

Estimating the equity beta of Norsk Hydro, 2021

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In the CAPM, the *equity beta* of a stock is an estimate of the degree to which the stock covaries with the broad equity market, typically proxied by an broad stock market index.

If we let r_{it} be the stock return, and r_{mt} the market return, both observed at time t , the beta β_i is calculated as

$$\beta_i = \frac{\text{cov}(r_{it}, r_{mt})}{\text{var}(r_{mt})}$$

beta needs to be estimated.

Typical procedure: historical returns

- ▶ the stock
- ▶ stock market index.

Estimating NHY beta

Gather data: Internet

Norsk Hydro ASA (NHY.OL)

Oslo - Oslo Delayed Price. Currency in NOK

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59.86 -0.88 (-1.45%)

As of 03:23PM CEST. Market open.

[Summary](#) [Chart](#) [Conversations](#) [Statistics](#) [Historical Data](#) [Profile](#) [Financials](#) [Analysis](#) [Options](#) [Holders](#) [Sustainability](#)

Previous Close	60.74	Market Cap	123.235B
Open	60.00	Beta (5Y Monthly)	1.39
Bid	59.98 x 1100	PE Ratio (TTM)	5.01
Ask	60.04 x 410000	EPS (TTM)	11.98
Day's Range	59.32 - 60.68	Earnings Date	Oct 25, 2022
52 Week Range	51.64 - 94.82	Forward Dividend & Yield	3.40 (5.60%)
Volume	1,728,362	Ex-Dividend Date	Sep 21, 2022
Avg. Volume	4,663,350	1y Target Est	76.86



Estimating NHY beta

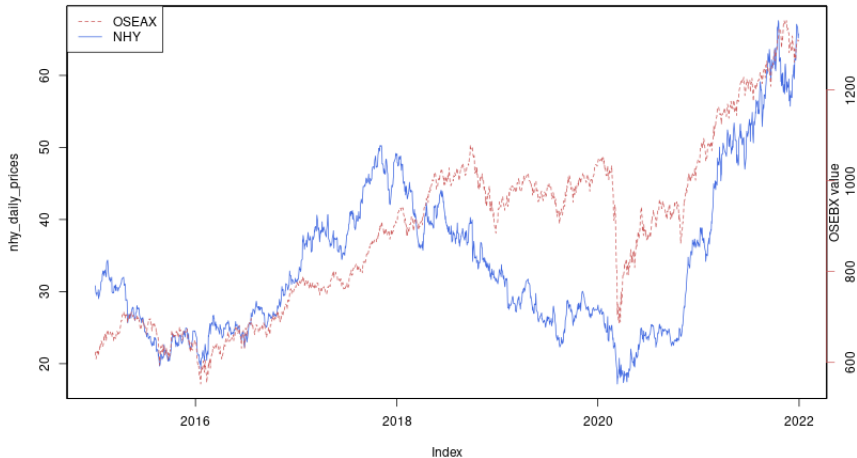
Date for estimation: Yearend 2021.

Using data 2017-2021.

Five years of monthly returns.

Index choice: OSEAX.

Estimating NHY beta - evolution of index and NHY



Estimating NHY beta - actual calculation - in R

Actual estimation is illustrated using R (refer to your quantitative courses):

To calculate beta, read the data on NHY and the stock market index.

R actually has routine for downloading stock market data from Yahoo finance (and calculating returns).

```
getSymbols("NH.Y.O",  
           from="2015-01-01",  
           source="yahoo")  
nh.y.daily.prices <- na.omit(NH.Y.O$NH.Y.O.Adjusted)  
nh.y.monthly.returns <- monthlyReturn(nh.y.daily.prices)
```

Estimating NHY beta - actual calculation - in R

Align data:

```
> data <- merge(nhy_monthly_returns,  
                oseax_monthly_returns,all=FALSE)  
> data <- data["2017/2021"]  
> ri <- data[,1]  
> rm <- data[,2]
```

Estimate beta by direct calculation:

```
> beta <- cov(ri,rm)/var(rm)  
> print(beta)  
1.53
```

Estimating NHY beta - actual calculation - in R

Alternatively, estimate beta as the coefficient estimate of a regression with r_{it} (NHY return) as the dependent variable, and r_{mt} (stock index return) as explanatory variable:

$$r_{it} = a_i + \beta_i r_{mt} + \varepsilon_{it}$$

```
> regr <- lm(ri~rm)
```

<i>Dependent variable:</i>	
	ri
rm	1.529*** (0.233)
Constant	0.002 (0.010)
Observations	59
Adjusted R ²	0.420

Note: *p<0.1; **p<0.05; ***p<0.01