

# Invest*Ed*

## BECOME A STOCK ANALYSIS EXPERT

**Understanding some of the calculations in the SSG tools**

**Brad Taylor**  
**[brad@churr.com](mailto:brad@churr.com)**

**Session: 1055**

# PURPOSE

- **To better understand the calculations behind the Stock Selection Guide used by stock analysis software**
  - **Toolkit 6**
  - **Stock Investment Guide**
  - **Other SSG Tools**



# OUTLINE

- **Topics Covered**
  - **R<sup>2</sup> (Visual Analysis Graph)**
  - **Debt to Equity Ratio**
  - **Sustainable Growth**
  - **PE to Earnings Growth (PEG) Ratio**
  - **Total Return**
  - **Projected Average Return (PAR)**

# **BACKGROUND**

- **In the “old days” the Stock Selection Guide was completed by hand**
- **Calculators and rulers were needed to complete the form**
- **Ratios and calculations were understood for each section**
- **The advent of computer software led to the “plug and play” approach used today**
- **Computers allow more complex calculations**



# APPROACH

- **Walk through the SSG form**
- **Examine calculations that are not straight forward**
- **Look at math behind the calculations**
- **Understand the meaning in context of the SSG**

# VISUAL ANALYSIS - R<sup>2</sup>

- Both Toolkit 6 and Stock Investment Guide display R<sup>2</sup> for the “curve fit” of the Sales and EPS Historical Growth Rates

(1) Historical Sales Growth = 38.29%
(2) Estimated Sales Growth <input type="text" value="17.00"/>
Sales Growth R <sup>2</sup> = 0.99
(3) Historical EPS Growth = 99.34%
(4) Estimated EPS Growth <input type="text" value="17.00"/>
EPS Growth R <sup>2</sup> = 0.93
ACE 5-year EPS Growth Estimate: 20.0%
S&P Strength Rating: B
Preferred Method EPS = \$13.64
Preferred EPS Growth Rate = 2.97%
<a href="#">Preferred EPS Procedure Calculation</a>

## Stock Investment Guide

- What does R<sup>2</sup> mean? Why should we care?

Projected 5 Yr Total Earnings Divided by Shares Outs. Calculated Growth Rate													
1	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
(1) Historical Sales Growth	26.5 %						(3) Historical Earnings Per Share Growth	90.4 %					
(2) Estimated Future Sales Growth	20.8 %						(4) Estimated Future Earnings Per Share Growth	20.8 %					
(5) Sales Growth R <sup>2</sup>	0.87						(6) Earnings Per Share Growth R <sup>2</sup>	0.53					

## Toolkit 6



# VISUAL ANALYSIS - $R^2$

- **Both Toolkit and Stock Investment Guide use a Least Squares Curve Fit to estimate historical sales and earnings growth lines on the SSG graph**
- **$R^2$  is also calculated to determine how well the line “fits” the data points.**

# MEANING OF R<sup>2</sup>

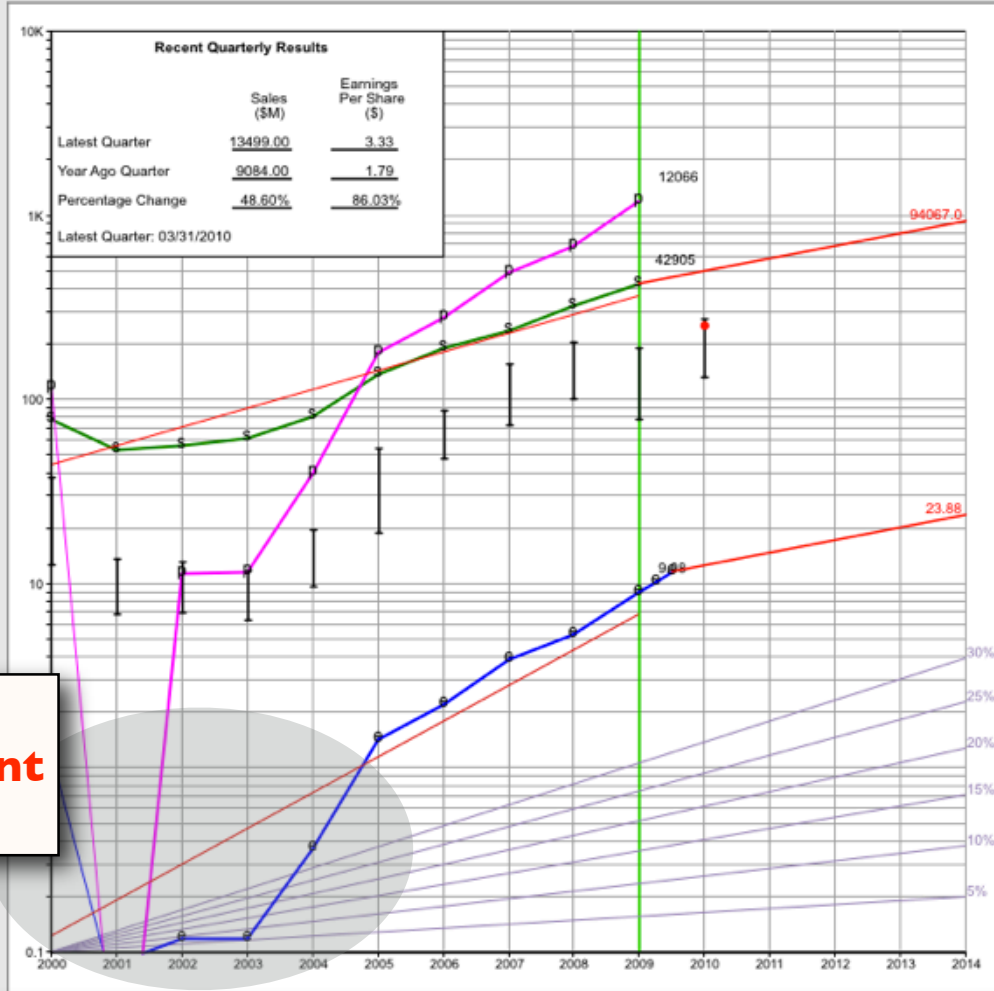
- R<sup>2</sup> is the statistical measure of how successful the curve fit (for the historical growth rate lines) explains the variation in the data. A value closer to 1.0 indicates a better fit.
- An R<sup>2</sup> value of 0.85 means the estimated growth rate line explains 85% of the total variation in the data about the average.
- For a more warm and fuzzy answer:
  - R<sup>2</sup> indicates consistency of the earnings or sales growth.
  - The more volatile the data, the lower the value of R<sup>2</sup>

• R<sup>2</sup> will provide a sense how well the historical sales & EPS growth approximate the actual data points



# R<sup>2</sup> EXAMPLE I

## APPLE INC (AAPL)



**Less Consistent EPS**

### Legend

- e - EPS
- s - Sales
- p - Pretax Income

### Growth Rates

(1) Historical Sales Growth = 26.53%

(2) Estimated Sales Growth

Sales Growth R<sup>2</sup> = 0.87

(3) Historical EPS Growth = 56.44%

(4) Estimated EPS Growth =

**EPS Growth R<sup>2</sup> = 0.65**

ACE 5-year

S&P Strength Rating: B

Preferred Method EPS = \$13.64

Preferred EPS Growth Rate = 2.97%

[Preferred EPS Procedure Calculation](#)

### Graph Adjustment

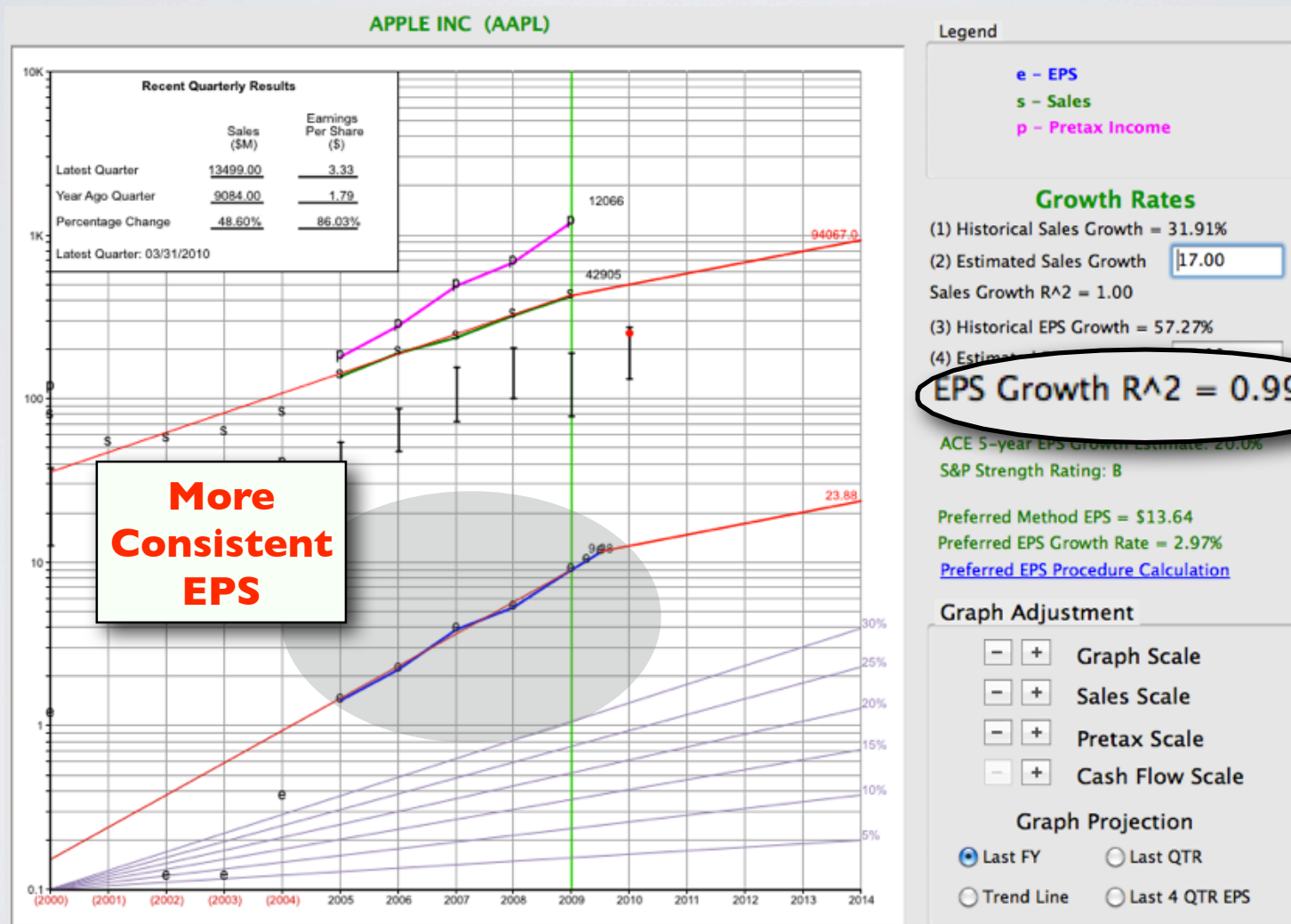
- Graph Scale
- Sales Scale
- Pretax Scale
- Cash Flow Scale

### Graph Projection

- Last FY  Last QTR
- Trend Line  Last 4 QTR EPS

**AAPL EPS growth estimate has a R<sup>2</sup> of 0.65 for 10 years**

# R<sup>2</sup> EXAMPLE 2



• AAPL EPS growth estimate has a R<sup>2</sup> of 0.99 for 5 years



# DEBT TO EQUITY RATIO

## PERFORMANCE

% Pretax Profit  
 % Earned on Capital  
**% Debt to Equity**

	(2000)	(2001)	(2002)	(2003)	2004	2005	2006	2007	2008	2009	5 Yr Ave	Trend
% Pretax Profit	26.8	21.8	24.4	23.3	23.9	22.9	22.4	20.9	22.0	21.9	22.0	EVEN
% Earned on Capital	31.0	28.8	30.2	26.4	24.8	26.5	27.7	24.6	29.5	25.4	26.7	DOWN
<b>% Debt to Equity</b>	12.6	47.8	40.1	26.4	33.4	31.7	49.9	53.4	49.8	49.3	46.8	UP

PRICE &  
 EARNINGS HISTORY

## Stock Investment Guide

### 2 QUALITY ANALYSIS

Company **ABBOTT LABORATORIES** (ABT)

06/15/10

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	5 YEAR AVG.	TREND UP/DOWN
<b>A</b> % Pre-tax Profit on Sales	26.8	21.8	24.4	23.3	23.9	22.9	22.4	20.9	22.0	21.9	22.0	EVEN
<b>B</b> % Return on Equity	31.0	28.8	30.2	26.4	24.8	26.5	27.7	24.6	29.5	25.4	26.7	DOWN
<b>C</b> % Debt to Equity	12.6	47.9	40.1	26.4	33.4	31.7	49.9	53.4	49.8	49.3	46.8	UP

### 3 PRICE, PRICE/EARNINGS RATIO and DIVIDEND ANALYSIS

## Toolkit 6

# DEBT TO EQUITY RATIO DEFINITION

- Traditional Definition
  - Debt to Equity Ratio = Total Liabilities / Shareholders Equity
- Shareholder Equity is not directly available in the SSG data feeds (due to the .ssg data file format)
- Shareholder Equity = Book Value Per Share \* Number Shares
- SSG %Debt to Equity = Long Term Debt / Shareholder Equity

**Long Term Debt is substituted for Total Liabilities due to availability of 10 years of liabilities data**



# UNDERSTANDING DEBT TO EQUITY

- **Debt ratios offer a valuable method for assessing a company's fundamental health**
- **In context and over time, the ratio offers valuable signals of deepening debt problems, e.g. financial crisis of 2008/2009**
  - **Many financial institutions overleveraged their businesses**
  - **As assets fell in value, the ratios became unsustainable**
- **Balance strength (or weakness) become a factor in a recession**
- **The higher the ratio, the higher the company leverage!**

**Watch the trend of the Debt to Equity Ratio  
Big Increases = Bad!**

# SUSTAINABLE GROWTH

- **The sustainable growth rate (SGR) calculation examines how much a company can grow without borrowing additional funds**
- **$SGR = ROE \times (1 - \text{Dividend Payout Ratio})$**
- **Changes in profitability (ROE), or reducing the dividend can improve the SGR**
  - **Provides capital required for growth**

• **SGR assumes no changes to the Debt-to-Equity ratio**



# SUSTAINABLE GROWTH

## Example (Abbott Labs)

**2009 ROE: 25.4%**

**Payout Ratio: 41.7%**

**$SGR = 25.4 * (1 - .417) = 14.8\%$**

- **Compare your SSG EPS growth estimate to the Sustainable Grow Rate**

# WEIGHTED PE AVERAGES

## PRICE & EARNINGS HISTORY

03.0 30.2 8.3 4.7 3.3 2.2 1.7 1.3 1.3 0.9 1.3 DOWN

Present Price = 157.79 52 Week High= 166.71 52 Week Low= 88.18

Year	High Price	Low Price	EPS	PE High	PE Low	Dividend	Payout	High Yield	
2005	148.7	76.7	3.65	40.7	21.0	0.985	27.0	1.3	
2006	146.2	90.8	4.35	33.6	20.9	1.380	31.7	1.5	
2007	154.9	109.4	5.39	28.7	20.3	2.038	37.8	1.9	
2008	178.6	66.6	5.96	30.0	11.2	2.535	42.5	3.8	
2009	166.7	76.0	6.81	24.5	11.2	3.645	53.5	4.8	
TOTAL	795.1	419.6							
AVERAGE	159.0	83.9		31.5	16.9		38.5		
AVERAGE PRICE EARNINGS RATIO= 24.2				CURRENT PRICE EARNINGS RATIO= 23.1					

PEG Ratio = 1.93 Proj PEG = 1.72 Current PE Ratio Based on Current EPS [\$6.82] Projected PE Ratio of [20.7] Based on Projected EPS [\$7.6]

## Standard Averages

## EARNINGS HISTORY

Present Price = 157.79 52 Week High= 166.71 52 Week Low= 88.18

Year	High Price	Low Price	EPS	PE High	PE Low	Dividend	Payout	High Yield	
2005	148.7	76.7	3.65	40.7	21.0	0.985	27.0	1.3	
2006	146.2	90.8	4.35	33.6	20.9	1.380	31.7	1.5	
2007	154.9	109.4	5.39	28.7	20.3	2.038	37.8	1.9	
2008	178.6	66.6	5.96	30.0	11.2	2.535	42.5	3.8	
2009	166.7	76.0	6.81	24.5	11.2	3.645	53.5	4.8	
TOTAL	795.1	419.6							
AVERAGE	159.0	83.9		(w) 29.1	(w) 15.0		38.5		
AVERAGE PRICE EARNINGS RATIO= 22.0				CURRENT PRICE EARNINGS RATIO= 23.1					

PEG Ratio = 1.93 Proj PEG = 1.72 Current PE Ratio Based on Current EPS [\$6.82] Projected PE Ratio of [20.7] Based on Projected EPS [\$7.6]

## Weighted Averages



# WEIGHTED PE AVERAGES

- **Weighted PE Ratio Averages provide an alternate view of the High and Low PE Ratios averages.**
- **Can adjust for declining or expanding PE ratios.**

	PE High	PE Low	Di
5	40.7	21.0	
5	33.6	20.9	
9	28.7	20.3	
6	30.0	11.2	
1	24.5	11.2	
	(w) 29.1	(w) 15.0	
	CURRENT PRICE EARN		

Weighting

$$\begin{aligned}
 1 \times 40.7 &= 40.7 \\
 2 \times 33.6 &= 67.2 \\
 3 \times 28.7 &= 86.1 \\
 4 \times 30.0 &= 120.0 \\
 5 \times 24.5 &= 122.5 \\
 \hline
 &436.5
 \end{aligned}$$

**Weighted PE Ratio:  $436.5 / 15 = 29.1$**

# **WEIGHTED PE AVERAGES**

- **The weighted PE ratio calculation emphasizes the most recent years in the average calculations.**
- **A standard average can be too high if PE ratios are declining each year (or too low if PE ratios are expanding)**
- **Provides an additional tool to consider in the analysis of a company**



# PRICE TO EARNINGS GROWTH (PEG)

## SSG Section 3

TOTAL	687.8	318.1					
AVERAGE	137.6	63.6		34.8	16.0		0.0
AVERAGE PRICE EARNINGS RATIO= 25.4			CURRENT PRICE EARNINGS RATIO= 23.1				
PEG Ratio = 1.22		Proj PEG = 1.02		Current PE Ratio Based on Current EPS [\$11.78]		Projected PE Ratio of [19.4] Based on Projected EPS [\$14.0]	

## Stock Investment Guide

AVERAGE P/E RATIO	25.4	PROJECTED P/E RATIO	19.4	TTM EPS	11.78
CURRENT P/E RATIO	23.1	PEG RATIO	1.0	FTM EPS	14.02
RELATIVE VALUE	90.9%	PROJ. RELATIVE VALUE	76.4%		

## Toolkit 6

**PEG = PE Ratio / Earnings Growth Rate**

**Example: 23.1 / 19.0 = 1.22**

# UNDERSTANDING THE PEG RATIO

- **PEG ratio is a valuation metric for determining relative trade-off between the stock price, the earnings per share (EPS), and the company's expected growth.**
- **In general, a higher growth company has a higher PE ratio**
- **A simple comparison of PE ratios may make the higher growth company appear overvalued**
- **Dividing PE Ratio by growth rate provides a consistent look across companies with different growth rates**
- **A PEG ratio at extreme levels (high or low) is highly questionable**
- **The PEG ratio does not take into consideration reliable companies that pay dividends on a regular basis**
- **Beware of the accuracy of EPS growth projections. The accuracy of the growth projection directly impacts the PEG ratio**

**• The PEG ratio, like many other investing calculations, should only be considered a “guide” to understanding a company**



# PEG RATIO LIMITATIONS

- **Absolute growth rate used in PEG calculations does not take into consideration economic growth effect.**
- **The PEG ratio of 1.0 is a somewhat arbitrary “ideal”**
- **A low PEG ratio in times of high economic growth may not be attractive when compared to other companies.**
- **A high PEG ratio in times of low economic growth may not reflect poor investment prospects**
- **PEG ratio has no implicit or explicit correction for inflation**
- **Speculative stocks can have a very high growth rate, leading to a low PEG ratio!**

**Higher PEG stock with steady growth may be a better investment than low PEG stocks on an earnings “streak”**

# RETURN CALCULATIONS

## RETURN ANALYSIS

Relative Value = 78.0%

Proj Rel Value = 70.8%

Current Yield =  $(100 * \text{Current Dividend}) \div \text{Current Price} = 100 * 1.76 / 47.2 = 3.7\%$

Ave. 5 Yr. Yield =  $(\text{Ave. EPS}(5\text{Yr}) * \text{Ave. Payout}) \div \text{Current Price} = (4.98 * 43.7) / 47.2 = 4.6\%$

Price Appreciation =  $((100 * \text{Projected High Price} \div \text{Current Price}) - 100) \div 5 = 25.4\%$

Average Total Return = Price Appreciation + Ave. 5 Yr. Yield = 30.0%

	P.A.R	Tot. Ret.
Average Yield	2.8%	2.5%
Annual Appreciation	15.1%	17.8%
Compounded Annual Return	17.9%	20.3%

## Stock Investment Guide

### 5 TOTAL RETURN ANALYSIS

#### A CURRENT YIELD

Present Full Year's Dividend \$ 1.760 ÷ Current Price of Stock \$ 47.200 = 3.7 % Present Yield or % Returned on Purchase Price

#### B AVERAGE YIELD OVER NEXT 5 YEARS

(Avg. EPS Next 5 Years 4.98 X Avg. % Payout 43.7) ÷ Current Price \$ 47.200 = 4.6 %

#### C X COMPOUND ANNUAL TOTAL RETURN

Average Yield 2.5 % + Annual Appreciation 17.8 % = Compound Annual Total Return 20.3 %

#### D X PROJECTED AVERAGE RETURN

Average Yield 2.8 % + Annual Appreciation 15.1 % = Projected Average Total Return 17.9 %

## Toolkit 6

Return calculations show percentage returns if analysis assumptions become reality




# COMPOUNDED TOTAL ANNUAL RETURN

- **Compounded growth rate to reach selected high price in analysis plus the 5-year stock yield**

$$\begin{aligned}\text{Tot Return} &= 100 * (1 - (\text{High Price} / \text{Current Price})^{1/5}) + 5 \text{ yr Yield} \\ &= 100 * (1 - (\text{High Price} / \text{Current Price})^{0.2}) + 5 \text{ yr Yield}\end{aligned}$$

## **5 Year Yield**

$$100 * (\text{Ave Payout} * \text{Projected EPS}) / \text{Selected High Price}$$


# COMPOUNDED TOTAL ANNUAL RETURN

$$100*(1-(\text{High Price} / \text{Current Price})^{0.2}) + 5 \text{ yr Yield}$$

## EXAMPLE

$$\begin{aligned}\text{Tot Return} &= 100*(1-(107.2 / 47.20)^{1/5}) + 2.5 \\ &= 100*(1-(107.2 / 47.20)^{0.2}) + 2.5 \\ &= 17.8 + 2.5 = 20.3\end{aligned}$$

### 5 Year Yield

$$100*(\text{Ave Payout} * \text{Projected EPS}) / \text{Selected High Price}$$

### Example:

$$100*(0.437 * 6.02)/107.2 = 2.454$$

- Indicates total return if your stock achieves the selected high price and dividend is collected for 5 years

# PROJECTED AVERAGE RETURN (PAR)

- **Compounded growth rate to reach a high price at the average PE ratio plus an average 5-year yield**

$$\text{PAR} = 100 * (1 - ((\text{Proj EPS} * \text{Ave PE Ratio}) / \text{Current Price})^{1/5}) + 5 \text{ yr Ave Yield}$$

$$= 100 * (1 - ((\text{Proj EPS} * \text{Ave PE Ratio}) / \text{Current Price})^{0.2}) + 5 \text{ yr Ave Yield}$$

## 5 Year Ave Yield

Average Dividend / Average Price =

$$\frac{\text{Ave Payout} * \text{Ave EPS}}{\text{Ave PE} * \text{Ave EPS}}$$

$$\text{Ave PE} * \text{Ave EPS}$$



# PROJECTED AVERAGE RETURN (PAR)

## EXAMPLE

$$\begin{aligned}\text{PAR} &= 100 * (1 - (6.02 * 15.9 / 47.20)^{1/5}) \\ &= 100 * (1 - (6.02 * 15.9 / 47.20)^{0.2}) + 2.8 \\ &= 15.1 + 2.8 = 17.9\end{aligned}$$

### 5 Year Yield

$$100 * (\text{Ave Payout} / \text{Ave PE}) =$$

### Example:

$$100 * (.437 / 15.9) = 2.8$$

- Indicates total return if your stock achieves a high price at the average PE and average dividend is collected for 5 years

# SUMMARY

- **We reviewed some of the calculations behind areas of the SSG**
  - **R<sup>2</sup> (Visual Analysis Graph)**
  - **Debt to Equity Ratio**
  - **Sustainable Growth**
  - **PE to Earnings Growth (PEG) Ratio**
  - **Total Return**
  - **Projected Average Return (PAR)**

- **Understanding the calculations in the SSG tools improves our understanding of their meaning**



# **SURVEY**

**This has been InvestEd Session: I055**

**Please take a moment to fill out the survey.**