VALUESOFT INVESTMENT SYSTEM

Version 2.0

Valuesoft … helping you build wealth so that you can live the lifestyle you choose and champion the causes you believe in.

Requires Excel for Windows

Price Value, Inc.
PO Box 2404
Fairfield, IA 52556
U.S.A.

http://www.sherlockinvesting.com

Dedicated to Sandy,
who has been with me every step
of this inner and outer journey.

Developers The software was developed and written by John Price Ph.D. and Matthew Price for Price Value, Inc.

The Investor's Dilemma

The dilemma faced by most investors is to choose between investing in "an attractive enterprise on unattractive terms or in an unattractive enterprise on attractive terms" as Benjamin Graham (Graham and Dodd 1934) wrote in 1934. Should we invest in General Electric, one of the great companies of the world, with a price/earnings ratio of over 35, more than twice the market average? Or should we invest in General Motors, a company struggling to bring its costs down but with a low price/earnings ratio of around 7, less than half the market average?

The goal of Valuesoft is to show how to find enterprises that are both attractive as companies and available on attractive terms.

The goal of Valuesoft is to help you find enterprises that are both attractive as companies and available on attractive terms.

Valuesoft provides quantitative methods for selecting great companies that are selling for a price that represents great value. Even more, the methods show you how to find such companies with the crucial property that their stock prices are likely to move to their intrinsic values. Valuesoft is a collection of functions to help investors make better decisions for buying and selling stocks, particularly for those investors who are seeking longer-term investments.

Asking the right questions

The foundation of successful investing is to start by asking the right questions. What is the most important question for a stock market investor?

- Whether the market is undervalued or overvalued? No!
- Whether interest rates will go up or down? No!
- Whether a particular company is undervalued or overvalued? No!
- Whether you should buy ABC or XYZ? No!
- Whether Joe Bloggs, the famous analyst, says it is a great buy? No!

All these questions are useless! Around the world there are office buildings full of people pumping out answers to these questions. They are not trying to mislead you. They are just trying to supply answers to these questions because people keep asking them and are willing to pay handsomely for the answers.

Even if they could be answered, the answers will not help you reach your financial goals. Why? Because they are the wrong questions.

Focusing on these questions will give you the illusion that you are a serious investor. Long hours reading all the articles and books, perhaps even poring over charts and financial reports, will only keep you locked in the system of struggle and mediocre success.

For others, the questions will give you an illusion of confidence and comfort because you are acting on the advice of the latest Wall Street hotshot.

But illusions hold you in bondage. As Morpheus in the film *The Matrix* explains, “Like everyone else, you were born into bondage. Born into a prison that you cannot taste or smell or touch. A prison ... for your mind.”

Chasing answers to these questions will keep you in this prison. At best you may from time to time do better than the S&P500 or some other index. At worst you will see your money slipping away with poor returns and excessive fees.

Consider the case of trying to determine whether a company is undervalued or overvalued. It may turn out to be undervalued using some academic model. And there are hundreds of books describing such models. But if it stays undervalued for the next 10 years it is not going to be much of an investment.

Even the whole notion of true value is flawed. Suppose you go into a jewelry store and decide to buy an emerald ring for $2,000. The jeweler assures you that it is really worth a lot more and even arranges to get an insurance certificate for $4,000. Great! You are now congratulating yourself for buying something that is valued at 100% more than you paid for it.

What if you split up with the person you were going to give the ring to? No worries, you are thinking. “I'll just sell it back to the store.” But when you go back in you are told that they will only pay $1,000 to buy it back. What you thought you were getting for 50% of its true value turns out to be overvalued by 100%.

All the other questions asked above can be dealt with in a similar manner. For example, Warren Buffett said that he has no idea what the market is going to do and whether it is undervalued or overvalued, whatever that may mean. What is more, he is not interested in knowing.

The same applies to interest rates. Buffett once said, “If the Federal Reserve Chairman Alan Greenspan were to whisper to me what his monetary policy was going to be over the next two years, it wouldn't change one thing I do.”

There is only one question. Underneath it all, there is only one desire. **What is my profit rate or percentage return?**

The core activity of an investor is to estimate with confidence the percentage return over a specified holding period when buying stock in a company. And you want to be able to do this based on numbers that you can see and adjust such as the growth rate of earnings.

When you can do this with a range of companies, you have a rational basis to decide when to buy stock in a particular company, when to hold, and when to sell. You can decide between companies. You can even decide between investing in a particular company or in bonds.

You are in control. The market is now working for you instead of against you.

Benjamin Graham described the stock market as an emotionally disturbed business partner called Mr. Market. This partner shows up every day declaring a price at he will buy stocks in each business or sell them to you.

When you know the expected return on a range of quality companies, you can wait until Mr. Market offers to sell you stock in one of these companies at a price that will give you the return that you want.

You can do this and more in a few minutes with the Valuesoft Investment System.

Now it is up to you. As Morpheus said in *The Matrix*, "I can only show you the door—you are the one that has to walk through it."

How much of the manual should you read?

The manual is in two parts. The first part consists of a general discussion of investment principles and how the Valuesoft Investment System can help you put them into practice. This part consists of the sections Installation, Understanding Financial Statements, Methods of Stock Valuation and Selection, Dynamic Valuation Methods, Beyond Intrinsic Value, and Valuesoft Templates.

In these sections there will be many techniques, ideas and tips. You may think that particular methods are not relevant for your goals. Or that you already know them. If you are not interested in static valuation methods, for example, you may be tempted to skip this section. But in that section you will also find information that will help you apply the dynamic valuation methods. You may already be very familiar with estimating future growth rates of earnings. However, the ideas contained in this section are necessary to be able to make full use of the Valuesoft functions.

For these reasons I encourage you not to think of the first sections as just a manual to consult when you need help. It is a course showing you how to get maximum long-term profit in the stock market. The Excel functions are there to help you implement the techniques and methods of the course in the most efficient manner.

With that said, my recommendation is to treat Sections 1 through 6 as a course and study them as a whole.

The second part consists of three sections: Valuesoft Investment Functions, Valuesoft Earnings Functions, and Valuesoft Option Functions. These sections define the Valuesoft functions and provide key examples. Again, for maximum effectiveness of the Valuesoft Investment System, I recommend that you look over **all** the functions. Information in the discussion of one of the functions may be important in the application of other functions.

If you are not interested in a particular function, you may not feel like reading about it. But persistence will pay off since there may be information that will be significant for other functions and their correct implementation.

There is one exception to this. If you are not interested in options so you can skip the section entitled Valuesoft Option Functions.

Excel Functions

To get full value from this course, it is important that you have a good understanding of Excel and the use of add-in functions **before you start.** Otherwise, too much of your attention will go on trying to learn Excel instead of the ideas and techniques in this manual. The Appendix gives a minimum background necessary to start using the Valuesoft functions.

Valuesoft Examples

As you go through the course, work through all the examples. Sure it takes time. But it will pay huge dividends in the end. When Warren Buffett discovered *The Intelligent Investor* by Benjamin Graham (Graham and Dodd 1934), he set himself the task of reading it from cover to cover ten times before he would do any more investing. You make money in the stock market by being right, not by rushing in with ideas that are only partially digested.

You make money in the stock market by being right, not by rushing in with ideas that are only partially digested.

I also recommend that you at least scan the articles I write in the Price on Value series. These articles expand many of the investment principles described below. They also introduce new principles and ideas that support the effectiveness of Valuesoft. You can find these articles at http://www.sherlockinvesting.com/articles.htm.

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The Valuesoft Story

Ever since reading about Warren Buffett's success in the stock market year after year, I have had two goals. The first was to understand how Buffett does it. The second was to describe his methods in clear terms so that anyone can do it.

Suppose you invest $10,000 in the stock market for an annual return of 30 percent; at the end of 10 years you will have over $130,000. If each year you added another $10,000, at the end of this time you would have the incredible amount of $550,000. Of course, if you were like me, you probably think returns of 30 percent in the stock market are impossible over a long period of time.

This is not the case. When you read about Warren Buffett you learn that he has been averaging around 30 percent in the stock market not for 10 years, or 20 years, but for 47 years! Not only that, he has been doing it with conservative, long-term investing.

To get started on understanding the investment methods of Warren Buffett I read everything that I could lay my hands on that was written by Warren Buffett or about him. After some months, I realized there were two major problems.

The first problem was that, even though Buffett has written extensively on his general principles and methods, he has written almost nothing about the specific details. The second problem was that Buffett has a phenomenal memory. I don't. And probably you don't either. He could memorize page after page of financial reports and analyze them at the same time.

After years of research and testing, I have developed the tools so that now anyone can begin to analyze stock market companies in the style of Warren Buffett. The outcome is the Valuesoft Investment System. It enables anyone to analyze stock market companies in the style of Warren Buffett.

Consider the first problem—lack of specific details. I scoured through hundreds of pages of material written by Warren Buffett, the chairman of Berkshire Hathaway. Always the pattern was the same. Everything would start well with Buffett giving brilliant descriptions of his general principles. But when you needed something that was detailed enough to apply to the evaluation of a specific company, you would find one of two things. Either there was insufficient information or the information led you in the wrong direction.

I will give you two examples: intrinsic value and return on equity.

In the essay An Owner's Manual for Berkshire Hathaway, Buffett writes that "intrinsic value … is the only logical approach to evaluating the relative attractiveness of investments and businesses." This is a good start and it gets better. He says that intrinsic value can be defined simply as "the discounted value of the cash that can be taken out of a business during its remaining life." Now we are getting somewhere.

The next paragraph says that the calculation of intrinsic value is not so simple and different people will arrive at different figures. I can live with that. All I want to know is how W.B. does it. Unfortunately we don't get this. Nor do we get any further indication of how it is done. He closes

the paragraph by saying that "we never give you our estimates of intrinsic value [although] our annual reports do supply the facts that we ourselves use to calculate this value." This tells us nothing. The annual reports of Berkshire Hathaway are in the same general form as the reports of any other company with the financial sections occupying many pages of dense financial information.

We are left with more questions than we started with. For example, just what is the "cash that can be taken out of a business?" For example, is it earnings, or cash flow, or cash earnings, or free cash flow, or owner earnings, or something else? And how do we estimate its size for future years.

In the Valuesoft Investment System you will learn how Buffett calculates intrinsic value. More importantly, you will receive practical software so that you can do this too. To make the System complete, I have also described the other methods for calculating intrinsic value giving their advantages and disadvantages. You will be able to use each of the methods with the software and compare the results.

Continuing with the problem of insufficient detail, regarding the second example, return on equity, every book and commentator on Buffett's methods says that he bases his analyses on this figure. I came to the same conclusion. But when I went to apply return on equity in practical situations, sometimes the analyses made sense and sometimes they did not.

So then I went back and re-read everything Buffett had written. Gradually clues began to emerge that he does not use return on equity … he uses return on capital! Suddenly all the pages of analyses and company studies made sense. In the Valuesoft Investment System I show you the advantages of using capital instead of equity and how it will give you a much better estimate of the future growth of the company. This is critical in determining whether to invest in a company or not. However, you will learn that for some purposes return on equity is better to use, and in other cases return on capital is better.

These are just two of the ways that the Valuesoft Investment System overcomes the problem of insufficient detail in Buffett's writing. The System contains many others and will take you right to the heart of his methods for getting consistent returns **year after year**.

The second problem to overcome was Buffett's ability to memorize page after page of company data. Whatever method you use to analyze a company, you need to remember the information so that you can compare it with analyses of other companies or analyses of the same company at later times. So the solution had to involve a computer program.

Further, the computer program had to be flexible enough to be able to use data that was typed in by hand or imported from a data base. Also, since I intended to offer it to people who attended my investment seminars and workshops, it had to be easily learned and used by a wide range of people.

Some years earlier I had designed and built an option valuation and analysis system based on Microsoft Excel and so I knew the advantages of this approach. Armed with this knowledge I designed a system that will help you perform Buffet analyses. The system incorporates a software package of functions that work within Windows Excel spreadsheets. The software is written with

Visual C++ so that the resulting functions are completely stable and seamlessly integrated within Excel becoming a part of your Excel spreadsheets. They are not macros that are tacked on.

With this approach, the functions that you receive with the Valuesoft Investment System are

- stable,
- portable,
- easy to learn,
- flexible

and can be combined with

- most data that you already have,
- data that you can type or copy and paste from the internet,
- most commercial databases (eg. Value Line),
- with hundreds of other functions within Excel.

Finally, you can

- easily plot your results using the chart facilities already within Excel.

The Valuesoft Investment System is in three parts:

1. A manual detailing how you can invest in the stock market for maximum long-term results.
2. Software so that you can incorporate the investment functions directly into any Excel spreadsheet.
3. Examples and templates showing how you can use the functions to analyze any portfolio in just a few minutes each week.

Free Data You can get all the data you need for the Valuesoft Investment System on-line and for free from sites such as Yahoo Finance and Microsoft's MoneyCentral. Or you can use commercial data bases. Many people use Value Line which is available from libraries all around the country.

Some of the topics you will cover in the manual include:

Static Valuation Methods: Benjamin Graham, Buffett's mentor, was the master of these methods. You will learn his strategies that have been shown many times to yield around 30 percent year after year.

Dynamic Valuation Methods: With these methods you will learn how to calculate the intrinsic value of companies using a variety of methods.

Earnings Growth Estimation: You will learn that most analysts estimates are, well, to put it mildly, not reliable. But there are times when you can rely on them. You will also learn simple strategies that give far better results for estimating the growth rate of earnings … and you will receive functions such as EGROWTH, EFORECAST and STAEGR to help you do it.

Beyond Valuation Methods: This is the core of the Valuesoft Investment System. You will learn that it does not matter what the theoretical value of the stock is. What counts is that you can be confident that it will rise in price so that you can get the return you expect from it within your investment time frame. You will receive two functions that show how to find stocks that will do this. The first function calculates the expected return from buying the stock. But the second

function is really my favorite. It sets a target price for a stock. Once you know this target price you can sit back and quietly wait for the right time to buy the stock.

These are not just abstract principles and methods. For a start, you can easily implement each one using functions that come with the system. Furthermore, they have been thoroughly tested and studied in three ways. The principles

- are based on my study of everything that Warren Buffett has written,
- are grounded in common sense (once you see them you'll wonder why you weren't always using them),
- have been tested using long-term, scientific studies of the marketplace.

Other functions in the System include

Payback period: This practical function calculates the number of years required for the sum of the discounted future earnings to equal (or cover) the price of the share. For some well-known companies it can be as short as 4 or 5 years, for others it is hundreds of years. It is a useful function for comparing companies.

Expectations Risk Index: This function calculates a measure of the proportion of the share price due to projected growth rate of earnings compared to the historical growth rate. A recent study showed that stocks with a low expectations risk index outperformed those with a high index.

Graham's Intrinsic Value Formula: This is a formula developed by Benjamin Graham, the father of value investing, giving a different approach to the intrinsic value of a stock.

Bonus: Option calculations The granting of options to the management and employees of companies is having a substantial effect on the earnings of the companies, an effect not widely recognized in the marketplace. So that you have a better opportunity of gauging this effect, Valuesoft includes 19 functions for calculating the price of options and their sensitivities to market movements. Functions such as these are usually only found in software costing $1000 or more.

Section 1 Installation

Valuesoft is easy to install; it is just a matter of opening any spreadsheet in Excel and loading the file vsoft20.xll as an add-in into that spreadsheet. You can then use the functions in Valuesoft as you would use any other Excel functions. This section describes these steps in more detail.

Installation and the Valuesoft Functions

Here is the basic method installing Valuesoft in the folder of your choice.

Valuesoft Installation

Here are details of installing vsoft20.xll and associated files to a folder depending on how you purchased Valuesoft. (If your computer shows the name of the file as vsoft20 instead of vsoft20.xll, read the subsection File Names at the end of this section.)

1. If you purchased Valuesoft on a disk, insert your disk in Drive A (or B), select Run, type a:\vsfiles20, and press the Enter key. Alternatively, double click on vsfiles20.exe. Now follow the steps to install the Valuesoft files in a new folder c:\vsoft20 or any folder of your choice.

2. If you received Valuesoft via e-mail, there will be a file called vsfiles20.exe in the attachments folder of your e-mail. Depending on your e-mail software, there may be an icon or a file name at the bottom of your e-mail giving the name of the file vsfiles20.exe. You can double click on this icon or file name right in your e-mail. Otherwise you may have to locate the file vsfiles20 using your file manager. Double click on the file vsfiles20. Now follow the steps to install the Valuesoft files in a new folder c:\vsoft20 or any folder of your choice.

Activating the Valuesoft Functions as Add-Ins

There are two methods for activating the Valuesoft functions. The first method is the preferred one. Before using either method, it is important to remove the functions of any earlier versions of Valuesoft. See the Removal section below.

Method 1 (Preferred)

For Excel versions prior to Office 2007

1) Open any spreadsheet in Excel, go to Tools|Add-ins, and then to Browse.
2) Go to the folder containing the Valuesoft files. Find the file vsoft20.xll and select it.
3) Now click OK twice to return to Excel.

For Microsoft Office 2007

1) Open Excel and then open any spreadsheet in Excel.
2) Click the **Microsoft Office Button**  which is generally in the top left hand corner of Excel, and then click **Excel Options**.
3) Click the **Add-Ins** category.
4) In the **Manage** box, click **Excel Add-ins**, and then click **Go**.
5) To load the Valuesoft Excel add-in, click **Browse**, and then locate the add-in in the folder where you installed the Valuesoft files. Select the add-in vsoft20.xll.
6) Now click **OK** twice to return to Excel.

In both cases you will briefly see a notice saying that Valuesoft has been added. Also the topic Valuesoft will have been added to the tool bar. Valuesoft has now been loaded into Excel and it is now available for all spreadsheets. Also it will still be available after you close and reopen Excel.

Method 2 An alternative method is to open any spreadsheet in Excel. While it is open, open the file vsoft20.xll as if it was another spreadsheet. The topic Valuesoft will have been added to the tool bar. With this method Valuesoft will be removed each time you exit the spreadsheet.

In both cases, all the Valuesoft functions are now available in the same manner as any other Excel function.

Note Valuesoft functions will only run when Valuesoft has been loaded into Excel. If Valuesoft has not been loaded, you will get an error message usually of the form #NAME? When you try to run a Valuesoft function.

Removal

The following is a description of how to remove the Valuesoft functions from Excel. It is also important to remove the Valuesoft function from all earlier versions of Valuesoft and from Valuesoft-L before activating the functions in this version of Valuesoft.

Start by opening Excel and going to Tools|Add-Ins. In the list of groups of functions, depending on the version of Valuesoft you wish to remove, you will see one or more categories with the word Valuesoft in their titles. Uncheck all of these and click OK. This will return you to the Excel spreadsheet.

Calling the Valuesoft Functions

The functions are contained in three new function categories called Valuesoft Investing, Valuesoft Earnings and Valuesoft Options. The functions can be called in precisely the same way as any other Excel function.

For example, select a cell and then click on the function button f_x at the top of the Excel sheet. This will give you a list of function categories starting with the categories All, Financial, Date & Time, and so on. Click on the category Valuesoft Investing, choose any of the Valuesoft functions, and click OK. You will then be guided through the process of entering arguments for this function.

For further details how to enter and use Excel add-in functions, it is recommended you consult your Excel documentation or Excel Help. If you are still having difficulties, please contact Price Value, Inc.

Getting Started with Company Data

Valuesoft comes with a number of Excel files with data from various companies. These are intended as examples of how you might set up a systematic way of analyzing companies. It also comes with an Excel file vscalcs.xls containing the calculations described in the manual. To get a proper understanding of the functions contained in Valuesoft, it is recommended that you work through these examples.

Support

Free support for the Valuesoft Investment System is available by contacting support@sherlockinvesting.com.

File Names

If your computer shows the names of the files in Valuesoft as vsoft20, vsman20, and so on, without the file extensions, it is because of the setting in Windows. It is recommended that you change the setting so that the files will be shown as vsoft20.xll, vsman20.pdf, and so on. In Windows 95 and Windows 98 this is done by opening Windows Explorer. Go to

View|Options

and change the settings as follows:

Select	Show all files
Check	Display the full MS-DOS path in the title bar
Uncheck	Hide MS-DOS file extensions for file types that are registered.

Click OK to record your changes.

The steps in Windows XP are very similar. Open Windows Explorer and choose

Tools|Folder Options|View.

Then change the settings as follows:

Select	Show hidden files and folders
Check	Display the full path in the address bar
Uncheck	Hide extensions for known file types

Click OK to record your changes.

For Windows Vista, open Windows Explorer and choose

Organize|Folder and Search Options

and click the View tab. Change the settings as follows:

Select	Show hidden files and folders
Check	Display the full path in the title bar
Uncheck	Hide extensions for known file types

Click OK to record your changes.

Note: Changing these settings is only for convenience and has no effect on the operation of any of the Valuesoft functions or on the operation of your computer.

Viewing the Manual

This file is an Adobe Acrobat file. This means that it has many features that make it easy to navigate and read on your computer screen. Some of the features are that it has internal links, navigation controls (such as scroll bars and arrows), view controls (such as magnification), search functions and links to web sites.

You can also print the document—but please do not distribute copies. This documentation is copyright material.

Here is how the link feature works. Click on any of the highlighted words or phrases and you will immediately jump to that reference. Then if you click on the right mouse button you will be given the opportunity to jump back to the place where you started.

For example, if you click on STAEGR, it will take you to its definition in the Glossary. When you have done that, click on the right mouse button and select the option to return you back to here.

You can also click on a series of links. Using the right mouse button will take you back through these links one at a time. Another way to go forward and backwards through the links is to use the buttons at the top of the screen.

Another feature is that clicking on any of the headings in the table of contents will take you to the section or subsection. If you have a large screen, you might like to select the Navigation Pane at the top of the screen. This will open a list of all the main headings and display them down the left side of your screen.

The link feature also applies to internet sites. Provided you are logged onto the internet at the time, clicking on one of these links will load your internet browser and take you to the site.

Section 2 Understanding Financial Statements

When Warren Buffett was asked his opinion on the best preparation for investing, he replied "Learn all the accounting you can." This section is a brief introduction to some of the main features of financial statements. Just enough to make the most of the Valuesoft Investment System.

> Learn all the accounting you can.
> – Warren Buffett

If you would like to go further, as the next step, I recommend *How To Profit From Reading Annual Reports* by Richard Loth (Loth 1993). Click here to order through Amazon.com.

The first part of the section will look at the three main financial statements: income statements, balance sheets and statements of cash flows. The second part will be an overview of the main ratios used to analyze the financial statements.

Principal Financial Statements

At the last count, people from 15 different countries are using the Valuesoft Investment System. This says a lot for Valuesoft and its success in systemizing fundamental principles of investing independent of any particular function. But it also causes a problem. It makes it difficult to write this section since different countries have different regulations regarding how financial statements are presented.

On the positive side, Aswath Damodaran (Damodaran 1996) wrote that these differences are "not as great as they are made out to be and cannot be used to explain away radical departures from fundamental principles of valuation." Most countries subscribe to basic accounting principles.

> The basic accounting principles are the same in most countries.

Since most of the sales of Valuesoft are in USA, the descriptions in this section will be based on the generally accepted accounting principles GAAP used in the USA. Even though the main ideas and definitions are similar across most countries, readers from other countries need to be on the lookout for differences.

Income Statement

The main outcome of the income statement is to arrive at the bottom line of a company. This is the net income of a company defined as revenues minus expenses. The income is divided into four sections: income from continuing operations, income from discontinued operations, extraordinary gains and losses and adjustments for changes in accounting principles.

The typical income statement starts with revenues and makes adjustments for the cost of goods sold, including depreciation on the assets used to produce the revenues, and any selling, general

and administration expenses. The result from this first set of calculations is called the operating profit or simply earnings before interest and taxes EBIT.

The next step is to subtract interest expenses giving the taxable income. Removing the taxes leads to the net income or earnings. Finally, this is adjusted for discontinued operations, extraordinary items, and changes caused by accounting changes.

The final figure is divided by the number of shares outstanding. Usually two figures are presented corresponding to basic shares outstanding and diluted shares outstanding. The final results are called basic earnings per share and diluted earnings per share.

Main Items in the Income Statement

Revenues
– Cost of goods sold
– Selling expenses
– Administration expenses
= Operating profit or EBIT
– Interest expenses
= Earnings before taxes
– Taxes
= Net Income before extraordinary items
+ Gains (losses) from discontinued operations
+ Extraordinary gains (losses)
+ Net income changes because of changes in accounting methods
= Net income after extraordinary items

Balance Sheet

The balance sheet provides a summary of what the company owns in terms of assets and what it owes to its equity holders and its lenders. The core relationship is

$$\text{Assets} = \text{Liabilities} + \text{Shareholders Equity}.$$

Assets and liabilities are grouped as current and noncurrent. Within these groups, generally assets are listed in decreasing order of their liquidity. Similarly, liabilities are listed in the order of their priority for payment.

An asset is a resource that has the potential to generate future cash flows or to reduce future cash outflows. They can be broken down into monetary, such as cash and receivables, and into fixed assets, inventory and intangible assets.

On the other hand, liabilities are expected to lead to a future cash outflow or the loss of a future cash inflow.

Balance Sheet Entries	
Assets	Current Assets
	Cash and cash equivalents
	Accounts receivable
	Inventories
	Other current assets
	Investments
	Plant, property and equipment (fixed assets)
	Intangible assets
Liabilities and Shareholders Equity	Current Liabilities
	Accounts payable
	Short-term borrowing
	Other current liabilities
	Long-term debt
	Other noncurrent liabilities
	Stockholders equity
	Preferred stock
	Common stock
	Retained earnings

Statement of Cash Flows

The cash flow statement tells how a company spends its money and where the money comes from. It is much like a summary of the company's checking account. Many a company has foundered because it has run out of cash even though it has a product that is selling well. A healthy cash flow is a crucial indicator of a healthy company.

GAAP requires that cash inflows and outflows are listed in three major activities: operations, investing, and financing. Operating cash flow is the most important source of cash for a company. It is presented by starting with net income taken from the income statement. Then adjustments are made to account for noncash charges such as depreciation and amortization. The next entries are changes in operating working capital in the areas of accounts receivable, inventories, and so on. The outcome is the net cash provided by operations.

Financial Ratios

How can we compare two companies if one has earnings of $10 billion and one has earnings of $10 million? The usual method is through financial ratios.

> The usual method for comparing companies of different sizes and structure is through financial ratios.

For example, the first company might have produced its earnings using invested capital of $100 billion and the second company with $50 million. By dividing earnings by capital we see that the return on capital for the two companies are 10 per cent and 20 per cent. This provides us with a

means of directly comparing the two companies: the second company is getting twice the return on its invested capital than the first company.

In evaluating a company as a possible addition, or removal, from our portfolio, we can use financial ratios in three ways.
(a) Examine the current ratios of the company.
(b) Compare the ratios with other companies and with the sector and overall market.
(c) Look at the history of the ratios.

The third method of using ratios is particularly important for long-term investing. If a key ratio has remained even or improved over the past five to ten years, then this gives us confidence about its levels in the future. This is even more true if all the key ratios have this property.

The following tables list the main ratios in the areas of profitability, debt and liquidity.

Profitability Ratios

Ratio	Method of Calculation	What it measures
Return on assets ROA	$\frac{\text{Net Income}}{\text{Total Assets}}$	Measures the efficiency of the company in generating profits from its assets.
Return on equity ROE	$\frac{\text{Net Income}}{\text{Total Equity}}$	Measures the profitability of the company from the perspective of the equity investor.
Return on Capital ROC	$\frac{\text{Net Income}}{\text{Total Capital}}$	Measures how well management is using the funds, equity plus debt, that they have available to them.
Return on Sales ROS	$\frac{\text{Net Income}}{\text{Net Sales}}$	Measures how much the company keeps from each dollar of sales.

Instead of Net Income, the numerator can be replaced by Operating Income or Pretax Income.

The next table lists the main ratios used to measure debt or leverage. Instead of debt in the different ratios, many people use long-term debt. However, because of the ease with which companies can roll over short-term debt, many companies use short-term financing to fund long-term projects. This means that restricting the ratios to long-term debt may be misleading.

Debt or Leverage Ratios		
Ratio	Method of Calculation	What it measures
Debt Ratio	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$	Measures degree of financial leverage as the proportion of assets financed by liabilities.
Debt to Equity	$\frac{\text{Total Debt}}{\text{Equity}}$	Measures the relationship of debt to equity.
Capitalization Ratio	$\frac{\text{Total Debt}}{\text{Total Capital}}$	Measures the relationship of debt to capital.
Interest Coverage Ratio	$\frac{\text{Pretax Inc + Interest Exp}}{\text{Interest Expense}}$	Measures how many times interest expense could be increased and still be covered by pretax income.
Total Debt can be replaced with other measures of debt such Long-Term Debt and Total Liabilities.		

The third category of ratios measure the liquidity of a company.

Liquidity Ratios		
Ratio	Method of Calculation	What it measures
Current Ratio	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	A basic measure of short-term liquidity.
Quick Ratio	$\frac{\text{Cash +Marketable Securities}}{\text{Current Liabilities}}$	A variant of the Current Ratio that distinguishes between current assets that can be quickly converted into cash and those that can't.
Days Sales Outstanding	$\frac{365 \times \text{Avg Accounts Recvble}}{\text{Net Sales}}$	A standardized measure of the number of days it takes to convert uncollected sales into cash.
Days Inventory Held	$\frac{365 \times \text{Avg Inventory}}{\text{Cost of Goods Sold}}$	A standardized measure of the number of days it takes to sell the company's inventory.

Section 3 Methods of Stock Valuation and Selection

A saying attributed to Benjamin Graham, the father of value investing and the author of the classic books *Security Analysis* and *The Intelligent Investor*, is that "price is what you pay, and value is what you get."

> Price is what you pay, value is what you get.

A fundamental goal is to determine the value of a stock so that we will know what price to pay.

It is easy to find the price of the stock of any company—just phone a broker, read the financial pages of any major newspaper, or look it up on any of the hundreds of internet sites that publish stock data. But it is not so easy to find the value of a company.

The value of a public company as distinct from its stock price can be referred to as its investment value, reasonable value, fair value or appraised value. But generally it referred to as its intrinsic value. In their 1934 investment classic, *Security Analysis*, Benjamin Graham and David Dodd give a definition of intrinsic value.

> In general terms it is understood to be that value which is justified by the facts, e.g., the assets, earnings, dividends, definite prospects, as distinct, let us say, from market quotations established by artificial manipulation or distorted by psychological excesses. ((Graham and Dodd 1934), page 17)

One difficulty is that there are many ways of estimating the intrinsic value of a company. Even though in the end you may focus on just a single method, it is important to understand the basic methods and to understand their advantages and disadvantages.

In the remainder of this section I will describe what I call static valuation methods. In the next section I will describe dynamic valuation methods.

In Section 5 I will go further by showing that there is something even more important than finding the intrinsic value of a stock, namely calculating the percentage profit from purchasing it at its current price. However, the ideas introduced in the intrinsic value sections will form the basis of these new methods. They will enable you to implement them with the most success.

For all these methods, Valuesoft has functions that give you the practical means to use them in your investing.

Static Valuation Methods

There are two basic classes of investment methods, the static and the dynamic. Static valuation methods involve taking a 'snapshot' of the company and valuing just what is contained in that snapshot at that moment in time.

The most common static valuation method is the calculation of the book value or equity of a firm. This is the net worth shown on the accountants' books. For the purposes of considering a company as a possible investment, it is calculated on a per-share basis: total assets minus total liabilities (including preferred stock at redemption value) divided by the number of shares of outstanding common stock. It is the balance-sheet value that a stockholder would get for each unit of stock should the company suddenly be sold up, all the debts paid off, and the remaining funds distributed to the stockholders.

The most common static valuation method is the calculation of the book value of a firm.

Of course, this assumes that if a building is listed in the accounts of a company as being worth two million dollars, then it really can be sold for this amount. In fact, there may be little agreement between the accounting value and the appraisal value. As general rule, the less a particular item or commodity is processed, then the more accurately it can be valued. For example, if we have ten pounds of raw cotton, then there would be good agreement among cotton brokers as to its value. If, however, this cotton was converted into pink shirts with purple polka dots, then this same cotton could be worth anything from a few dollars to … ?

Even for major companies, the ratio of share price to its book value can be 20, 30, or higher. In July, 1997, Amazon.com had a price to book value ratio of 31 and Quaker Oats had a ratio of 36. At the other end of the scale, this ratio can be well below 1. For example, Blair Corp had a price to book value ratio of 0.71 and Homebase, Inc had a ratio of 0.46.

Even though this ratio on its own is a poor predictor of future growth of the stock price, it is good to be aware of it, particularly when it reaches very high or very low levels.

Other static valuation methods are the *tangible book value* calculated by removing intangibles such as good will, patents and copyrights from the assets and the *liquidation book value* calculated by valuing the assets by the price they would get if they were immediately liquidated.

Net Current Asset Value

Benjamin Graham suggested a variation of the book value method which has been demonstrated to give superior returns. It consists of taking the current assets and removing all the liabilities, current and long term. The resulting figure is divided by the number of shares outstanding and is called the *net current asset value* per share. (It is also called the *net net asset value* per share.) Finally this is divided by the current price of the stock. It is this ratio that is calculated by the function NCAV in Valuesoft and we call it the NCAV ratio of the share.

Usually this NCAV ratio is negative. Occasionally it is positive. Even more occasionally it exceeds 1. These were the stocks sought by Benjamin Graham, particularly if the value exceeded 1.5. Graham referred to these stocks as "cigar butts." He would pay little attention to the quality of the companies and attempt to buy large numbers of them to gain protection through diversification. In *The Intelligent Investor* (Graham 1949, 1973), Graham wrote,

> It always seemed, and still seems, ridiculously simple to say that if one can acquire a diversified group of common stocks at a price less than the applicable

> net current assets alone—after deducting all prior claims, and counting as zero the fixed and other assets—the results should be quite satisfactory.

Suppose the current assets of a company are $10 million and its liabilities are $8 million. Suppose also that the number of shares outstanding are 4 million.

The net current asset value per share is calculated as

(10,000,000 – 8,000,000) / 4,000,000 = $0.50.

If the share price was less than 50 cents, the stock would meet Graham's criteria. It was even better if it was below 2/3rds of this, namely less than 33 cents.

The ratio of NCAV per share divided by the share price can be calculated with Excel using the Valuesoft function NCAV in the form NCAV(10,000,000, 8,000,000, 4,000,000, 0.50).

There is strong evidence that substantial returns can be made using this method. Graham used the method over the years with consistent success. Later, two later long-term studies by Henry Oppenheimer (Oppenheimer 1986) and Joseph Vue (Vue 1988) showed returns of around 30 percent annually. However, currently it seems difficult to find stocks that satisfy Graham's NCAV criteria.

On the other hand, at the 1998 annual meeting of Berkshire Hathaway, its chairman, Warren Buffett, said that he had owned a lot of soggy cigar butts in his time, but it is no fun to own stock in a company which you hope is liquidated before it goes bankrupt. See the article *The Return of the Buffetteers* by John Price (Price 1998).

Further articles on NCAV and related methods of Benjamin Graham can be found on the Sherlock Holmes Investing website. These include

The NCAV Strategy of Benjamin Graham
The NCAV Strategy of Benjamin Graham in Practice

Section 4 Dynamic Valuation Methods: Discount Cash Flow

The idea of dynamic valuation methods is that the valuation of a security does not depend on a 'snapshot' of its current balance sheet, but rather on the ability of the company to generate profits in the future. The possibility of analyzing stocks as being representative of ongoing businesses and not just the cash that could be realized if they were sold was first proposed in 1930 by Robert F. Wiese when he wrote, "the proper price of any security, whether stock or bond, is the sum of all future income payments discounted at the current rate of interest in order to arrive at the present value" (Wiese 1930).

This theme was picked up and extended by John Burr Williams in his famous book *The Theory of Investment Value* (Williams 1938).

We will see below that there are substantially weaknesses to putting this idea into practice. Nevertheless, the Wiese/Williams approach, now referred to as discount cash flow or DCF methods, opened a whole new frontier in the valuation of stocks and are standard methods taught in finance and investment courses around the world.

An alternative method to value stocks as ongoing businesses is, instead of having to make forecasts "out to infinity" as required by DCF methods, to make judicious use of key ratios and shorter-term forecasts. We will refer to this as the ratio method and describe it in the next section

Returning to the ideas of Wiese and Williams, these days, instead of the term 'proper price', it is usual to refer to the result of the calculations as the intrinsic value. The intrinsic value or proper price is supposed to be the "true" value of the stock, the assumption being that over time, if the price strays too far away from the intrinsic value, then it will move back towards it.

In June 1996, Warren Buffett issued a booklet entitled *An Owners Manual* to Berkshire's shareholders. Since that time, updated versions of the manual regularly appear in the annual report of Berkshire. In the manual Buffett writes that the intrinsic value is "the discounted value of the cash that can be taken out of a business during its remaining life".

> The intrinsic value of a stock is the discounted value of the cash that can be taken out of a business during its remaining life.
>
> –Warren Buffett

In symbolic terms:

$$(1) \qquad I = c_1 / (1 + r_1) + c_2 / (1 + r_2) + \ldots = \Sigma\, c_i / (1 + r_i),$$

where I is intrinsic value, c_i is the cash that can be taken out of the business in year i, r_i is the total discount rate up to year i, and the summation ranges over i for years 1 to ∞.

This leaves three major questions.

Question 1. What do we mean by the cash that can be taken out of a business?

Question 2. How fast is this cash growing and for how long?

Question 3. What discount rate should you use?

The first question is straightforward; the difficulties come with the final two questions which, in my opinion, make this method severely flawed. Nevertheless, we will present the standard answers. Once you have answered these questions, you can use the Valuesoft function PRESVAL to calculate the intrinsic value.

We will present the standard answers to these questions and then look at the weaknesses of this approach.

Question 1: What do we mean by the cash that can be taken out of a business?

In this subsection we are going to look at earnings, owner earnings, cash earnings and free cash flow. These are the different possibilities for the values c_1, c_2, … in the intrinsic value formula above.

Earnings, owner earnings, cash earnings and free cash flow

The simplest answer to the question "What do we mean by the cash that can be taken out of a business?" is that it is the earnings of the company (or earnings per share EPS if we are talking about individual stocks). When you use earnings, many of the ratios are already done for you. For example on most web sites, the price to earnings ratio, P/E ratio, is usually quoted alongside the price of the stock. From there it does not take much more digging to find other ratios such as return on equity, return on assets and return on capital.

Earnings are often referred to as the bottom line. The reason for this is that they are usually written in the bottom line of the profit and loss or income statement.

The official GAAP requirements for companies mean that EPS figures are quoted while including non-recurring gains and losses. It can be argued that this can give a misleading picture of the company since, for example, the profit from a one-off sale of a property would be included in the earnings.

Because of this, some companies and stock websites also display operating earnings which are derived from earnings by subtracting nonrecurring gains and adding back nonrecurring losses. The difficulty is that these nonrecurring items may have different names and may be treated differently by different data suppliers and sources.

Different names for adjustments:

- Non-recurring charges/gains
- One-time items
- Extraordinary items
- Adjustments

Different names for non-GAAP earnings:

- Pro forma earnings
- As adjusted earnings
- Core earnings

We now introduce the concepts of owner earnings, free cash flow and cash earnings.

Earnings are based on accrual accounting and usually don't describe the cash position of a company. For example, if a company purchases a fleet of cars, the price paid is not entered as an expense and so does not affect the earnings. Rather, the fleet is treated as an asset and each year only the deprecation component is entered as an expense until the value reaches zero. In other words, until the asset is written off.

To make allowance for these cash differences, Warren Buffett introduced the idea of 'owner earnings'. In the Appendix to the 1986 Annual Report of Berkshire Hathaway, he wrote:

> Owner earnings are (a) reported earnings plus (b) depreciation, depletion, amortization, and certain other non-cash charges less (c) the average annual amount of capitalized expenditures for plant and equipment, etc. that the business requires to fully maintain its long-term competitive position and its unit volume.

This is straightforward. Start with (a) the earnings or net profit as reported by the company (or earnings per share if working on a per share basis). When you pay tax on any profit, you are permitted to make various deductions, such as depreciation, before declaring the amount to be taxed. These are (b) non-cash expenses. Add these back to the earnings. The sum of (a) and (b) is called cash flow. Now subtract (c) the average annual amount of capital spending which is the actual outlay on plant and equipment.

Notice that Buffett uses the *average* annual amount of capitalized expenditures for plant and equipment. The reason for this is that capital expenditure can vary quite from year to year. If the company you are studying does have highly variable capital expenditure, try to determine the reason for this variability.

If, instead of the average amount of capitalized expenditure, we use the actual amount, the result is referred to as cash earnings.

Another factor to consider is that high growth companies frequently have significant need for capital expenditure. This could lead to growing earnings but decreasing cash earnings. Again, whenever there is a divergence between earnings and cash earnings look to see what the causes are.

There is one more adjustment that can be made. Again, referring back to Buffett,

> If the business requires additional working capital to maintain its competitive position and unit volume, the increment should also be included in (c). However, businesses following the LIFO inventory usually do not require additional working capital if unit volume does not change.

When this last adjustment is made, the outcome is called free cash flow.

Because working capital is based on a one-year time horizon, it can vary quite a bit from year to year even though the overall trend can be quite clear. These yearly variations can make the free cash flow very uneven. My suggestion is to run your eye over working capital to determine if, despite its ups and downs, it has an overall trend that is fairly evident. If this is the case, then ignore it and only deal with cash earnings. If it has a strong upward trend, then this might be a case for concern and you should try to find out the cause.

Note on the Use of the Term "Earnings"

Instead of continually repeating the words earnings, owner earnings, free cash flow and cash earnings, we will usually just refer to earnings. Depending on your background and goals, you can substitute any of the other terms for earnings. For example, if you are basing your calculation on earnings, the sentence "It is important to check for consistent growth of earnings" would be interpreted just as it is written. If you are basing your calculation on cash earnings, the previous sentence should be interpreted as "It is important to check for consistent growth of cash earnings."

If you are just getting started or if you are still not comfortable about looking up facts and figures regarding stocks, then it is best to stay with earnings and earnings per share.

> Stay with earnings and earnings per share until you are comfortable with these measures and how to use them in Valuesoft.

Wherever you see such terms as cash earnings and free cash flow in any of the Valuesoft functions, just interpret them as earnings. Take the step to cash earnings only when you feel at home with Valuesoft calculations based on earnings.

Question 2. How fast is this cash growing and for how long?

Instead of specifying the individual values for c_1, c_2, … in the intrinsic value formula above, the usual approach is to describe them by stating their growth rate over the whole sequence or growth rates if the sequence is broken into various parts. Just the same, at this stage things become very difficult. The first difficulty is that, as we see in the formula, forecasts out to infinity are required. The second difficulty is actually making forecasts with a satisfactory level of accuracy.

Forecasts out to infinity

It is standard practice to split forecasts into two phases, the growth phase and the stability or terminal growth phase. Typically the growth phase is the first 10 years and terminal phase is from 11 years onward. The problem is that any forecasts in the terminal phase are impossible to verify. If one person makes a forecast of 3% and another person makes a forecast of 5%, no matter how long we wait, we can never judge who made the more accurate forecast. To do this would require waiting forever.

On the positive side, the further we go out, because of the discounting factor, the effect on the intrinsic value of the cash that can be taken out of the business becomes increasingly small.

Earnings forecasts

Putting aside the impossibility of verifying forecasts out to infinity, even when we only consider a period as short as 5 years, the accuracy of forecasts by analysts is extremely patchy. For example, using thousands of analyst forecasts, a study by Bulkley and Harris showed that 5-year analyst forecasts are uncorrelated with actual growth. In other words, there is no significant value in paying attention to 5-year forecasts provided by analysts.

Other careful research studies looking at analyst forecasts over shorter time periods also demonstrate their high level of inaccuracy.

Fortunately Valuesoft has a proprietary function called STAEGR that helps all investors to make more accurate forecasts. We will discuss this essential tool in the next section.

Question 3. What discount rate should you use?

The discount rate is denoted by r_1, r_2, … in the intrinsic value formula given above. We face the same problems as for growth rate of the earnings numbers in the preceding question: forecasts out to infinity and the accuracy of the forecasts. The standard approach is to use what is referred to as the weighted average cost of capital or WACC. It is the average of the costs of the different sources of financing, whether debt or equity, each of which is weighted by its respective use in the given situation.

It is usually assumed to be constant in which case $1 + r_i = (1 + w)^i$, where w is the weighted average cost of capital. Since the WACC must allow for the possibility of default, it will always exceed the corresponding US Treasury rate. (Investors expect a higher rate of interest to compensate for the possibility of default) The amount of this excess is called the risk premium.[1] It consists of the risk free rate plus a risk premium that is calculated using beta. (All this is part of the Capital Asset Pricing Model.)

There a few sources that explicitly state some of the rates that they use in their DCF calculations. For example, a report[2] by Standard and Poor's in July 2007 stated that in arriving at a 12-month target price of $47 for Bed Bath and Beyond (BBBY) they used a weighted average cost of capital of 10.8% and a terminal growth rate of 4.0%. At the time BBBY was trading at $36.26.

Another example by Standard and Poor's is that in arriving at an intrinsic value of $66 for The Toro Company (TTC) they assumed an 8.7% weighted average cost of capital and a 3% terminal growth rate.[3] At the time TTC was trading at $61.57.

Warren Buffett takes a different approach. Because he only invests in securities that he thinks are completely safe, that is, have no risk, he discounts using the U.S. Treasury rate. At the 1998 annual meeting of Berkshire Hathaway, Buffett said,

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[1] The risk premium is calculated using beta which is part of the Capital Asset Pricing Model, something that is dismissed by Warren Buffett.

[2] The report was published by Standard and Poor's on July 14 2007 and gives BBBY a 4-star rating.

[3] The report was published by Standard and Poor's on July 14 2007 and gives TTC a 4-star rating.

> Don't worry about risk the way it is taught at Wharton. Risk is a go/no-go signal for us—if it has risk, we just don't go ahead. We don't discount the future cash flows at 9 percent or 10 percent; we use the U.S. treasury rate. We try to deal with things about which we are quite certain. You can't compensate for risk by using a high discount rate. (Price 1998)

In other countries the risk-free rate would be the rate for government bonds or the interbank rate. It is the rate corresponding to a loan that is the closest to default-free for the country.

In this manual everything will be written as if the risk-free discount rate is used. But, of course, you are free to use any other rate. The same applies to the Valuesoft Investment System. It is written as if all the discounting is done with respect to the risk-free rate. However, it is completely flexible so that any rate can be used.

Dividend Discount Methods

Instead of discounting such items as earnings and free cash flow back to present time as is done in DCF methods to calculate the intrinsic value of a stock, it is possible to take the same approach and discount dividends. These methods are referred to as dividend discount methods or DD methods.

Similar problems arise as for the DCF methods such as estimating the growth rate of dividends and choosing as discount rate.

Residual Income Valuation Methods

There are other methods of valuation based on current and future earnings, book values and dividends that have been developed by James Ohlson and others. See Williams (1938).They are too technical to be described in detail here but are based on the clean surplus relationship which states that growth in book value is equal to the earnings per share minus dividends. The final formula is referred to as the residual income valuation (RIV) method and states that the value is equal to the current book value plus anticipated residual earnings which is defined as the present value of its expected earnings in excess of the company's cost of equity capital.

Summary of weaknesses of DCF, DD and RIV methods

There are four main weaknesses of DCF and DD methods.

Weakness 1: Theoretical The first weakness is that they are theoretical formulas. Just because a stock has a high intrinsic value compared to its price, does not mean that it will be a profitable investment in terms of return. For example, it may continue at its current price levels.

Weakness 2: Multiple formulas There are many variations of the DCF, DD and RIV methods giving a range of different values. A stock could be undervalued according to one formula, but overvalued according to another.

Weakness 3: Instability All the formulas are unstable. This means that small changes in the input numbers lead to extremely large variation in the output. A change of a few percent in the input can lead to changes of 100% or more in the output.

The following table gives and example.

Current Cash	Initial Growth Rate	Final Growth Rate	Discount Rate	Intrinsic Value
$1.00	10%	4%	11%	$23.09
$1.00	11%	5%	10%	33.50%
$1.00	12%	6%	9%	$58.00

By making minor changes in the input variables, the output can vary from $23 to $58.

Weakness 4: Untestable inputs It is impossible to test the accuracy the key inputs in the formulas such as the terminal growth rate and the discount rate because they require forecasts out to infinity.

The weaknesses of the DCF, DD and RIV methods are compounded by analysts and financial web site providers who seem to be overshadowed by the desire to make sound bite marketing comments rather than provide proper understanding of the methods. One web site, for example, makes the claim about their DCF method that it "calculates value based on the company's economic performance". As we have just seen, this is not true. The value is based on a number of forecasts of economic performance, some of which are unable to be tested.

Another confusion of DCF proponents is that they seem to feel that the only worthwhile goal is to calculate the intrinsic value of a stock before anything else. However, intrinsic value on its own does not enable you to make an investment decision: it is the relationship between the price and the intrinsic value that is the key.

For example, if all we knew that the intrinsic value of one stock was $10 and another was $20, we would not know what to do. However, if we also knew that the current price of the first stock was $20 and the second stock was $10, we could conclude that the first stock was 100% overvalued while the second was 50% undervalued.

In other words, the value determination depends on the both the intrinsic value and the current price. Hence, in any mathematical development of a strategy to make investment decisions, it makes no difference when the actual price is inserted into the calculations, at the start, in the middle, or the end. In fact, for mathematical efficiency, it frequently makes sense to insert it right at the start.

One consequence is that, for investment decisions rather than a blind focus on intrinsic value, it may be warranted to make use of many types of price ratios. For example, once it is understood that what we are after is I / P, and not just I, where I is the intrinsic value and P is the current price, then formula (1) at the start of the section leads to:

(2) $$I / P = (c_1 / P)/ (1 + r_1) + (c_2 / P) / (1 + r_2) + \ldots$$

This means that, at the very least, the cash to price ratios are components of the formula.

In the next section we will make use of the fact that, in the end, it is natural and reasonable that certain ratios involving price are part of any rational strategy for determininng when to buy, to sell, or to do nothing.

Section 5 Dynamic Valuation Methods: Ratio Methods

As explained in the Introduction, there is something more important than estimating the (intrinsic) value of a company, and that is estimating the profit rate or percentage return you might expect from purchasing stock in the company.

> Estimating the expected percentage return from purchasing a stock is more important than calculating its intrinsic value.

It is generally assumed that all you have to do is find undervalued companies; then the return will take care of itself. This is not necessarily the case. As the saying goes, a bargain is not a bargain if it stays as a bargain.

Underneath it all, there is only one question. **What is my profit rate or percentage return?**

The answer to this question has two parts—the actual rate and the confidence you have in that rate. By using Valuesoft functions, by studying the charts of financial data and ratios, and by reading all you can about the company you will be able to make all your estimates with increasing accuracy and confidence. As Buffett once said:

> Pick out five to ten companies in which you understand their products: get their annual reports, get every piece of news you can on it. Ask yourself, "What do I not know that I need to know?" Talk to competitors and employees.

Your role is a reporter assigned to investigate a company. Your final article should contain your estimates for the company with justifications for these estimates. It should also contain a forecast of the future profit rate if you invest in the company now (STRET or STRETD) and perhaps a target price necessary to get your desired return (TARG or TARGD).

Ratio Methods

Since the PE ratio is equal to the price of the stock divided by earnings per share (eps), then

price = PE ratio x eps.

This means that for the price to rise, either the PE ratio must increase or the earnings per share must increase (or both, of course). The earnings component of the relationship is determined by the economic success of the business. I think of this as the objective side of the price rise.

In contrast, the PE ratio component is a description of what the market is prepared to pay for each dollar of earnings. This is the subjective side of any price movement. It is driven by short-term waves of market enthusiasm and pessimism as well as perceptions of the future earnings of the business.

This shows that price movement, in particular, price rises, can be analyzed as the linking of the subjective and the objective. For a successful investment we look to make purchases where both these components are working in our favor.

Forecasts of PE ratios and the growth rate of earnings are important entries in the functions STRET/STRETD and TARG/TARGD. The reminder of this section will focus mainly on the art and science of earnings forecasts leading to the next section where we bring it all together in applying Valuesoft.

Earnings Forecasts

An important quote from Warren Buffett is:

> Your goal as an investor should simply be to purchase, at a rational price, a part interest in an easily-understandable business whose earnings are virtually certain to be materially higher five, ten and twenty years from now.

Amongst other things, this makes it very clear that we need to be able to forecast earnings with as much accuracy as possible.

Analyst Forecasts of Earnings

One of the principal activities of professional stock analysts is to estimate the future earnings of public companies. They either state these estimates as earnings for a certain number of quarters into the future or as an annual growth rate of earnings.

There are many sources of these estimates, particularly on the internet. However, it is best to be cautious about these estimates.

The first reason for this is that companies frequently use accounting methods to distort their earnings figures. A number of studies have shown that managers manipulate earnings in order to report positive earnings, positive earnings growth, or earnings that exceed analyst expectations.

When managers cannot succeed in these goals, they generally allow for there to be a major drop in earnings called a 'big bath.' In other words, many managers manipulate earnings so that there are more small rises than small losses and more large losses than large rises (Lowenstein 1997). Spread the good news and limit the bad news to as short a time period as possible.

In 1998, Arthur Levitt, the Chairman of the Securities and Exchange Commission SEC gave a hard-hitting talk on this issue to the New York University Center for Law and Business (Levitt 1999). He wrote:

> Increasingly, I have become concerned that the motivation to meet Wall Street earnings expectations may be overriding common sense business practices. Too many corporate managers, auditors, and analysts are participants in a game of nods and winks.

The second reason to be wary of earnings estimates by analysts is that, well, frankly they are not all that reliable. In a comprehensive study from 1985 to 1996, Lawrence Brown (Brown 1997) compared the actual earnings of companies in the next quarter compared to predictions by analysts.

In all, he considered approximately 130,000 forecasts. He found that the average absolute percentage error was 91.6 percent and that the average error was 48.9 percent on the high side. This means that on the average, analysts estimated earnings to be almost 50 percent higher than

what they turned out to be. For 25 percent of the time their estimates were too low by 10 percent and for 38 percent of the time their estimates were too high by 10 percent.

Another study looked at the ability of analysts to forecast earnings for a period of 5 years, a more reasonable length of time for anyone following a value approach to investing. The study by Bulkley and Harris concluded that analyst forecasts are uncorrelated with the actual growth. This means that as far as a 5-year period goes, there is no advantage in using forecasts for individual companies by analysts and we may as well use the average of the forecasts of all analysts over all companies.

Given the unreliability of forecasts by analysts, clearly we need to look for a better way.

Your Own Estimates of Earnings

If you are going to perform your own forecasts of the earnings of a company, the most important rule to remember is that you don't have to estimate the earnings of every single company. We can pick and choose which companies we decide to focus on only including those companies with earnings that we can forecast with more confidence. Part of the Valuesoft Investment System is to show you how to find these companies.

> The Valuesoft Investment System helps you find companies with earnings that you can forecast with more confidence.

Charlie Munger, the Vice Chairman of Berkshire Hathaway, made the pithy comment at the 1998 annual meeting that he would like to set the following question in an exam on company valuation, "Determine the value of an internet company." A candidate who gave any answer at all would be failed.

There are more than 10,000 companies on the major stock exchanges in the U.S.A.; all you need is to be able to find reasonable lower estimates for the earnings growth of a small handful of these companies.

When making a forecast of earnings growth, there are two types of information, qualitative and quantitative.

Qualitative Information

Qualitative information deals with such things as the nature of the business; the relative position of the company within the industry; its, physical, geographical and operating characteristics; the ability of the management; and, finally, the outlook for the company and for the industry in general.

Three recommended books for describing steps to obtain qualitative information on a company are *Common Stocks and Uncommon Profits* by Philip Fisher (Fisher 1958 (reprint 1996)), and the two books by Peter Lynch *One Up On Wall Street* (Lynch 1989) and *Beating the Street* (Lynch 1993). Click here to order these books from Amazon.com.

Before discussing the second type of information, quantitative information, it is useful to consider the tendency of human beings to see orderly patterns when there are none.

Cognitive Illusions

Science, using mathematics, locates trends and patterns in data which may eventually become accepted scientific principles. There is a huge difference, however, between observing data about physical events, such as the movement of planets, and observing financial data, such as the prices of stocks.

Psychologists regularly perform experiments demonstrating that when people are shown random patterns, they often see and explain order in these patterns. Moreover, they continue to do this even after they know the patterns are random. This is an example of what is referred to as *cognitive illusions*, a tendency to apply incorrect reasoning and to continue with it even after it is known to be in error.

> To be a successful investor we need to guard against the tendency to apply incorrect reasoning and to continue with it even after it is known to be in error.

Consider the simple experiment of tossing an unbiased coin. Suppose it comes down heads 100 times in a row. Is a head or a tail more likely on the next throw? Most people would choose a tail, supporting their choice by quoting the "law of probability." Even after it is explained to them that this is no such law—how could a coin remember that is has come down 100 heads in a row and change its behavior for the next toss? —they frequently persist in this choice.[4]

Variants of this belief in a law of probability is one of the most common reasons for misguided investment decisions. If you see a pattern in past stock prices, well and good. But it is important to remember the disclaimer written on many investment documents: past performance is no guarantee of future results. The pattern you see may well be a cognitive illusion.

Benjamin Franklin expressed this succinctly, "So convenient a thing it is to be a reasonable creature, since it enables one to find or make a reason for everything one has a mind to do."

If you want to follow up this idea, Jack Gray discusses the use, and overuse, of data in investment and financial decision in an article *Overquantification* (Gray 1997). Also an evolutionary perspective on this tendency to see patterns and order where there are none is described by Piatelli-Palmarini (Piatelli-Palmarini 1994).

Quantitative Information

To use quantitative information to estimate the growth of earnings obviously means that you need to start with accurate data on the company or companies you are considering.

You can get the data from readily available internet sources such as Yahoo Finance or Microsoft's MoneyCentral. or you can get it directly from annual and quarterly reports. It is then

[4] An amusing alternative to this idea is described in the book *The Black Swan: The Impact of the Highly Improbable* by Nassim Nicholas Taleb. A character in the book essentially says that there is no way that anyone can toss 100 consecutive heads with a fair coin. The coin must be biased and hence there is a higher chance of tossing a head on the next throw. It is put forward as an example of "street smarts" as opposed to "book smarts".

a simple matter to use this data and regularly update the Valuesoft calculations. In this way you have a good estimate of the value of the company. Also you will always know what is the price at which you would buy and what is the price at which you would sell.

If the target price and the current price of a stock are separated by substantial amounts, the time between updates can be lengthy, three months or more. If the numbers are close, then you will want to update more regularly, perhaps weekly or even daily.

For more serious investors, you can buy databases consisting of detailed information on thousands of companies. Value Line is one source of this data; you can either purchase monthly data on 1,700 stocks or on 5,000 stocks. It comes on a CD ROM which you load into your computer. The data appears as a huge spreadsheet. You can do many analyses right there in the spreadsheet, including sorting on any variable, or you can copy and paste any or all of it to your own spreadsheet.

Once you do that, you can apply Valuesoft to the whole database. This allows you to sort through, or screen, thousands of stocks in a few seconds and only choose those with, say, a stable earnings growth and a predicted 10-year return above 10 per cent after taxes.

Once you start examining data on a regular basis, you can gradually build up a database of stocks that you watch with the help of the Valuesoft functions, waiting for the right opportunity to purchase them. These functions will enable you to set definite criteria for a purchase, or a sale, and all you have to do is monitor the prices of the stocks, and occasionally update their financial information.

In the remainder of this section, we will consider what to look for in a company to be able to consider making a forecast and then how to actually make the forecast in a rational and prudent manner.

Types of Companies

The best companies to own are those which can use the capital they generate at high rates of return over extended periods. Shares in these companies will grow in value over time at a pleasing rate and this growth will be reflected in the price of the share, provided it wasn't purchased at too high a price to begin with. The best thing such a company can do is for it to pay out as little as possible as dividends or share repurchases.

The best companies to own are those which can use the capital they generate at high rates of return over extended periods.

At the other end of the scale, the worst companies to own are those who need to employ ever-increasing amounts of capital at low rates of return. For these companies, the best they can do for their shareholders is to pay out as much as they can as dividends or share repurchases. However, it is often that they need, or at least this is what management says, increasing amounts of capital to stay competitive.

There are three major ways of dealing with the difficulty of forecasting the earnings growth rates of companies. The first is to consider companies whose earnings growth has been stable for a number of years, at least five, and preferably ten. In this way, you will see that their performance

has been maintained through a range of market conditions. Entering data into a spreadsheet and making graphs of as many performance parameters as possible—sales, earnings, cash earnings, and so on—is the best way to proceed.

To get more precision into your estimate of the smoothness of past data such as earnings, Valuesoft has introduced a new function called STAEGR™, short for the stability of earnings growth. This is discussed in detail below.

The second way to have more confidence in your earnings forecasts is to increase your understanding of the company in which you are investing. At the 1998 annual meeting of Berkshire Hathaway, Warren Buffett said that they like "homey, Norman Rockwell types of companies." Buffett only invests in companies within his "circle of competence." To understand a company, you need to understand its products, its competition, and its earning power.

One way to start this process is to put yourself in the position of an owner and ask yourself the questions: what do I produce, who are my competitors, who are my suppliers, who are my customers? Now read the reports, talk to people, use your imagination. Peter Lynch humorously promotes the same idea when he recommends that you don't invest in anything whose products you cannot draw with a crayon. He also recommends that you be able to give a one-minute talk on a company before you invest in it.

The third way is to always have, as Benjamin Graham wrote back in *The Intelligent Investor*, a margin of safety. Graham wrote: "Confronted with a … challenge to distill the secret of sound investment into three words, we venture the motto, MARGIN OF SAFETY."

If the calculations show that the intrinsic value is only slightly better than the price, then do not buy it. Buffett has often said that the three words "margin of safety" are the cornerstone of his investment philosophy…and success. Valuesoft contains two functions, PESAFETY and ESAFETY, that enable you to employ an automatic margin of safety.

Making accurate forecasts using STAEGR

All investing requires making forecasts, at least in the sense of doing something now with the anticipation of a particular outcome, even if the outcome is quite vague. We make a financial decision now such as to buy shares in a particular company with the desire for it to grow in value.

One of the goals of Valuesoft is to show how we can make more reliable forecasts and so achieve more reliable financial outcomes.

Use of the functions STRET/STRETD and TARG/TARGD requires making forecast of earnings. Valuesoft contains a proprietary tool called STAEGR to assist you in making accurate earnings forecasts.

The Valuesoft function STAEGR measures of the stability of the growth of historical data from year to year expressed as a percentage. This data can be any sequence of numbers ranging from earnings per share to total revenue. It is designed, however, to measure the stability of basic earnings and revenue per share. The maximum figure of 100 percent represents earnings that go up or down by the same percentage each year.

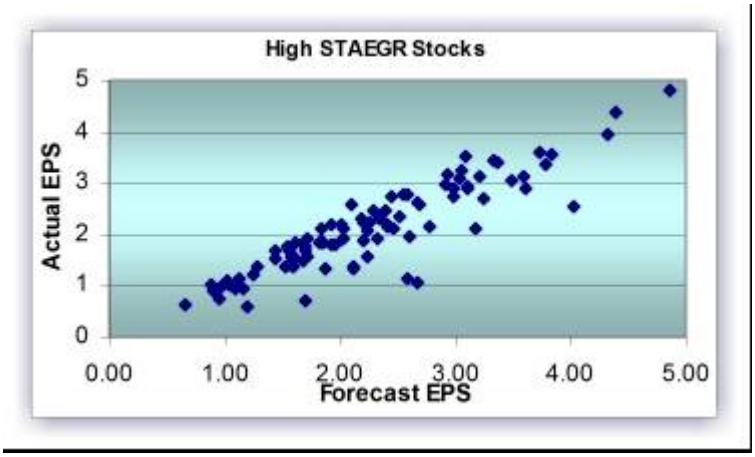
The calculations are based on fitting an exponential curve to the historical data with more emphasis placed on the stability of the growth of recent earnings. Special adjustments are made for negative earnings, for extreme outliers, and for earnings near zero. The calculations also require that there is at least three years with positive earnings.

Using Value Line data, I considered all the companies with eleven years of earnings data from 1988 to 1998 inclusive.[5] Next I divided the companies into ten groups ranging from those with the highest STAEGR over the ten years from 1988 to 1997 to those with the lowest STAEGR over this period. Each group contained 115 companies.

The next step was to use the Valuesoft function HGROWTH to calculate the earnings growth over this period. Earnings in 1998 were forecast using 1997 data and the historical growth figure. Finally the earnings forecast was compared with the actual earnings in 1998.

The result of most interest to us was that the forecasted earnings of the high STAEGR group were accurate within 98 percent. This can be seen in the accompanying chart.

The points represent the earnings figures, forecast and actual, of the companies in the group.



Another way of describing the results is that the average absolute error for this group of companies was 16 percent compared to the analyst error of 91.6 percent for all stocks. The difference is even more significant than it appears since the forecasts for the STAEGR method were for a full year whereas those of the analysts were only for the next quarter.

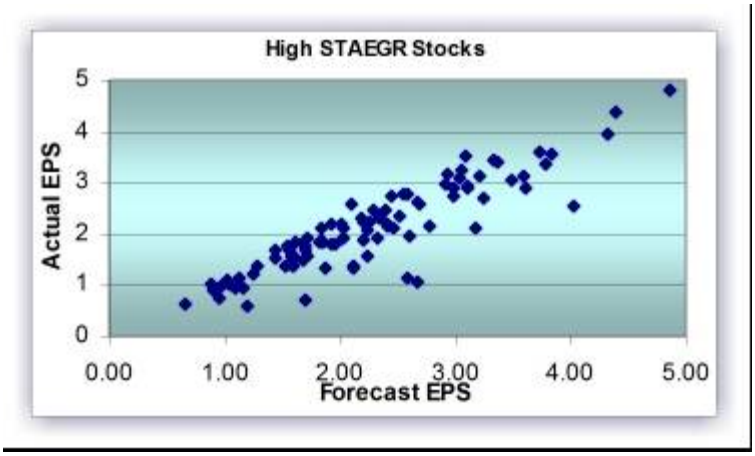
The results for the next group of stocks was similar. Their STAEGR ranged from 90 percent to 93 percent. This means that when we focus on stocks with the highest levels of STAEGR, say 90 percent and up, then the past growth of earnings is a statistically reliable predictor of earnings for the following year.

In contrast, the accuracy of the predictions in the other groups was much lower.

[5] Even though this study was carried out in 1999, it has been repeated every two or three years since then with similar results. You can see updated research and examples of high stability companies at http://www.stablegrowthcompanies.com.

The accompanying chart shows the data for the group of stocks with the lowest STAEGR.

Notice that for some of the points the forecast is negative while the actual earnings are positive while for other points the opposite holds, positive forecasts result in negative outcomes.



This did not occur for the two groups with the highest STAEGR.

This study shows that you can have more confidence that earnings will continue to grow as in the past for stocks with a high level of STAEGR.

> You can have more confidence that earnings will continue to grow in the future as in the past for stocks with a high level of STAEGR.

Here are some of the US companies with the highest levels of STAEGR.

Company Name	Symbol	Market Cap ($ Mill's)	Stability (STAEGR) 5 Years	Average Annual Growth (HGrowth) 5 Years
Walgreen Company	WAG	44,416	99.74	15.06
Sierra Bancorp	BSRR	270	99.71	19.91
United Community Banks	UCBI	1,125	99.18	14.12
Colony Bankcorp Inc	CBAN	145	99.03	15.28
Nuveen Investments	JNC	4,936	98.99	14.89
Compass Bancshares	CBSS	8,965	98.97	10.41
National Healthcare	NHC	646	98.94	19.67
Trico Bancshares	TCBK	350	98.94	13.86
Citizens Holding Com'y	CIZN	111	98.77	7.52
Amcore Financial	AMFI	672	98.67	2.64

Lists such as this and much more can be obtained form the site www.stablegrowthcompanies.com. This site also contains high stability companies for the Canadian and Australian markets.

Of course, just because we have confidence in our forecasts of future earnings of a company does not mean that we should rush out and buy it. It is always important to incorporate a clear margin of safety.

Earnings and Sales

Another factor in helping to forecast earnings as accurately as possible is to also look at sales and the net profit margin. As we wrote, earnings are often referred to as the bottom line. In contrast, sales are often referred as the top line because they are usually entered as the top line in profit and loss or income statement.

Sales, also referred to as revenue, are defined as the money coming into a company from its normal operations. From the sales the company pays its expenses and taxes and makes allowances for depreciation and other non-cash expenses. The earnings are what are left.

The net profit margin (npm) is defined as the earnings divided by the sales. If the net profit margin is, say, 20%, then we know that for every dollar of sales the company has earnings or net profit of 20 cents. Clearly,

earnings = net profit margin x sales.

Hence, for earnings to rise either the npm must rise or the sales must rise (or both).

When looking at the past growth of earnings and sales, there are three general cases. Either the growth rate of earnings substantially exceeds the growth rate of sales, both growth rates are approximately the same, or the growth rate of sales substantially exceeds the growth rate of earnings. Each of these cases needs to be looked at separately. (In the following discussion we assume that the STAEGR levels of both earnings and sales are at reasonably high levels. Without this, it is very difficult to make forecasts of earnings or sales with confidence.)

Case 1: The growth rate of earnings substantially exceeds the growth rate of sales. For this to happen, it must have been the case the net profit margin has been increasing. However, high margins will be noticed by competitors who may be willing to operate at lower margins believing that they could still be profitable.

Even if there are no existing competitors, high margins may attract the formation of new businesses lured by the possibility of lucrative area of business. For these reasons, it could be risky to evaluate a potential investment in a stock based on the assumption that the net profit margin will continue to increase as it has in the past. The conclusion is that, in this case, it would be sensible to lower forecasts of earnings from the past growth rate to a level closer to the growth rate of sales.

Case 2: The growth rate of earnings and the growth rate of sales are approximately the same. In this case, assuming that the STAEGR levels are high, we are justified to use the past growth arte of earnings as an approximation for the future growth rate.

Case 3: The growth rate of sales substantially exceeds the growth rate of earnings. For this to happen, it must have been the case the net profit margin has been decreasing. This could be an indication that the nature of the business is changing and that increasing turnover is required to

maintain the growth rate of earnings. In makes sense to look at the business more closely with a view to getting a better understanding of why this is happening. If the company can maintain its present margins, then it adds weight to the outcome that the past growth rate of earnings will continue into the future. If there is evidence that the margins may decrease further, then it could be that the earnings growth rate starts to slow down.

The Valuesoft function PESAFETY makes a conservative forecast of the future growth rate of earnings based on the past growth rates of earnings and sales, and the stability of earnings.

Return on Equity and Earnings Growth

We just saw that by examining the growth rate of earnings in relationship to the growth rate of sales we can get extra insight into making confident forecasts of the growth rate of earnings. There is also a relationship between return on equity and the dividend payout ratio which helps to make more confident forecast of earnings.

We start with a general assumption that there are no revaluations of any the assets of the company and that the company is not involved in raising new outside equity. Also we assume that the return on equity is constant over the years that we are studying the company.

Suppose, for example, that the company pays out all its earnings as dividends. In other words, assume that the payout ratio is 100%. Since each dollar of earnings is passed on to the shareholders as dividends, there will be no change in equity. Since return on equity is constant, there will be no growth in earnings.

At the other extreme, suppose that the company does not pay any dividends. This means that all the earnings are kept as equity. As an example, suppose that equity is initially $100 and ROE is 15%. This means that in the first year the company generates $15 as earnings.

Assume that all these earnings are in cash. As a consequence, the new equity is $115. Since ROE is 15%, the earnings in the second year are 15% of $115 which is $17.25. This shows that earnings have grown by 15%.

The general conclusion is that:

(1) growth rate of earnings = ROE x (1 - dividend payout ratio).

This is only an approximate relationship and requires a number of assumptions such as no revaluations of equity, no outside raising of equity, all earnings flow through to equity, and return on equity is constant on a year by year basis. Nevertheless, the relationship gives another piece of information when trying to make confident forecasts of the growth rate or earnings.

Warning: if ROE grows from one year to the next, this growth rate may flow through to the growth rate of earnings and will give an inflated picture. Once the ROE stabilizes, then the growth rate will once more be approximated by the preceding formula. The new formula is:

(2) growth rate of earnings = ROE x (1 - dividend payout ratio) + growth rate of ROE

As an example, suppose that in year 1 ROE is 10% and in year 2 it is 15%. Also suppose that there are no dividends. A simple application of formula (1) might lead to the conclusion that earnings would grow by around "10 to 15%". However, this would likely be a severe and dangerous over estimate. Since the ROE is growing, the assumptions of the first formula are violated.

Since the growth rate of ROE is 50%, when we apply formula (2) we see that

growth rate of earnings = 15% + 50% = 65%.

In practice it would be unusual to see such a high growth rate of earnings and it is likely that some of the other assumptions are violated. The point, however, is to be very cautious when you see a strong growth in ROE; it may give rise to a short-term, but unsustainable, growth in earnings. The prudent action is to assume that the ROE is not going to continue to increase and use the most recent ROE and the payout ratio in formula (1) as inputs into making growth forecasts of earnings.

USA Companies

The following is a list of USA companies that you could use as a starting point. They have been chosen because they had a high value of STAEGR for their earnings, a high return on equity, and fairly high growth rates for earnings per share and revenues for the past five years.

This makes them strong candidates for being companies to watch closely.

You could analyze them using a Level 1 Template, or a Level 2 Template as explained in Section 7. Or you could use your own template.

Company	Symbol	Price	Growth	Return on Equity	Return on Capital	STAEGR Earnings	STAEGR Sales
Bed Bath & Beyond	BBBY	$36.05	23.50%	22.40%	22.40%	94.00%	98.70%
Boston Beer	SAM	$40.18	23.20%	16.80%	16.80%	96.90%	96.90%
Chicago Mercantile	ACME	$539.30	39.50%	26.80%	26.80%	94.30%	95.50%
Corporate Exec	EXBD	$64.25	28.60%	24.90%	24.90%	94.40%	98.40%
Covance Inc.	CVD	$70.10	23.00%	15.70%	15.70%	98.30%	96.90%
Expeditors Internat'l	EXPD	$42.15	20.50%	22.00%	22.00%	95.40%	96.60%
First Cash Financial	FCFS	$23.81	27.50%	16.80%	15.60%	98.50%	95.30%
Forward Air	FWRD	$34.39	23.50%	26.40%	26.30%	95.30%	96.40%
Global Payments	GPN	$39.44	29.90%	16.30%	16.30%	97.20%	97.30%
Harley-Davidson	HOG	$60.71	22.10%	37.80%	28.80%	95.10%	97.90%
Healthcare	HCSG	$30.53	26.80%	15.40%	15.40%	96.80%	97.70%
Idexx Laboratories	IDXX	$94.97	21.40%	22.90%	22.50%	97.20%	97.20%
Infosys	INFY	$51.12	38.50%	31.30%	31.30%	94.10%	99.00%
Knight Transport	KNX	$19.78	29.30%	17.10%	17.10%	97.70%	97.30%
MTS Systems Corp	MTSC	$46.63	24.30%	23.20%	22.10%	96.90%	94.10%
Nike, Inc Shares- B	NKE	$58.98	20.40%	22.10%	20.80%	97.10%	98.50%
North Pittsburgh	NPSI	$24.19	24.90%	31.30%	26.60%	96.70%	96.00%
Raven Industries	RAVN	$37.15	26.30%	25.90%	25.90%	96.50%	96.60%
Simpson	SSD	$33.63	22.50%	15.70%	15.70%	95.00%	95.60%
Stryker Corporation	SYK	$63.95	22.90%	18.60%	18.60%	96.00%	98.50%
Toro Company, The	TTC	$59.53	25.90%	32.90%	22.80%	96.80%	97.40%
Varian Medical	VAR	$43.47	30.30%	30.70%	28.90%	96.70%	98.90%
Watsco, Inc.	WSO	$55.52	28.50%	16.00%	15.10%	96.50%	94.90%

This list will be updated and displayed at http://www.sherlockinvesting.com/vsoft01s23/tps.htm

Australian and New Zealand Companies

The following is a list of Australian and New Zealand companies that you could use as a starting point. They have been chosen because they had a high value of STAEGR for their earnings, a high return on equity, and fairly high growth rates for earnings per share and revenues for the past five years.

This makes them strong candidates for being companies to watch closely.

You could analyze them using a Level 1 Template or a Level 2 Template. Or you could use your own template.

Company	Symbol	Price	Growth	ROE	ROC	STAEGR Earnings	STAEGR Sales
Adelaide Bank	ADB	$15.20	17.00%	14.00%		98.40%	88.90%
Adelaide Brighton	ABC	$3.55	21.60%	15.00%	12.80%	93.70%	94.90%
Ammtec	AEC	$4.18	27.10%	31.00%	30.40%	88.80%	94.60%
ARB Corporation	ARP	$4.40	16.60%	25.90%	26.20%	97.20%	98.70%
Bendigo Bank	BEN	$15.34	15.50%	12.40%		99.30%	99.10%
Billabong	BBG	$17.86	26.70%	20.50%	15.70%	95.00%	97.20%
Blackmores	BKL	$20.55	24.20%	39.30%	32.00%	89.20%	98.00%
Corporate Express	CXP	$6.85	16.40%	29.50%	30.50%	94.20%	98.20%
Count Financial	COU	$3.16	31.70%	72.20%	72.20%	95.30%	86.20%
Korvest	KOV	$5.80	22.70%	21.40%	21.30%	86.30%	92.70%
Lend Lease	LLC	$18.34	23.60%	14.10%	11.50%	88.80%	90.00%
Monadelphous	MND	$15.17	47.70%	47.30%	37.90%	91.00%	90.00%
Noni B	NBL	$4.20	31.60%	26.70%	26.60%	96.90%	94.30%
OneSteel	OST	$6.34	40.60%	11.90%	10.30%	85.60%	94.50%
Select Harvests	SHV	$11.25	30.70%	30.40%	30.70%	96.00%	92.40%
Sims Group Ltd	SGM	$26.80	37.80%	16.40%	14.00%	85.20%	93.50%
St. George Bank	SGB	$35.82	18.20%	19.30%		97.70%	97.90%
Tasmanian Perpetual	TPX	$7.12	32.70%	23.20%	23.20%	93.00%	94.30%

This list will be updated from time to time and displayed at http://www.sherlockinvesting.com/vsoft01s23/tps.htm

Section 6 Valuesoft Templates

Templates are an extremely useful feature of Excel. For example, once you have set up a framework for analyzing a company, you can copy this framework to another Excel file or another sheet in the same file. Having done this, you can overwrite the data with the data from a second company.

Proceeding in this way you can have analyses for a range of companies with each analysis in precisely the same form. These analyses can range from a single line with a single function to a display involving many functions and charts. Once they have been set up, it is a simple matter to update the data whenever you desire.

These frameworks are called templates.

For a more professional approach, you can actually save one of the stock analysis frameworks as an Excel template. Use the commands File|Save As, go to the "Save as type" box and save as a Template (*.xlt) file. For example, you could save it as StockTemplate1.xlt. Once you have done this, whenever you open a new file in Excel you will be offered the possibility of opening this template.

This gives you the opportunity for creating a number of templates with different levels of detail depending on the type of analysis you want to do. For example, you might start with a very simple analysis of a larger number of stocks. For those stocks that look promising, you might progress to a template that provides a deeper analysis. Finally, before making your final decision, you could analyze the company with an even more detailed template.

This section will describe two levels of templates for using the Valuesoft functions. They are only intended as examples of the types of analysis that are possible. You could regularly check the page www.sherlockinvesting.com/vsoft20a/download.htm for analyses of Dow Jones companies using Level 2 templates.

The following two pages have more recent examples of Level 1 and Level 2 templates for a USA company:

www.sherlockinvesting.com/valuesoft/tp1.htm
www.sherlockinvesting.com/valuesoft/tp2.htm

while these two pages have more recent examples of an Australian company:

www.sherlockinvesting.com/valuesoft/tp1oz.htm
www.sherlockinvesting.com/valuesoft/tp2oz.htm

Level 1 Templates: Investment Return

The simplest level of a template is to use a single function from Valuesoft. The following example is for a US company. More recent versions of this example may be seen at http://www.sherlockinvesting.com/valuesoft/tp1.htm An example using Australian data is given at http://www.sherlockinvesting.com/valuesoft/tp1oz.htm

Let's do an analysis on Johnson & Johnson, the health care product company. After having done some research on the company (its products, competitors, and so on), you are ready to crunch some numbers.

This is where the Valuesoft Investment System comes in.

Suppose you are interested in estimating the percentage return on buying JNJ now and holding it for 5 years. You will need some data which you can get free from most of the major investment sites such as Money Central or Yahoo Finance. When you use these sites, you may have to go to different pages to collect all the information that you need.

For Yahoo Finance all the data we need is on the Profile page and the Research page for each company. The URL for these pages for SBC are

- http://biz.yahoo.com/p/j/jnj.html (Profile page),
- http://biz.yahoo.com/z/a/j/jnj.html (Research page).

You might find it easiest to print these pages before you start. The following is the list of the required data and the page where you can find it. (More details of these terms can be found in the glossary.)

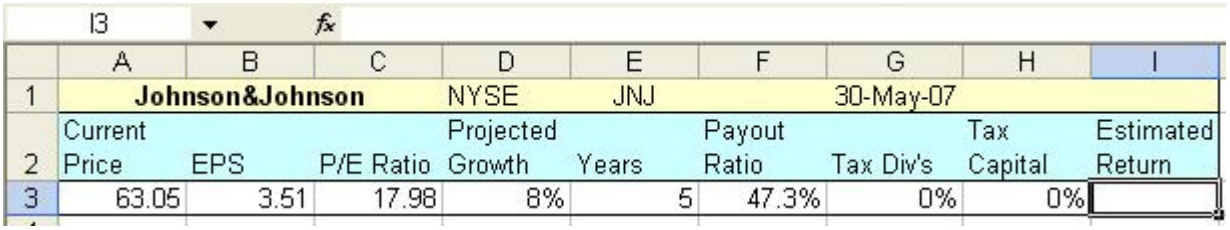
Current price: this is the last price at which the stock was sold (Profile page)
Earnings per share (EPS): the total earnings of the company divided by the number of shares outstanding (profile page). Think of this as the amount of money that the company is earning on your behalf for each share that you own.
Price to earnings ratio (P/E ratio): the current price divided by the earnings per share (Profile page).
Projected growth rate of earnings: this is a forecast of the average growth rate of earnings. Use the figure in the column "Next 5 Years" on the research page even though you may have a longer time frame in mind. If you are not given a figure (perhaps because no analysts are following the company), enter the average percentage growth rate for the past 5 years. If this is also missing, then beware of investing in this company. With less than five years of data, it is very difficult to make any forecasts.
Years: the time frame of your investment. Generally this will be 5 years or more.
Payout rate: this is the percentage of earnings that the company pays out in dividends. You don't get this figure directly on the Profile page. However, you can easily calculate it by dividing the Dividends by the Earnings per Share, in this case 1.01 / 2.45= 41%. (Even simpler is to type "= 1.01 / 2.45" in the appropriate cell and Excel will do the calculation for you.)

For things like the P/E ratio and the projected growth rate, don't worry too much about decimal places. It is likely that you will change them to more conservative figures when you have everything all set up.
The last two requirements are:
Tax rate on dividends: this is your marginal rate of tax.
Tax rate on capital gains: for simplicity I will set these both at 0% in the following examples.

When you have done this you get the following numbers.

JNJ 30 May 2007							
Current Price	EPS	P/E Ratio	Projected Growth	Years	Payout Rate	Tax Div's	Tax Capital
63.05	3.51	17.98	8.3%	5	47.3%%	0%	63.05

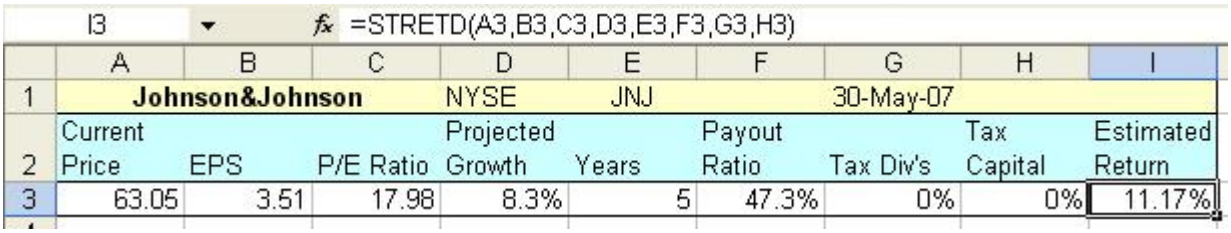
Now enter this data into an Excel page to get something like shown in the following figure:



	A	B	C	D	E	F	G	H	I
1	**Johnson&Johnson**			NYSE	JNJ		30-May-07		
2	Current Price	EPS	P/E Ratio	Projected Growth	Years	Payout Ratio	Tax Div's	Tax Capital	Estimated Return
3	63.05	3.51	17.98	8%	5	47.3%	0%	0%	

I have added some color and borders. If you do not want to use percentages, enter the numbers as decimals: 0.133 etc.

In the cell I3 type =STRETD(A4,B4,C4,D4,E4,F4,G4,H4) and press return. (You don't need to use uppercase letters. And if you are more familiar with Excel, you can get the same result by using the function button and going to the function STRETD, which stands for STock RETurn with Dividends reinvested.)



	A	B	C	D	E	F	G	H	I
1	**Johnson&Johnson**			NYSE	JNJ		30-May-07		
2	Current Price	EPS	P/E Ratio	Projected Growth	Years	Payout Ratio	Tax Div's	Tax Capital	Estimated Return
3	63.05	3.51	17.98	8.3%	5	47.3%	0%	0%	11.17%

In this case I have formatted the cell I3 as a percentage. If you did not do this you would get a decimal number. In this case I have put the cursor back into cell I3. Notice that =STRETD(A4,B4,C4,D4,E4,F4,G4,H4) has appeared in a box at the top of the page.

The number 11.17% is an estimate of the before-tax annual return by purchasing JNJ for $63.05 and holding it for 5 years.

At the time of writing this, Valueline estimated that the 3 to 5 year return for JNJ would be in the range 12% to 18% per year so you can see that the figures are similar. The huge advantage of Valuesoft is that you can put in your own estimates of the P/E ratio so that you can see exactly the effect on the final result. We will demonstrate this below.

Of course, the above only works when you have purchased and loaded Valuesoft. Without Valuesoft, you will get the result #NAME?

Margin of Safety

Remember, none of the inputs can be totally accurate. It is up to you to adjust them to allow for a margin of safety and other outcomes of your investigations. (In the Level 2 Templates below we show how Valuesoft has built-in functions for calculating a level of safety as a staring point for your own margin of safety.)

In the 1999 annual report of Berkshire Hathaway, Warren Buffett said that he employs "a range of values, rather than some pseudo-precise figure." With Valuesoft this is a snap since each time you enter a new number and press return, the answer is automatically recalculated.

For example, you may think that a projected P/E ratio of 17.98 is too high so you replace it by 15. Also you are not sure about the projected growth rate of earnings so you replace it by 6.0%. Now you get the results:

I3 fx =STRETD(A3,B3,C3,D3,E3,F3,G3,H3)

	A	B	C	D	E	F	G	H	I
1	**Johnson&Johnson**			NYSE	JNJ		30-May-07		
2	Current Price	EPS	P/E Ratio	Projected Growth	Years	Payout Ratio	Tax Div's	Tax Capital	Estimated Return
3	63.05	3.51	15	6.0%	5	47.3%	0%	0%	5.47%
4									

This time the estimated after-tax return is 5.47% per year. What this means is that under a margin of safety you will make at least 5.47% per year over the next 5 years. At the same time it leaves the upside open so that the final return could be much higher.

With more experience, you can do the above in a few minutes. Once you have set it up for a company, it is a simple matter to update that data as new information becomes available.

STRETD is only one of the 25 functions in Valuesoft. One of my other favorite functions is TARGD. This calculates the price that you would need to pay to achieve your desired return. When you do this, you set yourself up to wait until there is a dip in the price. At that moment you can buy the stock **you** want at **your** price to get **your** return.

The next level of templates includes an analysis of historical data in order to put the p/e and earnings forecasts on a firmer footing.

Level 2 Templates: Stability and Growth Rates

As we said in the introduction to this section, the most important activity of an investor is to estimate with confidence the percentage return over a specified holding period when buying stock in a company. And you want to be able to do this based on numbers that you can see and adjust such as the growth rate of earnings.

Because I am interested in medium to long-term investments (remember, Buffett's favorite investment period is forever), I need to have dependable forecasts of earnings for the next five years or more. However, for most companies it is extremely difficult to be able to forecast earnings with any confidence.

Most people rely on forecasts provided by the various stock analysis firms. Unfortunately, many studies show that their results are extremely unreliable.

Valuesoft has two functions that allow you to remove much of the guesswork from forecasting earnings. These functions are STAEGR™ and HGROWTH.

STAEGR The name STAEGR™ stands for STAbility of Earnings Growth. This function was discussed in detail in an earlier section. It measures the stability of earnings growth from year to year and expresses it as a percentage. The maximum figure of 100% represents earnings that go up, or down, by the same percentage each year. The calculations are based on fitting an exponential curve to the historical data with more emphasis on recent data. Special adjustments are made for negative earnings, for extreme outliers, and for earnings near zero.
The important thing for us is that large-scale studies in the USA and Australia show that stocks with a high level of STAEGR are likely to have earnings that continue to grow in the future at the same rate as they grew in the past.

We particularly look for stocks that have STAEGRs of 80 percent or more for both their earnings and their sales. If a company does not satisfy this criterion, I usually just pass it by. After all, if there was little stability in sales and earnings in the past, then it becomes virtually impossible to make confident forecasts for the future.

HGROWTH Once it is seen that the threshold for STAEGR has been passed, the next step is to calculate the growth rate for the earnings. This is done with the function HGROWTH (which stands for Historical GROWTH). Just as for STAEGR, the function works by fitting an exponential curve to the historical data with more emphasis on recent data. Special adjustments are made for negative earnings, for extreme outliers, and for earnings near zero.

Now use growth rate as it is, or modify it, to do calculations using such functions as STRET and TARG (or STRETD or TARGD).

Now we can use growth rate as it is, or modify it, to do calculations as you did in the Level 1 template with Valuesoft. (I will assume that you are familiar with the steps for the Level 1 analysis.)

Once again we will use Johnson & Johnson (JNJ). After having done an analysis of the company (its products, competitors, and so on), you are ready to crunch some numbers. (See below for an example of an Australian company.)

Suppose you are interested in estimating the percentage return on buying Johnson & Johnson now and holding it for 5

years. You can get all the data you need from Money Central. The URL is www.moneycentral.com. The data is contained on the following pages:

Quote Detail
Financial Results|Statements||10 Year Summary
Financial Results|Key Ratios|10 Year Summary

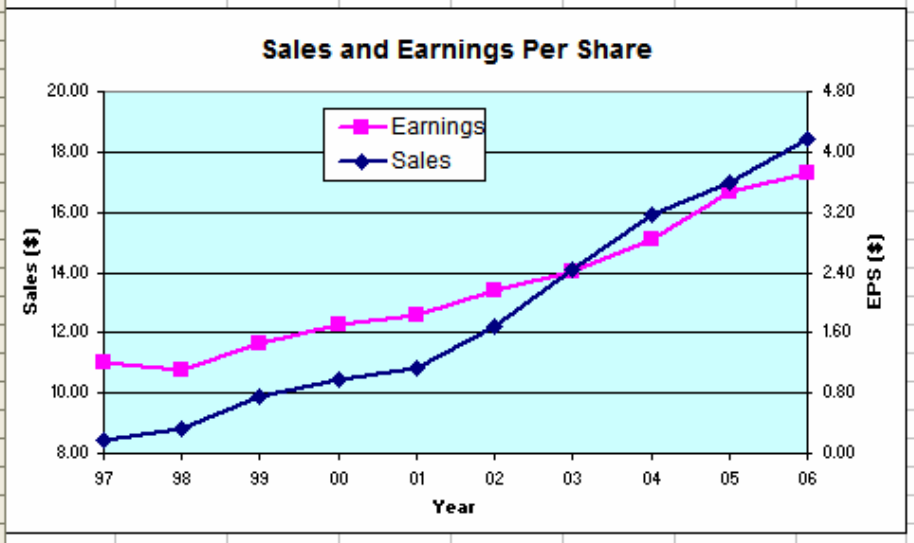
Warning: The numbers for earnings and other financial data can vary significantly between different data suppliers. This variation is due to the different conventions they have when extracting the data from the original financial statements prepared by the companies. For example, although the suppliers usually state that their figures for earnings per share exclude nonrecurring gains and losses, there can be still significant variations how this is put into practice.

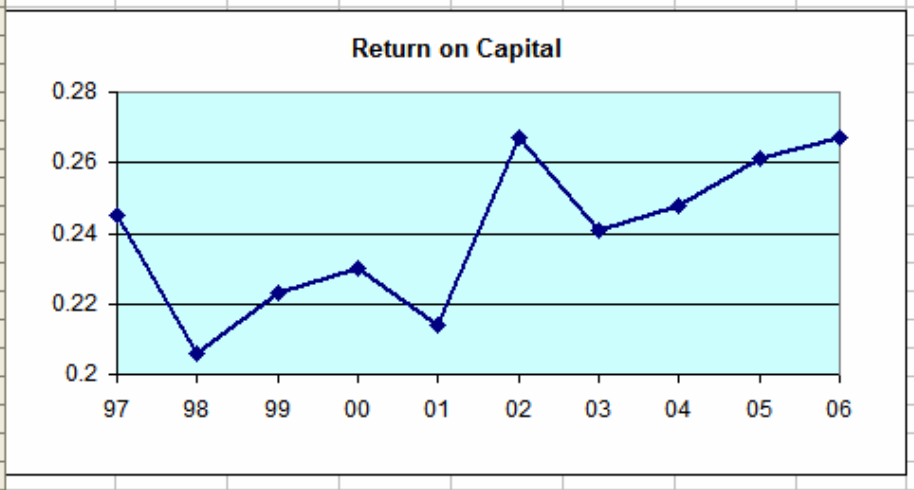
It is recommended that you get all the data for an individual company from the one data supplier and not to take some data from one supplier and other data from another.

Now all you do is type the numbers into a template supplied with Valuesoft. All the rest is done for you. The final result will look like the following figure.

Now all you do is type the numbers into a template supplied with Valuesoft. All the rest is done for you. The final result will look like this:-

1	Johnson & Johnson		NYSE		JNJ		30-May-07		
2		Year	Sales	EPS	ROC	P/E		Price	$63.05
3		Dec-97	8.41	1.20	24.5%	27.3	Current	P/E	18.07
4		Dec-98	8.80	1.11	20.6%	37.6		EPS	$3.49
5		Dec-99	9.88	1.47	22.3%	31.7		Payout	39.00%
6		Dec-00	10.48	1.70	23.0%	30.9	Return	Req'd	12.0%
7		Dec-01	10.83	1.84	21.4%	32.1		Est'd	7.4%
8		Dec-02	12.23	2.16	26.7%	24.9	Target Price		$49.68
9		Dec-03	14.11	2.40	24.1%	21.5			
10		Dec-04	15.94	2.84	24.8%	22.3		P/E	15.87
11		Dec-05	16.98	3.46	26.1%	17.4	Proj'd	EPS Gr.	10.2%
12		Dec-06	18.43	3.73	26.7%	17.7		Payout	37.0%
13	STAEGR	5-yr	99%	98%		Data		Years	5
14		10-yr	97%	94%		Estimates		Tav Div	35.0%
15	Growth	5-yr	10.5%	15.6%		Calcs		Tax Cap	20.0%
16		10-yr	9.6%	14.7%					
17									
18	Warning:	Forecasts in Cells I10-I12 are for illustration only.							
19		Use estimates based on your own reading and analysis.							





The functions in cells C13 to C16 are:

C13: = STAEGR($C$8:$C$12)
C14: =STAEGR($C$3:$C$12)
C15: =HGROWTH($C$8:$C$12)
C16: =HGROWTH($C$3:$C$12)

And similarly for D13 to D16.

The functions in I10 and I11 are there as a guide to set a margin of safety:

I10: = PESAFETY(I3,F12)
I11: = =ESAFETY(D15,C15,D13)

The functions in I7 and I8 are the final calculations:

I7: =STRETD(I2,I4,I10,I11,I13,I5,I14,I15)
I8: =TARGD(I6,I4,I10,I11,I13,I5,I14,I15)

Column E contains Return on Equity or Return on Capital. These are important measures of how well management is doing with the money they have. Consistently above 15% is a desirable level.

Notice the high levels of STAEGR in the cells C13 to D14. The chart also shows the smooth growth of sales and earnings. These are the types of companies I love. When they are purchased at the right price you can get outstanding profits with as much safety as bonds.

Of course, this does not mean that the growth will continue at this rate. But it does give some statistical support for such an occurrence.

In cells C15 to D16 we see the growth rates calculated using HGROWTH. The average annualized growth rates for earnings per share were 13.8% over ten years and 14.1% over the past five years.

Margin of Safety Using Safety Functions in Valuesoft

In this example I have added a margin of safety by using the functions PESAFETY and ESAFETY in Valuesoft. Applying the function PESAFETY lowers the PE ratio from the current level of 18.07 (in cell I3) to 15.87 (in cell I10). PESAFETY uses the current PE ratio and last year's PE ratio to estimate a more conservative level. Instead of last year's PE ratio, you can use other values such as the average PE ratio over the past 5 years.

The function ESAFETY lowers the growth estimate from the historical level of 15.6% per year (as seen in cell D15) to 10.2% (in cell I11). This lower level is based on the historical growth rate of earnings (in cell D15), the historical growth rate of sales (in cell C15), and the stability of earnings over the past 5 years as measured by STAEGR (in cell D12).

In cell I7 the estimated annualized percentage profit assuming that dividends are reinvested is 7.4%. This is under quite a strong margin of safety. It is equivalent to saying that there is a very strong probability that I will make at least this return over the next 5 years.

With Valuesoft you can find those stocks that you can lock ensure a satisfactory return while at the same time leaving open the possibility of a much higher return.

Target Prices

Another Valuesoft feature included in this template is the use of the function TARGD. This calculates the target price, or buying price, necessary to achieve your desired percentage profit. In this case, a percentage profit of 12% (cell I6) is asked for. The target price in cell I8 is $49.68.

Admittedly it has been a while since Johnson & Johnson was this low. But the market does funny things. When you know exactly how much you are willing to pay for a stock, often you get that temporary dip that you are looking for. Setting target prices is a vital part of the investment strategies used by Warren Buffett. He said that he is willing to wait indefinitely to buy the stock he wants at the price he is willing to pay.

Level 2 templates for all the companies in the Dow Jones Industrial Average can be downloaded at http://www.sherlockinvesting.com/vsoft01s23/tps.htm

ARB Corporation

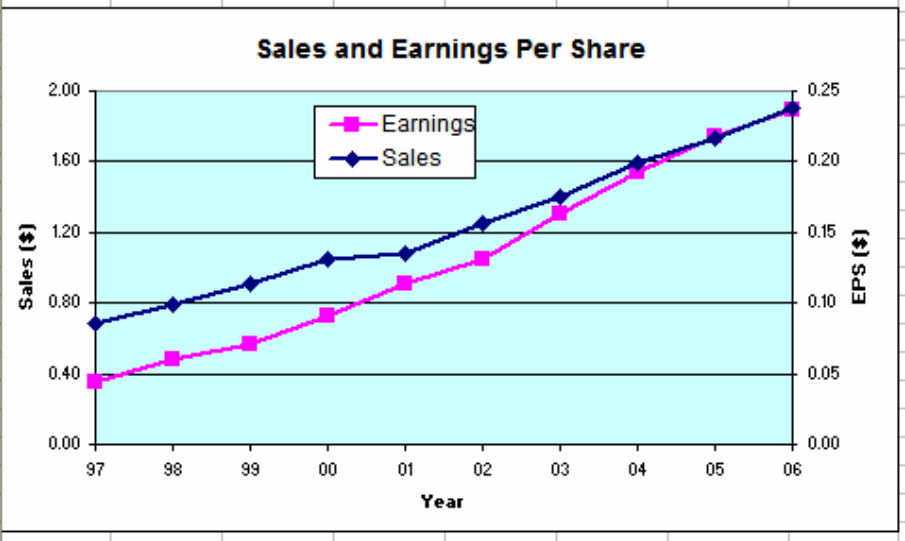
A comprehensive source of fundamental data on Australian and New Zealand companies is the Money section of www.NineMSN.com.au

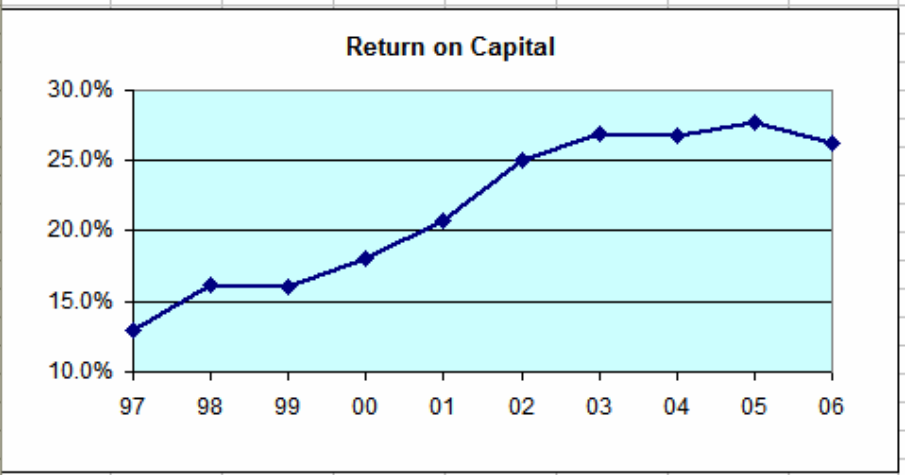
The company being analyzed is ARB Corporation, an Australian company that is a world supplier of quality equipment for four wheel drive and off-road vehicles. The following table lists the data that was used and the pages of the site where the data was found.

NineMSN Pages	Data
Main View	Current Price, Current EPS, Current P/E, Payout Ratio (Dividends/EPS). Could also enter Earnings and Dividend Forecasts for the next two years. The two-year forecasts for the percentage growth could be used as a guide for the growth forecasts.
Historical Financials	Sales, Cash Flow, Earnings, Dividends, Capital Spending, Book Value, Shares Outstanding, Average Annual P/E Ratio, Operating Margin, Net Profit (before abnormals), Long-Term Debt, Return on Capital

The following is a Level 2 analysis of ARB Corporation:

	A	B	C	D	E	F	G	H	I
1	ARB Corporation		ASX		ARP		30-May-07		
2		Year	Sales	EPS	ROC	P/E		Price	$4.60
3		Jun-97	0.68	0.044	12.9%	10.3	Current	P/E	19.50
4		Jun-98	0.79	0.060	16.2%	11.4		EPS	$0.24
5		Jun-99	0.91	0.071	16.1%	14.0		Payout	48.50%
6		Jun-00	1.05	0.091	18.1%	12.6	Return	Req'd	12.0%
7		Jun-01	1.08	0.114	20.7%	13.7		Est'd	7.0%
8		Jun-02	1.25	0.131	25.0%	17.2	Target Price		$3.67
9		Jun-03	1.40	0.163	26.9%	15.6			
10		Jun-04	1.59	0.192	26.8%	17.7		P/E	14.59
11		Jun-05	1.73	0.218	27.7%	16.8	Proj'd	EPS Gr.	10.5%
12		Jun-06	1.90	0.237	26.2%	12.9		Payout	37.0%
13	STAEGR	5-yr	99%	97%		Data		Years	5
14		10-yr	98%	94%		Estimates		Tav Div	0.0%
15	Growth	5-yr	11.1%	15.9%		Calcs		Tax Cap	0.0%
16		10-yr	11.9%	20.7%					
17									
18	Warning:	Forecasts in Cells I10-I12 are for illustration only.							
19		Use estimates based on your own reading and analysis.							





Template Addresses

The following is a list of sites containing descriptions of templates with Valuesoft functions
http://www.sherlockinvesting.com/valuesoft/tp1.htm
http://www.sherlockinvesting.com/valuesoft/tp1oz.htm
http://www.sherlockinvesting.com/valuesoft/tp2.htm
http://www.sherlockinvesting.com/valuesoft/tp2oz.htm

The following page contains a list of templates of the companies making up companies in the Dow Jones Industrial Average:
http://www.sherlockinvesting.com/vsoft01s23/tps.htm
These templates will be updated at regular intervals and will be available for one year from the date of purchase of Valuesoft.

Section 7 Valuesoft Investment Functions

The functions in this section provide the basic tools for deciding whether to buy a particular stock or not. Functions such as GIVF and PRESVAL directly estimate the value of a company. Others such as PAYBACK and PEG give indirect methods for valuing a company.

Another function STRET estimates the return from holding a stock over a specified period. Its partner TARG estimates the price of stock necessary to achieve a specified return.

EGROWTH

Earnings growth: Returns an estimate of the annual rate of growth of earnings per share.

EGROWTH (Return on capital, Dividend Payout)

Variables

Return on capital	Annual earnings as a fraction of capital per share (for example, 0.20 or 20%).
Dividend payout	Fraction of the earnings per share paid out as dividends (for example, 0.25 or 25%).

Discussion

One of the most important criteria for determining the intrinsic value of a stock is the projected growth of its earnings. (Instead of earnings, cash flow or free cash flow could also be used.) If the management is doing its job, whatever earnings that are not paid out as dividends, should increase the equity by the same amount. This formula makes use of this fact and estimates the growth in earnings by knowing the return on capital and the dividend payout.

If the actual growth differs markedly from what you get from EGROWTH then it is wise to try to understand why. For example, if the actual growth is higher than that given by EGROWTH it often means that the company is improving its operating margin or net profit margin. This is usually a sign of good management. However, the prudent investor needs to ask the question as to how long the company can keep improving at this rate. Once the net profit margin remains at a constant level, then it is likely that the growth rate will be closer to that predicted by EGROWTH.

Examples

Consider Paychex with a return on capital of approximately 30 percent and a dividend payout of 31 percent. Then EGROWTH gives the value 20.7 percent. This is lower than the observed growth rate for the reason just given, namely that the company has been increasing its efficiency each year. Even though increasing efficiency is very important and will help to maintain the competitiveness of the company. It may be unwise to bank on the fact that it can keep up this increase.

ERI

Expectations Risk Index: Returns a measure of the proportion of the share price due to projected growth rate of earnings compared to historical growth rate.

ERI (P/E Ratio, Discount Rate, Hist Growth, Proj Growth)

Variables

P/E Ratio: Ratio of share price to earnings per share.
Discount Rate: Rate at which future currency is discounted to present time (eg. 0.05 or 5.00%).
Hist Growth: Historical growth rate of earnings per share (eg. 0.20 or 20%).
Proj Growth: Projected growth rate of earnings per share (eg. 0.15 or 15%).

Discussion

The Expectations Risk Index (ERI) is an index for each stock that takes into account two things:

1. How much of the stock price depends on future growth.
2. How difficult it will be to achieve that growth.

The index used in Valuesoft is based on an idea of Alfred Rappaport described in the Wall Street Journal (January 4, 1997). The Expectations Index is also discussed in (Rappaport 1998).

One estimate of the intrinsic value of a stock is the present value of all future earnings. If we assume that there is no growth in future earnings, then this equals current earnings divided by the discount rate. For example, if current earnings are $2.00 (per share) and the discount rate is 5 percent, then the present value of all future earnings is $40 (= 2.00 / 0.05). If the current stock price is $100, then the proportion of the price due to future earnings is 40 percent (= 40 / 100). This means that 60 percent of the price is due to the expected growth on earnings.

Now assume that the historical growth rate of earnings is 10 percent and that analysts are projecting the future growth rate of earnings as 15 percent. Then we form the "acceleration factor" 1.045 = (1.15 / 1.10). The ERI is defined as $62.7 = 1.045 \times 60$.

In general it is better to favor stocks with a lower ERI in preference to stocks with a higher ERI.

As usual, instead of the P/E Ratio, you could use the ratio of price to cash earnings or price to free cash flow.

ESAFETY

Earnings Forecast with a Safety Factor: Returns a forecast of earnings per share based on the historical growth rate of earnings, the historical growth rate of sales, and the stability of earnings growth using STAEGR. It also incorporates a margin of safety.

ESAFETY (Hist Growth EPS, Hist Growth SPS, STAEGR EPS)

Variables

Hist Growth EPS: Historical growth rate of earnings per share (eg. 0.20 or 20%)
Hist Growth EPS: Historical growth rate of sales per share (eg. 0.20 or 20%)
STAEGR EPS: STAEGR of earnings per share (eg. 0.80 or 80%).

Discussion

Back in 1949 Benjamin Graham, the mentor of Warren Buffett, wrote a famous book called *The Intelligent Investor*. In it Graham wrote that the three most important words in investing are "margin of safety." The ESAFETY function in Valuesoft couples with the function PESAFETY to provide an automatic margin of safety when using the return functions STRET/STRETD and the target functions TARG/TARGD.

The function ESAFETY uses the historical growth rate of earnings per share, the historical growth rate of sales per share, and the stability of earnings per share to make a conservative estimate of the future growth rate of earnings per share. As an investor, it is less important to make an accurate estimate of growth rate than it is to make an estimate about which we can be confident that the actual growth will equal or exceed it. In other words, we are looking for a worst case scenario or something close to it.

Regarding the three input variables, it is clear why historical growth rate of earnings per share is used since a simple future forecast is that it is the same as the past.

There two options for the historical growth rate of sales per share; either it exceeds the growth rate of earnings per share or it does not. If sales per share growth is lower than earnings per share growth, then this can act as a restriction on future growth of earnings. In this case we use the growth rate of sales to lower the estimate of the growth rate of earnings.

In the opposite case where the growth rate of sales exceeds the growth rate of earnings we give less importance to the sales component.

Regarding the third input, namely the stability of the growth rate of earnings, as mentioned in earlier chapters, the higher the stability, the better historical growth rates act as a forecast for future growth rates. To integrate this finding into the function ESAFETY, the lower the value of stability as measured by STAEGR, the lower we make the output from ESAFETY.

Finally, over and above the following strategies in the design of ESAFETY, we incorporate an overall margin of safety. This is in two parts: mean reversion in the downward direction and an absolute reduction.

Of course, ESAFETY is an automatic function and cannot take into account all the information you may have gathered about the company. Nor can it allow for your own risk threshold. For

these reasons it is important to use ESAFETY only as an initial guide and that, before making any decisions, you should use your own judgments or advice you may have received form professionals.

GIVF

Graham's Intrinsic Value Formula: returns the intrinsic value of a share according to a formula due to Benjamin Graham

GIVF (Earnings, Growth Rate, Discount Rate)

Variables

Earnings: Earnings per share.
Growth Rate: Historical or projected growth rate of earnings per share (for example, 0.15 or 15%).
Discount Rate Rate at which future currency is discounted to present time (for example, 0.055 or 5.5%).

Discussion

This is a function published in later editions of Security Analysis by Benjamin Graham and various co-authors. It is not clear how much Graham used this formula. *In Value Investing Made Easy* by Janet Lowe, the author quotes Warren Buffett as saying, "I never use formulas like that. I never thought Ben was at his best when he worked with formulas either." Despite this, it is does give another method for estimating the intrinsic value of a company.

Examples

Consider Gillette trading with earnings for 1998 estimated to be $1.48. Its actual growth rate over the past 5 years has averaged 16 percent. Taking a discount rate of 5.5 percent and substituting these values into the function GIVF gives an intrinsic value of $47.95.

NCAV

Net Current Asset Value: returns the ratio of the net current asset value of the share and its price.

NCAV (Current Assets, Liabilities, Num. Shares, Price)

Variables

Current Assets: Assets with a normal life of one year or less.
Liabilities: Total liabilities of the company as reported on the balance sheet.
Num. Shares: Total number of common shares outstanding.
Price: Price of a single share.

Discussion

This method for finding undervalued stocks was developed by Benjamin Graham and is discussed in detail in Section 2: Methods of Stock Valuation and Selection.

Examples

In June, 1998, balance sheet figures for National Presto showed that it had current assets of $272.08m, liabilities of $42.67m, and 7.36 million shares outstanding. Its price was $39.75 giving an NCAV of 0.78. At that time, this was the company with the highest NCAV.

Calculations for Blair are given in Section 3.

PAYBACK

Payback Period: Returns the number of years required for the sum of the discounted future earnings to equal (or cover) the price of the share.

PAYBACK (P/E Ratio, Discount Rate, Growth Rate, Reduction, Years)

Variables

P/E Ratio:	Ratio of share price to earnings per share.
Discount Rate:	Rate at which future currency is discounted to present time (eg. 0.05 or 5.00%).
Growth Rate:	Projected growth rate of earnings per share over the period specified by Years (eg 0.15 or 15%).
Reduction:	Reduction factor for Growth Rate if a more conservative rate is desired (optional: default = 1).
Years:	Number of years for the assumed Growth Rate (optional: default = 100). From the time Years onwards, the growth rate is assumed to be 0.

Discussion

If a stock costs $20.00 and its earnings per share (eps) is $2.00, then its price-earnings ratio (p/e ratio) is 10 (= 20/2). Another way of interpreting this is that if eps remains constant, then it will take 10 years for the total of the earnings to equal, or cover, the price of the stock.

This calculation fails to take into account two factors. Firstly, the value of money in the future is less than the current value of money. Secondly, earnings per share may be increasing, or decreasing, over time. In PAYBACK, these factors are included as the Discount Rate and the Growth Rate.

The Discount Rate is typically the U.S. treasury rate in the U.S.A. and the corresponding rate in other countries. The entry for Growth Rate can be obtained from analysts' estimates or by using your own methods as discussed in 2: Methods of Stock Evaluation and Selection. The final result, called the *PaybackPeriod*, is the number of years required for the earnings, discounted back to present time, to total or cover the current stock price.

Generally it is better to purchase stocks with a short payback period in favor of those with a long payback period.

The Reduction variable allows the growth rate to be reduced by a given factor. For example, Growth Rate = 20 percent and Reduction = 2 will give the same result as Growth Rate = 10 percent and Reduction = 1. The Reduction variable is for users who are importing large numbers of Growth Rates from a data source. In this case they may want to reduce all the Growth Rates by

a fixed amount to implement a more cautious view. The Reduction variable allows this to be done without changing each individual Growth Rate.

The Years variable is the upper limit for the period of the assumed Growth Rate; from this time forward the Growth Rate is assumed to be 0.

The last two variables, Reduction and Years, are optional which means that Valuesoft will perform the calculations without any values being substituted for these variables. Their default values are 1 and 100. In some cases the payback period is actually infinite. In this case, the function PAYBACK returns the 999.99 as the number of years.

A more complete discussion of the concept of payback period is given in the article "Unzipping the P/E Ratio" by J.F. Price (Price 1997). (In this article and earlier versions of Valuesoft, the payback period was referred to as the covering period and PAYBACK was called COVPER.)

Examples

Consider Paychex and suppose that its current p/e ratio is 50, and assume that its growth rate is 24 percent for the next 10 years and that it is constant after that. Using a discount rate of 8 percent and a reduction factor of 1 gives a payback period of 20.11 years.

P/E	Discount	Growth	Reduction	Years	PAYBACK
50	5.5%	19%	1	10	22.41

If the number of years is increased to 20 and the growth reduced to 18 percent, then the payback period is 18.70 years.

P/E	Discount	Growth	Reduction	Years	PAYBACK
50	5.5%	12%	1	20	23.50

PEG

P/E Growth Ratio: calculates the ratio of the P/E ratio and the historical or projected growth rate of earnings.

PEG (P/E Ratio, Growth Rate)

Variables

P/E Ratio: Ratio of share price to earnings per share.
Growth Rate: Historical or projected growth rate of earnings per share (for example, 0.15 or 15%).

Discussion

This is a useful ratio for getting a quick idea whether or not a stock is undervalued. Peter Lynch mentions it in one of his books (Lynch 1989). He writes, "In general a p/e ratio that's half the growth rate is very positive, and one that's twice the growth rate is very negative." In other words, a PEG ratio of a half is very positive while a PEG ratio of 2 is very negative. Lynch continues, "We use this measure all the time in analyzing stocks for the mutual funds."

A number of people have done extensive studies on the predictive power of this ratio. David Lipshutz (Lipshutz 1997) analyzed the top 1000 public companies by market capitalization on a month by month basis for almost 12 years from January 1986 to July 1997. Each month he divided these into 10 groups ranging from the highest PEG ratio to the lowest. He found a high correlation between the groups and their annualized returns. As an example, the group with the lowest PEG had an average annualized return of 25 percent over the period compared to an average annualized return of 5 percent for the highest group.

Examples

In August 1998, the p/e ratio for Gillette was 32 and the Value Line estimate of earnings growth over the next 3-5 years was 16.50 percent. This gives a PEG ratio of 1.94.

PEGY

P/E Growth plus Yield Ratio: calculates the ratio of the P/E ratio and sum of the historical or projected growth rate of earnings and the yield.

PEGY (P/E Ratio, Growth Rate, Dividend Yield)

Variables

P/E Ratio: Ratio of share price to earnings per share",

Growth Rate: Historical or projected growth rate of earnings per share (for example, 0.15 or 15%).

Dividend Yield Common dividends per share divided by average price of stock over previous year.

Discussion

The ratio PEGY is similar to the PEG ratio except that the Dividend Yield is included in the calculations. Stocks with a low PEGY ratio not only tend to outperform the market on average, but they also tend to be less volatile. Lipshutz continued his study (Lipshutz 1997) with a similar study for the PEGY ratio (Lipshutz 1997). Using a universe of 1000 stocks grouped into deciles according to their PEGY ratio, the group with the lowest PEGY ratio gave a return of 20.1 percent over the time of the study (approximately 12 years) compared to a return of 6.0 percent for the group with the highest PEGY ratio. Two benefits of the PEGY approach compared to the PEG approach are (1) the low PEGY decile had a dividend yield of 2.3 percent compared to 1.1 percent for the high PEGY decile, and (2) the low PEGY decile was less volatile than the low PEG decile. (As a basis, the return on the universe of stocks was 13.4 percent with a dividend yield of 2.4 percent.)

Examples

In July 1998, the p/e ratio for Gillette was 32, the dividend yield was 1.79 percent and the Value Line estimate of earnings growth over the next 3-5 years was 16.50 percent. This gives a PEGY ratio of 1.75.

PESAFETY

Forecast of PE Ratio with a Safety Factor: Returns a forecast of the PE ratio based on the current PE ratio and any historical PE ratio or average of historical PE ratios. It also incorporates a margin of safety.

PESAFETY (Current PE Ratio, Historical or Average PE Ratio)

Variables

Current PE Ratio: Current PE ratio (eg. 12)
Historical PE Ratio: Historical PE ratio or an average of historical PE ratios (eg. 14)

Discussion

As mentioned in the discussion for the PESAFETY function, in 1949 Benjamin Graham wrote that the three most important words in investing are "margin of safety." The PESAFETY function in Valuesoft couples with the function ESAFETY to provide an automatic margin of safety when using the return functions STRET/STRETD and the target functions TARG/TARGD.

The function PESAFETY uses the current PE ratio and any historical PE ratio to make a conservative estimate of future PE ratios. It is recommended that the historical PE ratio that you use is an average of past PE ratios. In the Level 2 templates it is set as the average of the average PE ratios over the past 5 years.

The estimate starts with the current PE ratio. If the historical PE ratio is lower, then the calculations use this result to lower the estimate. Finally, a mean reversion is used in the lower direction as an extra margin of safety.

As for the ESAFETY function, PESAFETY is an automatic function and cannot take into account all the information you may have gathered about the company. Nor can it allow for your own risk threshold. For these reasons it is important to use PESAFETY only as an initial guide and that, before making any decisions, you should use your own judgments or advice you may have received from professionals.

PRESVAL

Present Value: calculates the present value of the discounted future (free) cash flows per share. This is an important estimate of the intrinsic value of the share.

PRESVAL (Free Cash Flow, Discount Rate, Years(1), Growth Rate(1), Reduction, Years(2), Growth Rate(2), Years(3).

Variables

Free Cash Flow: Free cash flow per share. Although this variable is described as free cash flow, other possible inputs are earnings, cash flow, and cash earnings.
Discount Rate: Rate at which future currency is discounted to present time (for example, 0.055 or 5.5%).
Years(1): Years for which the Free Cash Flow is assumed to grow with Growth Rate(1).
Growth Rate(1): Projected growth rate of free cash flow over Years(1).

Reduction	Reduction factor for Growth Rate(1) if a more conservative rate is desired (optional: default = 1).
Years(2)	Years for Growth Rate(2) following Growth Rate(1) (optional: default = 0).
Growth Rate(2):	Projected growth rate of Free Cash Flow over Years(2) (optional: default = 0).
Years(3)	Years for no projected growth (optional: default 999).

Discussion

This is the basic function for estimating the intrinsic value of a company. Basically it is the present value of the cash that can be taken out of the company over its entire life. This general idea is discussed in Section 2: Methods of Stock Valuation and Selection.

The function PRESVAL allows for growth in three stages. The number of years for Stage 1 is entered as Years(1) and in this period the growth is entered as Growth Rate(1). The number of years for Stage 2 is entered as Years(2) and in this period the growth is entered as Growth Rate(2). From this time onwards, the growth is assumed to be 0. To allow for the case where you might be importing data directly from a database, a variable called Reduction is included. For example, if Growth Rate(1) is 20 percent and Reduction is set at 2, then the calculations are performed as if Growth Rate(1) is 10% (= 20/2).

The variables Reduction, Years(2), Growth Rate(2) and Years(3) are optional with default values of 1, 0, 0, 999. This means that if these variables are not entered, the calculations will be carried out with these default values. The default values are sequential meaning that if you give values for the variables at the start of the list, the remaining variables will still take on their default values. You cannot, however, give values for the later variables without giving values for all the earlier ones.

A difficulty with the function PRESVAL is that if Growth Rate(1) exceeds the discount rate and if Years(1) is allowed to be larger and larger, then the value returned by PRESVAL will be arbitrarily large. This problem is avoided by the use of STRET and TARG.

Examples

In July, 1998, the cash earnings of Gillette was 94c per share. An estimate of their growth rate over the next 10 years is 15 percent. Using a discount rate of 5.50 percent gives a present value of $56.05. This calculation assumes that there will be no growth in cash earnings after 10 years. If we also assume that for the next 10 years the growth rate will be 10 percent, then the function PRESVAL returns the value $105.25.

STRET

Stock Return: returns the estimated annualized percentage profit return or rate of return from owning the stock.

STRET (Stock Price, EPS, P/E Ratio, Growth Rate, Years, Investment Rate, Payout Rate, Tax Rate (Div),Tax Rate (Capital))

Variables

Stock Price:	Current price of the stock.
EPS:	Current earnings per share.
P/E Ratio:	Estimate of ratio of share price to earnings per share at end of holding period.

Growth Rate: Historical or projected growth rate of earnings per share (for example, 0.15 or 15%).
Years: Length of the period in years the stock is intended to be held.
Inv Rate: Rate at which dividends are invested (for example, 0.055 or 5.5%).
Payout Rate: Proportion of annual earnings paid as dividends (for example, 0.25 or 25%).
Tax Rate (Div): Tax rate on dividends (for example, 0.30 or 30%).
Tax Rate (Capital): Tax rate on capital gains (for example, 0.20 or 20%).

Discussion

This is a useful function that calculates the percentage profit or expected return from holding a particular stock over any specified period. The return is calculated as an average per year. This function avoids the problem associated with the use of PRESVAL of having the result being highly sensitive to the length of the time over which the growth rate is assumed to be valid. It is this function and the next one that establishes the major difference between (1) finding undervalued companies (which may or may not rise to their intrinsic value) and (2) finding companies from which you can confidently expect a specified return. For this return to be satisfactory, then almost certainly the company must be undervalued. However, the emphasis is on the return, not on the intrinsic value of the company.

It is assumed that when the dividends are received, they are taxed at the rate specified by the value of Tax Rate (Div). The remaining funds are then invested at the specified Investment Rate for the remainder of the holding period. The annual interest on this re-investment is also taxed at the dividend tax rate.

Note: As it stands the function STRET does not allow the calculations to be performed assuming that the dividends are reinvested in the stock. For calculations assuming that dividends are reinvested use the function STRETD.

It is also assumed that the stock is sold at the end of the specified holding period and that the capital gain is taxed at the rate given by Tax Rate (Capital).

Examples

The estimated return for Gillette based on earnings was carried out in Section 4. This time we will do similar calculations using earnings instead of cash earnings. When this is done, the basic figures are:

Price	EPS	P/E	Growth	Years	Inv R.	Payout	Tax-Div	Tax-Cap
35	1.27	25	15%	10	5.5%	52%	30%	20%

Application of STRET gives an estimated after-tax return of 13.31 percent

For the years before 1995, the p/e ratio of Gillette was of the order of 20-22. After that time it leapt to the 30-40 range. If you replace the p/e of 25 with a p/e of 35 in the preceding calculations, STRET gives an after-tax return of 16.64 percent. On the down side, profits from Gillette have dropped over the past year and there is uncertainty whether they can turn this around. So a forecasted growth rate of 15 percent may be unrealistic.

STRETD

Stock Return: returns the estimated annualized percentage profit return or rate of return from owning the stock assuming that dividends are reinvested.

STRETD (Stock Price, EPS, P/E Ratio, Growth Rate, Years, Payout Rate, Tax Rate (Div), Tax Rate (Capital))

Variables

Stock Price: Current price of the stock.
EPS: Current earnings per share.
P/E Ratio: Estimate of ratio of share price to earnings per share at end of holding period.
Growth Rate: Historical or projected growth rate of earnings per share (for example, 0.15 or 15%).
Years: Length of the period in years the stock is intended to be held.
Payout Rate: Proportion of annual earnings paid as dividends (for example, 0.25 or 25%).
Tax Rate (Div): Tax rate on dividends (for example, 0.30 or 30%).
Tax Rate (Capital): Tax rate on capital gains (for example, 0.20 or 20%).

Discussion

This function is similar to STRET, the only difference is that it is assumed that each time dividends are paid, they are used to purchase more stock. Many corporations provide this as a service for their stockholders. In this case they are called dividend reinvestment plans. They are often referred to as DRPs or DRIPs. These plans are popular with many investors because they are a form of compulsory investing. Also usually no brokerage or transaction fees are paid.

The function calculates the percentage profit or expected return from holding a particular stock over any specified period. The return is calculated as an average per year

It is assumed that when the dividends are received, they are taxed at the rate specified by the value of Tax Rate (Div). The remaining funds are then used to purchase more stock at the prevailing price of the stock. In practice, the full amount of the dividends is used to purchase more stock and the stockholder is required to find the money to pay the tax from separate sources. The way that the calculations are done for STRETD can be interpreted as saying that as soon as the stock is purchased using a reinvestment plan, sufficient stock is sold to cover the tax obligation.

It is also assumed that the stock is sold at the end of the specified holding period and that the capital gain is taxed at the rate given by Tax Rate (Capital).

Examples

The estimated return for Gillette based on earnings was carried out in Section 4. This time we will do similar calculations using earnings instead of cash earnings. When this is done, the basic figures are:

Price	EPS	P/E	Growth	Years	Payout	Tax-Div	Tax-Cap
35	1.27	25	15%	10	52%	30%	20%

Application of STRETD gives an estimated after-tax return of 13.64 percent

For the years before 1995, the p/e ratio of Gillette was of the order of 20-22. After that time it leapt to the 30-40 range. If you replace the p/e of 25 with a p/e of 35 in the preceding calculations, STRET gives an after-tax return of 16.64 percent. On the down side, profits from Gillette have dropped over the past year and there is uncertainty whether they can turn this around. So a forecasted growth rate of 15 percent may be unrealistic.

TARG

Target Price: returns the price of the stock necessary to achieve the required rate of return over the holding period.

TARG (Required Return, EPS, P/E Ratio, Growth Rate, Years, Investment Rate, Payout Rate, Tax Rate (Div), Tax Rate (Capital))

Variables

Required Return: Percentage annual return required before purchasing the stock (for example, 0.15 or 15%).
EPS: Current earnings per share.
P/E Ratio: Estimate of ratio of share price to earnings per share at end of holding period.
Growth Rate: Historical or projected growth rate of earnings per share (for example, 0.15 or 15%).
Years: Length of the period in years the stock is intended to be held.
Inv Rate: Rate at which investments are invested (for example, 0.055 or 5.5%).
Payout Rate: Proportion of annual earnings paid as dividends (for example, 0.25 or 25%).
Tax Rate (Div): Tax rate on dividends (for example, 0.30 or 30%).
Tax Rate (Capital): Tax rate on capital gains (for example, 0.20 or 20%).

Discussion

The function TARG takes the calculations of STRET another step and provides a target price for the stock according to your desired after-tax percentage profit or return. The desired return is entered as the average percentage per year. Once you have calculated this target price, all that is necessary is to wait until there is a drop in the price of the stock to the target price.

As for the function STRET, it is assumed that when the dividends are received, they are taxed at the rate specified by the value of Tax Rate (Div). The remaining funds are then invested at the specified Investment Rate for the remainder of the holding period. The annual interest on this re-investment is also taxed at the dividend tax rate.

Note: As it stands, the function TARG does not allow the calculations to be performed assuming that the dividends are reinvested in the stock. For calculations assuming that dividends are reinvested use the function TARGD.

It is also assumed that the stock is sold at the end of the specified holding period and that the capital gain is taxed at the rate given by Tax Rate (Capital).

Examples

Suppose you are seeking an after tax return of 15 percent from an investment in Gillette. Using this value, and the values given in the following table, in the function TARG gives a target price of $19.22.

Required Return	EPS	P/E Ratio	Earnings Growth	Years	Invest't Rate	Payout	Tax Rate Dividends	Tax Rate Capital
15.00%	0.79	27	15%	10	5.5%	33%	30%	20%

Clearly, it would need to be a very large drop in the market before Gillette would be this low. If you only seeking a return of 15 percent before taxes, then replace the two tax rates by 0. This time the target price of the stock is $23.15.

TARGD

Target Price: returns the price of the stock necessary to achieve the required rate of return over the holding period assuming that dividends are reinvested.

TARGD (Required Return, EPS, P/E Ratio, Growth Rate, Years, Payout Rate, Tax Rate (Div), Tax Rate (Capital))

Variables

Required Return: Percentage after-tax total annual return required before purchasing the stock (for example, 0.15 or 15%).
EPS: Current earnings per share.
P/E Ratio: Estimate of ratio of share price to earnings per share at end of holding period.
Growth Rate: Historical or projected growth rate of earnings per share (for example, 0.15 or 15%).
Years: Length of the period in years the stock is intended to be held.
Payout Rate: Proportion of annual earnings paid as dividends (for example, 0.25 or 25%).
Tax Rate (Div): Tax rate on dividends (for example, 0.30 or 30%).
Tax Rate (Capital): Tax rate on capital gains (for example, 0.20 or 20%).

Discussion

The function TARGD takes the calculations of STRETD another step and provides a target price for the stock according to your desired after-tax percentage profit or return. The desired return is entered as the average percentage per year.

This function also assumes that dividends are used to purchase more stock in the company. Many corporations provide this as a service for their stockholders. In this case they are called dividend reinvestment plans. They are often referred to as DRPs or DRIPs. These plans are popular with many investors because they are a form of compulsory investing. Also usually no brokerage or transaction fees are paid.

Once you have calculated this target price, all that is necessary is to wait until there is a drop in the price of the stock to the target price.

As for the function STRETD, it is assumed that when the dividends are received, they are taxed at the rate specified by the value of Tax Rate (Div). The remaining funds are then used to purchase more stock at the prevailing price of the stock.

It is also assumed that the stock is sold at the end of the specified holding period and that the capital gain is taxed at the rate given by Tax Rate (Capital).

Examples

Suppose you are seeking an after tax return of 15 percent from an investment in Gillette assuming that dividends are reinvested in the company. Using this value, and the values given in the following table, function TARGD gives a target price of $19.55.

Required Return	EPS	P/E Ratio	Earnings Growth	Years	Payout	Tax Rate Dividends	Tax Rate Capital
15.00%	0.79	27	15%	10	33%	30%	20%

Clearly, it would need to be a very large drop in the market before Gillette would be this low. If you only seeking a return of 15 percent before taxes, then replace the two tax rates by 0. This time the target price of the stock is $24.09.

Section 8 Valuesoft Earnings Functions

The functions in this section support the functions in the previous section. In the previous section the functions needed fundamental data to arrive at various types of evaluations. In this section, although the variables are expressed as earnings or earnings per share, the functions are really just mathematical functions for describing different features of a sequence of numbers.

EFORECAST, for example, is a function that calculates a best-fit exponential curve to any sequence of data and then returns the value of the curve at any desired point. STAEGR is a function that measures the smoothness of the growth of a sequence of numbers.

In practice, however, the functions in this section are used in a setting which requires that their inputs are historical earnings or historical earnings per share of a company.

Reminder: We remind the user that to keep the explanation as simple as possible, usually only the term 'earnings' is used. Depending on the context and your experience, it can be interpreted as earnings, owner earnings, free cash flow or cash earnings.

CAGR

Compound Annual Growth Rate: Returns the Compound Annual Growth Rate based on the growth rates for individual years

CAGR(Rates of Growth)

Variables

Rates of Growth: Annual rates of growth: must be entered as a row range (eg. B4:B8) or column range (eg. C3:F3)

Discussion

This function combines the annual rates of return over consecutive years to give the overall annualized rate of return. It is equal to the compounded rate of return that is equivalent to an investment with the individual rates of return. The result is close to taking a simple average of the individual rates. The small difference is due to the fact that compound interest is used.

Examples

An investment of $100 for one year at 10 percent and then a second year at 20 percent means that at the end of two years the investment is worth $132. This is equivalent to a return of 14.89 percent compounded over two years. In contrast, the average of 10 percent and 20 percent is 15 percent. The function CAGR returns the value 14.89 percent.

As another example, consider the following data describing the annual growth of earnings per share for Paychex.

90	91	92	93	94	95	96	97	98
0.00%	0.00%	50.00%	50.00%	33.33%	41.67%	35.29%	34.78%	35.48%

The function CAGR returns the value 29.86 percent as the compound annual growth rate. In contrast, the average of the growth rates is 31.17 percent.

EFORECAST

Earnings Forecast: returns a forecast based on the best-fit to historical earnings

EFORECAST(Earnings data, Position)

Variables

Earnings data: Annual earnings per share: must be entered as a row range (eg. B4:B8) or column range (eg. C3:F3)

Position: Position for the required best fit: 0 current year, -1 prev year, 1 next year, etc (optional: default 0)

Discussion

This function is based on the calculation of an exponential curve that is the best-fit to the given data. Special adjustments are made for negative earnings, for extreme outliers and for earnings near zero. The value returned by EFORECAST is the value of the fitted exponential curve at the specified position.

Examples

The earnings per share data for Paychex for the past ten years is

89	90	91	92	93	94	95	96	97	98
0.04	0.04	0.04	0.06	0.09	0.12	0.17	0.23	0.31	0.42

Running EFORECAST on this data and setting the Position variable as 1 leads to an earnings figure of 0.54 for 1999.

EFORECAST can also be used to construct the exponential curve that is the best fit to given data. For the preceding data, the best fit is given in the following table:

89	90	91	92	93	94	95	96	97	98
0.04	0.04	0.04	0.06	0.09	0.12	0.17	0.23	0.31	0.42
0.0288	0.0386	0.0517	0.0692	0.0927	0.1242	0.1663	0.2227	0.2983	0.3995

HGROWTH

Historical earnings growth: returns the annualized growth rate of a sequence of data.

HGROWTH(Earnings data)

Variables

Earnings data: historical earnings per share; must be entered as a row range (eg. B4:B8) or column range (eg. C3:F3)

Discussion

HGROWTH is a measure of the annualized growth rate of a sequence of historical data such as sales per share or earnings per share. For example, the HGROWTH of the earnings per share figures

1.0, 1.1, 1.2, 1.4, 1.6

is 12.56 percent. This means that on average the earnings per share are growing by 12.56 percent each year.

In contrast to the conventional method of calculating average growth rate, all the numbers in the sequence are included in the calculation. For example, if we drop the second number in the sequence from 1.1 to 0.9 to get the sequence

1.0, 0.9, 1.2, 1.4, 1.6

then the HGROWTH becomes 14.87 percent. The higher figure is because the numbers are growing from a lower base. However, if we use the standard method for calculating growth there would be no difference between the growth for the two sequences.

For more details, see the technical note below.

You can remember the name by thinking Historical GROWTH.

Examples

The earnings per share data for Paychex for the past ten years is

89	90	91	92	93	94	95	96	97	98
0.04	0.04	0.04	0.06	0.09	0.12	0.17	0.23	0.31	0.42

Running HGROWTH on this data gives an annualized growth rate of 33.9 percent.

Technical Note

If you have a sequence of numbers: $x_0, x_1, x_2, \ldots, x_n$, the usual definition of the average growth is

$$Growth = \left(x_n / x_0\right)^{1/n} - 1.$$

There are three main weaknesses of this definition

1) The calculation only depends on the first and last numbers. For example, the same growth is given for both sequences

   1.0, 1.1, 1.2, 1.4, 1.6

   1.0, 0.9, 1.2, 1.4, 1.6.

   In both cases the growth is (1.6/1.0)1/4 – 1 = 12.47%. It does not take into account the other numbers in the sequence.
2) The calculation cannot be applied when the first or last number is zero or negative.
3) When the first (or last number) number is near 0, very exaggerated results may occur. For example, the standard calculation for the growth rate of the sequence

   0.01, 0.10, 0.10, 0.10, 0.10

   is 77.8%. Yet a change in the first number by 1 cent to $0.02 causes the growth rate to drop to 49.5%. (A change by 1 cent in the opposite direction even makes the growth rate impossible to calculate.)

The calculation for HGROWTH overcomes these three weaknesses. It is calculated by finding an exponential curve that is the best-fit to the given data. Special adjustments are made for negative data, for extreme outliers and for earnings near zero. The rate returned by HGROWTH is the annualized growth curve of this curve.

STAEGR

STAEGR: returns the stability of the growth in earnings

STAEGR(Earnings data)

Variables

Earnings data: historical earnings per share; must be entered as a row range (eg. B4:B8) or column range (eg. C3:F3)

Discussion

The function STAEGR™ measures of the stability of the growth of historical data from year to year expressed as a percentage. This data can be any sequence of numbers ranging from earnings per share to total revenue. It is designed, however, to measure the stability of basic earnings and cash earnings per share. The maximum figure of 100 percent represents earnings that go up or down by the same percentage each year.

The calculations are based on fitting an exponential curve to the historical data with more emphasis placed on the stability of the growth of recent earnings. Special adjustments are made

for negative earnings, for extreme outliers, and for earnings near zero. The calculations also require that there is at least three years with positive earnings.

Companies with a STAEGR above 90 percent for the past ten years are worth studying more closely. Studies show that the for these companies the annualized growth rate of earnings for the past ten years is statistically likely to continue for the next year. See the earlier discussion on STAEGR.

Examples

The earnings per share data for Paychex for the past ten years is

89	90	91	92	93	94	95	96	97	98
0.04	0.04	0.04	0.06	0.09	0.12	0.17	0.23	0.31	0.42

Running STAEGR on this data returns the value 91.1 percent.

SURPNEG

Negative Earnings Surprise: returns the earnings that are farthest below the predicted (best-fit) earnings as a percentage

SURPNEG(Earnings data)

Variables

Earnings data: historical earnings per share; must be entered as a row range (eg. B4:B8) or column range (eg. C3:F3)

Discussion

Calculations for this function are based on fitting an exponential curve to the historical data with more emphasis placed on the stability of the growth of recent earnings. Special adjustments are made for negative earnings, for extreme outliers, and for earnings near zero.

Actual data points below the best-fit curve are located and the ratios between these earnings and the fitted earnings are calculated. The function returns the most negative of these ratios.

Examples

The earnings per share data for Paychex for the past six years is

93	94	95	96	97	98
0.09	0.12	0.17	0.23	0.31	0.42

Running SURPNEG on this data returns the value –2.0 percent. Compared to most company data, this is a small percentage.

When the data covers a large range from near 0 to much larger values, SURPNEG may return a large negative value. This is because although the absolute deviation between the actual data and the best-fit curve may be small, for the data near 0 the percentage error may be quite large.

Remark

The way that an earnings surprise is defined in this function is not the way that they are usually defined. The common usage is that an earnings surprise is when the actual earnings differ from the consensus forecast of the analysts or a group of analysts.

SURPPOS

Positive Earnings Surprise: returns the earnings that are farthest above the predicted (best-fit) earnings as a percentage

SURPPOS(Earnings data)

Variables

Earnings data: historical earnings per share; must be entered as a row range (eg. B4:B8) or column range (eg. C3:F3)

Discussion

Calculations for this function are based on fitting an exponential curve to the historical data with more emphasis placed on the stability of the growth of recent earnings. Special adjustments are made for negative earnings, for extreme outliers, and for earnings near zero.

Actual data points below the best-fit curve are located and the ratios between these earnings and the fitted earnings are calculated. The function returns the most positive of these ratios.

Examples

The earnings per share data for Paychex for the past six years is

93	94	95	96	97	98
0.09	0.12	0.17	0.23	0.31	0.42

Running SURPPOS on this data returns the value 1.8 percent. Compared to most company data, this is a small percentage.

When the data covers a large range from near 0 to much larger values, SURPPOS may return a large negative value. This is because although the absolute deviation between the actual data and the best-fit curve may be small, for the data near 0 the percentage error may be quite large.

Remark

The way that an earnings surprise is defined in this function is not the way that they are usually defined. The common usage is that an earnings surprise is when the actual earnings differ from the consensus forecast of the analysts or a group of analysts.

Section 9 Valuesoft Option Functions

The functions in this section all involve calculations of the value of options. Apart from their value, the next most important calculations for options are their 'sensitivities'. These are measures of how much the value of an option changes when there are small movements in any of the financial parameters upon which the value depends. They are also referred to as the option 'Greeks' because they are commonly named after certain Greek letters.

Also, because of its importance as a variable needed for the option calculations, the function VOLATILITY is included to be able to calculate volatility of the prices of any asset.

EURO

European option: returns the value of a call or put European option or any of its "Greek Letters" or elasticity, depending on the final parameter, as calculated by the Black and Scholes formula.

Euro (Put_Call, Spot, Strike, Time, Rate, Yield, Vol, Signal)

Variables

Put_Call	Enter p for a Put option or c for a call European option.
Spot	Spot price of the underlying asset. As usual, the asset may not be a true asset (such as stock) but could be a ratio (such as a foreign exchange ratio) or a stock index (such as the Dow Jones Industrial index).
Strike	Strike or exercise price of the underlying asset.
Time	Time or duration of the option in years. The easiest way to enter time is to use Excel to subtract the option date from the exercise date and to divide the result by 365.
Rate	Risk-free interest rate (for example, 0.055 or 5.5%). It is usually the rate of the U.S. Treasury instrument with the same expiration data. It is assumed that interest is continuously compounded.
Yield	Yield corresponding to the asset (for example, 0.035 or 3.5%). In the case of an option on an exchange rate, it is the continuously compounded interest rate of the foreign currency and in the case of a stock index, it is the continuously compounded average dividend rate of the stocks. It is also referred to as the external force of discount.
Vol	Volatility of the underlying asset price (for example, 0.25 or 25%).
Signal	Indicator for price or a particular Greek letter (optional: default v, value). The parameters are

Value	Delta	Gamma	Rho	Phi	Kappa	Theta	Fwd Theta	Elasticity
v	d	g	r	f	k	t	w	e

Value The value of the option is calculated according to the formula derived by Fischer Black and Myron Scholes (the Black and Scholes option valuation formula) and modified by Garman and Kolhagen to allow for the inclusion of yields on the underlying asset.

For options on stocks with no dividends, the yield is set to 0, for options on currencies, it is set equal to the discount rate of the foreign currency, while for options on a stock index, it is set equal to the combined (continuous) dividend yield of the stocks making up the index.

Delta The delta of an option describes the ratio of the change in the option value compared to a change in the price of the underlying asset when the latter change is small. It measures the "sensitivity" of changes in the option price to changes in the price of the underlying asset. For example, if the delta is 0.5 and the price of the underlying asset increases by 10 cents, then the price of the option would increase by approximately 5 cents.

Mathematically the delta of an option is equal to the partial derivative of the option price with respect to the price of the underlying asset.

Gamma The gamma of an option describes the ratio of the change in the delta of the option compared to a change in the price of the underlying asset when the latter change is small. It measures the "sensitivity" of changes in the delta to changes in the price of the underlying delta. For example, if the gamma is 0.3 and the value of the underlying asset increases by $0.10, then the value of the delta would increase by approximately 0.03.

Mathematically the gamma of an option is equal to the second partial derivative of the option price with respect to the price of the underlying asset.)

Rho The rho of an option describes the ratio of the change in the option value compared to a change in the interest rate when the latter change is small. It is approximately equal to the change in the value of the option when the interest rate changes by 1 percent or 100 basis point. For example, suppose the rho is 0.50 and the interest rate increases by 10 basis points, say from 10.00% to 10.10%. Then the value of the option would grow by approximately $0.1 \times 0.5 = \$0.05$.

Mathematically the rho of an option is equal to one hundredth of the partial derivative of the option price with respect to interest rate.

Phi The phi of an option describes the ratio of the change in the option value compared to a change in the yield when the latter change is small. It is approximately equal to the change in the value of the option when the yield changes by 1 percent or 100 basis points. For example, suppose the phi is -0.50 and the yield increases by 30 basis points, say from 5.00% to 5.30%. Then the value of the option would decrease by approximately $0.3 \times 0.5 = \$0.15$.

Mathematically the phi of an option is equal to one hundredth of the partial derivative of the option price with respect to the yield.

Kappa or **Vega** The kappa or vega of an option describes the ratio of the change in the option value compared to a change in the volatility when the latter change is small. It is approximately equal to the change in the value of the option when the volatility changes by 1 percent or 100 basis point. For example, suppose the kappa is 0.30 and the yield increases by 10 basis points, say from 25.00% to 25.10%. Then the value of the option would increase by approximately $0.3 \times 0.1 = \$0.03$.

Mathematically the kappa of an option is equal to one hundredth of the partial derivative of the option price with respect to volatility.

Theta The theta of an option describes the ratio of the decrease in the option value compared to a change in the time to expiration of the option when the latter change is small. It is approximately equal to the decrease in the value of the option over one business day assuming 252 business days in the year. For example, suppose the theta is 0.20 and the option has 85 days to expiration. After 2 business days, the option would decrease in value by approximately $0.2 \times 2 = \$0.40$.

If you want to calculate the drop in value over an actual day, multiply by 252/365.

Mathematically the theta of an option is equal to 1/252 of the partial derivative of the option price with respect to the time to duration.

Forward Theta The forward theta of an option describes the ratio of the decrease in the option value compared to a change in the time to expiration of the option when the latter change is small assuming that the underlying asset is a forward. This is the same as assuming that the underlying asset moves according to the model for forwards. It is approximately equal to the decrease in the value of the option over one business day assuming the asset is a forward and that there are 252 business days in the year.

If you want to calculate the drop in value over an actual day, multiply by 252/365.

Mathematically the theta of an option is equal to 1/252 of the partial derivative of the option price with respect to the time to duration assuming that the asset moves according to the model for forwards.

Elasticity The elasticity of an option describes the ratio of the return on the value of an option compared to the return on the underlying asset assuming that there is a small change in the price of the underlying asset. It is the ratio of the potential return on the option compared to the potential return on the asset. The fact that it is almost always much larger than 1 explains why options are highly leveraged instruments.

As an example, suppose that the value of the elasticity is 12. If the price of the underlying asset increases by 1%, then the value of the option will increase by 12%.

Mathematically the elasticity of an option is equal to its delta multiplied by the price of the asset and divided by the value of the option.

Discussion

Generally options are highly leveraged financial instruments meaning that small movements in the underlying assets usually translate into large movements in the value of the option contract. For this reason, when looking for long-term value in the market place, options are generally not appropriate. However, if your analysis makes you extremely confident of a particular stock going up (or down) within a specified time, then you may be able to take advantage of your analysis by using futures or options.

There is another area where large numbers of options are being used and that is in compensation for the management and employees of many companies. Because of accounting procedures, the effect of these options is not fully reflected as an expense against earnings. For more details, see

the two articles Options as Management Compensation: The Hidden Effect on Earnings (Part I and Part II) on the web site: http://www.sherlockinvesting.com/articles.htm.

Many people believe that this method of compensation is going to have a substantial effect on stock prices in the years to come. To help understand this effect, it will be necessary to have a better understanding of options. The functions EURO and EUROF are included in Valuesoft to help this process by providing tools to measure the effect of this type of compensation.

Examples

Suppose we have a European option with the following parameters:

Spot	Strike	Today's Date	Exercise Date	Rate	Yield	Volatility
125	120	8 May 98	4 Jan 99	8.5%	5.0%	20%

The function EURO gives the results:

Signal	Symbol	Call	Put
Value	v	11.9132	4.4232
Delta	d	0.6603	-0.3072
Gamma	g	0.0170	0.0170
Rho	r	0.4663	-0.2828
Phi	f	-0.5450	0.2536
Kappa	k	0.0285	0.0142
Theta	t	0.0170	0.0196
Theta fwd	w	0.3503	0.3503
Elasticity	e	6.9284	-8.6816

EUROF

European futures option: returns the value of a call or put European option on a futures contract or any of its "Greek Letters" or elasticity, depending on the final parameter, as calculated by the Black and Scholes formula.

EUROF (Put_Call, Spot, Strike, Time, Rate, Vol, Signal)

Variables

Put_Call	Enter p for a put option or c for a call European option.
Futures	Price of the underlying futures contract.
Strike	Strike or exercise price of the underlying asset.
Time	Time or duration of the option in years.
Rate	Risk-free interest rate (for example, 0.055 or 5.5%). It is usually the rate of the U.S. Treasury instrument with the same expiration data. It is assumed that interest is continuously compounded.
Vol	Volatility of the underlying asset price (for example, 0.25 or 25%.
Signal	Indicator for value or a particular Greek letter (optional: default v, value). The parameters are

Value	Delta	Gamma	Rho	Kappa	Theta	Fwd Theta	Elasticity
v	d	g	r	k	t	w	e

For the definitions see the descriptions for the function EURO.

Discussion

The function EUROF for valuing and analyzing options on futures contracts is Fischer Black's modification of the Black and Schole function EURO.

Examples

Suppose we have a European futures option with the parameters:

Futures	Strike	Today's Date	Exercise Date	Rate	Volatility
125	120	8 May 98	4 Jan 99	8.5%	20%

The function EUROF gives the results:

Signal	Symbol	Call	Put
Value	v	10.0988	5.3717
Delta	d	0.5958	-0.3496
Gamma	g	0.0176	0.0176
Rho	r	-0.0667	-0.0355
Kappa	k	0.3625	0.3625
Theta	t	0.0184	0.0200
Theta fwd	w	0.0184	0.0200
Elasticity	e	7.3750	-8.1351

VOLATILITY

Volatility: returns the annualized volatility of the data.

VOLATILITY (frequency, data)

Variables

Frequency — Number of data points in a full year (eg. 251 for daily data).
Data — Actual asset values: must be entered as a row range (eg. B4:B8) or column range (eg. C3:F3)

Discussion

The input into the Black and Scholes option formulas that needs the most care is volatility. Roughly speaking, volatility is a measure of the variability of the asset price. The function VOLATILITY calculates the volatility of historical data where the data can be assumed to be daily, weekly, or any other regular period.

Examples

In the example spreadsheet, daily data for the NASDAQ 100 is given for 1998. The index ranges from 1008.23 on January 2 to 1836.01 on December 31. Since the data is only given for trading days, we set the frequency variable at 252. (This number varies slightly for each year depending on the distribution of holidays. The numbers 250, 251 or 252 are used by different analysts. It makes very little difference to the final calculations.)

Using the VOLATILITY function, the annualized volatility is 0.3258 or 32.58 percent.

By pulling out the weekly data, we can also calculate the volatility based on weekly data. This time the frequency input is 52. The annualized volatility is 27.47 percent.

Different sampling frequencies If the assumptions for the Black and Scholes model were valid, then the expected values of the annualized volatilities would be the same no matter how frequently the data was sampled. The explanation for this is beyond the scope of this manual.

In the example spreadsheet, the same NASDAQ data is further sampled in different ways.

Appendix A Introduction to Excel Functions

You can start using the Valuesoft functions with a minimum understanding of how to implement functions in Excel. However, it is recommended that you at least become familiar with Excel to the level outlined below. In general, the more you understand Excel, the more benefit you will derive from using Valuesoft.

There are many excellent books for learning Excel. Unless you are already familiar with Excel, it is not a bad idea to have an Excel book on hand to use as a reference. The topics covered below are intended as a pointer to the most relevant areas.

Functions and function arguments

A function in Excel consists of a built-in formula and a program to perform a calculation according to that formula. They usually require arguments and always return a result. Excel provides hundreds of built-in functions for performing all sorts of tasks from simple numerical calculations to sophisticated financial calculations.

When you type the name of a function into a cell it must be preceded by an equal sign. This tells Excel that it is a formula to be calculated and not just some text.

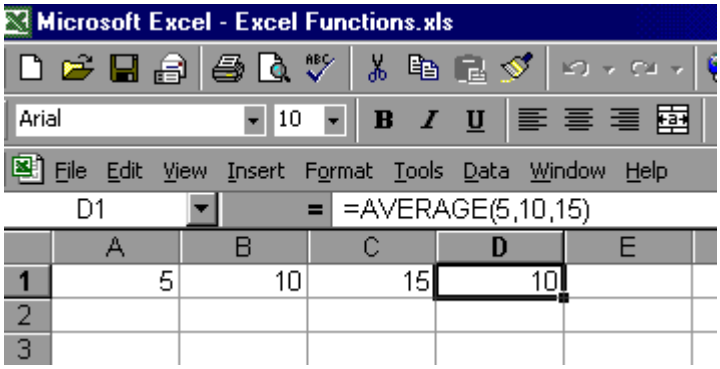
There are five ways that a function can be implemented in Excel. We illustrate each of the ways by finding the average of three numbers: 5, 10 and 15.

Method 1: Hard-Coded Arguments

Type =AVERAGE(5,10,15) in any cell followed by pressing the return key. You would get the result 10.

Notice that even though the number 10 is displayed in the cell you were using, when you put the cursor back in this cell, you see in the display box at the top of the Excel screen the information that you just typed in, namely =AVERAGE(5,10,15).

In this case we say that arguments of the function AVERAGE are 5, 10 and 15.

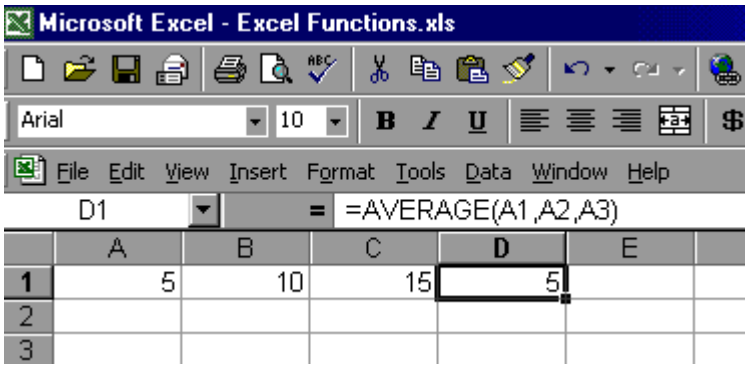


In the remaining methods, assume that the numbers 5, 10 and 15 are entered into the cells A1, A2 and A3. (There is nothing particular about these cells. They are chosen only for convenience.)

Method 2: Cell References

Enter =AVERAGE(A1,A2,A3) in another cell, say A4, and press return. This gives the result 10 in cell A4.

In this case we say that the arguments of the function AVERAGE are the cell references A1, A2 and A3.



Notice that if you change the number 10 in cell A1 to 25, the number in cell A4 immediately changes to 15 because you are now finding the average of 25, 10 and 15. This illustrates one of the great features of Excel. Once you have set up a function using cell references, whenever you change the values in these cells, the function is immediately recalculated with these new values.

Method 3: Array References

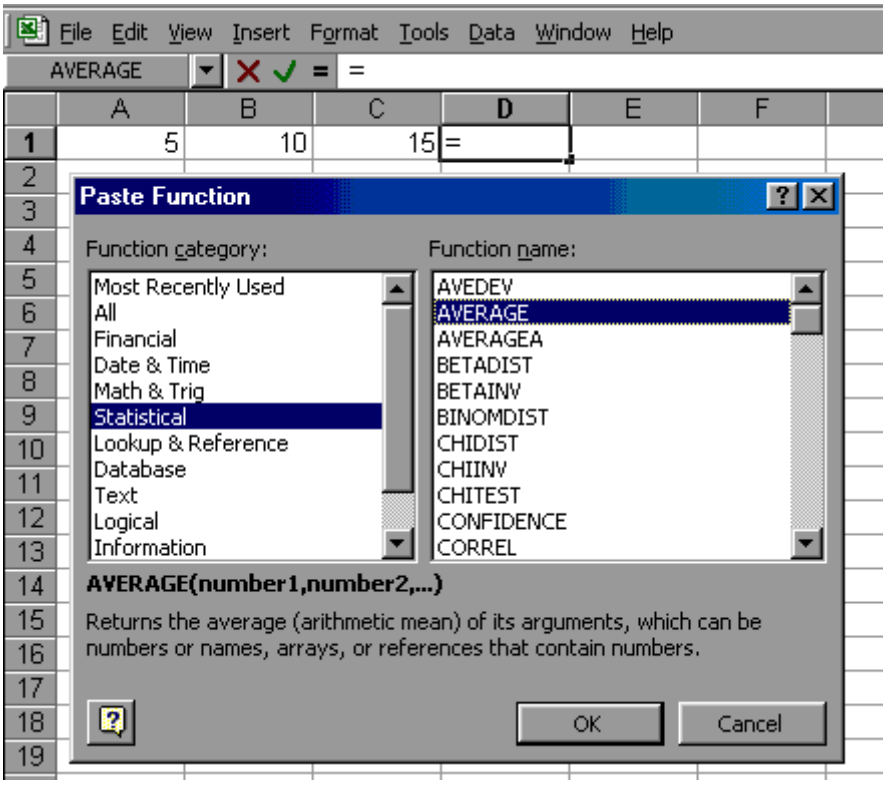
Enter =AVERAGE(A1:A3) in a cell, say A4, and press return. This gives the result 10 in cell A4.

In this case the argument is the array (A1,A2,A3). The cells must be contiguous either horizontally or vertically. Most of the functions in Valuesoft can only take their arguments as individual cells. The exceptions are the Valuesoft Earnings Functions CAGR and so on.

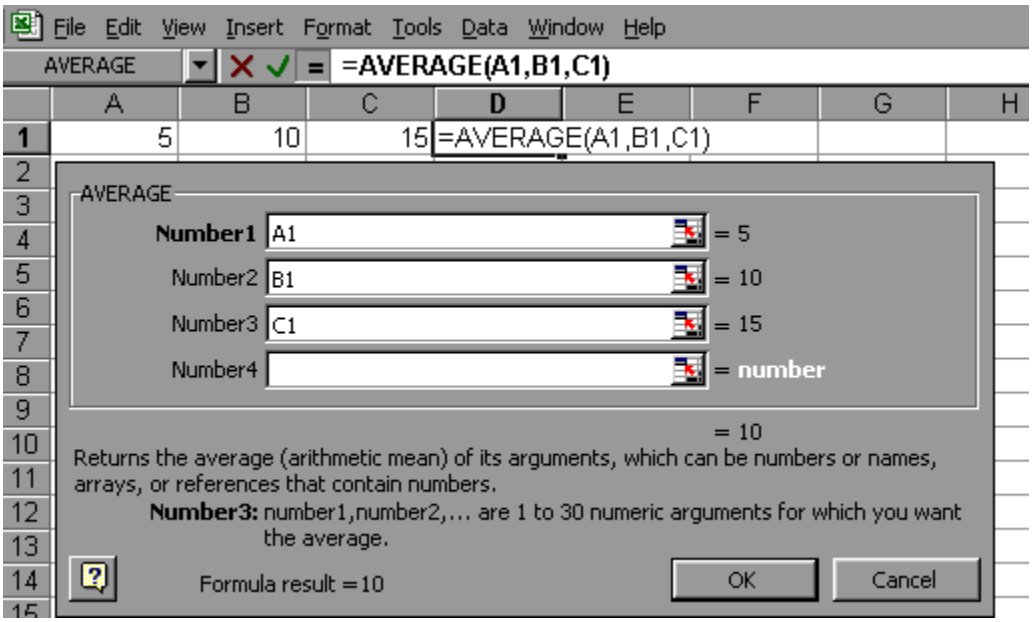
Method 4: Paste Function Dialog Box and Data Table

Use the Paste Function dialog box by using the commands Insert|Function or clicking on the function button f_x on the standard toolbar. The f_x button looks like:

Excel now displays a box called the *Paste Function Dialog Box*. This box lists all the functions grouped into categories according to type. The function AVERAGE is located in the category All and in the category Statistical.



Choose the function AVERAGE and click OK. This gives a box called the *data table* consisting of a list of data entry boxes. In each box you can enter a number (5 say) or a cell reference (A1 say). The cell reference can be typed in. A better way is to click on the cell itself. For example, if you want to enter A1 in the first data entry box, place the cursor in this box. Now place the cursor in cell A1 and click. Repeat these steps to add cell references to as many boxes as you need.



The data table box contains a brief description of the function. Also when the cursor is placed in any of the data entry cells you are given a brief description of the required argument.

For functions that can take arrays as arguments, the array can be entered by typing the array abbreviation directly into the data entry box. For example, type A1:A3 into the box. Alternatively, the array (A1,A2,A3) could be entered by dragging the cursor across the cells A1,A2,A3.

Method 5: Function Name and Data Table

Type =AVERAGE into cell A4 and click on the equal sign to the left of the cell display box at the top of the screen. This activates the formula palette described in the previous method. Now complete the palette as just described.

Types of Functions

The functions in Excel are arranged in a number of different classes or types: Financial, Date and Time, Math and Trig, and so on. The following is a brief description of the classes of functions that are most relevant to investment analysis and record keeping.

Date Functions

Calculations for stocks often involve dates. Excel has a wide range range of useful date functions. For example,

=NETWORKDAYS(A1,B1)

calculates the number of working days between the dates entered in cells A1 and B1.

Financial Functions

Excel has range of useful financial functions. One function, NPER, calculates the number of periods required to pay back a loan assuming constant payments and a constant interest rate. For example, suppose you have a loan of $50,000 for which you are charged an annual interest rate of 8.5%. You want to know how many payments of $550 per month will be required to pay off the loan. By using the function NPER with the entries

=NPER(0.085/12,-550,50000)

you get the answer 146.3 which is approximately 12 years and 2 months.

More advanced financial functions are available in the Analysis ToolPack that is supplied with Microsoft Excel. The ToolPak is loaded by going to Tools|Add-ins and checking the box next to Analysis ToolPak. (If Analysis ToolPak is not in the list, you may have to run the Excel setup program to install it on your computer.)

Consider the function YIELD used to calculate the yield or percentage return on purchasing a bond. Suppose on 15 May 2001 you have the opportunity to purchase a bond with face value $100 for $97.50. The bond has an annual coupon rate of 5.5% paid quarterly and it matures on 15 May 2021. The entry

=YIELD("15/5/2001","15/5/2021",0.055,97.5,100,4)

shows that the yield on this bond is 5.71%.

Logical Functions

Excel contains many logical functions. For example,

=IF(AVERAGE(A1:C1)>=10,10,AVERAGE(A1:C1))

returns the average of the entries in A1,B1,C1 if the average does not exceed 10. Otherwise it returns 10.

Data Entry

An extremely useful feature of Excel is the way that a variety of data can be entered by "filling" rather than typing it into each cell. We give two examples.

Examples

(1) Suppose you want to give the headings 1995, 1996, and so on to the columns A, B, … Instead of typing in each year, you can use the "Fill Right" command.

Start by entering 1995 in cell A1 and =A1+1 in cell B1. This gives 1995 in cell A1 and 1996 in cell A2. We want to repeat the "+1" calculation consecutively across the columns. This is done by selecting the cells B1 across to K1 followed by the Excel commands Edit|Fill|Right. The result is 1995 through to 2005 in the cells A1 to K1.

Notice that if you change the entry 1995 in cell A1 to 1996, all the entries across the page are automatically increased by 1 year.

(2) Suppose that you want a column with the first date of each month starting with March 1, 2005 through to July 1, 2005. Also suppose that next to these dates you want to record the number of days since the start of the year including the starting day and the ending day.

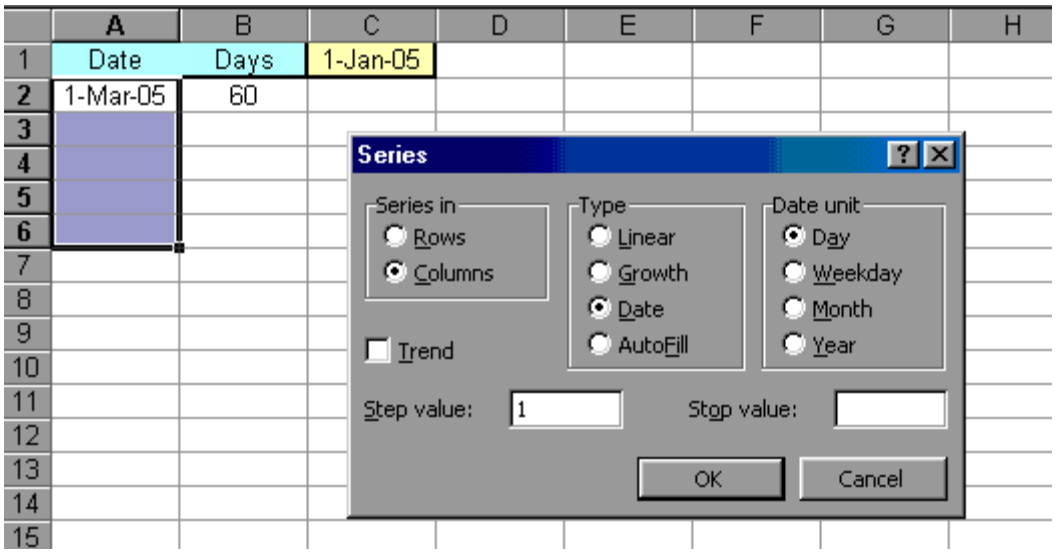
Start by entering the data as shown:

	A	B	C	D
1	Date	Days	1-Jan-05	
2	1-Mar-05			

You may need to format the cells A2 and C2 to display dates by using the commands Format|Cells|Number|Dates.

In cell B1 type =A2 – C$1 + 1. (The "$" sign is there to stop the data in cell C1 from updating when we fill in the rest of the data.) This will give you 60 in B2. (Again you may have to format the cell B2. To do this, after Format|Cells|Number|Number select the option with 0 decimal places.)

Now place the cursor in cell A2 and move down to select cells A2 through to A6. Go to Edit|Fill|Series… You should have the following display:



Select the Date unit Weekday and click OK. This will give you the dates 1-Mar-05 through to 1-Jul-05 in column 1.

The next step is to complete the cells B3 to B6. Again this can be done in one step. Select B2 and fill down to B6. Now go to Edit|Fill|Down. This will give you the required entries as shown in the next figure:

	A	B	C	D
1	Date	Days	1-Jan-05	
2	1-Mar-05	60		
3	1-Apr-05	91		
4	1-May-05	121		
5	1-Jun-05	152		
6	1-Jul-05	182		
7				

If you wish to have the number of days from a different date, simply change the date in cell C1.

Glossary of Terms

This is a glossary of the main terms used in investing with particular emphasis on those most relevant to the Valuesoft Investment System. For a much more complete list see http://www.investorwords.com.

American option An option that can be exercised at any time from the date of purchase until the expiration date.

Amortization A systematic, gradual reduction of the value of intangible assets over a given period of time. It is also used to describe the periodic repayment of debt, particularly when it is long-term.

Arbitrage A trading strategy that makes a riskless profit from a zero investment.

Ask price, Asking price The price at which an asset can be bought.

Asset Something of value that is owned by or owed to the company.

At-the-money An option on an asset with the strike of the option equal to the value of the asset.

Balance sheet A financial statement containing the three basic elements of a company: assets, liabilities and stockholders' equity. These three elements must 'balance' according to the formula: Equity = Assets – Liabilities.

Barrier option A path-dependent option with a payoff that depends upon whether a specified barrier has been crossed. Examples are down-and-out options, down-and-in option, up-and-out options and up-and-in options.

Basic earnings per share The earnings of a company (quarterly, semi-annually or annually) divided by the number of shares outstanding not taking into account options or warrants issued by the company. See diluted earnings per share.

Basis The difference between the futures price and the spot price of an asset.

Basis points See Points.

Beta A measure of the riskiness of a stock in terms of the variability of a stock price with respect to the variability of the market as a whole. Using this measure of risk, assets with a beta exceeding 1 are riskier than average. Assets with a beta below 1 are considered safer than average. See the Capital Asset Pricing Model.

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Bid price The price at which an asset can be sold.

Bid-ask spread The difference between the ask price and the bid price.

Book value This term usually refers to the stockholders' equity of a company, particularly on a per share basis. This is an accounting measure of value and the actual value may be quite different.

Call option An option to buy an underlying asset.

Capital The sum of the equity and long term debt of a company. It is sometimes referred to as invested capital or capital employed. For simplicity, capital can be measured as equity plus long-term liabilities.

Capital asset pricing model CAPM The CAPM is a general model describing the relationship between risk and return in equity markets. For such a simple model it is surprisingly accurate. Nevertheless, the simple-minded definition of risk using beta, a statistical analyses of stock prices, is at variance with the goals of long-term investing. Buffett is extremely critical of CAPM.

Capital spending Total outlay on such things as plant and equipment. It does not include funds spent on acquisitions. It could be expressed on a per share basis.

Cash This is the most liquid of the assets of a company and appears as the first line in the current assets in a company's balance sheet. It consists of money on hand and on deposit in banks.

Cash earnings The net earnings of a company plus depreciation, depletion, and amortization less the amount of capital expenditures. Other non-cash charges also need to be added back. These could arise from deferred tax assets and deferred tax liabilities. Cash earnings is similar to free cash flow but without removing any increments in working capital. Cash earnings may be stated for the entire company or on a per common share basis. See also owner earnings.

Cash earnings per share ceps The cash earnings of a company divided by the number of shares outstanding.

Cash Flow The net earnings of a company plus depreciation, depletion and amortization less preferred dividends (if any). It may be stated on for the entire company or on a per common share basis

Cost of capital See Weighted average cost of capital.

Cost of carry The cost of financing an instrument compared to the interest received. If such a cost is lower than the interest received, the cost of carry is said to be positive; otherwise it is said to be positive.

Cost of equity The rate of return that investors require to purchase common stock in a firm. It is usually calculated using the capital asset pricing model.

Cost of sales The cost of producing a company's inventory such as the cost of raw materials, labor and production overhead. For nonmanufacturing companies, it is the cost of merchandise purchased for resale.

Coupon The regular interest payment made on a bond. It could be paid quarterly, semi-annually, or annually.

Coupon bond A bond which makes coupon payments.

Current asset An asset of a company that is cash or is reasonably likely to be turned into cash within the next twelve months.

Current liability A liability of a company that is due within the next twelve months.

Current ratio The ratio of current assets to current liability.

Default risk The risk that a loss will occur if a counterparty to a transaction does not fulfill, that is, defaults on, its financial obligations.

Delivery date The date at which the underlying asset is (theoretically) exchanged for a cash payment on a forward or futures contract.

Delta The derivative of the price of an option with respect to the price of the underlying asset.

Depletion This is the equivalent of depreciation applied to the use of natural resources such as oil and gas, minerals and forests. It is the allowance in a balance sheet that these assets will eventually be used up.

Depreciation The accounting procedure that allocates the cost of a fixed asset such as plant and equipment (land is not depreciated) over its estimated useful life. It is generally included in the cost of sales item in the income statement.

Derivative A financial contract or security whose value depends on the value of an underlying asset. Examples are futures and options.

Diluted earnings per share The earnings of a company (quarterly, semi-annually or annually) divided by the number of shares outstanding plus the number of unexercised options and warrants issued by the company. See basic earnings per share.

Discontinued operations These are operations that have been or will be discontinued. They are reported separately from continuing operations in the income statement to improve the comparability of earnings from year to year.

Discount bond A zero-coupon bond.

Dividend A payment in the form of cash or stock by a company to its shareholders.

Dividend payout rate See payout rate.

Dividend yield The percentage formed by dividing the annual dividend by the market price of the stock .

Dow Jones Industrial Average (DJIA) A price-weighted average of thirty of the largest U.S. industrial companies.

Duration A measure of the average life of the cash flows of a bond.

Earnings A term used interchangeably with income and profit. No distinction is made between earnings and net earnings. It is all the revenue of a company (operating and nonoperating) less all the expenses (direct, indirect, taxes, etc) and excludes nonrecurring gains and losses. For investment purposes it is usually stated as earnings per share.

Earnings per share (eps) The net earnings (after preferred dividends, if any) per share of common stock. It usually means the sum of the earnings for the previous twelve months, called trailing earnings, although it can mean the earnings per share for a particular quarter. See also cash earnings per share.

Economic Value Added EVA This is a measure of the surplus value created by a company. It is computed as the amount of invested capital multiplied by the difference between the return on capital and the weighted average cost of capital.

EBDIT A standard abbreviation for earnings before depreciation, interest and taxes. See also EBIT and EBITDA. Warren Buffett refers to EBDIT as an abomination. He wrote that it is a sawed-off yardstick since it ignores depreciation as an expense on the theory that it does not require a current cash outlay.

EBIT A standard abbreviation for earnings before interest and taxes.

EBITDA A standard abbreviation for earnings before interest, taxes, depreciation and amortization. Warren Buffett said that EBITDA is a nonsense figure. “It is absolute folly to take any notice of it.”

Efficient markets A theory or hypothesis that the prices of assets accurately reflect the information in the market place.

Equity The general term used to describe the theoretical value of the investment that the shareholders have in a company. Also referred to as net worth. It is the difference between total assets and total liabilities. See also book value.

Eurodollars U.S. dollars deposited in banks outside the U.S.

Exchange-traded option Standardized options traded on a futures or options exchange. Commonly referred to as an ETO. See over-the-counter market.

Exercise price The price at which the underlying asset may be purchased (for a call option) or sold (for a put option) when an option is exercised.

Expectancy value A concept of intrinsic value developed by George Lasry (Lasry 1979). Expectancy value is implemented in the Valuesoft Investment System as the function EV.

Extraordinary item An entry in the income statement relating to transactions or events of a type that are outside the ordinary operations of the business, and are not of a recurring nature. Keeping them separate improves the comparability of earnings from year to year.

Expiration date The maturity date of a derivative contract.

Face value The principal payment on a bond at maturity.

Financial Accounting Standards Board (FASB) The FASB is the primary organization for the development of generally accepted accounting principles.

First in, first out (FIFO) A common method of valuing inventory as the cost of the goods purchased or produced earliest and still in inventory. In an inflationary environment it tends to maximize earnings since it understates current production costs. See LIFO.

Fixed assets See property, plant and equipment.

Forward contract A financial contract that requires the owner to purchase some underlying asset for a specified price at a fixed future date (the delivery date). No payments in either direction are made until the delivery date.

Free cash flow The net earnings of a company plus depreciation, depletion, and amortization less the amount of capital expenditures. Other non-cash charges also need to be added back. These could arise from deferred tax assets and deferred tax liabilities. Increments in working capital should be removed. Free cash flow may be stated for the entire company or on a per common share basis.. See also owner earnings.

Frictionless market An assumption that the market has no transaction costs and no trading restrictions.

Futures contract A marked-to-market financial contract requiring the owner to purchase some underlying asset for a specified price at a fixed future date.

Gamma The second derivative of the price of an option with respect to the price of the underlying asset.

Generally Accepted Accounting Principles GAAP These are principles that have evolved and been developed over the years which are now agreed upon by the accounting profession in the USA.

Goodwill Goodwill is an intangible asset which arises from the when the cost of acquisition of a company exceeds the equity value of the company.

Greeks The partial derivatives of the value of an option with respect to its input parameters.

Gross margin The ratio of the gross profit and a company's sales.

Gross Profit The difference between a company's sales and its cost of sales.

Hedge A position in one asset used to remove the price risk from a position in another asset.

Implied volatility The volatility implied by the price of an option.

Income See earnings.

Index fund A mutual fund that holds stocks in the same proportion as in a major index such as the Standard and Poor 500 (S&P 500).

Index option An option written on a stock index.

Intangible assets Assets in a balance sheet for "nonphysical" items such as patents, financing costs and purchased goodwill. The value of these assets is reduced by amortization over a given period of time. Intangible assets are often byproducts of acquisitions.

In-the-money A call (put) option on an asset with the strike of the option below (above) the value of the asset.

Initial public offering (IPO) A corporation's first equity offering to the public.

Inventory A company's merchandise, raw materials, and finished and unfinished products which have not yet been sold.

Last in, first out (LIFO) A common method of valuing inventory as the cost of the item most recently purchased or produced earliest. In an inflationary environment it tends to minimize earnings since it overstates average production costs. See FIFO.

Liability A debt or obligation of the company. See current liability and long-term liability.

LIBOR London Interbank Offer Rate: the rate at which a bank is willing to lend Eurodollars.

LIFFE London International Financial Futures Exchange.

Long-term debt Borrowed funds that are due for payment after one year, usually over several years. It usually forms the main component of the long-term liabilities on the balance sheet.

Long-term liability A liability that is due after one year. See current liabilities.

Long position A position in an asset that has been purchased.

Margin The dollar amount of cash or securities used as collateral to purchase a derivative security or asset.

Mark-to-market The process to record daily changes in futures or options markets and to debit or credit the margin accounts accordingly.

Net profit margin This is the ratio of earnings divided by sales. It measures the efficiency of the company in converting sales into earnings. If net profit margin is increasing over

time, then the earnings are growing faster than sales. Conversely, if net profit margin is decreasing over time, then the earnings are growing slower than sales.

Net sales This is the value from a company's sales of goods and services. It is the gross funds from the sale of goods and services less such items as allowances, discounts and returns. Sales and net sales are usually interchangeable.

Net worth Same as equity. In some cases net worth is defined as the value of common equity plus the value of the preferred shares.

Nonrecurring An expression used to describe earnings that are unusual or one-time events.

NOPAT This is an abbreviation for the net operating profit after taxes. The 'net' here indicates that it is the operating profit after depreciation. In the calculation of EVA, the return on capital is defined as NOPAT divided by capital.

Open interest The total number of outstanding futures or options contracts.

Operating earnings A company's net sales less the cost of sales and operating expenses. Depreciation may also be subtracted. In this case, operating earnings equal EBIT.

Operating expenses See selling, general and administration SG&A expenses.

Operating margin Operating earnings as a percentage of sales or revenues.

Opportunity cost It is a measure of the sacrifice an investor must make if he or she is to forgo the liquidity and relative safety of government securities in favor of common-stock investments. See also cost of equity.

Option A financial contract that gives the right for a particular transaction at some time in the future but without any obligation.

OTC Over the counter; see over-the-counter market.

OTC derivatives Derivative securities traded in the over-the-counter market.

Out-of-the-money A call (put) option on an asset with the strike of the option above (below) the value of the asset.

Over-the-counter market Trading in assets with a commercial or investment bank not using an exchange or stock market. Commonly referred to as OTC market. See exchange-traded option.

Owner earnings A term introduced by Warren Buffett defined as the "reported earnings plus depreciation, depletion, amortization and certain other non-cash charges less the average amount of capitalized expenditures for plant and equipment that the business requires to fully maintain its long-term position and its unit volume." If the business requires additional working capital, the increment should also be subtracted. Apart from asking

for the average amount of capitalized expenditures instead of the actual amount, this definition is the same as free cash flow. See also cash earnings.

Payout rate The portion of the income of a company paid out as dividends rather than retained in the company.

Preferred stock A security similar to stock except that it gives the owner a prior claim over stockholders with regard to dividend payments and distribution of assets should the company be liquidated. Preferred stock is normally entitled to specified dividend payments.

Price to cash earnings ratio, P/CE ratio The ratio of the market price of the stock and its cash earnings per share.

Price to earnings ratio, P/E ratio The ratio of the market price of the stock and its earnings per share. The earnings are generally stated for the previous year.

Pro forma earnings per share The earnings per share of a company (quarterly, semi-annually or annually) including an estimate of the cost of the unexercised options and warrants issued by the company divided by the number of shares outstanding. The number of shares outstanding may or may not include the number of options and warrants issued by the company.

Profit See earnings.

Points This can have different meanings depending on the context. Relating to stocks, it means $1. If a stock goes up by 3 points, then the price has risen by $3 per share. Relating to interest rates, it means 1/100 of one percent. If interest rates increase by 75 basis points, then they have increased by 0.75 percent.

Property, plant and equipment The collection of assets of a permanent nature required to operate the business. They are also referred to as fixed assets. Land, buildings, plant facilities, machinery equipment, furniture are capital lease equipment are considered to be fixed assets.

Put option An option to sell an underlying asset.

Quick ratio A ratio similar to the current ratio except that the numerator is restricted to the current assets that are cash or cash equivalents and trade receivables. As for the current ratio, the denominator is current liabilities.

Retained earnings The earnings of a company that are not paid out as dividends but are 'retained' within the company as working capital or to finance fixed investment. It is also referred to as undistributed earnings or profits, accumulated profits and retained income.

Return on … There are four major ratios used to describe the return of a company: earnings divided by assets, equity, capital or sales. These would be referred to as return on assets and so on. There are another four ratios formed by replacing earnings by operating profit.

Return on capital ROC The simplest definition is the ratio of earnings to capital. In some cases it is modified by replacing earnings with earnings plus the interest on the long-term debt. In this case, comparison with return on equity determines whether the company benefited from the extra debt. If return on equity is higher than return on capital, the debt has added value to the company. If the opposite is true, the extra debt has reduced returns to shareholders. (Value Line use one-half of the earnings on long-term debt.)

Revenues Generally this term refers to the gross or total inflow of funds to the company, usually sales plus nonoperating income sources such as interest income.

Rho The derivative of the price of an option with respect to the interest rate.

Risk-free rate A ``default-free" interest rate such as the rates of U.S. treasury bonds. See default risk.

Sales See Net sales.

Selling, general and administration (SG&A) expenses A grouping of expenses in an income statement representing a company's operating expenses. They generally consist of salaries, advertising, sales commissions, marketing costs, office expenses, rents, insurance, travel and entertainment.

Stockholders' equity The equity in a company less value of preferred stock.

Short position A position in an asset that has been sold short. Also a position in which a derivative has been written.

Short sale A transaction in which a security is borrowed from a broker and sold. At a later date the security must be re-purchased and returned to the broker.

Spot price The price of some asset for immediate delivery.

STAEGR A Valuesoft function that measures of the stability of the growth of historical data from year to year expressed as a percentage. See the main documentation for more details.

Stockholders' equity The equity in a company. May also need to subtract value of preferred stock.

Strike price See exercise price.

Swap A financial contract requiring both counterparties to a series of cash payments for a specified period of time, the size and direction of the payments depending on the value of some underlying asset.

10K form Each public company in the USA is required to submit annually a 10K form to the Securities and Exchange Commission. Much of it is similar to the financial portion of the Annual Report, but with more detail.

10Q form This is the quarterly report that each public company is required to submit to the Securities and Exchange Commission.

Trailing earnings per share The total earnings per share for the previous year divided by the total number of shares outstanding. See also basic earnings per share, diluted earnings per share, and pro forma earnings per share.

Weighted average cost of capital WACC The average cost of the different components of financing a company including debt, equity and other securities used by it to fund its financial requirements. The costs are weighted according to the amounts required.

Working capital The capital required to run the daily affairs of the company and is a measure of its liquidity. It is defined as the difference between a company's current assets and current liabilities.

Yield The rate of return of a bond.

Yield curve The yield on bonds, particularly discount bonds, as a function of their maturities.

Zero coupon bond A bond that makes no coupon payment. Also referred to as discount bond.

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