Certified International Investment Analyst

EXAMINATION I

Economics

Corporate Finance

Financial Accounting and Financial Statement Analysis

Equity Valuation and Analysis

Solutions

Final examination

March 2017

Question 1: Economics (35 points)

a)
a1)
The AS/AD model can be used to characterize the level and the dynamics of real output and the price level of an economy in the short and medium run. It consists of basically two curves: the aggregate demand (AD) and the aggregate supply (AS) curve which are both reflecting a relationship between the price level of the economy, P, and real output, Y.

The AD curve represents combinations of price levels and real income where the goods market is in equilibrium. It is a downward sloping curve (see Figure 1). The negative slope reflects an interest-rate and an international effect caused by changes in the price level.

The interest-rate effect works as follows: a decrease in the price level increases real money holdings. As a consequence, interest rates fall which stimulates investment expenditures and thus aggregate demand.

The international effect works as follows: a decrease in the domestic price level leads to a real depreciation, i.e. makes domestic goods relatively cheaper compared to foreign goods. As a consequence, exports rise and imports fall. If the Marshall-Lerner conditions are satisfied net exports and thus aggregate demand will rise.

The AS curve reflects the short to medium run supply decisions of firms as a function of the country's price level. It is an upward sloping curve (see Figure 1). The positive slope of the AS curve can be explained by the existence of either sticky prices or sticky wages. In the former case, it is assumed that prices of some goods do not change instantaneously when the price level rises. Because they don't change in price terms right away, these goods are cheaper relative to the ones captured by the higher price level. Consumers can purchase more of these goods creating a small amount of economic growth. Firms in turn must supply more to satisfy the increased demand for goods. Thus, an increase in the price level leads to an increase in firms' output and a positively sloping short-run supply curve. An alternative explanation is to assume that wages are sticky. Workers often sign contracts with employers determining salaries for years into the future. The contracts typically have an increase in nominal income that adjusts for the expected rates of inflation. However, when inflation becomes higher than expected, workers are paid a smaller real income and businesses consequently have cheaper labor. With cheaper labor, firms hire more workers and expand, leading to a higher output of goods and services. This leads to a positively sloping short-run supply curve.

The AS/AD framework assumes that in the long-run the economy will move to the natural level of output determined by the maximum capacity of this economy. This is ensured by corresponding changes in prices in case a deviation from the long-run equilibrium occurs.

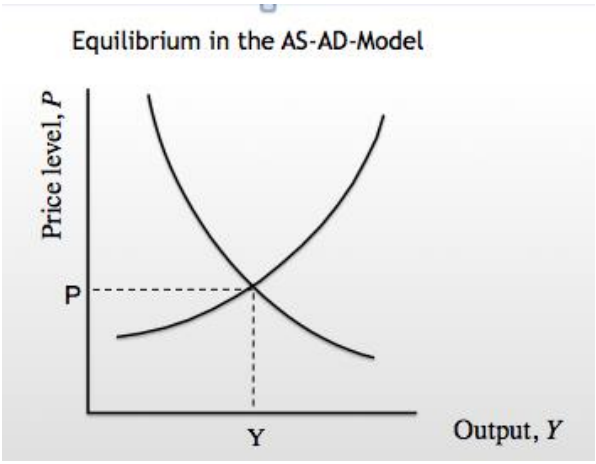

Figure 1: The AS-AD curve

a2)
The reduction in government spending directly translates into a reduction in aggregate spending. The increase in taxes decreases available income which in turn decreases private consumption. Overall, a leftward shift of the AD-curve will result (see Figure 3). We will therefore observe a decrease in the price level from P to P' and a reduction in output from its naturel level Yn to Y', i.e., the economy is anticipated to slide into a recession.

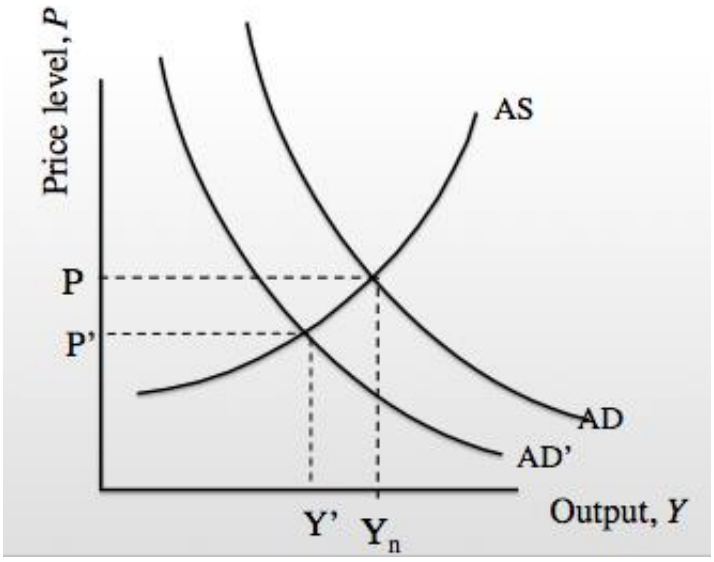

Figure 2: The effects of restrictive fiscal policies in the AS-AD model

b)
b1)
For a given price level, a nominal depreciation implies a real depreciation of the Greek currency. In other words, domestic (Greek) goods become relatively cheaper compared to foreign (rest of the world) goods. As a consequence, Greek exports should increase and imports should decrease. However, given that the value of the imports in terms of domestic goods also depends on the real exchange rate this only implies an improvement in the net exports (defined as exports (X) – imports (expressed in terms of domestic goods, S_{real}*M)) if the Marshall-Lerner condition, given by $\frac{\partial X}{\partial S_{real}} \frac{S_{real}}{X} - \frac{\partial M}{\partial S_{real}} \frac{S_{real}}{XM} > 1$ is satisfied. If this is the case the depreciation will lead to an increase in aggregate demand, i.e., a rightward shift of the AD curve (from AD' to AD'' in Figure 3 below). A devaluation of the right size can take the economy back to the natural level of output Yn.

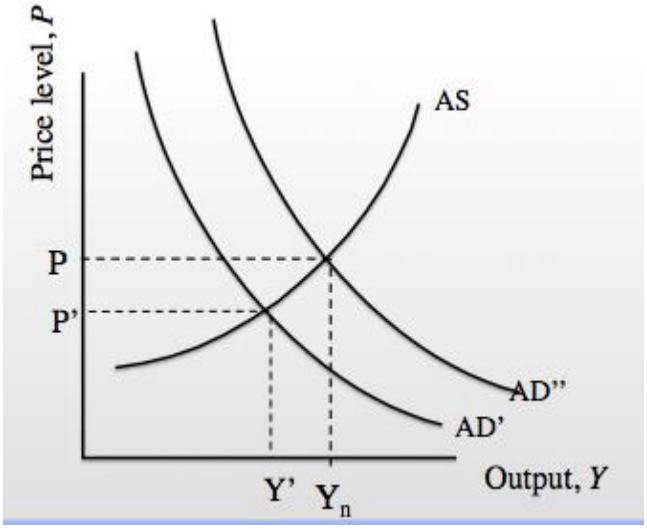

Figure 3: The effects of a nominal depreciation in the AS-AD model

b2)
The export/import figures for Greece point to two major problems which could arise in the context of the above discussed policy of introducing a new Greek currency and immediately depreciate it. First, the overall amount of goods which Greece exports is fairly small. In other words, the size of the quantitative effects of a depreciation might be rather limited. Secondly, a depreciation not only makes export goods cheaper but also import goods more expensive. If quantities exported/imported only react gradually to a currency depreciation then the immediate impact of such a depreciation might be a worsening of the trade balance rather than an improvement. The reason is that in the short run the „price effect" of the depreciation (import goods become more expensive, export goods cheaper) dominates the quantity effects. This negative short-run effect can be expected to be fairly significant, given that the Greek trade balance is significantly negative. Over time, the quantity effect would dominate though and an improvement in the trade balance would be observed. If one plots the resulting dynamics of net exports one obtains a J shaped pattern.

b3)
Greece would give up the advantages of a fixed exchange rate with respect to its euro zone trading partners. Most importantly, exchange-rate uncertainty would be re-introduced. Another, very likely negative effect would consist of a considerably reduced credibility of the monetary policy of the Greek central bank. A smaller level of credibility might cause investors to charge positive risk premia for investments in the country which could imply an overall lower level of foreign investments in Greece.

c)
c1)
When the output level is below its natural level (at Y' < Yn), then prices (P') are below expected prices (which is equal to P in Figure 4 below). As a consequence, price expectations will be adjusted downwards (to P'') leading to lower nominal wages and thus decreased production costs.

Therefore, the supply curve will gradually move downward (from AS to AS') ensuring the economy returns to its long-run equilibrium output level Yn.

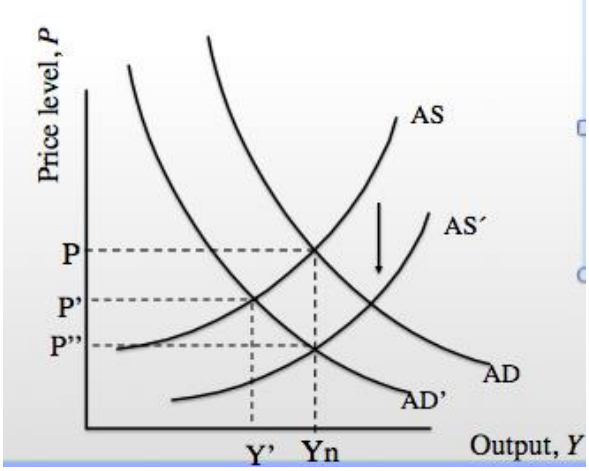

Figure 4: Adjustment process without nominal depreciation in the AS-AD model

c2)
The fiscal multiplier denotes the ratio of how much aggregate GDP will increase/decrease for a unit increase/decrease of fiscal spending. The mechanism underlying this multiplier is as follows: if government spending increases by one unit this leads to an increase in aggregate demand. This in turn increases output and thus available income. However, if disposable income (= income minus taxes) increases private consumption increases which again leads to an increase in aggregate demand ...

The size of the multiplier depends, amongst others, on the households' marginal propensity to consume, the real exchange rate and the marginal propensity to import.

If the fiscal multiplier is larger than 1, then a reduction in a country's public spending by 1% will lead to reduction in the country's GDP by more than 1%.

Overall, this can result in a short-term increase rather than decrease in the debt/GDP ratio.

Question 2: Financial Accounting and Financial Statement Analysis (48 points)

a)
a1)
a1a)
Revenues:
EUR 5.0 million / EUR 100.0 million · EUR 120.0 million = EUR 6.0 million

Explanatory remarks on determining revenues:
- The stage of completion is calculated as the ratio of costs incurred (EUR 5.0 million) to total expected contract costs (EUR 100.0 million), which is 5%.
- Revenues are to be recognized as a percentage of the completion stage (5% of EUR 120 million = EUR 6.0 million).

a1b)

Balance sheet items	Impact
Property, plant and equipment	- EUR 2.0 million
Inventories	EUR 0.0 million
Receivables	EUR 6.0 million
Cash and cash equivalents	- EUR 3.0 million

Income statement items	Impact
Revenues	EUR 6.0 million
Changes in inventories of finished goods and work in progress	EUR 0.0 million
Other own work capitalised	EUR 0.0 million
Cost of materials	EUR 0.0 million
Personnel expenses	- EUR 1.3 million
Depreciation	- EUR 2.0 million
Other operating expenses	- EUR 1.7 million
Operating profit (EBIT)	EUR 1.0 million

a2)
Profit or loss after tax:
- Profit after tax for financial year 2016 amounts to EUR 0.7 million (= operating profit of EUR 1.0 million · tax rate of 30%)
- The pretax result of EUR 1.0 million is reduced by a deferred tax expense of EUR 0.3 million.

a3)

Cash flow statement	Impact
Profit or loss after tax	EUR 0.7 million
Adjustment for tax expense (non-cash)	EUR 0.3 million
Adjustment for increase in receivables	-EUR 6.0 million
Depreciation of fixed assets	EUR 2.0 million
Cash flow from operating activities	**-EUR 3.0 million**

b)
b1)
IAS 36, paragraph 6: The recoverable amount of an asset (or a cash-generating unit) is the higher of its fair value less costs of disposal and its value in use.

b2)
Value in use: EUR 3,601,247.43

Discount rate: 10%
Net cash flow p.a. (in EUR): 950,000

	Net cash flow	Present value factor	Present value
Year 1	950,000	0.9091	863,636
Year 2	950,000	08264	785,124
Year 3	950,000	0.7513	713,749
Year 4	950,000	0.6830	648,863
Year 5	950,000	0.6209	589,875
Value in use (= NPV)			3,601,247

b3)
Impairment loss: EUR 1,398,753

Impairment loss = Book value – Recoverable amount
The recoverable amount of an asset is the higher of its fair value less cost of disposal and its value in use.
Value in use (EUR 3,601,247.43) is higher than fair value less costs of disposal (EUR 3,500,000).
Therefore,
Impairment loss = $(20{,}000{,}000 - 15{,}000{,}000) - 3{,}601{,}247 = 1{,}398{,}753$

b4)
Annual depreciation cost recognized over the 2017 till 2021 period:
EUR 3,601,247.43 / 5 = EUR 720,250

c)
c1)

	Interest	Lease payment	Principal repayment	Lease obligation at year end
				20,000,000
2017	2,000,000	5,275,950	3,275,950	16,724,050
2018	1,672,405	5,275,950	3,603,545	13,120,505
2019	1,312,051	5,275,950	3,963,900	9,156,606
2020	915,661	5,275,950	4,360,289	4,796,316
2021	479,632	5,275,950	4,796,316	0

c2)
Property, plant and equipment:
- end of 2017: 20,000,000 – 4,000,000 = 16,000,000
- end of 2018: 20,000,000 – (4,000,000 x 2) = 12,000,000
Financial debt = Lease obligation at year end (see table above)

Operating expenses = Depreciation (4,000,000 per year)
Financial expenses = Interest included in lease payments (see table above)

Balance sheet	December 31, 2017	December 31, 2018
Property, plant and equipment	16,000,000	12,000,000
Financial debt	16,724,050	13,120,505
Income statement	2017	2018
Operating expenses	4,000,000	4,000,000
Financial expenses	2,000,000	1,672,405

Question 3: Corporate Finance (39 points)

[Note: The answers below follow the definitions given in the course manuals and the formulae booklet. However, the answers which use only sales instead of sales or cost of goods sold can also be accepted. These results are given in brackets.]

a)

(i) Change in cash conversion cycle:

The current cash conversion cycle is the sum of the current inventory period and accounts receivable period, less the current accounts payable period:
Current inventory period = (8,877 / 43,200) x 365 = 75 days (42 d)
Current accounts receivable period = (19,036 / 77,200) x 365 = 90 days
Current accounts payable period = (3,551 / 43,200) x 365 = 30 days (17 d)
Current cash conversion cycle = 75 + 90 – 30 = 135 days (115 d)

Cash conversion cycle after policy changes = 50 + 65 – 45 = 70 days.

The change in the cash conversion cycle is therefore a decrease of 65 days. (45d)

(ii) Effect on current ratio:

At present, the current ratio is (1,000 + 8,877 + 19,036) / (3,551 + 19,865) = 1.235 times.

The current net working capital is USD 5.5 million.

The revised figures for inventory, trade accounts receivable, trade accounts payable and interest bearing loans (bank overdraft) must be calculated in order to find the current ratio after the planned working capital policy changes:
Revised inventory = 43,200 x 50/365 = 5,918 (in USD ,000) (10,575)
Revised accounts receivable = 77,200 x 65/365 = 13,748 (in USD ,000)
Revised accounts payable = 43,200 x 45/365 = 5,326 (in USD ,000) (9,518)
Revised overdraft level = 1,000 + 5,918 + 13,748 – 5,326 – 5,500 = 9,840 (in USD ,000) (10,305)

Revised current assets = 1,000 + 5,918 + 13,748 = 20,666 (in USD ,000) (25,323)
Revised current liabilities = 5,326 + 9,840 = 15,166 (in USD ,000) (19,823)
Revised current ratio = 20,666 / 15,166 = 1.363 times (1.277 times)
The effect on the current ratio is to increase it from 1.235 to 1.363 times. (to 1.277 times)

This is an improvement in ABC Co.'s short-term liquidity situation. (a slight improvement)

(iii) Finance cost saving:

The finance cost saving arises from the decrease in interest bearing loans (bank overdraft) from USD 19,862,000 to USD 9,840,000 (10,305,000), a reduction of USD 10,022,000 (9,557,000), with a saving of 5% per year or USD 501,100 (477,850) per year.

b)
Foreign currency risk can be divided into transaction risk, translation risk and economic risk.

Transaction risk
This is the foreign currency risk associated with short-term transactions, such as receiving money from customers in settlement of foreign currency accounts receivable. The risk here is that the actual profit or cost associated with the future transaction may be different from the expected or forecast profit or cost. The expected profit on goods or services sold on credit to a foreign client, for example, invoiced in the foreign currency, could be decreased by an adverse exchange rate movement. Transaction risk is therefore cash exposure, since cash transactions are affected by it. This type of foreign currency risk is usually hedged. Companies typically use the following financial instruments to hedge against transaction risk: FX forward contracts, money market hedges, FX futures contracts, FX option contracts, currency swaps. A further solution maybe invoicing all transactions in the firm's home currency.

Translation risk
This is the foreign currency risk associated with the consolidation of foreign currency denominated assets and liabilities. Movements in exchange rates can change the value of such assets and liabilities, resulting in unrealised foreign currency losses or gains when financial statements are consolidated for financial reporting purposes. These gains and losses exist only on paper and do not have an actual cash effect. Translation exposure is often referred to as accounting exposure. Translation exposure can be hedged using asset and liability management (e.g. denominating some of the firm's long term debt in foreign currency) and financial instruments (see above), but hedging this type of foreign currency risk may be deemed unnecessary.

Economic risk
This is the foreign currency risk associated with longer-term movements in exchange rates. It refers to the possibility that the present value of a company's future cash flows may be affected by future exchange rate movements, or that the competitive position of a company may be affected by future exchange rate movements. All internationally active companies face economic exposure. Economic risk is by its very nature harder to manage. In practice, many (especially large multinational) firms reduce their exposure to economic risk by matching of costs and revenues through financial instruments (see above), and/or through foreign currency borrowing/loans, and/or through the geographical structure of sourcing, production, marketing and sales (operational hedges).

c)
<u>Forward market hedge:</u>
Income from forward market hedge = EUR 8,649,771 x 1.1561 USD/EUR = USD 10,000,000.

<u>Money market hedge:</u>
Three-month euro borrowing rate = 6% / 4 = 1.50%
Three-month dollar deposit rate = 4% / 4 = 1.00%

Euros borrowed now = 8,649,771 / (1 + 0.015) = EUR 8,521,942
Dollar value of this borrowing = 8,521,942 x 1.1592 = 9,878,635
Dollar income on this deposited sum = 9,878,635 x 1.01 = 9,977,421

The forward market hedge gives USD 22,579 more income and hence will be preferred financially by ABC Co.

Question 4: Equity valuation and analysis (30 points)

a)
ROE = profit margin × total asset turnover × equity multiplier
ROE = (Net income / Sales) × (Sales / Assets) × (Assets / Equity)

ROE
= (36,750 / 675,000) × (675,000 / 725,000) × (725,000 / 405,000)
= (0.0544) × (0.9310) × (1.7901)
= 0.0907 (= 9.07%)

b)
Dividend payout ratio = (Dividends / Net income) = (15,000 / 36,750) = 0.4082 (= 40.82%)

Sustainable growth rate = ROE × retention ratio
Retention ratio = 1 – dividend payout ratio = b
Sustainable growth rate = 0.0907 × (1－0.4082) = 0.0537 (= 5.37%)

c)
Required return = risk-free rate + Beta × (Expected return on market – risk-free rate)
= 0.0275 + 0.8 × (0.095 – 0.0275) = 0.0815 (= 8.15%)

d)
With the constant growth dividend model:
Theoretical stock price:
$P_0 = D_0 \times (1 + g) / (r - g) = D_1 / (r - g)$
Forward P/E ratio:
$P_0 / E_1 = (D_1 / E_1) / (r - g)$
$g = ROE \times b$
(D_1 / E_1) = dividend payout ratio
So, $P_0 / E_1 = (D_1 / E_1) / \{\text{Required return} – (ROE \times b)\}$

<u>Scenario 1: Based on the actual dividend payout ratio in 2016</u>

Earnings per share next year:	USD 1.94
Dividend payout ratio:	40.82%
Growth rate:	5.37%
ROE:	9.07%
Required return:	8.15%
Forward P/E ratio:	14.68
Price today:	USD 28.48

$P_0 / E_1 = (D_1 / E_1) / \{\text{Required return} – (ROE \times b)\}$
= (0.4082) / {0.0815 – (0.0907 × 0.5918)} = 14.68

$E_1 = E_0 \times (1 + g)$ = 36,750 / 20,000 x 1.0537 = 1.84 × (1.0537) = USD 1.94

Given above P_0 = 14.68 × USD 1.94 = USD 28.48 (USD 28.43 based on not-rounded interim results or on direct use of the DDM-formula)

Scenario 2: Assume the company changed the dividend payout ratio to 60% in 2016

Earnings per share next year:	USD 1.91
Dividend payout ratio:	60.00%
Growth rate (0.0907 x 0.4):	3.63%
ROE:	9.07%
Required return:	8.15%
Forward P/E ratio:	13.27
Price today:	USD 25.35

$P_0 / E_1 = (D_1 / E_1) / \{\text{Required return} – (\text{ROE} \times b)\}$
$= (0.6) / \{0.0815 – (0.0907 \times 0.40)\} = 13.27$

$E_1 = E_0 \times (1 + g) = 1.84 \times (1.0363) = \text{USD } 1.91$

Given above $P_0 = 13.27 \times \text{USD } 1.91 = \text{USD } 25.35$ (USD 25.27 based on not-rounded interim results or on direct use of the DDM-formula)

[Note: The solutions round the earnings to the nearest penny.]

[Alternative answer:
We calculate the theoretical stock price by directly using the DDM-formula:
$P_0 = D_0 \times (1 + g) / (r - g) = D_1 / (r - g) = (E_1 \times \pi) / (r - g)$
and then subsequently deduce the forward P/E ratio:
$P_0 / E_1 = \pi / (r - g)$

Scenario 1:

$D_0 = 15{,}000 / 20{,}000 = 0.75$

$P_0 = 0.75 \times (1 + 0.0537) / (0.0815 – 0.0537) = \text{USD } 28.43$

$P_0 / E_1 = 0.4082 / (0.0815 – 0.0537) = 14.68$

Scenario 2:

$D_0 = 36{,}750 \times 0.6 / 20{,}000 = 1.1025$

g (sustainable growth rate) $= 0.0907 \times (1 - 0.6) = 0.0363$ (= 3.63%)

$P_0 = 1.1025 \times (1 + 0.0363) / (0.0815 – 0.0363) = \text{USD } 25.28$

$P_0 / E_1 = 0.60 / (0.0815 – 0.0363) = 13.27$]

e)
No, FFL should not have increased their dividend payout ratio to 60% in 2016. Increasing the dividend payout ratio from 40.82% to 60% would have decreased the price of the stock from USD 28.48 (USD 28.43) to USD 25.35 (USD 25.27). The CFO does not realize that paying out a higher percentage of earnings in dividends means that the company will retain less funds and forego good investments. This would result in a lower growth rate. (recall, growth = ROE × retention ratio).

In general increasing the dividend payout ratio impacts the stock price in two ways. The first is clear: a higher dollar dividend will increase stock price. The second is that a higher payout ratio means lower growth which decreases the stock price. The factor that dominates depends on the simple question. Is the company making good investments?

If ROE > required return, then the company is making good investments; since the investments are earning more than the required return. Recall that FFL has an ROE of 9.07% and a required return of 8.15% thus ROE (9.07%) > Required return (8.15%). FFL is making good investments. Accordingly, FFL increasing the dividend payout ratio to 60% would lower FFL's stock price. This is because the company would be better off if they used their net income to reinvest in the company and make profitable investments.

Question 5: Equity valuation and analysis (28 points)

a)
If a company has debt, a future debt amount is constant, and the debt beta is zero, the following relationship holds true between the stock beta β_L (levered beta) and the asset beta β_U (unlevered beta).

$$\beta_U = \frac{\beta_L}{\left[1 + (1-t) \cdot \frac{D}{E}\right]}$$

In this equation, D = total interest-bearing liabilities, E = market capitalization, t = corporate income tax rate. Therefore,

$$\text{Black's asset beta} = \frac{1.4}{1 + (1 - 0.3) \times 0.4/2} = 1.228$$

White does not have any debt, and if its asset beta is assumed to be equal to Black's, this value will be White's stock beta.

b)
b1)
This financial year's forecast residual income per share
= this year's earnings per share－book value per share at the beginning of this year × required rate of return of stock
= 12－90 × 0.1 = 3 (dollars)

Book value per share at the beginning of the next year
= book value per share at the beginning of this year + this year's earnings per share－this year's dividend per share
= 90＋12－2 = 100 (dollars)

Next year's forecast earnings per share
= book value per share at the beginning of next year × ROE
= 100 × 0.11 = 11 (dollars)

The next year's forecast residual income per share
= earnings per share of next year－book value per share at the beginning of next year × required rate of return of stock
= 11－100 × 0.1 = 1 (dollar)

b2)
ROE and the payout ratio will be constant from the next year onwards, so from the second year on, earnings per share, book value per share and residual income per share will grow at the sustainable growth rate of 8.25%.

Sustainable growth rate = ROE × (1－payout ratio) ＝11 × (1－0.25)＝8.25(%)

Theoretical share price

= book value per share at the beginning of this year + present value of residual income per share from this year onwards
= book value per share at the beginning of this year + present value of residual income per share this year + present value of residual income per share from the next year onwards

$$= 90 + \frac{3}{1.1} + \frac{1}{1.1} \cdot \frac{1}{0.1 - 0.0825} = 144.68 \text{ (dollars)}$$

From these results, White's share price can be determined to be reasonable.

c)
c1)
This financial year's forecast dividend per share
= this financial year's forecast earnings per share × payout ratio
= 12 × 0.4 = 4.8 (dollars)

Book value per share at the beginning of the next year
= book value per share at the beginning of this year + this year's earnings per share－this year's dividend per share
= 90 + 12－4.8 = 97.2 (dollars)

Next year's forecast per-share dividend
= book value per share at the beginning of the next year × ROE × payout ratio
= 97.2 × 0.11 × 0.4 = 4.28 (dollars)

From the second year onwards dividend per share will grow at the sustainable growth rate of 6.6%.
Sustainable growth rate = ROE × (1－payout ratio) ＝11 × (1－0.4)＝6.6％

Using the dividend discount model:
Theoretical share price
= present value of this year's dividend per share + present value of per-share dividend per share from next year onwards

$$= \frac{4.8}{1.1} + \frac{1}{1.1} \cdot \frac{4.28}{0.1 - 0.066} = 118.8 \text{ (dollars)}$$

c2)
Using the constant growth dividend discount model and sustainable growth rate, and expressing the ROE from the next year onwards required for the theoretical share price to reach 150 dollars as "x," the following equation holds true:

$$\frac{4.8}{1.1} + \frac{1}{1.1} \cdot \frac{97.2 \cdot x \cdot 0.4}{0.1 - x(1 - 0.4)} = 150$$

This equation can be solved to find that x = 0.1187 (= 11.87%)

Therefore, a theoretical share price of 150 dollars will require an ROE of 11.87% from the next year onwards.