Assignment 1 - Disney VS SP500

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1 Objectives

In this assignment, we want to evaluate how Disney performed as an investment between October 2008 and September 2013 and how risky it is. To do that we need to regresse monthly raw returns on Disney against returns on the S&P 500 over that period. Analyze parameters of the resulting regression model.

2 Implementation

2.1 Data Download

Required data has been downloaded from Yahoo Finance using next python function:

```
from pandas_datareader import data as pdr
pdr.get_data_yahoo()
```

2.2 Daily returns

Daily returns can be calculated using pandas **pct_change(1)** function.

2.3 Monthly returns

```
# Index monthly retunrs
# for period returns. Used to find monthly returns
def __total_return_from_returns(returns):
return (returns + 1).prod() - 1
self.__stock_monthly_returns = stock_daily_returns.groupby((
        stock_daily_returns.index.year,
        stock_daily_returns.index.month)).apply(
            self.__total_return_from_returns)
```

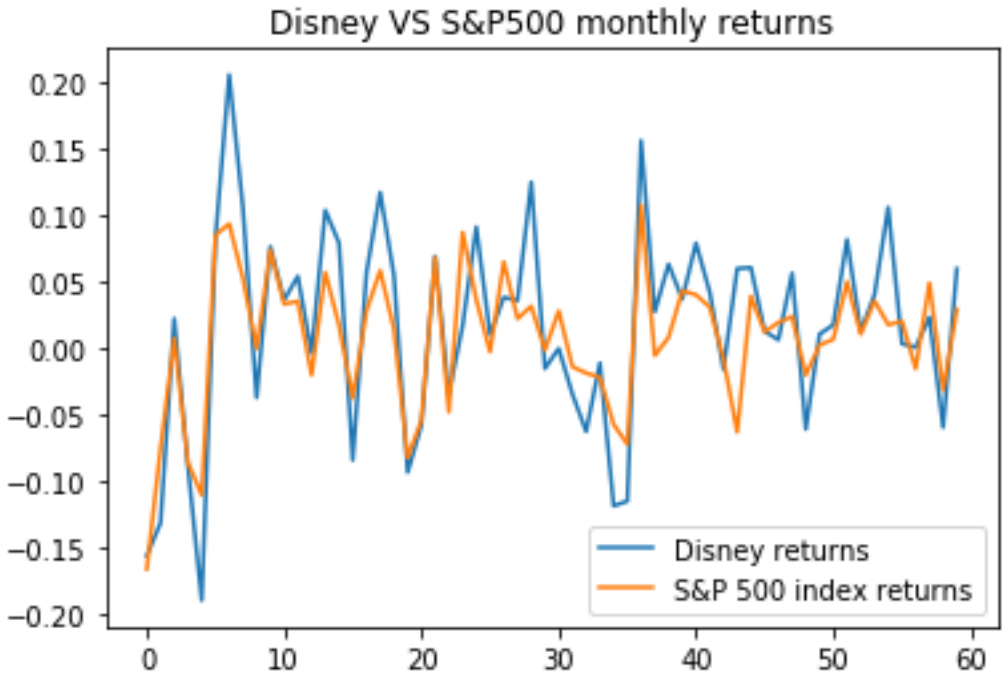
2.4 Regression in Python

To implement a regression in python **statsmodels** package can be used:

```
import statsmodels.api as sm
sm.add_constant()
model =sm.OLS()
model.fit()
```

This is ordinary least squares model.

2.5 Regression results



OLS Regression Results

Dep. Variable:	y	R-squared:	0.735
Model:	OLS	Adj. R-squared:	0.730
Method:	Least Squares	F-statistic:	160.7
Date:	Fri, 09 Mar 2018	Prob (F-statistic):	2.32e-18
Time:	21:50:07	Log-Likelihood:	109.48
No. Observations:	60	AIC:	-215.0
Df Residuals:	58	BIC:	-210.8
Df Model:	1		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
const	0.0070	0.005	1.357	0.180	-0.003	0.017
x1	1.2579	0.099	12.677	0.000	1.059	1.457

Omnibus:	7.488	Durbin-Watson:	2.209
Prob(Omnibus):	0.024	Jarque-Bera (JB):	7.538
Skew:	0.573	Prob(JB):	0.0231
Kurtosis:	4.304	Cond. No.	19.4

As we can see from the regression results the equation is:

$$Disney = 0.0070 + 1.2579 * SP500$$

From the equation we have: slope $= \beta = 1.2579$, meaning that Disney stocks are more sensitive than the market (more volatile) and moves in the same directions with the market.

The intercept $= \alpha = 0.0070$. α is a simple measure of stock price performance, relative to CAPM expectations. The intercept should be zero if the stock did exactly as predicted by the CAPM, and a positive (negative) intercept can be viewed as a measure that the stock did better (worse) than expected, at least during the period of the regression.

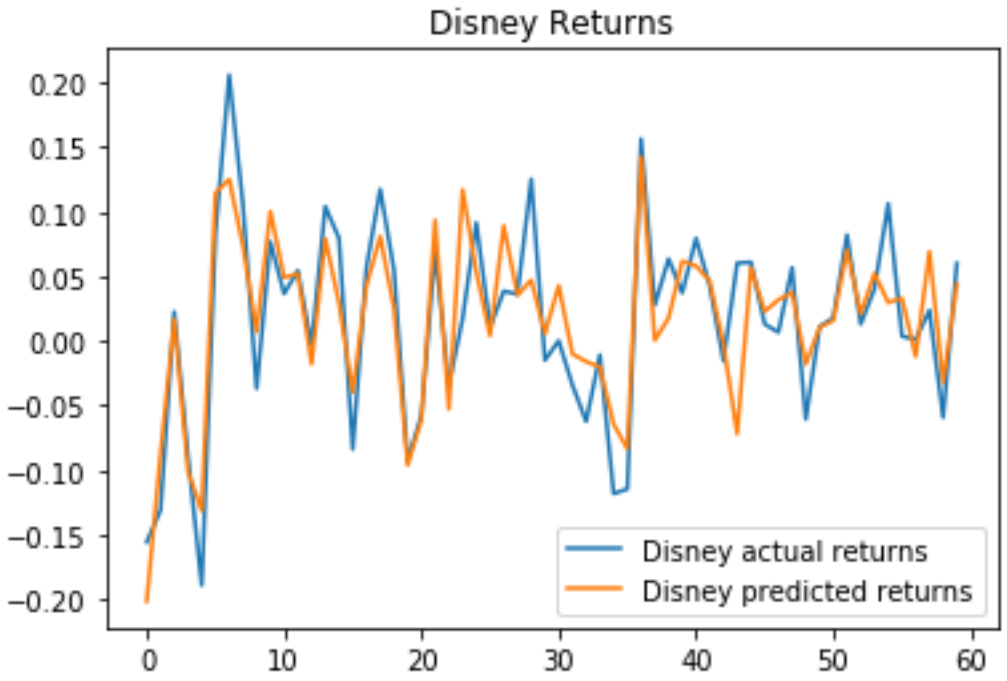
In the raw return regression, the intercept has to be compared to the predicted intercept, $Rf(1-\beta)$, in the CAPM equation:

- $\alpha > Rf(1–\beta)$ Stock did better than expected during regression period
- $\alpha = Rf(1–\beta)$ Stock did as well as expected during regression period
- $\alpha < Rf(1–\beta)$ Stock did worse than expected during regression period

Based on average FRED T-Bill rate I used risk free rate $= 0.003 = 0.3\%$

$$0.0070 > 0.003 * (1 - 1.2579)$$

This gives us that the stock did better than expected during regression period.



2.5.1 Annualized excess return

To calculate annualized excess return I used geometric average:

$$annualized = ((1 + r_1) \times \cdots \times (1 + r_n))^{\frac{12}{n}}$$

where n is number of months during the whole period.

$$excessed = annualized - risk\_free$$

As a result we have Annualized excess return = 0.173334105308.

2.5.2 R squared of the regression

The regression results show that he R squared of the regression is 0.735. Tt provides a measure of the goodness of fit of the regression. Precisely this means that S&P 500 index returns explain 73.5% of variance of Disney stock returns.

The significance of R squared can be interpreted as significance of F-statistic. According to the model summary Prob (F-statistic) $= 2.32e-18 < 0.05$, meaning that we can reject the null-hypothesis at 5% level of significance and conclude that our model provides a better fit than the intercept-only model (our model is significant on the whole).

2.5.3 Beta

The Standard Error of Beta Estimate is 0.099. The corresponding p-value $= 0.000 < 0.05$ that means that Beta coefficient is significant at 5% level of significance The Standard Error of Alpha Estimate is 0.005. The corresponding p-value $= 0.180 > 0.05$ that means that Alpha coefficient is not significant at 5% level of significance.