FIN401 ADVANCED FINANCIAL MANAGEMENT
NOTE: CAPITAL BUDGETING AND FREE CASH FLOWS

Computing Free Cash Flows

Capital Budgeting requires a forecast of Free Cash Flows (FCF), which are then used to measure the Internal Rate of Return (IRR) and Net Present Value (NPV) of a project. In addition, the IRR is also compared to the Weighted Average Cost of Capital (WACC) to determine the viability of the project.

Free Cash Flows represent the cash that is generated from the operations of a business.

The calculation of Free Cash Flows uses the same techniques as used in the generation of a Statement of Cash Flows. From a high-level perspective, Free Cash Flows are calculated from the first two sections of the Statement of Cash Flows:

- Cash from Operating Activities
- Cash from Investing Activities

The third section of a Statement of Cash Flows, Cash from Financing Activities, is not included, as it measures how a company finances its business operation and not the business operation itself.

Both the Income Statement and Balance Sheet are required to calculate the Free Cash Flows. To create an Excel schedule of Free Cash Flows, we will start with the Income Statement and Balance Sheet of a company over several years. From them, we will calculate the following:

1. Cash from Operations
2. Changes to Working Capital
3. Capital Expenditures

And then, we will add in two other sections:

4. Initial Investment
5. Terminal Value

Cash from Operations

We will calculate the cash generated by the operations of a company. Net Income of a company is an accounting calculation that accounts for both cash and non-cash activities and also includes any interest expense. In order to calculate the Cash from Operations, we want to only account for activity that represents cash in and out of the company. We also do not want to account for any interest expense as that expense is related to our cost of capital, or WACC. Therefore, we only want to calculate the cash that is generated from the *operations* of the company, so we exclude interest. However, we need to calculate the taxes that are incurred by the operations of the company as taxes are paid with cash.

Therefore, to calculate the cash from operations, we make the following calculations:

1) Earnings before Interest and Taxes (EBIT) x (1 – tax rate)
2) Add back depreciation

Some explanation and an example:

We multiply the EBIT x (1 – tax rate) to calculate the Net Operating Profit After Taxes (NOPAT). For example, a company that has EBIT of $100,000 and a tax rate of 25% would owe $25,000 in taxes (remember, we want to calculate the taxes without the benefit of the interest expense deduction), and its NOPAT would be $75,000 (EBIT of $100,000 – taxes of $25,000).
Another way to do the calculation would be EBIT X (1 – tax rate), or $100.000 x (1 – 0.25), or $100,000 x .75 = $75,000.

We then add back depreciation as it not a "cash event", i.e., it is an accounting entry and is not an expense that is paid for with cash.

The example below calculates Cash from Operations from an Income Statement as follows:

Cash From Operations	1	2	3	4
EBIT	$ 500,000	$ 550,000	$ 600,000	$ 700,000
Tax Rate 25%	25%	25%	25%	25%
EBIT x (1 - tax rate)	$ 375,000	$ 412,500	$ 450,000	$ 525,000
Depreciation Expense	$ 75,000	$ 100,000	$ 125,000	$ 150,000
Cash From Operations	**$ 450,000**	**$ 512,500**	**$ 575,000**	**$ 675,000**

Changes to Working Capital

The next step is to calculate the changes in working capital (working capital is defined as current assets minus current liabilities). A growing company, for example, will generally need to invest more working capital into a business to support the growth. It may need to have more inventory on hand and have more accounts receivable. It may also have an increase in Accounts Payable.

To calculate the impact of changes to working capital on cash, we need to review some concepts from Cash Flow Statements. The first is that a negative amount represents cash flowing out of the company, and a positive amount represents cash is flowing into the company. The second is that as assets go up our cash balances go down, and when liabilities go up cash goes up. And vice versa.

In the example below, we see that Accounts Receivable and Inventory increase from Year 1 to Year 2, as does Accounts Payable:

	Years		
	1	2	Change
Accounts Receivable	$ 75,000	$ 85,000	$ 10,000
Inventory	$ 150,000	$ 175,000	$ 25,000
Accounts Payable	$ 35,000	$ 50,000	$ 15,000

At the end of year 2, the company has $10,000 more in Accounts Receivable, $25,000 more in Inventory, and $15,000 more in Accounts Payable. Let's look at each line individually:

- Accounts Receivable went up, so, in essence, we are owed $10,000 more than we were owed last year. So we have $10,000 less in cash than we would have had if our balance had stayed the same. We have now invested $10,000 more in working capital to fund the business.

- Inventory also went up, so we have now have $25,000 more in inventory than we did at the end

of last year. This is a true cash expense, so we have invested another $25,000 in working capital.

- Accounts Payable has gone up by $15,000. So we have, in essence, received a "loan" from our suppliers. We owe them $15,000 more at the end of this year compared to last year, so that represents a decrease in working capital needed.

To calculate the Changes to Working Capital in Excel, we measure the change in the year-end balance from the previous year-end balance for the non-cash current assets and liabilities. See the following example balance sheet year-end balances and the resulting calculation of changes to working capital:

	Years			
Balance Sheet Balances	1	2	3	4
Accounts Receivable	$ 75,000	$ 85,000	$ 95,000	$ 90,000
Inventory	$ 150,000	$ 175,000	$ 185,000	$ 180,000
Accounts Payable	$ 35,000	$ 50,000	$ 60,000	$ 55,000
Changes to Working Capital				
Accounts Receivable		$ (10,000)	$ (10,000)	$ 5,000
Inventory		$ (25,000)	$ (10,000)	$ 5,000
Accounts Payable		$ 15,000	$ 10,000	$ (5,000)
Changes to Working Capital		$ (20,000)	$ (10,000)	$ 5,000

In the above example, in Year 2, we see that Accounts Receivable increased by $10,000 from Year 1. In our Changes to Working Capital, we capture that amount by taking the opposite of This Year's Balance minus Last Year's Balance. Therefore, our cash decreased by $10,000 because we had $10,000 more of Accounts Receivable. Likewise, Inventory increased by $25,000 which resulted in a $25,000 decrease in Cash as we also calculated by taking the opposite of This Year's Balance minus Last Year's Balance. However, because Accounts Payable increased by $15,000, we have an increase in Cash as we calculate that change by taking This Year's Balance minus Last Year's Balance.

Note that in Year 4, when the amounts decreased from the previous year, we see the opposite impact – a decrease in Accounts Receivable and a decrease in Inventory resulted in an increase in Cash.

Capital Expenditures

Capital Expenditures, sometimes known as Capex, are expenditures for Fixed Assets (also known as Property, Plant & Equipment). These expenditures are more obvious than the subtle changes to Working Capital and can be measured fairly easily by the year-to-year changes to the Fixed Asset accounts. These changes do NOT include changes to Accumulated Depreciation, but only include changes to the Gross amount of the Fixed Asset. As with other assets, an increase in Fixed Assets represents a cash expenditure, or negative cash flows. See the following example balance sheet year-end balances and the resulting calculation of Capital Expenditures:

	Years			
Balance Sheet Balances	1	2	3	4
Fixed Assets	$ 1,000,000	$ 1,250,000	$ 1,400,000	$ 1,750,000
Capital Expenditures		$ (250,000)	$ (150,000)	$ (350,000)

In the above example, fixed asset balances increased year-over-year, which means the company bought

more fixed assets. Therefore, cash decreased by the amount of the expenditures, as represented by the negative numbers.

Initial Investment

To accurately account for all Free Cash Flows, we need to include an amount of cash paid for the initial investment.

To account for the initial investment, we create a "Year 0", which represents the investment made at the very beginning of the investment, project, or acquisition (we will call this the "project"). "Year 0" represents the initial investment before immediately jumping into the first Year ("Year 1") of operations.

This "Year 0" initial investment is the amount spent today to generate the future cash flows in Years 1, 2, 3, etc. The initial investment is always a negative number, as it represents the cash spent to invest in the project.

Terminal Value

Most businesses are assumed to be a "going concern" which treats the business as one that will not liquidate in the near future. As such, an accurate forecast of the future could go on indefinitely to accurately measure the value of the business. Instead of forecasting for an infinite number of years, we sometimes calculate a "terminal value". The terminal value is generally placed in the last year of the forecast and measures what the company could be sold for at that time, or is the calculation of a perpetuity of all future cash flows discounted to the last year of the forecast. These will be discussed later in the course. Not all project calculations, however, include a terminal value.

Total Free Cash Flows

With all five sections complete (Cash from Operations, Changes in Working Capital, Capital Expenditures, Initial Investment, and Terminal Value), we can now calculate the Total Free Cash Flows. We will use EBIT from the Income Statement. We will use the non-cash Current Assets and Current Liabilities from the Balance Sheet. We will also take the Fixed Asset account balances from the Balance Sheet. The Initial Investment represents the purchase price or cost of the project, and the Terminal Value represents the sales price or exit price of the project. Note that the "Year 0" Balance Sheet balances represent the balances of those accounts at the initial start of the project.

	Years				
Balance Sheet Balances	0	1	2	3	4
Accounts Receivable	$ 70,000	$ 75,000	$ 85,000	$ 95,000	$ 90,000
Inventory	$ 130,000	$ 150,000	$ 175,000	$ 185,000	$ 180,000
Accounts Payable	$ 25,000	$ 35,000	$ 50,000	$ 60,000	$ 55,000
Fixed Assets	$ 875,000	$ 1,000,000	$ 1,250,000	$ 1,400,000	$ 1,750,000

Calculation of Free Cash Flows					
Cash From Operations					
EBIT		$ 500,000	$ 550,000	$ 600,000	$ 700,000
Tax Rate 25%		25%	25%	25%	25%
EBIT x (1 - tax rate)		$ 375,000	$ 412,500	$ 450,000	$ 525,000
Depreciation Expense		$ 75,000	$ 100,000	$ 125,000	$ 150,000
Cash From Operations		**$ 450,000**	**$ 512,500**	**$ 575,000**	**$ 675,000**
Changes to Working Capital					
Accounts Receivable		$ (5,000)	$ (10,000)	$ (10,000)	$ 5,000
Inventory		$ (20,000)	$ (25,000)	$ (10,000)	$ 5,000
Accounts Payable		$ 10,000	$ 15,000	$ 10,000	$ (5,000)
Changes to Working Capital		**$ (15,000)**	**$ (20,000)**	**$ (10,000)**	**$ 5,000**
Capital Expenditures		**$ (125,000)**	**$ (250,000)**	**$ (150,000)**	**$ (350,000)**
Free Cash Flows Subtotal		**$ 310,000**	**$ 242,500**	**$ 415,000**	**$ 330,000**
Initial Investment	**$ (2,100,000)**				
Terminal Value					**$ 2,200,000**
Total Free Cash Flows	**$ (2,100,000)**	**$ 310,000**	**$ 242,500**	**$ 415,000**	**$ 2,530,000**

Internal Rate of Return (IRR)

Once the Free Cash Flows are calculated, the Internal Rate of Return (IRR) of the Free Cash Flows can be calculated. This measures the rate of return of the investment. This is calculated by using the Free Cash Flows

In Excel, the IRR formula can be used to calculate the Internal Rate of Return (=IRR(cash flows starting with a negative initial investment amount))

For example, the Free Cash Flows calculated above would result in an IRR of 16.2%:

	Years				
	0	1	2	3	4
Total Free Cash Flows	$ (2,100,000)	$ 310,000	$ 242,500	$ 415,000	$ 2,530,000
IRR	16.2%				

Once the IRR is calculated, it is compared to the cost of capital % (WACC %). If the IRR is greater than or equal to WACC, it would be considered a good investment. If the IRR is less than the WACC, it would not be considered a good investment as the funds required to acquire the investment would cost more than the investment would return.

Net Present Value (NPV)

The IRR can also be compared to WACC by calculating Net Present Value (NPV). NPV calculates the value of an investment in a single dollar amount (at today's value), which is the value of all current and future Free Cash Flows. WACC is used to discount the Free Cash Flows to today's value. This is done by using the Excel NPV formula for the future cash flows and adding back in today's (Year 0's) cash flows. An NPV calculation of $0 means that the IRR is equal to WACC. An NPV calculation > $0 means that the IRR is greater than WACC. Likewise, an NPV calculation < $0 means the IRR is less than WACC.

In the above example, if we have a calculated WACC of 12.0%, the NPV would be calculated as follows:

	Years				
	0	1	2	3	4
Total Free Cash Flows	$ (2,100,000)	$ 310,000	$ 242,500	$ 415,000	$ 2,530,000
IRR	16.2%				
WACC	12.0%				
NPV	$ 273,355				

Note that because the IRR is greater than WACC, it results in a positive NPV.