
BETA COEFFCIENT
reporter：陆奕 寿浙慧 范烨青 高淼

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Part1

Description

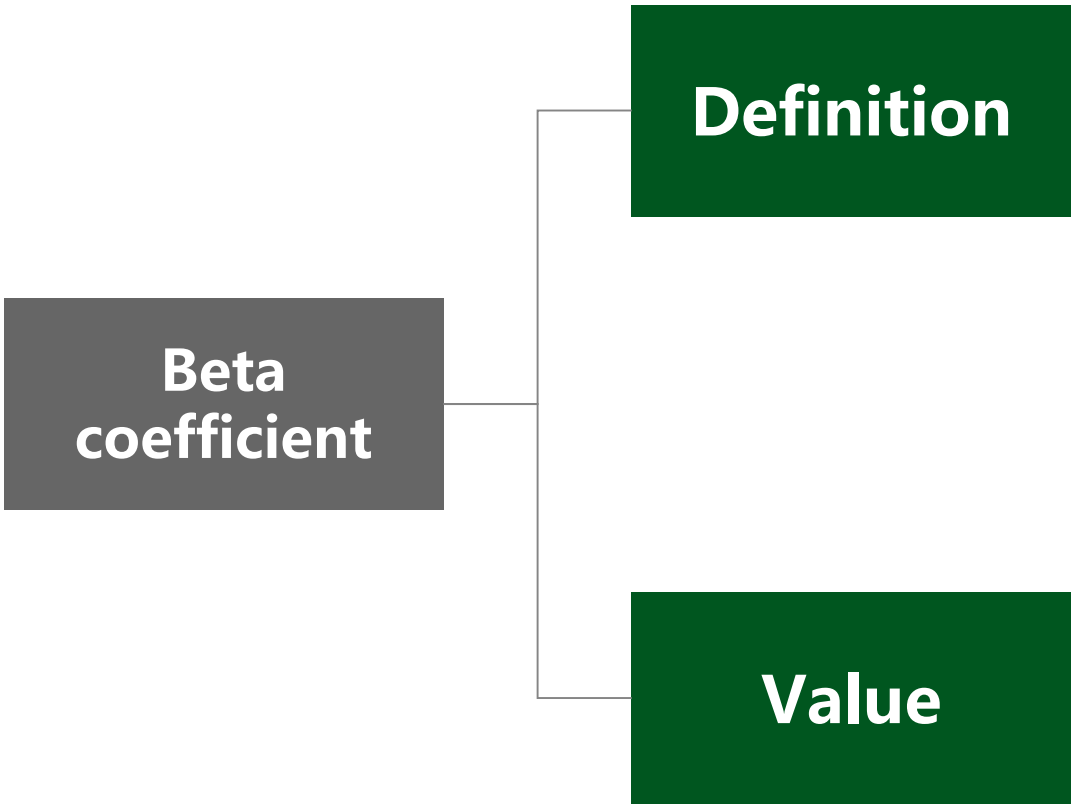
Description

- Our team named **“iloveby”**
- Aimed to calculate the **Beta coefficient** of a stock to indicate whether the stock is more or less volatile than the market as a whole and offer the users suggestions on investment.

Part2

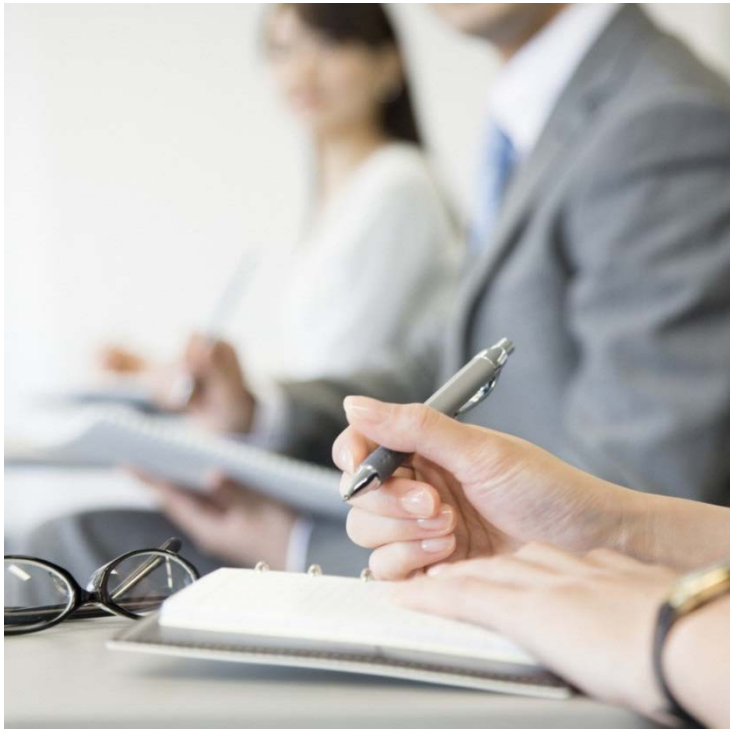
Background

Background



Definition

A measure of the risk arising from exposure to general market movements as opposed to idiosyncratic factors.
It indicates whether the stock is more or less volatile than the market as a whole.



Value

The **market portfolio** of all investable assets has a beta of exactly **1**.

A beta below 1 can indicate either an investment with lower volatility than the market or in the opposite direction of the benchmark.

A beta greater than 1 generally means that the asset both is volatile and tends to move up and down with the market.

Value of Beta	Interpretation	Example
$\beta < 0$	Asset movement is in the opposite direction of the benchmark	An inverse exchange-traded fund or a short position
$\beta = 0$	Asset movement is uncorrelated to the benchmark	Fixed-yield asset, whose growth is unrelated to the movement of the stock market
$0 < \beta < 1$	Asset moves in the same direction, but in a lesser amount than the benchmark	Stable, "staple" stock such as a company that makes soap. Moves in the same direction as the market at large, but less susceptible to day-to-day fluctuation.
$\beta = 1$	Asset moves in the same direction and in the same amount as the benchmark	A representative stock, or a stock that is a strong contributor to the index itself.
$\beta > 1$	Asset moves in the same direction, but in a greater amount than the benchmark	Stocks which are very strongly influenced by day-to-day market news, or by the general health of the economy.

Part3

Python Program

Python program

Data collection and processing

- Download the daily closing price of all individual shares and market index in the past two years from CSMAR database.

- To narrow the error, we use systematic sampling to filter every fifth data after a random start (e.g.: day1, day6, day11, day16……), and then calculate the weekly return on equity.

Python program

Imports

we import following packages for subsequent uses.

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

Python program

Import data

We use CSV to import the processed data - the return on equity of the market and the stock to be analyzed over a relatively long period of time. Then we store the data in lists for subsequent calculation.

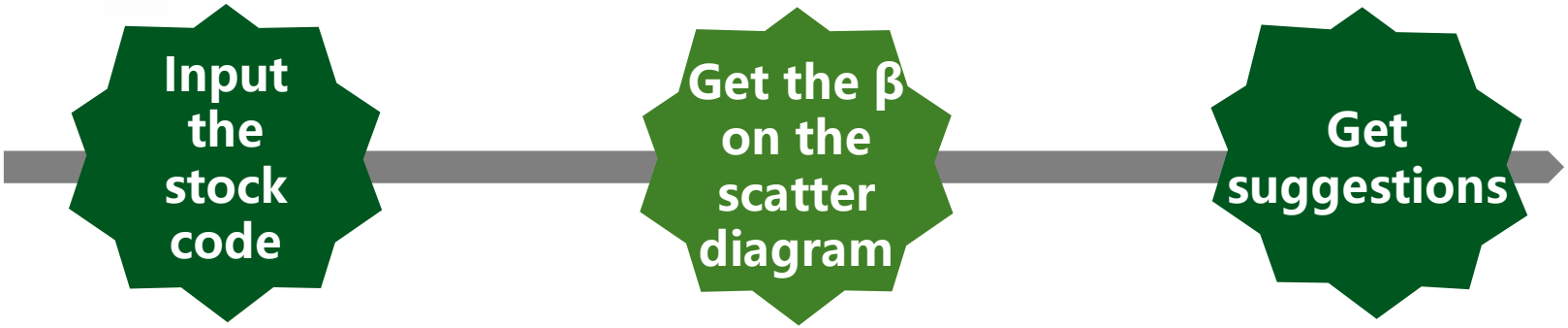
Python program

Function

- We program the function of calculation procedure by using gradient descent for linear regression to obtain the beta coefficient of the stock which reflect the risk of the stock.

Python program

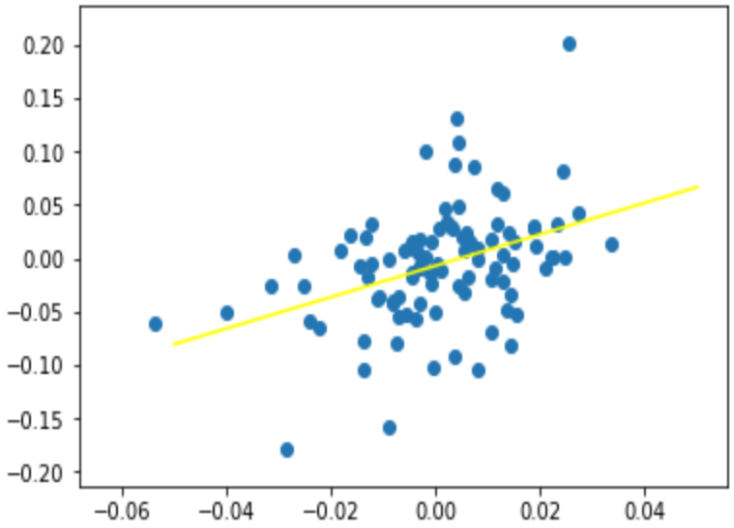
Result



Python program

Result


```
Please input the stock code: 10
beta = 1.4696414284519999
The stock moves in the same direction, but in a greater amount than the benchmark, involving more systematic risk than the overall market.
Suggestion: Pay close attention to day-to-day market news or the general health of the economy.
```



Python program

Code – part1

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline

data = pd.read_csv('./data/CAPMR_Adalyr.csv')

ID=list(data['Stkcd'])

RE=list(data['Dretnd'])

id = int(input('Please input the stock code: '))

i = ID.index(id)

x_data = RE[0:97]
y_data = RE[i:i+97]
x_data = np.asarray(x_data)
```

imports

read csv

store the data in lists

ask the user to input stock code

locate the data in list

generate the data

Python program

Code – part2

```
b = 0
w = 0
lr = 1.0
iteration = 100000
b_lr = 0.0
w_lr = 0.0

b_history = [b]
w_history = [w]

for i in range(iteration):

    b_grad = 0.0
    w_grad = 0.0
    for n in range(len(x_data)):
        b_grad = b_grad  - 2.0*(y_data[n] - b - w*x_data[n])*1.0
        w_grad = w_grad  - 2.0*(y_data[n] - b - w*x_data[n])*x_data[n]

    b_lr = b_lr + b_grad**2
    w_lr = w_lr + w_grad**2

    b = b - lr/np.sqrt(b_lr) * b_grad
    w = w - lr/np.sqrt(w_lr) * w_grad

    b_history.append(b)
    w_history.append(w)
```

# gradient descent for linear regression:
y(data) = b + w * x(data)

Python program

Code – part3

```
print('beta =',w)

p1=plt.scatter(x_data,y_data)

x=np.linspace(-0.05,0.05)
y = w*x+b
p2=plt.plot(x,y,color="yellow")


t=round(w,3)

if t>1:
    print("The stock moves in the same direction, but in a greater amount than
    print("Suggestion: Pay close attention to day-to-day market news or the ge

if t==1:
    print("The stock moves in the same direction and in the same amount as the

if t<1:
    print("The stock moves in the same direction, but in a lesser amount than
```

print the beta coefficient

plot the figure

round beta to the thousandth
provide user with suggestions

Part4

Problems in programming

Problems in programming

unable to use crawler

the process of data

Part5

Advantages of the program

Advantages of the program

the accuracy and sufficiency of data

Since we use the daily closing price of all individual shares and market index in the past two years which can be found from the CSMAR database. Owing to the accuracy and sufficiency of data, the correctness of beta coefficient of a stock can be substantially guaranteed.

the use of scatter diagram

On the scatter diagram, each point represents a date, plotted by the market's rate of return in that week on the horizontal axis and the rate of return of the individual stock we analyze on the vertical. The slope of the linear fitting equation is the beta. Because our group focus on data of a successive duration, the scatter diagram is able to reflect the approximate trend of beta coefficient, predicting whether the stock will be more or less volatile than the market.

Part6

Disadvantages of the program

Disadvantages of the program

- unable to update data
- the limited number of stock
- long operation time
- unable to compare different stocks


Thank you for watching