

Introduction to the balance sheet

ANALYZING FINANCIAL STATEMENTS IN PYTHON



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Risk Modeler

What we'll achieve

At the end of this course, we'll be able to:

- Read financial statements
- Define, compute, and interpret financial ratios
- Write reusable and general functions in Python that will reduce repetitive tasks
- Deal with missing data in financial statements
- Visualize financial ratios using Seaborn

The balance sheet

- A snapshot at a point in time of a company's
 - Assets
 - Liabilities
 - Shareholders' equity

The balance sheet

- $Assets = Liabilities + Shareholders' equity$
- A balance sheet has three main sections:
 - Assets
 - Liabilities
 - Shareholders' equity

Assets

- Can be broken down into
 - **Current assets:** benefits usually reaped within one year
 - **Non-current assets:** benefits reaped over the long run

Balance sheet of ABC	
In Thousands of US Dollars	
Current Assets	
Accounts recievable	1500
Inventory	1000
Total current assets	2500
Non-Current Assets	
Long term investments	2200
Property, plant and equipment	5120
Total non-current assets	7320
<u>Total assets</u>	14640

Liabilities

- Liabilities can be broken into:
 - Current liabilities: usually to be repaid within one year
 - Non-current liabilities: can be paid off after one year

Balance sheet of ABC	
In Thousands of US Dollars	
Current Liabilities	
Accounts payable	1200
Short term loans	1350
Total current liabilities	2550
Non-Current Liabilities	
Long term loans	2200
Total non-current assets	2200
Total liabilities	4750

Shareholders' equity

Balance sheet of ABC	
In Thousands of US Dollars	
Share holder's equity	9890

Balance sheet of ABC	
In Thousands of US Dollars	
Assets	
Current Assets	
Accounts recievable	1500
Inventory	1000
Total current assets	2500
Non-Current Assets	
Long term investments	2200
Property, plant and equipment	5120
Total non-current assets	7320
Total assets	14640
Liabilities and share holder's equity	
Current Liabilities	
Accounts payable	200
Short term loans	350
Total current liabilities	550
Non-Current Liabilities	
Long term loans	2200
Total non-current assets	2200
Total liabilities	5500
Share holder's equity	9140
Total liabilities and share holder's equity	14640

Let's practice!

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Financial ratios from the balance sheet

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Current ratio

- Proportion of current assets to current liabilities
- Measure of company's ability to meet short-term burdens
- Ratio greater than one considered good

Formula:

$$\frac{\text{Current assets}}{\text{Current liabilities}}$$

Debt-to-equity ratio

- Proportion of company's total burden amount of money invested by its owners
- Measure of outside money versus owners' money being used to run company operations
- Companies using relatively more debt are called leveraged companies

Formula:

$$\frac{\text{Total liabilities}}{\text{Total shareholders' equity}}$$

Equity multiplier ratio

- Proportion of company's total assets to amount of money invested by its owners
- Measure of how much assets are funded by the owners of the business
- Low ratio means company uses relatively more debt to fund its assets

Formula:

$$\frac{\text{Total assets}}{\text{Total shareholders' equity}}$$

Debt-to-assets ratio

- Proportion of a company's total liabilities to total assets
- Similar to current ratio
- Measure of whether the business has enough total assets to pay off its debts

Formula:

$$\frac{\text{Total liabilities}}{\text{Total assets}}$$

Family of ratios

Liquidity ratio

- Measures company's ability to meet short-term financial obligations, e.g.
 - Current ratio

Leverage ratio

- Shows how company uses equity and debt to finance its activities, e.g.:
 - Debt-to-equity ratio
 - Equity multiplier ratio

Solvency ratio

- Measures company's financial health
- Demonstrates whether company can meet its financial obligations in general, e.g.:
 - Debt-to-assets ratio

Let's practice!

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Computing financial ratios using pandas

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Structure of balance sheet data

- Balance sheet data loaded in `pandas` DataFrame called `balance_sheet`.

```
print(balance_sheet.head())
```

	Year	company	comp_type	Total Current Assets	Total Current Liabilities
0	2019	AAPL	tech	1628190000000	1057180000000
1	2020	AAPL	tech	1437130000000	1053920000000
2	2021	AAPL	tech	1348360000000	1254810000000
3	2022	AAPL	tech	135405_000000	1539820000000
4	2019	MSFT	tech	1755520000000	694200000000

Computing current ratio

```
balance_sheet["current_ratio"] = balance_sheet["Total Current Assets"] /  
                                   balance_sheet["Total Current Liabilities"]  
  
print(balance_sheet.head())
```

	Year	company	comp_type	Total Current Assets	Total Current Liabilities	current_ratio
0	2019	AAPL	tech	1628190000000	1057180000000	1.540
1	2020	AAPL	tech	1437130000000	1053920000000	1.364
2	2021	AAPL	tech	1348360000000	1254810000000	1.075
3	2022	AAPL	tech	1354050000000	1539820000000	0.879
4	2019	MSFT	tech	1755520000000	694200000000	2.529

Using `.groupby()` to get results by group

- To get the average current ratio by industry:

```
balance_sheet.groupby("comp_type")["current_ratio"].mean()
```

```
comp_type  
fmcg      0.869  
real_est  1.026  
tech      2.562
```

Using `.groupby()` to get results by group

```
balance_sheet.groupby(["Year", "comp_type"])["current_ratio"].mean()
```

Year	comp_type	
2018	fmcg	0.894
	real_est	0.919
	tech	4.070
2019	fmcg	0.802
	real_est	0.957
	tech	2.588
2020	fmcg	0.959
	real_est	1.039
	tech	2.609
2021	fmcg	0.868
	real_est	1.188
	tech	2.075
2022	fmcg	0.655
	tech	1.332

Using `groupby().transform()`

- `.transform()` can be used after `.groupby()` to append the groupby result to rows according to the group each row belongs to.

```
balance_sheet["industry_curr_ratio"] =  
    balance_sheet.groupby([  
        "Year", "comp_type"])[  
        "current_ratio"].transform("mean")  
print(balance_sheet.head())
```

	Year	company	comp_type	Total Current Assets	Total Current Liabilities	current_ratio	industry_curr_ratio
0	2019	AAPL	tech	162819000000	105718000000	1.540	2.588
1	2020	AAPL	tech	143713000000	105392000000	1.364	2.609
2	2021	AAPL	tech	134836000000	125481000000	1.075	2.075
3	2022	AAPL	tech	135405000000	153982000000	0.879	1.332
4	2019	MSFT	tech	175552000000	69420000000	2.529	2.588

Using `.groupby().transform()`

```
balance_sheet["relative_diff"] =  
    (balance_sheet["current_ratio"] /  
     balance_sheet["industry_curr_ratio"]) - 1
```

	Year	company	comp_type	current_ratio	industry_curr_ratio	relative_diff
0	2019	AAPL	tech	1.540	2.588	-0.405
1	2020	AAPL	tech	1.364	2.609	-0.477
2	2021	AAPL	tech	1.075	2.075	-0.482
3	2022	AAPL	tech	0.879	1.332	-0.340
4	2019	MSFT	tech	2.529	2.588	-0.023

Using .isin()

- `.isin()` used to subset data for analysis.
- Example: subset a DataFrame to show `fmcg` and `tech` companies in the year 2019 and 2020:

```
fmcg_2019 = balance_sheet.loc[
    (balance_sheet["Year"].isin([2019, 2020])) &
    (balance_sheet["comp_type"].isin(["tech", "fmcg"]))
]
```


Let's practice!

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