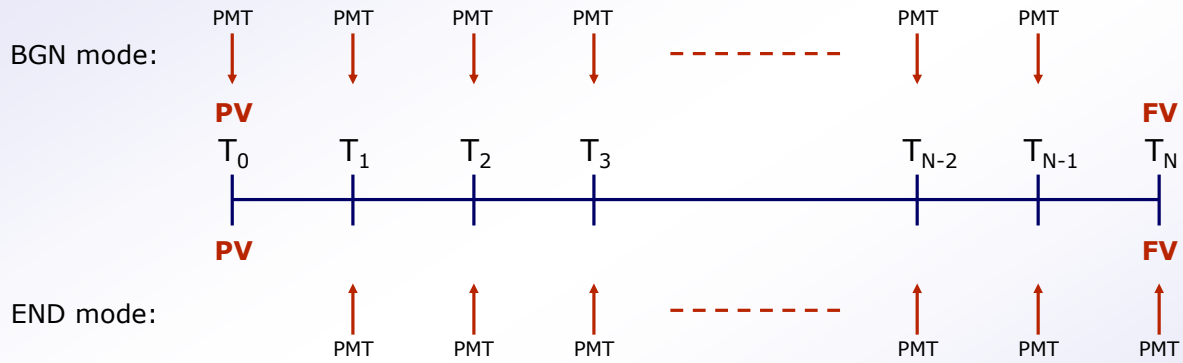


Generalised TVM diagram



Quartic Quote: "N and PMT describe N payments" (doh!)

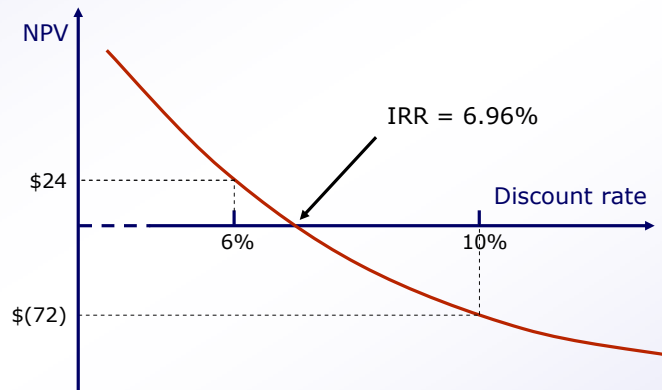


LOS 5.c: Calculate and interpret the FV and PV of ... an ordinary annuity ... an annuity due ...

Time Value of Money
1

NPV and IRR

For a normal project (cash outflow followed by inflows) one would expect a lower NPV for higher discount rates. Graphically:

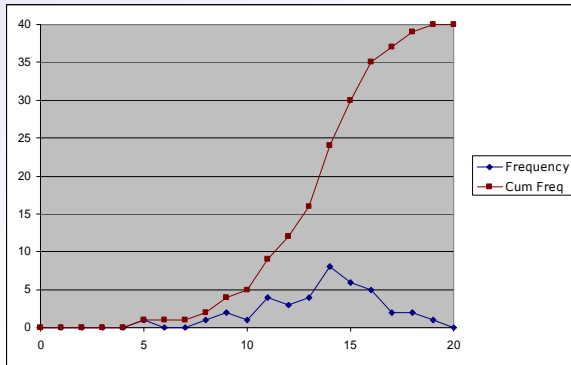


LOS 6.a: **calculate** and **interpret** NPV and IRR, contrasting NPV to IRR ... Discounted Cash Flow Applications

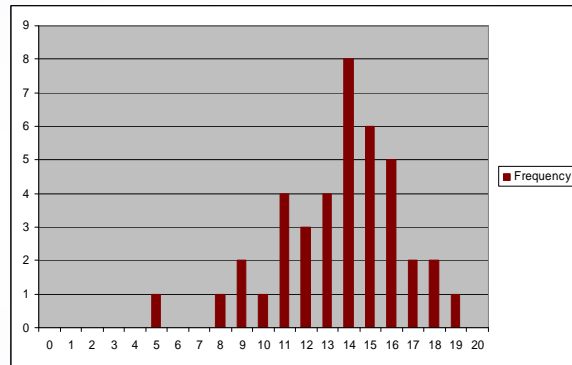
2

Graphical presentation of data

Frequency polygon and cumulative frequency:



Histogram:



For more detailed data graphs (in particular with *continuous* scales) presentation by **interval** may be more useful. For instance the scores could be grouped into 5% intervals (0 to 5%, 5 to 10% etc).



LOS 7.c: **analyze** and interpret a histogram or a frequency polygon

Statistical Concepts

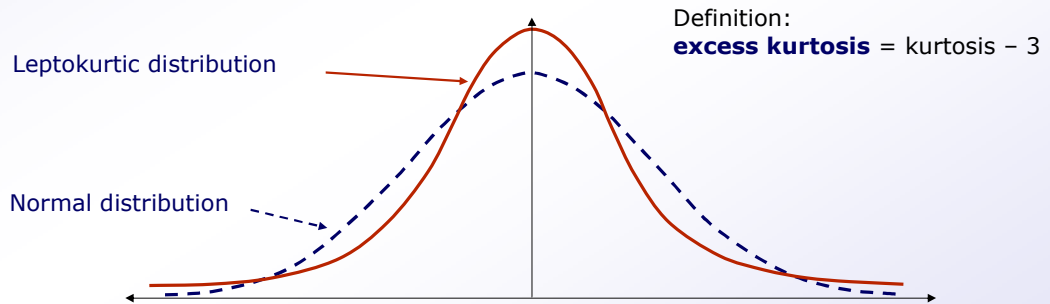
3

Kurtosis in return distributions

Kurtosis (K) describes the shape of a distribution relative to the normal distribution.

In particular:

- a **leptokurtic** distribution has more small and more large deviations (note $K > 3$)
- a **platykurtic** distribution has fewer small and fewer large deviations ($K < 3$)
- a **mesokurtic** distribution has similar small/large deviations by comparison to normal ($K = 3$).

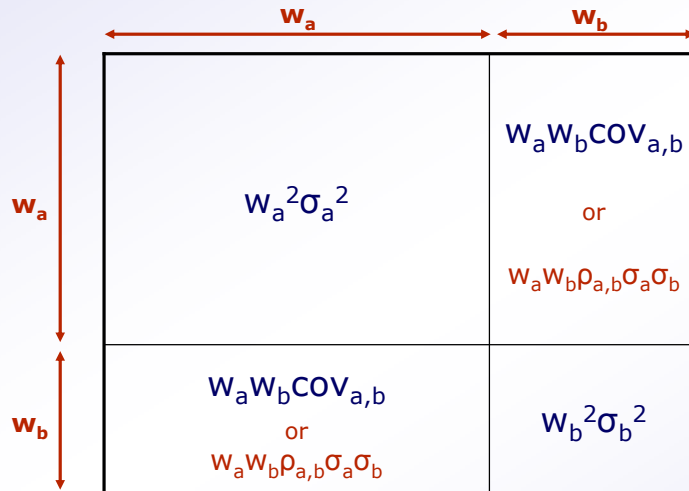


LOS 7.j: **define** and **interpret** kurtosis, and measures of population and sample kurtosis

Statistical Concepts
4

Portfolio variance: the Quartic Covariance Matrix

The portfolio variance can be thought of as a weighted average covariance of the various assets. The following diagram should help you to understand:



Now just add them up:

$$\sigma_p^2 = w_a^2 \sigma_a^2 + w_b^2 \sigma_b^2 + 2w_a w_b \text{COV}_{a,b}$$

$$\sigma_p^2 = w_a^2 \sigma_a^2 + w_b^2 \sigma_b^2 + 2w_a w_b \rho_{a,b} \sigma_a \sigma_b$$

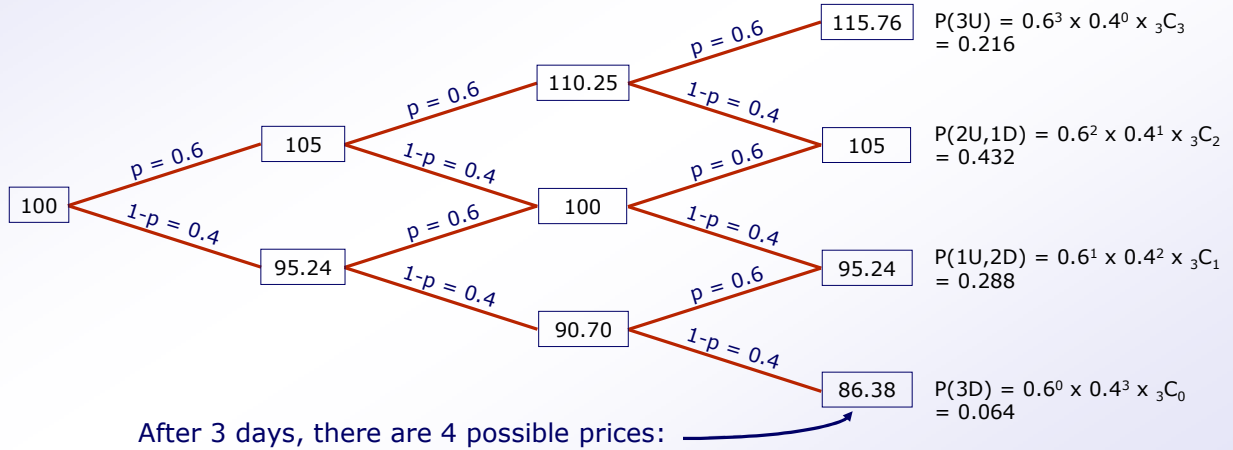


LOS 8.k: **calculate** and **interpret** expected value, variance & standard deviation

Probability Concepts
5

Binomial tree for stock price movements

Continuing the previous stock price example, suppose that the stock starts at 100. Each day, the price either rises, say by 5% (the “up factor”, $U = 1.05$), or falls by 4.76% (the “down factor”, $D = 1/1.05 = 0.9524$). We can use this to model the movement over a number of days, as follows:



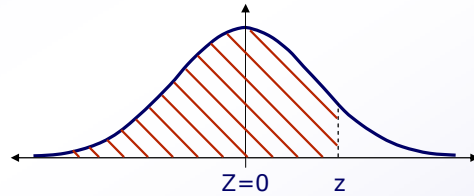
LOS 9.d: ... **construct** a binomial tree to describe stock price movement

Probability Distributions
6

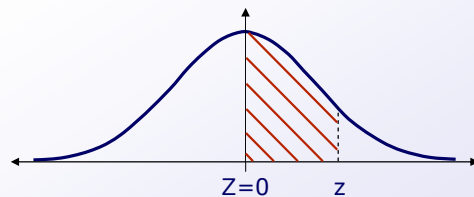
Normal distribution and probabilities

We can calculate the probability of a random variable falling within a range by using the normal distribution probability tables. There are two forms for these (note these are excerpts only):

P(Z < z)	z	0.00	0.01	0.04	0.05	0.06
	0.0	0.5000	0.5040	0.5160	0.5199	0.5239
	0.1	0.5398	0.5438	0.5557	0.5596	0.5636
	0.2	0.5793	0.5832	0.5948	0.5987	0.6026
	0.3	0.6179	0.6217	0.6331	0.6368	0.6406
	0.4	0.6554	0.6591	0.6700	0.6736	0.6772
	1.0	0.8413	0.8438	0.8508	0.8531	0.8554
	1.6	0.9452	0.9463	0.9495	0.9505	0.9515
	1.9	0.9713	0.9719	0.9738	0.9744	0.9750



P(0 < Z < z)	z	0.00	0.01	0.04	0.05	0.06
	0.0	0.0000	0.0040	0.0160	0.0199	0.0239
	0.1	0.0398	0.0438	0.0557	0.0596	0.0636
	0.2	0.0793	0.0832	0.0948	0.0987	0.1026
	0.3	0.1179	0.1217	0.1331	0.1368	0.1406
	0.4	0.1554	0.1591	0.1700	0.1736	0.1772
	1.0	0.3413	0.3438	0.3508	0.3531	0.3554
	1.6	0.4452	0.4463	0.4495	0.4505	0.4515
	1.9	0.4713	0.4719	0.4738	0.4744	0.4750



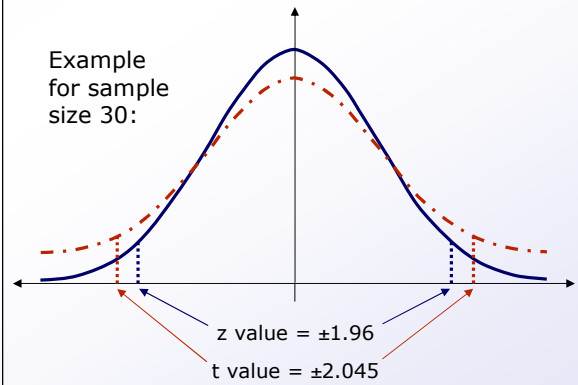
LOS 9.h: Define standard normal dist'n, explain how to standardize, calc/interp probs

Probability Distributions
7

Reading the t-tables

The t-tables are read in the opposite way to the z-tables. Remember for the normal distribution you specify the number of standard deviations and look up the probability. For t, you specify the probability (in fact, significance) and look up standard deviations.

1-tailed significance:	0.1	0.05	0.025	0.01	0.005	0.0005
2-tailed significance:	0.2	0.1	0.05	0.02	0.01	0.001
Degrees of freedom:						
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.599
3	1.638	2.353	3.182	4.541	5.841	12.924
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.869
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.408
10	1.372	1.812	2.228	2.764	3.169	4.587
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.327	2.576	3.292



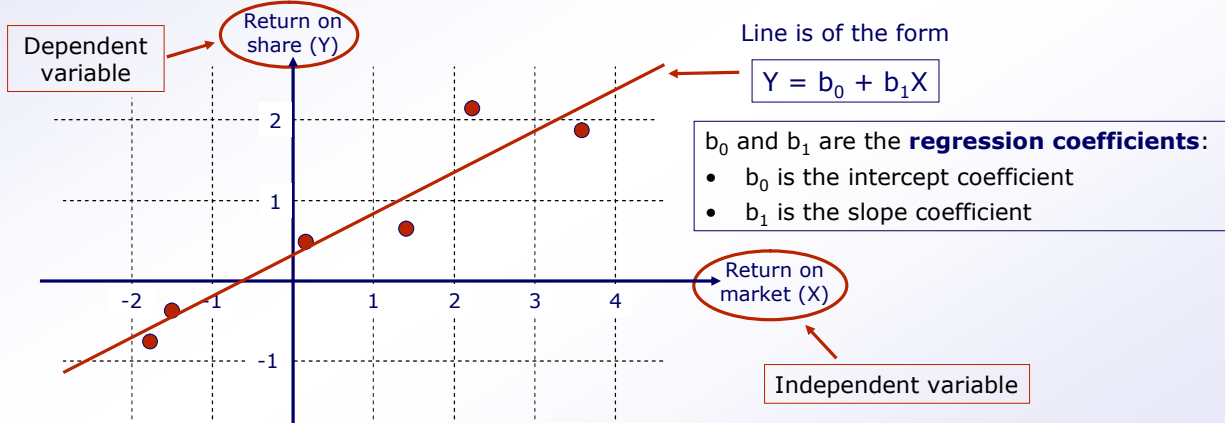
What happens to t value as n gets larger?



LOS 10.i: Describe the properties of Student's t- Sampling & Estimation
distribution & calc/interp its degrees of freedom

Linear regression: the basics

Linear regression is the process of identifying the “line of best fit” that most accurately demonstrates the component of movement in the **dependent** variable (shown as the Y-axis) that is “explained” by movement in the **independent** variable (X-axis).

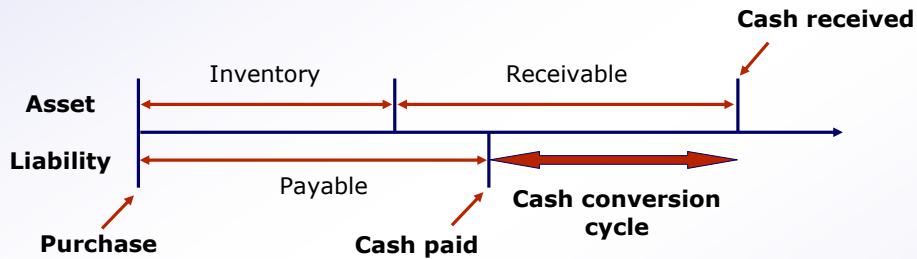


LOS 12.d: **Differentiate** between the dependent and independent variables in a linear regression ...

Correlation & Regression
9

Ratio analysis: internal liquidity/4

The **cash conversion cycle** shows how long it takes from when cash is paid by the company until cash is received back into the company.



As can be seen, the cash conversion cycle is

- = inventory processing period
- + receivables collection period
- payables payment period

For Conduit Inc:

- = 51 days
- + 47 days
- 65 days
- = **33 days**



LOS 38.c: **Calculate, interpret** and **discuss** the uses of measures of a company's internal liquidity...

Analysis of Financial Statements

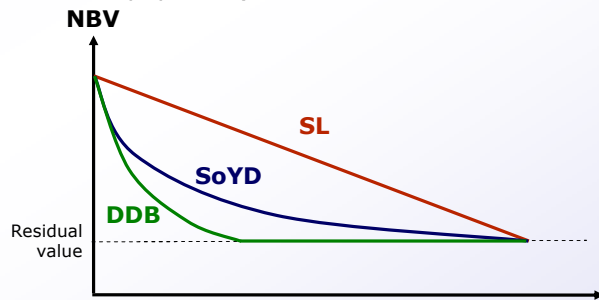
10

Impact of depreciation method

Financial statements and ratios are impacted by whether a firm uses straight line or accelerated methods of depreciation.

The balance sheet will always be **lower** under **accelerated** methods; the income statement will initially be **lower** under **accelerated** depreciation, though this will reverse in later years (unless the company invests in new equipment).

Item	SL	Accel
Total assets	↑	↓
Liabilities	same	same
Equity	↑	↓
Operating exps	↓	↑
EBIT & NI	↑	↓
RoA & RoE	↑	↓
CFO*	same	same



Quartic Quote: on the graph, asset values are the NBV and you can think of depreciation as the slope of the graph. Steep = higher expense.

* This assumes we are looking only at a change in **accounting** method (i.e. no tax change).

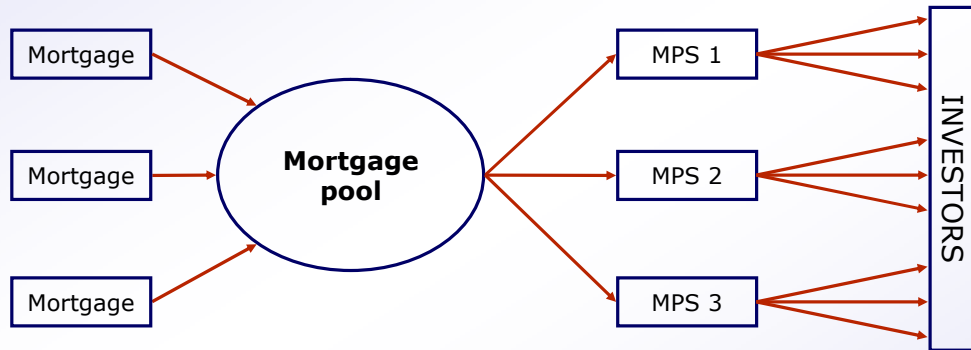


LOS 43.a: ... **Discuss** how the choice of depreciation method affects a company's f/s, ratios and taxes

Long-Term Assets: Depreciation

Mortgage passthrough securities

These are securities collateralized by mortgages loans. Payments by borrowers consist of (1) interest, (2) principal repayments and (3) curtailments or principal prepayments.



Although cash flows are monthly, payment amounts are uncertain. The level and timing of prepayments is unknown and is the source of much of the risk for investors. Prepayment risk increases as yields fall.

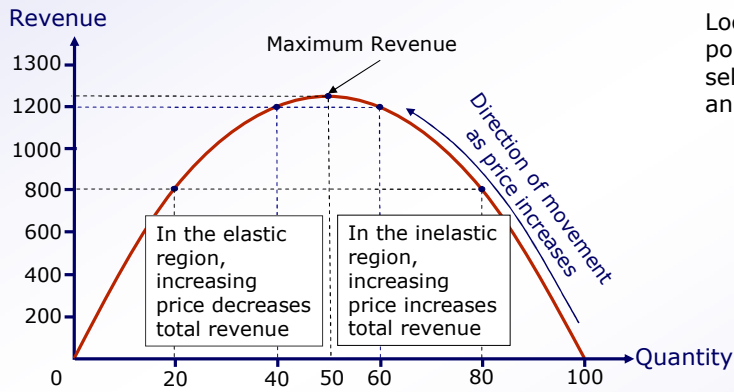
Q LOS 67.f: **Describe** mortgage-backed securities ... **explain** the cash flows, prepayments and prepayment risk

Bond Sectors and Instruments

12

Elasticity and Total Revenue

From the seller's point of view, the elasticity of demand for a product determines the likely effect on the total revenue that a shift in price will cause. Looking at the revenue of the product from previous slide:



Looking from the consumer's point of view, the amount the seller earns as revenue becomes an expenditure for the consumer.

Quartic Quote: In the inelastic region, change in revenue and change in price are in the **same** direction; in the elastic region, change in revenue and change in price are in **opposite** directions.



LOS 13.a: ...**explain** the difference between inelastic and elastic demand...

Elasticity
13

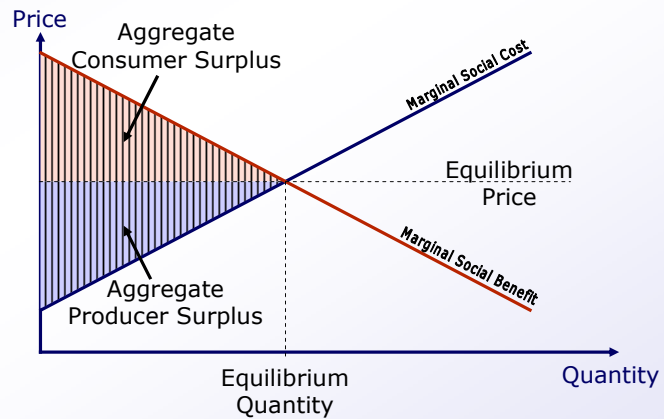
Maximising Aggregate Surpluses

Marginal social benefit (MSB) is the sum of each consumer's marginal benefit. Similarly **Marginal social cost** (MSC) is the sum of each suppliers marginal costs from producing the product.

Within the shaded region, the aggregate of surpluses increases with quantity.

Beyond the equilibrium quantity, MSC will exceed MSB.

Both aggregate surpluses are at their maximum at the equilibrium point. The market is therefore **most efficient** at this point.



LOS 14.d: **discuss** the relationship between consumer surplus, producer surplus and equilibrium.

Efficiency and Equity

14