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# Computational Investing, Part I

## ***072: Capital Assets Pricing Model***

*Find out how modern electronic markets work, why stock prices change in the ways they do, and how computation can help our understanding of them. Learn to build algorithms and visualizations to inform investing practice.*

# Recap of CAPM

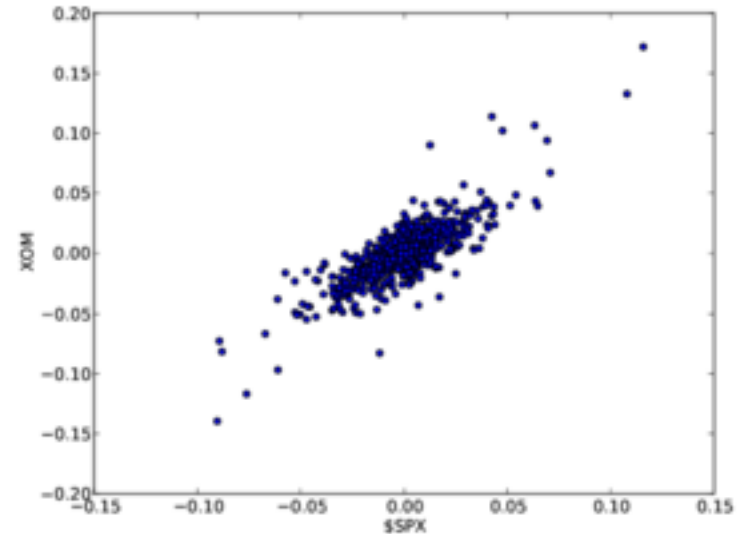
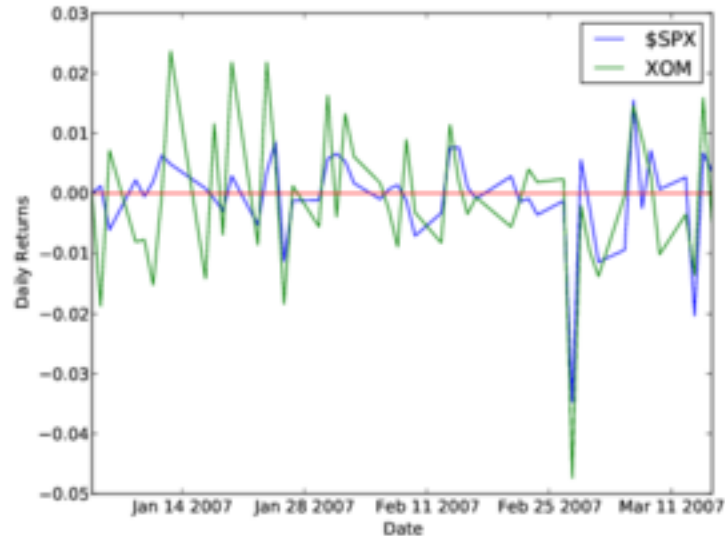
# CAPM: Definition of Beta

- ⦿ Assume:

- $r_i(t) = \text{beta}_i * r_m(t) + \text{alpha}_i$

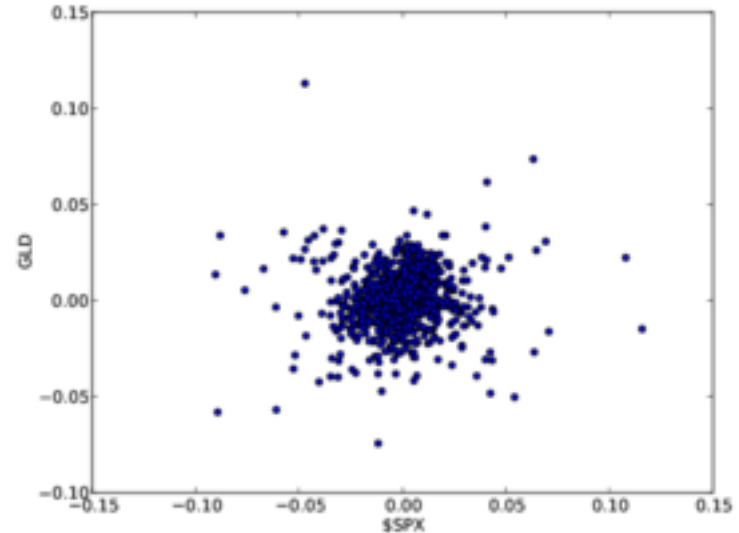
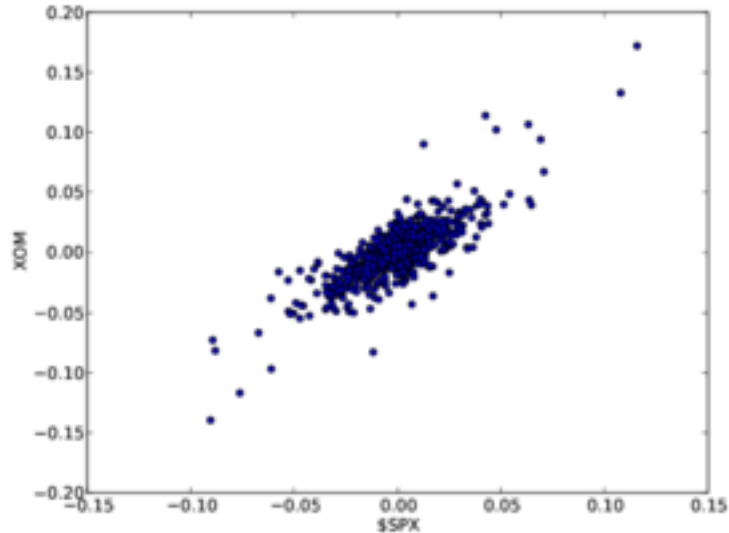
- ⦿ Use linear regression (line fitting) to find beta and alpha.

# Beta & Correlation with the Market



# Beta and Correlation are Different!

# Beta & Correlation with Market



# CAPM: Expected Residual = 0

## ⊙ CAPM:

- $r_i(t) = \text{beta}_i * r_m(t) + \text{alpha}_i$
- $r_i(t) = \text{beta}_i * r_m(t) + \text{random}$

## ⊙ Active Portfolio Management View

- $r_i(t) = \text{beta}_i * r_m(t) + \text{alpha}_i$

# CAPM: Implications

- Expected excess returns are proportional to beta.
- Beta of a portfolio = weighted sum of betas of components.