ACTSC 371 Final Exam Review

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Chapters 1 to 2

- The 3 steps of Corporate Finance: (1) In what long-lived assets should the firm invest? (2) How can the firm raise cash for required capital expenditure? (3) How should short-term operating cash flows be managed? [net working capital]
- Debt is cheaper than equity to a point
- Gross Basis Presentation: For fixed assets this is → Net FA (before), Accumulated Depreciation, Net FA (After), for shareholder's equity, this is SE (before), CS, RE, SE (after)
- Net Cash Flow (CF(A)) = OCF - △WC - △CAPEX
  - △CAPEX includes change in fixed assets minus depreciation
  - OCF = EBIT + Depreciation - Taxes = NI + Depreciation + Taxes
  - NI = (Revenues - Expenses - Depreciation)(1-T_c)
  - Retained Earnings = NI × (1-d) where d is the dividends payout ratio
  - △WC = Current Assets - Current Liabilities
- Cash Flows to Creditors (CF(B)) = Interest + LTD redemption - New debt issued
- Cash Flows to Stockholders (CF(S)) = Dividends + Stock repurchases - Stock Issuance
- Note that CF(A) = CF(B) + CF(S)
- Understand the several ratios discussed in this chapter

Chapter 3

- Steps of Financial Planning: (1) Building a corporate financial model (2) Describing different scenarios of future development from best to worst case (3) Using the models to construct pro-forma financial statements (4) Running the model under different scenarios (sensitivity analysis) (5) Examining the financial implications of ultimate strategic plans.
- Pro-forma statements are a summary of the effects of a certain increase in sales; they may use the assumption that certain balance sheet and statement items increase directly (percentage wise) with sales
- EFN is known as external financing needed and is the "plug" of an increase in sales; this is calculated as the difference between post sales total assets and post sales total financing (debt + equity)
  - Ways to fund EFN include: (1) Sell new shares of stock (2) Increase its reliance on debt (3) Reduce its dividend payout ratio (4) Increase profit margins (5) Decrease its asset requirement ratio.
- The rate of sales growth that produces an EFN of 0 is called the sustainable growth rate, g
  - Firms can achieve negative growth by selling off assets and closing divisions
  - Negative values of g mean that the company can attain higher growth rates without borrowing money

Chapter 4

- Consumption Theory: Graph is the curve that interpolates between consumption today (x-axis) and consumption tomorrow (y-axis). A point on the curve, (x, y) represents that an investment of x today is worth a consumption of y tomorrow; a rise in interest rates results in a a pivot around (x, y) that makes saving more popular and vice-versa for a decrease
- The separation theorem in financial markets says that all investors will want to accept or reject the same investment projects by using the NPV rule, regardless of their personal preferences

Chapter 6

- Holding period return: $r = \dfrac{\sum \text{Coupons} + \text{Sell Price - Initial Purchase Price}}{\text{Initial Purchase Price}}$
- Bond Amortization Schedule: Note that $\frac{P_1}{P_0} = (1+i) \implies P_0 = P_n(1+i)^n$.

Year	Face Value (F)	Coupon (Pmt)	Interest (I)	Write-up (P)	Book-Value (B)
0					B_0
1	F	Fr	$I_0 = B_1 \cdot i$	$P_0 = Fr - I_1$	$B_1 = B_0 - P_0$
2	F	Fr	$I_1 = B_2 \cdot i$	$P_1 = Fr - I_2$	$B_2 = B_1 - P_1$
$\vdots$	$\vdots$	$\vdots$	$\vdots$		$\vdots$

- Constant growth model: $P = \frac{Div_1}{r-g} = \frac{Div_0(1+g)}{r-g}$, NPVGO Growth model: $P = \frac{EPS}{r} + NPVGO$ where if $RR =$ Retention Ratio, then
$$NPVGO = \frac{\left[-EPS(RR) + \frac{EPS(RR)\times RoE}{r}\right]}{r-g}$$
- Differential Growth Model: $\frac{Div_1}{r-g_1}\left[1 - \frac{(1+g_1)^N}{(1+r)^N}\right] + \frac{Div_{N+1}}{r-g_2}(1+r)^{-N}$
- Value of g is $g =$ Retention Ratio $\times$ RoE
- The ratio between two consecutive write-ups in a bond amortization schedule is $1+i$ where i is your discount rate. This relationship is $\frac{1}{1+i}$ between consecutive write-downs

Chapter 7

- [Discounted] Payback Rule: How long does it take to pay back our investment [taking into account the time value of money]
- Average Accounting Rule: $ARR = \dfrac{\text{Average NI}}{\text{Average Book Value of Investment}}$
- IRR Rule: Accept if IRR is above a benchmark; Modified IRR uses different rates for outflows (borrowing rate) and inflows (investing rate)
- Crossover Rule: Calculate $NPV(A-B)$ for projects A and B and find the root of the curve; this is the IRR where the projects have equal value
- Mutually Exclusive Projects: RANK all alternatives and select the best one
- Independent Projects: Must exceed a MINIMUM acceptance criteria
- Profitability Index Rule: $PI = \dfrac{\text{PV of Future Cash Flows}}{\text{Initial Investment}}$ and accept if $PI > 1$; problems with ME Projects
- **Note:** When comparing two projects, you must make sure that the timeframe of comparison is the *lcm* of each individual time frame or run each project into perpetuity before valuation

Chapter 8

- $PV_{CCA\,Tax\,Shield} = \frac{CdT_c}{k+d} \times \frac{1+0.5k}{1+k} - \frac{SdT_c}{k+d} \times \frac{1}{(1+k)^n}$ where $S = \min(\text{Asset}_{Resale}, \text{Asset}_{Original})$, $C = \text{Asset}_{Original}$, $d =$ depreciation rate, $k =$ discount rate, $n =$ time assets sold, $T_c =$ corporate tax rate
- $PV_{Project} = NPV(\text{Income}) + NPV(\text{CAPEX}) + NPV(\text{NWC}) + PV_{CCA}$ where $NPV(\text{CAPEX}) = -Asset_{Original} + Asset_{Resale}(1+r)^{-t}$ and NWC is net work capital; note that if there is no tax rate, then there is no tax shield. That is, $PV_{CCA} = 0$
- Recall, NWC = Current Assets - Current Liabilities
- Calculating the IRR of a bond: Given cash flows, including the price; we solve for the discount rate which is the IRR
- Problems with IRR: Multiple IRRs, Are We Borrowing or Lending?, The Scale Problem, The Timing Problem (discount rate dependency)

- The following are equivalent definitions of OCF:

$$\begin{aligned} \text{OCF} &= \text{NI + Depreciation + Taxes} \\ &= \text{EBIT - Taxes + Depreciation} \\ &= \text{(Sales - Costs)(1 - } T_c\text{)+Depreciation(}T_c\text{)} \end{aligned}$$

  where T_c = corporate tax rate, EBIT = Sales - Operating Costs - Depreciation (CCA), NI = EBIT(1 - T_c)
- Annual CCA Worksheet → UCC = Undepreciated Capital Cost, CCA = Capital Cost Allowance, d = depreciation rate, T_C = corporate tax rate, r = discount rate
- The IRR of a project represents the cap on the discount rate in order for the project to be accepted (i.e if the discount rate > IRR, then we reject)

	Beginning		Ending		
Year	UCC	CCA	UCC	TS	PVTS
1	$B_1 = \frac{Asset_{Original}}{2}$	$C_1 = B_1 \cdot d$	$E_1 = B_1 - C_1$	$TS_1 = C_1 \cdot T_c$	$TS_1(1+r)^{-1}$
2	$B_2 = B_1 + E_1$	$C_2 = B_2 \cdot d$	$E_2 = B_2 - C_2$	$TS_2 = C_2 \cdot T_c$	$TS_2(1+r)^{-2}$
⋮	⋮	⋮	⋮	⋮	⋮

- Here, C_i is used in the depreciation amount used in the calculation of OCF, EBIT, or NI in the i^{th} year
- IATCF = OCF + Total Cash Flow from Investments (TCFI), where TCFI = △NWC - Equipment Expense
- Equivalent Annual Cost Method / EAC: Level of payment annuity in order to maintain the PV of the project/necessity
- Replacement Projects: Periodic costs are based on opportunity costs; each periodic cost is the maintenance cost plus the forgone earnings of resale, using the prev. year's resale value minus the current resale price; we replace when the periodic cost > EAC

Chapter 9

- Types of break even: **Accounting break-even:** sales volume at which net income = 0, **Cash break-even:** sales volume at which operating cash flow = 0, **Financial break-even:** sales volume at which net present value = 0
- Decision trees: (1) Ignore fixed costs (2) Calculate the NPVs for each final node (3) Sum the weighted average of the NPVs based on a balance of probabilities
- The break even IATCF ($IATCF_{BE}$) is the annual earnings such that the NPV (includes fixed costs(FC) and the discounted income cash flows) is zero
  - Splitting $IATCF_{BE}$ into OCF and equipment expense, we can work backwards from OCF to get the break-even revenue
  - We can go even further to get the break-even sales volume and price (note that variable costs vary with volume)
- We can value the PV of a project by the NPV of the project plus the value of the implicit managerial options of the project
- We can also employ the decision to delay the project in order to reduce costs; however, we must also balance the decrease in NPV as well

Chapter 23

- An option premium is made of an intrinsic (strike and spot difference) and a time/speculative value (highest when the underlying is at the money)
- Notable combinations: straddle (long call, long put), protective put (long stock, long put), covered call (long stock, short call)
- Put-call parity: $S_0 + p_0 = c_0 + Ke^{-rT}$ where $Ke^{-rT} \sim K(1 + r_A)^{-T}$; As $\uparrow r$, then $\uparrow c$ and $\downarrow p$
- Replicating portfolio: replicate the downside of the stock by borrowing the PV of the amount today + buying the stock; at T you own the value of the downside of the stock and the value of your portfolio (borrow amount + underlying stock) is the a scaling of a put or call;

- Call value = Stock price × Delta (scaling) - Amount Borrowed
- Deltas → -1 = in/put, $-\frac{1}{2}$ = at/put, 0 = out/put+call, $\frac{1}{2}$ = at/call, 1 = in/call

- Risk-Neutral approach: Use a weighted and discounted balance of probabilities of possible stock prices; if q is the chance of upside in the stock, then

$$q = \frac{(1+r_f) \times S(0) - S(D)}{S(U) - S(D)}$$

and

$$C(0) = \frac{q(\max(S(U)-K,0)) + (1-q)(\max(S(D)-K,0))}{(1+r_f)} = \frac{q(C(U)) + (1-q)(C(D))}{(1+r_f)}$$

- Black-Scholes will not be tested except for the theoretical stuff (i.e. $C_0 = S \times N(d_1) - Ee^{-rT} \times N(d_2)$)

Chapter 24

- "Executive Stock Options are call options (technically warrants) on the employer's shares." (cannot be sold, only exercised so no speculative value)
- "Executive Stock Options give executives an important tax break: grants of at-the-money options are not considered taxable income." (Taxes are due if the option is exercised.)
- In this section we also learn that the value of a start-up can be done via a Black-Scholes approach: the underlying is the NPV profits of the expanded project, the strike price is the initial costs
  - From this we get the value of a project M is $M = NPV + Opt$
  - Options here include an option to abandon and an option to delay
- You will need to know how to use a 3-step binomial pricing convention to price lookback options
  - Lookback options are priced using a $max_{t\in[0,T]}(S_T - S_t, 0)$ convention

Chapter 25

- Warrant (call to buy shares at strike K) price is $\left(\frac{n_s}{n_w+n_s}\right) c_0$ where c_0 is the price of a call at the money relative to the share price $\left(\frac{n_s}{n_w+n_s}\right)$ is the dilution factor, $n_s$the number of outstanding shares and n_w the number of warrants
  - Warrant gain is $\frac{\text{Firm's Value of Debt}_{+K\times n_w}}{n_s+n_w} - K$
- Convertible Bond Price (at the money) = Straight Bond Value (SBV) + Warrant Price = SBV + Conversion Value
- Conversion Value = Share price × Number of Shares converted
- Conversion Ratio = Straight Bond Par / Number of Shares converted
- Option Value = Convertible Bond Price - max(Conversion Value, SBV) where the second term on the right is the floor
- "Convertible debt carries a lower coupon rate than does otherwise-identical straight debt [and is usually issued out of the money]"
- Why are they issued?
  - Lower coupons!
  - [Equity vs. Debt] "If the company subsequently does poorly, it will turn out that the conversion option finishes out-of-the-money, but the firm would have been even better off selling equity when the price was high... But if the stock price does well, the firm is better off issuing convertible debt rather than equity."
  - "Convertible bonds reduce agency costs, by aligning the incentives of stockholders and bondholders"
  - "Convertible bonds also allow young firms to delay expensive interest costs until they can afford them"
  - They're used for capital budgeting (in start-up firms) when debt is not easily accessed and equity needs to be toned down
    - Note: (1) The bond ratings of firms using convertibles are lower (2) Convertibles tend to be used by smaller firms with high growth rates and more financial leverage (3) Convertibles are usually subordinated and unsecured.

    - Convertible bonds are usually un-securitized assets because the underlying bond should not be repossessed

- Callable bonds are useful when interest rates drop sharply. The bond is repurchased and new bonds are re-issued at the lower interest rate
    - "In the real world, most firms wait to call until the bond value is substantially above the call price. Perhaps the firm is afraid of the risk of a sharp drop in stock prices during the 30-day window (when bondholders can convert)"

Chapter 26

- Understand the subtle differences between futures and forwards (easy)
- Basis - the difference between the futures price and the spot price (variability of basis is basis risk)
- Clearinghouse benefits
    - The clearinghouse takes the opposite position on all trades, thus it allows for any short to be associated with any long
    - The CH nets out these positions, which reduces risk in the market.
    - It provides stability to the trading environment since it demands margin and thus which is a form of insurance against default.
    - The CH matches the shorts and longs; the short 'triggers' the match by requesting settlement in the month of settlement.
- Futures contract properties
    - These are marked-to-market on a periodic basis with profits and losses transferred to the margin account if asked
    - Spot price ˜ International supply/demand + localized factors (e.g. location of delivery)
    - Futures contracts ˜ International supply/demand
    - Cash settled futures - at expiry, profit or loss is traded between the long and short positions
    - When a maintenance margin call is issued, the trade must restored his position to the initial margin position
    - "The Chicago Mercantile Exchange (CME) is by far the largest [futures market]"; in Canada we have the Montreal Exchange
    - Understand the differences between hedging (convergence of spot and futures prices) and speculation as well as the mnemonic "Bakers long, farmers short"
- Locked limit up/down - closes trading on the exchange when the price drops or rises through a threshold
- Duration is defined as $\frac{\sum_t PV(CF_t)\times t}{\sum_t PV(CF_t)}$
- Swap contract properties
    - These are done through a swap bank which acts as a counterparty/broker to two other parties/banks and earns a spread as its profit; the total spread will usually be given in the question
    - The banks pay the ask price of the bank under their desired interest rate income (floating vs. fixed); the swap bank returns the opposite position which is used to fund the bank's loaning operations
    - Half of the spread on the swap's income from one bank is taken and another half from the other bank
    - Currency swaps will NOT be seen on the exam