Certified International Investment Analyst

EXAMINATION I

Economics

Corporate Finance

Financial Accounting and Financial Statement Analysis

Equity Valuation and Analysis

Questions

Final examination

September 2018

Question 1: Economics **(38 points)**

On December 22nd, 2017 the "Tax Cuts and Jobs Act" was signed into law in the United States (U.S.). Two of its key elements include sizeable (temporary) cuts in individual tax rates and significant (permanent) decreases in corporate tax rates.

For the purpose of the following analysis we will assume that the U.S. economy was in equilibrium at its natural level before the tax rate cuts were decided (and implemented).

a) We first consider potential effects of the cuts in individual tax rates. For illustrational reasons we assume that the cuts in these tax rates lead to a general increase in the disposable incomes of households. In question a) we treat the U.S. as a closed economy.

   a1) We start analysing the effects of the cut in tax rates employing the IS-LM model framework. First, shortly present – including a graphical representation - the IS-LM model. Then, briefly outline the consequences that the cut in the individual tax rates will have in the IS-LM model. Illustrate also your answer graphically. (8 points)

   a2) Assuming that the tax policy has the desired economic effects, i.e., will boost the economy. How will the central bank of the U.S. likely react knowing the potential long run effect of the tax policy above? Again, illustrate your answer graphically. Assume that the inflation rate was at its target level before the implementation of the tax reform. Hint: The inflation rate is not directly modelled within the IS-LM framework. You consider how the inflation rate will change with respect to the outlined scenario.]

   (3 points)

b) We now switch to the AS-AD model framework. As in questions a), we assume that the U.S. is a closed economy.

   b1) First shortly explain – including the use of a graphical representation – the AS-AD model framework. Consider the case of long-run equilibrium, where the output reaches its natural level. Then, briefly outline the consequences that the cut in the individual tax rates will have in the AS-AD model. Illustrate also your answer graphically.

   (8 points)

   b2) What longer-run effects will occur? How does the new longer-run equilibrium compare to the initial one? Shortly characterize the dynamics to the new long run equilibrium. Illustrate your answer graphically. (4 points)

c) We still focus only on the cuts in individual tax rates but now consider the U.S. as an open economy. We assume that the uncovered interest rate parity (UIP) and the Marshall-Lerner condition hold. Furthermore, we assume that capital is perfectly mobile internationally and that the U.S. exchange rate is flexible with respect to the considered foreign exchange rate (such as the euro or the yen).

   c1) Explain– including the use of a graphical representation – the Mundell-Fleming model. In this context, also provide a short exposition of the UIP relationship. (5 points)

c2) Briefly outline the consequences that the cut in the individual tax rates (considered in question a1) will have in the Mundell-Fleming model. Include a graphical illustration of your answer. Briefly compare your answer to the case of the closed economy considered in question a1). (6 points)

d) We now abstract from the cut in individual tax rates and exclusively consider the permanent cuts in the corporate tax rates and interpret them as permanent improvements in the supply conditions of firms. To answer the following questions, please use the AS-AD model framework (assuming that the U.S. is a closed economy).

Shortly outline the consequences that the cut in the corporate tax rates will have. Illustrate your answers graphically. Assume that the economy initially is in equilibrium at its natural level. (4 points)

Question 2: Financial Accounting and Financial Statement Analysis (52 points)

Singsang, a South Korean electronics group, launched a new version of its smartphone before Christmas, the Universe 9. The new model features exciting new innovations, as for example an OLED screen, facial recognition, and a camera able to take 3D pictures.

a) Determine the impact of the following transactions on Singsang's financial reporting and specify the respective amounts to be accounted for in Singsang's balance sheet, income statement and cash flow statement. The rate to be applied for current and deferred income taxes is 30%. Changes in current tax have to be recognized in the balance sheet under current tax liabilities. Unless indicated otherwise, taxable profit is the profit calculated according to IFRS. Current tax expense leads to current tax liabilities. Cash and cash equivalents on January 1st, 2017 was USD 2,000 million.

   Fill tables 1 to 3 and give reasons and justifications for your assessment when necessary.

   a1) Singsang spent USD 500 million of development costs for Universe 9's new features. All these costs are cash expenses. 20% of the costs do not satisfy the requirements for capitalization according to IFRS. The costs incurred have caused the company's tax expense to be reduced by USD 150 million (30% of USD 500 million). No depreciation and amortization is to be taken into account. (14 points)

   a2) In the financial year under review, Singsang has sold 1 million smartphones at a price of USD 700 each (cash sales). A total of 1.2 million smartphones have been produced. The following cash expenses have been incurred for manufacturing costs and for sales, general and administrative costs:

   - Manufacturing costs: USD 360 million
   - Selling expenses: USD 100 million
   - Non-capitalizable general and administrative expenses: USD 50 million

   (14 points)

   a3) In the financial year under review, Singsang had to announce a recall of the predecessor model due to a defective battery. Singsang estimates the costs for the recall of the defective product to be USD 600 million [Note: Nothing has yet been spent]. Singsang is also facing a potential fine in the amount of USD 300 million for the improper disposal of defective units. Singsang estimates the likelihood of having to pay the fine to be 30%. (12 points)

Table 1:

Impact on balance sheet (in USD millions)	Question a)		
	a1)	a2)	a3)
Non-current assets			
Intangible assets			
Property, plant and equipment			
Financial investments			
Deferred taxes			
Current assets			
Inventories			
Receivables			
Cash and cash equivalents			
Equity			
Issued capital			
Reserves			
Profit/loss for the year			
Non-current liabilities			
Amounts payable			
Deferred taxes			
Current liabilities			
Provisions			
Tax liabilities			

Table 2:

Impact on income statement (in USD millions)	Question a)		
	a1)	a2)	a3)
Sales revenue			
Cost of goods			
General and administrative expenses			
Selling expenses			
Research and development			
Other income			
Other expenses			
Operating profit			
Finance costs			
Profit or loss before tax			
Current income taxes			
Deferred income taxes			
Profit/loss for the year			

Table 3:

Impact on cash flow statement (in USD millions)	Question a)		
	a1)	a2)	a3)
Profit/loss for the year			
Depreciation and amortization expense			
Change in provisions			
Change in inventories			
Change in tax liabilities			
Change in deferred taxes			
Cash flow from operating activities			
Investments in property, plant and equipment			
Investments in intangible assets			
Cash received in connection with divestments			
Cash flow from investing activities			
Bank loans raised			
Bank loans repaid			
Cash flow from financing activities			
Change in cash and cash equivalents			
Cash and cash equivalents on Jan 1, 2017	2,000	2,000	2,000
Cash and cash equivalents on Dec 31, 2017			

b) In order to avoid a recurrence of an issue in the future like that of the battery of the predecessor model, Singsang acquired an 80% stake in Chinese battery manufacturer Li Ionel on December 31, 2017. The purchase price paid for the shares was USD 1.5 billion.

b1) At the time of the acquisition, the book value of Li Ionel's net assets was USD 900 million. The fair value of unrecognized assets was estimated to USD 300 million. Li Ionel's income tax rate is 25%. In its consolidated financial statements, Singsang measures any non-controlling interest in the acquiree at the non-controlling interest's proportionate share of the acquiree's identifiable net assets.

Determine the amount of goodwill to be accounted for by Singsang in its consolidated balance sheet (and show how you came about this amount). (8 points)

b2) To finance the acquisition, Singsang issued a bond in the amount of USD 1.0 billion at the end of 2017. The issue price was 98%, the nominal interest rate is 3% p.a., and the effective interest rate 3.3%. Indicate how the bond issue will impact Singsang's cash flow statement in 2017 and 2018. Singsang recognizes interest payments in its operating cash flow. Taxes are not to be taken into account. Use tables A and B right below. (4 points)

Table A: Impact on cash flow statement in 2017 (in USD millions)	
Line item	**Amount**
Cash flow from operating activities	
Cash flow from investing activities	
Cash flow from financing activities	
Cash and cash equivalents on Jan 1	2,000
Cash and cash equivalents on Dec 31	

Table B: Impact on cash flow statement in 2018 (in USD millions)	
Line item	**Amount**
Cash flow from operating activities	
Cash flow from investing activities	
Cash flow from financing activities	
Cash and cash equivalents on Jan 1	2,000
Cash and cash equivalents on Dec 31	

Question 3: Corporate Finance **(41 points)**

Warta SE is a pan-European producer of power storage solutions. Warta's shares are cross-listed and actively traded on the major European stock exchanges. Warta faces a five year fixed-term project for producing ultra-slim flexible high-capacity lithium-ion batteries on behalf of Sumsang Corporation, a world-leading manufacturer of cellular phones, as Sumsang expects the demand for cell phones to peak throughout the next five years. Warta's management has to assess the profitability of this project from various perspectives.

The project bears the same systematic risk as Warta's assets in place and requires a net initial investment of EUR 10'000'000 (at the beginning of the year 2019). The project does not require any further investments until maturity. In particular, the project does not result in any changes of Warta's net working capital.

Finn Angel, Warta's chief financial officer, forecasted the project's income statements for the next five fiscal years in euro (EUR) assuming straight-line depreciation. An excerpt of those income statements (year-end estimates in million EUR) is summarized in Exhibit 1.

Exhibit 1.

	2019	**2020**	**2021**	**2022**	**2023**
Revenues	5.4	5.8	6.2	5.9	6.1
Cost of goods sold	0.5	0.6	0.7	0.6	0.8
Depreciation	2.0	2.0	2.0	2.0	2.0
EBIT	2.9	3.2	3.5	3.3	3.3

Based on the CAPM (Capital Asset Pricing Model), the beta of Warta's shares equals 1.1. Warta's current leverage (in market values) amounts to 1. Warta's outstanding corporate debt is risky and has a debt beta of 0.3. The nominal risk-free rate of return equals 0.5% p.a. The European stock market is expected to earn a 10.5% return p.a. Let Warta's relevant corporate tax rate in Europe be 25%.

a) Provide the solution to the following problems. [Note: Keep track of all digits.]

a1) Determine the project's expected free cash flow to the firm (FCFF) in the fiscal years 2019 to 2023 (excluding the net initial investment). (5 points)

a2) Determine the project's weighted average cost of capital (WACC). Use the Capital Asset Pricing Model (CAPM) to calculate cost of equity (k_E) and cost of debt (k_D).

(7 points)

a3) Determine the project's net present value (NPV) as of January 1st, 2019. (3 points)

b) Finn Angel proposes a project-specific capital structure. In detail, the extent of debt financing underlying the project should be 20% [i.e. Debt / Value of the project = 0.2]. The debt's riskiness remains the same.

b1) Determine the systematic risk of Warta's assets in place. (3 points)

b2) Determine the project's equity cost of capital under the proposed project-specific capital structure. (5 points)

b3) Determine the project's weighted average cost of capital under the proposed project-specific capital structure. How is the project's net present value affected by the proposed project-specific capital structure? [Note: If you did not solve the problem a2) then use 7.0625% as that solution.] (4 points)

c) Finn Angel's term as CFO ends on December 2020 that is at the end of the project's second year and his remuneration is performance-based. Performance is oriented along the economic value added (EVA). [Note: Use your solution from problem a2) as WACC; if you did not solve the problem a2), then use 7.0625% as WACC. Note that EVA = NOPAT – Invested Capital * WACC. Base your calculations on the amount of Invested Capital at the beginning of each year.]

c1) Using the following table, determine the economic value added (EVA) of the project for each individual year throughout the project's lifetime as well as the project's market value added (MVA). (8 points)

Year (yyyy)	**2019**	**2020**	**2021**	**2022**	**2023**
EBIT					
Taxes					
NOPAT					
InvestedCapital (01.01.yyyy)					
DEP_{yyyy}					
Capital Charge					
EVA					

c2) Using the following table, determine the per period EVA in the years 2019 and 2020 if the annual depreciation (DEP) diminishes from year to year according to the following scheme (in million EUR): $DEP_{2019} = 4.0$, $DEP_{2020} = 3.0$, $DEP_{2021} = 2.0$, $DEP_{2022} = 1.0$, and $DEP_{2023} = 0$. [Note: Tax laws and accounting rules allow application of both depreciation methods.] Is it rational from Finn Angel's perspective to opt for this alternative depreciation scheme instead of straight-line depreciation? Explain your answer. (6 points)

	2019	2020	2021	2022	2023
EBITD					
Depreciation(straight line)					
EBIT (straight-line depreciation)					
EBITD					
Depreciation(diminishing depr)					
EBIT(diminishing depreciation)					
Taxes					
NOPAT					
Invested Capital (01.01.yyyy)					
Capital Charge					
EVA					

Question 4: Equity valuation and analysis **(49 points)**

Aeterna AG is a regional savings and loan bank established more than 100 years ago. Comunitae AG, established 10 years ago as a start-up company, operates a peer-to-peer (P2P) lending platform. P2P lending, is the practice of lending money to individuals or businesses through online services that match lenders with borrowers.

Both companies have limited their activities to the domestic market of their home country Prosperland, a highly developed country with 8 million inhabitants. The shares of both companies are listed and actively traded on Prosperland's national stock exchange; Aeterna's for many years, Comunitae's since the company's initial public offering (IPO) 4 years ago.

Over the past decade since the outbreak of the global financial crisis, Aeterna's savings and loan business has grown only very little, meanwhile, Comunitae was able to markedly expand its business volume through market share gains, particularly since its IPO. Prosperland's gross domestic product (GDP) grew between 1% and a maximum of 2% p.a. over the past 5 years, yields on its 10-year government bonds remained very low (between 0.0% and 1.0%) since the onset of the global financial crisis.

a) Table 1 below shows some key figures and ratios for both companies, based on current stock market prices and current analysts' estimates.

Table 1:

	Aeterna AG	Comunitae AG
Stock market price (in CU = currency unit)	CU 87.50	CU 125.00
Beta	0.917 (= 11/12)	1.4
Payout ratio π[1]	80%	10%
P/E ratio[1] (Price per share/EPS_1)	17.5x	25.0x

[1] Based on estimates for next financial year.

The risk-free rate is at 1.0% p.a., the risk premium of Prosperland's equity market is estimated at 6.0%.

a1) Calculate - for both companies - the sustainable growth rate implied by the current P/E ratio (P/EPS_1). [Note: Base your calculation on the Gordon growth dividend discount model and assume that the respective payout ratios π will remain the same forever. Use the Capital Asset Pricing Model (CAPM) formula to calculate the cost of equity (COE).] (6 points)

a2) Considering the introductory short remarks on both company's characteristics and history, shortly discuss whether the stock market's assessment of (implied) growth rates does make sense? (4 points)

a3) Many investors may look at Aeterna AG and find it more attractive since it has the lower P/E ratio between the two companies. Calculate the price/earnings to growth ratio (PEG ratio) for both companies and shortly discuss whether the results could potentially change investors' preferences. [Hint: The price/earnings to growth ratio (PEG ratio) is a stock's price-to-earnings (P/E) ratio divided by the growth rate of its earnings for a specified time period.] (4 points)

b) Daniel Taylor, analyst at OptimumInvest Asset Management, is covering both companies. He considers the Residual Income Model (RIM) to be appropriate to determine the theoretical fair value of Aeterna's shares. He bases his calculations on the following information and estimates.

Current book value per share (BPS_0)	CU 100.00
Current share price (17.5 x CU 5.00)	CU 87.50
EPS_1 (analyst's estimate for next year)	CU 5.00
ROE	5.00%
Payout ratio	80%
DPS_1 (analyst's estimate for next year)	CU 4.00
COE (analyst's estimate)	7.00%

Due to Aeterna's stable business in a developed and mature market Daniel Taylor expects ROE, COE and payout ratio to remain unchanged forever.

b1) Calculate Aeterna's sustainable EPS, DPS and BPS growth rates taking into account Daniel Taylor's estimates and assumptions. (3 points)

b2) Calculate the theoretical fair value of Aeterna's shares taking into account Daniel Taylor's estimates and assumptions and using the Residual Income Model (RIM), with:

Residual Income = Net Income – Equity Charge,
Equity Charge = Equity Capital x Cost of Equity, and

$$\text{Fair value per share} = BPS_0 + \left\{ \frac{RI_1}{(1+COE)^1} + \frac{RI_2}{(1+COE)^2} + \frac{RI_3}{(1+COE)^3} + \ldots \right\}$$

BPS_0 = current book value per share
RI_n = Residual Income per share in year n

[Hint: You may use the results from b1) to modify and simplify the above equation for fair value per share.]

(8 points)

b3) Aeterna's shares are currently trading below book value (PB ratio = CU 87.50 / CU 100 = 0.875). Is this justified?

b3i) Answer and explain based on the results calculated with the RIM in b2).

(2 points)

b3ii) Answer and explain based on the Gordon growth dividend discount model. Use Daniel Taylor's estimates and assumptions for your calculations.
[Hint: Rearrange the Gordon growth DDM equation to a "P/B ="-type equation.]
(3 points)

b3iii) Compare Aeterna's theoretical fair value calculated in b2) [or in b3ii)], on the basis of Daniel Taylor's estimates, with its current stock market price of CU 87.50. State two possible reasons why the stock market price is deviating quite significantly from Daniel Taylor's fair value. (4 points)

c) Comunitae AG is still a rather young and small company that is strongly and continuously growing its lending book. Currently its shares are traded at CU 125.00. The company has very recently announced that next year it will – for the first time ever – pay a dividend to shareholders in the amount of 10% of next year earnings. Daniel Taylor believes it is appropriate to determine the (theoretical) value of Comunitae's shares with a three-stage dividend discount model. Daniel Taylor's forecasts for the three stages are as follows:

Stage 1: Year 1, Year 2, and Year 3 (high growth period, low payout ratio)

	Year 1	Year 2	Year 3
EPS (earnings per share) (in CU)	5.00	7.00	9.10
EPS growth	43%	40%	30%
Payout ratio π	10.0%	15.0%	20.0%
DPS (dividend per share) (in CU)	0.50	1.05	1.82
Cost of equity is estimated at 10.0% p.a.			

Stage 2: Year 4 to Year 13 (10-year period of transition)

	Year 4	Years 5 to 13
EPS (in CU)	11.00	Growing by 9.5% p.a.
Payout ratio	25%	Stable at 25%.
DPS (in CU)	2.75	Growing by 9.5% p.a.
Cost of equity is estimated at 10.0% p.a.		

[Hint: The formula for the present value of a growing annuity is: $\frac{P}{(r-g)} \cdot \left[1-\left(\frac{1+g}{1+r}\right)^{n}\right]$ with P = first payment, r = rate per period, g = growth rate, and n = number of periods.]

Stage 3: Year 14 and following years (period of infinite stable growth and high payout ratio)

	Year 14	All following years
ROE	10.0%	Stable at 10.0%
EPS (in CU)	25.65	Growing by 3.0% p.a.
Payout ratio	70%	Stable at 70%.
DPS (in CU)	17.955	Growing by 3.0% p.a.
Cost of equity is estimated at 8.0% p.a. for the period after Year 13. At that time, Comunitae will have become a more stable and predictable firm.		

Calculate the theoretical fair value of Comunitae's shares taking into account Daniel Taylor's estimates and assumptions and using a three-stage dividend discount model and show that it is indeed close to the current market value. (15 points)

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Solutions

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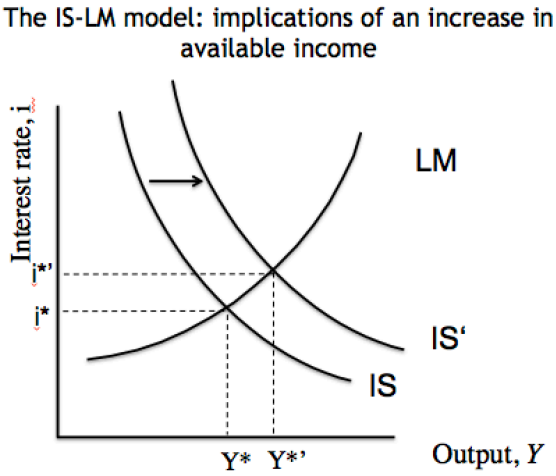
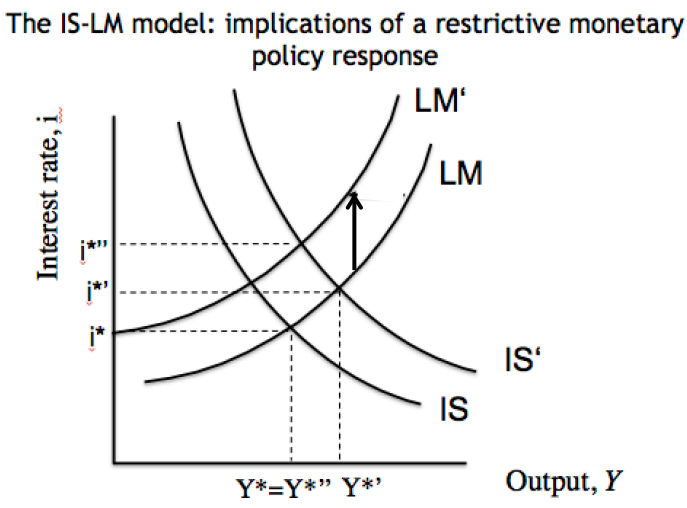
Question 1: Economics **(38 points)**

a)
a1)
The IS-curve describes the equilibrium relation between output (GDP, Y) and the interest rate (i) in the goods market. The aggregate demand (closed economy) is given by Z = C(Y-T) + I(i,Y) + G, where C is the aggregate consumption, I is the private investment and G is the government spending. Y – T is the disposable income. The LM-curve describes the equilibrium in the money market where real money supply, MS/P (where P is the price level of the economy), is equal to real money demand, L(Y,i). The levels of output Y* and interest rate i* are the only ones at which the balance of the two markets can be achieved simultaneously.

The tax cut increases the disposable income (Y – T) of households. As a consequence, the consumption of private households increases which leads to a rightward shift of the IS-curve (from IS to IS'). The LM-curve is not affected. The new equilibrium is characterized by a higher output (at Y*') and a higher interest rate (at i*').



a2)
An economic expansion is likely to increase the inflation rate. As a consequence, the central bank of the U.S. might consider conducting a restrictive monetary policy, i.e. it will reduce the money supply as the inflation rate is now above its target level. This will lead to an upward shift of the LM-curve (from LM to LM'). As a consequence, we will observe a further increase in the interest rate (from i*' to i*'') and a dampening of the initial increase in output (from Y*' to Y*'' or Y*).

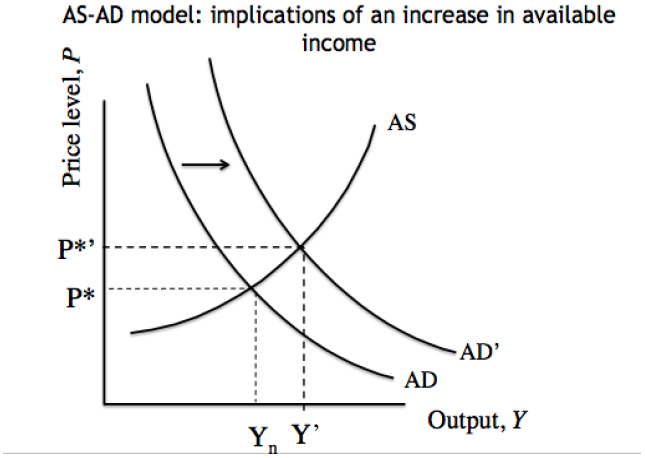


b)

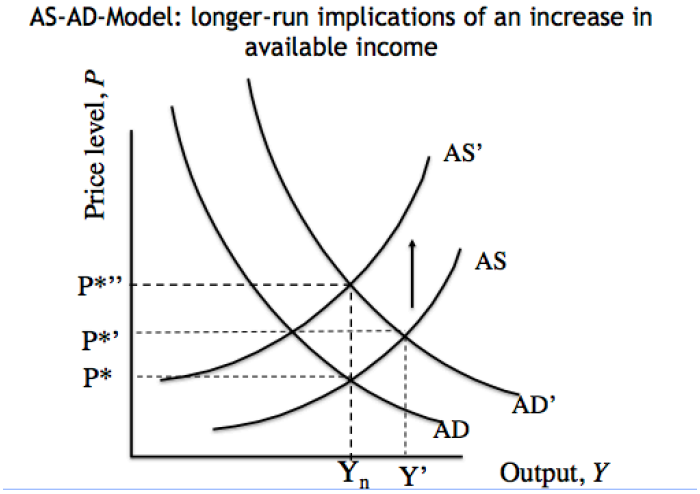
b1)

The AS/AD model consists of two curves. The AD curve represents combinations of the price level and real income for which the goods market is in equilibrium. The AS curve reflects short- to medium-run supply decisions of firms as a function of the country's price level. The AS/AD framework assumes that in the long-run the economy will move to the natural level of output (Y_n) by corresponding changes in prices in case a deviation from the long-run equilibrium occurs. Graphically, the long-run equilibrium of the economy is where the output is at its natural level (Y_n) and the price level is at P*.

The tax cut raises disposable income and thus private consumption. As a consequence, aggregate demand will increase, and the AD-curve will shift rightward (from AD to AD'). The AS-curve will not be affected. The new (temporary) equilibrium will be characterized by a higher output (Y') and a higher price level (P*').



b2)
At Y', actual prices are below expected prices (P*< P*'). Hence, price expectations are being revised. As a consequence, a price adjustment process will be triggered leading to larger wage increases which in turn increase production costs. This will move the AS-curve upward until output equals its natural level again (from AS to AS'). In the new equilibrium output will have the same level as initially (at Y_n). However, prices and interest rates will be higher (the price level is now at P*''). Concerning the composition of GDP, C is now larger whereas I is lower (due to the interest rate effect).



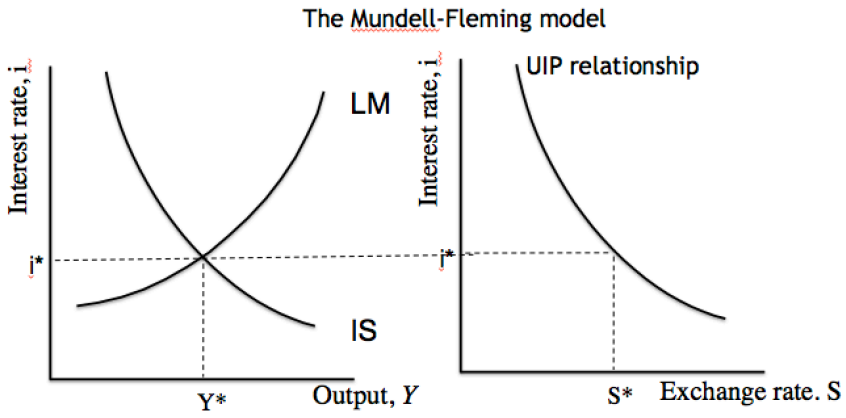
c)
c1)
The Mundell-Fleming model is characterized by three relationships:

First, the IS-equation (for an open economy), is given by:
$Y = Z = C(Y-T) + I(Y,i) + G + NX(Y,Y_F,S_{real})$,
where C(.), I(.), and G are the same as for a closed economy (see question a1). $NX(Y,Y_F,S_{real})$ the net exports.

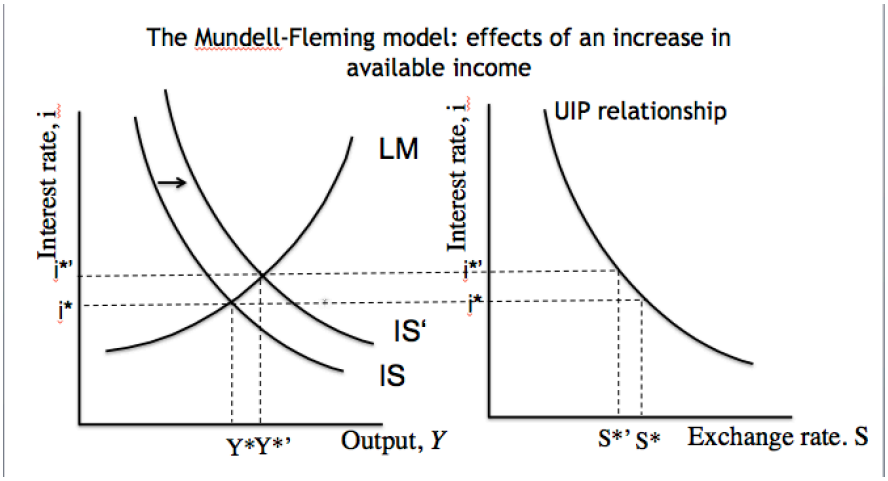
The second equation, the LM-equation, is given by (see question a1):
$MS/P = L(Y,i)$.

The third equation is given by the uncovered interest-rate parity (UIP) which states that, given perfect capital mobility and no transaction costs, the expected return from a domestic investment equals that for a comparable foreign investment.

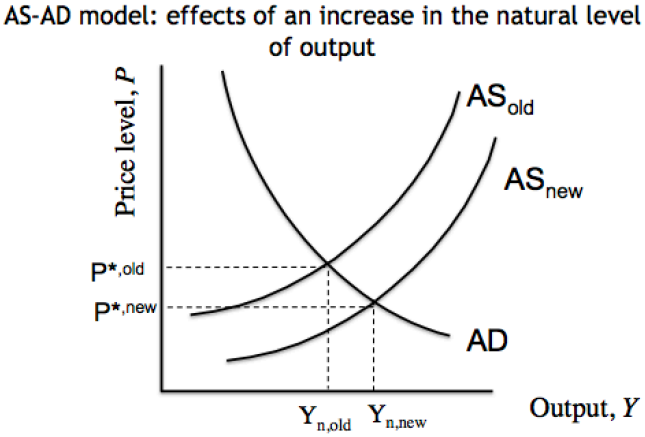
Formally:
$(1 + i) = (1 + i_F)\cdot(E(S_t+1)/S_t)$,
where i_F denotes the foreign interest rate and E(S) represents expected next period's nominal exchange rate.



c2)
The cut in tax rates will increase the available income of households and will thus increase their consumption. This in turn will increase aggregate demand leading to a rightward shift of the IS-curve (from IS to IS'). The implied increase in the domestic interest rate (from i* to i*') will induce a real appreciation (via the UIP relationship, as S decrease from S* to S*') which will somewhat dampen the output effect of the increase in available income, given that the Marshall-Lerner condition holds (as S decreases, i.e. the USD is appreciated, it worsen the net export NX). Overall the qualitative effects are identical to the case of the closed-economy (Y and i both increase), however, the quantitative effects differ because of the implied changes in the exchange rate.



d)
The corporate tax reform implies lower marginal rates on profits and investment income which could encourage saving, boost investment, and expand the stock of productive capital. This can lead to increase in the level of natural output, Y_n. Since we abstracted from the demand side in this question we don't consider any AD effects but only assume that the AS curve shifts to the right (from AS_{old} to AS_{new}). The new equilibrium is then characterized by higher output ($Y_{n,new}$) and a lower price level ($P^{*,new}$). Since it is assumed that the natural level of output was affected, no price adjustment process will occur and the economy will remain at the higher level of output ($Y_{n,new}$).



Question 2: Financial Accounting and Financial Statement Analysis (52 points)

a)

Table 1:

Impact on balance sheet (in USD millions)	Question a)		
	a1)	a2)	a3)
Non-current assets			
Intangible assets	400 [= 500 * 80%]		
Property, plant and equipment			
Financial investments			
Deferred taxes			
Current assets			
Inventories		60[1]	
Receivables			
Cash and cash equivalents	-500 (spent for development costs)	190 [= (700) – (360 + 100 + 50)]	
Equity			
Issued capital			
Reserves			
Profit/loss for the year	-70	175	-420
Non-current liabilities			
Amounts payable			
Deferred taxes	120 [= 150 * 80%]		
Current liabilities			
Provisions			600
Tax liabilities	-150	75	-180

[1] 0.2 million unsold smartphones out of 1.2 produced = 0.2 / 1.2 = 16.67%
Manufactoring costs for unsold smartphones = 360 * 16.67% = 60.

Table 2:

Impact on income statement (in USD millions)	Question a)		
	a1)	a2)	a3) [1]
Sales revenue		700	
Cost of goods		-300 [= 360 * 83.33%]	
General and administrative expenses		-50	
Selling expenses		-100	
Research and development	-100 [= 500 * 20%]		
Other income			
Other expenses			-600
Operating profit	-100	250	-600
Finance costs			
Profit or loss before tax	-100	250	-600
Current income taxes	150	-75 [= 250 * 30%]	180 [= 600 * 30%]
Deferred income taxes	-120 [= 150 * 80%]		
Profit/loss for the year	-70	175	-420

[1] The reasoning is as follow:

- A provision is to be created to cover the expenses incurred by the recall since they are based on a past event and are extremely likely.
- The possible imposition of a fine does not substantiate the need to create a provision since the probability of the outflow of resources embodying economic benefits is below 50%.

Table 3:

Impact on cash flow statement (in USD millions)	Question a)		
	a1)	a2)	a3)
Profit/loss for the year	-70	175	-420
Depreciation and amortization expense			
Change in provisions			600
Change in inventories		-60	
Change in tax liabilities	-150	75	-180
Change in deferred taxes	120		
Cash flow from operating activities	-100	190	0
Investments in property, plant and equipment			
Investments in intangible assets	-400		
Cash received in connection with divestments			
Cash flow from investing activities	-400	0	0
Bank loans raised			
Bank loans repaid			
Cash flow from financing activities	0	0	0
Change in cash and cash equivalents	-500	190	0
Cash and cash equivalents on Jan 1, 2017	2,000	2,000	2,000
Cash and cash equivalents on Dec 31, 2017	1,500	2,190	2,000

b)
b1) (in USD millions)

Book value of Li Ionel's net assets	900
+ Fair value of Li Ionel's unrecognized assets	300
– Deferred tax on Li Ionel's unrecognized assets: 300 * 25% =	– 75
= Li Ionel's identifiable net assets	1,125

Acquisition price of Singsang's interest in Li Ionel	1,500
+ Non-controlling interest in Li Ionel: 1,125 * 20% =	225
= Fair value of Li Ionel	1,725
– Li Ionel's identifiable net assets	1,125
= Goodwill	600

b2)

Impact on cash flow statement in 2017 (in USD millions)	
Line item	**Amount**
Cash flow from operating activities	
Cash flow from investing activities	
Cash flow from financing activities	980
Cash and cash equivalents on Jan 1	2,000
Cash and cash equivalents on Dec 31	2,980

Impact on cash flow statement in 2018 (in USD millions)	
Line item	**Amount**
Cash flow from operating activities	-30
Cash flow from investing activities	
Cash flow from financing activities	
Cash and cash equivalents on Jan 1	2,000
Cash and cash equivalents on Dec 31	1,970

Question 3: Corporate Finance **(41 points)**

a)
a1)
Note that there are not any changes in net working capital (ΔNWC) and not any further capital expenditures (CE). Formally, ΔNWC = 0, and CE = 0.

Let T denote the corporate tax rate. The project's free cash flow to the firm is given by:
FCF = EBIT * (1 - T) + Depreciation – ΔNWC – CE.

Thus, the project's FCFs (in million EUR) then are:

	2019	**2020**	**2021**	**2022**	**2023**
EBIT	2.9	3.2	3.5	3.3	3.3
Taxes	0.725	0.800	0.875	0.825	0.825
Depreciation	2.0	2.0	2.0	2.0	2.0
ΔNWC	0	0	0	0	0
CE	0	0	0	0	0
FCF	4.175	4.4	4.625	4.475	4.475

a2)
Warta's equity cost of capital according to the CAPM is:
$k_E = R_F + Beta_E * MRP = R_F + Beta_E * (E[R_M] - R_F) = 0.005 + 1.1 * (0.105 – 0.005) = 0.115 = 11.5\%$

Warta's cost of debt according to the CAPM is:
$k_D = R_F + Beta_D * MRP = R_F + Beta_D * (E[R_M] - R_F) = 0.005 + 0.3 * (0.105 – 0.005) = 0.035 = 3.5\%$

The value weights of debt and equity follow from the leverage:
$D/E = 1 \Leftrightarrow D = E \Rightarrow D / (D+E) = E / (E+E) = 1/2 \Rightarrow E / (D+E) = 1/2$

The weighted average costs of capital are:
$WACC = E / (E+D) * k_E + D / (E+D) * (1 – T) * k_D = 1/2 * 11.5\% + 1/2 * (1 – 25\%) * 3.5\% = 0.070625 = 7.0625\%$

a3)
The project's net present value (in million EUR) is:
$NPV = -10 + 4.175/1.070625 + 4.4/1.070625^2 + 4.625/1.070625^3 + 4.475/1.070625^4 + 4.475/1.070625^5 = 8.094$

b)
b1)
Currently, D/E = 1, and, $t_c = 25\%$.
One obtains the asset beta from unlevering the equity beta using the current leverage:
$Beta_A = Beta_E * 1 / [1 + (1-t_c) * D/E] + Beta_D * (1-t_c) * D/E / [1 + (1-t_c) * D/E]$
$= 1.1 * 1 / [1 + 75\% * 1] + 0.3 * 75\% * 1 / [1 + 75\% * 1] = 1.1 * 4/7 + 0.3 * 3/7 = 5.3/7 = 53/70 = 0.757$

b2)
First, determine the proposed leverage.
$D/V = 20\% \Rightarrow E/V = 80\% \Rightarrow D/E = D/V / E/V = 20\% / 80\% = 1/4$

One obtains the project's new equity beta from levering the asset beta using the proposed leverage.
$Beta_A = Beta_{E,new} * 1 / [1 + (1-t_c) * D/E] + Beta_D * (1-t_c) * D/E / [1 + (1-t_c) * D/E]$
$\Leftrightarrow Beta_{E,new} = [Beta_A - Beta_D * (1-t_c) * D/E / [1 + (1-t_c) * D/E]] * [1 + (1-t_c) * D/E]$

$= [53/70 - 0.3 * 75\% * 1/4 / [1+75\%*1/4]] * [1+75\%*1/4]$
$= [53/70 – 3/10 * 3/4 * 1/4 * 16/19] * 19/16$
$= [53/70 – 9/190] * 19/16$
$= [1007/1330 – 63/1330] * 19/16 = 944/1330 * 19/16 = 1121/1330 = 0.84286$

$k_{E,new} = R_F + Beta_{E,new} * MRP = 0.005 + 1121/1330 * (0.105 – 0.005) = 0.08929 = 8.929\%$

b3)
The project's WACC under the proposed capital structure results as follows:
$WACC = E / (E+D) * k_{E,new} + D / (E+D) * (1 – t_c) * k_D = 4/5 * 8.929\% + 1/5 * 75\% * 3.5\%$
$= 0.07668 = 7.668\%$

The project's net present value will be reduced since the WACC increases under the proposed capital structure.

c)
c1)
Note that EVA = NOPAT – Capital Charge,
where NOPAT = EBIT * $(1-t_c)$ and Capital Charge = Invested Capital * WACC.

Hence, the per period EVA (in million EUR) can be calculated in the following table:

Year (yyyy)	**2019**	**2020**	**2021**	**2022**	**2023**
EBIT	2.9	3.2	3.5	3.3	3.3
Taxes	0.725	0.800	0.875	0.825	0.825
NOPAT	2.175	2.4	2.625	2.475	2.475
InvestedCapital (01.01.yyyy)	10.0	8.0	6.0	4.0	2.0
DEP_{yyyy}	2.0	2.0	2.0	2.0	2.0
Capital Charge	0.70625	0.565	0.42375	0.2825	0.14125
EVA	1.46875	1.835	2.20125	2.1925	2.33375

The market value added (MVA) equals the present values of the per period future EVA:
$MVA = 1.46875/1.070625 + 1.835/1.070625^2 + 2.20125/1.070625^3 + 2.1925/1.070625^4 + 2.33375/1.070625^5 = 8.094$

[Remark. Note that the MVA of the project equals the project's NPV.]

c2)
With $DEP_{2019} = 4.0$ and $DEP_{2020} = 3.0$ we obtain:

	2019	2020	2021	2022	2023
EBITD	**4.900**	**5.200**	5.500	5.300	5.300
Depreciation(straight line)	**2.000**	**2.000**	2.000	2.000	2.000
EBIT (straight-line depreciation)	**2.900**	**3.200**	3.500	3.300	3.300
EBITD	**4.900**	**5.200**	5.500	5.300	5.300
Depreciation(diminishing depr)	**4.000**	**3.000**	2.000	1.000	0.000
EBIT(diminishing depreciation)	**0.900**	**2.200**	3.500	4.300	5.300
Taxes	0.225	0.550	0.875	1.075	1.325
NOPAT	0.675	1.650	2.625	3.225	3.975
Invested Capital (01.01.yyyy)	10.000	6.000	3.000	1.000	0.000
Capital Charge	0.70625	0.42375	0.21188	0.07063	0.00000
EVA	**-0.03125**	**1.22625**	2.41313	3.15438	3.97500

The EVA in the year 2019 turns negative due to the alternative depreciation scheme, in 2020 EVA is still lower than EVA based on straight-line depreciation. (In the years 2021, 2022, and 2023, EVA is higher).

As the EVA in years 2019 and 2020 is smaller under the alternative depreciation scheme and Finn Angel's salary depends on EVA performance, it is rational not to opt for this alternative.

Question 4: Equity valuation and analysis (49 points)

a)
a1)
Cost of equity (COE) = $r_f + \beta(r_m - r_f) = r_f + \beta$ x equity market risk premium.
Aeterna: COE = 0.01 + 11/12 x 0.06 = 0.065 = 6.50%
Comunitae: COE = 0.01 + 1.4 x 0.06 = 0.094 = 9.40%

With $P_0 = \frac{DPS_1}{(COE-g)} = \frac{\pi \cdot EPS_1}{(COE-g)}$ and $\frac{P_0}{EPS_1} = \frac{\pi}{(COE-g)}$
Aeterna: $\frac{P_0}{EPS_1} = 17.5 = \frac{0.80}{(0.065-g)}$, solving for g. g = 1.9286%
Comunitae $\frac{P_0}{EPS_1} = 25.0 = \frac{0.10}{(0.094-g)}$, solving for g. g = 9.00%

a2)
Aeterna is an over 100-year-old and established firm, active in the savings and loan market of a highly developed country with 8 million inhabitants. Prosperland's economy is – over time – growing with round about 2%. Aeterna's implied growth rate of 1.93% is in line with Prosperland's GDP growth and therefore makes sense.

Comunitae is a young and (very probably) a still rather small company with activities in the relatively new field of peer-to-peer lending. With its cost-efficient online platform that matches lenders with borrowers Comunitae is (very probably) able to offer better terms and conditions for both parties, lenders and borrowers. Therefore Comunitae is (quite likely) able to gain market share and to grow its lending book above average market growth. Though an implied growth rate of 9.00% appears to be attainable and reasonable in the short and medium term (Maybe, that Comunitae is even able to outgrow the rate of 9.00% for a few years), in the long term a perpetual growth rate (The Gordon growth model is implicitly based on the growth rate being perpetual.) of 9.00% will be by no means sustainable. Therefore, the stock market very probably overestimates Comunitae's potential long term growth rate.

a3)
The price/earnings to growth ratio (PEG ratio) is a stock's price-to-earnings (P/E) ratio divided by the growth rate (in percentage) of its earnings for a specified time period.

Aeterna: PEG ratio = 17.5x / 1.9286 = 9.07x
Comunitae: PEG ratio = 25.0x / 9.00 = 2.78x

Comunitae is trading at a much lower PEG ratio than Aeterna and investors purchasing it are paying less per unit of earnings growth, and therefore may prefer Comunitae to Aeterna. (However, the question of how long Comunitae is able to grow with 9.5% must be taken into consideration.)

b)
b1)
Note that, $EPS_2 = EPS_1 + ROE \cdot (1 - \pi) \cdot EPS_1$
since $(1 - \pi) \cdot EPS_1$ are the reinvested earnings,
and consequently $\frac{EPS_2}{EPS_1} = 1 + g = 1 + ROE \cdot (1 - \pi)$,
which implies $g = ROE \cdot (1 - \pi)$.

Aeterna: $g = 5\% \cdot (1 - 0.80) = 1.00\%$, EPS are growing with 1.0% p.a.
Since payout ratio does not change, DPS growth is also 1.0% p.a.
Consequently, growth of retained earnings and BPS is 1.0% as well.

b2)
Book value per share = BPS_0 = CU 100
COE = 0.07 = 7.00%
Equity $Charge_1$ = CU 100 x 0.07 = CU 7.00
RI_1 = EPS_1 – Equity $Charge_1$ = CU 5.00 – CU 7.00 = - CU 2.00

Since EPS and Book value are growing at a constant rate of 1.00% p.a., the equity charge and the RI income are also growing by 1.00% p.a.

Therefore the formula:

$$\text{Theoretical fair value per share} = BPS_0 + \left\{ \frac{RI_1}{(1+COE)^1} + \frac{RI_2}{(1+COE)^2} + \frac{RI_3}{(1+COE)^3} + \ldots \right\}$$

can be modified and simplified to:

$$\text{Theoretical fair value per share} = BPS_0 + \frac{RI_1}{(COE - g)}$$

For Aeterna, $\text{Theoretical Fair value per share} = \text{CU } 100 + \frac{-\text{CU } 2.00}{(0.07-0.01)} = \text{CU } 66.67$

b3)
b3i)
A PB ratio below 1 is justified. With a ROE of 5% Aeterna is not earning its cost of equity (of 7.0%) and is therefore destroying (book) value. Justified PB ratio based on the RIM is CU 66.67/CU 100 = 0.6667 < 1.00. Against this background, Aeterna's current share price of CU 87.50 looks overvalued.

b3ii)
Rearrange Gordon growth equation:
$P_0 = \frac{DPS_1}{(COE-g)} = \frac{EPS_1 \cdot \pi}{(COE-g)} = \frac{ROE \cdot BPS \cdot \pi}{(COE-g)}$ into $\frac{P_0}{BPS} = \frac{ROE \cdot \pi}{(COE-g)}$ and then into $\frac{P_0}{BPS} = \frac{ROE-g}{(COE-g)}$
(with $g = ROE \cdot (1 - \pi)$ transformed into $ROE \cdot \pi = ROE - g$).

Aeterna: $\frac{P_0}{BPS} = \frac{ROE-g}{(COE-g)} = \frac{0.05-0.01}{(0.07-0.01)} = 0.6667$

Justified PB ratio based on Gordon growth DDM is 0.6667 and therefore < 1.00; Aeterna does not earn its cost of equity and is therefore destroying (book) value. Against this background, Aeterna's current share price of CU 87.50 looks overvalued by the same token.

b3iii)
The difference between the stock market price and the theoretical fair value is slightly bigger than 30% (CU 87.50 / CU 66.67 – 1).

Reasons for the deviation:
Even at a stock market price of CU 87.50 Aeterna's (expected) dividend yield is 4.57%, which compares to only 1% yield on 10-year treasury bonds. The characteristics of Aeterna, its business and its market indicate that the dividend is relatively safe.

Investors may believe that Aeterna's current ROE of 5% may recover in a higher interest rate environment which allows for higher net interest margins.

Over the last decade since the outbreak of the global financial crisis, growth of Prosperland's economy and credit growth has been muted. With all major economies synchronically growing again, credit growth in Prosperland could soon pick up again and lead to higher growth rates for Aeterna's business.

COE is estimated at 7.0% by Mr Taylor. He may be wrong. Aeterna's very stable business may allow for a β of only 0.8. With risk free rates at 1.0% and equity market risk premium of (relatively high) 6.0% Aeterna's cost of equity would shrink to 5.8% (= 1.0% + 0.8 x 6%).

c)
Stage 1

Cost of equity	10.00%

	Year 1	**Year 2**	**Year 3**
DPS (in CU)	0.50	1.05	1.82
Discount factor (base 10%)	0.9091	0.8264	0.7513
PV	0.4545	0.8678	1.3674
Sum of PVs (in Year 0)		**(1)**	**2.69**

Stage 2

Cost of equity	10.00%

		Year 4 to Year 13
with $\frac{P}{(r-g)} \cdot \left[1-\left(\frac{1+g}{1+r}\right)^{n}\right]$		
and		
P = DPS_4 =		2.75
r = COE =		10.00%
g =		9.50%
n = number of years =		10
PV at the beginning of Year 4		24.49
Discount factor (base 10%)		0.7513
PV in Year 0	**(2)**	**18.40**

Stage 3

Cost of equity "period Year 14 and following"	8.00%
Cost of equity "period Year 1 to Year 13"	10.00%

		Year 14 and following
DPS_{14} (in CU)		17.955
COE ("period Year 14 and following")		8.00%
Growth rate of dividends = g =		3.00%
with Terminal value (at the beginning of Year 14) $= \frac{DPS_{14}}{COE-g} = \frac{17.955}{0.08-0.03}$		
Terminal value		359.10
Discount factor (base 10%) = $1 / (1 + 0.10)^{13}$		0.2897
PV of Terminal value in Year 0	**(3)**	**104.02**
Theoretical fair value = (1) + (2) + (3) =		**125.11**