

Part 1 - Build box 1 / CAGR

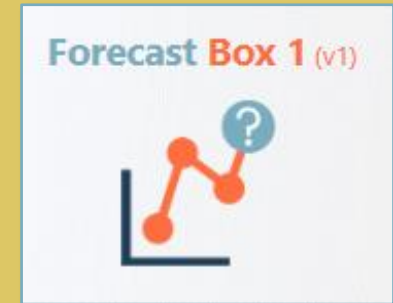
Financial
forecast
with
PowerBI



CAGR

Compound Annual
Growth Rate

Today, learn to
build the Box 1





CAGR, or Compound Annual Growth Rate

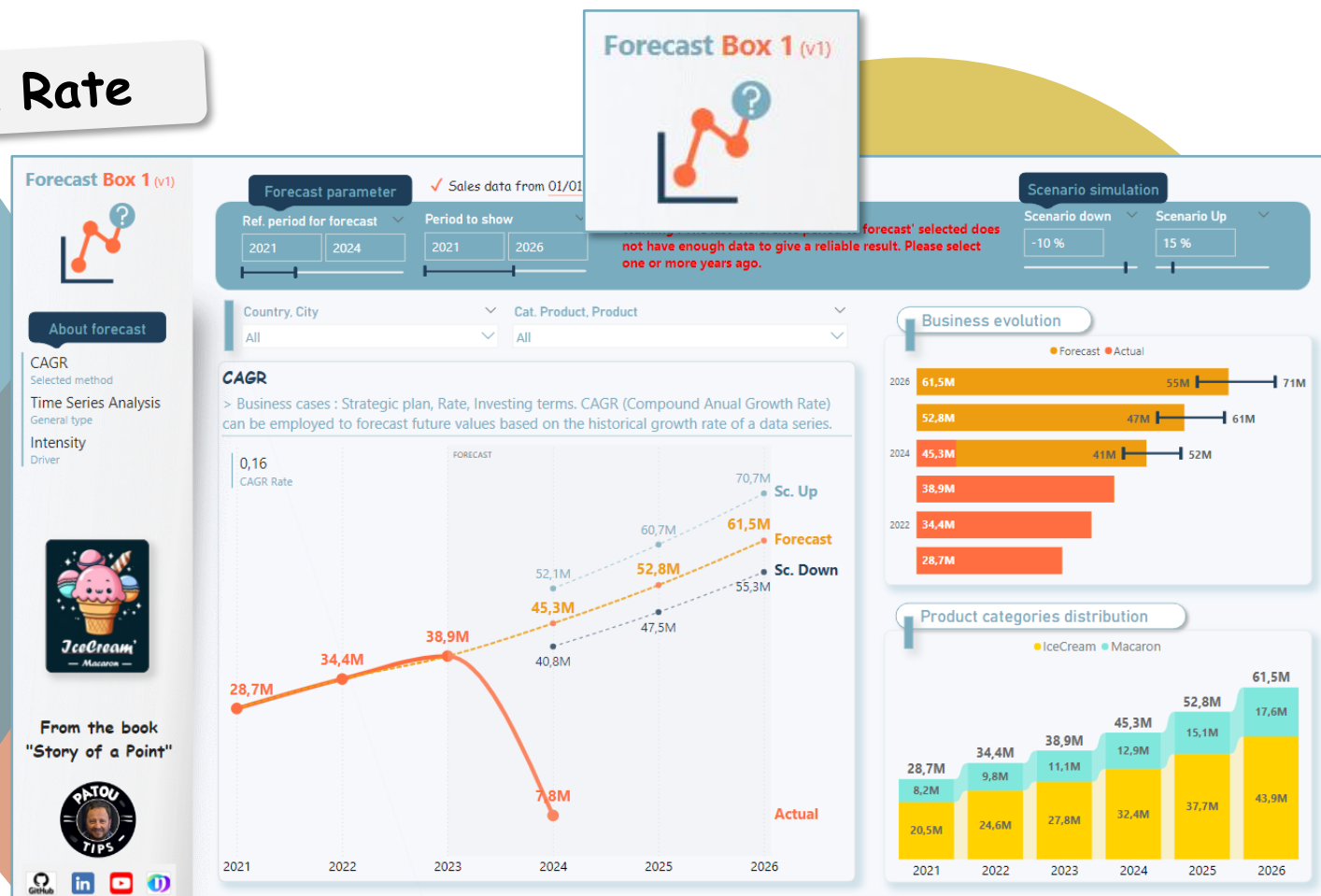
CAGR, or Compound Annual Growth Rate, belongs to the family of financial forecasts. It is often used to estimate the return on investment over a given period.

It is a valuable tool for investors and financial analysts to evaluate the performance of an investment or compare the growth of different companies over a period of time.

Links

To test on line (access free)

To practice (PowerBi files free)





When and how to use it?

| | |
|-------------------------------------|---|
| Typical applications | <ul style="list-style-type: none">Strategic Plan: Many companies need to have a long-term vision, to reassure their shareholders for example, especially for big FirmsCurrency growth rate |
| General type | Time Series Analysis |
| Drivers used | Intensity |
| Data required (Reference period) | A minimum of 3 years of sales history, without seasonality cycles. It could be also 3 others period, such month, days. Please note: A period must be complete. The aggregate total is enough |
| Projection | 3-year forecast. Short terms |
| Identification of the turning point | Poor |
| Pros | Simple statistical models |

| | |
|-----------------------|--|
| Cons | However, it has drawbacks. It does not take into account the ups and downs during the analyzed period. Only the final value and the initial value are taken into account. |
| Note | The CAGR is an average of performance. The average performance over the years is different from the annual average. The CAGR does not add up! If your performance increases by 30% then by 20%, in the end it does not increase by 50% (30%+20%), but by 26% (1.3*1.2). |
| Forecast calculations | <p><u>Step 1: Calculate CAGR:</u> $CAGR = (End\ value / Start\ value)^{1/n} - 1$ → with "n" is the number of period</p> <p><u>Step 2: Calculate Forecast:</u> Revenue Year N+1 = Revenue Year N * (1+CAGR) Revenue Year N+2 = Revenue Year N * (1+CAGR)² Revenue Year N+3 = Revenue Year N * (1+CAGR)³ Revenue Year N+4 = Revenue Year N * (1+CAGR)⁴ Revenue Year N+5 = Revenue Year N * (1+CAGR)⁵</p> <p>Note: A 3 year forecast is an acceptable limit ("Revenue Year N+3). Futher away it's more random.</p> |



About IceCream & Macaron
a fictitious company based on Paris.



IceCream'
- & Macaron -

IceCream & Macaron is a fictitious company based on Paris.

It has 10 stores in 3 European countries. This company manufactures the products sold in these stores, ice cream and macaroons.

Stores are generally launched in summer to amortize their openings more quickly and generate more useful CashFlow.

Product are generally launched in the Spring.

The activity is very sensitive to the weather and the end-of-year holidays.

About data The sales data used in our book runs from January 1, 2021 to March 15, 2024.

Stores

| Country | City |
|---------|-----------|
| France | Paris |
| | Nice |
| | Marseille |
| | Lyon |
| | Nantes |
| | Bordeaux* |
| | Toulouse* |

| Country | City |
|---------|--------|
| Austria | Wien |
| Germany | Munich |
| Italy | Rome |

* The latest stores to open are Bordeaux (1/8/2021) and Toulouse (1/8/2022).

Products

| Category | Product |
|----------|-------------|
| IceCream | Chocolate |
| | Vanilla |
| | Strawberry* |
| | Lemon* |
| | Mint |

| Category | Product |
|----------|------------|
| Macaron | Chocolate |
| | Pistachio |
| | Strawberry |
| | Lemon |
| | Caramel |

** → The last 2 product launches, Lemon ice creams (1/3/2021) and Strawberry ice creams (1/3/2022).

► We will use the data of the fictitious firm
« IceCream & Macaron » for this forecast!



CAGR, or Compound Annual Growth Rate

Practice and learn

Part 1 - Build box 1

How it works?

Choose dates for calculation and vizualisation

- **Ref. period for forecast:** Years needed to calculate the CAGR rate.
- **Period to show:** Years to show on the visualizations.

Note : The last year selected to be considered full must have at least 80% of the days in a year with sales. A red message text appears if the condition is not met. Non-full years are not taken into account in the forecast calculations.

CAGR

> Business cases : Strategic plan, Rate, Investing terms. CAGR (Compound Annual Growth Rate) can be employed to forecast future values based on the historical growth rate of a data series.

Simulate scenarios

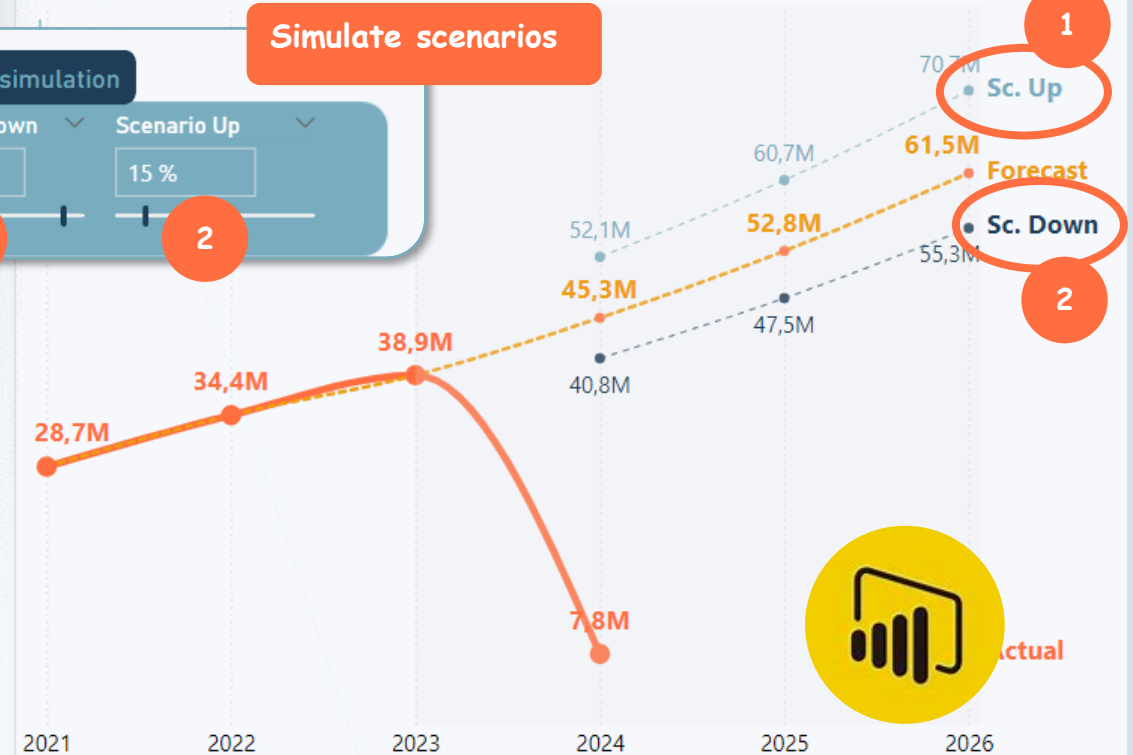
Scenario simulation

Scenario down

-10 %

Scenario Up

15 %





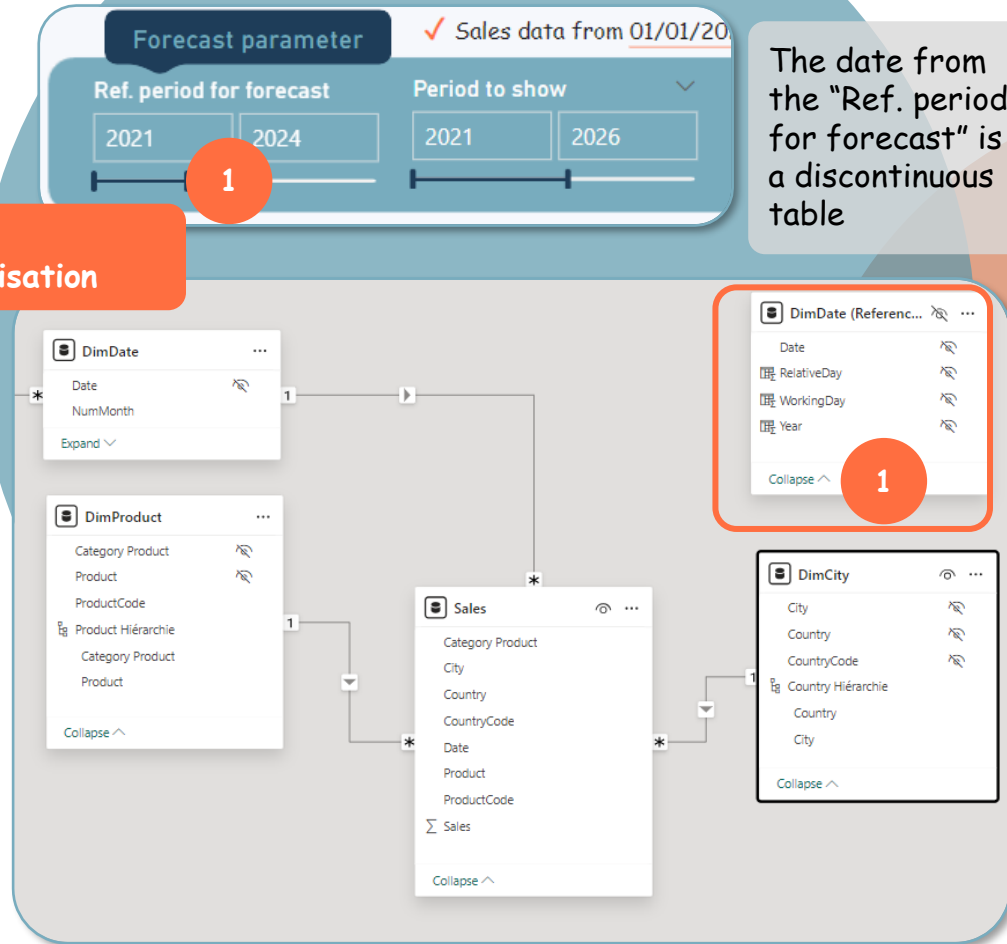
CAGR, or Compound Annual Growth Rate

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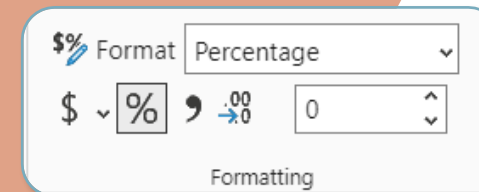
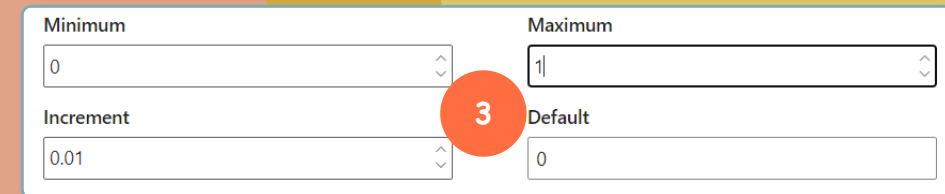
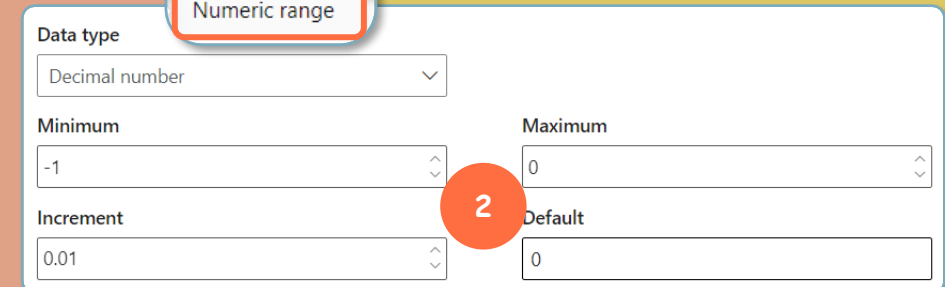
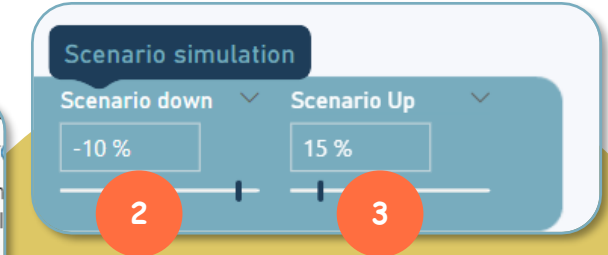
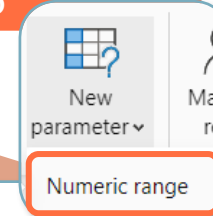
Part 1 - Build box 1

About modelisation...

Build modelisation



Create 2 parameters for scenario



Don't forget to put the values in the "percentage format".



CAGR, or Compound Annual Growth Rate

Practice and learn

Part 1 - Build box 1

About DAX measure...

We need to write 7 measures!

- Box 1 (CAGR)
 - ☐ CAGR Rate
 - ☐ FC CAGR
 - ☐ FC CAGR Calculation
 - ☐ Last Year Good For Forecast
 - ☐ Sc. Down Box1
 - ☐ Sc. Up Box1
 - ☐ Warning Selected Ref Period

Write « Last Year Good for Forecast » measure

This measure will be very useful for the measure « FC CAGR Calculation » (see next page)

```
1 Last Year Good For Forecast =
2 VAR Last_Year_Reference_Period_Selected =
3 YEAR(CALCULATE(
4     MAX('DimDate (Reference Period)'[Date]),
5     ALLSELECTED('DimDate (Reference Period)'[Date])))
6
7 VAR Result =
8 IF(
9     CALCULATE(
10         IF(
11             1 DISTINCTCOUNT(Sales[Date]) < 0.8 * DISTINCTCOUNT(DimDate[Date]),0,1),
12         DimDate[Year]=Last_Year_Reference_Period_Selected)=0,
13         LASTNONBLANK(all(DimDate[Year]),CALCULATE([Actual]))-1,
14         Last_Year_Reference_Period_Selected)
15
16 RETURN Result
```



In line the 11, we check whether each year is full (1) or not (0). To be considered full, the number of days with sales must be equal to at least 80% of all the days of the year.

| Year | Actual | FC CAGR | Line 11 | Last Year Good For Forecast |
|------|------------|---------------|---------|-----------------------------|
| 2021 | 28 667 665 | 28 667 665,00 | 1 | 2023 |
| 2022 | 34 420 455 | 34 420 455,00 | 1 | 2023 |
| 2023 | 38 893 290 | 38 893 290,00 | 1 | 2023 |
| 2024 | 7 764 964 | 45 301 842,14 | 0 | 2023 |
| 2025 | | 52 766 348,67 | 0 | 2023 |
| 2026 | | 61 460 802,05 | 0 | 2023 |

We put the conditional line 11 into a Calculate function (lines 9 to 14) to override and force the line context. 2024 is not full, so 2023 becomes the last year considered full.



CAGR, or Compound Annual Growth Rate

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Part 1 - Build box 1

Write « CAGR »
measure

Step 1: Calculate CAGR:

1 $CAGR = (End\ value / Start\ value)^{1/n} - 1$
→ with "n" is the number of period

```
1 CAGR Rate =
2 VAR First_Year_Reference_Period =
3 YEAR(CALCULATE(
4     MIN('DimDate (Reference Period)'[Date]),
5     ALLSELECTED('DimDate (Reference Period)'[Date])))
6
7 VAR Last_Year_Reference_Period =
8 [Last Year Good For Forecast]
9
10 VAR Number_Of_Year =
11 Last_Year_Reference_Period - First_Year_Reference_Period
12
13 VAR End_Value =
14 CALCULATE([Actual],DimDate[Year]=Last_Year_Reference_Period)
15
16 VAR Start_Value =
17 CALCULATE([Actual],DimDate[Year]=First_Year_Reference_Period)
18
19 VAR Rate_CAGR = DIVIDE
20     (End_Value,Start_Value)^(1/Number_Of_Year)-1
21
22 RETURN Rate_CAGR
```

Write « FC CAGR
Calculation »
measure

FC = ForeCast

Step 2: Calculate Forecast:

Revenue Year N+1 = Revenue Year N * (1+CAGR)
Revenue Year N+2 = Revenue Year N * (1+CAGR)^2
Revenue Year N+3 = Revenue Year N * (1+CAGR)^3
Revenue Year N+4 = Revenue Year N * (1+CAGR)^4
Revenue Year N+5 = Revenue Year N * (1+CAGR)^5

Note : The value "N" is the measure "Last Year Good for Calculation" (see previous page)

```
1 FC CAGR Calculation =
2 VAR Last_Year_Reference_Period = [Last Year Good For Forecast]
3
4 VAR Number_Of_Year_For_Calculation =
5     SELECTEDVALUE(DimDate[Year])-Last_Year_Reference_Period
6
7 VAR Rate_CAGR = [CAGR Rate]
8
9 VAR Forecast_Calculation =
10     IF(
11         SELECTEDVALUE(DimDate[Year])>Last_Year_Reference_Period,
12         CALCULATE(
13             [Actual],
14             DimDate[Year]=Last_Year_Reference_Period)
15         * (1 + Rate_CAGR) ^ Number_Of_Year_For_Calculation)
16
17 RETURN Forecast_Calculation
```




CAGR, or Compound Annual Growth Rate

Practice and learn

Part 1 - Build box 1

Write « FC CAGR » measure

FC = ForeCast

```
1 FC CAGR =  
2 SUMX(VVALUES(DimDate[Year]),  
3 CALCULATE(  
4     IF(ISBLANK([FC CAGR Calculation]),  
5         [Actual],  
6         [FC CAGR Calculation]  
7     )  
8 ))
```

Write « Sc. Up Box1 » measure
Sc. = Scenario

```
1 Sc. Up Box1 =  
2 SUMX(VVALUES(DimDate[Year]),  
3     [FC CAGR Calculation]*(1+[Value Growth Up]))
```

Write « Sc. Down Box1 » measure
Sc. = Scenario

```
1 Sc. Down Box1 =  
2 SUMX(VVALUES(DimDate[Year]),  
3     [FC CAGR Calculation]*(1+[Value Growth Down]))
```

Create the « Warning
Selected Ref. Period »
measure

This message appear when the
user select a year not full

Forecast parameter ✓ Sales data from 01/01/2021 to 15/03/2024

| Ref. period for forecast | Period to show |
|--------------------------|----------------|
| 2021 2024 | 2021 2026 |

Warning : The last 'Reference period to forecast' selected does not have enough data to give a reliable result. Please select one or more years ago.

```
1 Warning Selected Ref Period =  
2 VAR Last_Year_Reference_Period =  
3 YEAR(CALCULATE(  
4     MAX('DimDate (Reference Period)'[Date]),  
5     ALLSELECTED('DimDate (Reference Period)'[Date])))  
6  
7 VAR Result =  
8 IF(  
9     CALCULATE(  
10         IF(  
11             DISTINCTCOUNT(Sales[Date]) < 0.8 * DISTINCTCOUNT(DimDate[Date]),0,1),  
12             DimDate[Year]=Last_Year_Reference_Period)=0,  
13         "Warning : The last 'Reference period to forecast' selected does not have  
14         enough data to give a reliable result. Please select one or more years ago.",  
15         ""  
16     )  
17 RETURN Result
```



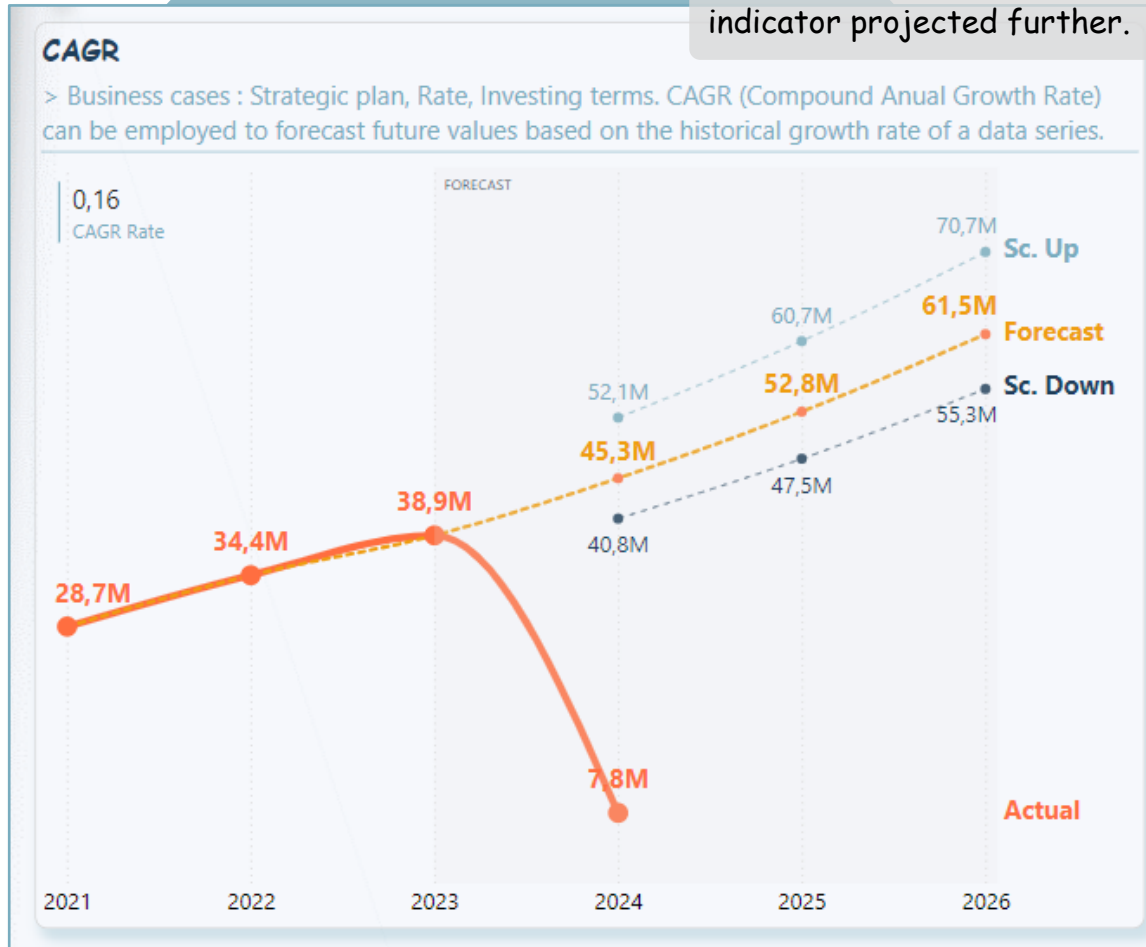
CAGR, or Compound Annual Growth Rate

Practice and learn

Part 1 - Build box 1

About Visualization...

This visualization is very useful to see the deformation of the indicator projected further.



Build ... >

Suggestions

X-axis

Date Hiérarc... X | >
Year X | >

+Add data

Y-axis

Actual X | >
Forecast X | >
Sc. Down X | >
Sc. Up X | >

+Add data

Format ... >>

Search

Visual Properties ...

> Title ☒

> X-axis

> Y-axis

> Secondary y-axis

> Legend ☐

> Small multiples

> Gridlines

> Zoom slider ☐

> Lines

> Shade area ☐

> Markers ☒

> Data labels ☒

> Series labels ☒

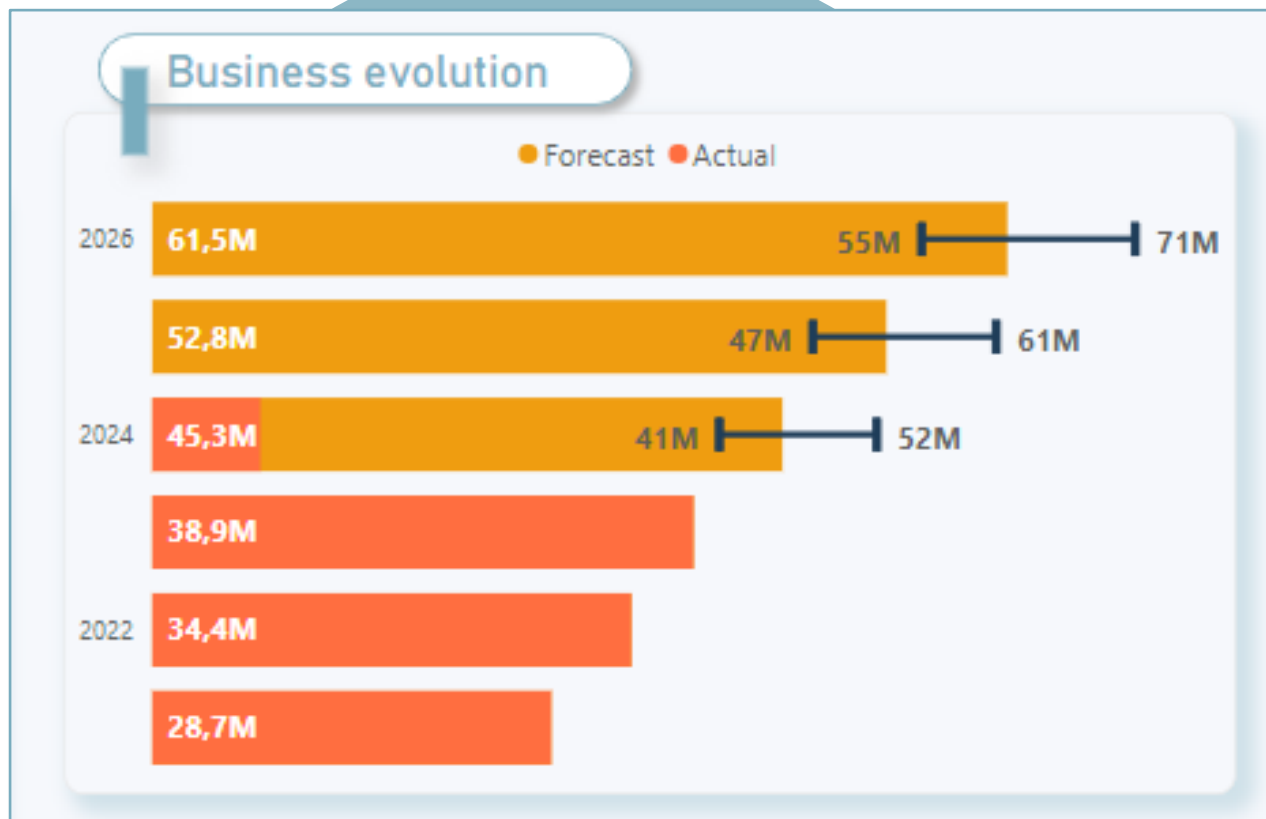
More details on the book "Story of a Point / Financial forecast with PowerBI"



CAGR, or Compound Annual Growth Rate

Practice and learn

Part 1 - Build box 1



Build

Suggestions

Y-axis

Date Hiérarc... X | >

Year X | >

+Add data

X-axis

Forecast X | >

Actual X | >

+Add data

Legend

+Add data

Error bars

Apply settings to

Series

Forecast

Options

Enabled On

Type

By field

Upper bound

Sc. Up Box1 X | >

Lower bound

Sc. Down B... X | >

Relationship to measure

Absolute

Make symmetrical Off

Bar

Match series color Off

Bar color

Width

1

Marker shape

—

Marker size

10

Border color

Dark Blue

Border size

1 px

Error labels

Font

Segoe UI 12

B I U

Match series color Off

Color

Dark Grey

Label format

Absolute

Show background On

Background color

White

Transparency

90 %

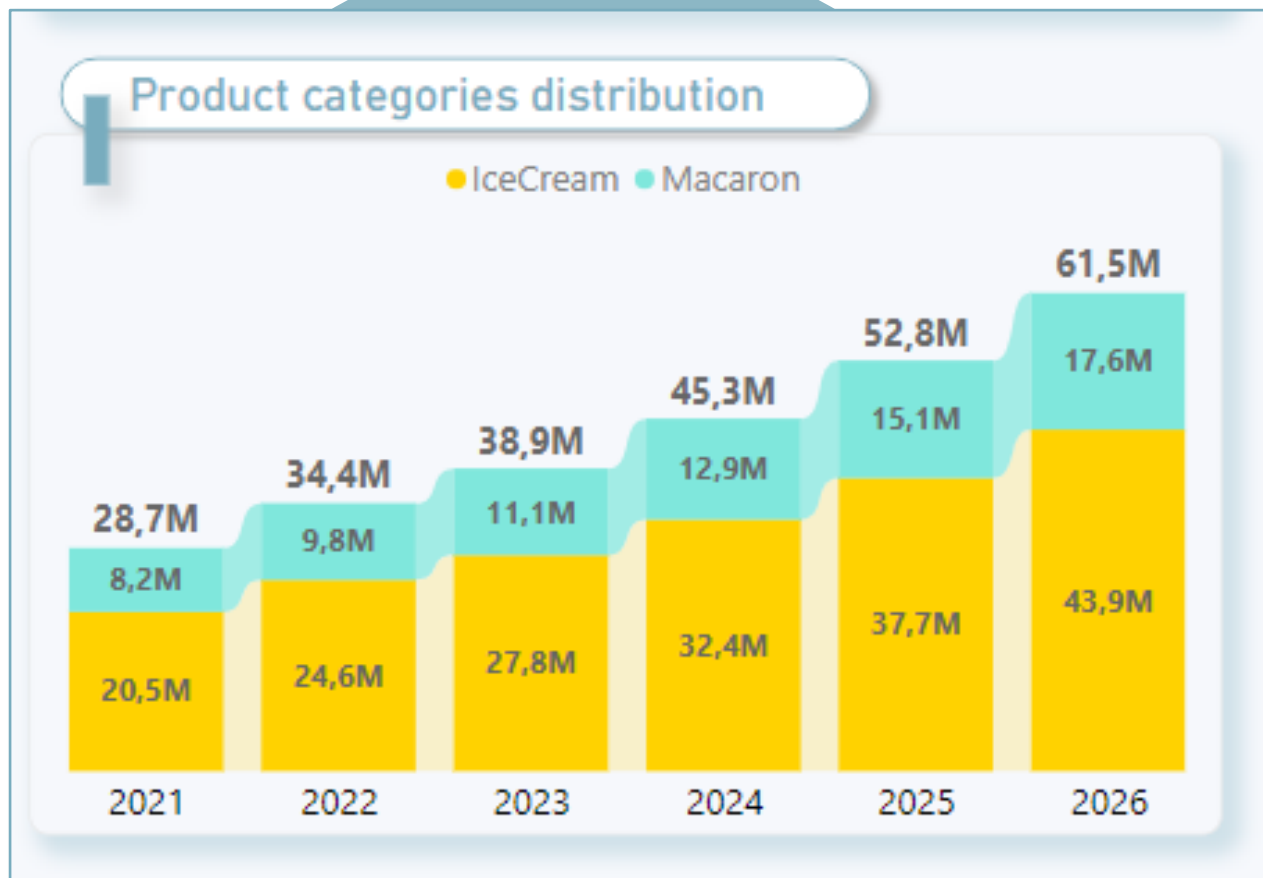
More details on the book "Story of a Point / Financial forecast with PowerBI"



CAGR, or Compound Annual Growth Rate

Practice and learn

Part 1 - Build box 1



Build ... >>

Suggestions

X-axis

Date Hiérarc... X >
Year X >

+ Add data

Y-axis

FC CAGR X >

Legend

Product Hiér... X >
Category Pr... X >

Ribbons On

Apply settings to

Series

All

Color

Match series color On

Transparency

30 %

Border Off

Layout

Data labels On

Apply settings to

Series

All

Show for this series On

Options

Title Off

Value On

Field

FC CAGR

Font

Segoe UI 12

B *I* U

Color

fx

More details on the book "Story of a Point / Financial forecast with PowerBI"

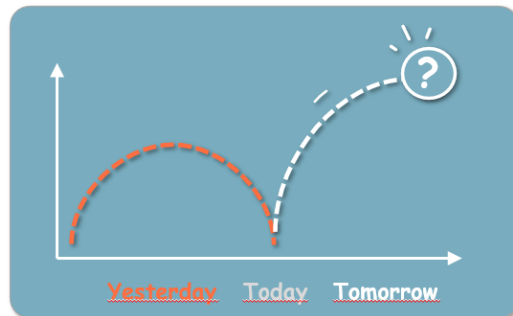
Go further with my book « Story of a Point »

To test on line (access free)

Financial series / Part 1

Story of a Point

Financial forecast with PowerBI



To Learn*

Financial forecast with PowerBi

- Forecasting concepts
- Practice and learn with PowerBI
- Build your own forecast with the "forecast boxes"

**Buy a book and get the eBook for free and always get the free updates

To practice (PowerBI files free)

Patrice Fayard



Forecasting
Concepts

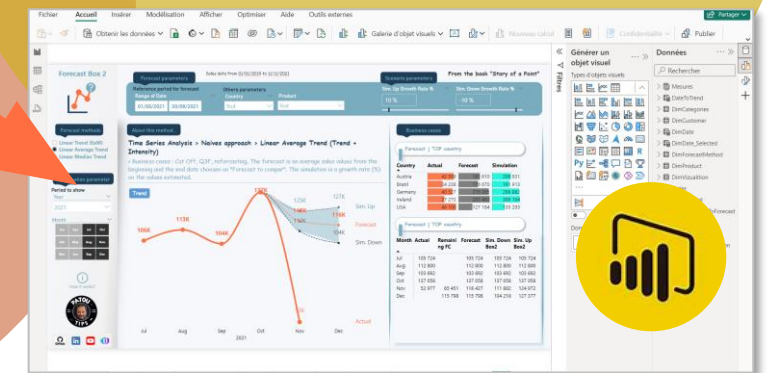


Business
Cases



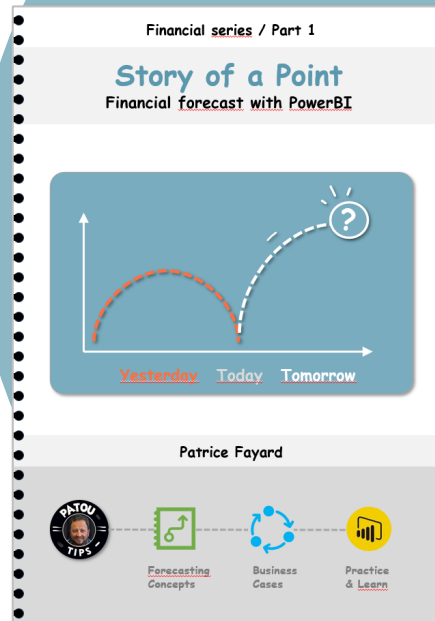
Practice
& Learn

Available in book and e-book
English : December 2024
French : January 2025
German : March 2025



Financial Series

How to predict
my Business?

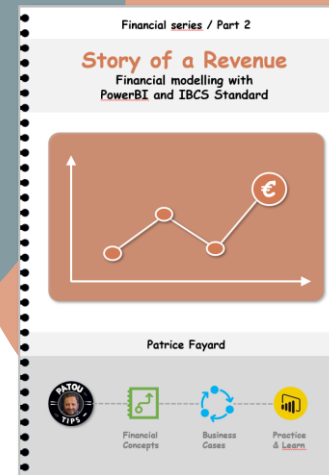


Story of a Point

Financial forecast
with PowerBi

Available in book and e-book
English : **December 2024**
French : January 2025
German : March 2025

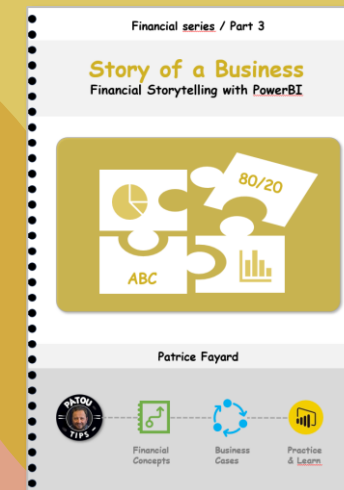
How to follow
my Business?



Story of a Revenue Financial Modelling with PowerBi

Available in book and e-book
English : **December 2025**
French : January 2026
German : March 2026

How to explain
my Business?



Story of a Business Financial Storytelling with PowerBi

Available in book and e-book
English : **December 2026**
French : January 2027
German : March 2027

Don't forget!
This isn't the truth,
it's just my truth!



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