UNIVERSITY of VIRGINIA
DARDEN SCHOOL OF BUSINESS

FIN 7603 - VALUATION IN FINANCIAL MARKETS
AY 2023 – 2024, FY Quarter 4

This elective finance course offers advanced insights into valuing firms and assets in financial markets, building on core concepts from the core finance course, Financial Management and Policies. Structured in three modules, the course covers equity valuation, debt analysis, and options valuation, shifting the focus of the analysis from cash flow coming from operations to cash flow allocated to capital providers. Module 1 revisits valuation techniques, integrating and moving past the standard DCF methodologies to value equity claims directly. Module 2 explores debt and options valuation, emphasizing bond risk measurement and the factors influencing its value. Module 3 combines methodologies to value hybrid securities, applying financial engineering tools. The objective of the course is to provide valuation skills employed in other finance elective courses and apply valuation models to real financial data and assets.

Evaluation

Students are expected to be prepared for each class. Course grades will be determined based on class performance with regards to regular contribution to in-class discussions (40%) and individual performance on a final exam (60%). The use of generative AI for class and exam preparation is inconsistent with the objectives of the course and is considered inappropriate.

Learning Resources

Supplementary Text: The course does not rely on a textbook. Brealey, Myers and Allen, Principles of Corporate Finance is a standard finance textbook, and we recommend it as a reference. Its purchase, however, is in no way required.

Learning Teams: While not a core course, previous experience suggests that students benefit tremendously from discussing ahead what we cover in class. The creation of ad-hoc learning teams is strongly encouraged.

Q&A Sessions: The instructor will provide two optional Question and Answer Sessions during the term, at the end of the first and second module. More can be organized if need.

Cross Registration: Student may enroll in either *Valuation in Financial Markets* (VFM) or *Managerial Finance*, but not both. Because *VFM* is a prerequisite for some finance electives, enrolment in *VFM* is required for students to enroll in these electives.

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AY 2023-2024, FY Quarter 4
VALUATION IN FINANCIAL MARKETS
COURSE OUTLINE

Module 1 – Valuing a Company's Equity		
1	**Wednesday, March 20th**	**The Segmentation of Cash Flow** *Shamrock Capital: Pricing the Masters of Taylor Swift (F-2050)*
2	**Thursday, March 21th**	**The Segmentation of Cash Flow** *Ramsay Street (F-Draft)*
3	**Wednesday, March 27th**	**Equity Residual Approach – LBO** *Clear Channel Communications (F-1755)*
4	**Thursday, March 28th**	**Equity Residual Approach – LBO** *Lonestar Graphite*
5	**Wednesday, April 3rd**	**Equity Residual Approach – Real Estate** *Town Center at King of Prussia*
6	**Thursday, April 4th**	**Equity Residual Approach – Project Finance** *EDP Renewables North America*

Module 2 – Valuing a Company's Options and Debt		
7	**Wednesday, April 10th**	**Options and Option Pricing** *Principal Protected Equity Linked Note*
8	**Thursday, April 11th**	**Options and Implied Volatility** *Ito's Dilemma*
9	**Wednesday, April 17th**	**Debt Valuation: The Risks of Debt** *Standard Integrated Circuits*
10	**Thursday, April 18th**	**Debt Valuation: Variable vs fixed rate** *Float or Fix? Google's Debt Choice*

Module 3 – Putting it All Together, Three Challenging Cases		
11	**Wednesday, April 24**	**Funding Costs and Currencies** *Vale*
12	**Thursday, April 25th**	**Beyond Debt and Equity: Convertible Bonds** *Tesla, Inc. Convertible Bonds (Draft)*
13	**Wednesday, May 1st**	**Beyond Debt and Equity: M&A with Contingent Value Rights** *Canadian Pacific's Bid for Norfolk Southern (HBS 9-216-057)*
14	**Thursday, May 2nd**	**Valuation Overview**
Friday May 3rd – Monday May 6th: Exam		

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VALUATION IN FINANCIAL MARKETS
Session #1: The Segmentation of Cash Flow

Objective: **Valuing different cash flow streams**

Case: ***F-2050 Shamrock Capital: Pricing the Masters of Taylor Swift***

File: **F-2050X.xls**

Read: If you would like to refresh firm valuation techniques covered in FMP, you can review **F-1684-Business Valuation: Standard Approaches and Applications** and **F-1699-Business Valuation in Mergers and Acquisition** (you covered both in FMP 2). Otherwise, you can refresh your understanding by watching the online tutorial: **Methods of Valuation for Mergers and Acquisitions**.

Assignment:

1. What are the potential upside opportunities and downside risks of an investment in Swift's master recordings?
2. Please critique the base-case financial forecast in case Exhibit 10. Do you believe it to be a reasonable forecast of the financial outcomes? If not, what are your specific concerns?
3. Do you have any reservations about the case Exhibit 11 base-case valuation model of Shamrock's ownership of the masters? Do the assumptions about cost of capital and steady-state growth rate seem reasonable? Does $601 million represent a sensible base-case value for the investment? Note that the definition of FCF used in this model is FCF = NOPAT − Change in NWC − Change in NFA. Since the change in net fixed assets can also be defined as capital expenditures less depreciation and amortization, this definition of FCF is equivalent to the traditional definition, FCF = NOPAT − Change in NWC − capital expenditures + depreciation & amortization.
4. Based on the requested 3% payment to Braun specified in the base-case forecast in case Exhibit 10, what is the discounted-cash-flow value of the deal to Braun? Note that the cash flow to Braun is equal to his after-tax royalty income.
5. Based on the payments specified in the base-case forecast, what is the discounted-cash-flow value of the deal to Swift? Note that the cash flow to Swift is equal to her after-tax royalty income less increases in the amount retained in accrued royalties (which is her accounts receivable).
6. How would a Swift decision to rerecord all six albums impact the cash flow to the three parties? Please use the rerecording schedule estimates and streaming impact estimates in Exhibit 12 for your analysis. Exhibit 12 should be interpreted to forecast the decrease in streaming for the original masters, after that album is re-recorded. The total number of streams forecasted stays the same, what changes is the split between original and re-recorded masters. How do the investment valuations change under the scenario of Swift rerecording?
7. What market information from comparable companies is helpful as a benchmark in your valuation? Would you consider using market multiples or transaction multiples to value the masters?

8. Based on all your analysis, what do you believe the deal is worth to Shamrock? If you were Reynolds, what bidding strategy would you recommend to Shamrock's investment team?

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VALUATION IN FINANCIAL MARKETS
Session #2: The Segmentation of Cash Flow

Objective: **Introducing equity residual cash flow**

Case: **F-2072** ***Ramsay Street***

File: **F-2072X**

Read: **F-2070 An Introduction to Equity Residual Cash Flow**

Assignment:

1. How would you model the annual incremental benefits of buying versus renting? In your analysis, include a DCF model that captures the incremental benefits of equity ownership of the Ramsay Street house over the next three years versus renting. *Note:* To keep our models consistent, it is best if you do this in one incremental cash flow model where you tradeoff the incremental savings you get by not paying rent with the incremental costs of ownership including the after-tax interest and property tax payments. The cash flows used in your model should be equity residual cash flows. How do these differ from a free-cash-flow model? What are the incremental costs/savings before repaying the loan? And after?

2. The Averills are currently earning 3.5% on their savings. Is that the appropriate opportunity cost to use as the discount rate in your model? How does it reflect the risk of the cash flows? Based on the data forwarded from Jeremey Averill, what would he consider to be the appropriate discount rate?

3. What are the most important assumptions in the decision to buy the house on Ramsay Street?

4. What do you recommend that the Averills do?

This DCF analysis is unique in that the cash flows you calculate should be equity residual cash flows rather than free cash flows--since you should be subtracting payments to debt holders and only including cash flow to the equity holders (the Averills). With an equity residual cash flow valuation model, cash flow removes the annual interest payments and the annual repayments of the debt balance and the discount rate should reflect the risk born by just the equity holders as opposed to a weighted average cost of capital.

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VALUATION IN FINANCIAL MARKETS
Session #3: Equity Residual Approach – LBO

Objective: Introduce the Equity Residual Approach to valuation. Application to an LBO transaction.

Case: **F-1755 *Hat in Hand-Financing the Leveraged Buyout of Clear Channel Communications***

File: **F-1755X.xlsx**

Hat in Hand Student_template.xlsx

Read: **F-1639 Valuation of Late-Stage Companies and Buyouts**
You can see how LBO deals evolved in the past 10 years at **this link**.

Assignment:

1. What is a leverage buyout? What types of companies are good candidates for an LBO? What how do equity investors create value in an LBO?
2. Is Clear Channel a solid LBO candidate? What value creation sources can Bain/THL recognize with Clear Channel? What are the PE consortium's trouble with the Clear Channel deal?
3. If the bankers refuse to fund the agreed amount, should Bain/THL put in the extra capital or walk away from the deal?
4. Using the base-case assumptions, what are the free cash flows? What are the expected annual debt cash flows (interest payment and principal repayment) for each of the debt holders (existing, senior, subordinated)? What are the (residual) cash flows to equity? Please assume that THL/Bain use all positive equity cash flow the company generates over the next five years to pay down company debt. Which debt should they pay back first? How much debt do you anticipate Clear Channel will still have when Bain/THL exits the deal at the end of 2012?
   Note: You can use the "template" file to guide you through the calculations. When considering the base case and new terms for the financing, assume that the prime rate (LIBOR) is 3%.
5. What happens if the new terms included also a 25bp increase in spread over prime rate?
6. Access quantitative (IRR) and qualitative implications of each alternative decisions PE firms can make and be prepared to make a recommendation.
7. If you know that the financial forecasts you have in hand were compiled in the end of 2006, would your recommendations change?

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VALUATION IN FINANCIAL MARKETS
Session #4: Equity Residual Approach – LBO

Objective: Introduce the Equity Residual Approach to valuation. Application to an LBO transaction.

Case: ***F-1595 Lonestar Graphite***

File: **F-1595X - REVISED.xls**

Read: **Using the Equity Residual Approach to Valuation: An Example**

If you would like a reminder of (or would like more details on) how to lever-unlever beta, you can take a look at this note: A derivation of the levered beta formula

Watch: Introduction to the Equity Residual Approach

Assignment:

1. What is Hamilton's business? Why is Hamilton interested in Lonestar?
2. Based on the transaction multiples in Exhibit 8, what value do you expect UNOTEX expects to receive on their sale of Lonestar?
3. Using management's financial forecast for Lonestar in Exhibit 2, what is the implied equity residual cash flow forecast? Assume that the starting debt is $51.8 million and the debt and interest follows what is in Exhibit 2 ("Total Debt" at year-end for the forecast period is provided in the top row of the spreadsheet).
4. What value do you estimate that Hamilton can achieve for Lonestar upon exit?
5. What is your assessment of the reasonableness of the base-case financial forecast? How does your valuation change with the forecasts in Exhibit 4? What do you see as the major risks of this deal to Hamilton?
6. Based on the prevailing multiples and a desire to achieve at least a 25% IRR, what do you believe is the most equity that Hamilton should contribute to the Lonestar deal?
7. Suppose that you question the 25% IRR and want to estimate the discounted value of the equity cash flows using a cost of equity based on the CAPM. To do this, please follow the example in the technical note and note that it is customary to work backwards using the exit value as the terminal equity figure and estimating the previous annual equity value by discounting the next year's expected payouts at the prevailing cost of equity as EqVal(T-1) = (ERCF(T)+ EqVal(T)) / (1+Ke(T)), following the technical note, and continue to roll back the values and cost equity estimates year by year.
   Does your estimate using this model differ from your initial estimate of how much Hamilton should bid? Why?

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VALUATION IN FINANCIAL MARKETS
Session #5: Equity Residual Approach – Real Estate

Objective: **Extension of the Equity Residual Approach to real estate.**

Case: ***F-2011 Town Center at King of Prussia***

File: **F-2011X.xlsx**

Assignment:

1. Is the Town Center project a good investment? As part of your analysis, use the Supplement Exhibit provided in the spreadsheet to calculate the expected internal rate of return (IRR) associated with the project. Please consider the most important risks associated with the Town Center project.
   Note: Starting from the NOI, calculate the unlevered cash flow using the development (acquisition, hard, and soft costs should all be based on total SF) and the sale price (based on the cap rate valuation method, notice that NOI does not include reserves for this calculation, cf. Appendix). You may assume that replacement reserves are a cash expense such that the annual total cash flow can be estimated as NOI less replacement reserves. Exit value can be estimated using the cap rate valuation method. Taxes are not considered in this case as the taxes are passed through to the equity investors. Remember that the remaining debt balance is paid off upon the sale.
2. What is the IRR that the project would have if it was fully equity financed?
3. What is the IRR and Equity Multiple based on the levered cash flows, if the project is partly financed with a loan with LTC=65%?
   Consider the debt in this case as an amortizing loan, i.e., the payment of the loan is the same every year and it goes to pay interest and part of the principal (you can use the PMT formula in Excel to calculate the payment). Note that the annual equity residual cash flow is equal to the total cash flow less the annual interest payment and debt repayment. Remember that the remaining debt balance is paid off upon the sale. The annual debt amortization schedule can be calculated as: *End-of-year debt balance = Beginning-of-year debt balance – Principal repayment* and *Principal repayment = Annual debt service cost – Amount of payment that is interest*
4. Using the equity residual cash flow forecast and the terms of the equity partnership, what is the expected return (IRR) for the two equity partners: Lifetime Insurance and RDC?
   Note: A short cut to calculating the Promote is to use Goal Seek in Excel to find the final cash flow that generates an IRR of 12%. The difference between this cash flow and the forecasted cash flow is the value of the Promote.
5. Compare the unlevered, levered, and post-waterfalls IRR. What's the relationship between leverage, risk, and IRR? Does that same relationship hold for EM, the other valuation method?
6. Are the LP and RDC equally motivated to sell the project at a high multiple? Do they (both) prefer selling it earlier in time? You can do a simple sensitivity analysis to show this. How sensitive is your analysis to the assumed cap rates on the property?

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VALUATION IN FINANCIAL MARKETS
Session #6: Equity Residual Approach – Project Finance

Objective: **Extension of the Equity Residual Approach to project finance**

Case: ***F-1757 EDP Renewables North America: Tax Equity Financing and Asset Rotation***

File: **F-1757X.xlsx**

Read: **Note to accompany EDP case**

Supplementary Materials: Online tutorials: **Project Financing**

Assignment:

1. What is EDPR's business? What financing challenges does it face?

2. Why has EDPR relied on a project financing strategy, which uses tax equity and asset rotation investors to develop wind farms? Why is this better than a traditional financing approach of just using EDPR capital?

3. Based on the financial forecast (see adjusted Exhibit 14 as presented in the spreadsheet), what is the total annual cash flow generated by the Rising Star project? Is EDPR able to generate this cash flow on its own?

4. The case notes that EDPR offered a Tax Equity (TE) investor the cash flow allocations specified in Exhibit 14 in exchange for an equity investment of $240 million in the project. Based on the financial forecast in Exhibit 14, what are the total cash payments the TE investor expects to achieve? If the TE investor faces an opportunity cost of capital of 5%, is this an attractive investment?

5. Based on the Exhibit 14 forecast, what is the annual cash flow that the Class A shareholders expect to receive (According to Exhibit 13, the Class A shareholders are the Asset Rotation investor and EDPR)? The case notes that EDPR splits the Class A cash flow with a passive Asset Rotation (AR) investor that obtains a 49% claim in exchange for an investment of $90 million in the project. Using the financial forecast in Exhibit 14, what are the cash payments the AR investor expects to achieve? Should they be willing to invest at an opportunity cost of capital of 6%? What is the IRR that EDPR expects to earn with this financing structure?

What are the advantages and disadvantages of the financing strategy proposed? What returns and risks does each class of investors face? (Tax Equity, Minority Owner of cash equity, and EDPR) Describe the motivations and risks faced by all three sets of equity investors?

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VALUATION IN FINANCIAL MARKETS
Session #7: Options and Option Pricing

Objective: Introduce the basics of options and their valuation. Structuring new financial products and how they are used in wealth management.

Case: ***F-1752 Principal Protected Equity Linked Notes***

File: Option Valuation Models.xls

Read: ***F-1519 Option Contracts and Their Valuation***

F-1522 The Black-Scholes Option Pricing Model

OR view the online tutorials: Option Contracts and their Valuation, Introduction to Put-Call Parity , Estimating Volatility

Assignment:

1. Casals finds that customers appreciate structured notes such as the equity-linked note discussed in the case. What is the value proposition offered by such products?
2. Consider an equity-linked note with a 100% participation rate. Please graph the payoff at maturity for such a note across various levels of return for the S&P 500. How does the graph change if you the participation rate drops to 50% or 40%?
3. Casals is considering offering the notes for a price of $1 million. Is such a price a "fair" deal for both the client and the bank if the participation rate is 100%? How about a 50% or 40% participation rate? Hint: How should the bank allocate the $ 1 million to deliver this equity-linked note to the client? In other words, how could you "home cook" the same payoff as the equity-linked note using option contracts and other traditional financial securities? What do you estimate would be the cost of this package?
4. Casals realized that clients would like to get the $ 1 million capital guaranteed and receive 50% (not 40%) of the increase in the S&P500 index. Casals wanted to propose to the client whether she would accept a product with a cap on her gains if the S&P500 rises by more than 20%. This meant the client gets 50% of the S&P index appreciation (that is, 10%) if the index goes up 20% or more. See the payoff table below. How could the bank add this extra feature to the PP-ELN product? How could you "home cook" that same payoff using option contracts and other traditional financial securities? Is $1 million a "fair" price for this product?
5. What does put-call parity say about the pricing of puts on the SP500? How could you use puts to structure the product mentioned in question 2?

Ending value of the S&P500 (current index=1)	Underlying (S&P500) return	PP-ELN Payoff (principal = $ 1 million)	PP-ELN return
0.80	-20%	1	0%
0.85	-15%	1	0%
0.90	-10%	1	0%
0.95	-5%	1	0%
1	0%	1	0%
1.05	5%	1.025	2.5%
1.10	10%	1.05	5%
1.15	15%	1.075	7.5%
1.20	20%	1.10	10%
1.25	25%	1.10	10%
1.30	30%	1.10	10%

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VALUATION IN FINANCIAL MARKETS
Session #8: Options and Implied Volatility

Objective: Cover the relationship between implied and realized volatility

Case: ***Ito's Dilemma 2023 (Draft)***

File: ITO 2023.xlsx
Option Valuation Models.xlsx

Read: ***F-1519 Option Contracts and Their Valuation***

F-1522 The Black-Scholes Option Pricing Model

OR view the online tutorials: Option Contracts and their Valuation, Introduction to Put-Call Parity , Estimating Volatility

Assignment:

1. What did her instructor mean by the statement, "an American option is usually not better dead than alive"? To help your reflection on this comment, please decompose the market prices for the options into their intrinsic value and their time value. Note that the intrinsic value of a call option is equal to MAX (0, S – X) and the intrinsic value of a put option is equal to MAX (0, X – S). The time value of an option is the difference between the market price and the intrinsic value. Lastly, as American option is an option that can be exercised at any time before maturity.
2. What did her instructor mean by the statement, "Without volatility, an option has no purpose and therefore no value. The more volatility associated with holding the underlying asset, the more you're willing to pay for the optionality created by option contracts."
3. Do you, like Ito, find a consistent discrepancy between the option values you estimate using the Black-Scholes model and those priced by the market? Please note that Carnival does not pay dividends on its shares.
4. Do you believe there is a trading opportunity? If so, what specific trade do you recommend? If you were to implement either the Strangle or the Butterfly strategy, what specific contracts from Exhibit 1 would you buy and sell? How much would the strategy cost you?
5. By trading in the options and the stock, can you envision a strategy that generates a return but virtually no risk?

Note: The Black-Scholes formula for a put option is $p = Ke^{-rT}N(-d_2) - SN(-d_1)$ where d_1 and d_2 are calculated like in the tech notes.

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VALUATION IN FINANCIAL MARKETS
Session #9: Debt Valuation: The risks of debt

Objective: Understand a bond's price sensitivity to interest rate changes.

Case: ***F-2068 Standard Integrated Circuits***

File: **F-2068X.xslx**

Read: ***F-2075 Bond Prices and Interest-Rate Risk***

F-2084 Spot and Forward Interest Rates

Alternatively, you can view the online tutorials: Introduction to duration, Macaulay Duration , how to calculate the Macaulay duration using Excel & Modified Duration , Spot and Forward Interest Rates

Self-Assessments: I thought it may be helpful to provide a way for you to assess your understanding. Either before or after class, if you would like, you can do these self-assessment exercise, on Macaulay Duration , Modified Duration, on estimating spot rates and estimating forward rates

Assignment:

1. What are the risks faced by a bond investor? What factors contribute to the changes in the value of a bond?
2. How would you expect the value of the Treasury bonds in Exhibit 6 if all interest rates increased by 1? Verify the modified duration for the Treasury bonds in Exhibit 6 with 2.5- and 5-years to maturity. You can assume that they mature exactly 2.5 and 5 years after the case date (1/26/2022) and that their coupons are the same as their yields, as they trade at par. What does modified duration capture? If all interest rates increased by 1% on 1/27/2022, what would happen to the value of those bonds?
3. Evaluate the three offers faced by SIC's treasurer. Does SIC take on the same risks regardless of how they fund the Safe acquisition? What criteria would you use to compare them? Consider the costs and risks of each financing.
   Note: Duration can also be used to capture the loan's risks, using exactly the same formula as it is used for bonds, after adjusting the payments according to the loan schedule, the value of the bond today (the loan amount), and the yield (the loan rate).
4. Is there any other debt type you would ask the banker to price for you, if you were SIC's treasurer?
5. The three loans offered to SIC cannot be paid off early. If they could, would you expect the required interest payments to change? If yes, would all three required interest rates change the same way?
6. The banker offers a floating-rate loan as one of the options. Under this funding strategy, what would you expect the future 10 payments to be? How do you form your expectations for what the 6-month rates will be in the future?
7. Do you think the banker priced her offers correctly? What are her incentives?

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VALUATION IN FINANCIAL MARKETS
Session #10: Debt Valuation: Variable vs fixed rate

Objective: Understanding the valuation and use of interest rate swaps.

Case: **F-2073** ***Fixed- or Floating-Rate Debt? Let me Google That for You***

File: **F-2073X**

Read: ***F-2079 Interest Rate Swaps***

Or watch:

Interest Rate Swaps. Notice that the video refers to quarterly payments and quarterly-compounded rates. We will treat interest rate swaps to have semiannual payments and semiannually-compounded rates, just like we do for bonds. If you go through the video, make sure to integrate it with the tech note when preparing the assignment questions for the case.

Assignment:

1. Why is Google raising cash by issuing debt?
2. Based on the expectation theory, how are spot rates, forward rates, and future monetary policy rates connected? What are the current interest rate conditions? Are market in agreement regarding the general interest rate trend?
3. Using the spot rates for 0.5-year (5.430%) and 1-year (5.191%) in Exhibit 6, calculate the implied forward rate. Is it consistent with the quoted forward rates? Explain whether the markets expected a cut in interest rate to take place in the year following the case-date of July 25, 2023.
4. Using the rates in Exhibit 6, is the interest rate swap spread quoted to Santos correct? You can follow the tech note to answer this question.
5. In Exhibit 7, Santos lays out four scenarios for what rates could be six-months in the future. Standing in February 2024, rates could be exactly how they were expected to be in August 2023 (Scenario 1), a little higher (Scenario 2), lower (Scenario 3), or persistently high (Scenario 4). Assuming that the market's expectations for future interest rates in August 2023 were correct, what could Santos expect Google payments to be between August 2024 and August 2028, if Google were to issue a fixed-rate or a floating-rate bond?
6. How do the expected payments for a fixed- and floating-interest bond change if the forward rates behave instead like in Scenarios 2, 3, and 4, rather than Scenario 1? What would the value of the bonds be in February 2024 under the different scenarios? Why?
7. Should Google commit to pay fixed or floating interest payments? Why? Based on Exhibit 2, how could Google use financial engineering to match its relative exposure to interest rate risk to Apple? What would its expected payments look like in the different scenarios, if it did?

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VALUATION IN FINANCIAL MARKETS
Session #11: Funding Costs and Currencies

Objective: Understanding the valuation and use of interest rate swaps.

Case: ***F-1633 Vale SA***

File: **F-1633X.xls**

Read: ***F-1565 Hedged Cost of Funds***

Assignment:

1. Why does Vale normally borrow in USD? Why should Vale consider borrowing in a currency other than dollars?

2. Assuming that the bonds are issued at par, what is the relevant yield to maturity in USD for each of the currency alternatives? To do so, calculate forward rates for each currency and use those rates to convert the expected GBP- and euro-denominated annual bond payments into U.S. dollars.

3. Which debt issue would you recommend and why?

4. What is the credit spread implied by the three yields anticipated by Vale? How do these compare to average credit spreads in each of the markets?

Notes: The yields in the case are computed based on annual coupons as is true of all Euro bonds, including Euro bonds denominated in U.S. dollars.

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VALUATION IN FINANCIAL MARKETS
Session #12: Between Debt and Equity – Convertible Bonds

Objective: **Review convertible bonds and how they are priced.**

Case: ***F-2069 Tesla, Inc. Convertible Bonds***

Data: **Option Valuation Models.xlsx**

Online tutorial: *Convertible Bonds*, *Estimating Volatility*

Assignment:

1. How important is it for Tesla to raise external funding in 2019? Could the company wait? Or, on the contrary, has the company missed an opportunity to raise the funding earlier in the year or in the previous year?

2. How should the company raise the funding? What are the pros and cons of a seasoned equity offering? A straight bond? A convertible bond?

3. The case states a convertible bond can be valued as the sum of a straight bond plus a call option. What is the value of the call option component of the convertible bond offering assuming that the bond matures in five years and the conversion premium is 27.5%? Note that the strike price resulting from a 27.5% conversion premium will determine "how many" options are embedded in the convertible bond. For sake of simplicity please ignore the impact of dilution. Be prepared to explain your choice of inputs for the Black-Sholes pricing model for the stock price, risk-free rate, dividend yield, and volatility.

4. How should you value the bond component of the convertible bond? What are the cash flows? What discount rate should be used to value the cash flows? What should the coupon rate be in order for convertible bond with a 27.5% conversion premium to sell at exactly $1,000 per bond?

5. What coupon rate should he propose for a 15% conversion premium? What about for a 40% conversion premium?

6. What conversion rate and coupon would you recommend Tesla to issue the bond with?

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VALUATION IN FINANCIAL MARKETS
Session #13: Between Debt and Equity – M&A with Contingent Value Rights

Objective: **Firm Valuation and Options**

Case: *Canadian Pacific's Bid for Norfolk Southern (HBS 9-216-057)*

File: **CanPac-NorfSouth.xlsx (Use my spreadsheet with calculations)**

Option Valuation Models.xlsx

Assignment:

1. What do you see as Canadian Pacific's (CP) rationale for the merger? Do you think this merger is compelling?
2. Exhibit 6 in the excel spreadsheet provides a valuation of Norfolk Southern (NS) as a standalone company (PPS=79.76). In the same sheet, you will find a valuation of the synergies that could be realized by the CP-NS merged company. The synergies are from Table A, and include the expected pre- and post-merger benefits from the operational improvements and the combination synergies. The text (page 7) suggests that the merger would also provide tax benefits by reducing taxes for the combined company. We will ignore the tax benefits.
3. On Dec 8th, CP made the offer to exchange the following package for each share of Norfolk Southern stock: $32.86 in cash plus 0.451 CP-NS shares. Note that the offer is for shares in the combined CP-NS company, not shares in the old CP company, as implied in the case. What is the value of the package being offered to Norfolk Southern shareholders? Which company's shareholders are benefitting more from the merger?
   This is a tough question and will fill the bulk of our discussion in class. The "combined company" sheet provides a structure for the estimation. Please note that the price per share of the consolidated CP-NS company can be estimated as follows:

   a. Pre-merger Standalone Enterprise Value of the two businesses
   b. Plus the value of the merger gains
   c. Less the value of the existing debt of the two standalone businesses
   d. Less the new debt being offered to finance the cash portion of the deal
   e. Divided by the post-merger shares outstanding

   In other words, the assets of the combined company are the sum of the assets of the two original companies plus the synergies. The debt of the new company is the sum of the original companies' debts and the new debt that was raised to pay the cash portion of the deal. The combined company equity can be found by subtracting the latter from the former.
   To simplify our discussion, please assume that the pre-merger announcement prices of $134/share for Canadian Pacific and $79.76/share for Norfolk-Southern (consistent with NS's valuation from the model in sheet "Exhibit 6") represent the standalone equity values for these two businesses. For new debt, you can assume that all cash payments that Canadian Pacific makes to Norfolk-Southern shareholders are financed with new debt (and

that the companies' current cash levels are operational). To calculate the post-merger shares outstanding for the merged business, you will need to assume that all NS shares are converted at a ratio of 0.451 CP-NS shares for each NS share, and CP shares are converted at a ratio of 1 CP share per CP-NS share.

3. How does the value of the revised offer made to NS investors change, if an investor expects only half of the synergies to be realized?
4. On Dec 16th Canadian Pacific added a sweetener, 0.451 of a Contingent Value Right (CVR) to the offer. What is the payoff profile of the CVR? What is Canadian Pacific's motivation to sweeten the offer?
5. How do you replicate the CVR with call and put options? Using the Black-Scholes model, what is the value of a CVR?
6. Using your analysis, what is the value of the December 16th package being offered to Norfolk-Southern shareholders? How does it compare to the standalone stock price of $80 per share? How does this value change if the merger is only able to achieve 50% of the merger benefits? What NS equity investor will see the largest increase in their perceived value, when CP adds the CVR to the deal?
7. Would you advocate that the board accept or reject the revised offer?

UNIVERSITY of VIRGINIA
DARDEN SCHOOL OF BUSINESS

VALUATION IN FINANCIAL MARKETS
Session #14: Valuation Overview

Objective: Overview of Valuation & Last Year's Exam.

Read: Rock Capital

File: Rock Capital XLS

Option Valuation Models XLS

Sample Submissions:

Sample 1

Sample 2

Assignment:

The following questions mirror questions that you might expect in the exam. You may consider completing the questions as a practice exam.

Please complete a memo from the perspective of Melanie Waters that provides commentary and recommendations to the Rock Capital investment committee on the Silver Light investment and the Napoleon Mountain investment. To submit the memo, you should upload a single pdf file containing up to one-page of text and three pages of exhibits to support your analysis. The exhibits and memo should be professional and legible such that it is easy for someone that understands such analysis to follow your work.

Your memo should include the following:

PART 1 (50 points). Please articulate the key assumptions that are critical to the success of the Silver Light deal and include an exhibit which shows the detail of your estimation of the expected equity residual cash flow and debt repayment from 2022 to 2030 as well as the respective internal rate of return associated with the deal.

PART 2 (25 points). Please provide your perspective on the relative merits between Financing Alternative A and Financing Alternative B (i.e., which investment package is better for Rock Capital?). Your perspective should include an analysis of the debt cash flows associated with the two proposals and a comparison of the returns that Rock Capital should expect to return. To avoid exchange rate risk, you should consider the impact of hedging the exchange rate risk of the Swiss franc note using the forward prices associated with the Law of One Price and report the implied forward prices.

PART 3 (25 points). Please provide your perspective on the relative merits between Financing Alternative A and Financing Alternative C (i.e., which investment package is better for Rock Capital?). Your perspective should include a valuation of the debt component of the convertible note based on a 9% discount rate and a valuation of the option component of the convertible bond.