

Devin Barras Case Scenario

Devin Barras is valuing a company named Fumbler. Fumbler has been growing at a faster growth rate than the other companies in the similar industry. The company has not paid any dividends so far. The earnings are stable and growing. The income statement for the recent year for the company is given in Exhibit 1.

Exhibit 1
Fumbler: Income Statement (in thousands dollars) 2012

Revenue	350
Cost of goods sold	<u>120</u>
Gross profit	230
SG&A	<u>60</u>
EBITDA	170
Depreciation and amortization	<u>55</u>
Earnings before interest and taxes	115
Interest expense	<u>35</u>
Earnings before taxes	80
Taxes (@40%)	<u>32</u>
Net Income	48

In the footnotes of the company, the company has provided the details that it has sold a long-term asset for \$300,000. The book value for that asset was \$280,000. The gain in the asset has been recognized as a part of revenue. The balance sheet at the end of last year has been given in Exhibit 2.

Exhibit 2
Fumbler: End of year Balance Sheet (in thousands dollars)

Year	2011	2012
Cash	75	103
Accounts receivable	40	55
Inventory	<u>120</u>	<u>145</u>
Current Assets	235	303
Net PP&E	<u>450</u>	<u>440</u>
Total Assets	685	743
Accounts payable	105	95
Current portion of long term debt	<u>45</u>	<u>55</u>
Current liabilities	150	150
Long-term debt	250	260
Common stock	200	200
Retained earnings	<u>85</u>	<u>133</u>
Total liability and equity	685	743

The free cash flow to firm is expected to grow at a rate of 10% for next 3 years and after that it would stabilize to a long term growth rate of 4%. The financing details and capital structure for the company are given in Exhibit 3.

Exhibit 3

Target D/E ratio	0.8
Before tax cost of debt	8.00%
Marginal tax rate	40.0%
Cost of equity	12.50%

In management and discussion it is given that company would start dividend payments after 5 years. Devin is contemplating the impact of dividend payments on the free cash flow to the firm.

Kevin Spacey, a friend of Devin, asks him about the impact of dividend payments, stock issuance, and debt issuance on free cash flow to the firm. Devin makes the following statements:

Statement 1: There is no impact of dividend payment on the free cash flow of the firm for a particular year

Statement 2: There is no impact of stock issuance on the free cash flow to the firm for a particular year

Statement 3: The free cash flow to the firm will increase on debt issuance for a particular year

1. What is the change in working capital for the company for calculation of FCFF in year 2012 from year 2011?
 - a) \$88,000
 - b) \$78,000
 - c) \$50,000
2. What is the change in fixed capital investment for the company in year 2012?
 - a) -\$30,000
 - b) \$25,000
 - c) \$65,000
3. What is the free cash flow to the firm for year 2012?
 - a) \$29,000
 - b) \$49,000
 - c) \$84,000
4. What is the value of the firm?
 - a) \$1,178,759
 - b) \$732,776
 - c) \$697,633
5. Which of the following statements made by Devin is least accurate about the impact on FCFF of dividend payments, stock issuance, and debt issuance?
 - a) Statement 1
 - b) Statement 2
 - c) Statement 3
6. What is the least likely impact of free cash flow to the firm on the payment of dividends in the future years?
 - a) Decrease in free cash flow to the firm
 - b) No impact in the free cash flow to the firm
 - c) Increase in free cash flow to the firm

Daniel Brown Case Scenario

Daniel Brown, a CFA charter holder, has run a regression on time series data for the sales data. He has used a log-linear model and the results of the regression model are shown in Exhibit 1.

Exhibit 1

	Coefficient	Standard Error	t-statistic
Intercept	2.15	0.025	86.0
Trend	0.055	0.005	11.0

Model is $\ln \text{revenue} = b_0 + b_1(t)$ where $t = 1, 2, \dots, 32$ and revenue is in million dollars.

He has used quarterly data from 1st quarter of 2000 to the last quarter of 2007.

Daniel is contemplating between choosing AR (1) model or AR (2) model for a particular auto-regression of some data. To check the forecasting accuracy of both the models, he used both model for forecasting the results from 1st quarter of 2008 to last quarter of 2012. He also calculated the root mean squared error (RMSE) for the residuals of data from 1st quarter of 2000 to the last quarter of 2007. The results of the RMSE are shown in Exhibit 2.

Exhibit 2

	AR(1) model	AR(2) model
RMSE for data from 2000 to 2007	5.64	4.12
RMSE for data from 2008 to 2012	12.59	14.11

He wants to form a hypothesis test for autoregressive conditional heteroskedasticity. The ARCH (1) model is $e_t^2 = a_0 + (a_1 - 1)e_{t-1}^2 + \mu_t$

He also runs a regression using two time series of stock returns and GDP growth where none of the time series are covariance stationary and are not co-integrated as well.

Joseph Lentz, a colleague of Daniel, asks him about the conditions for a time series model to be covariance stationary. Daniel makes the following statements:

Statement 1: It should have a constant and finite expected value

Statement 2: It should have a constant and finite variance

Statement 3: It should have a constant and finite covariance between values at any given lag

Joseph asks him about the random walk model as well. He wants to know about the properties of random walk model. Daniel makes the following statements:

Statement 4: The expected value of each error term is zero

Statement 5: The variance of the error terms is constant and there is no serial correlation between the error terms

Statement 6: The random walk model is covariance stationary

7. What is the approximate predicted value of revenue for the 3rd quarter of 2010?
- a) \$91.38 million
 - b) \$73.33 million
 - c) \$15.72 million
8. Which autoregressive model he should use by looking at the residual mean squared errors (RMSE)?
- a) AR(1) model
 - b) AR (2) model
 - c) Either of AR(1) model or AR(2) model
9. Can the linear regression model be used for modelling the relationship between two time series in the given example of stock return and GDP growth rate?
- a) Yes, because they are not co-integrated
 - b) Yes, because they are not covariance stationary
 - c) No
10. What would be the null hypothesis for the autoregressive conditional heteroskedasticity?
- a) $a_0 = 0$
 - b) $a_1 = 0$
 - c) $a_1 = 1$
11. Which of the following statements made by Daniel is least likely to be accurate regarding the conditions of a time series model to be covariance stationary?
- a) Statement 2 as it should have only finite variance which may or may not be constant
 - b) Statement 3 as it should have a constant variance which need not be finite
 - c) All statements are correct
12. Which of the following statements made by Daniel is least likely to be accurate regarding the properties of a random walk model?
- a) Statement 5
 - b) Statement 6
 - c) All statements are correct

Peter Robinson Case Scenario

Peter Robinson is trying to calculate the cost of equity for a company, Little Flower. He thinks that the Fama-French model would be applicable for that company and wants to check whether the model is statistically explaining the returns of the stock over a period. He runs the regression model for the company for the monthly return data of last 5 years and the results of the regression are given in Exhibit 1. He runs the regression by keeping the constant term as zero.

Exhibit 1

	Coefficient	Standard error	t-statistics
$R_M - R_f$	1.6	0.4	4.00
$R_{small} - R_{big}$	0.4	0.12	3.33
$R_{HBM} - R_{LBM}$	-0.7	0.27	-2.59

ANOVA	df	SS	MS	F	Significance F
Regression	-	84.50	-	-	<0.005
Error	-	120.50	-	-	
Total	-	205.00	-	-	
R^2	-				

The Fama-French model is formulated as: $R_i - R_f = \beta_{mk,it} * (R_M - R_f) + \beta_{SMB,i} * (R_{small} - R_{big}) + \beta_{HML} * (R_{HBM} - R_{LBM}) + e_i$

- Where $R_{mk} - R_f$ = return on a value-weighted market index minus the risk-free rate
- $R_{small} - R_{big}$ = average return on 3 small-cap portfolios minus the average return on 3 large-cap portfolios
- $R_{HBM} - R_{LBM}$ = average return on 2 high book-to-market portfolio minus the average return on 2 low book-to-market portfolios

The critical value of test statistic at 5% degree of significance and 59 degrees of freedom is 2.00 for two-tailed test and 1.67 for one-tailed test.

Peter is worried about the presence of heteroskedasticity in the given data. He checks the heteroskedasticity using Breusch-Pagan test. He runs a regression on the squared residuals with the independent variables and the result of that regression is given in Exhibit 2.

Exhibit 2

	SS
Regression	128.55
Error	312.12
Total	440.67

The one-tailed critical value for a chi-square distribution for 5% level of significance is given in Exhibit 3.

Exhibit 3

Degrees of freedom	Value of chi square
1	3.841
2	5.991
3	7.815

Peter is also contemplating the addition of another independent variable liquidity premium in the Fama-French model (it will become Pastor-Stambaugh model after addition of that). He wants to check whether the addition of new independent variable is desirable or not. He checks that by adding another variable and by running the regression on the data and finds out that because of addition of that data, R^2 value increased by 2.0%.

13. What is the F-statistic value for the given multiple regression model?
- 0.70
 - 13.09
 - 40.67
14. How much percentage of variation in the equity risk premium is unexplained by the regression model?
- 29.17%
 - 41.22%
 - 58.78%
15. What is the required return on equity for Little Flower using Fama-French regression model if the market risk premium is 6%, $R_{\text{small}} - R_{\text{big}} = 2.5\%$ and $R_{\text{HMB}} - R_{\text{LBM}} = 1.5\%$? Assume the risk free rate to be 5.5%.
- 9.55%
 - 15.05%
 - 17.15%
16. Is heteroskedasticity present in the given regression data?
- Yes, because the test statistic is greater than the critical value of 3.841
 - Yes, because the test statistic is greater than the critical value of 7.815
 - No, because the test statistic is lesser than the critical value of 7.815
17. Should Peter include the additional independent variable liquidity premium in the Fama-French model?
- Yes, because R^2 increased by 2.0% on addition of that independent variable
 - Yes, because adjusted R^2 increased on addition of that independent variable
 - No, because adjusted R^2 decreased on addition of that independent variable
18. At 5% level of significance, is the beta of market (coefficient of market risk premium) statistically significant than 1?
- Yes, because the calculated t-statistic 4.0 is greater than the critical test statistic of 2.00
 - Yes, because the calculated t-statistic 4.0 is greater than the critical test statistic of 1.67
 - No

Hemanta Veksler Case Scenario

Hemanta Veksler, CFA, is an equity analyst in Inaam Securities. He values securities using relative valuation models. He calculates the justified price multiples and compares those with the actual multiple to make investment decisions. He is looking at two securities. The data for the securities has been provided in Exhibit 1.

Exhibit 1

	Xyre Limited	Sonoco Inc.
Current earnings per share	\$12.00	GBP 8.00
Required return of equity	14.50%	12.50%
Rate of inflation	5.00%	2.0%
Percentage of cost passed through to revenue	60%	50%

While calculating the justified P/E ratios for Xyre Limited and Sonoco Inc. Hemanta assumed that the growth rate in earnings is due to inflation only and all the earnings have been paid as dividends.

The share price of Xyre Limited is trading at \$95 and that of Sonoco Inc. is trading at GBP 60.

Dhruv Richman, CFA level II candidate, has just joined the firm. He is going through training. Hemanta is guiding him through his training. Dhruv asks Hemanta about the P/E ratio that whether in an industry a firm with a higher P/E ratio is always overvalued as compared to a firm with a lower P/E ratio.

Hemanta replies that it is not necessary that a higher P/E ratio means that the company is overvalued. If a firm has a higher P/E ratio than the other company, it could be because of following reasons:

Reason 1: The firm is overvalued

Reason 2: The firm has a higher required rate of return

Reason 3: The firm has a higher growth rate in earnings

Hemanta also tells that because P/E ratio doesn't take care of growth in the earnings, another ratio PEG can be calculated to compare the firms. PEG ratio is calculated by dividing the P/E ratio by the growth rate of the company. However, there are some limitations with PEG ratio as well.

Limitation 1: It assumes a non-linear relationship between P/E and growth

Limitation 2: It does not factor in differences in risk

Limitation 3: It does not account for the difference in the duration of growth

Dhruv is studying the historical pattern of P/E values for cyclical companies. He finds out that the P/E value is high at the bottom of the cycle when the EPS is low and is low at the top of the cycle when the EPS is high.

Hemanta explains that this is due to the Molodovsky effect which is the cause of this counter cyclical property of P/Es. He states that the high P/E at the bottom of the cycle can also be explained in this way: P/Es may be positively related to recent earnings growth rate but negatively related to the anticipated future growth rate because of expected drop in the earnings.

After explaining many other things to Dhruv, Hemanta asks him a question. He asks him to calculate the justified P/B ratio for a company for which data is given in Exhibit 2.

Exhibit 2

Justified forward P/E ratio	10.0
Dividend payout ratio	40.0%
Return on equity	16.0%
Required return on equity	12.0%

19. Which of the following securities is/are overvalued according to P/E ratio?
- Xyre Limited
 - Sonoco Inc.
 - Both the securities are undervalued
20. Which of the following stock is justified a higher P/E ratio?
- Sonoco Inc.
 - Xyre Limited
 - Both the stocks have same justified P/E ratio
21. Which of the following reasons given by Hemanta regarding the interpretation of P/E ratio is least likely to be correct?
- Reason 1
 - Reason 3
 - Reason 2
22. Which of the following limitations is least likely to be accurate for PEG ratio as stated by Hemanta?
- Limitation 2
 - Limitation 1
 - Limitation 3
23. What is the justified P/B ratio for the company whose data is given in Exhibit 2?
- 2.0
 - 3.0
 - 4.0
24. Is Hemanta correct about the explanation of Molodovsky effect?
- Yes
 - No, he is explaining the cause of lower P/E at the top of the cycle
 - No, because high P/E ratio has nothing to do with the recent growth rate

Robert Higgs Case Scenario

Robert Higgs, CFA, is working as a security analyst in Casey Research. His primary job is to calculate the required return on equity for various stocks. He has developed an expertise in this field by working more than five years.

He is looking at S&P Index. He calculates the equity risk premium using macroeconomic model estimates. The data for the security is given in Exhibit 1.

Exhibit 1
S&P Index

Expected Inflation, EINFL	2.0%
Expected growth rate in real earnings per share, EGREPS	2.5%
Expected growth rate in P/E ratio, EGPE	5.0%
Expected income component, EINC	3.0%

The expected risk free rate is 6% per annum.

He also calculates the equity risk premium of S&P Index using Gordon growth model estimates. The dividend yield on the index based on year-ahead aggregate forecasted dividends and aggregate market value is 2.5%. The consensus long-term earnings growth rate is 4.5%. The current long-term government bond yield is 3.0%.

Bob Murphy, portfolio manager in Casey Research, asks Robert to calculate the required return on equity for a small cap stock using Fama-French model. Robert extracts the data for the small cap stock, Bluestone Inc., which is given in Exhibit 2.

Exhibit 2
Bluestone Inc.

RMRF (return on market value-weighted equity index in excess of the one-month T-bill rate)	6.0%
SMB (average return on small cap portfolios minus the average return on large cap portfolios)	1.5%
HML (average return on high book-to-market portfolios minus the average return on low book-to-market portfolios)	3.0%
Beta (mkt)	1.2
Beta (value)	-0.7
Beta (size)	0.9
Risk-free rate	6.0%

Bob inquires Robert about the model to be used for calculating the required return on equity for relatively illiquid securities. Robert replies that a model known as Pastor-Stambaugh model (PSM) can be used to calculate the required return on equity. The liquidity premium is also added to Fama-French model and the beta of the stock with respect to liquidity is multiplied with the liquidity premium to get the liquidity premium for the stock. He also makes following statements:

Statement 1: The more liquid stock will have a higher liquidity beta

Statement 2: Average-liquidity equity should have a liquidity beta of zero

Statement 3: The liquidity premium represents the excess returns to a portfolio that invests the proceeds from shorting high-liquidity stocks in a portfolio of low-liquidity stocks

One colleague asks Robert to calculate the required return on an equity using bond yield plus risk premium method for Capstone Inc. The data for Capstone Inc. is given in Exhibit 3.

Exhibit 3
Capstone Inc.

Macaulay Duration of long-term debt	12.80
Modified duration of long-term debt	11.95
Number of coupon payment per year for long-term debt	1.00
Risk premium for holding the security	4.5%
Risk-free rate	6.0%

Bob asks him about the difference between the statistical multifactor models and macroeconomic factor models. Robert makes the following statements:

Statement 4: In macroeconomic factor models, the factors are economic variable that have impacted the historical cash flows of companies

Statement 5: In statistical factor models, statistical methods are applied to historical returns to determine portfolios of securities that explain those returns in various senses.

25. What is the equity risk premium for S&P Index? Use macroeconomic model estimates to calculate the equity risk premium.
- a) 6.50%
 - b) 6.78%
 - c) 7.07%
26. What is the GGM (Gordon growth model) equity risk premium estimate?
- a) 3.90%
 - b) 4.00%
 - c) 4.11%
27. What is the required return on equity for Bluestone Inc. using Fama-French model?
- a) 12.45%
 - b) 14.85%
 - c) 16.65%
28. Which of the following statements made by Robert is least likely to be accurate for PSM model?
- a) Statement 1
 - b) Statement 2
 - c) Statement 3
29. What is the required return on equity for Capstone Inc. using bond yield plus risk premium method?
- a) 9.80%
 - b) 10.50%
 - c) 11.61%
30. Which of the following statements made by Robert regarding the statistical multifactor model and macroeconomic multifactor model is least accurate?
- a) Statement 4
 - b) Statement 5
 - c) Both statements are correct