Certified International Investment Analyst

EXAMINATION I

Economics

Corporate Finance

Financial Accounting and Financial Statement Analysis

Equity Valuation and Analysis

Solutions

Final examination

March 2016

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

a)
The current account balance is the sum of net exports and NIRA. Hence, the Greek current account (in % of GDP) evolved as follows:

	2011	2012	2013
Greece: Net exports of goods and services (% of GDP)	-5.98	-2.41	-0.18
Greece: NIRA (including transfers) (% of GDP)	-3.88	-0.07	0.91
Greece: Current account balance (% of GDP)	**-9.86**	**-2.48**	**0.73**

b)
The current account balance reflects the difference between national savings and national investment (CB = S – I). If national savings exceed investment, the country runs a current account surplus. If national savings are smaller than investment, the country runs a current account deficit.

c)
A sequence of current account deficits reduces a country's net foreign assets, i.e. external liabilities increase faster than external assets. Being confronted with strongly negative net foreign assets, international investors may eventually question a country's creditworthiness and pull out their money. This withdrawal of foreign finance usually results in a financial crisis.

d)
A country is able to run a current account deficit if it manages to sell assets to the rest of the world (i.e.: "borrow" from the rest of the world). If international investors get worried about the country's creditworthiness, they refuse to purchase these assets (i.e.: "lend"), and the country is forced to reduce its current account deficit (via the increase in the net investment income) or even to move to a current account surplus. This is what happened in Greece between 2011 and 2013.

[Note: Current account balance = Trade balance + Net investment income + Net unilateral transfers.]

e)
The real exchange rate is defined as the nominal exchange rate S (in price notation, i.e. domestic currency units per foreign currency unit) multiplied by the foreign price level P^F and divided by the domestic price level P.

$$S_{real} = \frac{S \cdot P^F}{P}.$$

A *real depreciation* may be caused by a nominal depreciation (i.e. an increase of S), an increase of the foreign price level P^F, or a decrease in the domestic price level P.

f)
The relationship between Greece's real effective exchange rate and its net exports from 2011 through 2013 are in accord with theoretical predictions. Net exports (NX) are given by the following equation:

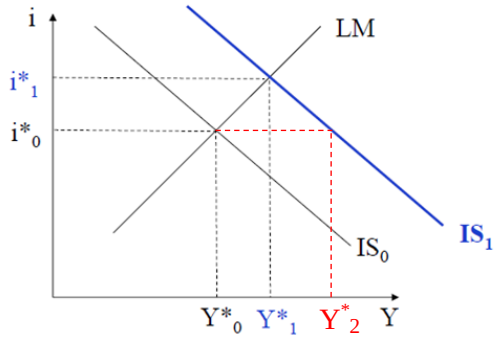
$$NX = X(Y_F, S_{real}) - S_{real} \cdot M(Y, S_{real}).$$

A real exchange rate depreciation raises the quantity of exports *X* since it makes domestic goods less expensive for foreigners. It reduces the quantity of imports *M* since it makes foreign goods more expensive for domestic residents. These two mechanisms establish a positive relationship between the real exchange rate and the volume of net exports, i.e. net exports increase if the currency depreciates in real terms. However, there is also a price effect running in the opposite direction, since an increase in S_{real} raises the *value* of imports. If the Marshall-Lerner condition is satisfied, i.e. if the sum of export and import elasticities exceeds one, net exports increase as a result of a real depreciation when net exports are almost zero.

This condition seemed to be satisfied in the Greek case, since net exports increased while there was a real depreciation.

g)
In a closed economy, an increase in government spending raises output (from Y^*_0 to Y^*_1) and the interest rate (from i^*_0 to i^*_1).

This can be illustrated using the IS/LM-model: the fiscal expansion shifts the IS-curve to the right (from IS_0 to IS_1 in the graph below). The resulting output increase raises the demand for money. For a given money supply, the interest rate has to increase. This dampens the output expansion (from Y^*_2 to Y^*_1) by reducing investment (crowding-out effect). Eventually, the economy settles on a new equilibrium (Y^*_1, i^*_1) that is characterized by a higher interest rate and higher output.



h)
On the one hand, an expansionary policy may be counterproductive since it raises public debt and exacerbates worries about the Greek government's creditworthiness. This would further raise interest rates and jeopardize financial stability. If, however, the fiscal stimulus has a very strong effect on output, the ratio of debt over GDP may actually shrink, and the government's fiscal situation (relative to output) may improve.

Question 2: Financial Accounting and Financial Statement Analysis (49 points)

a)
Equity Ratio Han Kan Gang = 38.5% (= 6,900,000 / 17,900,000)

Equity Ratio Zhu Lang Sam = 35.7% (= 4,050,000 / 11,350,000)

b)
b1)

- In accordance with IAS 38, research costs cannot be capitalised [IAS 38, paragraph 54; "No intangible asset arising from research (or from the research phase of an internal project) shall be recognised. Expenditure on research (or on the research phase of an internal project) shall be recognised as an expense when it is incurred."], and development costs may only be capitalised when certain precisely defined conditions are met.
- An intangible asset arising from development (or from the development phase of an internal project) shall be recognised if, and only if, an entity can demonstrate all of the following:
  - the technical feasibility of completing the intangible asset so that it will be available for use or sale;
  - its intention to complete the intangible asset and use or sell it;
  - its ability to use or sell the intangible asset;
  - how the intangible asset will generate probable future economic benefits;
  - the availability of adequate technical, financial and other resources to complete the development and to use or sell the intangible asset;
  - its ability to measure reliably the expenditure attributable to the intangible asset during its development.

b2)

Consolidated Statement of financial position of Han Kan Gang as of 31.12.N1:

Intangible Assets	0	Capital Stock	500,000
Property, Plant and Equipment	5,600,000	Capital Reserves	3,000,000
Financial Instruments	800,000	Other Reserves	1,600,000
Noncurrent Assets	**6,400,000**	**Shareholders' Equity**	**5,100,000**
Inventories	6,600,000	Current Liabilities	4,300,000
Receivables	3,100,000	Noncurrent Liabilities	6,700,000
Current Assets	**9,700,000**	**Liabilities**	**11,000,000**
Total	**16,100,000**	**Total**	**16,100,000**

Consolidated Statement of financial position of Zhu Lang Sam as of 31.12.N1:

Intangible Assets	0	Capital Stock	450,000
Property, Plant and Equipment	4,100,000	Capital Reserves	2,000,000
Financial Instruments	350,000	Other Reserves	1,200,000
Noncurrent Assets	**4,450,000**	**Shareholders' Equity**	**3,650,000**
Inventories	3,900,000	Current Liabilities	2,700,000
Receivables	2,600,000	Noncurrent Liabilities	4,600,000
Current Assets	**6,500,000**	**Liabilities**	**7,300,000**
Total	**10,950,000**	**Total**	**10,950,000**

Intangible assets = 0
According to Lorenzo Ferrari's assumption all (capital) expenditures for the development of internally generated patents should have been recognized as an expense in the income statement. Therefore, none of the development costs should have been capitalized as intangible assets.

Other Reserves = 1,600,000 resp. 1,200,000:
According to Lorenzo Ferrari's assumption all development costs for internally generated patents should have been recognized as an expense in the income statement. Accordingly, these expenses should have reduced the net (comprehensive) income of both companies.

Han Kang Gang:
Other reserves (adjusted) = 3,400,000 – Book Value of Intangible Assets = 3,400,000 – 1,800,000 = 1,600,000.

Zhu Lang Sam:
Other reserves (adjusted) = 1,600,000 – Book Value of Intangible Assets = 1,600,000 – 400,000 = 1,200,000.

b3)
b3i)
Han Kan Gang: Deferred tax liabilities of 540,000 (= 1,800,000 · 30%).
Zhu Lang Sam: Deferred tax liabilities of 120,000 (= 400,000 · 30%).

As a consequence of the capitalisation of development costs for internally generated patents the net assets in the statement of financial position exceed the net assets calculated for tax purposes. When the carrying amount of the intangible assets is recovered in future periods, the entity has to pay additional taxes amounting to 30% of the taxable temporary difference. These additional future taxes have to be shown in the statement of financial position as a liability.

b3ii)

Consolidated Statement of financial position of Han Kan Gang as of 31.12.N1:

Intangible Assets	0	Capital Stock	500,000
Property, Plant and Equipment	5,600,000	Capital Reserves	3,000,000
Financial Instruments	800,000	Other Reserves	2,140,000
Noncurrent Assets	**6,400,000**	**Shareholders' Equity**	**5,640,000**
Inventories	6,600,000	Current Liabilities	4,300,000
Receivables	3,100,000	Noncurrent Liabilities	6,160,000
Current Assets	**9,700,000**	**Liabilities**	**10,460,000**
Total	**16,100,000**	**Total**	**16,100,000**

Consolidated Statement of financial position of Zhu Lang Sam as of 31.12.N1:

Intangible Assets	0	Capital Stock	450,000
Property, Plant and Equipment	4,100,000	Capital Reserves	2,000,000
Financial Instruments	350,000	Other Reserves	1,320,000
Noncurrent Assets	**4,450,000**	**Shareholders' Equity**	**3,770,000**
Inventories	3,900,000	Current Liabilities	2,700,000
Receivables	2,600,000	Noncurrent Liabilities	4,480,000
Current Assets	**6,500,000**	**Liabilities**	**7,180,000**
Total	**10,950,000**	**Total**	**10,950,000**

Taking into account tax effects a reversal of the capitalization of internally generated intangible assets impacts 'Other Reserves' and 'Noncurrent Liabilities' as follows:

The 'Deferred tax liabilities' (see b3i) formed part of 'Noncurrent Liabilities'. Therefore, 'Noncurrent Liabilities' now have to be reduced by the respective amounts. I.e. Han Kan Gang 'Noncurrent Liabilities' = 6,700,000 – 540,000 = 6,160,000 and Zhu Lang Sam 'Noncurrent Liabilities' = 4,600,000 – 120,000 = 4,480,000.

On the other hand accumulated net (comprehensive) income raises by the same amount. I.e. Han Kan Gang 'Other Reserves' = 1,600,000 + 540,000 = 2,140,000 and Zhu Lang Sam 'Other Reserves' = 1,200,000 + 120,000 = 1,320,000.

c)

c1)

At the commencement of the lease term, the lessee shall recognise the leased item as an asset – or as the right to use an asset - at an amount equal to its fair value or, if lower, the present value of the minimum lease payments.

An equivalent amount is recognised as a finance lease liability.

c2)

Calculation of the present value of the lease payments = 1,731,791

$= 400{,}000 \cdot 1.05^{-1} + 400{,}000 \cdot 1.05^{-2} + 400{,}000 \cdot 1.05^{-3} + 400{,}000 \cdot 1.05^{-4} + 400{,}000 \cdot 1.05^{-5}$

This amount has to be recognized as an asset.

Non-current assets and liabilities increase by an amount equal to the present value of the lease payments. A partial amount of 380,952 TCU ($400{,}000 \cdot 1.05^{-1}$) has to be disclosed under the current liabilities and the balance of 1,350,839 TCU (1,731,791 – 380,952) increases the noncurrent liabilities. Shareholders' equity is not impacted by the reclassification.

c3)

Consolidated Statement of financial position of Han Kan Gang as of 31.12.N1:

Intangible Assets	0	Capital Stock	500,000
Property, Plant and Equipment	7,331,791	Capital Reserves	3,000,000
Financial Instruments	800,000	Other Reserves	2,140,000
Noncurrent Assets	**8,131,791**	**Shareholders' Equity**	**5,640,000**
Inventories	6,600,000	Current Liabilities	4,680,952
Receivables	3,100,000	Noncurrent Liabilities	7,510,839
Current Assets	**9,700,000**	**Liabilities**	**12,191,791**
Total	**17,831,791**	**Total**	**17,831,791**

Han Kan Gang shall recognize the leased item as an asset at an amount equal to its fair value or, if lower, the present value of the lease payments, which is 1,731,791 (see c2). Therefore PPE = 5,600,000 + 1,731,791 = 7,331,791.

On the other hand, Han Kang Gang's 'Liabilities' increase by the same amount (equal to the present value of the lease payments). According to its maturity, the amount has to be split in CU 380,952 reported in 'Current Liabilities' (= 4,300,000 + 380,952 = 4,680,952) and CU 1,350,839 reported in 'Noncurrent Liabilities' (= 6,160,000 + 1,350,839 = 7,510,839).

c4)

The recognition of leased assets and lease liabilities would result in temporary differences of the same amount but with opposite signs.

Accordingly, both assets and liabilities would increase by an equal amount (30% of the present value of lease payments), so that Stockholders' Equity would not be affected.

d)

d1)

The gain on the hedging instrument is not recognized in profit until the hedged transaction has occurred.

Accordingly, on the statement of financial position at 31.12.N1, there is:
- an asset (the hedging instrument) measured at 300,000 TCU
- in equity, a cumulative gain on cash flow hedges for 300,000 TCU.

d2)

The equity ratio of Zhu Lang Sam would fall to 32.6% (= 3,470,000 / 10,650,000).
[Equity ratio based on question b3) is 34.4% (= 3,770,000 / 10,950,000)].

Based on the solution to b3) Zhu Lang Sam's 'Shareholder's Equity' is 3,770,000. 'Shareholder's Equity' includes 300,000 of hedging gain. Therefore, if Zhu Lang Sam had not entered into forward contracts, its 'Shareholders' Equity' would be 3,770,000 – 300,000 = 3,470,000.

On the other hand, the asset corresponding to the gain on the hedging instrument would not have been recognized, so that Total Assets would amount to 10,950,000 – 300,000 = 10,650,000.

Question 3: Corporate Finance (35 points)

a)

- Finance lease:

[A lease is classified as a finance lease if it transfers substantially all the risks and rewards incidental to ownership of an asset to the lessee (see also IAS 17, paragraph 8). The lease term is for the major part of the economic life of the asset, and/or the lease transfers ownership of the asset to the lessee by the end of the lease term, and/or at the inception of the lease the present value of the (minimum) lease payments amount to at least substantially all of the fair value of the leased asset.] For accounting purposes, the asset is deemed to have been acquired. The leased asset is posted to the lessee's statement of financial position as an asset and is subject to depreciation. In addition, the present value of future lease payments is considered to be the leasing liability and posted to the lessee's statement of financial position as a liability. The lease payments shall be recognized in profit or loss, and be apportioned between finance charge and the reduction of the outstanding liability.

- Operating lease:

[A lease is classified as an operating lease if it does not transfer substantially all the risks and the rewards incidental to ownership. The term of the lease is normally significantly less than the economic life of the leased asset and the lease payments made over the term of the lease are not sufficient to cover the cost of the leased asset.] For accounting purposes, the leasing agreement is considered to be the same as a rental contract and the lessee posts the entire value of leasing fees to the profit and loss statement. The lessee does not post the leased asset to the statement of financial position, nor does it depreciate the leased asset. The leasing liability is not posted to the statement of financial position as a liability. Normally, the lessee is required to make certain disclosures for operating leases in the notes to its financial statements.

b)

This would be categorized as an "operating lease" because the total present value of future lease payments is 73% of the estimated cash purchase price, and therefore below the 90% threshold.

Calculation:

$$\text{PV}(\text{leasing fee}) = 9 + \frac{9}{1.05} + \frac{9}{1.05^2} + ... + \frac{9}{1.05^9} = 9 \cdot \frac{1 - \frac{1}{1.05^{10}}}{1 - \frac{1}{1.05}} = 72.970 \,\text{million EUR}$$

$$\frac{\text{PV}(\text{leasing fee})}{\text{Estimated cash purchase price}} = \frac{72.970 \,\text{million}}{100 \,\text{million}} = 72.97\%$$

c)

This leasing agreement is categorized as an operating lease under Country X's accounting rules. There is therefore no need for Western Airlines to post the leasing liability to its balance sheet. As a result, the debt ratio in the financial statements will certainly be lower than it would have been had the company issued debt to raise the funds for purchase of the aircraft. However, this leasing agreement cannot be canceled for 10 years, and rating agencies and institutional investors are likely to view it as equivalent to debt in light of the actual nature of

the leasing liability. It is therefore virtually meaningless to use a lease simply to avoid an increase in the nominal debt ratio.

d)
d1)

$$\frac{100{,}000{,}000}{20} \cdot 0.35 = 1{,}750{,}000\,\text{EUR}$$

d2)

$$9{,}000{,}000 \cdot 0.35 = 3{,}150{,}000\,\text{EUR}$$

d3)

Year 0: $100{,}000{,}000 - 9{,}000{,}000 + 3{,}150{,}000 = 94{,}150{,}000\,\text{EUR}$

Years 1-9: $-1{,}750{,}000 - 9{,}000{,}000 + 3{,}150{,}000 = -7{,}600{,}000\,\text{EUR}$

Year 10: $-1{,}750{,}000 - 50{,}000{,}000 = -51{,}750{,}000\,\text{EUR}$

Year 0:
Purchase Cash Flow = -100,000,000 (purchase aircraft)
Lease Cash Flow = -Leasing fee + tax saving effect of leasing fee = -9,000,000 + 3,150,000 = -5,850,000
Cash Flow Difference = Lease CF - Purchase CF = -5,850,000 – (-100,000,000) = 94,150,000

Year 1-9:
Purchase Cash Flow = 0
Lease Cash Flow = -Leasing fee + tax saving effect of leasing fee – lost tax saving effect of depreciation = -9,000,000 + 3,150,000 – 1,750,000 = -7,600,000
Cash Flow Difference = Lease CF - Purchase CF = -7,600,000 - 0 = -7,600,000

Year 10:
Purchase Cash Flow = +50,000,000 (sale aircraft)
Lease Cash Flow = – lost tax saving effect of depreciation = -1,750,000 = -1,750,000
Cash Flow Difference = Lease CF - Purchase CF = -1,750,000 – 50,000,000 = -51,750,000

d4)

$$\text{NPV} = 94{,}150 + \sum_{t=1}^{9} \frac{-7{,}600}{1.0325^{t}} - \frac{51{,}750}{1.0325^{10}}$$

$$= 94{,}150 - 7{,}600 \cdot 7.696123 - \frac{51{,}750}{1.0325^{10}} = -1{,}925{,}118\,\text{EUR}$$

Alternative approach #1 to solve the question:

	Buy		**Lease**		**Delta**	
		Tax savings	**Leasing fee**	**Tax savings**		**Present Value**
Year 0	100,000,000		9,000,000	3,150,000	94,150,000	94,150,000
Year 1		1,750,000	9,000,000	3,150,000	-7,600,000	-7,360,774
Year 2		1,750,000	9,000,000	3,150,000	-7,600,000	-7,129,079
Year 3		1,750,000	9,000,000	3,150,000	-7,600,000	-6,904,677
Year 4		1,750,000	9,000,000	3,150,000	-7,600,000	-6,687,339
Year 5		1,750,000	9,000,000	3,150,000	-7,600,000	-6,476,841
Year 6		1,750,000	9,000,000	3,150,000	-7,600,000	-6,272,970
Year 7		1,750,000	9,000,000	3,150,000	-7,600,000	-6,075,516
Year 8		1,750,000	9,000,000	3,150,000	-7,600,000	-5,884,277
Year 9		1,750,000	9,000,000	3,150,000	-7,600,000	-5,699,057
Year 10	-50,000,000	1,750,000		-	-51,750,000	-37,584,584
Advantage (Disadvantage) of leasing						**-1,925,118**

Alternative approach #2 to solve the question:

Cost of asset						**100,000,000**
less Depreciation tax shield		**Cash flow**			**NPV**	**-14,739,191**
	Year 0					
	Year 1	1,750,000			1,694,915	
	Year 2	1,750,000			1,641,564	
	Year 3	1,750,000			1,589,892	
	Year 4	1,750,000			1,539,847	
	Year 5	1,750,000			1,491,378	
	Year 6	1,750,000			1,444,433	
	Year 7	1,750,000			1,398,967	
	Year 8	1,750,000			1,354,932	
	Year 9	1,750,000			1,312,283	
	Year 10	1,750,000			1,270,976	
	Total				14,739,191	
less Lease payments (after tax)		**Lease payment**	**Tax saving**	**Cash flow**	**NPV**	**-50,872,319**
	Year 0	9,000,000	3,150,000	5,850,000	5,850,000	
	Year 1	9,000,000	3,150,000	5,850,000	5,665,859	
	Year 2	9,000,000	3,150,000	5,850,000	5,487,515	
	Year 3	9,000,000	3,150,000	5,850,000	5,314,784	
	Year 4	9,000,000	3,150,000	5,850,000	5,147,491	
	Year 5	9,000,000	3,150,000	5,850,000	4,985,463	
	Year 6	9,000,000	3,150,000	5,850,000	4,828,536	
	Year 7	9,000,000	3,150,000	5,850,000	4,676,548	
	Year 8	9,000,000	3,150,000	5,850,000	4,529,344	
	Year 9	9,000,000	3,150,000	5,850,000	4,386,774	
	Year 10					
	Total				50,872,319	
Resale value after 10 years	**Year 10**	**Resale value**			**NPV**	**-36,313,607**
		50,000,000			36,313,607	
Advantage (Disadvantage) of leasing						**-1,925,118**

d5)
The NPV of the cash flow difference from leasing and purchasing is -1,925,118 euros, so purchasing has the cost advantage.

e)

Using "C_{10}" as the difference in the 10th year at which the NPV of the cashflow difference is zero, C_{10} satisfies the following relationship:

$$94{,}150{,}000 - 7{,}600{,}000 \cdot 7.696123 - \frac{C_{10}}{1.0325^{10}} = 0$$

Solving for C_{10}:

$$C_{10} = 49{,}099{,}300\,\text{EUR}$$

Therefore, using "V10" for the disposal price in 10 years, the following relationship holds true:

$$V_{10} + 1{,}750{,}000 + 0.35 \cdot (50{,}000{,}000 - V_{10}) = 49{,}099{,}300\,\text{EUR}$$

Solving for V_{10}:

$$V_{10} = 45{,}922{,}000\,\text{EUR}$$

Question 4: Equity valuation and analysis (58 points)

a)
a1)
According to the CAPM formula:
$k_A = 0.03 + 0.7 \cdot (0.1 - 0.03) = 0.079$
$k_B = 0.03 + 1.5 \cdot (0.1 - 0.03) = 0.135$

a2)
The stock prices are:
$P_A(0) = \frac{0.8 \cdot 1.01}{0.079 - 0.01} = 11.7101$
$P_B(0) = \frac{1.3 \cdot 1.05}{0.135 - 0.05} = 16.0588$

b)
The formulae for the stock price in the DDM's setting is $P(0) = \frac{Div_0 \cdot (1+g)}{k-g}$,
and for the required rate of return as determined by the CAPM: $k = r_F + \beta \cdot (\bar{r}_M - r_F)$.
It is obvious that a change in $\bar{r}_M$ affects k. For a given β, an increase of $\bar{r}_M$ results in a lower stock price (i.e. so that the expected return is correspondingly higher), and accordingly a decrease in a higher stock price.

For different β-factors, the magnitude of the change in k depends on the size of β. If $\beta > 1.0$ the stock's price will be more volatile than the market and any change in $\bar{r}_M$ is amplified with respect to k, while if $0 < \beta < 1$ the stock's price will be less volatile than the market (defensive stock) and the effect of a change in $\bar{r}_M$ becomes reduced on k.

c)
c1)
Overall dividends are obtained by multiplying the dividend per share and the number of outstanding shares. Therefore current dividends for company A are $0.8 \cdot 4{,}000 = 3{,}200$, while for company B dividends are $1.3 \cdot 1{,}000 = 1{,}300$. This means that the current overall dividend of the novel company AB is $4{,}500$.

Overall dividends paid in $t = 1$ will be $3{,}200 \cdot 1.01 + 1{,}300 \cdot 1.05 = 3{,}232 + 1{,}365 = 4{,}597$, so the rate of growth in the first year is:
$\frac{4{,}597}{4{,}500} - 1 = 0.02156 \approx 2.16\%$

Overall dividends in $t = 2$ are $3{,}200 \cdot 1.01^2 + 1{,}300 \cdot 1.05^2 = 3{,}264.32 + 1{,}433.25 = 4{,}697.57$, so from $t = 1$ to $t = 2$ the growth rate is:
$\frac{4{,}697.57}{4{,}597} - 1 = 0.02188 \approx 2.19\%$

The growth rate of dividends for the combined company is not constant!

c2)
As the number of outstanding stocks of AB is $N_{AB} = 4{,}000 + 1{,}000 \cdot SER$, the current dividend per share is:

$$\frac{4{,}500}{4{,}000 + 1{,}000 \cdot \text{SER}} = \frac{4.5}{4 + \text{SER}}$$

c3)

The following inequality must hold: $0.8 < \frac{4.5}{4 + SER}$.
Solving this equation for SER results in $SER < 1.625$.

c4)
β of the new company is:

$$\beta_{AB} = 0.7 \cdot \frac{11.7101 \cdot 4{,}000}{11.7101 \cdot 4{,}000 + 16.0588 \cdot 1{,}000} + 1.5 \cdot \frac{16.0588 \cdot 1{,}000}{11.7101 \cdot 4{,}000 + 16.0588 \cdot 1{,}000} = 0.90425$$

Therefore, $\text{k}_{\text{AB}} = 0.03 + 0.90425 \cdot (0.1 - 0.03) = 0.0933$.

c5)
The current discounted value of all future dividends is:

$$\frac{3{,}200 \cdot 1.01}{0.0933 - 0.01} + \frac{1{,}300 \cdot 1.05}{0.0933 - 0.05} = 38{,}799.52 + 31{,}524.25 = 70{,}323.77$$

so that the stock price of company AB is:

$$P_{AB}(0) = \frac{70{,}323.77}{4{,}000 + 1{,}000 \cdot SER}$$

c6)
Shareholders of company A end up with a larger wealth if $\text{P}_{\text{AB}}(0) > \text{P}_{\text{A}}(0)$. This means that $\frac{70{,}323.77}{4{,}000 + 1{,}000 \cdot SER} > 11.7101$ that becomes $SER < 2.0054$.

Company B shareholders receive SER stocks of the novel company for each stock they own. They are better off when $SER \cdot P_{AB}(0) > P_B(0)$; this means that:

$$\frac{70{,}323.77 \cdot SER}{4{,}000 + 1{,}000 \cdot SER} > 16.0588.$$

From this inequality results $SER > 1.1837$ so that both groups of shareholders see a growth in their wealth when $1.1837 < SER < 2.0054$.

d)
A positive synergy can be created in a number of ways, examples are:

i) a reduction in costs obtained, for instance, by reducing duplicate positions in terms of staff or branches;

ii) a reduction in the competition between companies that operate in the same business, if two such companies merge. This could eventually lead to higher selling prices;

iii) an economy of scale effect, for instance due to an improved purchase power with respect to suppliers;

iv) the acquisition of a new market or a new technology that otherwise would have been impossible or very expensive;

v) a reduction in financial costs due to the fact that the end company has a smaller bankruptcy risk than one of the pre-existing ones.

e)
e1)
The equity value of the end company is:

$$P_{AB}(0)\cdot N_{AB} = \frac{70{,}323.77}{4{,}000+1{,}000\cdot SER}\cdot(4{,}000+1{,}000\cdot SER) = 70{,}323.77$$

It is evident that this value does not depend on SER.

e2)
The synergy value is the difference between the equity value of AB and the sum of the equity values of A and B:

$$70{,}323.77-(11.7101\cdot 4{,}000+16.0588\cdot 1{,}000) = 7{,}424.366$$

e3)
The exchange ratio in this case is:

$$\mathrm{ER} = \frac{16.0588}{11.7101} = 1.37136$$

And the stock price of the resulting company is:

$$\mathrm{P_{AB}}(0) = \frac{70{,}323.77}{4{,}000+1{,}000\cdot 1.37136} = 13.0924$$

The change in wealth for stockholders of company A is:

$$(13.0924-11.7101)\cdot 4{,}000 = 5{,}528.854$$

while for shareholders of company B the change is:

$$(13.0924\cdot 1{,}000\cdot 1.37136-16.0588\cdot 1{,}000) = 1{,}895.512$$

Obviously, $5{,}528.854+1{,}895.512 = 7{,}424.366$