

Monetary Economics

Trading, Risk and Return

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Readings

- Cuthbertson, Chs. 4 and 5
- Next time, Malkiel Part One

Trading

- Venues for trading
- Exchanges
 - Quote driven
 - Order driven
 - Bid-ask spread
- Over The Counter (OTC)
 - Not listed
 - Trades generally negotiated between buyer and seller

Orders

- Market order
 - Buy at lowest offer price or sell at highest bid price
- Limit order
 - Buy if price falls below a set limit price
 - Sell if price rises above a set limit price
- Stop order
 - Sell if price falls below a set price
 - Buy if price rises above a set price
 - “stop loss”

Orders

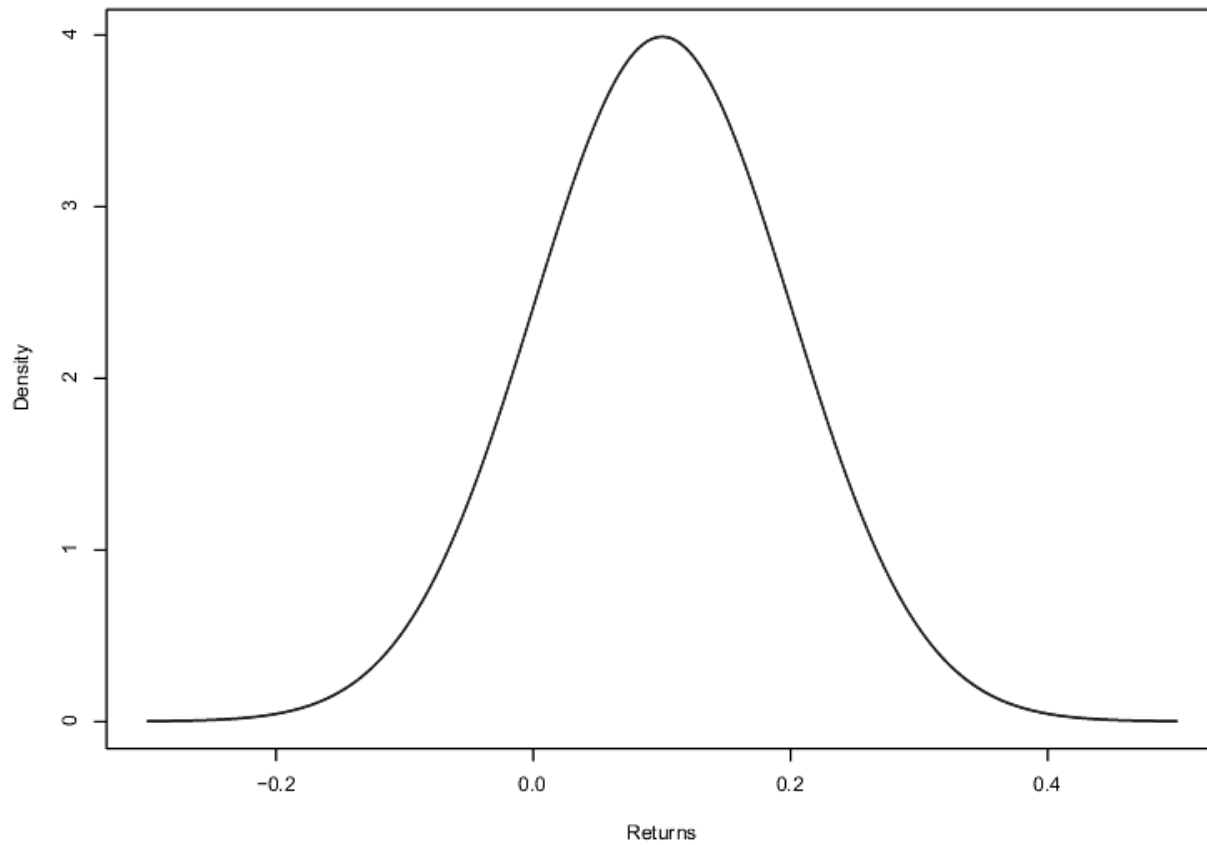
- Stop limit order
 - Sell if price falls below a set price unless price falls below a lower set value
 - Buy if price rises above a set price unless price rises above a higher set value
- Fill-or-kill order
 - Fill immediately or cancel it
- Open order
 - Order is good until filled
- Many other types have been introduced in last few years

Risk and Return

- Common dictionary definition of risk is “possibility of loss or injury”
- Definition includes two things
 - Probability
 - Loss
- The definition of risk in Finance is “uncertainty associated with the price or return on an asset”
 - A particular context
 - Both bad and good outcomes

Illustration

- Graph of normal distribution with mean of 0.1



Measure of Risk

- Standard deviation is the usual measure of risk for a single security by itself

- Standard deviation is square root of variance

- Also called “volatility”

- Variance: A version based on data

$$s^2 = \frac{\sum (R_t - \bar{R})^2}{N}$$

- R_t is return in period t and \bar{R} is the average return

- Variance: A more theoretically motivated definition

$$\sigma^2 = E[R - ER]^2$$

- ER is the expected value of R , R indicates one of the possible values and $E[R - ER]^2$ is the expected value of squared deviations around the expected value

Standard Deviation of Return

- Standard deviation is the usual measure of risk for a single security by itself
 - Standard deviation is square root of variance
 - Also called “volatility”
$$s = \sqrt{\frac{\sum (R_t - \bar{R})^2}{N}} = \left(\frac{\sum (R_t - \bar{R})^2}{N} \right)^{\frac{1}{2}}$$
 -
 - Standard deviation: A more theoretically motivated definition $\sigma = \left(E[R - ER]^2 \right)^{\frac{1}{2}}$

Why Not Just Use Variance?

- Suppose a return has a mean of 6 percent per year and a standard deviation of 3 percent per year
- The variance is the square of 3 percent per year
 - 3 percent per year squared is 9 squared percent per year
 - Example: area of 10 feet by 20 feet room is 200 squared feet

Owning Stocks and Selling Stocks Short

- Besides buying stock, an investor can sell stocks short
 - Bet that stock price will go down
 - What is a short sale?
 - Investor sells stock that he does not own
 - Borrow the stock from someone else and sell that borrowed stock
 - Owe the lender the stock plus any dividends plus a convenience charge
 - To extinguish position, must buy the stock on the market
 - If the price goes down by more than the dividends and charge for borrowing the stock, short seller makes a profit
 - If the price goes up, the short seller has a loss

Price of Amazon Stock

Price of Amazon Stock



Price of Amazon Stock

Price of Amazon Stock
Adjusted for stock splits



Margin

- Margin purchases: Put down part of the funds and borrow the rest
- Using margin means that leverage increases
 - Leverage is the ratio of total funds at risk to own funds

Cash purchase

- Buy 100 shares of Amazon stock at \$200 per share and price increases to \$300
- Return on investment is
 $(\$30,000 - \$20,000) / \$20,000 = 0.50$ or 50 percent

Margin Purchase

- 200 shares of Amazon stock at \$200 per share and price increases to \$300
- Borrow half of funds at an interest rate of 10 percent
- Invested \$20,000
- Receive \$60,000 from selling stock
 - Pay back loan of \$20,000 and interest of \$2000
- Return is
$$(\$60,000 - \$20,000 - \$2,000 - \$20,000) / \$20,000 =$$
$$\$18,000 / \$20,000 = 90 \text{ percent}$$

Margin Magnifies Losses as Well

- Suppose buy stock and price falls
- There is a loss
- Margin and leverage magnify gains and losses

Relationship Between Levered Return and Unlevered Return

- Usual to use *Excess return*: Return less riskfree rate

$$R_L - r = \frac{TF}{OF}(R_U - r)$$

- R_L is the levered return, R_U is the unlevered return and r is the riskfree rate
- Let OF represents own funds and TF represents total funds

Relationship Between Levered Return and Unlevered Return

- We have $R_L - r = \frac{TF}{OF}(R_U - r)$
- In this example, $R_L = 0.90$, $R_U = 0.50$ is the unlevered return and $r = 0.10$, $TF = \$40,000$ and $OF = \$20,000$
$$0.9 - 0.1 = 2 * (0.5 - 0.1)$$
- Which verifies that the arithmetic and the formula agree
- Leverage here has increased the excess return by a factor of 2

How Is Risk Affected?

- Volatility of leveraged investment and volatility of unleveraged investment in this example – $\sigma_L = 2\sigma_U$
 - This leverage doubles any gains and losses

Is Leverage Always A Good Thing?

- One way to evaluate risk: The Sharpe Ratio
- The Sharpe Ratio (SR) is

$$SR = \frac{R - r}{\sigma}$$

- It is the excess return per unit of risk on an individual investment
- Similar in some ways to miles per gallon of gas in a car
- How much return do you get for each unit of risk?

Comparison of Levered and Unlevered Investment

- Volatility of leveraged investment and volatility of unleveraged investment in this example $\sigma_L = 2\sigma_U$
 - This leverage doubles any gains and losses
- The excess return also doubles
 - Goes from 0.5-0.1 to 0.9-0.1, from 0.4 to 0.8
- The Sharpe ratio $SR = \frac{R-r}{\sigma}$ is unaffected
 - Numerator and denominator double

Investment Vehicles

- Most common are mutual funds and Exchange Traded Funds (ETFs)
- Can make similar investments in both
- Mutual funds
 - Priced (NAV determined) at 4 PM Eastern Time
- ETFs
 - Trade all day
- Expenses can differ
- There can be tax effects

Summary

- Stocks are traded a variety of ways
- Many different kinds of orders, some obscure to the typical person
- Risk is an ever-present component of stock returns
- The typical measure of risk is the standard deviation of its return

Summary

- If a stock's price goes down, can earn a positive return by short selling (shorting) the stock
- Can increase the positive and negative return from owning a stock by leverage
- Leverage does not change the Sharpe ratio of an investment