PRINCIPLES OF FINANCE

## CAPM CHALLENGES

Elise Gourier

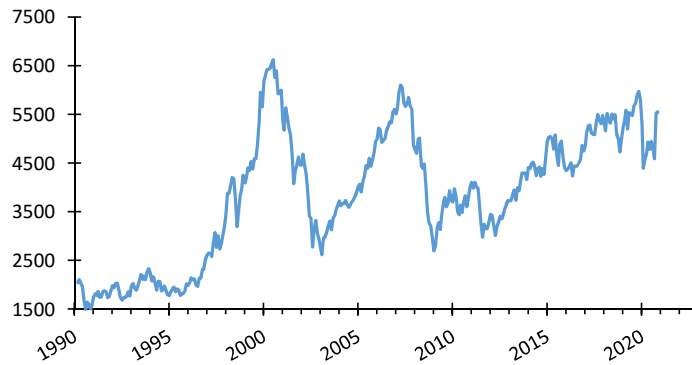(elise.gourier@essec.edu)

1. Roll's critique

- Reference: Roll, Richard (March 1977), "A critique of the asset pricing theory's tests Part I: On past and potential testability of the theory", *Journal of Financial Economics*, **4** (2): 129–176

- The market portfolio is not observable!

- Should contain all asset classes (bonds, commodities…), in all countries.
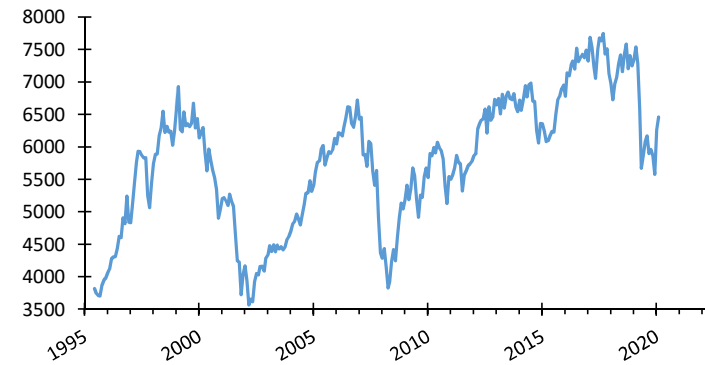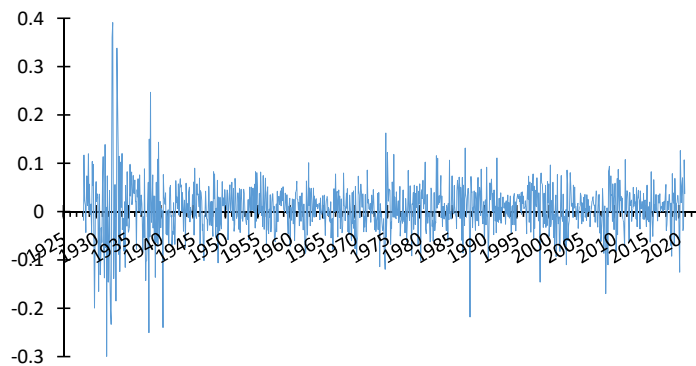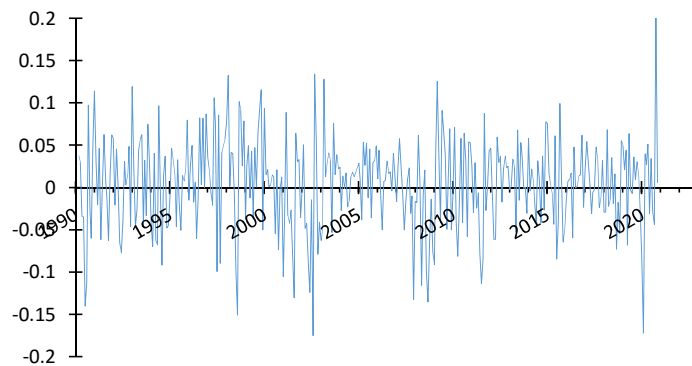
Some example of indices
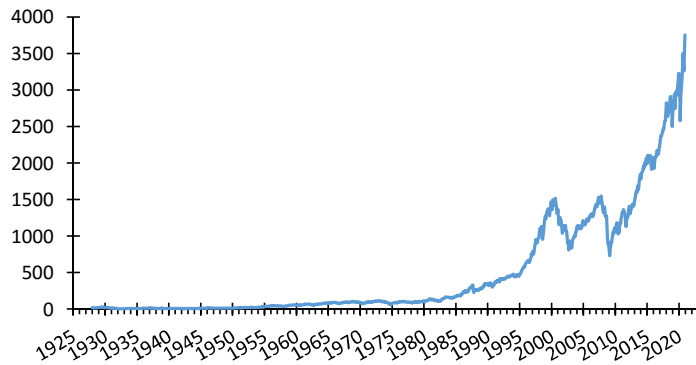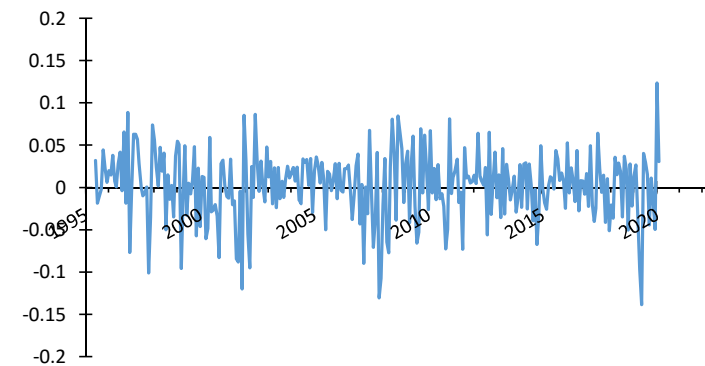
Some example of indices

Returns Correlation Matrix (1995-2020)

	S&P500	*CAC 40*	*FTSE*
S&P500	1		
CAC 40	0.78	1	
FTSE	0.80	0.82	1

2. Estimation of beta

EOG Returns against the market

$y = 1.2342x + 0.0001$
$R^2 = 0.3425$
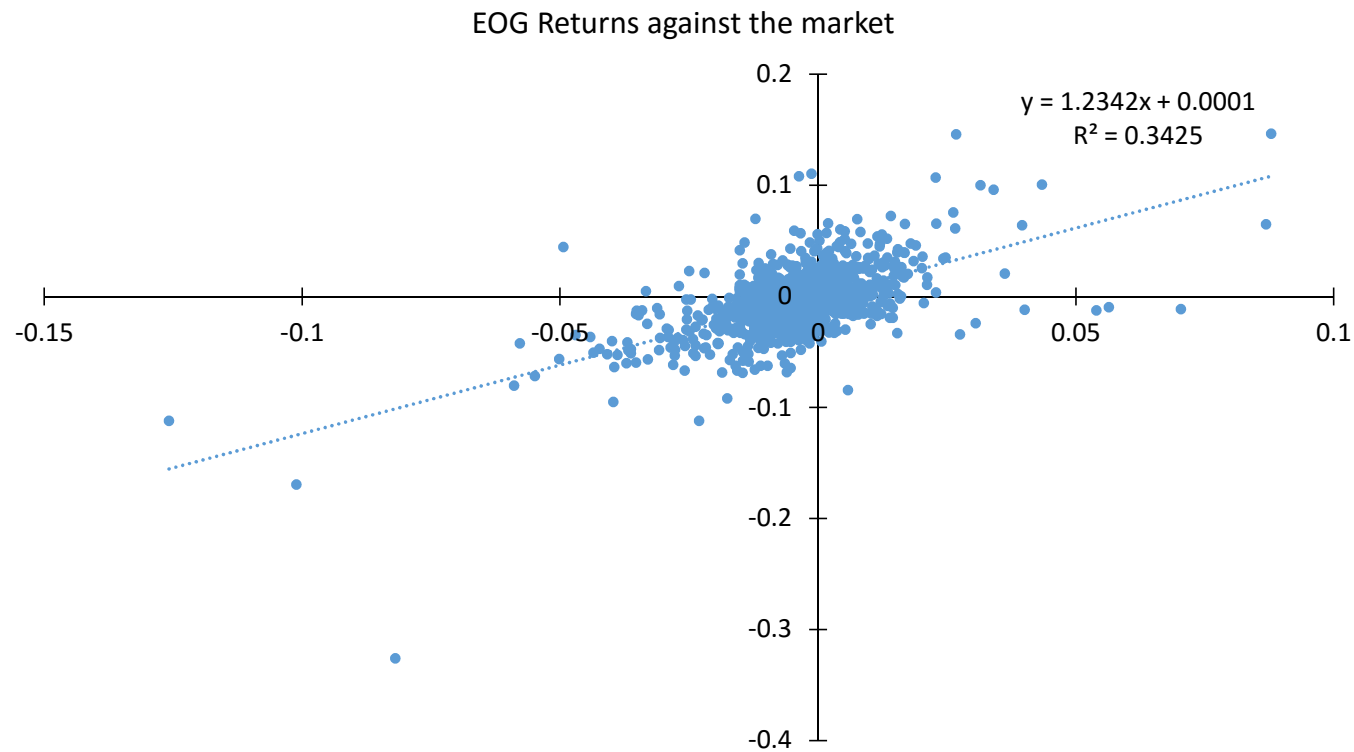
Lots of outliers
(low R^2)

Sector ETF

Energy ETF return against the market (excluding outliers)

$y = 1.1363x - 0.0004$
$R^2 = 0.6522$

- Non-outliers
- Outliers
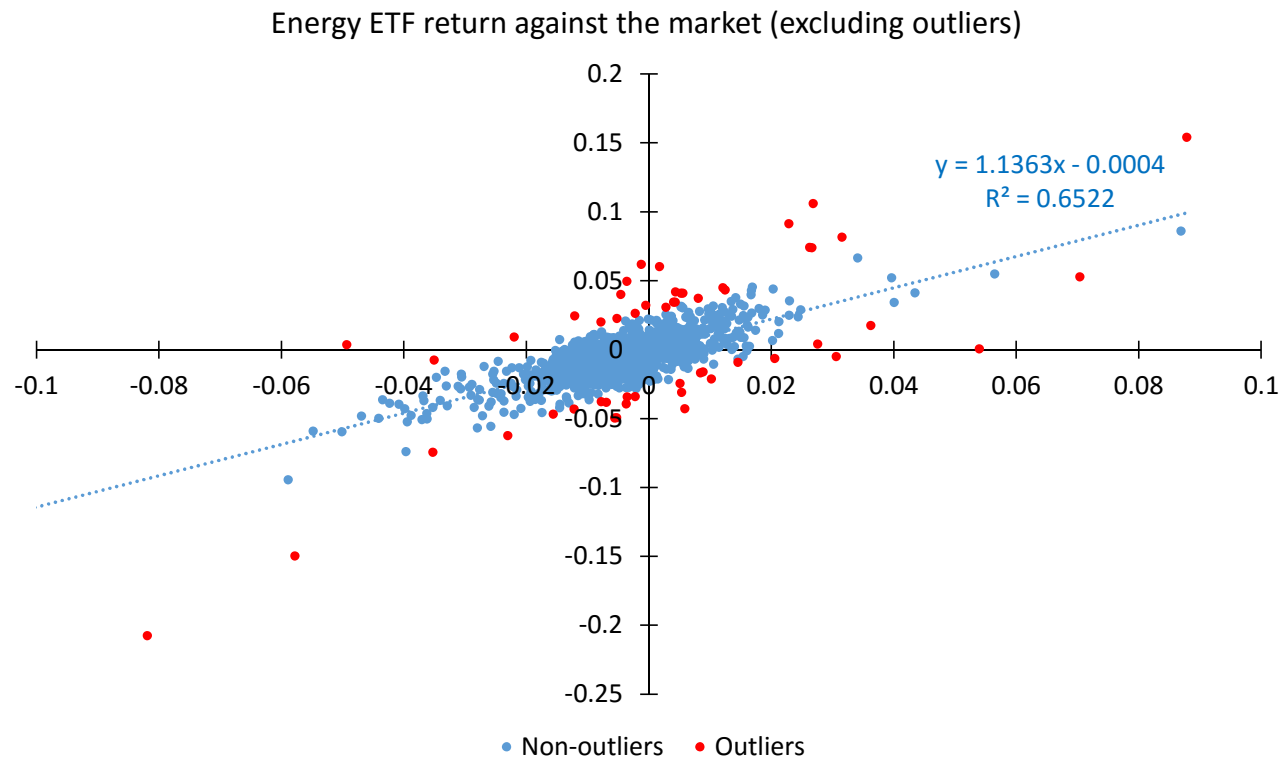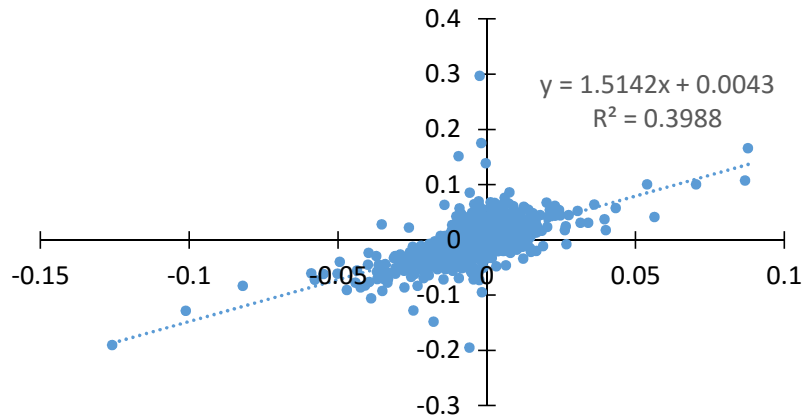
Does not completely solve the problem of outliers!

Sector ETF

Nvidia returns against the market

$y = 1.5142x + 0.0043$
$R^2 = 0.3988$

TSM returns against the market

$y = 0.9788x + 0.0009$
$R^2 = 0.4446$
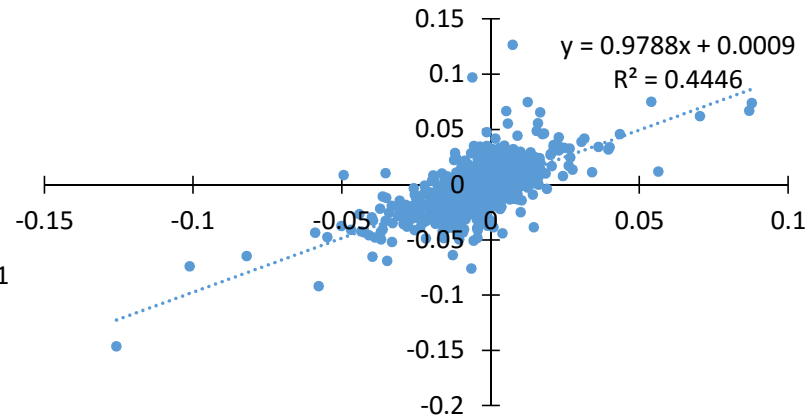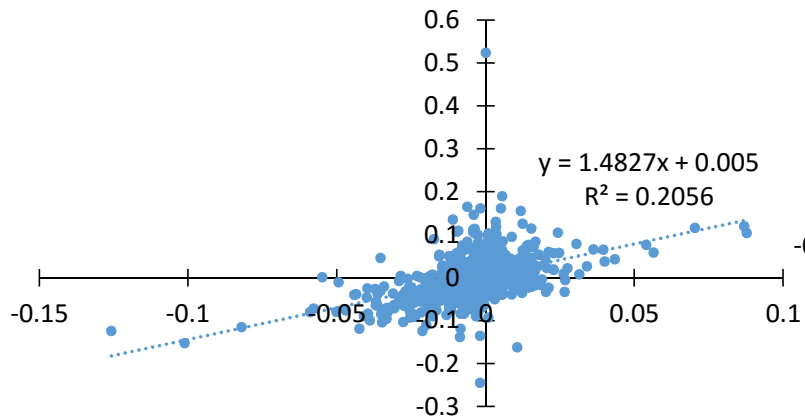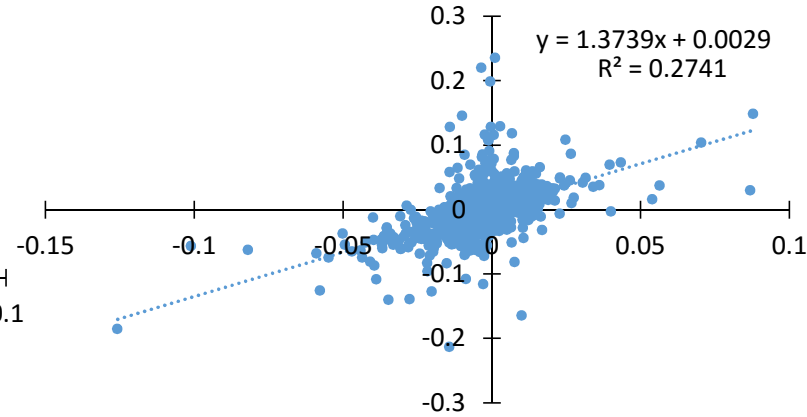
Large variation within some sectors (ex of IT sector)

AMD returns against the market

$y = 1.4827x + 0.005$
$R^2 = 0.2056$

OLED returns against the market

$y = 1.3739x + 0.0029$
$R^2 = 0.2741$

Sector ETF

Industrials ETF returns against the market

$y = 1.0455x + 0.0002$

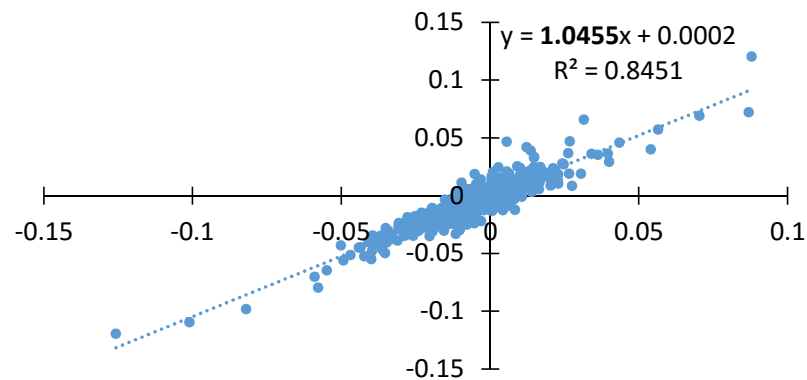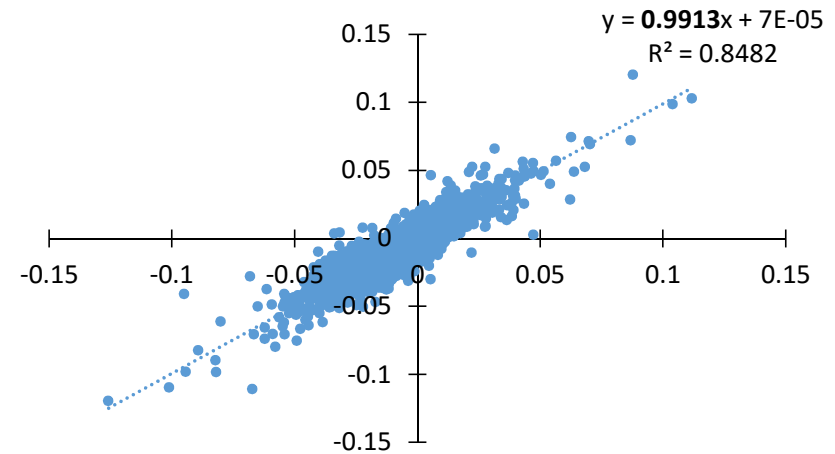Materials ETF returns against the market

$y = 1.023x + 0.0001$
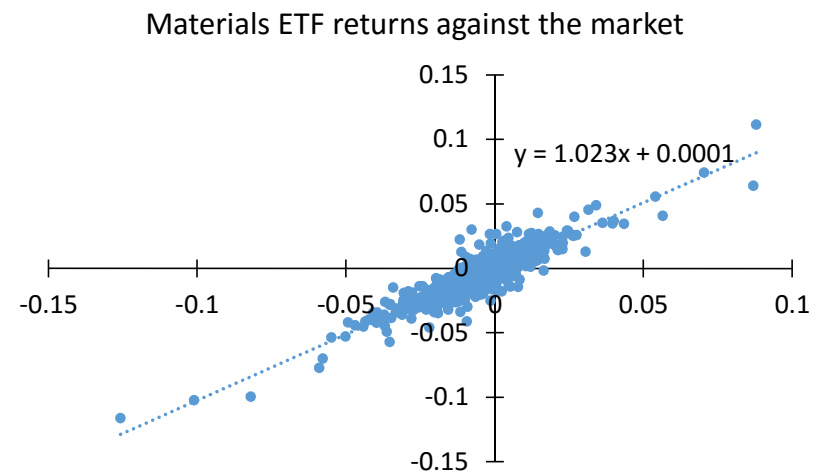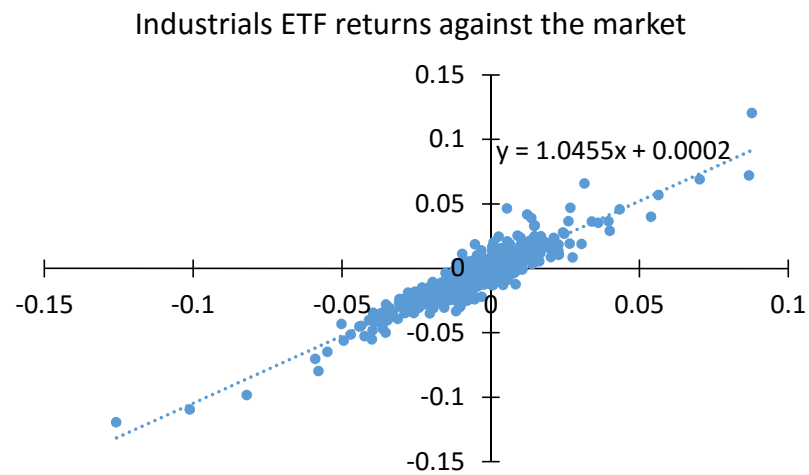
Other sectors are less volatile → Estimation is easier.

How many years of historical data?
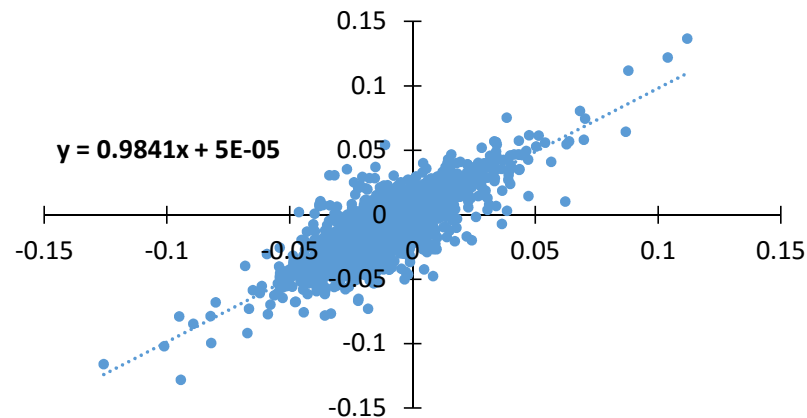

Industrials ETF returns against the market (2016-2020)

y = **1.0455**x + 0.0002
R² = 0.8451

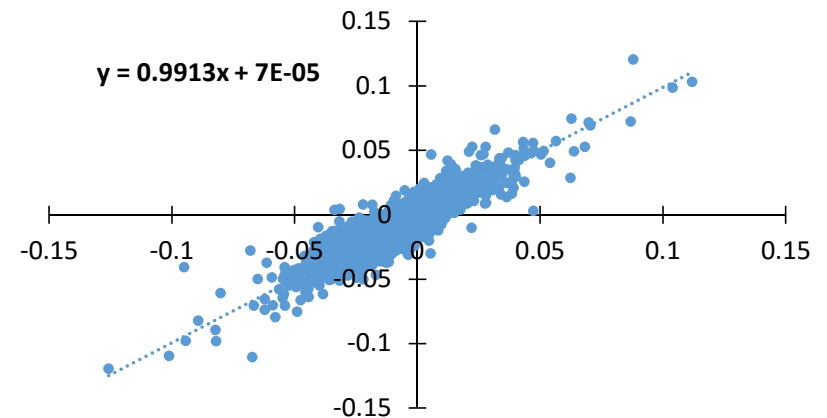Industrials ETF against the market (1999-2020)

y = **0.9913**x + 7E-05
R² = 0.8482

Frequency of estimation: daily vs. monthly

Materials ETF returns against the market

Industrials ETF returns against the market

y = 0.9841x + 5E-05

y = 0.9913x + 7E-05

Materials ETF returns against the market
(monthly)

Industrials ETF returns against the market
(monthly)

y = 0.9989x + 0.0032

y = 1.0012x + 0.0031