6. Free Cash Flows Analysis (FCFF, FCFE, CCF, EVA, BRA, RFA, APV, FEVA, DDM)

6.1 Free Cash Flow

There are many discounting methods. All of them give the same results when we use the proper cash flows and the appropriate discounting rate. Fair value cannot be dependent on a model.

1. FCFF - *free cash flows to the firm*, the most traditional method, in which operating and investment cash flows are discounted using WACC,
2. FCFE - *free cash flows to equity*, in which cash flows are discounted using cost of equity,
3. CCFF - *capital cash flows the firm*, in which capital cash flows (CCFE = FCFE + CFD, CFD - cash flows to debt) are discounted using weighted average cost of capital before tax,
4. CCFE - *capital cash flows to equity*, in which capital cash flows (CCFE = FCFF- CFD, CFD- cash flows to debt) are discounted using adjusted cost of equity before tax,
5. EVA_F - *incremental economic value added to the firm*, in which economic cash flows to the firm are discounted using WACC,
6. EVA_E - *incremental economic value added to equity*, in which economic cash flows to equity are discounted using cost of equity,
7. ECF_F - *economic cash flows to the firm*, in which economic cash flows against initial book value of equity and debt are discounted using WACC,
8. ECF_E - *economic cash flows to equity*, in which economic cash flows against initial book value of equity are discounted using cost of equity,
9. BRA_F - *business risk adjusted free cash flows to the firm)*, in which cash flows are discounted using unlevered cost of capital,
10. BRA_E - *business risk adjusted free cash flows to equity)*, in which cash flows are discounted using unlevered cost of capital,
11. RFA_F - *risk-free-rate adjusted free cash flows to the firm*, in which cash flows are discounted using risk-free interest rate,
12. RFA_E - *risk-free-rate adjusted free cash flows to equity)*, in which cash flows are discounted using risk-free interest rate,
13. APV_F - *adjusted present value*, in which cash flows to the firm are discounted using unlevered cost of capital,
14. APV_E - *adjusted present value*, in which cash flows to equity are discounted using unlevered cost of capital,
15. FEVA - *financial and economic value added*, which decomposes cash flows into various streams, and discounts them with unlevered cost of capital,
16. DDM - *dividend discount models*, in which dividends and cash surpluses are discounted using cost of equity,
17. DEC - *decomposition method*, in which operating, investment, tax shield cash and differences between equity cost of capital and external cost of capital flows are discounted using cost of equity.

Table 10. Discounting Methods

	R_A	R_E	R_{AbT}	R_{EbT}	R_U	R_F
Firm	FCFF EVAF ECF		CCFF		APVF BRAF	RFAF
Equity		FCFE EVAE ECE DDM DEC		CCFE	APVE BRAE FEVA	RFAE

6.1.1 Free cash flow to the firm (FCFF)

Free cash flow to the firm (FCFF) is the cash flow available to suppliers of capital (equity holders and debtors) after all investments in fixed assets and net current assets have been made.

FCFF is independent of the company's capital structure. The same cash flow is used to value levered and unlevered company. FCFF does not depend on capital structure and also on cost of equity and interest rates. It may be interpreted as cash flow to equity holders of an unlevered company. FCFF depends on sales, operating costs and depreciation.

FCFF is different from EBIT. FCFF can be expressed as

(15) $FCFF = EBIT\ (1-T) + D - \Delta FA - \Delta NCA$

where

EBIT – operating income (earnings before interest and taxes),
T - tax rate,
D - depreciation,
ΔFA - investment in fixed assets,
ΔNCA – investment in fixed current assets.

FCFF can be also estimated as follows:

(16) $FCFF = NI + D + \text{Interest Expense}\ (1-T) - \Delta FA - \Delta NCA$

or

(17) $FCFF = OCF + \text{Nonoperating Income} - \text{Interest Expense}\ T - \Delta FA$

or

(18) $FCFF = NOI\ (1-T) + D + \text{Nonoperating Income}\ (1-T) - \Delta FA - \Delta NCA$

or

(19) $FCFF = \Delta Cash - \text{Tax Savings} - \text{Financial Flow}$

where

OCF - operating cash flows,
Interest Expense x T – tax savings.

6.1.2 Free cash flow to equity (FCFE)

Free cash flow to equity is the cash flow available to equity holders after all financial flow adjustments (interest and principal payments have been paid and new borrowing received). FCFE can be estimated as follows:

(20) $FCFE = FCFF - \text{Interest Expense}\ (1-T) + \text{Net Borrowing}$

or

(21) FCFE= NI + D - ΔFA - ΔNCA + Net Borrowing

or

(22) FCFE= OCF + Nonoperating income – Interest Expense - ΔFA + Net Borrowing

or

(23) FCFE = ΔCash – (Issued Stock – Dividends Paid)

6.2 Discounting Methods

6.2.1 FCFF and FCFE

In general, there are two approaches to valuation: FCFF - *free cash flows to the firm and* FCFE - *free cash flows to equity*.

	FCFF	FCFE
cash flows	operating, investment	operating, investment, financial
discount rate	WACC (weighted average cost of capital)	cost of equity

In capital budgeting or when valuing companies discounting methods are divided to show the value of equity or the value of a firm (equity and debt). When the value of firm is established you can simply deduct the market value of debt to show the value of equity. When you obtain the value of equity you should add the market value of debt to derive the value of a firm. All discounting methods should give the same results. It is also very important to understand that tax shield increases the value of equity and not the value for bondholders. The differences between two general approaches to valuation: FCFF - *free cash flows to the firm and* FCFE - *free cash flows to equity* are shown in the following table:

	FIRM	EQUITY
Cash Flows	FCFF = operating, investment	FCFE = operating, investment, financial
Discounting Rate	weighted average cost of capital, WACC	cost of equity
Continuing value		
income approach	$CV(FCFF_n) = \frac{FCFF_n(1+g)}{R_A - g}$	$CV(FCFE_n) = \frac{FCFE_n(1+g)}{R_E - g}$
book value approach	$CV(FCFF_n) = FA_n + NCA_n = E_n + D_n$	$CV(FCFE_n) = FA_n + NCA_n - D_n = E_n$

where

R_A is the expected rate of return on equity and debt of an levered company (WACC, weighted average cost of capital),

R_E is the expected rate of return on stock of an levered company (levered cost of equity capital),

g is growth rate of the appropriate cash flow,

FA is fixed assets

NCA is net current assets

E is equity

D is debt

n is the horizon of business plan

The FCFF cash flows generated by an asset are investment and operating cash flows, which do not depend on the amount of debt or interest payments being made by the company. A discounting rate (WACC) used in this approach depends on capital structure.

The FCFE cash flows are operating, investment and financial cash flows. The FCFE cash flows depend on capital structure. A discounting rate (cost of equity) used in this approach does not depend on capital structure.

6.2.2 EVA (Economic Value Added)

EVA for equityholders

(24) $EVA_E = NI - R_E \times E_P$

or

(25) $EVA_E = (ROE - R_E) \times E_P$

where

NI – net income,

R_E - cost of equity,

E_P – equity at the beginning of period,

$ROE = NI/E_P$.

EVA for the firm

(26) $EVA_F = NOI\ (1\text{-}T) - R_A \times (E_P+D_P)$

or

(27) $EVA_F = (ROA - R_A) \times (E_P+D_P)$

where

NOI (1-T)– net operating income after tax,

R_A - weighted average cost of capital,

(E_P+D_P) – equity + debt,

$ROA = NOI(1\text{-}T)/ (E_P+D_P)$

MVA (market value added)

Market value added (MVA) represents the difference between the market value of equity and net debt and the book value of capital employed. MVA assesses increase in value with regard to capital invested. When debt is the same (narket or book value) on both sides of the difference, the MVA is just the difference between the market capitalization and the book value of equity.

Task 6

1. Using balance sheet, income statement, and cash flow statement prepare the balance sheet changes and selected income statement items to prepare own cash flow statement using indirect and direct approach.
2. Prepare a cash flow statement for the period using indirect and direct approach.
3. Explain differences between prepared cash flow statement and Statements of Cash Flows of a company.
4. Discuss the structure of net cash flow from operating, financing, and investment activities (sources and uses).
5. Calculate, explain and interpret FCFF and FCFE using different formulas.

Problem 12. Data for Cash Flow Statement

Required:

Using balance sheet, income statement, and cash flow statement prepare the balance sheet changes and selected income statement items to prepare own cash flow statement using indirect and direct approach.

Solution

Balance sheet changes

	Dec. 31, 2014	*Dec. 31, 2013*	*Dec. 31, 2012*	
Accounts receivable	407	-114	161	balance sheet
Inventories	177	-13	-172	balance sheet
Other current assets	-3 722	1 123	-9 181	balance sheet
Long Term Assets	-286	-2 905	-1 369	balance sheet
Accounts payable	4 563	-10	3 538	balance sheet
Long -Term Debt, Other Liabilities, Deferred Income Taxes	284	3 619	1 415	balance sheet
Equity without net income and dividends	-4 653	-3 385	-3 244	balance sheet
Net income	7 124	8 626	9 086	income statement
Dividends	-5 350	-4 969	-4 595	cash flow statement
Change in cash	-1 456	1 972	-4 361	

Income statement

	Dec. 31, 2014	*Dec. 31, 2013*	*Dec. 31, 2012*	
Net Operating Revenues	45 998	46 854	48 017	income statement
Cost of goods sold	-17 889	-18 421	-19 053	income statement
Remaining expenses without depreciation	-16 425	-16 228	-16 203	income statement
Depreciation and amortization	-1 976	-1 977	-1 982	cash flow statement
Interest income	594	534	471	income statement
Interest expense	-483	-463	-397	income statement
Other income	-494	1 178	956	income statement
Income tax	-2 201	-2 851	-2 723	income statement
Net income	7 124	8 626	9 086	
Begining cash balance	10 414	8 442	12 803	balance sheet
Effective Income Tax Rate	23,60%	24,84%	23,06%	

Problem 13. Cash Flow Statement using indirect and direct approach

Required:
(a) Prepare a cash flow statement for the period using indirect approach.
(b) Prepare a cash flow statement for the period using direct approach.

Solution
(a)

Indirect approach	*Dec. 31, 2014*	*Dec. 31, 2013*	*Dec. 31, 2012*
Cash inflows (outflows) from operating activities			
Net income	7 124	8 626	9 086
Depreciation and amortization	1 976	1 977	1 982
Inventories	177	-13	-172
Other current assets	-3 722	1 123	-9 181
Accounts receivable	407	-114	161
Accounts payable	4 563	-10	3 538
Adjustments			
Interest income	-594	-534	-471
Interest expense	483	463	397
Other income	494	-1 178	-956
Net cash inflow (outflow) from operating activities	10 908	10 340	4 384
Cash inflows (outflows) from investing activities			
Long Term Assets, Depreciation and amortization	-2 262	-4 882	-3 351
Interest income	594	534	471
Other income	-494	1 178	956
Net cash inflow (outflow) from investing activities	-2 162	-3 170	-1 924
Cash inflows (outflows) from financing activities			
Equity without net income and dividends	-4 653	-3 385	-3 244
Dividends	-5 350	-4 969	-4 595
Long -Term Debt, Other Liabilities, Deferred Income Taxes	284	3 619	1 415
Interest expense	-483	-463	-397
Net cash inflow (outflow) from financing activities	-10 202	-5 198	-6 821
Net increase (decrease) in cash	-1 456	1 972	-4 361
Balance at beginning of year	10 414	8 442	12 803
Balance at end of year	8 958	10 414	8 442
Net cash provided by operating activities	10 908	10 340	4 384
Net cash provided by (used in) investing activities	-2 162	-3 170	-1 924
Net cash provided by (used in) financing activities	-10 202	-5 198	-6 821
Net increase (decrease) in cash	-1 456	1 972	-4 361

True Statement of cash flows

	Dec. 31, 2014	*Dec. 31, 2013*	*Dec. 31, 2012*
Net cash provided by operating activities	10615	10542	10645
Net cash provided by (used in) investing activities	-7506	-4214	-11404
Net cash provided by (used in) financing activities	-3631	-3745	-3347
Exchange Rate	-934	-611	-255
Net increase (decrease) in cash	-1456	1972	-4361

(b)			
Direct approach	*Dec. 31, 2014*	*Dec. 31, 2013*	*Dec. 31, 2012*
Cash inflows (outflows) from operating activities			
Cash collected from customers			
Net Operating Revenues	45 998	46 854	48 017
Accounts receivable	407	-114	161
Cash from sales	46 405	46 740	48 178
Payments to suppliers			
Cost of goods sold	-17 889	-18 421	-19 053
Inventories	177	-13	-172
Accounts payable	4 563	-10	3 538
Cash production costs	-13 149	-18 444	-15 687
Gross cash margin	33 256	28 296	32 491
Remaining expenses without depreciation	-16 425	-16 228	-16 203
Cash from operations	16 831	12 068	16 288
Other current assets	-3 722	1 123	-9 181
Taxes	-2 201	-2 851	-2 723
Net cash inflow (outflow) from operating activities	10 908	10 340	4 384

Problem 14. FCFF and FCFE Cash Flows

Required:			
(a) Calculate FCFF starting from net income, cash flow from operations			
and net operating income after tax.			
(b) Calculate FCFE starting from FCFF, net income, cash flow from operations			
and net operating income after tax.			
Solution			
(a)			
Free cash flows to the firm (FCFF)	*Dec. 31, 2014*	*Dec. 31, 2013*	*Dec. 31, 2012*
NI	7 124	8 626	9 086
D	1 976	1 977	1 982
Net Interest (1-T)	-85	-53	-57
ΔFA	-2 262	-4 882	-3 351
ΔNCA	1 425	986	-5 654
FCFF	8 178	6 654	2 006
OCF	10 908	10 340	4 384
Other income	-494	1 178	956
Net Interest	111	71	74
Net Interest (1-T)	-85	-53	-57
ΔFA	-2 262	-4 882	-3 351
FCFF	8 178	6 654	2 006
NOI (1-T)	7 417	7 687	8 294
Other Income (1-T)	-377	885	736
D	1 976	1 977	1 982
ΔFA	-2 262	-4 882	-3 351
ΔNCA	1 425	986	-5 654
FCFF	8 178	6 654	2 006
ΔCash	-1 456	1 972	-4 361
Tax savings	26	18	17
Financial flow	9 608	4 664	6 350
FCFF	8 178	6 654	2 006

(b)			
Free cash flows to equity (FCFE)	*Dec. 31, 2014*	*Dec. 31, 2013*	*Dec. 31, 2012*
FCFF	8 178	6 654	2 006
Net Interest (1-T)	85	53	57
Long -Term Debt, Other Liabilities, Deferred Income Taxes	284	3 619	1 415
FCFE	8 547	10 326	3 478
NI	7 124	8 626	9 086
+D	1 976	1 977	1 982
ΔFA	-2 262	-4 882	-3 351
ΔNCA	1 425	986	-5 654
Long -Term Debt, Other Liabilities, Deferred Income Taxes	284	3 619	1 415
FCFE	8 547	10 326	3 478
OCF	10 908	10 340	4 384
+NonopInc	-494	1 178	956
Net Interest	111	71	74
- ΔFA	-2 262	-4 882	-3 351
Long -Term Debt, Other Liabilities, Deferred Income Taxes	284	3 619	1 415
FCFE	8 547	10 326	3 478
ΔCash	-1 456	1 972	-4 361
-(Issued stock - Dividends paid)	10 003	8 354	7 839
FCFE	8 547	10 326	3 478