

Basics of Investment

Presented By

Ye Yi

**6718 South, 2680 East
Salt Lake City, Utah 84121**

Basics of Investment





A. Introduction of Money Value Measurement -- Present Value and Future Value

Assuming that you have deposited \$1,000 into a bank CD and will receive 3% (\$30) in interest payment per year over next 10 years

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A. Introduction of Money Value Measurement -- Present Value and Future Value

Following table shows how much money you will have in this account at the end of each year:

Year 1		$= (1+0.03) \times \$1,000 = \1030.00
Year 2		$= (1+0.03)^2 \times \$1,000$
Year 3		$= (1+0.03)^3 \times \$1,000$
...
Year 10		$= (1+0.03)^{10} \times \$1,000 = \1343.92

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A. Introduction of Money Value Measurement -- Present Value and Future Value

We can generalize it into a common equation:

$$\text{🌱} = (1+r)^n \times \$1,000$$

Where: r annual interest rate
n number of years in savings
\$1,000 money you have today
🌱 money you will have n years later

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A. Introduction of Money Value Measurement -- Present Value and Future Value

Or:

$$FV = PV(1+r)^n \quad 1343.92 = 1000(1+0.03)^{10}$$

$$PV = FV/(1+r)^n \quad 1000 = 1343.92/(1+0.03)^{10}$$

Where: **r** interest rate
 n number of interest payment
 PV present value
 FV future value

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B. Introduction to Rate Concept

$$FV = PV(1+r)^n$$

$$PV = FV/(1+r)^n$$

$$r = (FV/PV)^{1/n} - 1$$

$$1343.92 = 1000(1+0.03)^{10}$$

$$1000 = 1343.92/(1+0.03)^{10}$$

$$0.03 = (1342.92/1000)^{1/n} - 1$$

Discussion of These Rates

- Inflation Rate, Interest Rate
- Rate of Return, Market Rate
- **Discount/Discount Rate**
- Cost of Capital

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B. Introduction to Rate Concept -- Continued

Discount is the vital part of many financial and investment analyses. We know the past and the present but never future. Many financial and investment decisions are based on discounting potential future payout (that is drawn from assumptions and estimates) to present value to see if PV of the payout is **significantly higher than the money that needs to be invested today**

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C. Annuity (A stream of fixed amount of payments over a period of time) & PV of an Annuity

Annuity Example

You won a lottery of \$100,000. It will be paid as \$4,000/year over 25 years (assuming the first payment starts at the end of the year).

PV of Annuity

You need money now to buy a car and your rich brother has agreed to help you, buying the ticket from you. He gives you \$70,000 cash and gets your lotto-ticket. If inflation rate is 3.5% per year over this period of time (as historical), what is the worth of this lottery, in today's cash?

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C. Annuity (A stream of fixed amount of payments over a period of time) & PV of an Annuity

From $PV = FV/(1+r)^n$, We have:

$$\begin{aligned} PV &= P_1 + P_2 + P_3 + \dots + P_{25} \\ &= 4000/(1+0.035) + 4000/(1+0.035)^2 + 4000/(1+0.035)^3 + \dots \\ &\quad + 4000/(1+0.035)^{25} \\ &= 4000[1/0.035 - 1/(0.035(1+0.035)^{25})] = 65,926.06 \end{aligned}$$

Your brother is generous on this deal

Or: $PV = A[1/r - 1/(r(1+r)^n)]$

Where: A Constant amount of the payment

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D. Consumer Applications of Annuity PV Equation (many)

$$PV = A \left[\frac{1}{r} - \frac{1}{r(1+r)^n} \right]$$

Example #1: Loan/Mortgage Payment

You want to borrow a loan of \$10,000 from a bank, and have agreed to pay back in 4 equal annual payments, if the bank charges 10% on interest rate, how much is your annual payment?

Answer:

$$A = 10,000 / 3.16987 = 3154.71$$

$$(\text{total interest paid} = 3,154.71 \times 4 - 10,000 = 2,618.84)$$

Note : for mortgage payment calculation, $r = \text{APR}/12$, $n = \text{years} \times 12$

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D. Consumer Applications of Annuity PV Equation (many)

$$PV = A[1/r - 1/(r(1+r)^n)] \quad \text{If } n \rightarrow \infty, PV = A/r$$

Example #2: PV of a Perpetual Annuity

You want to buy a building, the building produces \$20,000 per year in rental income for foreseeable future and the rate of returns on this type of investment is 10%, estimate the value of the building

Answer: $PV = 20,000/0.1 = 200,000$

What if you “know” 5% return is good enough? $PV = 400,000$

(Why individual rental properties sell faster and at higher prices than commercial ones? What if rents can grow at a given % rate?)

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D. Business Applications of Annuity PV Equation (many)

$$PV = A[1/r - 1/(r(1+r)^n)]$$

Example #3: Financial Distress in Lending Business

You and your wife own a small mortgage company with \$1,000,000 invested in mortgage lending 2 years ago at an average rate of 6% for 30-year mortgages. Economy is hot today and you would like to sell the mortgage portfolio to invest into the stock market. Today's 30 year mortgage rate is at 7%, how much you can get from your mortgage portfolio?

Answer:

$$PV = 60,000 [1/0.07 - 1/(0.07(1+0.07)^{28})] = \$728,227$$

(think about change of your home value as rate changes if no population growth)

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E. Bond and Bond Investment

How it works:

When you purchase a bond, you actually have loaned your money to the bond issuer (in multiple of \$1,000 face value), you will receive an interest payment every 6-month (twice per year) from the issuer over the life of the bond. At the end of the life (maturity), the issuer will return back to you the borrowed principal

Example: you paid \$1,000 for a 30 year 6% T- bond, you will receive \$30 interest payment in every 6-month, at the end of 30 years, you will get your \$1,000 back (face value back)

(How much is the total dividends received? \$1,800)

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E. Bond and Bond Investment

How it works:

The bond can be purchased from the beginning of the issuing, or most commonly, from the market (with remaining life), just like stocks

The dividend rate of the bond is called coupon rate, once issued, **it will never be changed** until the maturity

The coupon rate of a bond is dominated by its safety rating

Current market rate of similar bonds will have a significant impact on prices of previously issued bonds if you want to sell before maturity, resulting in a capital gain or loss

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E. Bond and Bond Investment

How it works

When you buy/sell a previously issued bond, the value (price) is calculated by:

$$PV = A[1/r - 1/(r(1+r)^n)] + F/(1+r)^n$$

Where: A semi-annual coupon interest payment
r current market rate of other similar bonds (annual/2)
n remaining numbers of payments
F face value (par value)

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E. Bond and Bond Investment

Example:

You bought a \$1,000 30 year T-bond 5 years ago with a coupon rate of 7%, today, due to the recession, Fed has lowered rate significantly and the current 30 year T-bond rate is at 4.5%, you want to sell your bond, how much it is worth?

Note: the remaining life is 25 years ($n=50$), semi-annual rate = 2.25%

$$\begin{aligned} P &= 35[1/0.0225 - 1/(0.0225(1+0.0225)^{50})] + 1000/(1+0.0225)^{50} \\ &= 1,372.93 \end{aligned}$$

* For convenience we just use 30 year rate for 25 years

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E. Bond and Bond Investment

Some Basic Knowledge of Bonds:

Corporate Bonds

- Bondholders are creditors, not owners, no voting rights
- Interests on bonds must be paid before stock dividends
- Trust indenture (deed of trust) must be filed at SEC if > \$5,000,000 offering, the indenture has protective covenants and appoint trustee
- The indenture give the trustee the right to take over the business ,or operate or sell properties

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E. Bond and Bond Investment

Common Types of Corporate Bonds

A) Secured (Backed by Assets) – Often Called Indenture

- First mortgage – backed by the first mortgage lines
- Second mortgage – second in priority
- Open end – can continue to issue the same class under the same indenture, maximum \$ amount should be specified in the indenture
- Close-end – one issue, all other additional issuing will be as 2nd, 3rd, etc
- Collateral trust bond – backed by the security deposited with the trustee, the security must be in any companies but not the issuer
- Equipment trust certificates (ETCs) – backed by equipment, widely used for airline, trucking and railroad companies

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E. Bond and Bond Investment

Common Types of Corporate Bonds

B) Unsecured (Backed by Good Faith and Credit)

- Usually called debentures
- Pays higher interest
- Often convertible
- Some are subordinated debentures with shorter term

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E. Bond and Bond Investment

Common Types of Corporate Bonds

C) Income or Adjustment

- No interest is guaranteed
- Usually issued when a company is in reorganization
- Less safe
- Income bonds are traded flat without interest

D) Guaranteed

- With a guarantor party involved such as parent company
- Guarantor pays in case of default

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E. Bond and Bond Investment

Bond Ratings:

S&P	AAA	AA	A	BBB	BB	B	CCC	CC	C	D
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Moody's	Aaa	Aa	A	Baa	Ba	B	Caa	Ca	C
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Investment grade

Junk grade



Also, there will be “+” & “-” signs after each grade such as A, A+, AA-, AA, etc

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E. Bond and Bond Investment

US Government Issues

(Federal obligations are exempt from the State and local taxes)

A) Negotiable Government Securities –Fully Guaranteed by US Government

- T-Bills (up to 1 year)
- T-Notes (2-10 Years)
- T-Bonds (10-30 Years)
- Zero-Coupon Securities

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E. Bond and Bond Investment

B) Some Government Agency Obligations – Not Guaranteed (except GNMA, but Considered Safe (tax status vary))

Federal Farm Credit Banks, Federal Home Loan Banks

Federal Home Loan Mortgage Corporation (Freddie Mac)

Federal National Mortgage Association (FNMA or Fannie Mae)

Student Loan Marketing Association

Government National Mortgage Association (GNMA or Ginnie Mae) – Only agency securities backed by the US Government

Collateralized Mortgage Obligations (CMOs)

Real Estate Mortgage Investment Conduit (REMIC)

Inter-American Development Bank

Tennessee Valley Authority (TVA) – backed by power sales and issued with Treasury authority

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E. Bond and Bond Investment

Municipal Bonds

- Issued by state, city and other local authorities
- Issued by US territories such as Puerto Rico, US possessions
- **In default, investors can sue a municipality, cannot sue the state**
- Primary hold by banks, insurance companies, etc, can be used as collaterals
- Not suitable for non-profit organizations, pension funds, and individual with low tax rates
- Interest is also paid semi-annually
- **Interest is exempted from federal tax**
- **Interest from bonds issued by US territories and possessions is triple exempt**
- Interest from bonds issued by a state and purchased by a resident of the state is triple exempted
- Capital gain is subject to taxes
- Tax exempt status of these bonds are subject to many status requirement

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F. Stocks and Stock Investment

Common Knowledge of Stocks

Stocks – Units of ownership of the company. Stock owners are shareholders of the company and have voting rights, can receive cash or stock dividends

Common Stocks -- Shareholders are at the bottom of the “Food Chain” with only residual rights when a company is in liquidation

Preferred Stocks – Better residual rights in liquidation. Cash dividends are paid quarterly at a fixed rate, and before any dividends to common shares (different capitalization method as compared with bonds)

Basics of Investment

F. Stocks and Stock Investment

Common Knowledge of Stocks

- Value Stocks – Traditional, matured industry, have limited/no revenue and earning growth, high debt, high dividends payout
- Growth Stocks -- New/young industry, have high revenue and earning growth rates before their maturity, usually little or no debt, pay “token” or no dividends
- Cyclic Stocks -- Business revenues and earnings rise and fall together with certain the cycle of global/domestic economic activities. Investors often bet them either in long or short position before next cycle starts

Basics of Investment

F. Stocks and Stock Investment

Common Practices Observed in Stocks Investment (although many)

- A. You bought a stock at low and sold it at high in 2 months, using the profit for the summer vacation, your wife/husband calls you smart.
- B. You bought a stock at low and continue to buy in next several years at relative “low” of “high”, finally cash out at either new high of high or low of new high in future. You have a good retirement.
- C. You bought a stock then the market entered into a severe correction. Your wife/husband calls you an idiot. You could not sleep at night so you sold at a loss to “reserve” the capital. Many years later, you noticed this stock is at a price of many times of, or equal to, what you bought, you then call both yourself and your wife/husband idiots

Basics of Investment

F. Stocks and Stock Investment

Assessment of A Stock's Value

In “educated or professional” way, when a stock’s price is unreasonably low, we refer it as “undervalued”. When it is unreasonably high, we call it as “overvalued”

But how do we determine a stock’s value that is needed to determine the buying/selling point?

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F. Stocks and Stock Investment

Assessment of A Stock's Value

Classic Textbook Method – Discount each and all future dividends to present value, then add them all together (remember the lottery case we discussed before?)

$$PV = \sum [D_i / (1+r_i)^i]$$

Where: D_i dividends to be received at i th year
 r_i average discount rate from now to the i th year
 i i th year

Basics of Investment

F. Stocks and Stock Investment

Assessment of A Stock's Value –Classic Textbook

$$PV = \sum [D_i / (1+r_i)^i]$$

Example:

The preferred stock of company ABC has a par value of \$100 and provides 5% dividends per year for foreseeable future, how much is the stock's value if the 9% is a fair rate of return for this type of investment?

Answer: This can be solved by perpetual annuity equation $P=A/r$

$$\text{Price} = \$100 \times 0.05 / 0.09 = \$55.56$$

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F. Stocks and Stock Investment

Assessment of A Stock's Value – Practical Situation

Practical situation – In nearly every case, a company's yearly dividends may increase or decrease, how do we determine the value?

- Using historical data to compute the average dividends growth rate to project future dividends
- Properly estimate the rate of return (in this case, normally 30 year T-bond rate + risk premium , for example, $6+3 = 9\%$)
- Discount all future dividends back to today and add them together

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F. Stocks and Stock Investment

Assessment of A Stock's Value – Practical Situation

Mathematically, we can obtain

$$PV = A_0(1+g) \{ [1 - (1+g)^n / (1+r)^n] / [r-g] \}$$

Or

$$PV = A_0(1+g)/(r-g) \text{ for } n \rightarrow \infty \text{ and } g < r$$

Where: A_0 last year's dividends
 g historical dividends growth rate
 r discount rate (= 30 year T bond rate + risk premium
 such as 6+3 = 9%)

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F. Stocks and Stock Investment

Assessment of A Stock's Value -- Practical Situation

$$P = A_0(1+g) \left\{ \frac{1 - (1+g)^n / (1+r)^n}{r-g} \right\} \quad P = A_0(1+g) / (r-g) \text{ for } n \rightarrow \infty \text{ \& } g < r$$

Example:

The preferred stock of company ABC has a par value of \$100 and had 5% dividends last year. Historically, the company's dividends have been increased about 4% per year during the past 10 years and there is no reason to doubt the growth in future, how much is the stock's fair value if the 9% is a fair rate of return for this type of investment? (Using both 30 year life and infinite life to calculate)

Answer: \$78.58 & \$104, respectively

(Note: These equations can be used for rental property calculations)

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F. Stocks and Stock Investment

Assessment of A Stock's Value – Growth Stocks

Most growth stocks provide no dividends, how do we value them?

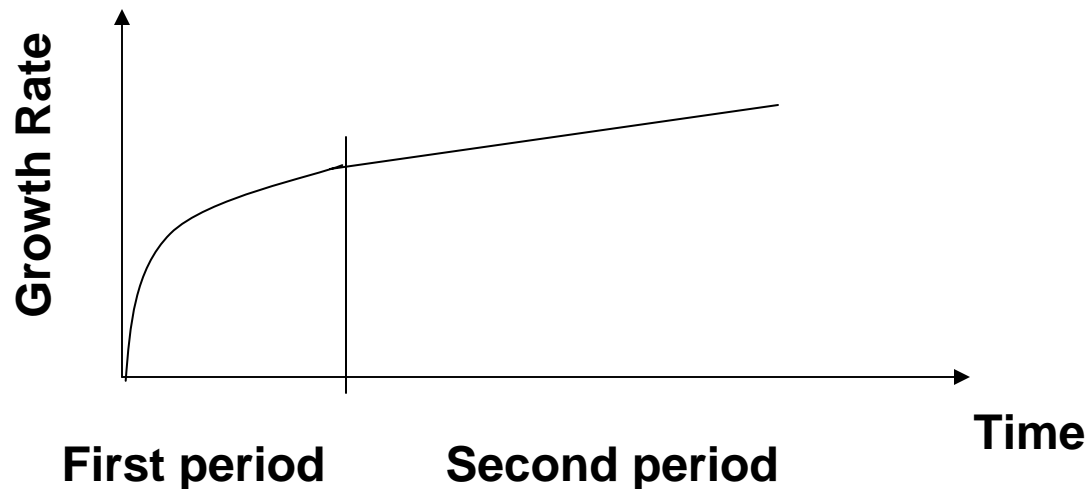
- We use the earnings of a company, rather than dividends, to calculate
- Remember these companies are still new/young & have decent growth rates
- We believe it is wiser to let these companies use their earnings to invest back into their businesses to fuel the further growth, rather than drain the cash now. When they approach the maturity, dividends paid will be a lot more than what can be paid today
- Microsoft as an example

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F. Stocks and Stock Investment

Assessment of A Stock's Value – Growth Stocks

Most of these companies have two stages of growth, the first leg is from now to next several years (say 5 years) at high growth rates, when the first leg of the grow is completed, these companies approach their maturity and will have much smaller growth rates for the rest of their life (**Microsoft as an example**)



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F. Stocks and Stock Investment

Assessment of A Stock's Value – Growth Stock

We can mathematically calculate it too! For example, if we assume the second leg in growth is infinite, then

$$PV = A_0(1+g_1) \left\{ \frac{1-(1+g_1)^{n_1}/(1+r)^{n_1}}{r-g_1} \right\} + A_0(1+g_1)^{n_1}(1+g_2)/[(r-g_2)(1+r)^{n_1}] \quad g_2 < r$$

Where: A_0 last year's earnings (note $A_0(1+g_1)$ = this year's earnings)
 g_1 growth rate of the first period
 g_2 growth rate of the second period
 r discount rate (should use company's cost of capital+ risk premium)

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F. Stocks and Stock Investment

Assessment of A Stock's Value – Growth Stock

We can also mathematically calculate finite life, multiple legs of growths, etc. All are possible even without a mathematical equation, just use Excel spread sheet. But, commonly:

- 2 legs of growths are widely used with the first leg in 5 years and the second in infinite life (since all these are projections anyway)
- In practical application, current yearly earning estimates is used as A_0 (unless we compare with last year's price too, explain MA)
- As a general rule of thumb, a discount rate of **at least** 12% should be used (can anyone guess the reason?)

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F. Stocks and Stock Investment

Assessment of A Stock's Value – Growth Stock

Example #1: EBAY, current stock price about \$80

Current yearly earning estimate:	\$1.08
Past 5 years earning growth rate:	72.4%
Estimated earning growth rate for next 5 years	35%
Assuming after 5 years, earning growth rate will be	8%
Assuming discount rate is	12%

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F. Stocks and Stock Investment

Assessment of A Stock's Value – Growth Stock

Example #1: EBAY, current stock price about \$80

$$PV = A_0(1+g_1) \left\{ \frac{[1-(1+g_1)^{n_1}/(1+r)^{n_1}]}{[r-g_1]} \right\} + A_0(1+g_1)^{n_1}(1+g_2)/[(r-g_2)(1+r)^{n_1}] \quad g_2 < r$$

We have

$$PV = \$83.98$$

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F. Stocks and Stock Investment

Assessment of A Stock's Value – Growth Stock

Example #1: EBAY, current stock price about \$80

Since the company during the past five years has recorded > 70% growth rate on earnings, the possibility that the earning for next 5 years will be at a value of > 35% is high, if one assumes that the actual growth rate for the next 5 years averaging 50%, then

$$PV = A_0(1+g_1) \left\{ \frac{1-(1+g_1)^{n_1}}{(1+r)^{n_1}} \right\} / [r-g_1] + A_0(1+g_1)^{n_1}(1+g_2) / [(r-g_2)(1+r)^{n_1}] \quad g_2 < r$$

$$PV = \$139.75$$

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F. Stocks and Stock Investment

Assessment of A Stock's Value – Growth Stock

Example #2: INTC, current stock price about \$28

Current yearly earning estimate:	\$1.2
Past 5 years earning growth rate:	-19.1%
Estimated earning growth rate for next 5 years	15%
Assuming after 5 years, earning growth rate will be	8%
Assuming discount rate is	12%

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F. Stocks and Stock Investment

Assessment of A Stock's Value – Growth Stock

Example #2: INTC, current stock price about \$28

$$PV = A_0(1+g_1) \left\{ \frac{[1-(1+g_1)^{n_1}/(1+r)^{n_1}]}{[r-g_1]} \right\} + A_0(1+g_1)^{n_1}(1+g_2)/[(r-g_2)(1+r)^{n_1}] \quad g_2 < r$$

We have

$$PV = \$43.48$$

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F. Stocks and Stock Investment

Assessment of A Stock's Value – Growth Stock

Examples # 1&2: EBAY/INTC, current stock price about \$80/\$28

Three Questions

- 1) Normally, people tend to buy a stock at a price that has a further discount from calculated PV. However, for EBAY, the current trading price is close to calculated PV, Why?
- 2) Why INTC it is traded so much discounted from calculated \$44 value?
- 3) If EBAY can only deliver a growth rate for the next 5 years at 20%, what is the fair value of the stock if all other assumptions remain the same? (\$48.85)

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F. Stocks and Stock Investment

Limitation of the Analysis by Discounted Cash Flow

1. Fraud – By greedy corporate officials
2. Fraud – By greedy analysts/brokerage companies
3. Unexpected change or disruption of business conditions and environments
4. Momentum –overly exuberance or pessimism, short squeeze

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F. Stocks and Stock Investment

Alternative Assessment of A Stock's Value – PE

You have read and heard stock's PE (price to earning ratio), what it is?

Mathematically a PE is the company's current stock price, divided by its earnings (per share). As such we also have trailing and forwarding PE.

Financial, PE represents the number of years required to recover your paid principal through yearly earnings (PE = 5, 5 years, PE = 100, 100 years)

Is low PE stocks undervalued and high PE stocks overvalued? (think about traditional, growth and cyclic three cases)

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F. Stocks and Stock Investment

Basic Strategies in Stock Investment for Non-Professionals (long-term players)

1. Follow recommendations from **majority** analysts covering the stocks
2. Diversify your holdings into portfolios
3. Separate investment from gambling and day trading (active trading fine but you should know what you are doing)
4. Always follow dollar cost average for almost any method (short or long)
5. Separate temporary economical or geo-political impacts on the market from general long-term economic trends

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F. Stocks and Stock Investment

Basic Strategies in Stock Investment for Non-Professionals
(long-term players)

6. Have consistent and active involvement regardless of the current market conditions
7. **DO NOT** let your portfolio value influence your decision making especially if your portfolio consists of high β value stocks

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F. Stocks and Stock Investment

Basic Strategies in Stock Investment for Non-Professionals (**short-term momentum players**)

Five Golden Rules

Rule # 1 Do not lose your money

Rule #2 No matter what types of hedging methods you use, follow the Rule #1

Rule #3 Buy when there is blood on the street (when everyone calls you idiot)

Rule #4 Sell when it looks like gold (when average consumers start buying)

Rule #5 Do not buy/sell in lump sum (cost average and risk reduction)

Basics of Investment

F. Stocks and Stock Investment

Alternative Way of A Stock Investment – ETF (Exchange Traded Funds)

An ETF consists of selected stocks from a single industrial or targeted sector. Number of stocks in an ETF are far less than that in a common mutual fund. ETF has following characters:

- Trades just like a single stock, can be hedged to offset potential losses (such as write protective options)
- Provides better or worse returns than general market, **rotation is a key**
- Provides far smaller return than best performing stocks in the same sector (zero sum game) yet has less risks than single stocks too