: total interest coverage: 5.4 x) (40% of Cap'l)
Leases, Uncapitalized: Annual rentals $2.2 mill.
Pension Assets-12/13 $127.5 mill. **Oblig.** $152.7 mill.
Pfd Stock None.

Common Stock 38,778,608 shs. as of 5/5/14

MARKET CAP: $1.3 billion (Mid Cap)

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		17-19
228.0	236.2	268.6	301.4	318.7	361.0	398.9	419.3	466.9	472.1	**475**	**500**	Revenues ($mill)	**565**
16.5	22.5	23.1	28.0	26.8	29.5	41.4	42.0	54.1	62.7	**61.0**	**60.0**	Net Profit ($mill)	**73.0**
37.4%	47.0%	40.5%	42.6%	37.8%	38.9%	43.2%	41.7%	39.9%	36.3%	**37.0%**	**40.0%**	Income Tax Rate	**40.0%**
- -	- -	12.2%	8.5%	6.9%	3.2%	5.8%	2.0%	2.5%	.5%	**.5%**	**2.5%**	AFUDC % to Net Profit	**2.5%**
47.7%	50.4%	48.6%	46.9%	46.2%	45.9%	44.3%	45.4%	42.2%	39.8%	**41.5%**	**43.0%**	Long-Term Debt Ratio	**42.5%**
52.3%	49.6%	51.4%	53.1%	53.8%	54.1%	55.7%	54.6%	57.8%	60.2%	**58.5%**	**57.0%**	Common Equity Ratio	**57.5%**
480.4	532.5	551.6	569.4	577.0	665.0	677.4	749.1	787.0	818.4	**840**	**875**	Total Capital ($mill)	**1000**
664.2	713.2	750.6	776.4	825.3	866.4	855.0	896.5	917.8	981.5	**1010**	**1050**	Net Plant ($mill)	**1180**
5.2%	5.4%	6.0%	6.7%	6.4%	5.9%	7.6%	7.1%	8.3%	8.9%	**8.5%**	**8.0%**	Return on Total Cap'l	**9.5%**
6.6%	8.5%	8.1%	9.3%	8.6%	8.2%	11.0%	10.3%	11.9%	12.7%	**12.5%**	**12.0%**	Return on Shr. Equity	**12.5%**
6.6%	8.5%	8.1%	9.3%	8.6%	8.2%	11.0%	10.3%	11.9%	12.7%	**12.5%**	**12.0%**	Return on Com Equity	**12.5%**
1.0%	2.8%	2.7%	3.9%	3.1%	3.2%	5.8%	5.3%	6.6%	6.8%	**6.0%**	**5.0%**	Retained to Com Eq	**5.5%**
84%	67%	67%	58%	64%	61%	47%	49%	45%	47%	**53%**	**58%**	All Div'ds to Net Prof	**56%**

CURRENT POSITION ($MILL.)	2012	2013	3/31/14
Cash Assets	23.5	38.2	74.9
Other	160.5	153.4	138.3
Current Assets	184.0	191.6	213.2
Accts Payable	40.6	49.8	42.6
Debt Due	3.3	6.3	30.3
Other	49.8	44.8	46.2
Current Liab.	93.7	100.9	119.1
Fix. Chg. Cov.	488%	531%	533%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '11-'13 to '17-'19
Revenues	5.5%	6.5%	4.0%
"Cash Flow"	7.5%	8.5%	5.5%
Earnings	9.0%	13.0%	6.0%
Dividends	4.0%	6.5%	9.0%
Book Value	5.5%	6.5%	4.5%

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun. 30	Sep. 30	Dec. 31	Full Year
2011	94.3	109.8	119.9	95.3	419.3
2012	107.6	114.3	133.5	111.5	466.9
2013	110.6	120.7	130.9	109.9	472.1
2014	101.9	**125**	**133.1**	**115**	**475**
2015	**120**	**130**	**135**	**115**	**500**

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun. 30	Sep. 30	Dec. 31	Full Year
2011	.19	.34	.42	.17	1.12
2012	.27	.40	.49	.26	1.41
2013	.35	.43	.53	.30	1.61
2014	.28	**.42**	**.55**	**.30**	**1.60**
2015	**.30**	**.45**	**.58**	**.32**	**1.65**

Cal-endar	QUARTERLY DIVIDENDS PAID B■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2010	.13	.13	.13	.13	.52
2011	.13	.14	.14	.14	.55
2012	.14	.14	.1775	.1775	.64
2013	.1775	.1775	.2025	.2025	.76
2014	.2025	.2025			

BUSINESS: American States Water Co. operates as a holding company. Through its principal subsidiary, Golden State Water Company, it supplies water to more than 250,000 customers in 75 communities in 10 counties. Service areas include the greater metropolitan areas of Los Angeles and Orange Counties. The company also provides electric utility services to nearly 23,250 customers in the city of Big Bear Lake and in areas of San Bernardino County. Sold Chaparral City Water of Arizona (6/11). Has 728 employees. Officers & directors own 2.9% of common stock (4/12 Proxy). Chairman: Lloyd Ross. President & CEO: Robert J. Sprowls. Inc: CA. Addr: 630 East Foothill Boulevard, San Dimas, CA 91773. Tel: 909-394-3600. Internet: www.aswater.com.

Severe drought conditions in California should not have a material impact on American States Water's main subsidiary. State regulators have established mechanisms that allow Golden Gate Water Co. (GGWC) to pass through higher costs to consumers resulting from the drought. To date, conservation efforts have proved successful in lowering the demand for water and easing any rate shock over the higher monthly bills. GGWC will continue to pump and collect as much of its own water as possible because purchasing water (about 35% of total) on the California market is more expensive.

Share earnings will likely remain flat-tish through 2015. GGWC is earning close to the maximum allowed by state regulators. Thus, we don't expect much growth in utility operations in the near term. Due to solid cash generation, however, annual dividend hikes should remain healthy.

Longer term, nonregulated activities are a major plus. American States Utility Services (ASUS) operates the water systems at nine U.S. Army bases. Currently, this segment accounts for 22% of net income. Over the next few years, we expect profits from this segment to increase as the government continues to privatize the water services at more bases. This also represents a relatively low-risk opportunity for the company to earn a greater return on equity than permitted by regulators.

American States has the strongest balance sheet in the industry. The equity-to-total capital ratio has recently been in the 60% neighborhood as the company has been retiring outstanding debt. As a result, American States is the sole company in the industry with an A Financial Strength rating. Moreover, a 1.25 million share-buyback program through mid-2016 was just announced.

These shares have been on a roll. Over the past month, the price has risen about 18%, versus 5% for the broader market averages. And, while this run-up has diminished some of the equity's luster over the 2017-2019 time frame, it still offers better total return potential than others in the water group because of its solid dividend growth prospects.

James A. Flood *July 18, 2014*

(A) Primary earnings. Excludes nonrecurring gains/(losses): '04, 7¢; '05, 13¢; '06, 3¢; '08, (14¢); '10, (23¢) '11, 10¢. Next earnings report due early August. Quarterly earnings may not add due to rounding.
(B) Dividends historically paid in early March, June, September, and December. ■ Div'd reinvestment plan available.
(C) In millions, adjusted for splits.

Company's Financial Strength	A
Stock's Price Stability	90
Price Growth Persistence	75
Earnings Predictability	90

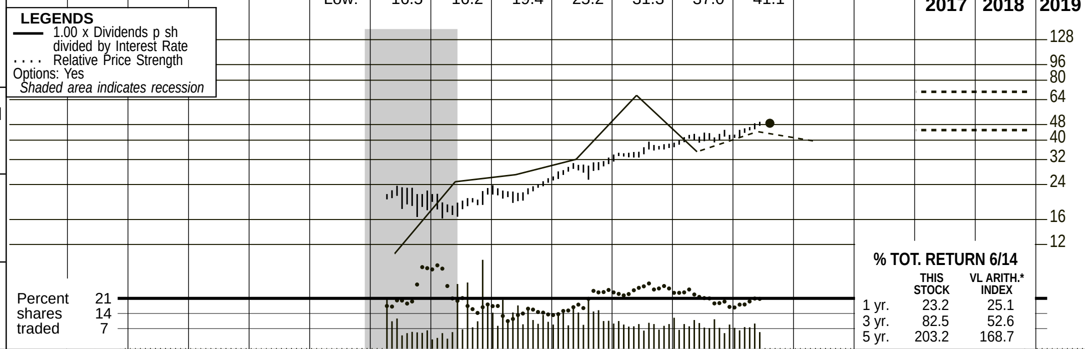
AMERICAN WATER NYSE-AWK

RECENT PRICE **48.61** | P/E RATIO **20.3** (Trailing: 22.9 Median: NMF) | RELATIVE P/E RATIO **1.08** | DIV'D YLD **2.6%** | VALUE LINE

TIMELINESS 1 Raised 5/16/14
SAFETY 3 New 7/25/08
TECHNICAL 3 Raised 6/27/14
BETA .70 (1.00 = Market)

High:	23.7	23.0	25.8	32.8	39.4	45.1	49.6
Low:	16.5	16.2	19.4	25.2	31.3	37.0	41.1

Target Price Range
2017 | 2018 | 2019



2017-19 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	70	(+45%)	11%
Low	45	(-5%)	1%

Insider Decisions

	A	S	O	N	D	J	F	M	A
to Buy	0	0	0	0	0	0	0	1	0
Options	0	0	0	2	0	0	0	10	0
to Sell	0	0	0	2	0	0	0	9	0

Institutional Decisions

	3Q2013	4Q2013	1Q2014
to Buy	197	204	220
to Sell	176	176	177
Hld's(000)	144172	143986	144603

% TOT. RETURN 6/14

	THIS STOCK	VL ARITH.* INDEX
1 yr.	23.2	25.1
3 yr.	82.5	52.6
5 yr.	203.2	168.7

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007E	2008	2009	2010	2011	2012	2013	2014	2015	© VALUE LINE PUB. LLC	17-19
- -	- -	- -	- -	- -	- -	- -	- -	13.08	13.84	14.61	13.98	15.49	15.18	16.25	16.28	*17.10*	*17.65*	Revenues per sh	*20.55*
- -	- -	- -	- -	- -	- -	- -	- -	.65	d.47	2.87	2.89	3.56	3.73	4.27	4.36	*4.70*	*5.05*	"Cash Flow" per sh	*5.60*
- -	- -	- -	- -	- -	- -	- -	- -	d.97	d2.14	1.10	1.25	1.53	1.72	2.11	2.06	*2.40*	*2.60*	Earnings per sh A	*3.05*
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	.40	.82	.86	.90	1.21	.84	*1.18*	*1.30*	Div'd Decl'd per sh B■	*1.52*
- -	- -	- -	- -	- -	- -	- -	- -	4.31	4.74	6.31	4.50	4.38	5.27	5.25	5.50	*6.10*	*6.00*	Cap'l Spending per sh	*5.25*
- -	- -	- -	- -	- -	- -	- -	- -	23.86	28.39	25.64	22.91	23.59	24.11	25.11	26.52	*26.65*	*26.85*	Book Value per sh D	*28.40*
- -	- -	- -	- -	- -	- -	- -	- -	160.00	160.00	160.00	174.63	175.00	175.66	176.99	178.25	*180.00*	*182.50*	Common Shs Outst'g C	*190.00*
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	18.9	15.6	14.6	16.8	16.7	19.9	*Bold figures are*		Avg Ann'l P/E Ratio	*18.5*
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	1.14	1.04	.93	1.05	1.06	1.12	*Value Line*		Relative P/E Ratio	*1.25*
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	1.9%	4.2%	3.8%	3.1%	3.4%	2.0%	*estimates*		Avg Ann'l Div'd Yield	*2.6%*
						- -	- -	2093.1	2214.2	2336.9	2440.7	2710.7	2666.2	2876.9	2901.9	*3100*	*3250*	Revenues ($mill)	*3900*
						- -	- -	d155.8	d342.3	187.2	209.9	267.8	304.9	374.3	369.3	*430*	*465*	Net Profit ($mill)	*580*
						- -	- -	- -	- -	37.4%	37.9%	40.4%	39.5%	40.7%	39.1%	*39.0%*	*38.5%*	Income Tax Rate	*38.0%*
						- -	- -	- -	- -	- -	- -	- -	- -	6.2%	5.1%	*5.5%*	*6.0%*	AFUDC % to Net Profit	*8.0%*
						- -	- -	56.1%	50.9%	53.1%	56.9%	56.8%	55.7%	53.9%	52.4%	*54.0%*	*53.5%*	Long-Term Debt Ratio	*55.0%*
						- -	- -	43.9%	49.1%	46.9%	43.1%	43.2%	44.2%	46.1%	47.6%	*46.0%*	*46.5%*	Common Equity Ratio	*45.0%*
						- -	- -	8692.8	9245.7	8750.2	9289.0	9561.3	9580.3	9635.5	9940.7	*10400*	*10600*	Total Capital ($mill)	*12000*
						- -	- -	8720.6	9318.0	9991.8	10524	11059	11021	11739	12391	*12800*	*13200*	Net Plant ($mill)	*14650*
						- -	- -	NMF	NMF	3.7%	3.8%	4.4%	4.8%	5.4%	5.1%	*6.0%*	*6.0%*	Return on Total Cap'l	*6.5%*
						- -	- -	NMF	NMF	4.6%	5.2%	6.5%	7.2%	8.4%	7.8%	*9.0%*	*9.5%*	Return on Shr. Equity	*10.5%*
						- -	- -	NMF	NMF	4.6%	5.2%	6.5%	7.2%	8.4%	7.8%	*9.0%*	*9.5%*	Return on Com Equity	*10.5%*
						- -	- -	NMF	NMF	3.0%	1.8%	2.8%	3.5%	3.6%	4.7%	*4.0%*	*4.5%*	Retained to Com Eq	*5.5%*
						- -	- -	- -	- -	34%	65%	56%	52%	57%	40%	*49%*	*51%*	All Div'ds to Net Prof	*50%*

CAPITAL STRUCTURE as of 3/31/14
Total Debt $5861.8 mil. **Due in 5 Yrs** $1034.0 mil.
LT Debt $5208.7 mil. **LT Interest** $274.0 mil.
(Total interest coverage: 3.0x) (52% of Cap'l)

Leases, Uncapitalized: Annual rentals $15.9 mill.
Pension Assets 12/13 $1383.6 mill **Oblig.** $1494.1 mill.
Pfd Stock $16.0 mill. **Pfd Div'd** $.7 mill

Common Stock 179,018,709 shs. **as of 5/1/14**

MARKET CAP: $8.7 billion (Large Cap)

CURRENT POSITION ($MILL.)	2012	2013	3/31/14
Cash Assets	24.4	27.0	30.8
Other	475.0	523.3	657.2
Current Assets	499.4	550.3	688.0
Accts Payable	279.6	14.2	183.8
Debt Due	385.9	644.5	653.1
Other	329.3	576.8	360.8
Current Liab.	994.8	1235.5	1197.7
Fix. Chg. Cov.	297%	307%	305%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '11-'13 to '17-'19
Revenues	- -	3.0%	4.5%
"Cash Flow"	- -	32.5%	5.0%
Earnings	- -	- -	7.5%
Dividends	- -	- -	7.5%
Book Value	- -	-.5%	2.0%

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun. 30	Sep. 30	Dec. 31	Full Year
2011	596.7	668.8	760.9	639.8	2666.2
2012	618.5	745.6	831.8	681.0	2876.9
2013	636.1	724.3	829.2	712.3	2901.9
2014	681.9	*773.1*	*895*	*750*	*3100*
2015	*705*	*810*	*940*	*795*	*3250*

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun. 30	Sep. 30	Dec. 31	Full Year
2011	.23	.42	.73	.34	1.72
2012	.28	.66	.87	.30	2.11
2013	.32	.57	.84	.33	2.06
2014	.38	*.65*	*1.00*	*.37*	*2.40*
2015	*.40*	*.70*	*1.05*	*.45*	*2.60*

Cal-endar	QUARTERLY DIVIDENDS PAID B■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2010	.21	.21	.22	.22	.86
2011	.22	.23	.23	.23	.91
2012	.23	.23	.25	.50	1.21
2013	- -	.28	.28	.28	.84
2014	.28	.31			

BUSINESS: American Water Works Company, Inc. is the largest investor-owned water and wastewater utility in the U.S., providing services to over 14 million people in over 30 states and Canada. It's nonregulated business assists municipalities and military bases with the maintenance and upkeep as well. Regulated operations made up 89.1% of 2013 revenues. New Jersey is its biggest market accounting for 24.6% of revenues. Has roughly 6,600 employees. Depreciation rate, 3.1% in '13. BlackRock, Inc., owns 10.5% of the common stock outstanding. Officers & directors own 2.8%. (3/14 Proxy). President & CEO; Jeffry Sterba. Chairman; George MacKenzie. Address: 1025 Laurel Oak Road, Voorhees, NJ 08043. Telephone: 856-346-8200. Internet: www.amwater.com.

American Water Works recently raised the dividend a hefty 11%. This was more than double the industry average. Moreover, with a low dividend-to-net profit ratio, we expect the annual payout growth rate to average in the high single digits through 2017-2019.

American Water Works stands out among other publicly traded water utilities. For starters, the company's market cap is nearly $9 billion, or almost half that of the combined eight other entities in the group followed by *Value Line.* (The closest in size is Aqua America at $4.4 billion.) With American Water's large balance sheet comes the wherewithal to finance acquisitions, which have played a large part in the utility's growth. The company is one of the beneficiaries of the consolidation trend taking place in the industry. Smaller municipally-owned water utilities that don't have the funds required to modernize their antiquated water systems are looking to merge with bigger entities.

Cost control is American Water's speciality. The utility is one place where the much overused word "synergy" actually works. Economies of scale have proved successful, as the expense ratio has declined by a solid margin every year since 2011.

Keeping customers' bills low is one way of staying on the right side of regulators. State commissions that rule on utilities' petitions for rate relief are usually under severe political pressure not to increase customer's (i.e., voter's) water bills. Effectively managing expenses reduces the chances of a negative regulatory ruling.

Finances are adequate. Management has indicated that the construction budget will be $5.5 billion over the next five-year period. We think that American Water will be able to maintain an average balance sheet over this time frame. Indeed, this isn't too bad, considering the projected size of the utility's acquisitions, capital outlays, and dividends.

These shares now carry a 1 Timeliness rank (Highest) for year-ahead relative performance. The recent strength in the stock price has made it unattractive on a long-term basis, however.

James A. Flood *July 18, 2014*

(A) Diluted earnings. Excludes nonrecurring losses: '08, $4.62; '09, $2.63; '11, $0.07. Discontinued operations: '06, (4¢); '11, 3¢; '12, (10¢). Next earnings report due early August. Quarterly earnings may not sum due to rounding. **(B)** Dividends paid in March, June, September, and December. ■ Div. reinvestment available. Two payments made in 4th quarter of 2012. **(C)** In millions. **(D)** Includes intangibles. In 2013: $1.21 billion, $6.78/share. **(E)** Pro forma numbers for '06 & '07.

Company's Financial Strength	B+
Stock's Price Stability	100
Price Growth Persistence	80
Earnings Predictability	20

AQUA AMERICA NYSE-WTR

RECENT PRICE	P/E RATIO		RELATIVE P/E RATIO	DIV'D YLD	
25.01	20.8	(Trailing: 21.9) (Median: 24.0)	1.11	2.6%	VALUE LINE

TIMELINESS 3 Lowered 5/24/13
SAFETY 2 Raised 4/20/12
TECHNICAL 2 Raised 7/11/14
BETA .70 (1.00 = Market)

High:	13.4	14.8	23.4	23.8	21.3	17.6	17.2	18.4	19.0	21.5	28.1	26.3
Low:	9.5	11.3	14.0	16.1	15.1	9.8	12.3	13.2	15.4	16.8	20.6	22.4

Target Price Range
2017 | 2018 | 2019

2017-19 PROJECTIONS

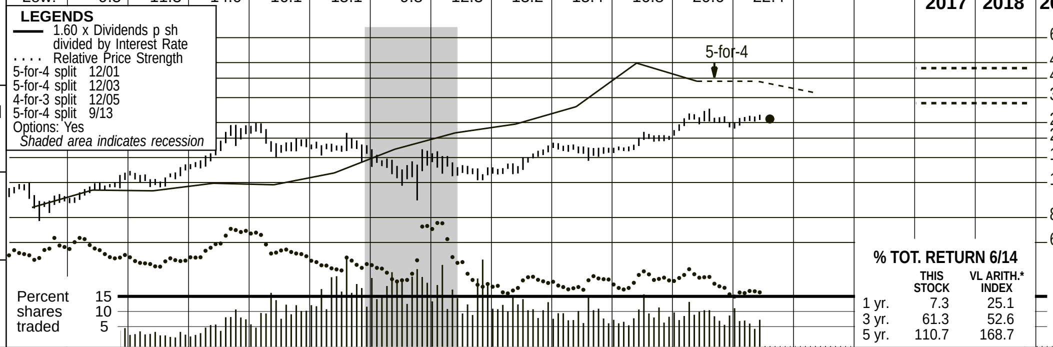
	Price	Gain	Ann'l Total Return
High	45	(+80%)	18%
Low	30	(+20%)	8%

Insider Decisions

	A	S	O	N	D	J	F	M	A
to Buy	0	0	0	0	0	0	0	0	0
Options	2	1	1	0	2	0	3	2	0
to Sell	0	1	1	3	1	1	1	4	1

Institutional Decisions

	3Q2013	4Q2013	1Q2014
to Buy	153	140	130
to Sell	154	149	145
Hld's(000)	85173	83710	82758



% TOT. RETURN 6/14

	THIS STOCK	VL ARITH.* INDEX
1 yr.	7.3	25.1
3 yr.	61.3	52.6
5 yr.	110.7	168.7

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	© VALUE LINE PUB. LLC	17-19
1.67	1.93	1.97	2.16	2.28	2.38	2.78	3.08	3.23	3.61	3.71	3.93	4.21	4.10	4.32	4.32	*4.60*	*4.90*	Revenues per sh	*5.60*
.49	.58	.61	.69	.76	.77	.87	.97	1.01	1.10	1.14	1.29	1.42	1.45	1.51	1.82	*1.95*	*2.00*	"Cash Flow" per sh	*2.90*
.32	.33	.37	.41	.43	.46	.51	.57	.56	.57	.58	.62	.72	.83	.87	1.16	*1.20*	*1.30*	Earnings per sh A	*1.55*
.20	.22	.23	.24	.26	.28	.29	.32	.35	.38	.41	.44	.47	.50	.54	.58	*.63*	*.69*	Div'd Decl'd per sh B■	*.90*
.65	.72	.93	.87	.96	1.06	1.23	1.47	1.64	1.43	1.58	1.66	1.89	1.90	1.98	1.73	*1.90*	*1.95*	Cap'l Spending per sh	*1.95*
2.57	2.74	3.08	3.32	3.49	4.27	4.71	5.04	5.57	5.85	6.26	6.50	6.81	7.21	7.90	8.63	*8.85*	*9.05*	Book Value per sh	*11.00*
90.25	133.50	139.78	142.47	141.49	154.31	158.97	161.21	165.41	166.75	169.21	170.61	172.46	173.60	175.43	177.93	*174.00*	*171.00*	Common Shs Outst'g C	*170.00*
22.5	21.2	18.2	23.6	23.6	24.5	25.1	31.8	34.7	32.0	24.9	23.1	21.1	21.3	21.9	21.2	*Bold figures are*		Avg Ann'l P/E Ratio	*24.0*
1.17	1.21	1.18	1.21	1.29	1.40	1.33	1.69	1.87	1.70	1.50	1.54	1.34	1.34	1.39	1.19	*Value Line*		Relative P/E Ratio	*1.50*
2.9%	3.0%	3.3%	2.5%	2.5%	2.5%	2.3%	1.8%	1.8%	2.1%	2.8%	3.1%	3.1%	2.8%	2.8%	2.4%	*estimates*		Avg Ann'l Div'd Yield	*2.4%*

CAPITAL STRUCTURE as of 3/31/14
Total Debt $1623.7 mill. **Due in 5 Yrs** $324.6 mill.
LT Debt $1498.0 mill. **LT Interest** $70.0 mill.
(Total interest coverage: 3.9x) (49% of Cap'l)

Pension Assets-12/13 $232.4 mill. **Oblig.** $281.2 mill.

Pfd Stock None
Common Stock 177,060,756 shares **as of 4/23/14**

MARKET CAP: $4.4 billion (Mid Cap)

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		17-19
442.0	496.8	533.5	602.5	627.0	670.5	726.1	712.0	757.8	768.6	*800*	*835*	Revenues ($mill)	*950*
80.0	91.2	92.0	95.0	97.9	104.4	124.0	144.8	153.1	205.0	*210*	*225*	Net Profit ($mill)	*265*
39.4%	38.4%	39.6%	38.9%	39.7%	39.4%	39.2%	32.9%	39.0%	10.0%	*30.0%*	*30.0%*	Income Tax Rate	*30.0%*
--	--	--	--	--	--	--	--	2.9%	1.1%	*2.0%*	*2.0%*	AFUDC % to Net Profit	*2.0%*
50.0%	52.0%	51.6%	55.4%	54.1%	55.6%	56.6%	52.7%	52.7%	48.9%	*51.0%*	*51.0%*	Long-Term Debt Ratio	*52.0%*
50.0%	48.0%	48.4%	44.6%	45.9%	44.4%	43.4%	47.3%	47.3%	51.1%	*49.0%*	*49.0%*	Common Equity Ratio	*48.0%*
1497.3	1690.4	1904.4	2191.4	2306.6	2495.5	2706.2	2646.8	2929.7	3003.6	*3150*	*3325*	Total Capital ($mill)	*3950*
2069.8	2280.0	2506.0	2792.8	2997.4	3227.3	3469.3	3612.9	3936.2	4167.3	*4300*	*4400*	Net Plant ($mill)	*5000*
6.7%	6.9%	6.4%	5.9%	5.7%	5.6%	5.9%	6.9%	6.6%	8.0%	*8.5%*	*9.0%*	Return on Total Cap'l	*.5%*
10.7%	11.2%	10.0%	9.7%	9.3%	9.4%	10.6%	11.6%	11.0%	13.4%	*13.5%*	*14.5%*	Return on Shr. Equity	*14.0%*
10.7%	11.2%	10.0%	9.7%	9.3%	9.4%	10.6%	11.6%	11.0%	13.4%	*13.5%*	*14.5%*	Return on Com Equity	*14.0%*
4.6%	4.9%	3.7%	3.2%	2.8%	2.7%	3.7%	4.6%	4.3%	6.7%	*6.5%*	*7.0%*	Retained to Com Eq	*6.0%*
57%	56%	63%	67%	70%	72%	65%	60%	61%	50%	*53%*	*53%*	All Div'ds to Net Prof	*58%*

CURRENT POSITION ($MILL.)	2012	2013	3/31/14
Cash Assets	5.5	5.1	17.5
Receivables	92.9	95.4	89.9
Inventory (AvgCst)	11.8	11.4	11.8
Other	150.7	59.8	94.4
Current Assets	260.9	171.7	213.6
Accts Payable	55.5	65.8	31.5
Debt Due	125.4	123.0	125.7
Other	93.3	78.1	94.0
Current Liab.	274.2	266.9	251.2
Fix. Chg. Cov.	413%	388%	389%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '11-'13 to '17-'19
Revenues	6.5%	4.0%	*4.5%*
"Cash Flow"	8.0%	8.0%	*10.0%*
Earnings	8.5%	11.0%	*8.5%*
Dividends	7.5%	7.0%	*9.0%*
Book Value	8.0%	6.0%	*5.5%*

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2011	163.6	178.3	197.3	172.7	712.0
2012	164.0	191.7	214.6	187.5	757.8
2013	180.0	195.7	204.3	188.6	768.6
2014	182.7	*205*	*210*	*202.3*	*800*
2015	*195*	*210*	*220*	*210*	*835*

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2011	.18	.22	.24	.19	.83
2012	.15	.24	.29	.19	.87
2013	.26	.30	.36	.24	1.16
2014	.24	*.30*	*.40*	*.26*	*1.20*
2015	*.27*	*.32*	*.40*	*.31*	*1.30*

Cal-endar	QUARTERLY DIVIDENDS PAID B ■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2010	.116	.116	.116	.124	.47
2011	.124	.124	.124	.132	.50
2012	.132	.132	.132	.14	.54
2013	.14	.14	.152	.152	.58
2014	.152	.152			

BUSINESS: Aqua America, Inc. is the holding company for water and wastewater utilities that serve approximately three million residents in Pennsylvania, Ohio, North Carolina, Illinois, Texas, New Jersey, Florida, Indiana, and five other states. Acquired AquaSource, 7/03; Consumers Water, 4/99; and others. Water supply revenues '13: residential, 60.3%; commercial, 15.8%; industrial & other, 23.9%. Officers and directors own .8% of the common stock; Vangurad Group, 6.6%; State Street Capital Corp., 6.3%; Blackrock, Inc, 6.1% (4/14 Proxy). Chairman & Chief Executive Officer: Nicholas DeBenedictis. Incorporated: Pennsylvania. Address: 762 West Lancaster Avenue, Bryn Mawr, Pennsylvania 19010. Telephone: 610-525-1400. Internet: www.aquaamerica.com.

Aqua America is continuing to expand via acquisitions. A very high percentage of water systems in the U.S. is owned by small towns and cities. Aqua America has been benefiting from this environment by making deals with financially strapped government entities that do not have the wherewithal to upgrade their antiquated water systems. In May, the utility agreed to purchase Illinois-based North Maine Utilities for $22 million and to invest an additional $10 million into improving the system. Aqua made 15 acquisitions last year and is expected to match that figure in 2014.

A promising new market has stumbled of late. When a new oil or gas site is being drilled using the hydraulic fracking method, five million gallons of water is required for each well. Aqua realized that drillers are willing to pay a premium to have a water company extend its pipelines into their oil fields. Aqua has installed new pipelines in the Marcellus Shale, as a result. Drilling activity has been less than expected, however, due to low natural gas prices. This has led to Aqua posting losses in this sector in the latest quarter. Over the long term, we remain very optimistic about this operation as Aqua has identified 575 wells yet to be tapped.

Capital outlays will remain large. The company expects to spend close to $1 billion over the next three years, mostly to upgrade its existing facilities. Since Aqua's finances have improved significantly over the previous four years, the balance sheet should be able to take on more debt and still remain healthy.

Dividend growth prospects are encouraging. Even with its large construction program, we think that Aqua will be able to maintain hikes in the annual payout in the 8% to 10% range over the long pull.

Aqua shares offer attractive total return potential over the next three- to five- year period. Recently, the yield spread between high- and low- quality water utilities has been very compressed. This means that investors only have to sacrifice a minimum amount of current yield for the strong dividend growth prospects that this stock offers.

James A. Flood *July 18, 2014*

(A) Diluted egs. Excl. nonrec. gains (losses): '99, (9¢); '00, 2¢; '01, 2¢; '02, 4¢; '03, 3¢; '12, 18¢. Excl. gain from disc. operations: '12, 7¢; '13, 9¢. May not sum due to rounding. Next earnings report due early August.
(B) Dividends historically paid in early March, June, Sept. & Dec. ■ Div'd. reinvestment plan available (5% discount).
(C) In millions, adjusted for stock splits.

Company's Financial Strength	B++
Stock's Price Stability	100
Price Growth Persistence	60
Earnings Predictability	95

ARTESIAN RES. CORP. NDQ--ARTNA

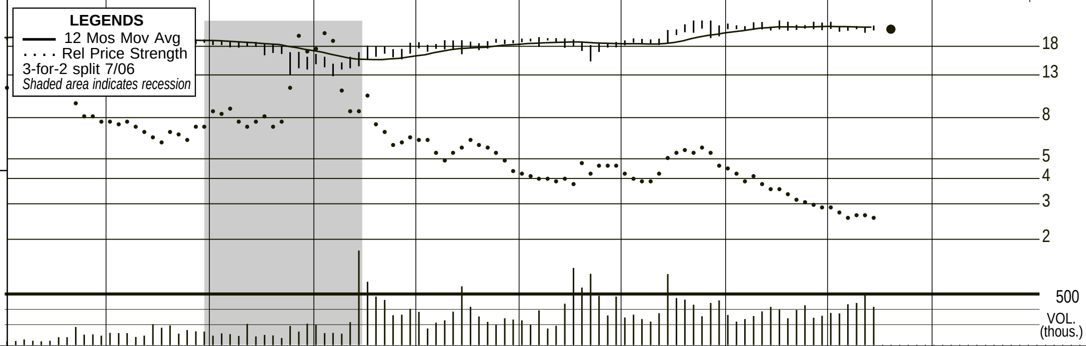
RECENT PRICE **21.91** | TRAILING P/E RATIO **22.6** | RELATIVE P/E RATIO **1.10** | DIV'D YLD **3.9%** | VALUE LINE

	22.33	20.67	19.31	18.73	19.59	19.99	24.43	24.27	23.82	High
	17.90	18.26	13.00	12.81	16.43	15.16	18.20	21.52	21.03	Low

RANKS

PERFORMANCE	3	Average
Technical	3	Average
SAFETY	3	Average
BETA .55		(1.00 = Market)

Financial Strength	B
Price Stability	90
Price Growth Persistence	40
Earnings Predictability	85



© VALUE LINE PUBLISHING LLC	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015/2016
SALES PER SH	7.77	7.20	7.59	8.11	8.48	7.56	8.10	7.82	--	
"CASH FLOW" PER SH	1.75	1.57	1.65	1.84	1.92	1.64	2.04	1.87	--	
EARNINGS PER SH	.97	.90	.86	.97	1.00	.83	1.13	.94	***1.16*** A,B	***1.25*** C/NA
DIV'DS DECL'D PER SH	.61	.66	.71	.72	.75	.76	.79	.82	--	
CAP'L SPENDING PER SH	5.08	3.66	6.09	2.32	2.57	1.83	2.36	2.40	--	
BOOK VALUE PER SH	10.15	11.66	11.86	12.15	12.44	13.12	13.57	13.80	--	
COMMON SHS OUTST'G (MILL)	6.09	7.30	7.40	7.51	7.65	8.61	8.71	8.83	--	
AVG ANN'L P/E RATIO	20.3	21.5	20.1	16.4	18.2	22.5	18.3	23.9	***18.9***	***17.5/NA***
RELATIVE P/E RATIO	1.10	1.14	1.21	1.09	1.16	1.41	1.17	1.34	--	
AVG ANN'L DIV'D YIELD	3.1%	3.4%	4.1%	4.5%	4.1%	4.1%	3.8%	3.7%	--	
SALES ($MILL)	47.3	52.5	56.2	60.9	64.9	65.1	70.6	69.1	--	***Bold figures are consensus earnings estimates and, using the recent prices, P/E ratios.***
OPERATING MARGIN	45.6%	45.6%	45.1%	46.9%	46.5%	45.5%	48.7%	47.0%	--	
DEPRECIATION ($MILL)	4.6	5.2	5.8	6.6	7.0	7.4	7.9	8.3	--	
NET PROFIT ($MILL)	6.1	6.3	6.4	7.3	7.6	6.7	9.8	8.3	--	
INCOME TAX RATE	39.0%	39.8%	40.8%	40.1%	40.0%	40.8%	40.2%	40.2%	--	
NET PROFIT MARGIN	12.8%	11.9%	11.4%	11.9%	11.7%	10.4%	14.0%	12.0%	--	
WORKING CAP'L ($MILL)	d8.8	2.5	d20.9	d23.3	d27.9	d11.4	d11.4	d12.3	--	
LONG-TERM DEBT ($MILL)	92.1	91.8	107.6	106.0	105.1	106.5	106.3	105.5	--	
SHR. EQUITY ($MILL)	61.8	85.1	87.8	91.2	95.1	113.0	118.2	121.8	--	
RETURN ON TOTAL CAP'L	5.8%	5.3%	4.7%	5.2%	5.6%	4.6%	5.9%	5.1%	--	
RETURN ON SHR. EQUITY	9.8%	7.4%	7.3%	8.0%	8.0%	6.0%	8.3%	6.8%	--	
RETAINED TO COM EQ	3.8%	2.1%	1.4%	2.1%	2.0%	.5%	2.5%	.9%	--	
ALL DIV'DS TO NET PROF	61%	71%	81%	74%	75%	92%	70%	87%	--	

A No. of analysts changing earn. est. in last 4 days: 0 up, 0 down, consensus 5-year earnings growth not available. B Based upon 4 analysts' estimates. C Based upon 3 analysts' estimates.

ANNUAL RATES

of change (per share)	5 Yrs.	1 Yr.
Sales	1.0%	-3.5%
"Cash Flow"	2.5%	-8.0%
Earnings	1.0%	-17.0%
Dividends	3.5%	4.0%
Book Value	4.0%	1.5%

Fiscal Year	QUARTERLY SALES ($mill.) 1Q	2Q	3Q	4Q	Full Year
12/31/12	16.7	17.9	19.0	17.0	70.6
12/31/13	16.3	17.8	18.1	16.9	69.1
12/31/14	16.9				
12/31/15					

Fiscal Year	EARNINGS PER SHARE 1Q	2Q	3Q	4Q	Full Year
12/31/11	.14	.23	.26	.20	.83
12/31/12	.28	.32	.33	.20	1.13
12/31/13	.20	.28	.29	.17	.94
12/31/14	.23	***.31***	***.37***	***.25***	
12/31/15					

Cal-endar	QUARTERLY DIVIDENDS PAID 1Q	2Q	3Q	4Q	Full Year
2011	.19	.19	.19	.193	.76
2012	.193	.198	.198	.203	.79
2013	.203	.206	.206	.209	.82
2014	.209	.212			

INSTITUTIONAL DECISIONS

	3Q'13	4Q'13	1Q'14
to Buy	30	17	28
to Sell	27	34	25
Hld's(000)	3033	2952	3092

ASSETS ($mill.)	2012	2013	3/31/14
Cash Assets	.6	.4	.5
Receivables	8.7	8.1	7.6
Inventory	1.4	1.5	1.6
Other	2.8	3.3	2.3
Current Assets	13.5	13.3	12.0
Property, Plant & Equip, at cost	454.4	472.9	- -
Accum Depreciation	83.8	89.8	- -
Net Property	370.6	383.1	383.5
Other	7.6	7.4	7.6
Total Assets	391.7	403.8	403.1
LIABILITIES ($mill.)			
Accts Payable	3.5	4.1	3.5
Debt Due	12.6	12.2	10.1
Other	8.8	9.3	9.0
Current Liab	24.9	25.6	22.6

LONG-TERM DEBT AND EQUITY as of 3/31/14

Total Debt $115.6 mill. **Due in 5 Yrs.** NA
LT Debt $105.5 mill.
Including Cap. Leases NA
(46% of Cap'l)

Leases, Uncapitalized Annual rentals NA

Pension Liability $.3 mill. in '13 vs. $.4 mill. in '12

Pfd Stock None **Pfd Div'd Paid** None

Common Stock 8,863,769 shares
(54% of Cap'l)

INDUSTRY: Water Utility

BUSINESS: Artesian Resources Corporation, through its subsidiaries, provides water, wastewater, and other services on the Delmarva Peninsula. It distributes and sells water to residential, commercial, industrial, municipal, and utility customers in Delaware, Maryland, and Pennsylvania. The company also offers water for public and private fire protection to customers in its service territories. In addition, it provides contract water and wastewater services, water and sewer service line protection plans, and wastewater management services, as well as design, construction, and engineering services. As of December 31, 2013, the company served approximately 79,700 metered water customers through 1,182 miles of transmission and distribution mains. Has 239 employees. Chairman, C.E.O. & President: Dian C. Taylor. Address: 664 Churchmans Rd., Newark, DE 19702. Tel.: (302) 453-6900. Internet: http://www.artesianwater.com.

N.A.

July 18, 2014

TOTAL SHAREHOLDER RETURN

Dividends plus appreciation as of 6/30/2014

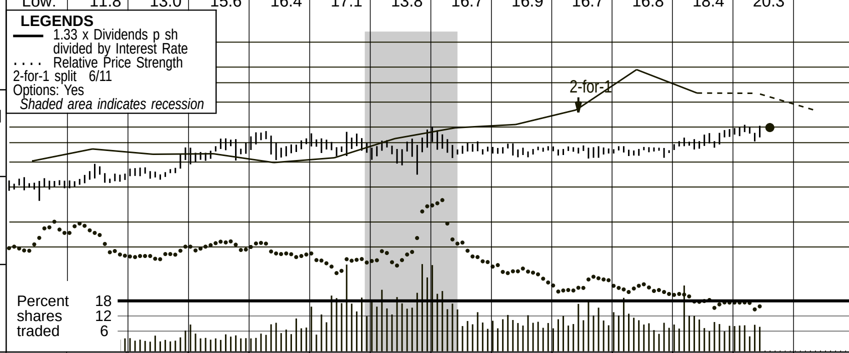
3 Mos.	6 Mos.	1 Yr.	3 Yrs.	5 Yrs.
1.07%	-0.13%	4.79%	40.01%	72.07%

CALIFORNIA WATER NYSE-CWT

RECENT PRICE 23.82 | P/E RATIO 23.8 (Trailing: 26.5, Median: 20.0) | RELATIVE P/E RATIO 1.27 | DIV'D YLD 2.8% | VALUE LINE

TIMELINESS 3 Raised 6/20/14
SAFETY 3 Lowered 7/27/07
TECHNICAL 2 Raised 7/4/14
BETA .70 (1.00 = Market)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
High:	15.7	19.0	21.1	22.9	22.7	23.3	24.1	19.8	19.4	19.3	23.4	24.8
Low:	11.8	13.0	15.6	16.4	17.1	13.8	16.7	16.9	16.7	16.8	18.4	20.3



2017-19 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	35	(+45%)	12%
Low	25	(+5%)	4%

Insider Decisions

	A	S	O	N	D	J	F	M	A
to Buy	0	1	0	0	0	0	0	0	0
Options	1	0	0	0	0	0	0	1	0
to Sell	0	0	0	0	0	0	0	0	0

Institutional Decisions

	3Q2013	4Q2013	1Q2014
to Buy	60	74	64
to Sell	51	52	58
Hld's(000)	27841	27908	29389

Target Price Range 2017 2018 2019
64 48 40 32 24 20 16 12 8 6

% TOT. RETURN 6/14

	THIS STOCK	VL ARITH.* INDEX
1 yr.	27.8	25.1
3 yr.	42.6	52.6
5 yr.	54.7	168.7

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	© VALUE LINE PUB. LLC	17-19
7.38	7.98	8.08	8.13	8.67	8.18	8.59	8.72	8.10	8.88	9.90	10.82	11.05	12.00	13.34	12.23	*12.60*	*13.25*	Revenues per sh	*16.50*
1.30	1.37	1.26	1.10	1.32	1.26	1.42	1.52	1.36	1.56	1.86	1.93	1.93	2.07	2.32	2.21	*2.20*	*2.40*	"Cash Flow" per sh	*3.00*
.73	.77	.66	.47	.63	.61	.73	.74	.67	.75	.95	.98	.91	.86	1.02	1.02	*1.00*	*1.20*	Earnings per sh A	*1.50*
.54	.54	.55	.56	.56	.56	.57	.57	.58	.58	.59	.59	.60	.62	.63	.64	*.65*	*.68*	Div'd Decl'd per sh B ■	*.94*
1.37	1.72	1.23	2.04	2.91	2.19	1.87	2.01	2.14	1.84	2.41	2.66	2.97	2.83	3.04	2.58	*2.65*	*3.35*	Cap'l Spending per sh	*3.20*
6.69	6.71	6.45	6.48	6.56	7.22	7.83	7.90	9.07	9.25	9.72	10.13	10.45	10.76	11.28	12.54	*12.90*	*13.30*	Book Value per sh C	*15.10*
25.24	25.87	30.29	30.36	30.36	33.86	36.73	36.78	41.31	41.33	41.45	41.53	41.67	41.82	41.98	47.74	*48.00*	*48.00*	Common Shs Outst'g D	*50.00*
17.8	17.8	19.6	27.1	19.8	22.1	20.1	24.9	29.2	26.1	19.8	19.7	20.3	21.3	17.9	20.1	*Bold figures are*		Avg Ann'l P/E Ratio	*20.0*
.93	1.01	1.27	1.39	1.08	1.26	1.06	1.33	1.58	1.39	1.19	1.31	1.29	1.34	1.14	1.13	*Value Line*		Relative P/E Ratio	*1.25*
4.2%	4.0%	4.3%	4.4%	4.5%	4.2%	3.9%	3.1%	2.9%	3.0%	3.1%	3.1%	3.2%	3.4%	3.5%	3.1%	*estimates*		Avg Ann'l Div'd Yield	*3.1%*

CAPITAL STRUCTURE as of 3/31/14
Total Debt $497.6 mill. **Due in 5 Yrs** $89.3 mill.
LT Debt $425.7 mill. **LT Interest** $28.0 mill.
(LT interest earned: 3.4x; total int. cov.: 3.2x)
(42% of Cap'l)
Pension Assets-12/13 $266.2 mill.
Oblig. $383.2 mill.
Pfd Stock None

Common Stock 47,803,849 shs.
as of 4/27/14

MARKET CAP: $1.1 billion (Mid Cap)

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		17-19
315.6	320.7	334.7	367.1	410.3	449.4	460.4	501.8	560.0	584.1	*605*	*635*	Revenues ($mill) E	*825*
26.0	27.2	25.6	31.2	39.8	40.6	37.7	36.1	42.6	47.3	*48.0*	*58.0*	Net Profit ($mill)	*75.0*
39.6%	42.4%	37.4%	39.9%	37.7%	40.3%	39.5%	40.5%	37.5%	30.3%	*34.5%*	*38.0%*	Income Tax Rate	*39.0%*
3.2%	3.3%	10.6%	8.3%	8.6%	7.6%	4.2%	7.6%	8.0%	4.3%	*7.0%*	*8.5%*	AFUDC % to Net Profit	*7.0%*
48.6%	48.3%	43.5%	42.9%	41.6%	47.1%	52.4%	51.7%	47.8%	41.6%	*43.0%*	*45.5%*	Long-Term Debt Ratio	*49.0%*
50.8%	51.1%	55.9%	56.6%	58.4%	52.9%	47.6%	48.3%	52.2%	58.4%	*57.0%*	*54.5%*	Common Equity Ratio	*51.0%*
565.9	568.1	670.1	674.9	690.4	794.9	914.7	931.5	908.2	1024.9	*1030*	*1185*	Total Capital ($mill)	*1435*
800.3	862.7	941.5	1010.2	1112.4	1198.1	1294.3	1381.1	1457.1	1515.8	*1570*	*1600*	Net Plant ($mill)	*1850*
6.1%	6.3%	5.2%	5.9%	7.1%	6.5%	5.5%	5.5%	6.3%	6.0%	*6.0%*	*7.5%*	Return on Total Cap'l	*6.5%*
8.9%	9.3%	6.8%	8.1%	9.9%	9.6%	8.6%	8.0%	9.0%	7.9%	*8.0%*	*9.0%*	Return on Shr. Equity	*10.0%*
9.0%	9.3%	6.8%	8.1%	9.9%	9.6%	8.6%	8.0%	9.0%	7.9%	*8.0%*	*9.0%*	Return on Com Equity	*10.0%*
2.1%	2.1%	1.0%	1.8%	3.8%	3.8%	3.0%	2.3%	3.4%	3.4%	*3.0%*	*5.0%*	Retained to Com Eq	*4.0%*
77%	78%	86%	77%	61%	60%	66%	71%	62%	56%	*65%*	*57%*	All Div'ds to Net Prof	*63%*

CURRENT POSITION ($MILL.)	2012	2013	3/31/14
Cash Assets	38.8	27.5	21.7
Other	107.8	112.0	108.4
Current Assets	146.6	139.5	130.1
Accts Payable	46.8	55.1	50.7
Debt Due	136.3	54.7	71.9
Other	59.7	56.8	69.6
Current Liab.	242.8	166.6	192.2
Fix. Chg. Cov.	296%	301%	299%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '11-'13 to '17-'19
Revenues	4.0%	7.0%	*4.5%*
"Cash Flow"	6.0%	6.5%	*5.5%*
Earnings	5.5%	4.0%	*7.5%*
Dividends	1.0%	1.5%	*7.0%*
Book Value	5.5%	4.5%	*4.5%*

Cal-endar	QUARTERLY REVENUES ($ mill.)E Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2011	98.1	131.4	169.3	103.0	501.8
2012	116.8	143.6	178.1	121.5	560.0
2013	111.4	154.6	184.4	133.7	584.1
2014	110.5	*155*	*195*	*144.5*	*605*
2015	*125*	*160*	*200*	*150*	*635*

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2011	.03	.29	.50	.04	.86
2012	.03	.31	.56	.12	1.02
2013	.01	.28	.61	.12	1.02
2014	d.11	*.27*	*.66*	*.18*	*1.00*
2015	*.05*	*.30*	*.67*	*.18*	*1.20*

Cal-endar	QUARTERLY DIVIDENDS PAID B ■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2010	.149	.149	.149	.149	.60
2011	.154	.154	.154	.154	.62
2012	.1575	.1575	.1575	.1575	.63
2013	.16	.16	.16	.16	.64
2014	.1625	.1625			

BUSINESS: California Water Service Group provides regulated and nonregulated water service to roughly 471,900 customers in 83 communities in California, Washington, New Mexico, and Hawaii. Main service areas: San Francisco Bay area, Sacramento Valley, Salinas Valley, San Joaquin Valley & parts of Los Angeles. Acquired Rio Grande Corp; West Hawaii Utilities (9/08). Revenue breakdown, '13: residential, 70%; business, 19%; public authorities, 5%; industrial, 5%; other 1%. '13 reported depreciation rate: 3.8%. Has 1,131 employees. President, Chairman, and Chief Executive Officer: Peter C. Nelson. Inc.: Delaware. Address: 1720 North First Street, San Jose, California 95112-4598. Telephone: 408-367-8200. Internet: www.calwatergroup.com.

State regulators still have not ruled on California Water's petition for higher rates. In early July 2012, the utility filed a rate case with the California Public Utility Commission (CPUC) seeking increases in customers' bills of $92.7 million, $17.2 million and $16.9 million, in 2014, 2015, and 2016, respectively. Due to the size of the hikes, California Water worked with six different entities affected by the hikes, including the Office of Ratepayers Advocates. After lengthy negotiations, an agreement was reached with all parties involved in the discussions. According to the deal, annual rates would be raised by $45 million, $10 million, and $10 million over the 2014-2016 period. An administrative law judge has also recently signed off on the settlement.

The utility's fate continues to be in hands of regulators. Despite all of California Water's efforts, the CPUC has the final authority and is not bound by the recommendations mentioned above. Indeed, we are surprised by the delay in the final ruling.

Meanwhile, the first quarter was a major disappointment. Without the full rate relief, California Water lost $0.11 a share in the March period. And, while the increased costs should eventually be recovered, the time frame appears to now be 12 to 24 months, instead of collected over the remainder of 2014.

We are slashing our earnings estimate for 2014. Due to the CPUC's delay, we now expect the company's share earnings to only reach $1.00, $0.20 less than our previous number. We are also reducing our forecast for 2015 by $0.10, to $1.20.

Severe drought conditions in California should not have a near-term impact on the company. That's because mechanisms are in place that permit any increased costs related to the water shortage to be passed along to customers.

California Water shares hold modest appeal at this juncture. Investors might want to steer clear of this stock until the CPUC issues a final ruling. Moreover, the company's recent annual dividend increase of 1.6% was extremely unimpressive. For those insisting on owning a water utility, there are much better selections available in the group, in our opinion.

James A. Flood *July 18, 2014*

(A) Basic EPS. Excl. nonrecurring gain (loss): '00, (4¢); '01, 2¢; '02, 4¢; '11, 4¢. Next earnings report due mid-August. **(B)** Dividends historically paid in late Feb., May, Aug., and Nov.
■ Div'd reinvestment plan available.
(C) Incl. intangible assets. In '13: $18.2 mill., $0.38/sh.
(D) In millions, adjusted for splits.
(E) Excludes non-reg. rev.

Company's Financial Strength	B++
Stock's Price Stability	100
Price Growth Persistence	50
Earnings Predictability	90

CONNECTICUT WATER NDQ-CTWS

RECENT PRICE	33.21	P/E RATIO	19.0 (Trailing: 19.7; Median: 22.0)	RELATIVE P/E RATIO	1.01	DIV'D YLD	3.1%	VALUE LINE

TIMELINESS 2 Raised 12/13/13
SAFETY 3 New 1/18/13
TECHNICAL 3 Lowered 3/14/14
BETA .65 (1.00 = Market)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
High:	30.4	29.8	28.2	27.7	25.6	29.0	26.4	27.9	29.1	32.8	36.4	35.5
Low:	24.0	23.8	21.9	20.3	22.4	19.3	17.3	20.0	23.3	26.2	27.8	31.3

Target Price Range 2017 | 2018 | 2019

2017-19 PROJECTIONS

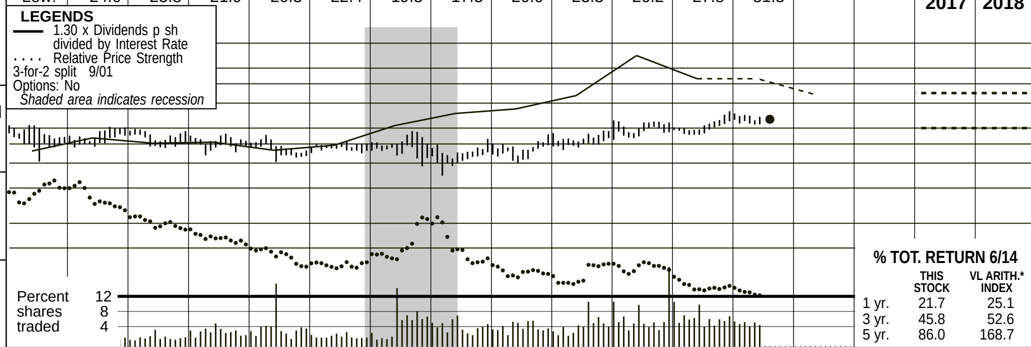
	Price	Gain	Ann'l Total Return
High	45	(+35%)	11%
Low	30	(-10%)	1%

Insider Decisions

	A	S	O	N	D	J	F	M	A
to Buy	0	0	0	0	0	0	0	0	0
Options	0	0	0	2	0	0	0	0	0
to Sell	0	0	0	2	0	0	0	0	0

Institutional Decisions

	3Q2013	4Q2013	1Q2014
to Buy	42	41	44
to Sell	31	35	27
Hld's(000)	4509	4350	4324



% TOT. RETURN 6/14

	THIS STOCK	VL ARITH.* INDEX
1 yr.	21.7	25.1
3 yr.	45.8	52.6
5 yr.	86.0	168.7

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	© VALUE LINE PUB. LLC	17-19
5.58	5.87	5.70	5.93	5.77	5.91	6.04	5.81	5.68	7.05	7.24	6.93	7.65	7.93	9.47	8.29	*8.45*	*8.70*	Revenues per sh	*11.65*
1.59	1.65	1.73	1.78	1.78	1.89	1.91	1.62	1.52	1.90	1.95	1.93	2.04	2.11	2.64	2.63	*2.75*	*2.85*	"Cash Flow" per sh	*3.00*
1.02	1.03	1.09	1.13	1.12	1.15	1.16	.88	.81	1.05	1.11	1.19	1.13	1.13	1.53	1.66	*1.75*	*1.85*	Earnings per sh A	*1.95*
.78	.79	.79	.80	.81	.83	.84	.85	.86	.87	.88	.90	.92	.94	.96	.98	*1.01*	*1.04*	Div'd Decl'd per sh B■	*1.16*
1.12	1.42	1.43	1.86	1.98	1.49	1.58	1.96	1.96	2.24	2.44	3.28	3.06	2.61	2.79	3.02	*2.95*	*2.90*	Cap'l Spending per sh	*2.75*
8.52	8.61	8.92	9.25	10.06	10.46	10.94	11.52	11.60	11.95	12.23	12.67	13.05	13.50	20.95	17.92	*18.95*	*20.85*	Book Value per sh D	*23.75*
6.80	7.26	7.28	7.65	7.94	7.97	8.04	8.17	8.27	8.38	8.46	8.57	8.68	8.76	8.85	11.04	*11.25*	*11.50*	Common Shs Outst'g C	*12.00*
15.5	18.2	18.2	21.5	24.3	23.5	22.9	28.6	29.0	23.0	22.2	18.4	20.7	23.0	19.4	18.4	*Bold figures are*		Avg Ann'l P/E Ratio	*20.0*
.81	1.04	1.18	1.10	1.33	1.34	1.21	1.52	1.57	1.22	1.34	1.23	1.32	1.44	1.23	1.03	*Value Line*		Relative P/E Ratio	*1.25*
4.9%	4.2%	4.0%	3.3%	3.0%	3.0%	3.1%	3.4%	3.6%	3.6%	3.6%	4.1%	3.9%	3.6%	3.2%	3.2%	*estimates*		Avg Ann'l Div'd Yield	*3.1%*
						48.5	47.5	46.9	59.0	61.3	59.4	66.4	69.4	83.8	91.5	*95.0*	*100*	Revenues ($mill)	*140*
						9.4	7.2	6.7	8.8	9.4	10.2	9.8	9.9	13.6	18.3	*19.5*	*21.0*	Net Profit ($mill)	*23.5*
						22.9%	- -	23.5%	32.4%	27.2%	19.5%	35.2%	41.3%	32.0%	28.0%	*30.0%*	*31.0%*	Income Tax Rate	*33.0%*
						- -	- -	- -	- -	1.7%	- -	- -	- -	1.7%	2.0%	*2.0%*	*2.0%*	AFUDC % to Net Profit	*2.0%*
						42.8%	44.9%	44.4%	47.8%	46.9%	50.6%	49.5%	53.2%	49.0%	46.9%	*45.5%*	*43.5%*	Long-Term Debt Ratio	*43.0%*
						56.7%	54.6%	55.1%	51.8%	52.7%	49.1%	50.2%	46.5%	50.8%	52.9%	*54.5%*	*56.5%*	Common Equity Ratio	*57.0%*
						155.1	172.3	174.1	193.2	196.5	221.3	225.6	254.2	364.6	373.6	*390*	*420*	Total Capital ($mill)	*500*
						246.1	247.7	268.1	284.3	302.3	325.2	344.2	362.4	447.9	471.9	*490*	*490*	Net Plant ($mill)	*575*
						7.0%	5.0%	4.9%	5.5%	5.9%	5.5%	5.4%	4.9%	4.8%	5.9%	*6.0%*	*6.0%*	Return on Total Cap'l	*6.0%*
						10.6%	7.5%	6.9%	8.7%	9.0%	9.3%	8.6%	8.3%	7.3%	9.2%	*10.0%*	*9.0%*	Return on Shr. Equity	*8.5%*
						10.6%	7.6%	7.0%	8.7%	9.1%	9.4%	8.7%	8.3%	7.3%	9.2%	*10.0%*	*9.0%*	Return on Com Equity	*8.5%*
						3.1%	.3%	NMF	1.6%	1.9%	2.3%	1.6%	1.4%	2.8%	3.8%	*4.0%*	*3.5%*	Retained to Com Eq	*3.5%*
						71%	95%	105%	82%	79%	76%	81%	83%	62%	59%	*58%*	*58%*	All Div'ds to Net Prof	*59%*

CAPITAL STRUCTURE as of 3/31/14
Total Debt $178.5 mill. **Due in 5 Yrs** $18.6 mill.
LT Debt $174.4 mill. **LT Interest** $7.2 mill.
(Total interest coverage: 4.4x)
(47% of Cap'l)
Leases, Uncapitalized: Annual rentals $.1 mill.
Pension Assets $56.8 mill.
Oblig. $64.2 mill.

Pfd Stock $0.8 mill. **Pfd Divd** NMF

Common Stock 11,080,435 shs.
as of 4/30/14
MARKET CAP: $375 million (Small Cap)

CURRENT POSITION ($MILL.)	2012	2013	3/31/14
Cash Assets	13.2	18.4	15.3
Accounts Receivable	11.5	12.3	11.4
Other	11.7	16.2	17.1
Current Assets	36.4	46.9	43.8
Accts Payable	10.0	10.8	6.5
Debt Due	3.0	4.1	4.1
Other	2.9	7.8	9.9
Current Liab.	15.9	22.7	20.5
Fix. Chg. Cov.	408%	375%	375%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '11-'13 to '17-'19
Revenues	4.0%	5.0%	*5.5%*
"Cash Flow"	3.0%	6.5%	*3.5%*
Earnings	2.5%	8.0%	*5.0%*
Dividends	1.5%	2.0%	*3.0%*
Book Value	6.0%	8.0%	*5.5%*

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun. 30	Sep. 30	Dec. 31	Full Year
2011	16.0	17.4	20.6	15.4	69.4
2012	18.5	21.3	24.5	19.5	83.8
2013	19.7	22.6	27.6	21.6	91.5
2014	20.3	*23.7*	*29.0*	*22.0*	*95.0*
2015	*22.0*	*25.0*	*30.0*	*23.0*	*100*

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun. 30	Sep. 30	Dec. 31	Full Year
2011	.26	.37	.39	.11	1.13
2012	.22	.47	.67	.17	1.53
2013	.24	.39	.86	.17	1.66
2014	.27	*.47*	*.76*	*.25*	*1.75*
2015	*.32*	*.48*	*.78*	*.27*	*1.85*

Cal-endar	QUARTERLY DIVIDENDS PAID B Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2010	.228	.228	.233	.233	.922
2011	.233	.233	.238	.238	.942
2012	.238	.238	.2425	.2425	.962
2013	.2425	.2425	.2475	.2475	.98
2014	.2475	.2475			

BUSINESS: Connecticut Water Service, Inc. is a non-operating holding company, whose income is derived from earnings of its wholly-owned subsidiary companies (regulated water utilities). Its largest subsidiary, Connecticut Water, accounted for about 85% of the holding company's net income in 2012, and provides water services to 400,000 people in 55 towns throughout Connecticut and Maine. Acquired The Maine Water Co., 1/12; Biddeford and Saco Water, 12/12. Inc.: CT. Has about 260 employees. Chairman/President/CEO: Eric W. Thornburg. Officers and directors own 2.2% of the common stock; BlackRock, Inc. 6.7%; The Vanguard Group, 5.3% (4/13 proxy). Address: 93 West Main Street, Clinton, CT 06413. Telephone: (860) 669-8636. Internet: www.ctwater.com.

Connecticut Water Services continues to benefit from a past regulatory ruling. Last year, the utility agreed to lower customer bills and not seek higher rates before 2015 in order to keep the benefits resulting from a tax refund. The settlement appeared to have worked out for both Connecticut Water and its customers. Indeed, in 2013, the company was able to break out of a five-year run of sluggish profits.

A more constructive regulatory environment could be a major positive. Connecticut's regulatory climate is rated as below average by *Value Line*. (This includes rulings on both electric and water utilities.) Should the Nutmeg state continue the trend of working with utilities, Connecticut Water's long-term prospects would be enhanced.

Earnings should show steady, mid-single-digit gains over this year and next. In Maine, which is responsible for 20% of total revenues, the company has merged its two water utilities. This should eliminate regulatory redundancies and help lower costs. Moreover, as the company continues to expand, it will be earning a return on a larger asset base. All told, we expect share net to increase by over 5%, in both 2014 and 2015.

Long-term dividend growth will probably be below the industry average. Connecticut Water's dividend history over the past five and 10 years has been not been nearly as robust as its peers. As profits continue to move higher, though, there should be more room for payout hikes. Investors should take note of the next board of directors' meeting in August, when the annual dividend increase will be announced. We think the company will finally break the five-year pattern of only increasing the dividend by $0.02 a share.

Connecticut Water is expanding its customer base. The company is currently working on two projects aimed at increasing revenues. Pipelines are being extended so that the town of Mansfield will become a new customer. A deal has also been reached to supply water to the University of Connecticut's main campus in Storrs.

These shares are timely. The stock has underperformed of late, making it somewhat appealing on a relative basis.

James A. Flood *July 18, 2014*

(A) Diluted earnings. Next earnings report due late July. Quarterly earnings do no add in '12 due to rounding.
(B) Dividends historically paid in mid-March, June, September, and December. ■ Div'd reinvestment plan available.
(C) In millions, adjusted for split.
(D) Includes intangibles. In '13: $31.7 million/$2.87 a share.

Company's Financial Strength	B+
Stock's Price Stability	90
Price Growth Persistence	40
Earnings Predictability	85

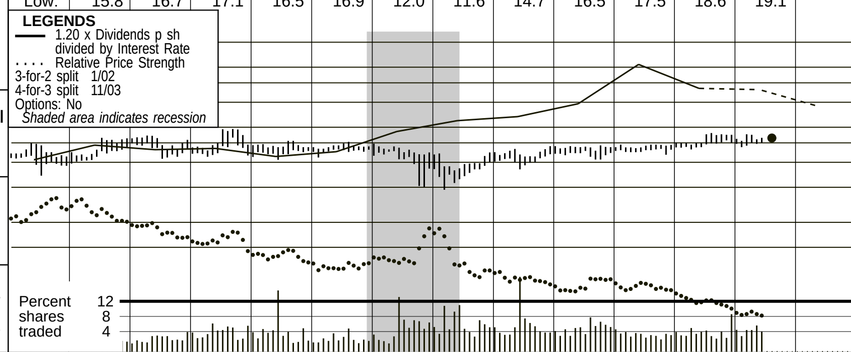
MIDDLESEX WATER NDQ-MSEX

RECENT PRICE	21.14	P/E RATIO	19.2 (Trailing: 20.5) (Median: 21.0)	RELATIVE P/E RATIO	1.02	DIV'D YLD	3.6%	VALUE LINE

TIMELINESS **3** Lowered 4/11/14
SAFETY **2** New 10/21/11
TECHNICAL **3** Lowered 7/18/14
BETA .70 (1.00 = Market)

High:	21.2	21.8	23.5	20.5	20.2	19.8	17.9	19.3	19.4	19.6	22.5	22.1
Low:	15.8	16.7	17.1	16.5	16.9	12.0	11.6	14.7	16.5	17.5	18.6	19.1

Target Price Range
2017 | 2018 | 2019



2017-19 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	30	(+40%)	12%
Low	20	(-5%)	3%

Insider Decisions

	A	S	O	N	D	J	F	M	A
to Buy	1	0	0	0	1	0	0	0	0
Options	0	0	0	0	0	0	0	0	0
to Sell	2	0	0	0	2	0	0	0	0

Institutional Decisions

	3Q2013	4Q2013	1Q2014
to Buy	42	43	37
to Sell	29	32	34
Hld's(000)	6608	6384	6432

% TOT. RETURN 6/14

	THIS STOCK	VL ARITH.* INDEX
1 yr.	10.3	25.1
3 yr.	28.0	52.6
5 yr.	78.9	168.7

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	© VALUE LINE PUB. LLC	17-19
4.39	5.35	5.39	5.87	5.98	6.12	6.25	6.44	6.16	6.50	6.79	6.75	6.60	6.50	6.98	7.19	*7.75*	*8.00*	Revenues per sh	*9.35*
1.02	1.19	.99	1.18	1.20	1.15	1.28	1.33	1.33	1.49	1.53	1.40	1.55	1.46	1.56	1.72	*1.80*	*1.85*	"Cash Flow" per sh	*2.35*
.71	.76	.51	.66	.73	.61	.73	.71	.82	.87	.89	.72	.96	.84	.90	1.03	*1.10*	*1.15*	Earnings per sh A	*1.20*
.58	.60	.61	.62	.63	.65	.66	.67	.68	.69	.70	.71	.72	.73	.74	.75	*.76*	*.77*	Div'd Decl'd per sh B■	*.83*
2.68	2.33	1.32	1.25	1.59	1.87	2.54	2.18	2.31	1.66	2.12	1.49	1.90	1.50	1.36	1.26	*1.95*	*2.00*	Cap'l Spending per sh	*2.00*
6.80	6.95	6.98	7.11	7.39	7.60	8.02	8.26	9.52	10.05	10.03	10.33	11.13	11.27	11.48	11.82	*12.10*	*12.60*	Book Value per sh D	*13.20*
9.82	10.00	10.11	10.17	10.36	10.48	11.36	11.58	13.17	13.25	13.40	13.52	15.57	15.70	15.82	15.96	*16.10*	*16.25*	Common Shs Outst'g C	*17.00*
15.2	17.6	28.7	24.6	23.5	30.0	26.4	27.4	22.7	21.6	19.8	21.0	17.8	21.7	20.8	19.7	*Bold figures are Value Line estimates*		Avg Ann'l P/E Ratio	*22.0*
.79	1.00	1.87	1.26	1.28	1.71	1.39	1.46	1.23	1.15	1.19	1.40	1.13	1.36	1.32	1.11			Relative P/E Ratio	*1.40*
5.4%	4.4%	4.2%	3.8%	3.7%	3.5%	3.4%	3.5%	3.7%	3.7%	4.0%	4.7%	4.2%	4.0%	4.0%	3.7%			Avg Ann'l Div'd Yield	*3.3%*

CAPITAL STRUCTURE as of 3/31/14
Total Debt $161.9 mill. **Due in 5 Yrs** $56.4 mill.
LT Debt $129.0 mill. **LT Interest** $5.0 mill.
(LT interest earned: 6.0x)
(40% of Cap'l)

Pension Assets-12/13 $46.4 mill.
Oblig. $56.0 mill.
Pfd Stock $2.9 mill. **Pfd Div'd:** $.1 mill.

Common Stock 15,986,792 shs.
as of 4/30/14

MARKET CAP: $350 million (Small Cap)

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		17-19
71.0	74.6	81.1	86.1	91.0	91.2	102.7	102.1	110.4	114.8	*125*	*130*	Revenues ($mill)	*155*
8.4	8.5	10.0	11.8	12.2	10.0	14.3	13.4	14.4	16.6	*17.0*	*18.0*	Net Profit ($mill)	*20.5*
31.1%	27.6%	33.4%	32.6%	33.2%	34.1%	32.1%	32.7%	33.9%	34.1%	*34.0%*	*33.0%*	Income Tax Rate	*34.0%*
--	--	--	--	--	--	6.8%	6.1%	3.4%	1.9%	*1.0%*	*1.0%*	AFUDC % to Net Profit	*2.0%*
53.8%	55.3%	49.5%	49.0%	45.6%	46.6%	43.1%	42.3%	41.5%	40.4%	*42.5%*	*43.5%*	Long-Term Debt Ratio	*43.5%*
42.5%	41.3%	47.5%	49.6%	51.8%	52.1%	55.8%	56.6%	57.4%	58.7%	*57.0%*	*56.0%*	Common Equity Ratio	*56.0%*
214.5	231.7	264.0	268.8	259.4	267.9	310.5	312.5	316.5	321.4	*340*	*365*	Total Capital ($mill)	*400*
262.9	288.0	317.1	333.9	366.3	376.5	405.9	422.2	435.2	446.5	*455*	*450*	Net Plant ($mill)	*500*
5.1%	5.0%	5.1%	5.6%	5.8%	5.0%	5.7%	5.2%	5.4%	5.9%	*6.0%*	*6.0%*	Return on Total Cap'l	*6.5%*
8.5%	8.2%	7.5%	8.6%	8.6%	7.0%	8.1%	7.5%	7.8%	8.7%	*8.5%*	*8.5%*	Return on Shr. Equity	*9.0%*
9.0%	8.6%	7.8%	8.7%	8.9%	7.0%	8.2%	7.5%	7.8%	8.7%	*8.5%*	*8.5%*	Return on Com Equity	*9.0%*
.9%	.6%	1.3%	1.8%	2.0%	.1%	2.1%	1.0%	1.4%	2.4%	*2.5%*	*2.5%*	Retained to Com Eq	*3.0%*
90%	94%	84%	79%	78%	98%	75%	87%	83%	73%	*72%*	*70%*	All Div'ds to Net Prof	*69%*

CURRENT POSITION ($MILL.)	2012	2013	3/31/14
Cash Assets	3.0	4.8	5.9
Other	21.6	21.0	19.9
Current Assets	24.6	25.8	25.7
Accts Payable	3.8	6.3	5.6
Debt Due	11.1	33.8	32.9
Other	41.1	12.6	14.0
Current Liab.	56.0	52.7	52.5
Fix. Chg. Cov.	554%	697%	695%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '11-'13 to '17-'19
Revenues	1.5%	1.0%	*5.0%*
"Cash Flow"	3.0%	1.5%	*7.0%*
Earnings	3.5%	1.5%	*4.5%*
Dividends	1.5%	1.5%	*2.0%*
Book Value	4.5%	3.0%	*2.5%*

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun. 30	Sep. 30	Dec. 31	Full Year
2011	24.0	26.1	28.7	23.3	102.1
2012	23.5	27.4	32.4	27.1	110.4
2013	27.0	29.1	31.3	27.4	114.8
2014	27.1	*31.9*	*35.0*	*31.0*	*125*
2015	*30.0*	*33.0*	*37.0*	*30.0*	*130*

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun. 30	Sep. 30	Dec. 31	Full Year
2011	.11	.23	.32	.12	.84
2012	.11	.23	.38	.17	.90
2013	.20	.28	.36	.19	1.03
2014	.20	*.30*	*.40*	*.20*	*1.10*
2015	*.20*	*.32*	*.43*	*.20*	*1.15*

Cal-endar	QUARTERLY DIVIDENDS PAID B■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2010	.180	.180	.180	.183	.72
2011	.183	.183	.183	.185	.73
2012	.185	.185	.185	.1875	.74
2013	.1875	.1875	.1875	.19	.753
2014	.19	.19			

BUSINESS: Middlesex Water Company engages in the ownership and operation of regulated water utility systems in New Jersey, Delaware, and Pennsylvania. It also operates water and wastewater systems under contract on behalf of municipal and private clients in NJ and DE. Its Middlesex System provides water services to 60,000 retail customers, primarily in Middlesex County, New Jersey. In 2013, the Middlesex System accounted for 60% of operating revenues. At 12/31/13, the company had 279 employees. Incorporated: NJ. President, CEO, and Chairman: Dennis W. Doll. Officers & directors own 3.3% of the common stock; BlackRock, 7.4%; Vanguard 3.3%. (4/14 proxy). Add.: 1500 Ronson Road, Iselin, NJ 08830. Tel.: 732-634-1500. Internet: www.middlesexwater.com.

Middlesex Water was recently granted rate relief. On June 18th, the New Jersey State Board of Public Utilities (BPU) permitted the utility to raise customers' bills by 6.34%. Middlesex had originally sought a hike of 15.9%, but eventually lowered that figure to 12.1%. The ruling could have been more generous, but the 9.75% allowed return on equity was a positive, in our opinion.

Earnings growth will probably be decent for this year and next. In addition to the increase in New Jersey, Middlesex was granted higher rates in Delaware in February. These new revenues should enable the utility to more than compensate for the loss of sales resulting from the closing of a large oil refinery owned by Hess Corp and the expiration of a contract to supply water to the borough of Sayreville. All told, we think the company's share net will increase by 7% in 2014, and 5%, in 2015.

Annual dividend hikes should remain subpar, however. We think that 2014 will mark the seventh straight year in which the company raises the yearly payout by only $0.01. Though this streak could be broken next year, we estimate the hike will only average 2.0% through 2017-2019, well short of the norm for a water utility.

Capital expenditures are expected to spike this year and next. Like most of its peers, Middlesex has to invest heavily to upgrade and repair an outmoded infrastructure. Spending is expected to average $32 million in 2014 and 2015 compared to the $20 million required in 2013. The utility currently has a relatively low debt-to-total capital ratio, which means that its balance sheet is strong enough to withstand an increase in the debt load.

When it comes to yield, appearances can be deceiving. Middlesex continues to have the highest yield in the industry. This is not a positive, however, as it reflects investors' negative views regarding the company's dividend growth prospects. Hence, the market is demanding more current income as compensation. Even with the high current yield, we do not find the stock attractive in the year ahead nor over the next three- to five-year period.

James A. Flood *July 18, 2014*

(A) Diluted earnings. May not sum due to rounding. Next earnings report due mid-August.
(B) Dividends historically paid in mid-Feb., May, Aug., and November.■ Div'd reinvestment plan available.
(C) In millions, adjusted for splits.

Company's Financial Strength	B++
Stock's Price Stability	90
Price Growth Persistence	40
Earnings Predictability	80

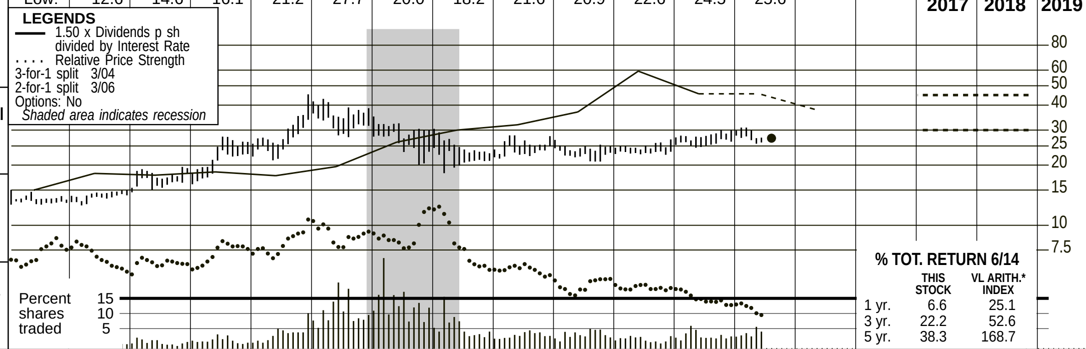
SJW CORP. NYSE-SJW

RECENT PRICE **27.30** | P/E RATIO **21.8** (Trailing: 25.3 / Median: 24.0) | RELATIVE P/E RATIO **1.16** | DIV'D YLD **2.8%** | VALUE LINE

TIMELINESS 3 Raised 6/20/14
SAFETY 3 New 4/22/11
TECHNICAL 2 Raised 7/4/14
BETA .80 (1.00 = Market)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
High:	15.0	19.6	27.8	45.3	43.0	35.1	30.4	28.2	26.8	26.9	30.1	30.9
Low:	12.6	14.6	16.1	21.2	27.7	20.0	18.2	21.6	20.9	22.6	24.5	25.6

Target Price Range 2017 | 2018 | 2019



2017-19 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	45	(+65%)	16%
Low	30	(+10%)	6%

Insider Decisions

	A	S	O	N	D	J	F	M	A
to Buy	0	0	0	1	0	0	0	0	0
Options	1	0	0	1	1	0	0	0	0
to Sell	1	0	0	1	1	0	0	0	0

Institutional Decisions

	3Q2013	4Q2013	1Q2014
to Buy	43	43	32
to Sell	29	30	39
Hld's(000)	10697	10770	10980

% TOT. RETURN 6/14

	THIS STOCK	VL ARITH.* INDEX
1 yr.	6.6	25.1
3 yr.	22.2	52.6
5 yr.	38.3	168.7

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	© VALUE LINE PUB. LLC	17-19
5.58	6.40	6.74	7.45	7.97	8.20	9.14	9.86	10.35	11.25	12.12	11.68	11.62	12.85	14.01	13.73	*14.30*	*14.55*	Revenues per sh	16.75
1.26	1.43	1.23	1.49	1.55	1.75	1.89	2.21	2.38	2.30	2.44	2.21	2.38	2.80	2.97	2.90	*3.40*	*3.45*	"Cash Flow" per sh	3.85
.76	.87	.58	.77	.78	.91	.87	1.12	1.19	1.04	1.08	.81	.84	1.11	1.18	1.12	*1.25*	*1.40*	Earnings per sh A	1.70
.39	.40	.41	.43	.46	.49	.51	.53	.57	.61	.65	.66	.68	.69	.71	.73	*.75*	*.77*	Div'd Decl'd per sh B■	.94
1.81	1.77	1.89	2.63	2.06	3.41	2.31	2.83	3.87	6.62	3.79	3.17	5.65	3.75	5.67	4.68	*5.20*	*5.10*	Cap'l Spending per sh	4.80
7.53	7.88	7.90	8.17	8.40	9.11	10.11	10.72	12.48	12.90	13.99	13.66	13.75	14.20	14.71	15.92	*17.05*	*18.20*	Book Value per sh	21.10
19.01	18.27	18.27	18.27	18.27	18.27	18.27	18.27	18.28	18.36	18.18	18.50	18.55	18.59	18.67	20.17	*21.00*	*22.00*	Common Shs Outst'g C	23.00
13.1	15.5	33.1	18.5	17.3	15.4	19.6	19.7	23.5	33.4	26.2	28.7	29.1	21.2	20.4	24.3	*Bold figures are*		Avg Ann'l P/E Ratio	22.0
.68	.88	2.15	.95	.94	.88	1.04	1.05	1.27	1.77	1.58	1.91	1.85	1.33	1.30	1.36	*Value Line*		Relative P/E Ratio	1.40
3.9%	3.0%	2.1%	3.0%	3.4%	3.5%	3.0%	2.4%	2.0%	1.7%	2.3%	2.8%	2.8%	2.9%	3.0%	2.7%	*estimates*		Avg Ann'l Div'd Yield	2.5%

CAPITAL STRUCTURE as of 3/31/14
Total Debt $372.4 mill. **Due in 5 Yrs** $21.2 mill.
LT Debt $334.9 mill. **LT Interest** $18.7 mill.
(Total interest coverage: 2.9x) (51% of Cap'l)

Leases, Uncapitalized: Annual rentals $5.5 mill.

Pension Assets $91.4 mill. **Oblig.** $128.7 mill.

Pfd Stock None.

Common Stock 20,203,134shs. as of 4/25/14

MARKET CAP: $550 million (Small Cap)

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		17-19
166.9	180.1	189.2	206.6	220.3	216.1	215.6	239.0	261.5	276.9	*300*	*320*	Revenues ($mill)	385
16.0	20.7	22.2	19.3	20.2	15.2	15.8	20.9	22.3	23.5	*26.0*	*31.0*	Net Profit ($mill)	39.0
42.1%	41.6%	40.8%	39.4%	39.5%	40.4%	38.8%	41.1%	41.1%	38.7%	*41.0%*	*40.0%*	Income Tax Rate	40.0%
2.1%	1.6%	2.1%	2.7%	2.3%	2.0%	- -	- -	2.0%	- -	*1.0%*	*1.5%*	AFUDC % to Net Profit	3.0%
43.7%	42.6%	41.8%	47.7%	46.0%	49.4%	53.7%	56.6%	55.0%	51.1%	*51.0%*	*52.0%*	Long-Term Debt Ratio	53.5%
56.3%	57.4%	58.2%	52.3%	54.0%	50.6%	46.3%	43.4%	45.0%	48.9%	*49.0%*	*48.0%*	Common Equity Ratio	46.5%
328.3	341.2	391.8	453.2	470.9	499.6	550.7	607.9	610.2	656.2	*730*	*835*	Total Capital ($mill)	1035
456.8	484.8	541.7	645.5	684.2	718.5	785.5	756.2	831.6	898.7	*960*	*1025*	Net Plant ($mill)	1200
6.5%	7.6%	7.0%	5.7%	5.8%	4.4%	4.3%	4.9%	5.0%	5.0%	*5.5%*	*5.5%*	Return on Total Cap'l	6.0%
8.7%	10.6%	9.7%	8.2%	8.0%	6.0%	6.2%	7.9%	8.1%	7.3%	*7.5%*	*8.0%*	Return on Shr. Equity	8.0%
8.7%	10.6%	9.7%	8.2%	8.0%	6.0%	6.2%	7.9%	8.1%	7.3%	*7.5%*	*8.0%*	Return on Com Equity	8.0%
3.6%	5.6%	5.2%	3.5%	3.3%	1.2%	1.2%	3.1%	3.3%	2.8%	*3.0%*	*3.5%*	Retained to Com Eq	3.5%
58%	47%	46%	57%	59%	80%	80%	61%	59%	62%	*60%*	*55%*	All Div'ds to Net Prof	55%

CURRENT POSITION ($MILL.)

	2012	2013	3/31/14
Cash Assets	2.5	2.3	3.1
Other	40.4	37.4	37.7
Current Assets	42.9	39.7	40.8
Accts Payable	8.5	12.6	10.7
Debt Due	20.7	23.0	37.5
Other	19.9	23.6	23.7
Current Liab.	49.1	59.2	71.9
Fix. Chg. Cov.	317%	268%	270%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '11-'13 to '17-'19
Revenues	5.5%	4.0%	3.5%
"Cash Flow"	6.0%	4.0%	4.5%
Earnings	3.5%	.5%	7.0%
Dividends	4.5%	3.5%	5.0%
Book Value	5.5%	2.5%	6.0%

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun. 30	Sep. 30	Dec. 31	Full Year
2011	43.7	59.0	73.9	62.4	239.0
2012	51.1	65.6	82.4	62.4	261.5
2013	50.1	74.2	85.2	67.4	276.9
2014	54.6	*75.4*	*95.0*	*75.0*	*300*
2015	*60.0*	*80.0*	*100*	*80.0*	*320*

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun. 30	Sep. 30	Dec. 31	Full Year
2011	.03	.29	.44	.35	1.11
2012	.06	.28	.53	.31	1.18
2013	.07	.37	.44	.24	1.12
2014	.04	*.40*	*.51*	*.30*	*1.25*
2015	*.10*	*.43*	*.55*	*.32*	*1.40*

Cal-endar	QUARTERLY DIVIDENDS PAID B■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2010	.17	.17	.17	.17	.68
2011	.173	.173	.173	.173	.69
2012	.1775	.1775	.1775	.1775	.71
2013	.1825	.1825	.1825	.1825	.73
2014	.1875	.1875			

BUSINESS: SJW Corporation engages in the production, purchase, storage, purification, distribution, and retail sale of water. It provides water service to approximately 228,000 connections that serve a population of approximately one million people in the San Jose area and 11,000 connections that serve approximately 36,000 residents in a service area in the region between San Antonio and Austin, Texas. The company offers nonregulated water-related services, including water system operations, cash remittances, and maintenance contract services. SJW also owns and operates commercial real estate investments. Has about 379 employees. Chrm.: Charles J. Toeniskoetter. Inc.: CA. Address: 110 W. Taylor Street, San Jose, CA 95110. Tel.: (408) 279-7800. Int: www.sjwater.com.

SJW's fate remains in the hands of state regulators. Two and one-half years ago, the utility filed a petition seeking rate relief with the California Public Utility Commission (CPUC). Higher rates were sought for the three-year period from 2013 to 2015. Since the increases petitioned for were so sizable, at 21.5%, 4.9%, and 12.6%, respectively, the final decision will have a major impact on SJW. We think the company has made a reasonable case for the hikes, but the CPUC is under political pressure to not raise water bills too high. On a positive note, the CPUC earlier allowed SJW recovery of the $62 million that will be invested to upgrade a waste facility.

The severe drought could possibly put more pressure on regulators. Prices are rising for the water that the utility has to purchase from another entity to meet the needs of the service area. SJW is allowed to pass these costs through to customers. Still, with water bills at such levels, the CPUC is under greater political pressure to keep citizens' (i.e., voters') rates from skyrocketing. On the other hand, if regulators don't provide utilities with a fair return on investment, funds won't be available to upgrade the aging systems.

The capital budget is large. SJW has been forced to plow back most of its internally generated funds into modernizing the existing water infrastructure. Additional capital is also required for SJW to meet the demand for water from its growing service area, which includes the prosperous Silicon Valley.

The balance sheet will probably weaken. With large projected capital outlays, the company will be forced to depend on external funds for financing. As a result, debt as a percent of total capital should rise in the years ahead.

Dividend growth prospects are below average for a water utility. The last hike averaged only 2.7% on an annual basis. We think this will be the trend through 2017-2019 as increases in the payout will be held back by the need to fund the large construction program.

These shares do not stand out for relative year-ahead performance. Moreover, the stock's potential total returns are close to average over the next 3 to 5 years.

James A. Flood *July 18, 2014*

(A) Diluted earnings. Excludes nonrecurring losses : '03, $1.97; '04, $3.78; '05, $1.09; '06, $16.36; '08, $1.22; '10, 46¢. Next earnings report due early August.. Quarterly egs. may not add due to rounding.
(B) Dividends historically paid in early March, June, September, and December. ■ Div'd reinvestment plan available.
(C) In millions, adjusted for stock splits.

Company's Financial Strength	B+
Stock's Price Stability	85
Price Growth Persistence	45
Earnings Predictability	80

YORK WATER NDQ-YORW

RECENT PRICE **20.19** | P/E RATIO **22.4** (Trailing: 27.3; Median: 25.0) | RELATIVE P/E RATIO **1.19** | DIV'D YLD **2.9%** | VALUE LINE

TIMELINESS 4 Raised 3/28/14
SAFETY 2 New 7/19/13
TECHNICAL 3 Lowered 7/18/14
BETA .75 (1.00 = Market)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
High:	13.5	14.0	17.9	21.0	18.5	16.5	18.0	18.0	18.1	18.5	22.0	21.5
Low:	9.3	11.0	11.7	15.3	15.5	6.2	9.7	12.8	15.8	16.8	17.6	19.0

Target Price Range 2017 | 2018 | 2019

2017-19 PROJECTIONS

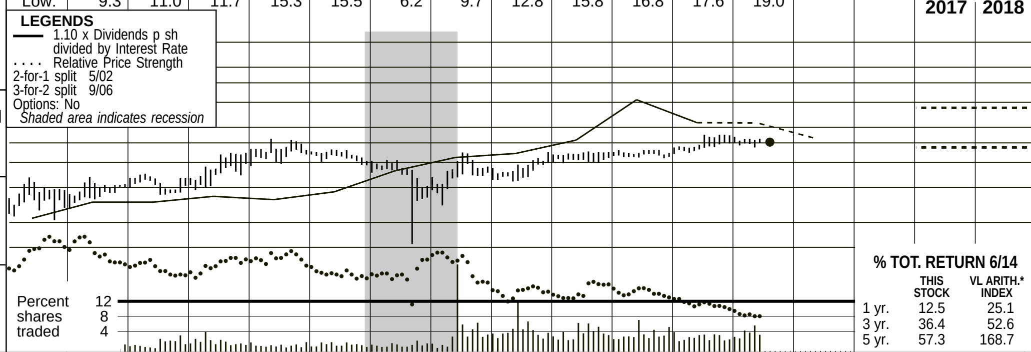
	Price	Gain	Ann'l Total Return
High	30	(+50%)	13%
Low	19	(-5%)	2%

Insider Decisions

	A	S	O	N	D	J	F	M	A
to Buy	0	2	5	0	0	6	0	1	4
Options	0	0	0	0	0	0	0	0	0
to Sell	0	0	0	0	1	0	0	0	0

Institutional Decisions

	3Q2013	4Q2013	1Q2014
to Buy	30	29	30
to Sell	23	24	21
Hld's(000)	3451	3528	3634



% TOT. RETURN 6/14

	THIS STOCK	VL ARITH.* INDEX
1 yr.	12.5	25.1
3 yr.	36.4	52.6
5 yr.	57.3	168.7

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	© VALUE LINE PUB. LLC	17-19
--	--	--	2.05	2.05	2.17	2.18	2.58	2.56	2.79	2.89	2.95	3.07	3.18	3.21	3.27	*3.65*	*3.95*	Revenues per sh	*4.65*
--	--	--	.59	.57	.65	.65	.79	.77	.86	.88	.95	1.07	1.09	1.12	1.19	*1.35*	*1.45*	"Cash Flow" per sh	*1.75*
--	--	--	.43	.40	.47	.49	.56	.58	.57	.57	.64	.71	.71	.72	.75	*.90*	*.95*	Earnings per sh A	*1.10*
--	--	--	.34	.35	.37	.39	.42	.45	.48	.49	.51	.52	.53	.54	.55	*.57*	*.59*	Div'd Decl'd per sh B	*.74*
--	--	--	.75	.66	1.07	2.50	1.69	1.85	1.69	2.17	1.18	.83	.74	.94	.76	*.90*	*.85*	Cap'l Spending per sh	*1.00*
--	--	--	3.79	3.90	4.06	4.65	4.85	5.84	5.97	6.14	6.92	7.19	7.45	7.73	7.98	*7.95*	*8.20*	Book Value per sh	*8.90*
--	--	--	9.46	9.55	9.63	10.33	10.40	11.20	11.27	11.37	12.56	12.69	12.79	12.92	12.98	*12.60*	*12.20*	Common Shs Outst'g C	*11.80*
--	--	--	17.8	26.9	24.5	25.7	26.3	31.2	30.3	24.6	21.9	20.7	23.9	24.4	26.3	*Bold figures are*		Avg Ann'l P/E Ratio	*22.0*
--	--	--	.91	1.47	1.40	1.36	1.40	1.68	1.61	1.48	1.46	1.32	1.50	1.55	1.48	*Value Line*		Relative P/E Ratio	*1.40*
--	--	--	4.4%	3.3%	3.2%	3.1%	2.9%	2.5%	2.8%	3.5%	3.6%	3.5%	3.1%	3.1%	2.8%	*estimates*		Avg Ann'l Div'd Yield	*3.0%*

CAPITAL STRUCTURE as of 3/31/14
Total Debt $84.9 mill. **Due in 5 Yrs** $19.5 mill.
LT Debt $84.9 mill. **LT Interest** $5.2 mill.
(Total interest coverage: 4.0x)
(45% of Cap'l)

Pension Assets 12/13 $27.1 mill.
Oblig. $32.1 mill.

Pfd Stock None

Common Stock 12,944,260 shs.
as of 5/6/14

MARKET CAP: $250 million (Small Cap)

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		17-19
22.5	26.8	28.7	31.4	32.8	37.0	39.0	40.6	41.4	42.4	*46.0*	*48.0*	Revenues ($mill)	*55.0*
4.8	5.8	6.1	6.4	6.4	7.5	8.9	9.1	9.3	9.7	*11.5*	*12.0*	Net Profit ($mill)	*13.0*
36.7%	36.7%	34.4%	36.5%	36.1%	37.9%	38.5%	35.3%	37.6%	37.6%	*37.0%*	*36.0%*	Income Tax Rate	*37.0%*
--	--	7.2%	3.6%	10.1%	--	1.2%	1.1%	1.1%	.8%	*1.0%*	*1.0%*	AFUDC % to Net Profit	*1.5%*
42.5%	44.1%	48.3%	46.5%	54.5%	45.7%	48.3%	47.1%	46.0%	45.1%	*47.5%*	*49.5%*	Long-Term Debt Ratio	*50.0%*
57.5%	55.9%	51.7%	53.5%	45.5%	54.3%	51.7%	52.9%	54.0%	54.9%	*52.5%*	*50.5%*	Common Equity Ratio	*50.0%*
83.6	90.3	126.5	125.7	153.4	160.1	176.4	180.2	184.8	188.4	*190*	*195*	Total Capital ($mill)	*210*
140.0	155.3	174.4	191.6	211.4	222.0	228.4	233.0	240.3	244.2	*250*	*255*	Net Plant ($mill)	*270*
7.6%	8.4%	6.2%	6.7%	5.7%	6.2%	6.5%	6.4%	6.4%	6.5%	*7.5%*	*7.5%*	Return on Total Cap'l	*7.5%*
10.0%	11.6%	9.3%	9.5%	9.2%	8.6%	9.8%	9.5%	9.3%	9.3%	*11.5%*	*12.0%*	Return on Shr. Equity	*12.0%*
10.0%	11.6%	9.3%	9.5%	9.2%	8.6%	9.8%	9.5%	9.3%	9.3%	*11.5%*	*12.0%*	Return on Com Equity	*12.0%*
2.1%	3.0%	2.2%	1.7%	1.4%	1.9%	2.7%	2.5%	2.4%	2.4%	*4.0%*	*4.5%*	Retained to Com Eq	*4.0%*
79%	74%	77%	82%	85%	78%	72%	73%	74%	74%	*63%*	*62%*	All Div'ds to Net Prof	*67%*

CURRENT POSITION ($MILL.)	2012	2013	3/31/14
Cash Assets	4.0	7.6	5.7
Accounts Receivable	6.4	3.8	3.4
Other	1.2	3.8	4.3
Current Assets	11.6	15.2	13.4
Accts Payable	1.1	1.8	1.6
Debt Due	.1	--	--
Other	4.3	6.0	6.5
Current Liab.	5.5	7.8	8.1
Fix. Chg. Cov.	414%	417%	417%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '11-'13 to '17-'19
Revenues	4.5%	3.0%	*6.5%*
"Cash Flow"	6.5%	6.5%	*7.5%*
Earnings	5.5%	5.0%	*7.0%*
Dividends	4.5%	2.5%	*5.5%*
Book Value	7.0%	5.0%	*2.5%*

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun. 30	Sep. 30	Dec. 31	Full Year
2011	9.6	10.5	10.5	10.0	40.6
2012	9.6	10.4	11.0	10.4	41.4
2013	10.1	10.7	10.9	10.7	42.4
2014	10.6	*11.5*	*12.1*	*11.8*	*46.0*
2015	*11.0*	*12.0*	*12.5*	*12.5*	*48.0*

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun. 30	Sep. 30	Dec. 31	Full Year
2011	.17	.19	.19	.16	.71
2012	.15	.17	.22	.18	.72
2013	.17	.18	.19	.21	.75
2014	.16	*.24*	*.25*	*.25*	*.90*
2015	*.20*	*.25*	*.25*	*.25*	*.95*

Cal-endar	QUARTERLY DIVIDENDS PAID B Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2010	.128	.128	.128	.128	.512
2011	.131	.131	.131	.131	.524
2012	.134	.134	.134	.134	.535
2013	.138	.138	.138	.138	.552
2014	.1431	.1431			

BUSINESS: The York Water Company is the oldest investor-owned regulated water utility in the United States. It has operated continuously since 1816. As of December 31, 2013, the company's average daily availability was 35.0 million gallons and its service territory had an estimated population of 190,000. Has more than 63,000 customers. Residential customers accounted for 63% of 2013 revenues; commercial and industrial (29%); other (8%). It also provides sewer billing services. Incorporated: PA. York had 105 full-time employees at 12/31/13. President/CEO: Jeffrey R. Hines. Officers/directors own 1.1% of the common stock (3/14 proxy). Address: 130 East Market Street York, Pennsylvania 17401. Telephone: (717) 845-3601. Internet: www.yorkwater.com.

We are maintaining our 2014 earnings estimate for York Water. First-quarter results were a disappointment, coming in at $0.16 a share, $0.03 a share less than the consensus number. The period had a few unexpected expenses, plus the poor weather resulted in higher-than-budgeted maintenance costs. Since these charges probably won't recur, we think that per-share earnings can break out of their rut and increase 20% this year. (Share net was between $0.71 and $0.75 from 2010 to 2013.) Fueling the bottom line will be the higher rates that state regulators allowed the utility to implement on February 28th.
The bottom line will most likely rise modestly next year. Higher rates will be in effect for the full year, versus only 10 months in 2014. Together with better cost controls, this should result in at least a 5% share-net gain. Our estimates for both years could prove conservative should the company change tack and decide to execute its stock-buyback program in a shorter period of time (see below).
The share-repurchase program has still not gained any traction. In March 2013, management announced plans to repurchase 1.2 million shares, or over 9% of the company's outstanding equity. Sixteen months later and the number of shares outstanding have only been reduced by 40,000.
Dividend growth prospects are average at best. Compared to other water utilities, York has a high dividend-to-net profit ratio. This means that there is not a substantial amount of room for dividends to increase. And, though this percentage is on the decline, it most likely won't go low enough for annual dividends hikes to surpass the industry average.
Finances are adequate. Despite the need to spend to upgrade an aging infrastructure, capital expenditures should be manageable in the years ahead. Indeed, York should be able to fund the outlays without having to issue any new bonds. So, the debt-to-total equity ratio should remain close to a healthy 50% level.
York shares are rated to underperform the broader market averages over the next six- to 12-month period. Moreover, total return potential through 2017-2019 is below average, as well.
James A. Flood *July 18, 2014*

(A) Diluted earnings. Next earnings report due early August.
(B) Dividends historically paid in mid-January, April, July, and October.
(C) In millions, adjusted for splits.

Company's Financial Strength	B+
Stock's Price Stability	85
Price Growth Persistence	65
Earnings Predictability	100

Press Release

FEDERAL RESERVE press release

Release Date: July 30, 2014

For immediate release

Information received since the Federal Open Market Committee met in June indicates that growth in economic activity rebounded in the second quarter. Labor market conditions improved, with the unemployment rate declining further. However, a range of labor market indicators suggests that there remains significant underutilization of labor resources. Household spending appears to be rising moderately and business fixed investment is advancing, while the recovery in the housing sector remains slow. Fiscal policy is restraining economic growth, although the extent of restraint is diminishing. Inflation has moved somewhat closer to the Committee's longer-run objective. Longer-term inflation expectations have remained stable.

Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. The Committee expects that, with appropriate policy accommodation, economic activity will expand at a moderate pace, with labor market indicators and inflation moving toward levels the Committee judges consistent with its dual mandate. The Committee sees the risks to the outlook for economic activity and the labor market as nearly balanced and judges that the likelihood of inflation running persistently below 2 percent has diminished somewhat.

The Committee currently judges that there is sufficient underlying strength in the broader economy to support ongoing improvement in labor market conditions. In light of the cumulative progress toward maximum employment and the improvement in the outlook for labor market conditions since the inception of the current asset purchase program, the Committee decided to make a further measured reduction in the pace of its asset purchases. Beginning in August, the Committee will add to its holdings of agency mortgage-backed securities at a pace of $10 billion per month rather than $15 billion per month, and will add to its holdings of longer-term Treasury securities at a pace of $15 billion per month rather than $20 billion per month. The Committee is maintaining its existing policy of reinvesting principal payments from its holdings of agency debt and agency mortgage-backed securities in agency mortgage-backed securities and of rolling over maturing Treasury securities at auction. The Committee's sizable and still-increasing holdings of longer-term securities should maintain downward pressure on longer-term interest rates, support mortgage markets, and help to make broader financial conditions more accommodative, which in turn should promote a stronger economic recovery and help to ensure that inflation, over time, is at the rate most consistent with the Committee's dual mandate.

The Committee will closely monitor incoming information on economic and financial developments in coming months and will continue its purchases of Treasury and agency mortgage-backed securities, and employ its other policy tools as appropriate, until the outlook for the labor market has improved substantially in a context of price stability. If incoming information broadly supports the Committee's expectation of ongoing improvement in labor market conditions and inflation moving back toward its longer-run objective, the Committee will likely reduce the pace of asset purchases in further measured steps at future meetings. However, asset purchases are not on a preset course, and the Committee's decisions about their pace will remain contingent on the Committee's outlook for the labor market and inflation as well as its assessment of the likely efficacy and costs of such purchases.

To support continued progress toward maximum employment and price stability, the Committee today reaffirmed its view that a highly accommodative stance of monetary policy remains appropriate. In determining how long to maintain the current 0 to 1/4 percent target range for the federal funds rate, the Committee will assess progress--both realized and expected--toward its objectives of maximum employment and 2 percent inflation. This assessment will take into account a wide range of information, including measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial developments. The Committee continues to anticipate, based on its assessment of these factors, that it likely will be appropriate to maintain the current target range for the federal funds rate for a considerable time after the asset purchase program ends, especially if projected inflation continues to run below the Committee's 2 percent longer-run goal, and provided that longer-term inflation expectations remain well anchored.

When the Committee decides to begin to remove policy accommodation, it will take a balanced approach consistent with its longer-run goals of maximum employment and inflation of 2 percent. The Committee currently anticipates that, even after employment and inflation are near mandate-consistent levels, economic conditions may, for some time, warrant keeping the target federal funds rate below levels the Committee views as normal in the longer run.

Voting for the FOMC monetary policy action were: Janet L. Yellen, Chair; William C. Dudley, Vice Chairman; Lael Brainard; Stanley Fischer; Richard W. Fisher; Narayana Kocherlakota; Loretta J. Mester; Jerome H. Powell; and Daniel K. Tarullo. Voting against was Charles I. Plosser who objected to the guidance indicating that it likely will be appropriate to maintain the current target range for the federal funds rate for "a considerable time after the asset purchase program ends," because such language is time dependent and does not reflect the considerable economic progress that has been made toward the Committee's goals.

Statement Regarding Purchases of Treasury Securities and Agency Mortgage-Backed Securities

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2014 Classic Yearbook

Market Results for Stocks, Bonds, Bills, and Inflation 1926–2013

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Chapter 11

Using Historical Data in Forecasting and Optimization

Probabilistic Forecasts

When forecasting the return on an asset or a portfolio, investors are (or should be) interested in the entire probability distribution of future outcomes, not just the mean or "point estimate." An example of a point estimate forecast is that large company stocks will have a return of 13 percent in 2014. It is more helpful to know the uncertainty surrounding this point estimate than to know the point estimate itself. One measure of uncertainty is standard deviation. The large company stock return forecast can be expressed as 13 percent representing the mean and 20 percent representing the standard deviation.

If the returns on large company stocks are normally distributed, the mean (expected return) and the standard deviation provide enough information to forecast the likelihood of any return. Suppose one wants to ascertain the likelihood that large company stocks will have a return of -25 percent or lower in 2014. Given the above example, a return of -25 percent is $[13-(-25)]/20 = 1.9$ standard deviations below the mean. The likelihood of an observation 1.9 or more standard deviations below the mean is 2.9 percent. This can be looked up in any statistics textbook, in the table showing values of the cumulative probability function for a normal distribution. Thus, the likelihood that the stock market will fall by 25 percent or more in 2014 is 2.9 percent. This is valuable information, both to the investor who believes that stocks are a sure thing and to the investor who is certain that they will crash tomorrow.

In fact, the historical returns of large company stocks are not exactly normally distributed, and a slightly different method needs to be used to make probabilistic forecasts. The actual model used to forecast the distribution of stock returns is described later in this chapter.

Some people are wary of probabilistic forecasts because they seem too wide to be useful—the most widely quoted forecasters, after all, make very specific predictions. However, the forecast of a probability distribution actually reveals much more than the point estimate. The point estimate reflects what statisticians call an "expected value", but the actual return will likely be higher or lower than the point estimate. By knowing the extent to which actual returns are likely to deviate from the point estimate, the investor can assess the risk of every asset, and thus compare investment opportunities in terms of their risks as well as their expected returns. As Harry Markowitz showed nearly a half-century ago in his Nobel Prize-winning work on portfolio theory, investors care about avoiding risk as well as seeking return. Probabilistic forecasts enable investors to quantify these concepts.

The Lognormal Distribution

In the lognormal model, the natural logarithms of asset return relatives are assumed to be normally distributed. A return relative is one plus the return. That is, if an asset has a return of 15 percent in a given period, its return relative is 1.15.

The lognormal distribution is skewed to the right. This means that the expected value, or mean, is greater than the median. Furthermore, if return relatives are lognormally distributed, returns cannot fall below negative 100 percent. These properties of the lognormal distribution make it a more accurate characterization of the behavior of market returns than does the normal distribution.

In all normal distributions, moreover, the probability of an observation falling one standard deviation below the mean equals the probability of falling one standard deviation above the mean; both probabilities are about 34 percent. In a lognormal distribution, these probabilities differ and depend on the parameters of the distribution.

Forecasting Wealth Values and Rates of Return

Using the lognormal model, it is fairly simple to form probabilistic forecasts of both compound rates of return and ending period wealth values. Wealth at time **n** (assuming reinvestment of all income and no taxes) is:

$$W_n = W_0(1+r_1)(1+r_2)\ldots(1+r_n) \quad (30)$$

where,

W_n = the wealth value at time **n**;
W_0 = the initial investment at time **0**; and,
r_1, r_2, etc. = the total returns on the portfolio for the rebalancing period ending at times 1, 2, and so forth.

The compound rate of return or geometric mean return over the same period, r_G, is:

$$r_G = \left(\frac{W_n}{W_0}\right)^{\frac{1}{n}} - 1 \quad (31)$$

where,
r_G = the geometric mean return;
W_n = the ending period wealth value at time **n**;
W_0 = the initial wealth value at time **0**; and,
n = the inclusive number of periods.

By assuming that all of the $(1+r_n)$'s are lognormally distributed with the same expected value and standard deviation and are all statistically independent of each other, it follows that W_n and $(1+r_G)$ are lognormally distributed. In fact, even if the $(1+r_n)$'s are not themselves lognormally distributed but are independent and identically distributed, W_n and $(1+r_G)$ are approximately lognormal for large enough values of **n**. This "central-limit theorem" means that the lognormal model can be useful in long-term forecasting even if short-term returns are not well described by a lognormal distribution.

Calculating Parameters of the Lognormal Model

To use the lognormal model, we must first calculate the expected value and standard deviation of the natural logarithm of the return relative of the portfolio. These parameters, denoted **m** and **s** respectively, can be calculated from the expected return (μ) and standard deviation (σ) of the portfolio as follows:

$$m = \ln(1+\mu) - \left(\frac{s^2}{2}\right) \quad (32)$$

$$s = \sqrt{\ln\left[1+\left(\frac{\sigma}{1+\mu}\right)^2\right]} \quad (33)$$

where,
l_n = the natural logarithm function.

To calculate a particular percentile of wealth or return for a given time horizon, the only remaining parameter needed is the z-score of the percentile. The z-score of a percentile ranking is that percentile ranking expressed as the number of standard deviations that it is above or below the mean of a normal distribution. For example, the z-score of the 95th percentile is 1.645 because in a normal distribution, the 95th percentile is 1.645 standard deviations above the 50th percentile or median, which is also the mean. Z-scores can be obtained from a table of cumulative values of the standard normal distribution or from software that produces such values.

Given the logarithmic parameters of a portfolio (**m** and **s**), a time horizon (**n**), and the z-score of a percentile (**z**), the percentile in question in terms of cumulative wealth at the end of the time horizon (W_n) is:

$$e^{\left(mn+zs\sqrt{n}\right)} \quad (34)$$

Similarly, the percentile in question in terms of the compound rate of return for the period (r_G) is:

$$e^{\left(m+z\frac{s}{\sqrt{n}}\right)} - 1 \quad (35)$$

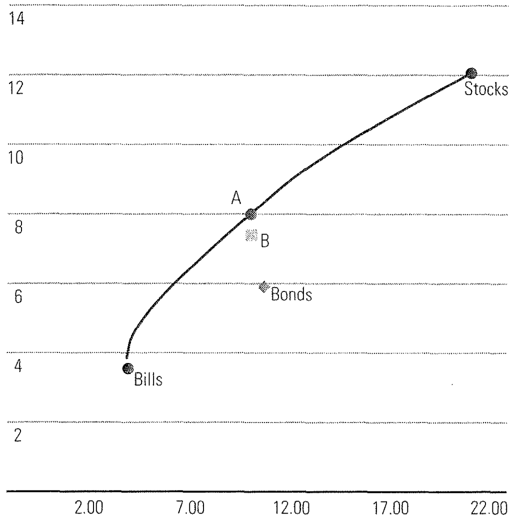
Mean-Variance Optimization

One important application of the probability forecasts of asset returns is mean-variance optimization. Optimization is the process of identifying portfolios that have the highest possible expected return for a given level of risk, or the lowest possible risk for a given expected return. Such a portfolio is considered "efficient," and the locus of all efficient portfolios is called the efficient frontier. An efficient frontier constructed from large company stocks, long-term government bonds, and Treasury bills is shown in Graph 11-1. All investors should hold portfolios that are efficient with respect to the assets in their opportunity set.

The most widely accepted framework for optimization is Markowitz or mean-variance optimization (MVO), which makes the following assumptions: 1) the forecast mean, or expected return, describes the attribute that investors consider to be desirable about an asset; 2) the risk of the asset is measured by its expected standard deviation of returns; and 3) the interaction between one asset and another is captured by the expected correlation coefficient of the two assets' returns. MVO thus requires forecasts of the return and standard deviation of each asset, and the correlation of each asset with every other asset.[1]

In the 1950s, Harry Markowitz developed both the concept of the efficient frontier and the mathematical means of constructing it (mean-variance optimization).[2] Currently, there are a number of commercially available mean-variance optimization software tools available, including Morningstar *EnCorr*®.[3] This advanced analytical software unites proven financial models, sophisticated Ibbotson methodologies, and comprehensive Morningstar investment data.

Graph 11-1: Efficient Frontier
Large Company Stocks, Long-Term Government Bonds, and U.S. Treasury Bills



Data from 1926–2013.

Estimating the Means, Standard Deviations, and Correlations of Asset Returns

To simulate future probability distributions of asset and portfolio returns, one typically estimates parameters of the historical return data. The parameters that are required to simulate returns on an asset are its mean and standard deviation. To simulate returns on portfolios of assets, one must also estimate the correlation of each asset in the portfolio with every other asset. Thus, the parameters required to conduct a simulation are the same as those required as inputs into a mean-variance optimization.[4]

To illustrate how to estimate the parameters of asset class returns relevant to optimization and forecasting, we construct an example using large company stocks, long-term government bonds, and Treasury bills. The techniques used to estimate these parameters are described below. These are similar techniques as those used in Morningstar *EnCorr*® software.

Means, or Expected Returns

The mean return (forecast mean, or expected return) on an asset is the probability-weighted average of all possible returns on the asset over a future period. Estimates of expected returns are based on models of asset returns. While many models of asset returns incorporate estimates of GNP, the money supply, and other macroeconomic variables, the model employed in this chapter does not. This is because we assume (for the present purpose) that asset markets are informationally efficient, with all relevant and available information fully incorporated in asset prices. If this assumption holds, investor expectations (forecasts) can be discerned from market-observable data. Such forecasts are not attempts to outguess, or beat, the market. They are attempts to discern the market's expectations, i.e., to read what the market itself is forecasting.

For some assets, expected returns can be estimated using current market data alone. For example, the yield on a riskless bond is an estimate of its expected return. For other assets, current data are not sufficient. Stocks, for example, have no exact analogue to the yield on a bond. In such cases, we use the statistical time series properties of historical data in forming the estimates.

To know which data to use in estimating expected returns, we need to know the rebalancing frequency of the portfolios and the planning horizon. In our example, we will assume an annual rebalancing frequency and a twenty-year planning horizon. The rebalancing frequency gives the time units in which returns are measured.

With a twenty-year planning horizon, the relevant riskless rate is the yield on a twenty-year coupon bond. This riskless rate is the baseline from which the expected return on every other asset class is derived by adding or subtracting risk premia.

Large Company Stocks

The expected return on large company stocks is the riskless rate, plus the expected risk premium of large company stocks over bonds that are riskless over the planning horizon. With a twenty-year planning horizon, this risk premium is 6.96 percent, shown as the long-horizon expected equity risk premium in Table 11-1. Hence, the expected return on large company stocks is 3.67 (the riskless rate) plus 6.96 (the risk premium) for a total of 10.63 percent. Read more about the historical equity risk premium on page 151.

Bonds and Bills

For default-free bonds with a maturity equal to the planning horizon, the expected return is the yield on the bond; that is, the expected return is the riskless rate of 3.67 percent. For bonds with other maturities, the expected bond horizon premium should be added to the riskless rate (for longer maturities) or subtracted from the riskless rate (for shorter maturities). Since expected capital gains on a bond are zero, the expected horizon premium is estimated by the historical average difference of the income returns on the bonds.[5]

For Treasury bills, the expected return over a given time horizon is equal to the expected return on a Treasury bond of a similar horizon, less the expected horizon premium of bonds over bills. The long-term horizon premium is estimated by the historical average of the difference of the income return on bonds and the return on bills. From Table 11-1, this is 1.77 percent. Subtracting this from the riskless rate (3.67 percent) gives us an expected return on bills of 1.90 percent. Of course, this forecast typically differs from the current yield on a Treasury bill, since a portfolio of Treasury bills is rolled over (the proceeds of maturing bills are invested in new bills, at yields not yet known) during the time horizon described.

Standard Deviations

Standard deviations are estimated from historical data as described in Chapter 6. Since there is no evidence of a major change in the variability of returns on large company stocks, we use the entire period 1926–2013 to estimate the standard deviation of these asset classes. For bonds and bills, we use the period 1970–2013.

Correlations

Correlations between the asset classes are estimated from historical data as described in Chapter 6. Correlation coefficients for stocks, bonds, and bills are derived from 1926–2013. Correlations between major asset classes change over time. Graph 11-2 shows the historical correlation of annual returns on large company stocks and long-term bonds over 20 year rolling periods from 1926–1945 through 1994–2013.

Generating Probabilistic Forecasts

For large company stocks in Table 11-2, the logarithmic parameters are calculated to be $\mathbf{m} = 0.0978$ and $\mathbf{s} = 0.1787$ based on equations (32) and (33). The z-scores of the 95th, 50th, and 5th percentile are 1.645, 0, and -1.645, respectively. Using these parameters, we can calculate the 95th, 50th, and 5th percentiles of cumulative wealth

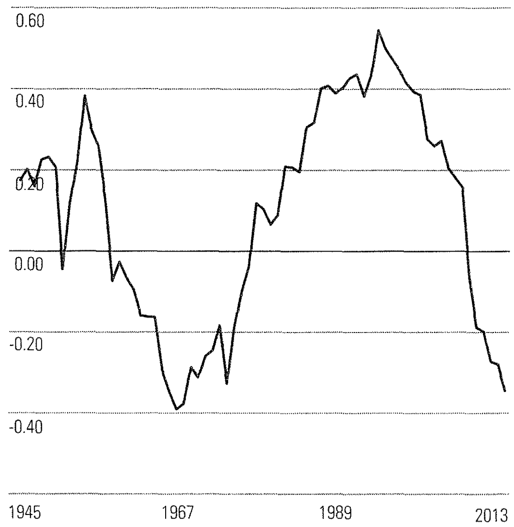
Table 11-1: Building Blocks for Expected Return Construction

Yields (Riskless Rates)†	Value (%)
Long-Term (20-year) U.S. Treasury Coupon Bond Yield	3.67
Intermediate-Term (5-year) U.S. Treasury Coupon Note Yield	1.13
Short-Term (30-day) U.S. Treasury Bill Yield	0.01
Fixed Income Risk Premia†, ‡	
Expected default premium: *long-term corporate bond total returns minus long-term government bond total returns*	0.08
Expected long-term horizon premium: *long-term government bond income returns minus U.S. Treasury bill total returns**	1.77
Expected intermediate-term horizon premium: *intermediate-term government bond income returns minus U.S. Treasury bill total returns**	1.08
Equity Risk Premia †, ◊	
Long-horizon expected equity risk premium: *large company stock total returns minus long-term government bond income returns*	6.96
Intermediate-horizon expected equity risk premium: *large company stock total returns minus intermediate-term government bond income returns*	7.52
Short-horizon expected equity risk premium: *large company stock total returns minus U.S. Treasury bill total returns**	8.51
Small Stock Premium: *small company stock total return minus large company stock total return*	4.80

† As of December 31, 2013. Maturities are approximate.
‡ Expected risk premia for fixed income are based on the differences of historical arithmetic mean returns from 1970–2013.
◊ Expected risk premia for equities are based on the differences of historical arithmetic mean returns from 1926–2013.
* For U.S. Treasury bills, the income return and total return are the same.

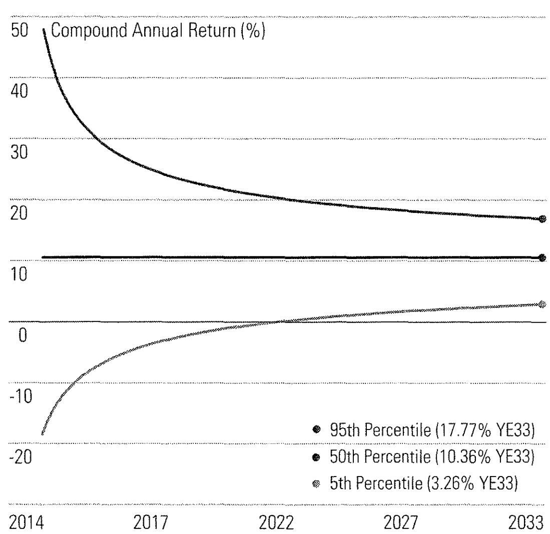
and compound returns over various time horizons using equations (34) and (35). Graph 11-3 shows percentiles of compound returns over the entire range of one to twenty year horizons in graphical form. This type of graph is sometimes called a "trumpet" graph because the high and low percentile curves taken together make the shape of a trumpet. The "mouthpiece" of the trumpet is on the right side of the graph because for long time horizons, all percentiles converge to the median (50th percentile).

Graph 11-2: Twenty Year Rolling Period Correlations of Annual Returns Large Company Stocks and Long-Term Government Bonds



Data from 1926–1945 through 1994–2013.

Graph 11-3: Forecast Total Return Distribution 100 Percent Large Stocks



Data from 2014–2033.

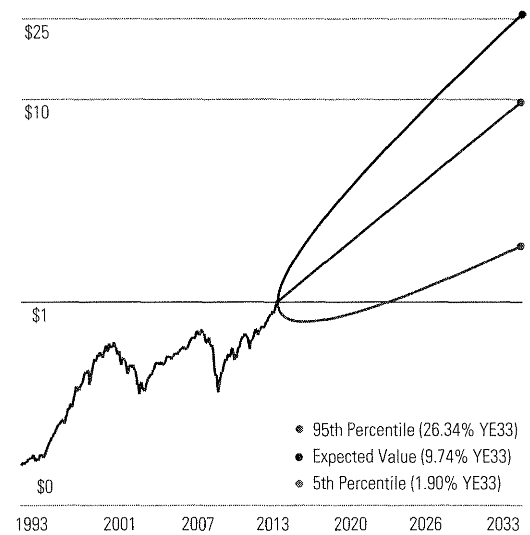
Table 11-2: Optimization Inputs: Year-End 2013 Large Company Stocks, Long-Term Government Bonds, and U.S. Treasury Bills (%)

	Expected Return	Standard Deviation	Correlation with Stocks	Bonds	Bills
Stocks	12.1	20.2	1.00		
Bonds	5.9	9.8	-0.01	1.00	
Bills	3.5	3.1	-0.02	0.20	1.00

Data from 1926-2013.

Graph 11-4 is a graph showing percentiles of cumulative wealth over the entire range of zero to twenty year time horizons, along with the back history of the portfolio's performance. The past and forecasted (future) values on the graph are connected by setting the wealth index to $1.00 at the end of 2013. The past index values show how much wealth one would have had to hold in large company stocks to have $1.00 at the end of 2013; the percentiles of future value show the probability distribution of future growth of $1.00 invested in large company stocks. This type of graph is sometimes called a "tulip" graph because of its overall shape.

Graph 11-4: Forecast Distribution of Wealth Index Value 100 Percent Large Stock



Data from 1993–2033.

Table 11-3 shows (in the top panel) the probability distribution of compound annual returns on large company stocks over the next 20 years. The top line shows the 95th percentile or optimistic case, the middle line the 50th percentile or median case, and the bottom line the 5th percentile or pessimistic case. The bottom panel shows the same projections, redrawn as cumulative values of $1.00 invested at the beginning of the period simulated. Simulations such as these are used for asset allocation, funding of liabilities, and other portfolio management-related applications; Morningstar *EnCorr*® mean-variance optimization software can produce these forecasts.

Table 11-3: Forecast Distributions of Compound Annual Returns and End of Period Wealth – Large Company Stocks

	Compound Annual Return (%)				
Percentile	2015	2018	2023	2028	2033
95th	35.76	25.77	21.02	18.97	17.77
90th	29.66	22.17	18.56	16.99	16.07
75th	20.09	16.39	14.56	13.76	13.29
Expected Value	11.16	10.63	10.45	10.39	10.36
25th	1.27	4.49	6.15	6.90	7.34
10th	-6.21	-0.46	2.57	3.94	4.77
5th	-10.42	-3.31	0.49	2.22	3.26

	End of Period Wealth ($1 Invested on 12/31/13)				
Percentile	2015	2018	2023	2028	2033
95th	1.84	3.15	6.74	13.54	26.34
90th	1.68	2.72	5.49	10.53	19.70
75th	1.44	2.14	3.89	6.92	12.13
Expected Value	1.26	1.77	3.12	5.51	9.74
25th	1.03	1.25	1.82	2.72	4.13
10th	0.88	0.98	1.29	1.79	2.54
5th	0.80	0.85	1.05	1.39	1.90

Data from Year-end 2013.

Constructing Efficient Portfolios

A mean-variance optimizer uses the complete set of optimizer inputs (the expected return and standard deviation of each asset class and the correlation of returns for each pair of asset classes) to generate an efficient frontier. The efficient frontier shown in Graph 11-1 was generated from the inputs described above and summarized in Table 10-2. Each point on the frontier represents a portfolio mix that is mean-variance efficient. The point labeled **A** represents a portfolio that contains 39 percent in large company stocks, 48 percent in long-term bonds, and 13 percent in Treasury bills (Recall that other asset classes were not considered in this example). From the location of point **A** on the grid, we can find its expected return (8.00 percent) and standard deviation (9.20 percent).

Using Inputs to Form Other Portfolios

Given a complete set of inputs, the expected return and standard deviation of any portfolio (efficient or other) of the asset classes can be calculated. The expected return of a portfolio is the weighted average of the expected returns of the asset classes:

$$r_p = \sum_{i=1}^{n} x_i r_i \tag{36}$$

where,

r_p = the expected return of the portfolio **p**;
n = the number of asset classes;
x_i = the portfolio weight of asset class **i**, scaled such that:

$$\sum_{i=1}^{n} x_i = 1$$

and,

r_i = the expected return of asset class **i**.

The point labeled **B** in Graph 11-1 represents a portfolio that contains 45 percent large company stocks (asset class 1), one percent in long-term bonds (asset class 2), and 54 percent in Treasury bills (asset class 3). Applying the above formula to this portfolio using the inputs in Table 11-2, we calculate the expected return to be 7.40 percent as follows:

$(0.45 \times 12.1) + (0.01 \times 5.9) + (0.54 \times 3.5) = 7.39^*$
*difference due to rounding

The standard deviation of the portfolio depends not only on the standard deviations of the asset classes, but on all of the correlations as well. It is given by:

$$\sigma_p = \sqrt{\sum_{i=1}^{n} \sum_{i=1}^{n} x_i x_j \sigma_i \sigma_j \rho_{ij}} \tag{37}$$

where,

σ_p = the standard deviation of the portfolio;
xi and xj = the portfolio weights of asset classes **i** and **j**;
σ_i and σ_j = the standard deviations of returns on asset classes **i** and **j**; and,
ρ_{ij} = the correlation between returns on asset classes **i** and **j**.
(Note that ρ_{ij} equals one and that ρ_{ij} is equal to ρ_{ji}).

	Stocks (asset class 1)	Bonds (asset class 2)	Bills (asset class 3)
Stocks	$x_1^2\,\sigma_1^2\,\rho_{1,1}$ = (0.45)²(0.202)²(1) = 0.008263	$x_1\,x_2\,\sigma_1\,\sigma_2\,\rho_{1,2}$ = (0.45)(0.01)(0.202) (0.098)(-0.01)= -0.000009	$x_1\,x_3\,\sigma_1\,\sigma_3\,\rho_{1,3}$ = (0.45)(0.54)(0.202) (0.031)(-0.02) = -0.000030
Bonds	$x_1\,x_2\,\sigma_1\,\sigma_2\,\rho_{1,2}$ = (0.01)(0.45)(0.098) (0.202)(-0.01) = -0.000001	$x_2^2\,\sigma_2^2\,\rho_{2,2}$ = (0.01)²(0.098)²(1)= 0.000001	$x_2\,x_3\,\sigma_2\,\sigma_3\,\rho_{2,3}$ = (0.01)(0.54)(0.098) (0.031)(0.20) = 0.000003
Bills	$x_1\,x_3\,\sigma_1\,\sigma_3\,\rho_{1,3}$ = (0.54)(0.45)(0.031) (0.202)(-0.02) = -0.000030	$x_2\,x_3\,\sigma_2\,\sigma_3\,\rho_{2,3}$ = (0.54)(0.01)(0.031) (0.098)(0.20) = 0.000003	$x_3^2\,\sigma_3^2\,\rho_{3,3}$ = (0.54)²(0.031)²(1) = 0.000280

The standard deviation for point **B** in Graph 11-1 (containing three asset classes) would be calculated as shown above. By summing these terms and taking the square root of the total, the result is a standard deviation of 9.21 percent.

Enhancements to Mean-Variance Optimization

Ibbotson Associates was an early adopter of the use of mean-variance optimization to develop asset class model guidelines and continues to assist the industry in the development of enhancements to the traditional mean-variance approach as well as the state-of-the-art techniques described later in the chapter. Over the last-half century, the Markowitz mean-variance optimization (MVO) framework has become the textbook approach for creating these optimal asset allocations, but the approach has several shortcomings.

Shortcomings of Traditional Optimization Techniques

One notable shortcoming is that the output (optimal asset allocation weights) is very sensitive to the inputs (expected returns, standard deviations, and correlations). Input sensitivity oftentimes can lead to highly concentrated allocations in only a small number of the available asset classes. For example, if a typical optimization starts with around 10 asset classes to choose from, it wouldn't be uncommon to see just a few of these asset choices ending up in the resulting optimal allocation, with the remaining asset choices not even getting a mention. An example of this is shown in Graph 11-5, where only two of the nine asset classes originally considered made it into the final optimized mix (point **A**).

Graph 11-5 highlights the potential pitfalls of blindly following mean-variance optimization results. Mean-variance optimization is a powerful tool, but it needs to be used with caution. For instance, basing mean-variance optimization inputs on shorter time periods, as was done in Graph 11-5, can contribute to the extreme results. Basing the mean-variance optimization inputs on longer time periods, such as those presented elsewhere in this book, can help mitigate the extreme asset allocations mixes. The reason that longer time periods are preferred is that with longer time periods there is usually a more consistent ratio of return to risk amongst the different asset classes.

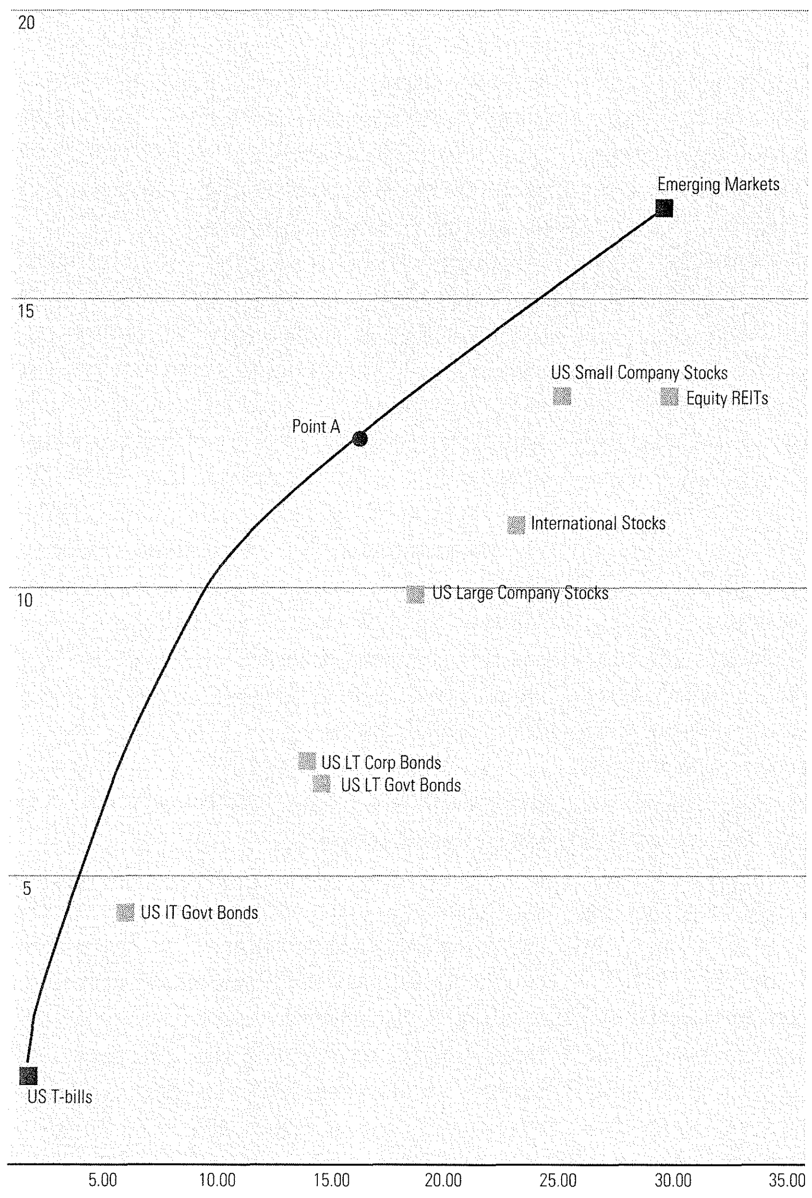
In addition to basing inputs on longer term histories, the most common solution to the problem of the highly concentrated asset allocations is to place maximum and minimum allocation constraints on each asset. For instance, in the example shown in Graph 11-5, we could specify a minimum allocation of 5 percent and a maximum allocation of 15 percent for each of the nine asset choices. This would ensure that each asset gets represented in the final allocation and also that no single asset completely dominates in the final allocation mix. Unfortunately, these artificial minimums and maximums are arbitrary, and usually end up limiting the ability of the optimizer to properly act on the information contained in the inputs.

Two Popular Enhancements to Traditional Optimization Techniques

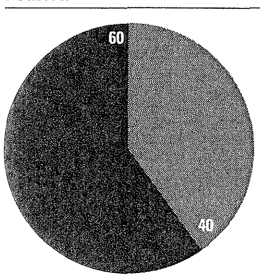
Two popular enhancements to traditional optimization techniques have emerged in recent years that can help overcome these difficulties. While both of these methods can help develop well-diversified asset allocations, they approach the problem in very different ways. The first of these, the Black-Litterman model, attempts to create better inputs. The second, resampled mean-variance optimization, attempts to build a better optimizer.

The Black-Litterman model was created by Fischer Black and Robert Litterman in the late 1980s. The Black-Litterman model combines investors' views regarding expected returns and the expected returns predicted by the capital asset pricing model (CAPM) to form a single blended estimate of expected returns. When this new combined estimate is used as an input within a traditional mean-variance optimization framework, it produces well-diversified portfolios that include not only market-based asset allocations but also allocations in assets that received favorable views.

Graph 11-5: Efficient Frontier: Traditional Optimization*



Point A.



Emerging Markets	60%
U.S. Long-Term Govt Bonds	40%

Data from 2004–2013

* The inputs for Graph 11-5 were estimated using 10 years of quarterly data.

** International stocks are represented by the Morgan Stanley Capital International Europe, Australasia, and Far East (EAFE®) Index; REITs are represented by the FTSE NAREIT Equity REIT Index®; emerging markets are represented by the Morgan Stanley Capital International Emerging Markets Index.

The second approach, resampled mean-variance optimization, is an attempt to build a better optimizer. Resampling grew out of the work of a number of authors, but is most closely associated with the work of Richard Michaud. While traditional mean-variance optimization treats the capital market assumptions as if they were known with 100 percent certainty, resampled mean-variance optimization recognizes that the capital market assumptions are forecasts, and are therefore not known with 100 percent certainty.

Conceptually, resampled mean-variance optimization is a combination of Monte Carlo simulation[6] and the more traditional Markowitz mean-variance optimization approach. The simulation randomly resamples possible returns from a forecasted return distribution or randomly resamples possible returns from a historical distribution. The simulated returns lead to a simulated set of capital market assumptions that are used in a traditional mean-variance optimizer, and the asset allocations are recorded. After combining the asset allocations from the numerous intermediate optimizations, the resulting asset allocations are those that, on average, are predicted to perform best over the range of potential outcomes implied by the capital market assumptions. Research has shown that asset allocations selected from a resampled efficient frontier may outperform those from a traditional efficient frontier.[7]

In addition to the problem of getting results that are highly concentrated in just a few of the assets available, there are two more criticisms of the traditional mean-variance optimization framework.

First, the traditional approach focuses on a subset of the total portfolio. Traditionally, the focus is on finding a mix of asset classes that maximizes the expected return, subject to a risk constraint. However, because the purpose of most asset portfolios is to fund a specified future cash-flow stream—a liability—the true risk for the portfolio is not the standard deviation of the assets or the performance of the assets relative to that of peers—the true risk is not being able to fund the future liability.

An asset allocation approach that takes the future liability into account is called liability-relative optimization (or surplus optimization). The usual method employed to accomplish this is to constrain the optimizer to hold an asset class representing the liability short.

Second, the traditional mean-variance optimization framework assumes that the returns of the assets in the optimization are normally distributed. As illustrated in Table 2-1, the return distributions of different asset classes do not always follow a standard, symmetrical bell-shaped curve. Some assets have distributions that are skewed to the left or right, while others have distributions that are skinnier or fatter than others. These more complicated characteristics are called skewness and kurtosis, respectively. The next wave of enhancements to the traditional mean-variance optimization are frameworks that incorporate these additional types of non-normalities into the optimization.

Markowitz 1.0

In 1952, Harry Markowitz, invented portfolio optimization. His genius was based on three principles; risk, reward and the correlation of assets in a portfolio. Over the years, technologies advanced, markets crashed, but the portfolio optimization models used by many investors did not evolve to compensate. This is surprising in light of the fact that Markowitz was a pioneer of technological advancement in the field of computational computer science. Furthermore, he did not stand idly by in the area of portfolio modeling, but continued to make improvements in his own models and to influence the models of others. Few of these improvements, however, were picked up broadly in practice.

Going Supersonic

Because Markowitz's first effort was so simple and powerful, it attracted a great number of followers. The greater the following became, the fewer questioners debated its merits. Markowitz's original work is synonymous with modern portfolio theory and has been taught in business schools for generations and not surprisingly, is still widely used today.

Then came the crash of 2008, and people are starting to ask questions at last. The confluence of the recent economic trauma and the technological advances of the past few decades make today the perfect moment to describe the supersonic models that can be built around Markowitz's fundamental principles of risk, reward and correlation. In a recent paper, we assert that Markowitz's original work remains the perfect framework for applying the latest in economic thought and technology. We dub our updated model "Markowitz 2.0."

Markowitz 2.0

The Flaw of Averages

The 1952 mean-variance model of Harry Markowitz was the first systematic attempt to cure what Savage [2009] calls the "flaw of averages". In general, the flaw of averages is a set of systematic errors that occur when people use single numbers (usually averages) to describe uncertain future quantities. For example, if you plan to rob a bank of $10 million and have one chance in 100 of getting away with it, your average take is $100,000. If you described your activity beforehand as "making $100,000" you would be correct on average. But this is a terrible characterization of a bank heist. Yet as Savage [2009] discusses, this very "flaw of averages" is made all the time in business practice, and helps explain why everything is behind schedule, beyond budget, and below projection, and was an accessory to the economic catastrophe that culminated in 2008.

Harry Markowitz's 1952 mean-variance model distinguished between different investments that had the same average (expected) return but different risks, measured as variance or its square root (standard deviation). This breakthrough systematic attempt to cure the flaw of averages ultimately garnered a Nobel Prize for its inventor. However, the use of standard deviation and covariance introduces a higher order version of the flaw of averages, in that these concepts are themselves a version of averages.

Adding Afterburners to Traditional Portfolio Optimization

By taking advantage of the very latest in economic thought and computer technology, we can, in effect, add more thrust to the original framework of the Markowitz portfolio optimization model. The result is a dramatically more powerful model that is more aligned with 21st century investor concerns, markets, and financial instruments such as options.

Traditional portfolio optimization, commonly referred to as mean-variance optimization (MVO), suffers from several limitations which can easily be addressed with today's technology. Our discussion here will focus on five practical enhancements:

1. First, we use a scenario-based approach to allow for fat-tailed distributions. "Fat-tailed" return distributions are not possible within the context of traditional mean-variance optimization, where return distributions are assumed to be adequately described by mean and variance.

2. Second, we replace the single period expected return with the long-term forward-looking geometric mean (GM), as this takes into account accumulation of wealth.

3. Third, we substitute conditional value at risk (CVaR), which only looks at tail risk, for standard deviation, which looks at average variation.

4. Fourth, the original Markowitz model used a covariance matrix to model the distribution of returns on asset classes; we replace this with a scenario-based model that can be generated with Monte Carlo simulation, and can incorporate any number of distributions.

5. Finally, we exploit new statistical technologies pioneered by Savage in the field of Probability Management. Savage invented an astonishing new technology called the Distribution String, or DIST™, which encapsulates thousands of trials as a single data element or cell, thus eliminating the main disadvantage of the scenario-based approach—the need to store and process large amounts of data.

The Scenario Approach versus Lognormal Distributions

One of the limitations of the traditional mean-variance optimization framework assumes that the distribution of returns of the assets in the optimization can be adequately described simply by mean and variance alone. The most common depiction of this assumption is to draw the distribution of each asset class as a symmetrical bell-shaped curve, which is not always the case.

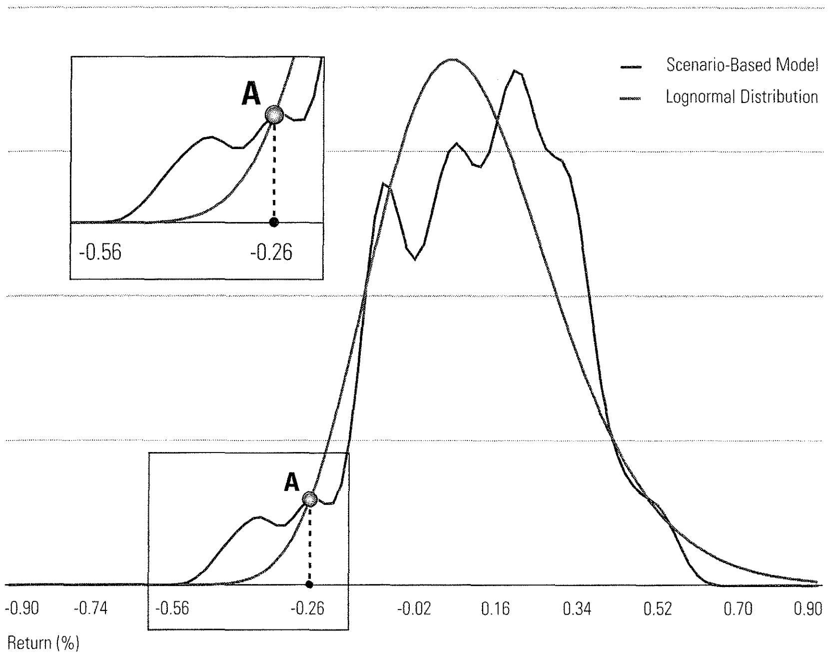
Over the years, various alternatives have been put forth to replace mean-variance optimization with an optimization framework that takes into account the non-normal features of return distributions. Some researchers have proposed using distributions curves that exhibit skewness and kurtosis (i.e., have fat tails) while others have proposed using large numbers of scenarios based on historical data or Monte Carlo simulation.

The scenario-based approach has two main advantages over a distribution curve approach: (1) it is highly flexible; for example, non-linear instruments such as options can be modeled in a straight forward manner, and (2) it is mathematically manageable; for example, portfolio returns under the scenarios are simply weighted averages of asset class returns within the scenarios. In this way, the distribution of a portfolio can be derived from the distributions of the assets classes without working complicated equations that might lack analytical solutions; only straight-forward portfolio arithmetic is needed.

In standard scenario analysis, there is no precise graphical representation of return distributions. Histograms serve as approximations such as those shown in Graph 2-1. We augment the scenario approach by employing a smoothing technique so that smooth curves represent return distributions. For example, Graph 11-6 shows the distribution curve of annual returns of large company stocks under our scenario-based approach. Comparing Graph 11-6 with the large company stock histogram in Graph 2-1, we can see that the smooth distribution curve retains the properties of the historical distribution while showing the distribution in a more esthetically pleasing and precise form. Further, our model can bring all of the power of continuous mathematics to the scenario approach. This was previously enjoyed only by models based on continuous distributions.

In Graph 11-6, the solid gray line represents the distribution of annual returns of large company stocks when our smoothed scenario-based approach is used and the red line represents the distribution curve of annual returns of large company stocks when traditional mean-variance analysis is used and we assume that returns follow a lognormal distribution.

Graph 11-6: Distribution of Annual Returns: Large Company Stocks
Lognormal Distribution versus Scenario-Based Model



Data from 1926–2009

If we extend a vertical line from Point A down to the x-axis, the area to the left (and underneath) each of the curves represents the occurrences of annual returns equal to or less than, in this case, –26 percent. Since these are cumulative distributions, we can calculate the probability that the annual returns of large company stocks will be less than or equal to –26 percent by dividing the area underneath each of the curves by the total area underneath each of the curves as a whole.

For example, looking to the scenario-based model, the area to the left of the vertical line under the scenario-based distribution represents 5 percent of the total area underneath this entire distribution line. This implies that the probability of large company stocks having a return of –26 percent or less is 5 percent. Correspondingly, the area to the left of the vertical line for the lognormal distribution represents 1.6 percent of the total area under the entire lognormal distribution line. This implies that the probability of large company stocks having a return of –26 percent or less using the traditional mean-variance model is 1.6 percent.

As Kaplan et al. [2009] discuss, "tail events" have occurred often throughout the history of capital markets all over the world, but the probabilities associated with them may be systematically underestimated within the context of traditional mean-variance analysis, where return distributions are assumed to be lognormal. The scenario-based model proposed by Kaplan and Savage is a real step forward as it better models the non-trivial probabilities associated with tail events. For a more detailed discussion of tail events and their non-triviality, see Chapter 13. In Chapter 13, Kaplan introduces a new set of monthly real stock market total returns going back a full 125 years, and uses these new returns to demonstrate that the severity of the financial crisis of 2008 was not unique, but was merely the latest chapter in a long history of market meltdowns.

Geometric Mean (GM) versus Single Period Expected Return

In MVO, reward is measured by expected return which is a forecast of arithmetic mean. However, over long periods of time, investors are not concerned with simple averages of return; rather they are concerned with the accumulation of wealth. We use forecasted long-term geometric mean (GM) as the measure of reward because investors who plan on repeatedly reinvesting in the same strategy over an indefinite period would seek the highest rate of growth for the portfolios as measured by geometric mean.[8]

Conditional Value at Risk (CVaR) versus Standard Deviation

As for risk, much has been written about how investors are not concerned merely with the degree of dispersion of returns (as measured by standard deviation), but rather with how much wealth they could lose. A number of "downside" risk measures have been proposed to replace standard deviation as the measure of risk in strategic asset allocation. While any one of these could be used, our preference is to use Conditional Value at Risk (CVaR).

CVaR is related to Value at Risk (VaR). VaR describes the left tail in terms of how much capital can be lost over a given period of time. For example, a 5 percent VaR answers a question of the form: Having invested $10,000 there is a 5 percent chance of losing $X or more in 12 months. (The "or more" implications of VaR are sometimes overlooked by investors with serious implications.) Applying this to idea to returns, the 5 percent VaR is the negative of the 5th percentile of the return distribution. For example, the 5th percentile of the distribution shown in Graph 11-6 is –25.8 percent so its 5 percent VaR is 25.8 percent. This means there is a 5 percent chance of losing $2,850 or more on a $10,000 investment. CVaR is the expected or average loss of capital should VaR be breached. Therefore CVaR is always greater than VaR. For example, the 5 percent CVaR for the distribution shown in Graph 11-6 is 35.8 percent, or $3,580 on a $10,000 investment.

Scenarios versus Correlation

In mean-variance analysis, the covariation of the returns of each pair of asset classes is represented by a single number, the correlation coefficient. This is mathematically equivalent to assuming that a simple linear regression model is an adequate description of how the returns on the two asset classes are related. In fact, the r-square statistic of a simple linear regression model for two series of returns is equal to the square of the correlation coefficient.

However, for many pairs of asset classes, a linear model misses the most important features of the relationship. For example, during normal times, non-U.S. equities are considered to be good diversifiers for U.S. equity investors. But during global crises, all major equity markets move down together.

Furthermore, suppose that the returns on two asset classes indices were highly correlated, but instead of including direct exposures to both in the model, one was replaced with an option on itself. Instead of having a linear relationship, we now have a nonlinear relationship which cannot be captured by a correlation coefficient.

Fortunately, these sorts of nonlinear relationships between returns on different investments can be handled in a scenario-based model. For example, in scenarios that represent normal times, returns on different equity markets could be modeled as moving somewhat apart from each other; while scenarios that represent global crises could model the markets as moving downward together.

Ultrasonic Statistical Technology

Since it may take thousands of scenarios to adequately model return distributions, until recently, a disadvantage of the scenario-based approach has been that it requires large amounts of data to be stored and processed. Even with the advances in computer hardware, the conventional approach of representing scenarios with large tables of explicit numbers remained problematic.

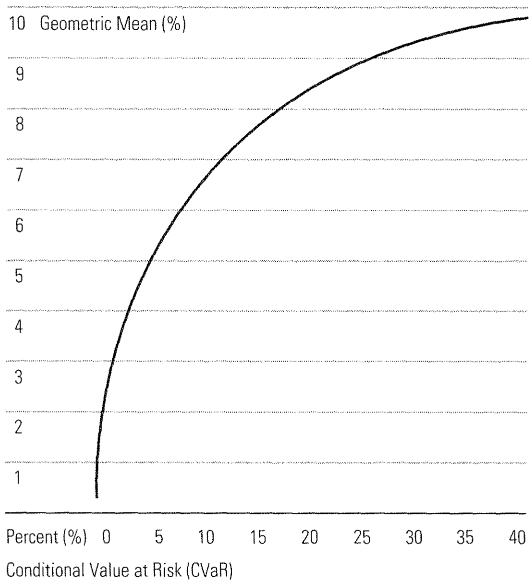
The phenomenal speed of computers has given rise to the field of Probability Management, an extension of data management to probability distributions, rather than numbers. The key component of Probability Management is the Distribution String, or DIST™, that can encapsulate thousands of trials as a single data element. The use of DISTs greatly saves on storage and speeds up processing time, so that a Monte Carlo simulation consisting of thousands of trials can be performed on a personal computer in an instant. Monte Carlo simulations that use DISTs are also very adaptable, allowing for almost any return distribution or underlying probability model, rather than being contained by parameters. While not all asset management organizations are prepared to create the DISTs needed to drive GM-CVaR optimization, some outside vendors, such as Morningstar Ibbotson, can fulfill this role.

Another facet of Probability Management is interactive simulation technology, which can run thousands of scenarios through a model before the sound of your finger leaving the <Enter> key reaches your ear. These supersonic models allow much deeper intuition into the sensitivities of portfolios, and encourage the user to interactively explore different portfolios, distributional assumptions, and potential black swans. A sample of such an interactive model is available for download from http://www.ProbabilityManagement.org.

Finale: The New Efficient Frontier

Putting it all together, we form an efficient frontier of forecasted geometric mean (GM) and conditional value at risk (CVaR) as shown in Graph 11-7,[9] incorporating our scenario approach to covariance and new statistical technology. We believe that this efficient frontier is more relevant to investors than the traditional expected return vs. standard deviation frontier of MVO because it shows the trade-off between reward and risk that is meaningful to investors; namely, long-term potential growth vs. short-term potential loss.

Graph 11-7: Geometric Mean – Conditional Value at Risk Efficient Frontier



Approaches to Calculating the Equity Risk Premium

The expected return on stocks over bonds, the equity risk premium, has been estimated by a number of authors who have utilized a variety of different approaches. Such studies can be categorized into four groups based on the approaches they have taken. The first group of studies derive the equity risk premium from historical returns between stocks and bonds. Supply-side models, using fundamental information such as earnings, dividends, or overall productivity, are used by the second group to measure the expected equity risk premium. A third group adopts demand-side models that derive the expected returns of equities through the payoff demanded by equity investors for bearing the additional risk. The opinions of financial professionals through broad surveys are relied upon by the fourth and final group. The rest of this chapter will focus on the historical and supply-side equity risk premia.

The Historical Equity Risk Premium

The expected equity risk premium can be defined as the additional return an investor expects to receive to compensate for the additional risk associated with investing in equities as opposed to investing in riskless assets.

Unfortunately, the expected equity risk premium is unobservable in the market and therefore must be estimated. Typically, this estimation is arrived at through the use of historical data. The historical equity risk premium can be calculated by subtracting the long-term average of the income return on the riskless asset (Treasuries) from the long-term average stock market return (measured over the same period as that of the riskless asset).

In using a historical measure of the equity risk premium, one assumes that what has happened in the past is representative of what might be expected in the future. In other words, the assumption one makes when using historical data to measure the expected equity risk premium is that the relationship between the returns of the risky asset (equities) and the riskless asset (Treasuries) is stable.

The Stock Market Benchmark

The stock market benchmark chosen should be a broad index that reflects the behavior of the market as a whole. Two examples of commonly used indexes are the S&P 500® and the New York Stock Exchange Composite Index. Although the Dow Jones Industrial Average is a popular index, it would be inappropriate for calculating the equity risk premium because it is too narrow.

We use the total return of our large company stock index (currently represented by the S&P 500) as our market benchmark when calculating the equity risk premium. The S&P 500 was selected as the appropriate market benchmark because it is representative of a large sample of companies across a large number of industries. The S&P 500 is also one of the most widely accepted market benchmarks. In short, the S&P 500 is a good measure of the equity market as a whole.

Table 11-4 illustrates the equity risk premium calculation using several different market indices and the income return on three government bonds of different horizons.

Table 11-4: Equity Risk Premium with Different Market Indices

	Equity Risk Premia		
	Long-Horizon (%)	Intermediate-Horizon (%)	Short-Horizon (%)
S&P 500	6.96	7.52	8.51
Total Value-Weighted NYSE	6.76	7.32	8.31
NYSE Deciles 1–2	6.23	6.79	7.78

Data from 1926–2013.

The equity risk premium is calculated by subtracting the arithmetic mean of the government bond income return from the arithmetic mean of the stock market total return. Table 11-5 demonstrates this calculation for the long-horizon equity risk premium.

Table 11-5: Long-Horizon Equity Risk Premium Calculation

	Arithmetic Mean				
Long-Horizon	Market Total Return (%)		Risk-Free Rate (%)		Equity Risk Premium (%)
S&P 500	12.05	–	5.09	=	6.96
Total Value-Weighted NYSE	11.85	–	5.09	=	6.76
NYSE Deciles 1–2	11.32	–	5.09	=	6.23

Data from 1926–2013.

Data for the New York Stock Exchange is obtained from Morningstar and the Center for Research in Security Prices (CRSP) at the University of Chicago's Graduate School of Business. The "Total" series is a capitalization-weighted index and includes all stocks traded on the New York Stock Exchange except closed-end mutual funds, real estate investment trusts, foreign stocks, and Americus Trusts. Capitalization-weighted means that the weight of each stock in the index, for a given month, is proportionate to its market capitalization (price times number of shares outstanding) at the beginning of that month. The "Decile 1–2" series includes all stocks with capitalizations that rank within the upper 20 percent of companies traded on the New York Stock Exchange, and it is therefore a large-capitalization index. For more information on the Center for Research in Security Pricing data methodology, see Chapter 7.

The Market Benchmark and Firm Size

Although not restricted to include only the 500 largest companies, the S&P 500 is considered a large company index. The returns of the S&P 500 are capitalization weighted, which means that the weight of each stock in the index, for a given month, is proportionate to its market capitalization (price times number of shares outstanding) at the beginning of that month. The larger companies in the index therefore receive the majority of the weight. The use of the NYSE "Deciles 1–2" series results in an even purer large company index. However, if using a large stock index to calculate the equity risk premium, an adjustment is usually needed to account for the different risk and return characteristics of small stocks. This was discussed further in Chapter 7 on the size premium.

The Risk-Free Asset

The equity risk premium can be calculated for a variety of time horizons when given the choice of risk-free asset to be used in the calculation. Chapter 3 provides equity risk premia calculations for short-, intermediate-, and long-term horizons. The short-, intermediate-, and long-horizon equity risk premia are calculated using the income return from a 30-day Treasury bill, a 5-year Treasury bond, and a 20-year Treasury bond, respectively.

20-Year versus 30-Year Treasuries

Our methodology for estimating the long-horizon equity risk premium makes use of the income return on a 20-year Treasury bond; however, the Treasury currently does not issue a 20-year bond. The 30-year bond that the Treasury recently began issuing again is theoretically more correct when dealing with to the long-term nature of business valuation, yet Ibbotson Associates instead creates a series of returns using bonds on the market with approximately 20 years to maturity. The reason for the use of a 20-year maturity bond is that 30-year Treasury securities have only been issued over the relatively recent past, starting in February of 1977, and were not issued at all through the early 2000s.

The same reason exists for why we do not use the 10-year Treasury bond—a long history of market data is not available for 10-year bonds. We have persisted in using a 20-year bond to keep the basis of the time series consistent.

Income Return

Another point to keep in mind when calculating the equity risk premium is that the income return on the appropriate-horizon Treasury security, rather than the total return, is used in the calculation.

The total return is comprised of three return components: the income return, the capital appreciation return, and the reinvestment return. The income return is defined as the portion of the total return that results from a periodic cash flow or, in this case, the bond coupon payment. The capital appreciation return results from the price change of a bond over a specific period. Bond prices generally change in reaction to unexpected fluctuations in yields. Reinvestment return is the return on a given month's investment income when reinvested into the same asset class in the subsequent months of the year. The income return is thus used in the estimation of the equity risk premium because it represents the truly riskless portion of the return.

Arithmetic versus Geometric Means

The equity risk premium data presented in this book are arithmetic average risk premia as opposed to geometric average risk premia. The arithmetic average equity risk premium can be demonstrated to be most appropriate when discounting future cash flows. For use as the expected equity risk premium in either the CAPM or the building block approach, the arithmetic mean or the simple difference of the arithmetic means of stock market returns and riskless rates is the relevant number. This is because both the CAPM and the building block approach are additive models, in which the cost of capital is the sum of its parts. The geometric average is more appropriate for reporting past performance, since it represents the compound average return.

Appropriate Historical Time Period

The equity risk premium can be estimated using any historical time period. For the U.S., market data exists at least as far back as the late 1800s. Therefore, it is possible to estimate the equity risk premium using data that covers roughly the past 100 years.

Our equity risk premium covers the time period from 1926 to the present. The original data source for the time series comprising the equity risk premium is the Center for Research in Security Prices. CRSP chose to begin their analysis of market returns with 1926 for two main reasons. CRSP determined that the time period around 1926 was approximately when quality financial data became available. They also made a conscious effort to include the period of extreme market volatility from the late twenties and early thirties; 1926 was chosen because it includes one full business cycle of data before the market crash of 1929. These are the most basic reasons why our equity risk premium calculation window starts in 1926.

Implicit in using history to forecast the future is the assumption that investors' expectations for future outcomes conform to past results. This method assumes that the price of taking on risk changes only slowly, if at all, over time. This "future equals the past" assumption is most applicable to a random time-series variable. A time-series variable is random if its value in one period is independent of its value in other periods.

Choosing an Appropriate Historical Period

The estimate of the equity risk premium depends on the length of the data series studied. A proper estimate of the equity risk premium requires a data series long enough to give a reliable average without being unduly influenced by very good and very poor short-term returns. When calculated using a long data series, the historical equity risk premium is relatively stable. Furthermore, because an average of the realized equity risk premium is quite volatile when calculated using a short history, using a long series makes it less likely that the analyst can justify any number he or she wants. The magnitude of how shorter periods can affect the result will be explored later in this chapter.

Some analysts estimate the expected equity risk premium using a shorter, more recent time period on the basis that recent events are more likely to be repeated in the near future; furthermore, they believe that the 1920s, 1930s, and 1940s contain too many unusual events. This view is suspect because all periods contain "unusual" events. Some of the most unusual events of the last hundred years took place quite recently, including the inflation of the late 1970s and early 1980s, the October 1987 stock market crash, the collapse of the high-yield bond market, the major contraction and consolidation of the thrift industry, the collapse of the Soviet Union, the development of the

European Economic Community, the attacks of September 11, 2001 and the more recent liquidity crisis of 2008 and 2009.

It is even difficult for economists to predict the economic environment of the future. For example, if one were analyzing the stock market in 1987 before the crash, it would be statistically improbable to predict the impending short-term volatility without considering the stock market crash and market volatility of the 1929–1931 period.

Without an appreciation of the 1920s and 1930s, no one would believe that such events could happen. The 88-year period starting with 1926 is representative of what can happen: it includes high and low returns, volatile and quiet markets, war and peace, inflation and deflation, and prosperity and depression. Restricting attention to a shorter historical period underestimates the amount of change that could occur in a long future period. Finally, because historical event-types (not specific events) tend to repeat themselves, long-run capital market return studies can reveal a great deal about the future. Investors probably expect "unusual" events to occur from time to time, and their return expectations reflect this.

A Look at the Historical Results

It is interesting to take a look at the realized returns and realized equity risk premium in the context of the above discussion. Table 11-6 shows the average stock market return and the average (arithmetic mean) realized long-horizon equity risk premium over various historical time periods. The table shows that using a longer historical period provides a more stable estimate of the equity risk premium. The reason is that any unique period will not be weighted heavily in an average covering a longer historical period. It better represents the probability of these unique events occurring over a long period of time.

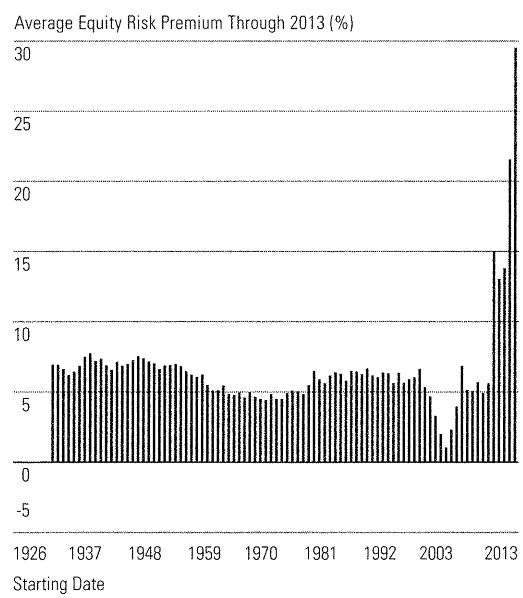
Table 11-6: Stock Market Return and Equity Risk Premium Over Time

Length (Yrs.)	Period Dates	Large Company Stock Arithmetic Mean Total Return (%)	Long-Horizon Equity Risk Premium (%)
88	1926–2013	12.1	7.0
80	1934–2013	12.5	7.2
70	1944–2013	12.8	7.2
60	1954–2013	12.4	6.2
50	1964–2013	11.4	4.7
40	1974–2013	12.6	5.5
30	1984–2013	12.6	6.3
20	1994–2013	11.1	6.1
15	1999–2013	6.6	2.0
10	2004–2013	9.2	5.2
5	2009–2013	18.4	15.0

Data from 1926–2013.

Looking carefully at Graph 11-8 will clarify this point. The graph shows the realized equity risk premium for a series of time periods through 2013, starting with 1926. In other words, the first value on the graph represents the average realized equity risk premium over the period 1926–2013. The next value on the graph represents the average realized equity risk premium over the period 1927–2013, and so on, with the last value representing the average over the most recent five years, 2007–2013.

Graph 11-8: Equity Risk Premium Using Different Starting Dates



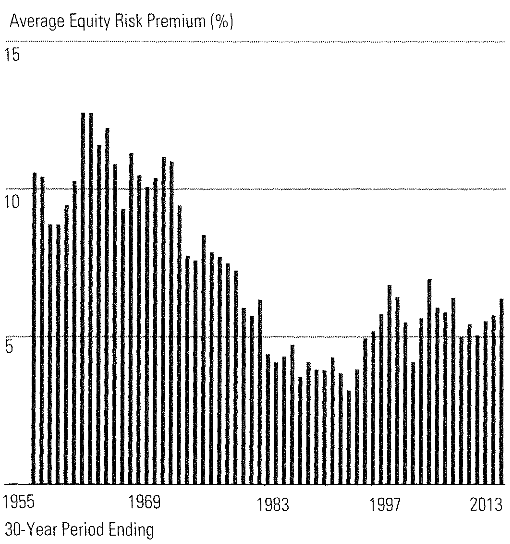
Data from 1926–2013.

Concentrating on the left side of Graph 11-8, one notices that the realized equity risk premium, when measured over long periods of time, is relatively stable. In viewing the graph from left to right, moving from longer to shorter historical periods, one sees that the value of the realized equity risk premium begins to decline significantly. Why does this occur? The reason is that the severe bear market of 1973–1974 is receiving proportionately more weight in the shorter, more recent average. If you continue to follow the line to the right, however, you will also notice that when 1973 and 1974 fall out of the recent average, the realized equity risk premium jumps up by nearly 1.2 percent.

Additionally, use of recent historical periods for estimation purposes can lead to illogical conclusions. As seen in Table 11-6, the bear market in the early 2000's and in 2008 has caused the realized equity risk premium in the shorter historical periods to be lower than the long-term average.

The impact of adding one additional year of data to a historical average is lessened the greater the initial time period of measurement. Short-term averages can be affected considerably by one or more unique observations. On the other hand, long-term averages produce more stable results.

Graph 11-9: Equity Risk Premium Over 30-Year Periods



Data from 1926–2013.

Some practitioners argue for a shorter historical time period, such as 30 years, as a basis for the equity risk premium estimation. The logic for the use of a shorter period is that historical events and economic scenarios present before this time are unlikely to be repeated. Graph 11-9 shows the equity risk premium measured over 30-year periods, and it appears from the graph that the premium has been trending downwards. The 30-year equity risk premium remained close to 4 percent for several years in the 1980s and 1990s. However, it has fallen and then risen in the most recent 30-year periods.

The key to understanding this result lies again in the years 1973 and 1974. The oil embargo during this period had a tremendous effect on the market. The equity risk premium for these years alone was -21 and -34 percent, respectively. Periods that include the years 1973 and 1974 result in average equity risk premia as low as 3.2 percent. The 2000s have also had an enormous effect on the equity risk premium.

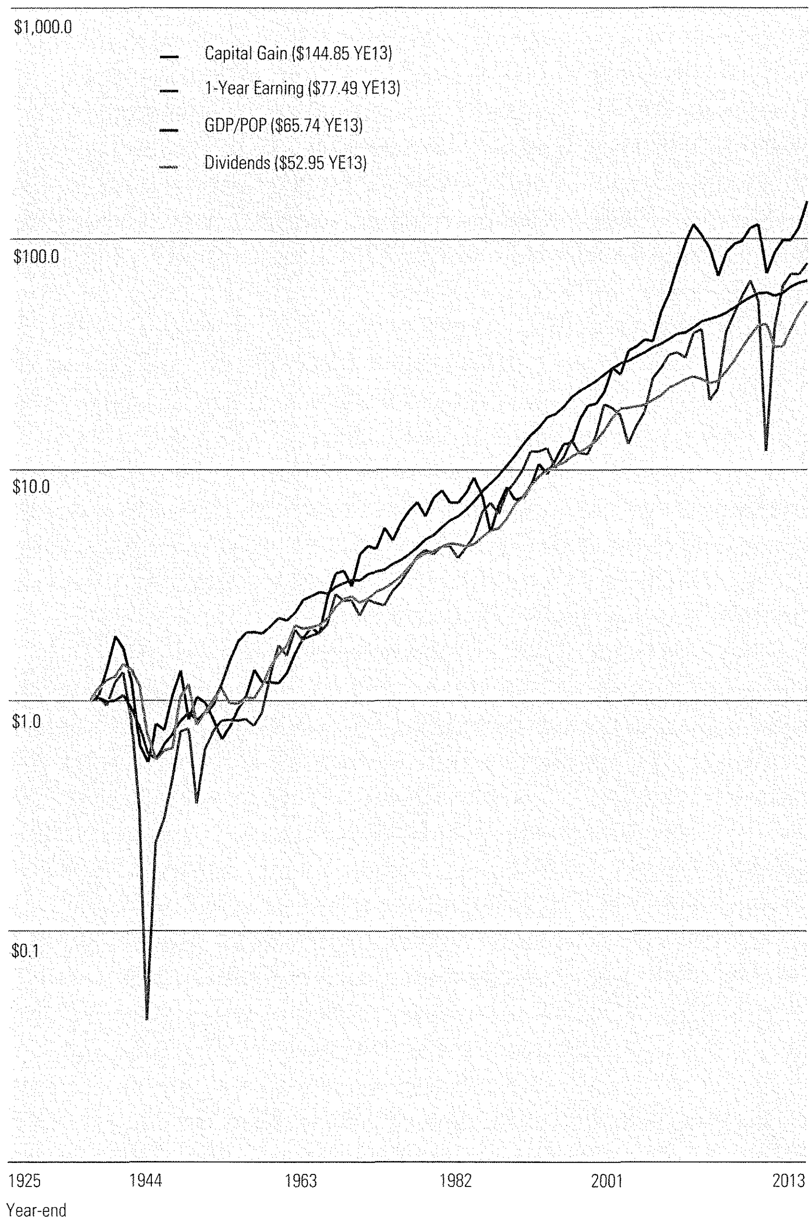
It is difficult to justify such a large divergence in estimates of return over such a short period of time. This does not suggest, however, that the years 1973 and 1974 should be excluded from any estimate of the equity risk premium; rather, it emphasizes the importance of using a long historical period when measuring the equity risk premium in order to obtain a reliable average that is not overly influenced by short-term returns. The same holds true when analyzing the poor performance of the early 2000s and 2008.

Supply Model

This section is based upon the work by Roger G. Ibbotson and Peng Chen, who combined the first and second approaches to arrive at their forecast of the equity risk premium.[10] By proposing a new supply side methodology, the Ibbotson-Chen study challenges current arguments that future returns on stocks over bonds will be negative or close to zero. The results affirm the relationship between the stock market and the overall economy.

Long-term expected equity returns can be forecasted by the use of supply side models. The supply of stock market returns is generated by the productivity of the corporations in the real economy. Investors should not expect a much higher or lower return than that produced by the companies in the real economy. Thus, over the long run, equity return should be close to the long-run supply estimate.

Graph 11-10: Capital Gains, GDP Per Capita, Earnings, and Dividends
Index (Year-End 1925 = $1.00)



Data from 1925–2013.

Earnings, dividends, and capital gains are supplied by corporate productivity. Graph 11-10 illustrates that earnings and dividends have historically grown in tandem with the overall economy (GDP per capita). However, GDP per capita did not outpace the stock market. This is primarily because the P/E ratio increased 1.87 times during the same period. So, assuming that the economy will continue to grow, all three should continue to grow as well.

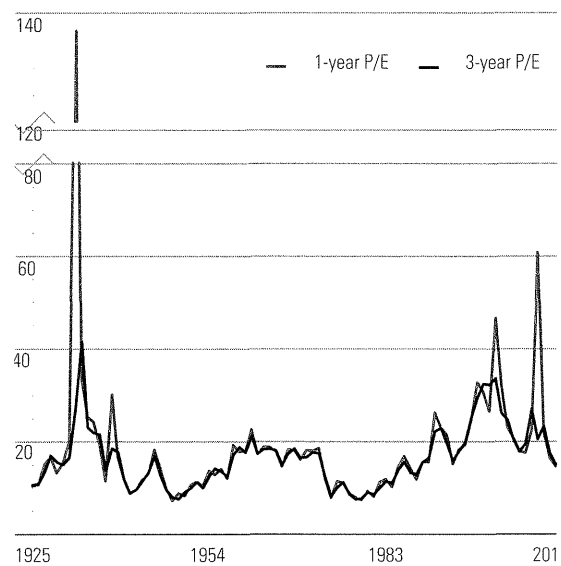
Forward-Looking Earnings Model

Roger G. Ibbotson and Peng Chen forecast the equity risk premium through a supply side model using historical data. They utilized an earnings model as the basis for their supply side estimate. The earnings model breaks the historical equity return into four pieces, with only three historically being supplied by companies: inflation, income return, and growth in real earnings per share. The growth in the P/E ratio, the fourth piece, is a reflection of investors' changing prediction of future earnings growth. The past supply of corporate growth is forecasted to continue; however, a change in investors' predictions is not. P/E rose dramatically from 1980 through 2001 because people believed that corporate earnings were going to grow faster in the future. This growth in P/E drove a small portion of the rise in equity returns over the same period.

Graph 11-11 illustrates the price to earnings ratio from 1926 to 2013. The P/E ratio, using one-year average earnings, was 10.22 at the beginning of 1926 and ended the year 2013 at 19.11, an average increase of 0.71 percent per year. The highest P/E was 136.55 recorded in 1932, while the lowest was 7.07 recorded in 1948. Ibbotson Associates revised the calculation of the P/E ratio from a one-year to a three-year average earnings for use in equity forecasting.

Graph 11-11: Large Company Stocks P/E Ratio

P/E Ratio



Data from 1925–2013.

This is because reported earnings are affected not only by the long-term productivity, but also by "one-time" items that do not necessarily have the same consistent impact year after year. The three-year average is more reflective of the long-term trend than the year-by-year numbers. The P/E ratio calculated using the three-year average of earnings had an increase of 0.67 percent per year.

The historical P/E growth factor, using three-year earnings, of 0.67 percent per year is subtracted from the equity forecast, because it is not believed that P/E will continue to increase in the future. The market serves as the cue. The current P/E ratio is the market's best guess for the future of corporate earnings and there is no reason to believe, at this time, that the market will change its mind. Using this top-down approach, the geometric supply-side equity risk premium is 4.08 percent, which equates to an arithmetic supply-side equity risk premium of 6.12 percent.

Another approach in calculating the premium would be to add up the components that comprise the supply of equity return, excluding the P/E component. Thus, the supply of equity return only includes inflation, the growth in real earnings per share, and income return. The forward-looking earnings model calculates the long-term supply of U.S. equity returns to be 9.37 percent:

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

$$9.37\%^* = [(1+2.96\%)\times(1+2.07\%)-1]+4.05\%+0.22\%$$

*difference due to rounding

where:

SR = the supply of the equity return;
CPI = Consumer Price Index (inflation);
g_{REPS} = the growth in real earning per share;
Inc = the income return;
$Rinv$ = the reinvestment return.

The equity risk premium, based on the supply-side earnings model, is calculated to be 4.11 percent on a geometric basis:

$$SERP = \frac{(1+SR)}{(1+CPI)\times(1+RRf)}-1$$

$$4.11\%^* = \frac{1+9.37\%}{(1+2.96\%)\times(1+2.04\%)}-1$$

*difference due to rounding

where:

$SERP$ = the supply-side equity risk premium;
SR = the supply of the equity return;
CPI = Consumer Price Index (inflation);
RRf = the real risk-free rate.

Converting the geometric average into an arithmetic average results in an equity risk premium of 6.14 percent:

$$R_A = R_G + \frac{\sigma^2}{2}$$

$$6.14\%^* = 4.11\% + \frac{20.19\%^2}{2}$$

*difference due to rounding

where:

R_A = the arithmetic average;
R_G = the geometric average;
σ = the standard deviation of equity returns.

As mentioned earlier, one of the key findings of the Ibbotson and Chen study is that P/E increases account for only a small portion of the total return of equity. The reason we present supply-side equity risk premium going back only 25 years in Table 11-7 (see next page) is because the P/E ratio rose dramatically over this time period, which caused the growth rate in the P/E ratio calculated from 1926 to be relatively high. The subtraction of the P/E growth factor from equity returns has been responsible for the downward adjustment in the supply side equity risk premium compared to the historical estimate. Beyond the last 25 years, the growth factor in the P/E ratio has not been dramatic enough to require an adjustment.

Table 11-7 presents the supply side equity risk premium, on an arithmetic basis, beginning in 1926 and ending in each of the last 25 years.

Table 11-7: Supply-Side and Historical Equity Risk Premium Over Time

Period Length (Yrs.)	Period Dates	g(P/E)	Arithmetic Average Supply Side Equity Risk Premium (%)	Historical Equity Risk Premium (%)
88	1926–2013	0.67*	6.12	6.96
87	1926–2012	0.46*	6.09	6.70
86	1926–2011	0.40	6.07	6.62
85	1926–2010	0.59	5.97	6.72
84	1926–2009	0.94	5.57	6.67
83	1926–2008	0.79	5.53	6.47
82	1926–2007	1.15	5.74	7.06
81	1926–2006	0.75	6.22	7.13
80	1926–2005	0.65	6.29	7.08
79	1926–2004	0.83	6.18	7.17
78	1926–2003	1.09	5.94	7.19
77	1926–2002	1.17	5.65	6.97
76	1926–2001	1.53	5.71	7.43
75	1926–2000	1.49	6.06	7.76
74	1926–1999	1.52	6.32	8.07
73	1926–1998	1.40	6.35	7.97
72	1926–1997	1.20	6.37	7.77
71	1926–1996	0.87	6.46	7.50
70	1926–1995	0.74	6.47	7.37
69	1926–1994	0.59	6.32	7.04
68	1926–1993	0.90	6.17	7.22
67	1926–1992	1.15	5.98	7.29
66	1926–1991	1.12	6.12	7.39
65	1926–1990	0.67	6.36	7.16
64	1926–1989	0.60	6.72	7.45

Data from 1926–2013. *Contains earnings estimate(s).

Long-Term Market Predictions

The supply side model estimates that stocks will continue to provide significant returns over the long run, averaging around 9.37 percent per year, assuming historical inflation rates. The equity risk premium, based on the top-down supply-side earnings model, is calculated to be 4.08 percent on a geometric basis and 6.12 percent on an arithmetic basis.

In the future, Ibbotson and Chen predict increased earnings growth that will offset lower dividend yields. The fact that earnings will grow as dividend payouts shrink is in line with the Miller and Modigliani Theory.

The forecasts for the market are in line with both the historical supply measures of public corporations (i.e. earnings) and overall economic productivity (GDP per capita). IM

Endnotes

1 The standard deviation is the square root of the variance; hence the term "mean-variance" in describing this form of the optimization problem.

2 Markowitz, Harry M., Portfolio Selection: Efficient Diversification of Investments, New York: John Wiley & Sons, 1959.

3 For more information about Morningstar *EnCorr®* software, refer to the Investment Tools and Resources page at the back of this book, or within the United States, call +1 866 910-0840. Outside the United States, call +44 020 3107-0020.

4 It is also possible to conduct a simulation using entire data sets, that is, without estimating the statistical parameters of the data sets. Typically, in such a nonparametric simulation, the frequency of an event occurring in the simulated history is equal to the frequency of the event occurring in the actual history used to construct the data set.

5 The expected capital gain on a par bond is self-evidently zero. For a zero-coupon (or other discount) bond, investors expect the price to rise as the bond ages, but the expected portion of this price increase should not be considered a capital gain. It is a form of income return.

6 See Chapter 12, "Wealth Forecasting with Monte Carlo Simulation" for more information.

7 See Markowitz and Usmen [2003].

8 Ranking investment strategies by forecasted GM is sometimes described as applying the Kelly Criterion; an idea promoted by William Poundstone [2005].

9 Other researchers have also proposed using GM and CVaR as the measures or reward and risk in an efficient frontier. See for example Sheikh and Qiao, [2009].

10 "Long-Run Stock Returns: Participating in the Real Economy," Roger G. Ibbotson and Peng Chen, Financial Analysts Journal, January/February 2003.

Essentials of Managerial Finance

third edition

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RISK IN FINANCIAL ANALYSIS

The riskiness of an asset is defined in terms of the likely variability of future returns from the asset. For example, if one buys a $1 million short-term government bond expected to yield 5 percent, then the return on the investment, 5 percent, can be estimated quite precisely, and the investment is defined to be relatively risk free. However, if the $1 million is invested in the stock of a company just being organized to prospect for uranium in Central Africa, then the probable return cannot be estimated precisely. The rate of return on the $1 million investment could range from minus 100 percent to some extremely large figure; because of this high variability, the project is defined to be relatively risky. Similarly, sales forecasts for different products of a single firm might exhibit differing degrees of riskiness. For example, the Union Carbide Company might be quite sure that sales of its Eveready batteries will range between 50 and 60 million for the coming year, but be highly uncertain about how many units of a new laser measuring device will be sold during the year.

Risk, then, is associated with project variability—the more variable the expected future returns, the riskier the investment. However, we can define risk more precisely, and it is useful to do so. This more precise definition requires a step-by-step development, which constitutes the remainder of this section.

Probability Distributions

Any investment decision—or, for that matter, almost *any* kind of business decision—implies a forecast of future events, with the forecast being either explicit or implicit. Ordinarily, the forecast of annual cash flow is a single figure, or point estimate, frequently called the "most likely" or "best" estimate. For example, one might forecast that the cash flows from a particular project will be $500 a year for three years.

How good is this point estimate; that is, how confident is the forecaster of his predicted return? Is he very certain, very uncertain, or somewhere in between? This degree of uncertainty can be defined and measured in terms of the forecaster's "probability distribution"—the probability estimates associated with each possible outcome. In its simplest form, a probability distribution could consist of just a few potential outcomes. For example, in forecasting cash flows, we could make an optimistic estimate, a pessimistic estimate, and a most likely estimate; or, alternatively, we could make high, low, and "best guess" estimates. We might expect our high, or optimistic,

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TABLE 7-1

Average rates of return on Treasury bills, government bonds, corporate bonds, and common stocks, 1926–1994 (figures in percent per year)

Portfolio	AVERAGE ANNUAL RATE OF RETURN Nominal	Real	Average Risk Premium (Extra Return versus Treasury Bills)
Treasury bills	3.7	.6	0
Government bonds	5.2	2.1	1.4
Corporate bonds	5.7	2.7	2.0
Common stocks (S&P 500)	12.2	8.9	8.4
Small-firm common stocks	17.4	13.9	13.7

Source: Ibbotson Associates, Inc., *1995 Yearbook*.

You may ask why we look back over such a long period to measure average rates of return. The reason is that annual rates of return for common stocks fluctuate so much that averages taken over short periods are meaningless. Our only hope of gaining insights from historical rates of return is to look at a very long period.[3]

Arithmetic Averages and Compound Annual Returns

Notice that the average returns shown in Table 7-1 are arithmetic averages. In other words, Ibbotson Associates simply added the 69 annual returns and divided by 69. The arithmetic average is higher than the compound annual return over the period. The 69-year compound annual return for the S&P index was 10.2 percent.[4]

The proper uses of arithmetic and compound rates of return from past investments are often misunderstood. Therefore, we call a brief time-out for a clarifying example.

Example: Suppose that the price of Big Oil's common stock is \$100. There is an equal chance that at the end of the year the stock will be worth \$90, \$110, or \$130. Therefore, the return could be −10 percent, +10 percent, or +30 percent (we assume that Big Oil does not pay a dividend). The *expected* return is $\frac{1}{3}(-10 + 10 + 30) = +10$ percent.

If we run the process in reverse and discount the expected cash flow by the expected rate of return, we obtain the value of Big Oil's stock:

[3]Even with 69 years of data we cannot be sure that this period is truly representative and that the average is not distorted by a few unusually high or low returns. The reliability of an estimate of the average is usually measured by its *standard error*. For example, the standard error of our estimate of the average risk premium on common stocks is 2.5 percent. There is a 95 percent chance that the *true* average is within plus or minus 2 standard errors of the 8.4 percent estimate. In other words, if you said that the true average was between 3.5 and 13.4 percent, you would have a 95 percent chance of being right. (*Technical note:* The standard error of the mean is equal to the standard deviation divided by the square root of the number of observations. In our case the standard deviation is 20.6 percent, and therefore the standard error is $20.6/\sqrt{69} = 2.5$.)

[4]This was calculated from $(1 + r)^{69} = 811$, which implies $r = .102$. (*Technical note:* For lognormally distributed returns the annual compound return is equal to the arithmetic average return minus half the variance. For example, the annual standard deviation of returns on the U.S. market was about .20, or 20 percent. Variance was therefore $.20^2$, or .04. The compound annual return is $.04/2 = .02$, or 2 percentage points less than the arithmetic average.)

$$PV = \frac{110}{1.10} = \$100$$

The expected return of 10 percent is therefore the correct rate at which to discount the expected cash flow from Big Oil's stock. It is also the opportunity cost of capital for investments which have the same degree of risk as Big Oil.

Now suppose that we observe the returns on Big Oil stock over a large number of years. If the odds are unchanged, the return will be −10 percent in a third of the years, +10 percent in a further third, and +30 percent in the remaining years. The arithmetic average of these yearly returns is

$$\frac{-10 + 10 + 30}{3} = +10\%$$

Thus the arithmetic average of the returns correctly measures the opportunity cost of capital for investments of similar risk to Big Oil stock.

The compound annual return on Big Oil stock is

$$(.9 \times 1.1 \times 1.3)^{1/3} - 1 = .088, \text{ or } 8.8\%,$$

less than the opportunity cost of capital. Investors would not be willing to invest in a project that offered an 8.8 percent expected return if they could get an expected return of 10 percent in the capital markets. The net present value of such a project would be

$$NPV = 100 + \frac{108.8}{1.1} = -1.1$$

Moral: If the cost of capital is estimated from historical returns or risk premiums, use arithmetic averages, not compound annual rates of return.

Using Historical Evidence to Evaluate Today's Cost of Capital

Suppose there is an investment project which you *know*—don't ask how—has the same risk as Standard and Poor's Composite Index. We will say that it has the same degree of risk as the *market portfolio*, although this is speaking somewhat loosely, because the index does not include all risky securities. What rate should you use to discount this project's forecasted cash flows?

Clearly you should use the currently expected rate of return on the market portfolio; that is the return investors would forgo by investing in the proposed project. Let us call this market return r_m. One way to estimate r_m is to assume that the future will be like the past and that today's investors expect to receive the same "normal" rates of return revealed by the averages shown in Table 7-1. In this case, you would set r_m at 12.2 percent, the average of past market returns.

Unfortunately, this is *not* the way to do it: r_m is not likely to be stable over time. Remember that it is the sum of the risk-free interest rate r_f and a premium for risk. We know that r_f varies. For example, as we finish this chapter in early 1995, Treasury bills yield about 6 percent, more than 2 percentage points above the 3.7 percent average return of Treasury bills.

What if you were called upon to estimate r_m in 1995? Would you have said 12.2 percent? That would have squeezed the risk premium by 2.2 percentage points. A more sensible procedure takes the current interest rate on Treasury bills plus 8.4 percent, the average *risk premium* shown in Table 7-1. With a rate of 6 percent for Treasury bills, that gives

$$\begin{aligned} r_m(1995) &= r_f(1995) + \text{normal risk premium} \\ &= .06 + .084 = .144, \text{ or } 14.4\% \end{aligned}$$