

# Introduction to financial statements

FINANCIAL FORECASTING IN PYTHON



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# About this course

- Analyze data in a simple way
- Using Python
- Model different sources of data
- Financial forecasting basics

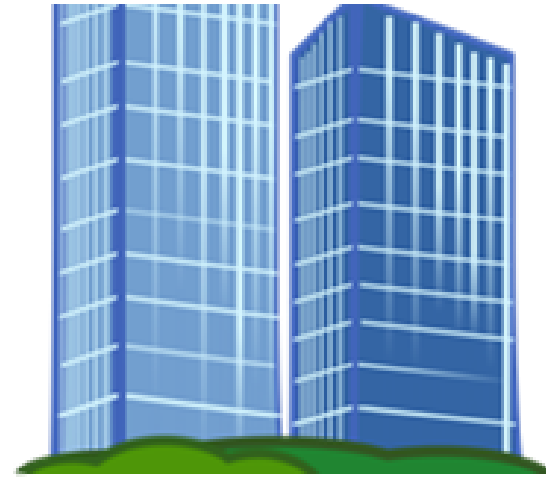
# Financial statements, an introduction

- Records of financial information
- Universal format and clear structure
- Used for decision making
- Important metrics for forecasting

# Types of financial statements



**1. Income Statement**  
Income and Expenses



**2. Balance Sheet**  
Assets, Liabilities and  
Capital



**3. Cash Flow Statement**



**4. Statement of  
Shareholder's Equity**

# How financial statements are used in forecasting

- Build on the important metrics
- Shows financial health of a company
- Provides structure for solid financial forecasting



# The income statement \ profit & loss statement

Two important elements:

- Gross Profit: **DIRECT** sales and costs
- Net Profit: **INDIRECT** income and expenses

Income Statement	
Mark's Gadget Shop	
Sales	1,000
Costs of Goods Sold	- 600
<b>Gross Profit</b>	<b>400</b>
Operating Expenses	
Selling and Admin	- 100
R&D Expense	- 30
Training	- 20
<b>Total Operating Expenses</b>	<b>- 150</b>
<b>Net Profit</b>	<b>250</b>

# Gross profit

**DIRECT** sales and costs

```
cogs = material_costs +  
        direct_labor_costs +  
        factory_costs
```

```
gross_profit = sales - cogs
```

## Income Statement

Mark's Gadget Shop			
Sales			1,000
Costs of Goods Sold	-		600
<b>Gross Profit</b>	<b>=</b>		<b>400</b>
Operating Expenses			
Selling and Admin	-		100
R&D Expense	-		30
Training	-		20
<b>Total Operating Expenses</b>	-		<b>150</b>
<b>Net Profit</b>			<b>250</b>

# Net profit

## INDIRECT income and expenses

```
opex = insurance +  
      admin_sales +  
      r_d +  
      training_cost +  
      other_non_direct_costs
```

```
net_profit = gross_profit - opex
```

Income Statement	
Mark's Gadget Shop	
Sales	1,000
Costs of Goods Sold	- 600
Gross Profit	<u>400</u>
Operating Expenses	
Selling and Admin	- 100
R&D Expense	- 30
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Total Operating Expenses	<u>150</u>
Net Profit	<u><u>250</u></u>



# Let's practice!

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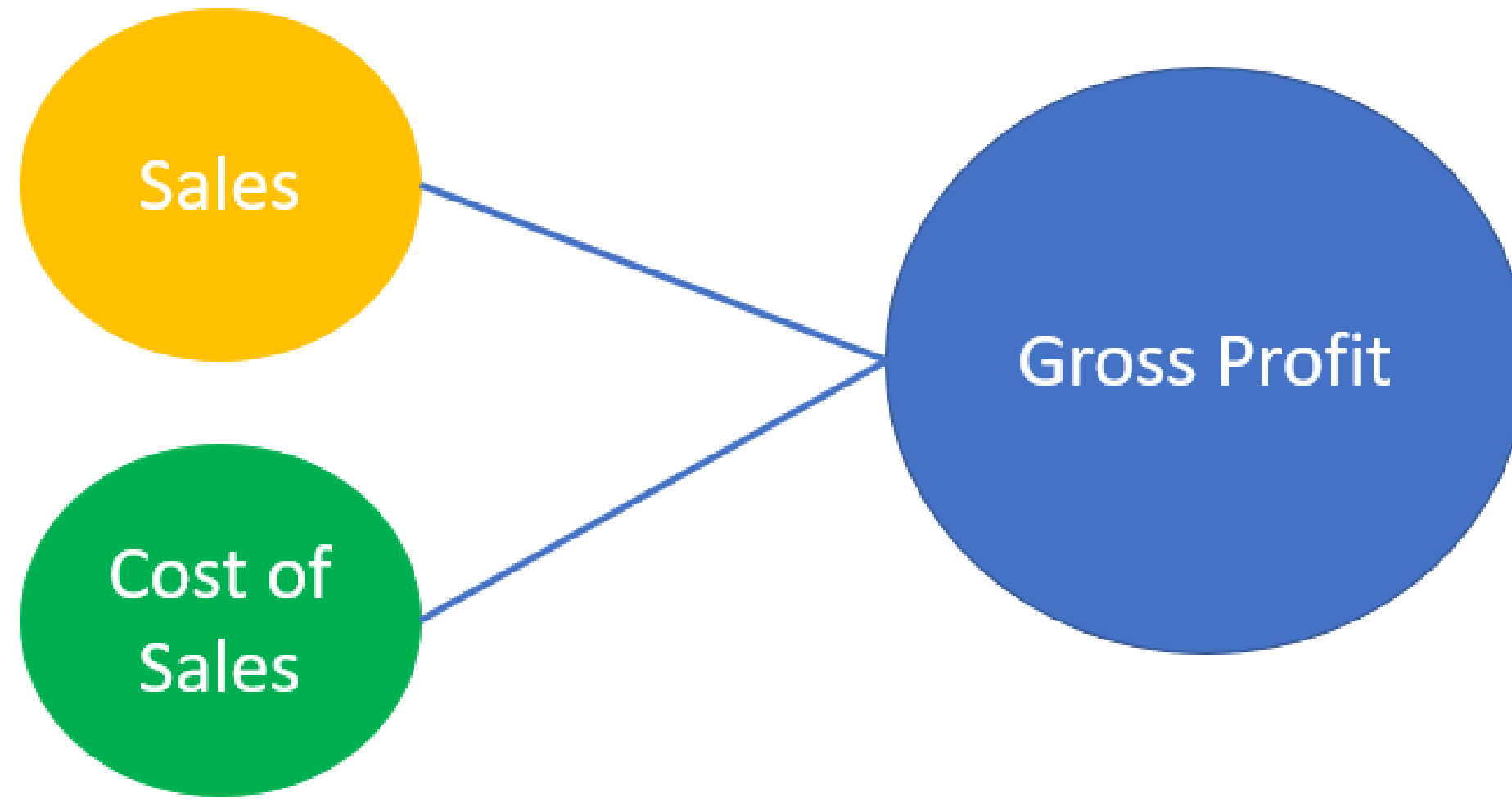
# Calculating sales and the cost of goods sold

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# Calculating sales and the cost of goods sold



# Calculating sales

Sales = Income = Revenue = Turnover

Data needed:

- Sales price per unit `sp_unit`
- Number of units sold `units`

Complexities

- Discounts (Discounted Sales Price) `d_sp`
- Credit sales
- Sales mix `sp_1` vs `sp_2`



# Calculating Cost of Goods Sold (COGS)

Data needed:

- `fixed_costs`
  - Costs independent of units
- `Variable_costs_per_unit`
  - Costs incurred per unit produced
- Inventory opening balance `inv_ob`
- Inventory closing balance `inv_cb`



# What does the gross profit tell us?

- Profit margin (%)
  - `gp_margin`
- Analyze the profitability of our core product
- Calculate the break even point

```
break_even = fixed_costs/(sp - variable_costs)
```

# Let's practice!

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# Working with raw datasets

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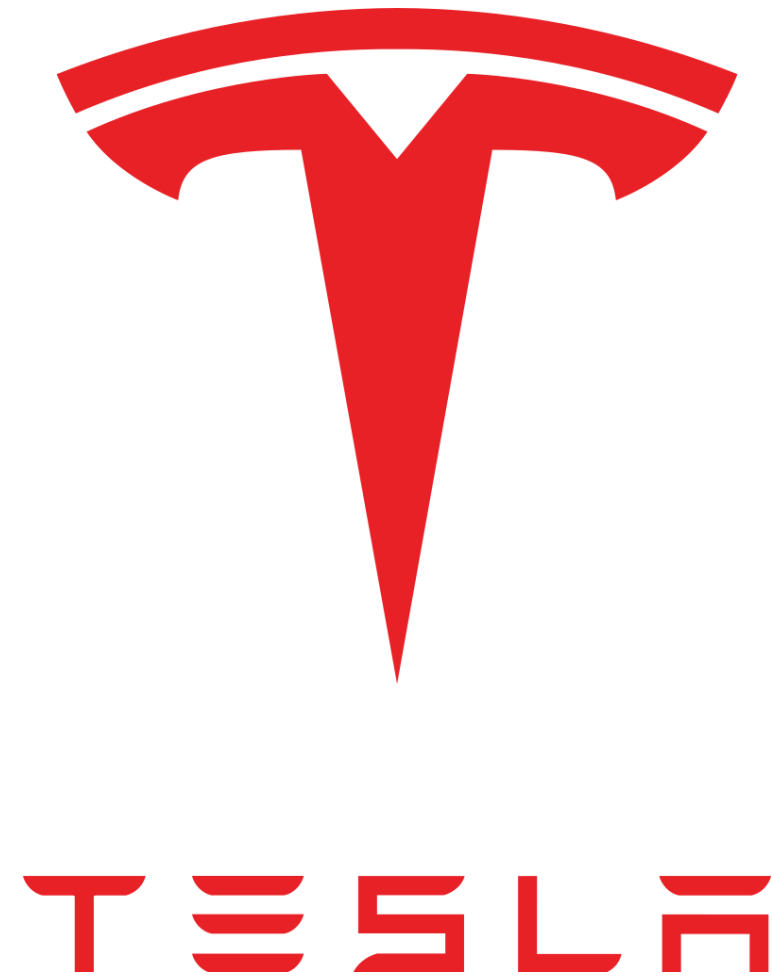


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# Obtaining a dataset for forecasting

- Tesla Motors Inc.
- Historic information publicly available
- Income statement as .csv



# First look

	A	B	C	D	E	F	G
1	TESLA INC (TSLA) CashFlowFlag INCOME STATEMENT						
2	Fiscal year ends in December. USD in millions except per share	2012-12	2013-12	2014-12	2015-12	2016-12	TTM
3	Revenue	413	2013	3198	4046	7000	10755
4	Cost of revenue	383	1557	2317	3123	5401	8536
5	Gross profit	30	456	882	924	1599	2219
6	Operating expenses						
7	Research and development	274	232	465	718	834	1269
8	Sales, General and administrative	150	286	604	922	1432	2250
9	Total operating expenses	424	518	1068	1640	2267	3520
10	Operating income	-394	-61	-187	-717	-667	-1301
11	Interest Expense	0	33	101	119	199	390
12	Other income (expense)	-2	23	3	-40	120	53
13	Income before taxes	-396	-71	-285	-876	-746	-1638
14	Provision for income taxes	0	3	9	13	27	52
15	Net income from continuing operations	-396	-74	-294	-889	-773	-1689
16	Other					98	282
17	Net income	-396	-74	-294	-889	-675	-1407
18	Net income available to common shareholders	-396	-74	-294	-889	-675	-1407
19	Earnings per share						
20	Basic	-3.69	-0.62	-2.36	-6.93	-4.68	-8.54
21	Diluted	-3.69	-0.62	-2.36	-6.93	-4.68	-8.54

# Filtering the data in Python

```
# Choose some interesting metrics
interesting_metrics = ['Gross profit', 'Net income']
```

```
# Using the .isin() method, filter for rows containing these metrics
filter = income_statement.metric.isin(interesting_metrics)
filtered_income_statement = income_statement[filter]
print(filtered_income_statement)
```

metric	2012-12	2013-12	2014-12	2015-12	2016-12	TTM
Gross profit	30.0	456.0	882.0	924.0	1599.0	2219.0
Net income	-396.0	-74.0	-294.0	-889.0	-675.0	-1407.0

# Let's practice!

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