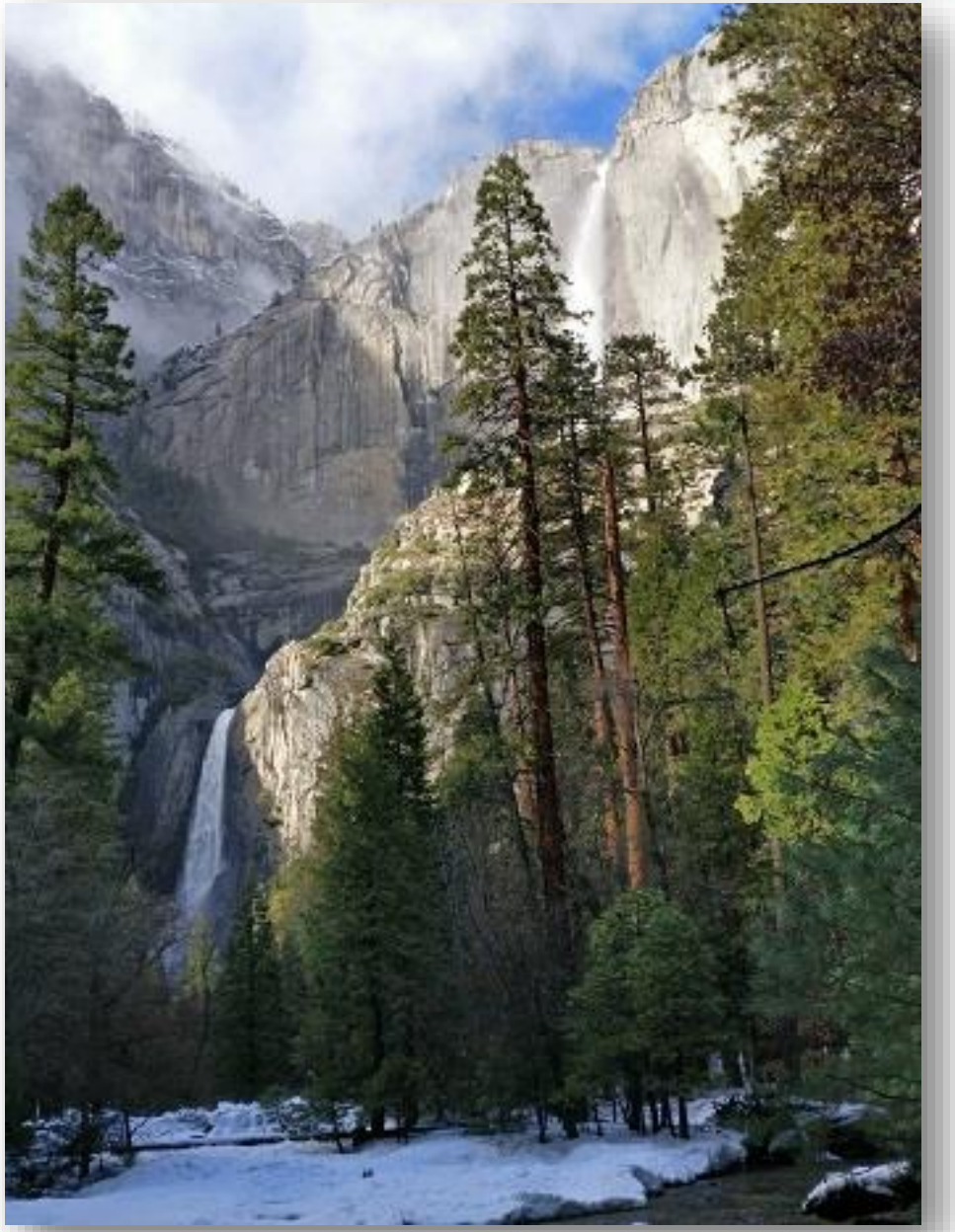
Microlectures ...

Econ 136

Active date:

Tuesday March 3, 2020



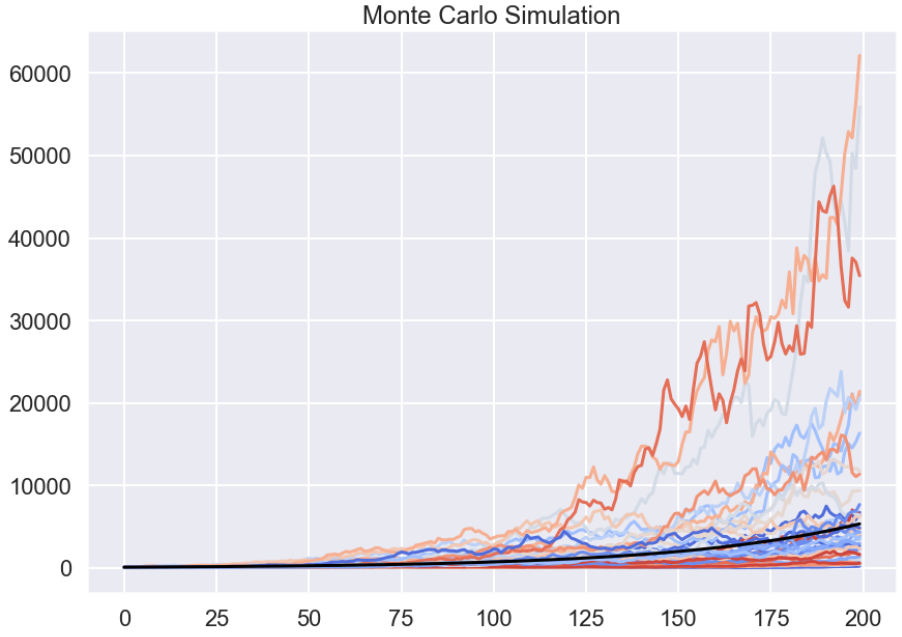
GOOG strangle would have been a bust ...

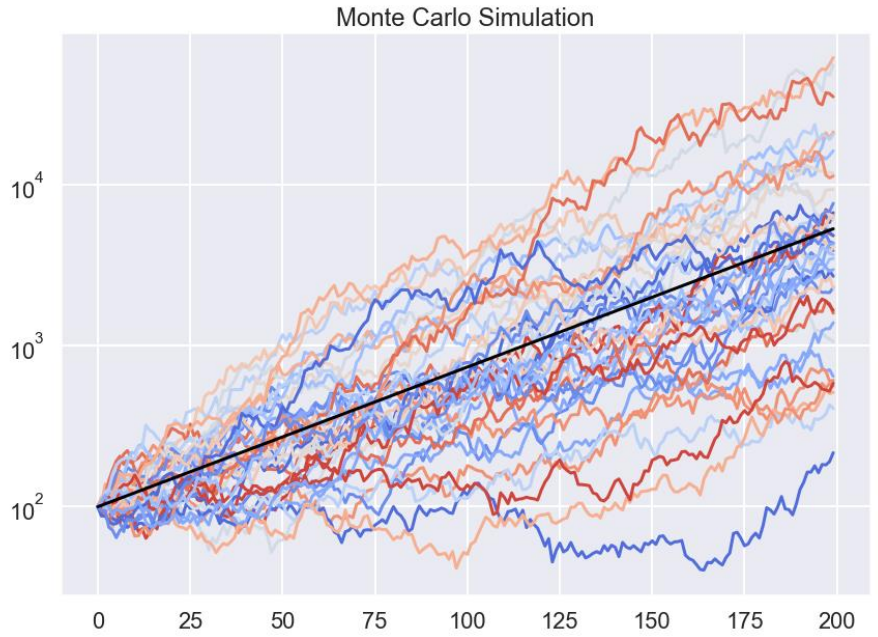
Model used: ib_strangle_inpos_v1_3.py
Monday, February 3, 2020, 07:44:53 AM local
GOOG, Last: 1472.26, Bid: 1472.06, Bid Size: 2, Ask: 1472.44, Ask Size: 1, Peg: 1472.25
Expiry: 20200207, days to expiry: 4.0
Call strike: 1477.50, Put strike: 1475.00
Call Bid: 37.30, Ask: 37.90, Peg: 37.60
Put Bid: 40.80, Ask: 41.20, Peg: 41.00
Position value: 78.60.
Call IDV: 0.034021, Duration Volatility: 0.058927
Put IDV: 0.033589, Duration Volatility: 0.058178
Call sigma ratio: 3.3453
Put sigma ratio: 3.3028
One day time decay: 10.665.

Model used: ib_strangle_inpos_v1_3.py
Tuesday, February 4, 2020, 06:49:25 AM local
GOOG, Last: 1437.03, Bid: 1435.58, Bid Size: 2, Ask: 1437.49, Ask Size: 1, Peg: 1436.53
Expiry: 20200207, days to expiry: 3.0
Call strike: 1477.50, Put strike: 1475.00
Call Bid: 3.40, Ask: 3.80, Peg: 3.60
Put Bid: 40.70, Ask: 43.00, Peg: 41.85
Position value: 45.45.
Call IDV: 0.016364, Duration Volatility: 0.023142
Put IDV: 0.016106, Duration Volatility: 0.022778
Call sigma ratio: 1.6091
Put sigma ratio: 1.5837
One day time decay: 3.455.

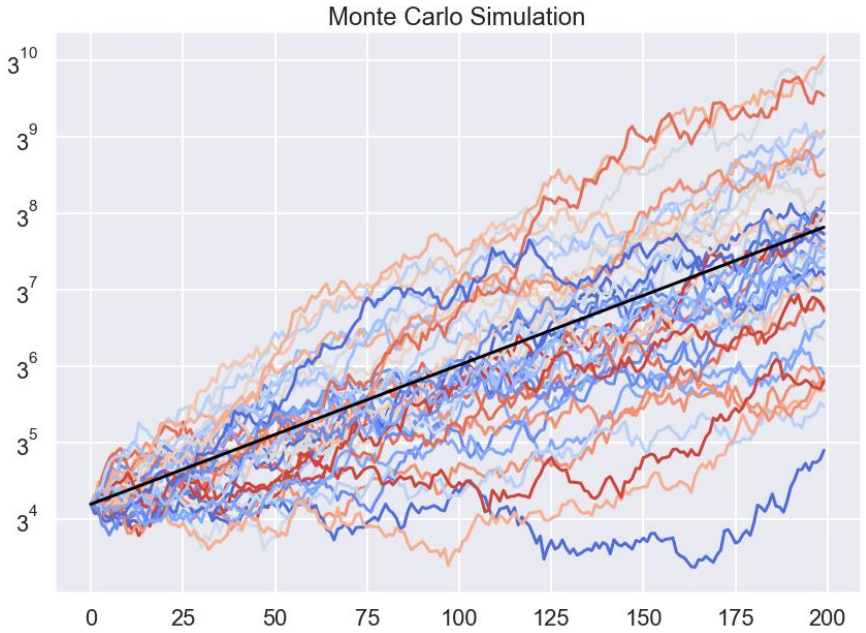
Note: Two earnings reports ago, on July 25, 2019, a single GOOG strangle went from $5,080 to $9,620!

```
days = 200
sims = 40
stock_sym = "HMC"
stock_pr = 100.00
drift = 0.02
sigma = 0.09
```

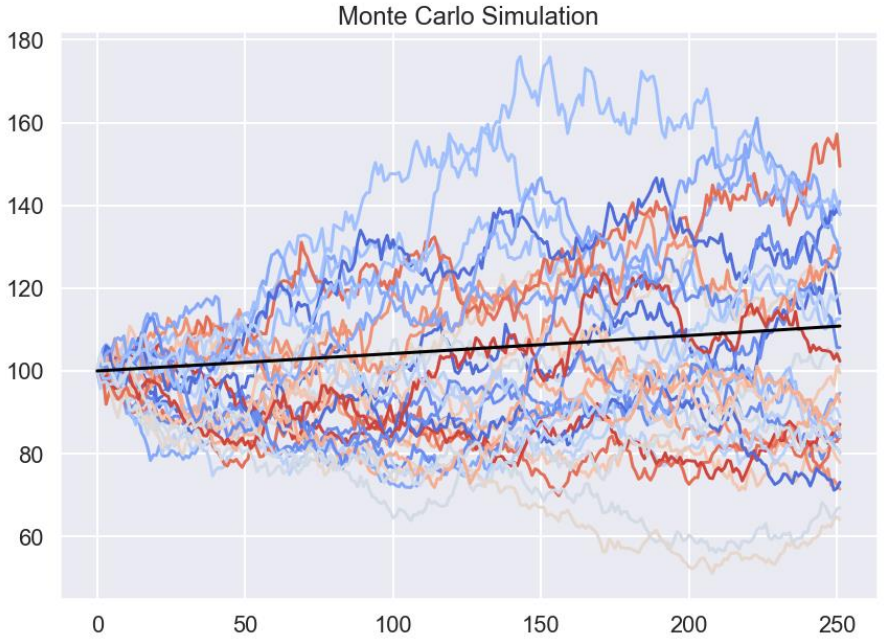


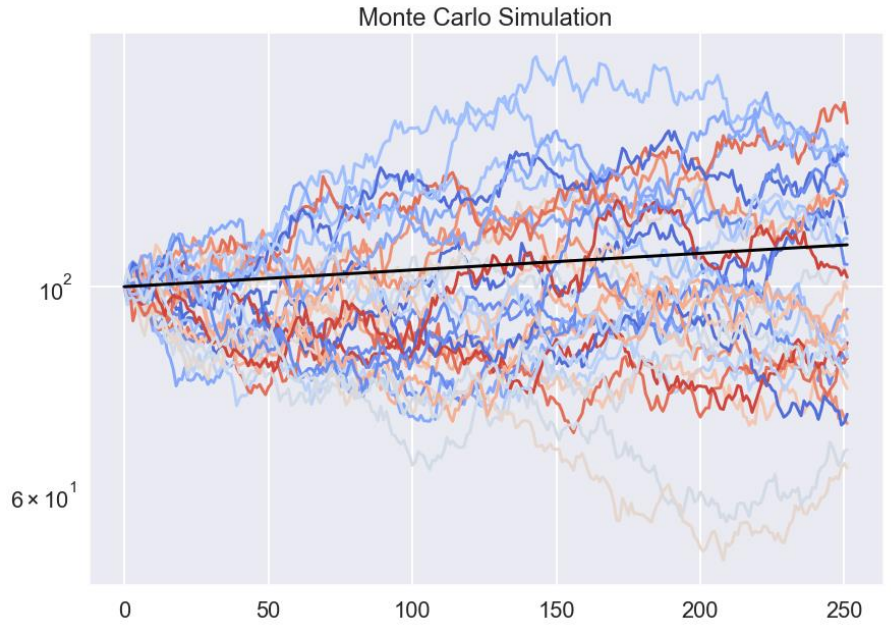



```
np.random.seed(666)
draw = np.random.standard_normal([sims,days])
```



```
days = 252              # default 18
sims = 30             # default 1000
stock_sym = "HMC"
stock_pr = 100.00       # default 100.0
drift = 0.00041         # our mean, and we
sigma = 0.0180        # default 0.0180
```



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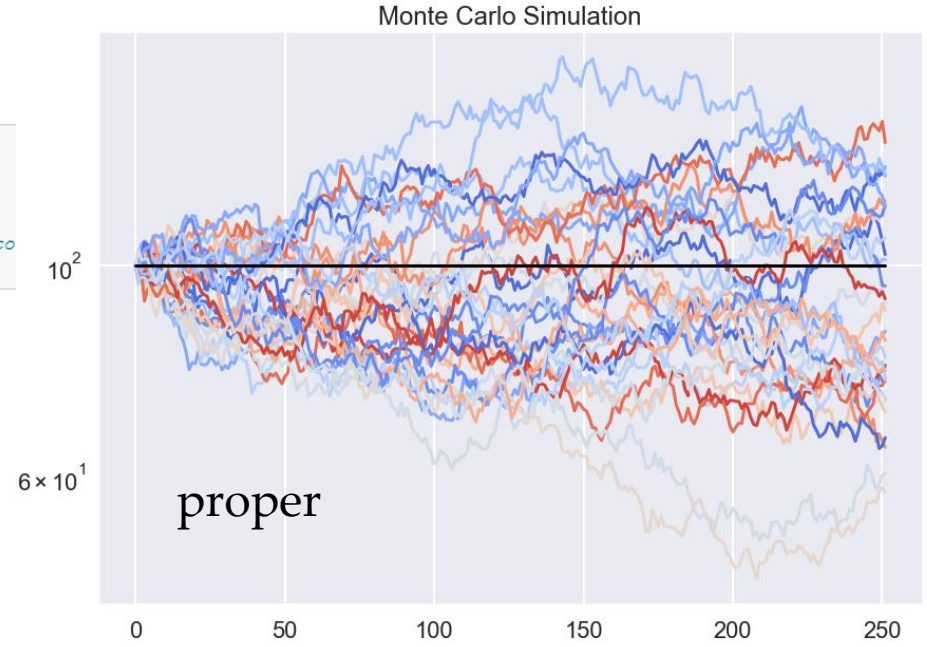
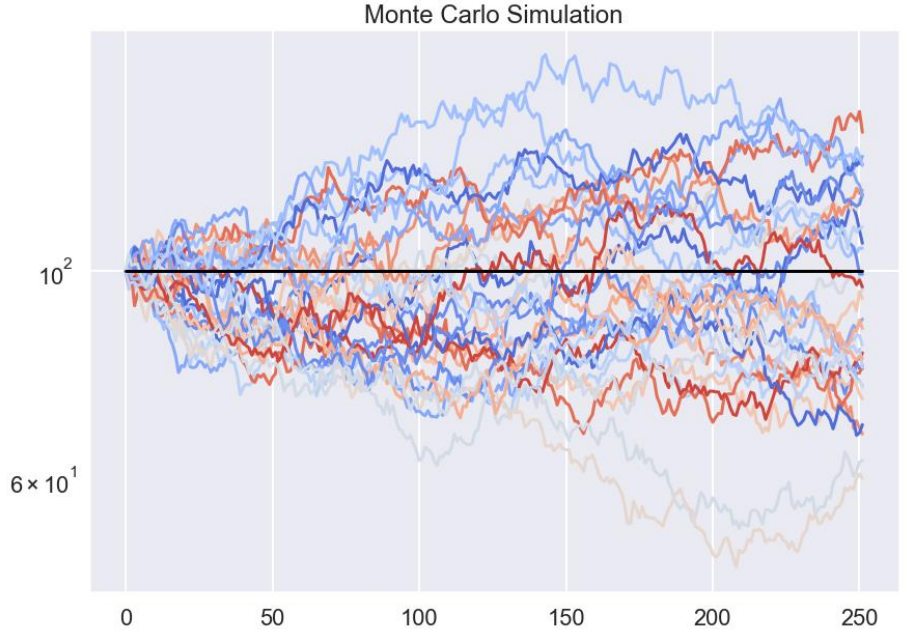
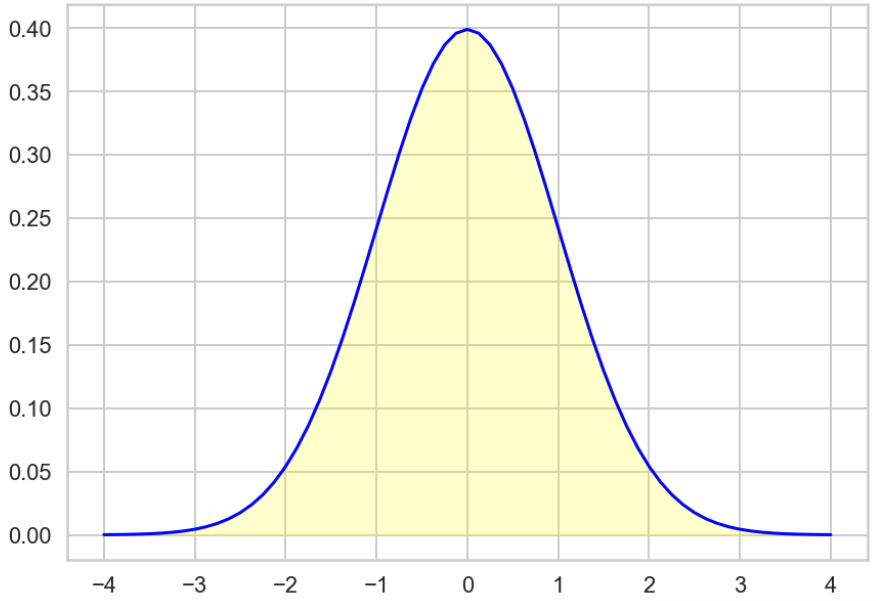
```

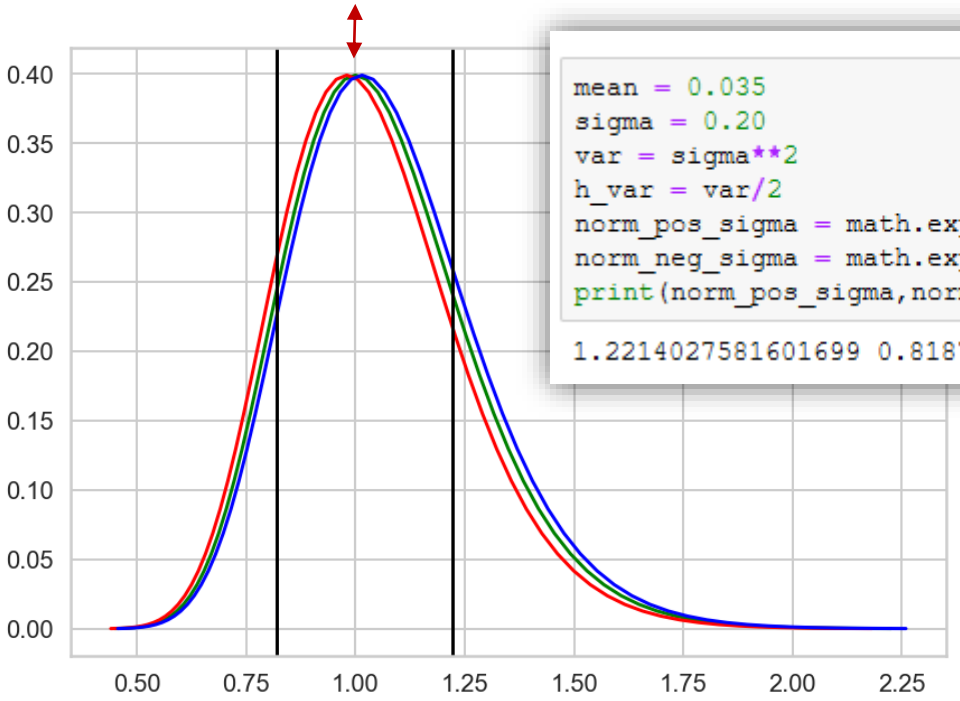






$$P_t = P_0 e^{\left[\left(\mu - \sigma^2/2\right)t + \sigma\varepsilon_t\right]}$$

This is a logarithmic transformation ...




```
mean = 0.035
sigma = 0.20
var = sigma**2
h_var = var/2
norm_pos_sigma = math.exp(sigma)
norm_neg_sigma = math.exp(-sigma)
print(norm_pos_sigma,norm_neg_sigma)
```

```
1.2214027581601699 0.8187307530779818
```

$$pdf_1 = e^{\sigma\varepsilon} \qquad \text{(green)}$$

$$pdf_2 = e^{(\sigma\varepsilon - \sigma^2/2)} \qquad \text{(red)}$$

$$pdf_3 = e^{(\sigma\varepsilon - \frac{\sigma^2}{2} + \mu)} \qquad \text{(blue)}$$

Some clarifying (hopefully) notation ...

$$P_{t+1} = P_t e^{\left[\left(\mu - \sigma^2/2\right) + \sigma\epsilon\right]}$$

The daily price formula for our Geometric Brownian Motion assumption is here on the left:

$$P_t = P_0 e^{\left[\left(\mu - \sigma^2/2\right)t + \sigma\sqrt{t}\times\varepsilon\right]}$$

When we assume that our unit of time is "days" and our mean, variance, and standard deviation is also measured in days, then the specific application of the Geometric Brownian Motion assumption for multiple days is shown on the left:

$$P_{str} = P_{sto} e^{\left[\left(-\sigma^2/2\right)t + \sigma\sqrt{t}\times Z\right]}$$

[Difficult to understand] – If we have a strike price and we want to know what size that a random draw from a standard normal distribution must be at a minimum to hit the strike price or beyond, we must solve this non-stochastic equation for Z. Again, "t" is days on our examples.

Note: This slide was corrected to include the missing subscripts on two of the price variables on the original slide and to add a "t" to the bottom equation. The corrected slide was also added to main call_itm lecture.

Econ 136 Spring 20

First quiz distribution

Original score	Percent (modified)	Grade equiv	Number
48+	83% +	A	23
45 - 47	78%	A-	14
41-44	71%	B+	5
34-40	60%	B	5
			47

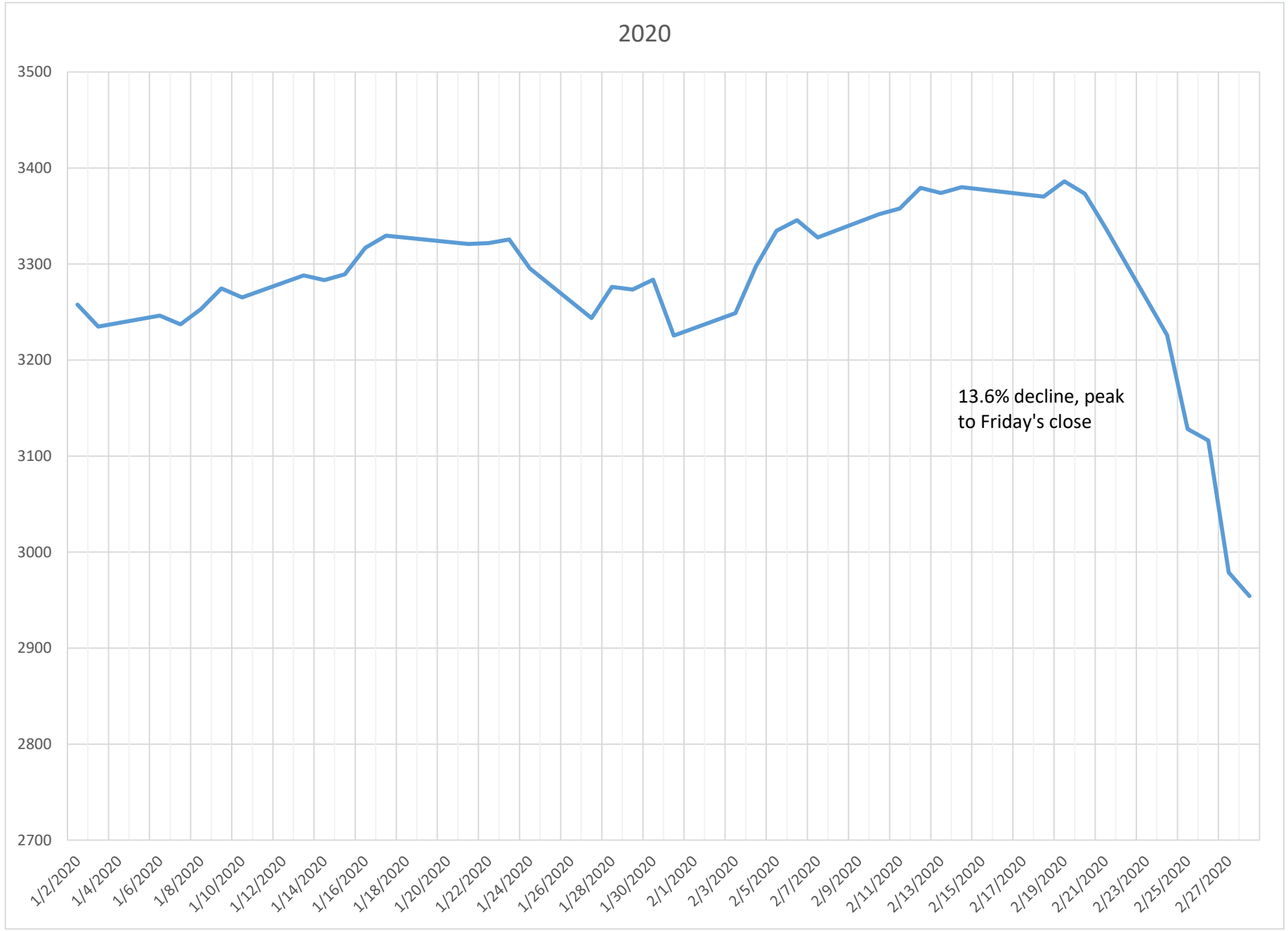
... as of Feb 2020, a nagging bug ...


```
67   # Do the IB handshake
68   #
69   ib = IB()
70   ib.connect('127.0.0.1', 7496, clientId=82)
71   print(ib.connect)
72   #
73   # Start the asyncio loop
74   #
75   util.patchAsyncio()
76   #
77   # Get the stock quote
78   #
79   # stock = Stock(stosym, 'SMART', 'USD') [the old command - what follows is new].
80   stock = Stock(symbol=stosym, exchange='SMART', currency='USD')
81   ib.qualifyContracts(stock)
82   l1_quote = ib.reqMktData(stock,"",True,False)
83   #
84   # This asyncio command below prevents the quotes from sending "nan"s instead of
85   # data.
86   #
87   ib.sleep(0.5)
88   s_last = l1_quote.last
89   s_bid = l1_quote.bid
90   s_bid_size = l1_quote.bidSize
91   s_ask = l1_quote.ask
92   s_ask_size = l1_quote.askSize
93   s_peg = (s_ask+s_bid)/2.0
94   s_peg = round(s_peg,2)
95   #
96   print("  {}, Last: {:.2f}, Bid: {:.2f}, Bid Size: {:d}, Ask: {:.2f}, Ask Size: {:d}, Peg: {:.2f}"
97       .format(stosym,s_last,s_bid,s_bid_size,s_ask,s_ask_size,s_peg))
98   print ("  Expiry: {}, days to expiry: {}".format(expiry,days))
99   print ("  Call strike: {:.2f}, Put strike: {:.2f}".format(call_strike,put_strike))
100  #
```

Starting asyncio, but calling it effectively from an ib-insync method already initializing it ... this is fine.

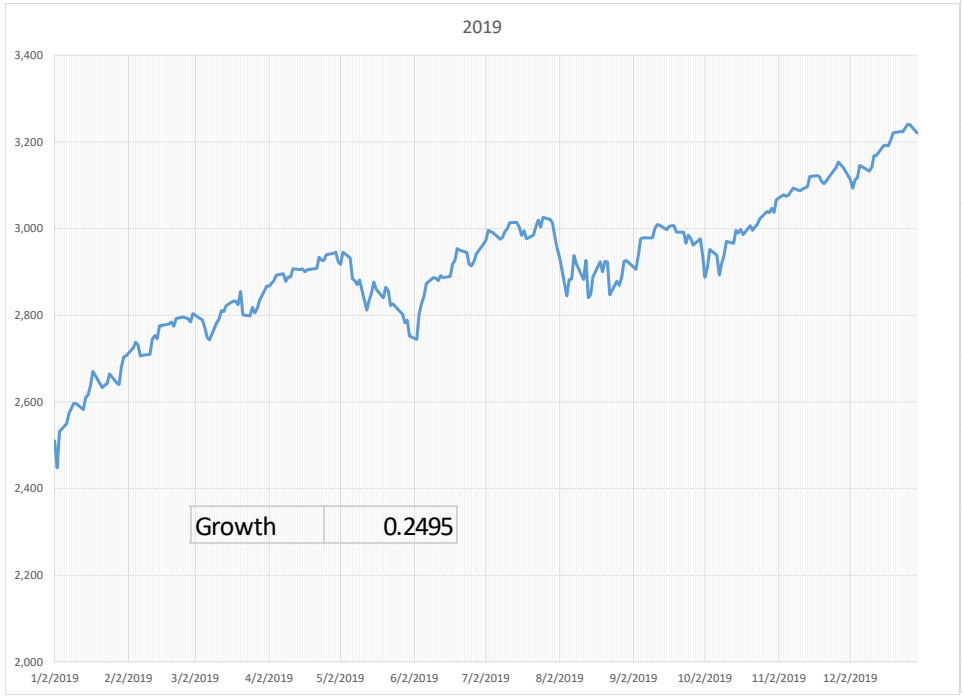
This is the problem ... this usage, although it works 90% of the time, is not correct.

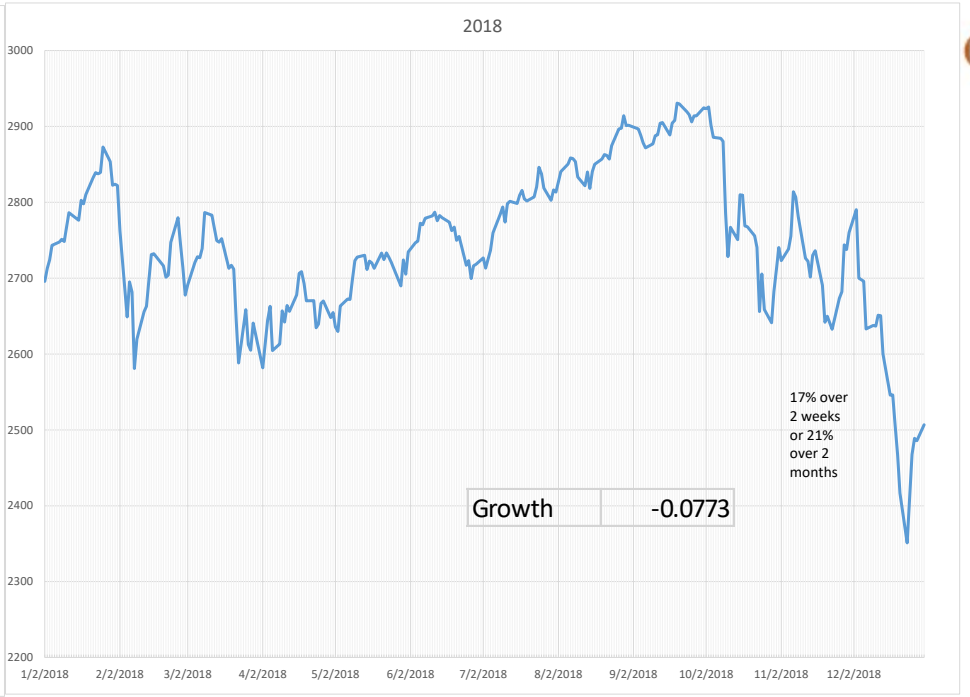
asyncio is the primary Python utility designed to overcome I/O-bound latency (and other latency as well, but most applications are dealing with I/O latency). It is designed to overcome Python's very restrictive Global Interpretor Lock (GIL), which forces Python to be sequential. With GIL, when I/O bound, the program has to wait for a data bucket to fill before any other steps can be executed (this was why Go was developed by Google). Asyncio goes around the GIL.

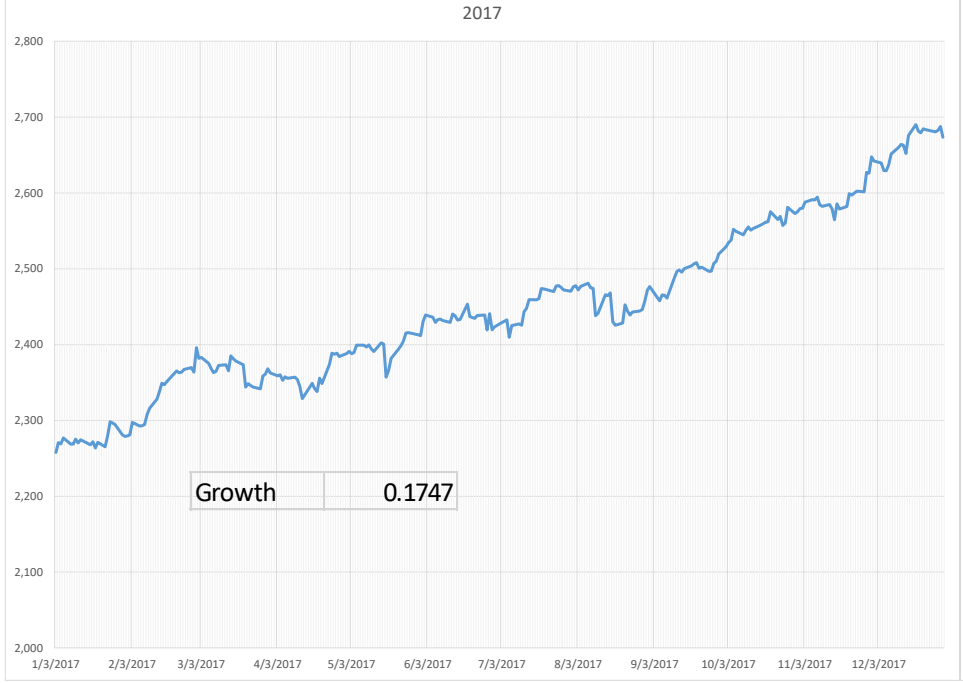

2020
3500
3400
3300
3200
3100
3000
2900
2800
2700
13.6% decline, peak
to Friday's close
1/2/2020
1/4/2020
1/6/2020
1/8/2020
1/10/2020
1/12/2020
1/14/2020
1/16/2020
1/18/2020
1/20/2020
1/22/2020
1/24/2020
1/26/2020
1/28/2020
1/30/2020
2/1/2020
2/3/2020
2/5/2020
2/7/2020
2/9/2020
2/11/2020
2/13/2020
2/15/2020
2/17/2020
2/19/2020
2/21/2020
2/23/2020
2/25/2020
2/27/2020

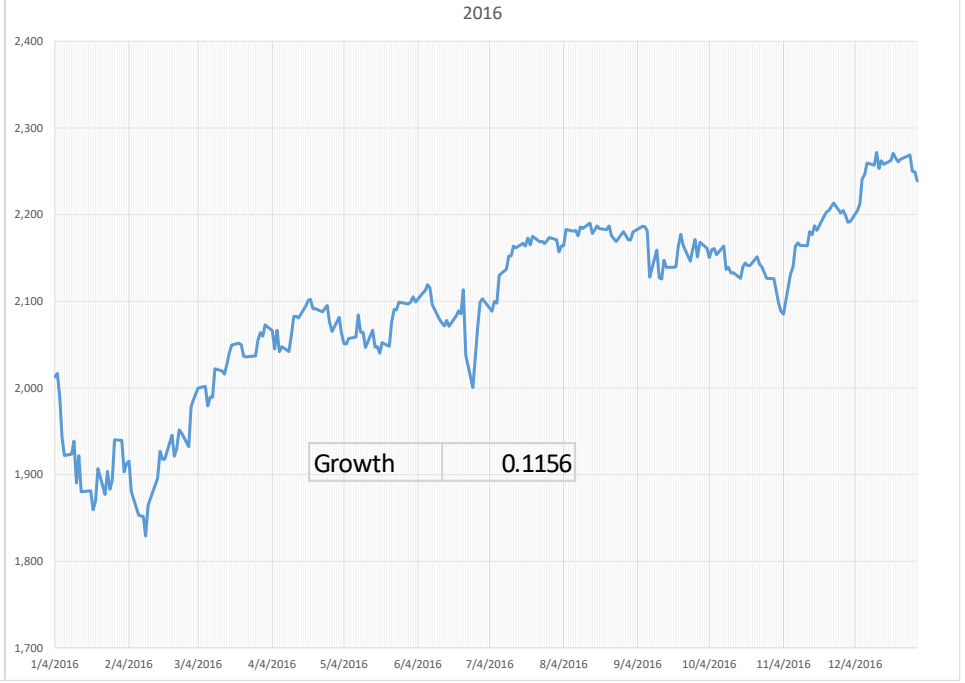

2020 OHLC
3500
3400
3300
3200
3100
3000
2900
2800
1/2/2020
1/7/2020
1/12/2020
1/17/2020
1/22/2020
1/27/2020
2/1/2020
2/6/2020
2/11/2020
2/16/2020
2/21/2020
2/26/2020
That is pretty substantial for only 5 days ...

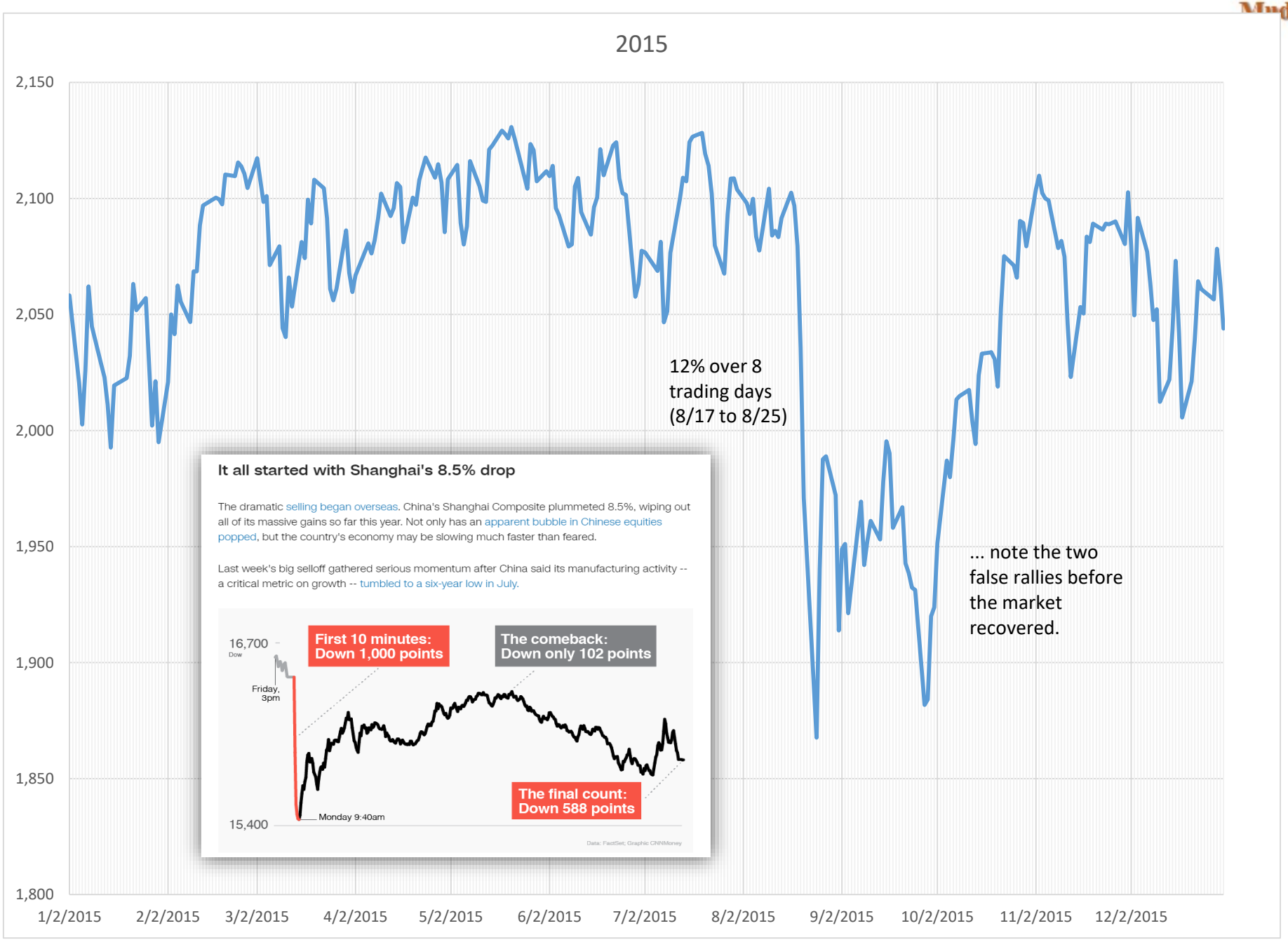
(Palm Island Traders) finance



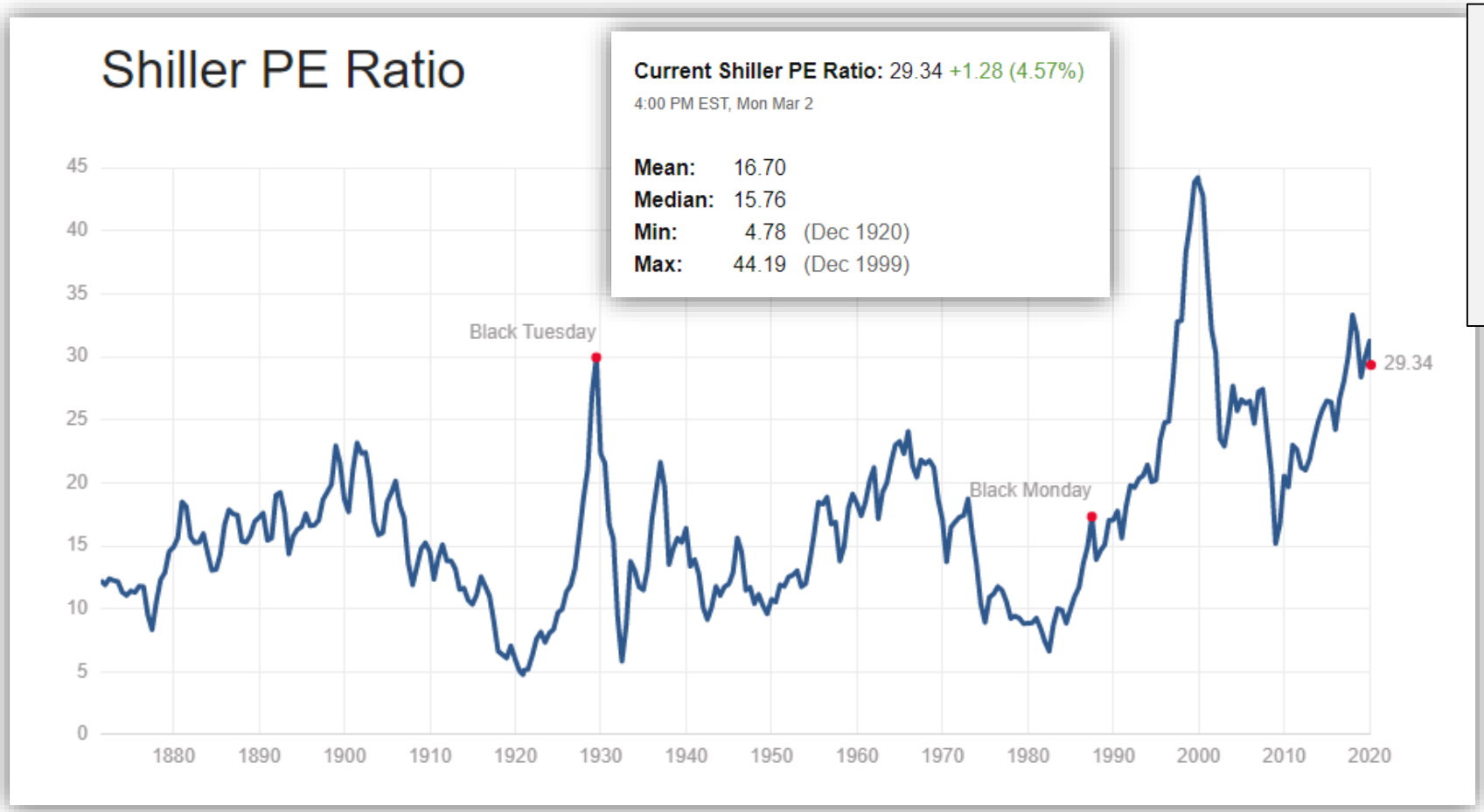







2015
2,150
2,100
2,050
2,000
1,950
1,900
1,850
1,800
1/2/2015
2/2/2015
3/2/2015
4/2/2015
5/2/2015
6/2/2015
7/2/2015
8/2/2015
9/2/2015
10/2/2015
11/2/2015
12/2/2015
12% over 8 trading days (8/17 to 8/25)
... note the two false rallies before the market recovered.
It all started with Shanghai's 8.5% drop
The dramatic selling began overseas. China's Shanghai Composite plummeted 8.5%, wiping out all of its massive gains so far this year. Not only has an apparent bubble in Chinese equities popped, but the country's economy may be slowing much faster than feared.
Last week's big selloff gathered serious momentum after China said its manufacturing activity -- a critical metric on growth -- tumbled to a six-year low in July.
16,700
Dow
Friday, 3pm
First 10 minutes: Down 1,000 points
The comeback: Down only 102 points
The final count: Down 588 points
Monday 9:40am
15,400
Data: FactSet; Graphic CNNMoney

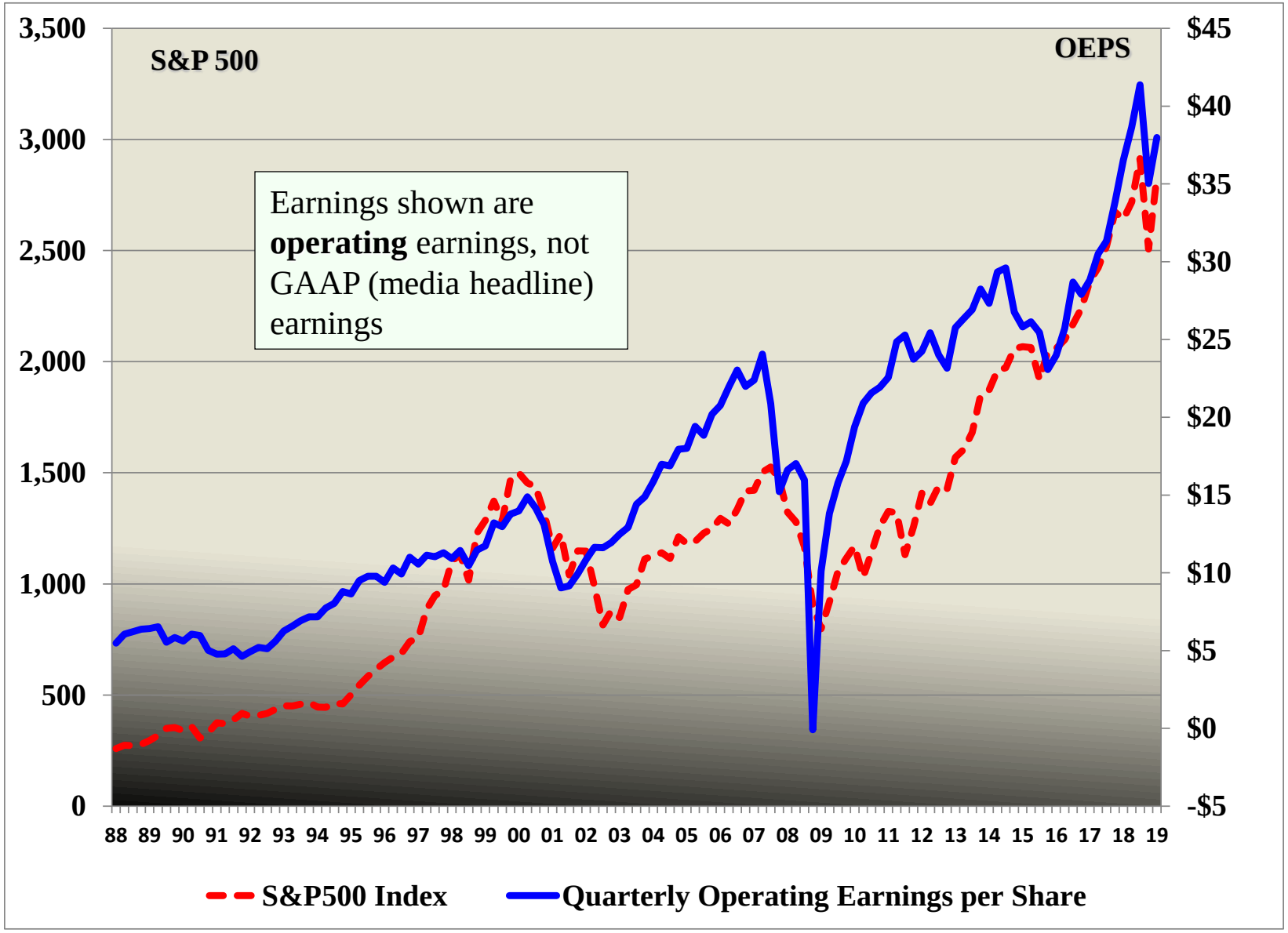
The current Shiller/CAPE data ...



3 ways to look at earnings and P/E:

1. Ultra-long (Shiller/CAPE)
2. Current ttm
3. Forward looking

Correlation between S&P 500 Index and Quarterly Operating Earnings per-share of S&P 500 companies, quarterly, Q1 88 to Q1 2019

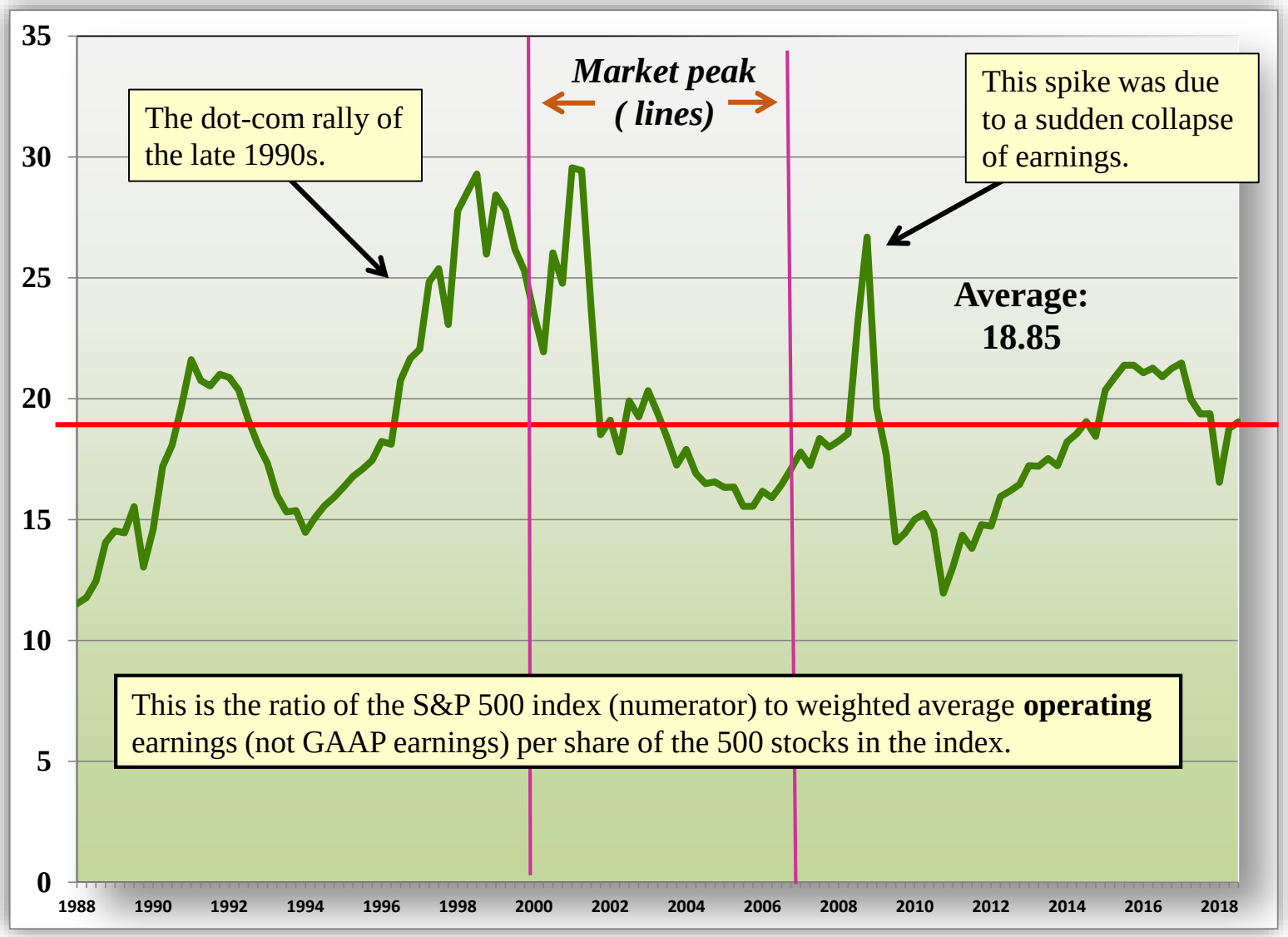


... from Econ 104 ...

Source: Data for this are taken from ***Standard and Poor's Index Services*** downloads at http://us.spindices.com/indices/equity/sp-500

Historical Price-to-Earnings (P/E) Ratio
S&P 500 stocks quarterly Q4 88 to Q1 2019

... from Econ 104 ...



Source: Data for this are taken from ***Standard and Poor's Index Services*** downloads at
http://us.spindices.com/indices/equity/sp-500


TLT
1 Week/Hourly candles
File
Edit
View
Alert
Buy
Sell
Consolidated
L: 153.18 CH: -2.13 CH%: -1.37%
157.00
156.00
155.00
154.00
153.18
152.00
151.00
150.00
Volume
7.5M
5.0M
2.5M
Feb 26
Feb 27
Feb 28
Mar 2
Dec 2
Dec 16
Dec 30
Jan 13
Jan 27
Feb 10
JNK
1 Week/Hourly candles
File
Edit
View
Alert
Buy
Sell
Consolidated
109.50
109.00
108.50
108.00
107.41
107.00
106.50
106.00
105.50
105.00
Volume
2.5M
Feb 26
Feb 27
Feb 28
Mar 2
Dec 2
Dec 16
Dec 30
Jan 13
Jan 27
Feb 10

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MARKETS | CREDIT MARKETS

Long-Term U.S. Treasury Yields Hit Record Lows

Futures market expects 0.5 percentage point rate cut by Federal Reserve in March

iShares 20+ Year Treasury Bond ETF (TLT)

NasdaqGS - NasdaqGS Real Time Price. Currency in USD

Add to watchlist | Visitors trend 2W ↑ 10W ↑ 9M ↑ | Quote Lookup

153.94 -1.14 (-0.74%)
At close: 4:00PM EST

153.18 -0.76 (-0.49%)
After hours: 5:14PM EST

Buy | Sell

Summary | Chart | Conversations | Historical Data | Profile | Options | Holdings | Performance | Risk

Indicators | Comparison | Date Range 1D 5D 1M 3M 6M YTD 1Y 2Y 5Y Max | Interval 1W | Candle | Draw