Discussion of "Bubbles for Fama"

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This paper:

- Stock prices of a U.S industry has increased 100% in both raw and excess returns over previous two years. Call this **B**.

- Authors look at the time period 1928-2013 (and augment this with international data from 1987-2013). Identify 40 **B**s.

- Four findings:
  - **B** does not forecast future returns
  - **B** does predict higher probability of a crash (call this **C**).
  - Characteristics of industry with a **B** look different when there is a subsequent **C** versus non-**C**
  - A subset of these characteristics of a **B** do help forecast future returns.

This discussion:

- Is **B** really a bubble?
- Is **C** really a crash?
  - Alternative facts (not K. Conway style)
  - Alternative model
- Comment on sample size & characteristics analysis

The paper starts with this quote from Fama:

"For bubbles, I want a systematic way of identifying them. It's a simple proposition. You have to be able to predict that there is some end to it. All the tests people have done trying to do that don't work. Statistically, people have not come up with ways of identifying bubbles."
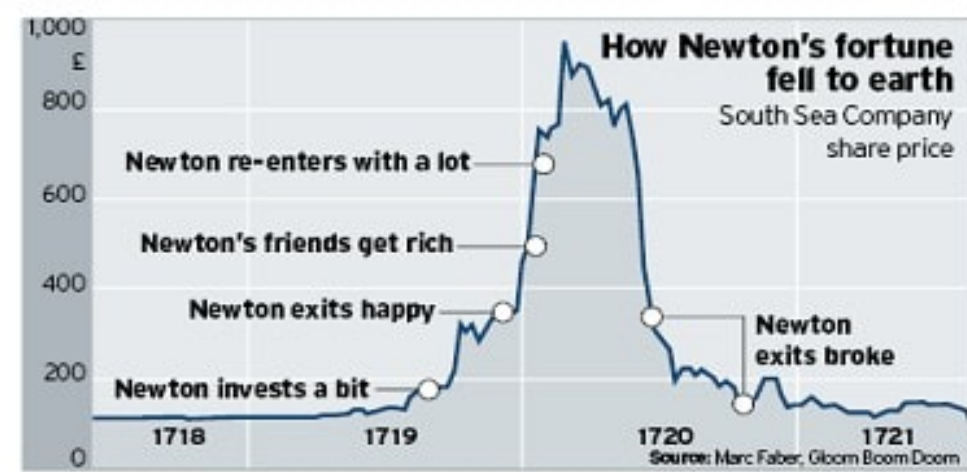Eugene Fama, June 2016

THANKS FOR NOTHING, YOU NBER BRAINS (NY Post, Dec 23, 2001)

Those econo-wonks at the National Bureau of Economics Research are at it again.
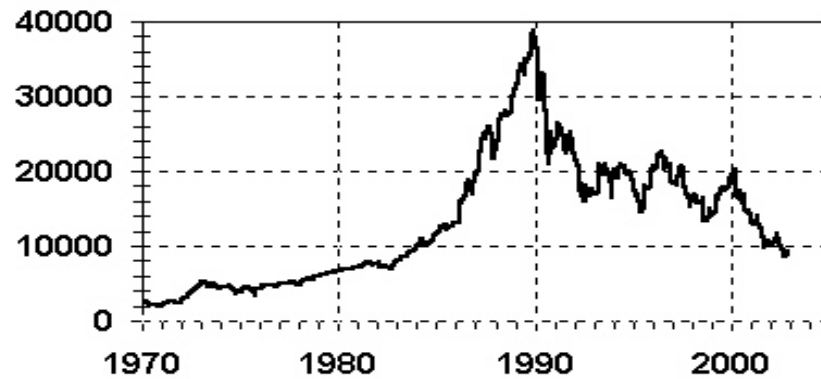
In November, the venerable group of economists descended from their ivory tower to declare what anyone not in a coma already knew – that the U.S. was in recession.

Now, more than a year since the dot-coms bombed, driving down stocks as much as 70 percent and closing the door on the longest U.S. economic expansion, the NBER's academics put their frontal lobes together to explain why the bubble burst.

"It is possible that 'optimistic' investors overwhelm 'pessimistic' ones, leading to [stock] prices not reflecting fundamental values . . . ," says Eli Ofek and **Matthew Richardson** in their NBER Working Paper issued this month.
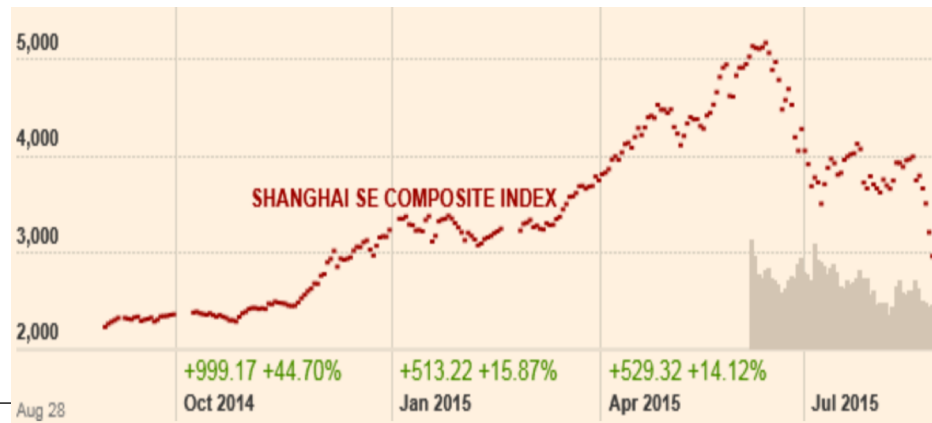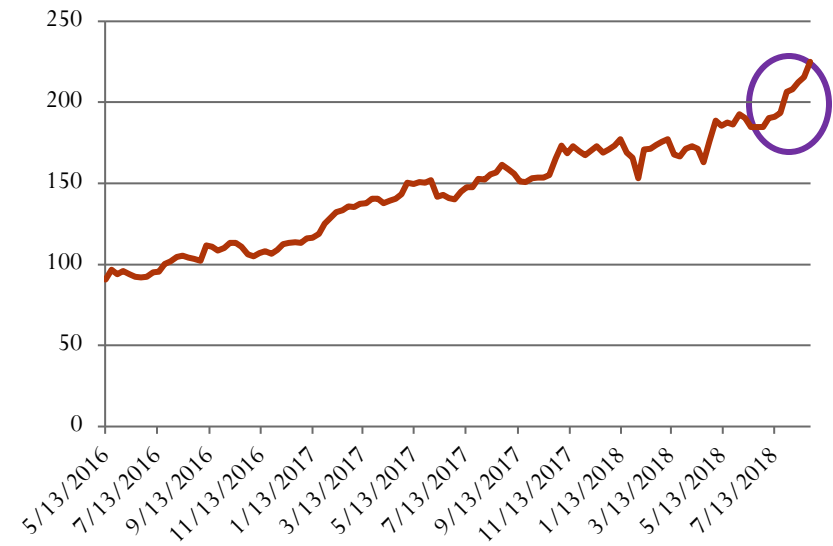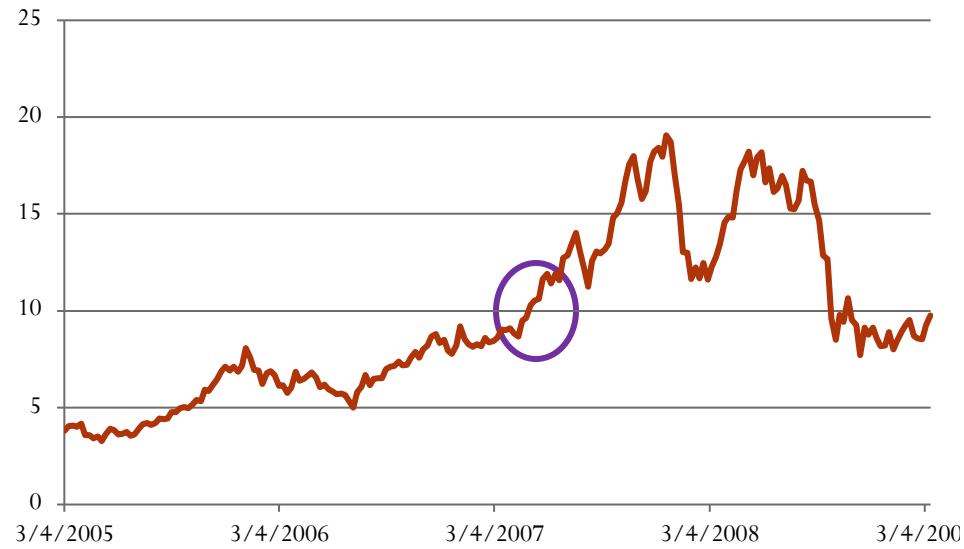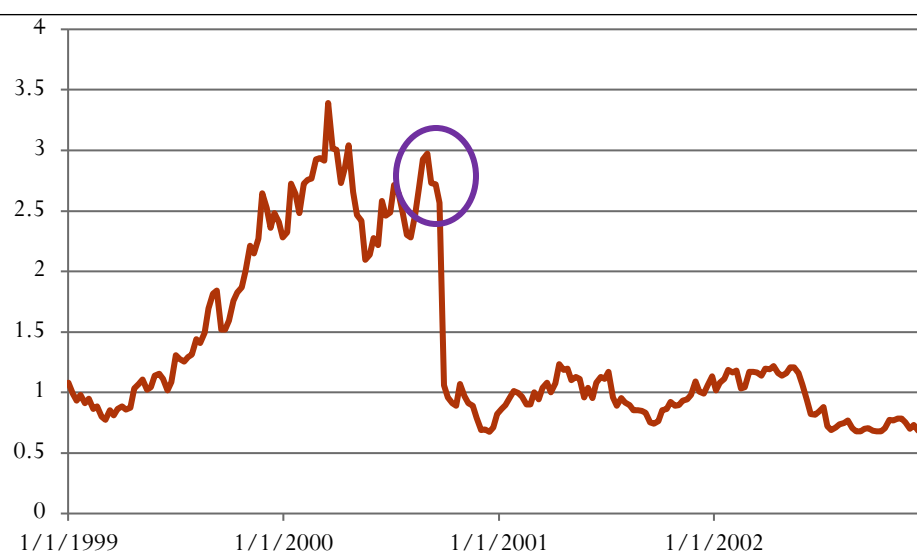
Tulip price index 1636-37

200
150
100
50
25

Feb 3
Feb 5
Feb 9
Dec 12
Dec 1
Nov 25
Nov 12
May 1

How Newton's fortune fell to earth
South Sea Company share price

£ 1,000
800
600
400
200
0

Newton re-enters with a lot
Newton's friends get rich
Newton exits happy
Newton invests a bit
Newton exits broke

1718   1719   1720   1721

Source: Marc Faber, Gloom Boom Doom

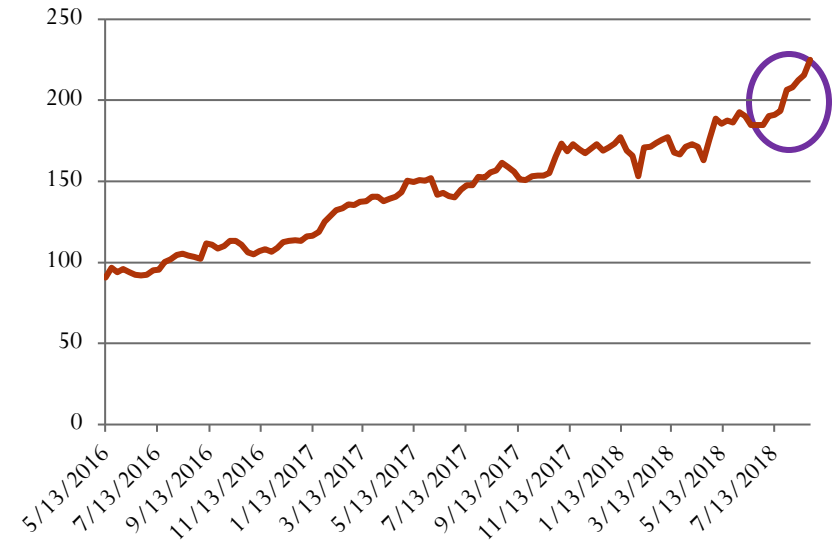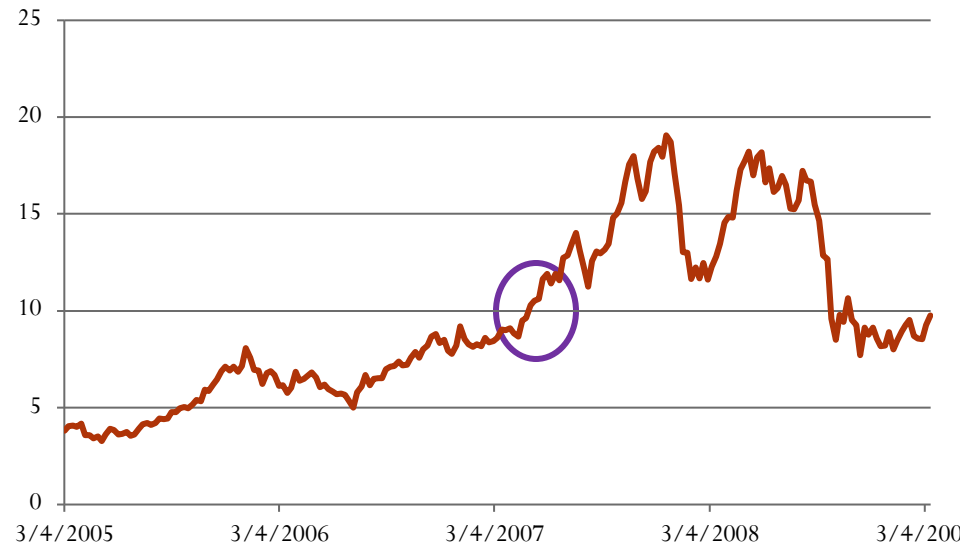## Nikkei Stock Index

40000
30000
20000
10000
0

1970   1980   1990   2000

The Rise and Fall
The Nasdaq Composite Index, daily close

5000
4000
3000
2000
1000
0

1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

March 10, 2000 Nasdaq sets all-time closing high of 5048.62.

May 15, 1997 Amazon.com goes public at $18 a share (equivalent of $1.50 today, split-adjusted) and rises 31% that day.

Jan. 10, 2000 AOL agrees to pay $156 billion in stock for Time Warner, the second-largest acquisition ever.

Sept. 8, 2004 Former investment banker Frank Quattrone gets 18 months in jail for obstructing an IPO probe.

April 12, 1996 Yahoo's stock price more than doubles its first day as a public company to close at $33 (equivalent of $1.38 today, split-adjusted.)

Nov. 13, 1998 Stock of theglobe.com goes public and soars 606% that day, closing at $63.50.

April 23, 2001 Theglobe.com is delisted; stock closes at 16 cents.

Dec. 9, 1999 VA Linux Systems goes public and gains 698% that day.

Oct. 9, 2002 Nasdaq hits a bear-market low of 1114.11.

Friday's close: 2070.61

Dec. 5, 1996 Alan Greenspan warns of "irrational exuberance."

Dec. 16, 1998 Analyst Henry Blodget says Amazon stock, then below $250, will hit $400 within a year; it does, within weeks.

Jan. 14, 2000 The Dow Jones Industrial Average peaks at 11722.98.

Aug. 19, 2004 Google goes public; and closes up 18% that day.

Source: WSJ Market Data Group

SHANGHAI SE COMPOSITE INDEX

5,000
4,000
3,000
2,000

+999.17 +44.70%
Oct 2014

+513.22 +15.87%
Jan 2015

+529.32 +14.12%
Apr 2015

Jul 2015

Aug 28

$20000
$15000
$10000
$5000
$0

Jan '16   Jul '16   Jan '17   Jul '17   Jan '18   Jul '18

coindesk

AAPL
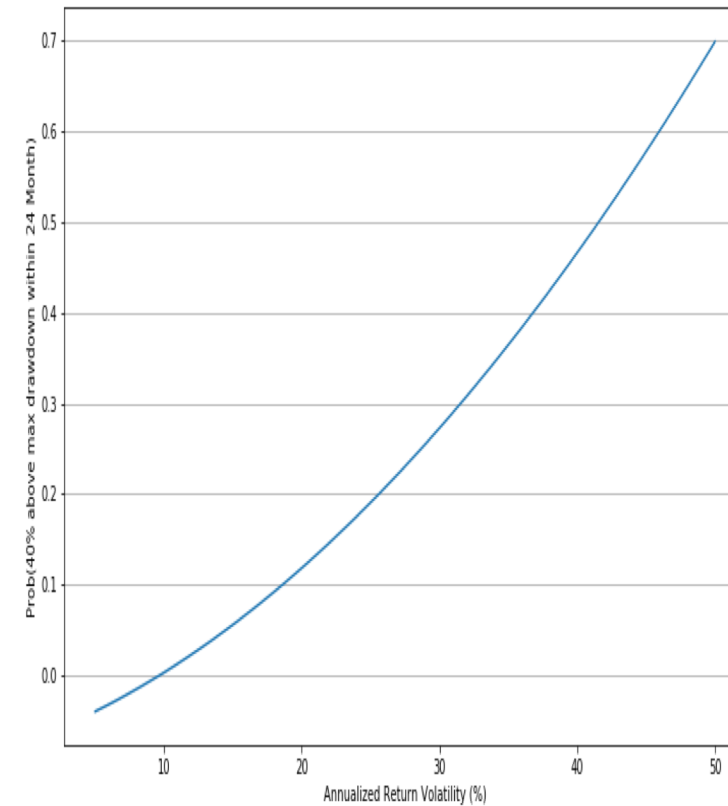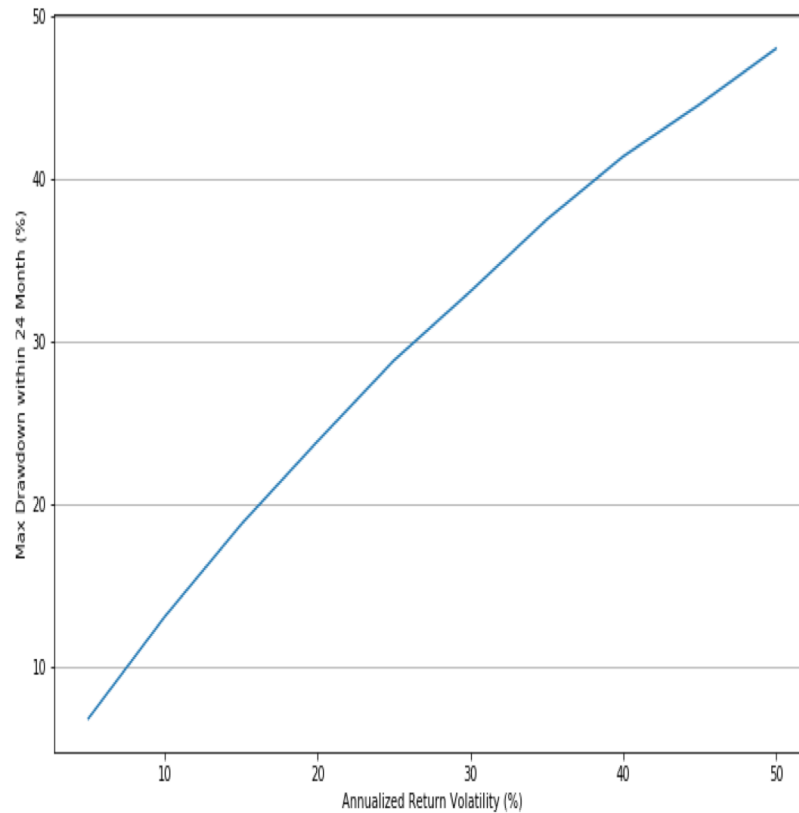
What's a Crash?

- This paper chooses a 40% max drawdown (DD_{Max}) over the following 2-year period as a crash.

- Suppose prices follow a Brownian motion with zero drift and volatility parameter, σ. Then the expected max drawdown over T periods is:
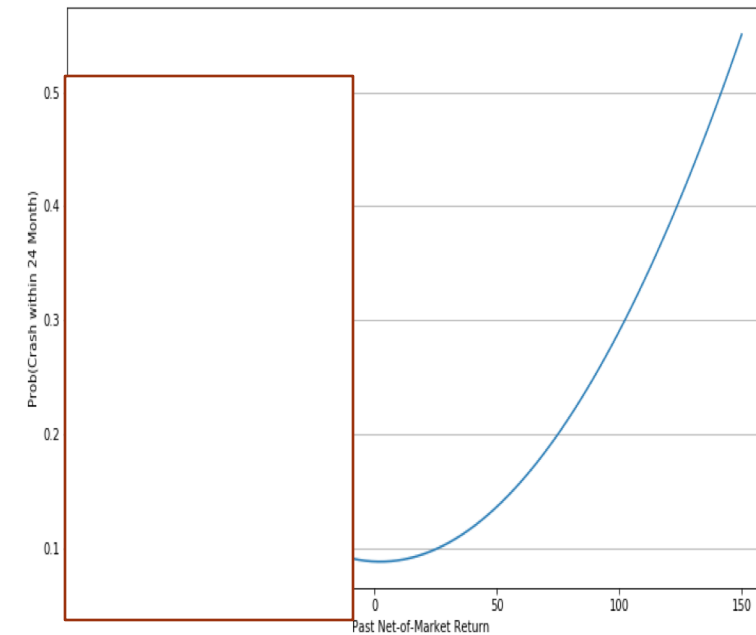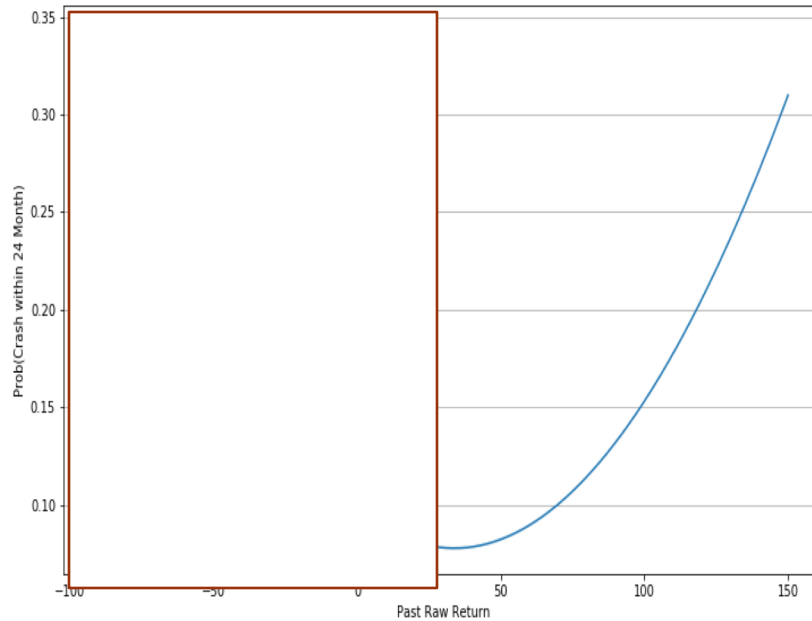
$$E\left[DD_{Max}\right] = \sigma\sqrt{\frac{\pi T}{2}}$$

- With the median industry σ equal to 26% (net of mkt 20%), the expected 2-year max drawdown is around 40%!!! (With a drift and SR=.4, E[DD_{Max}] is approximately 33%).
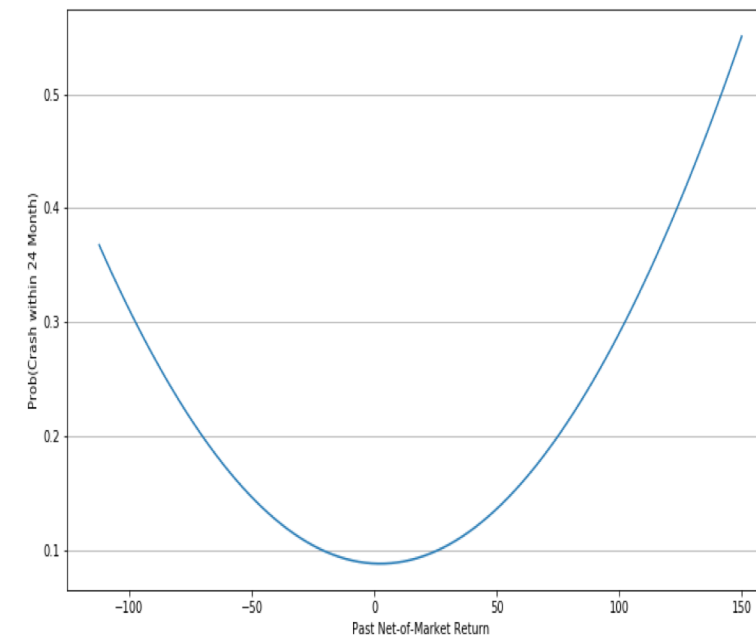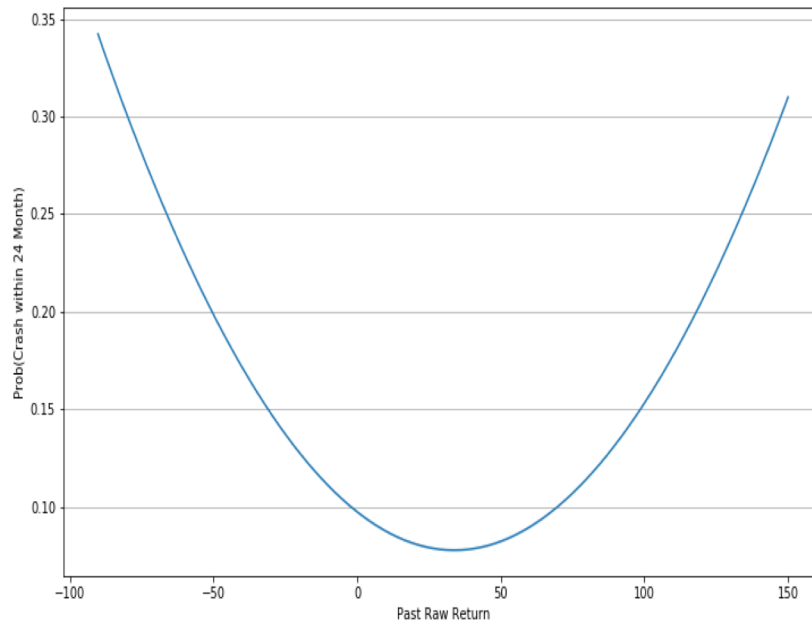
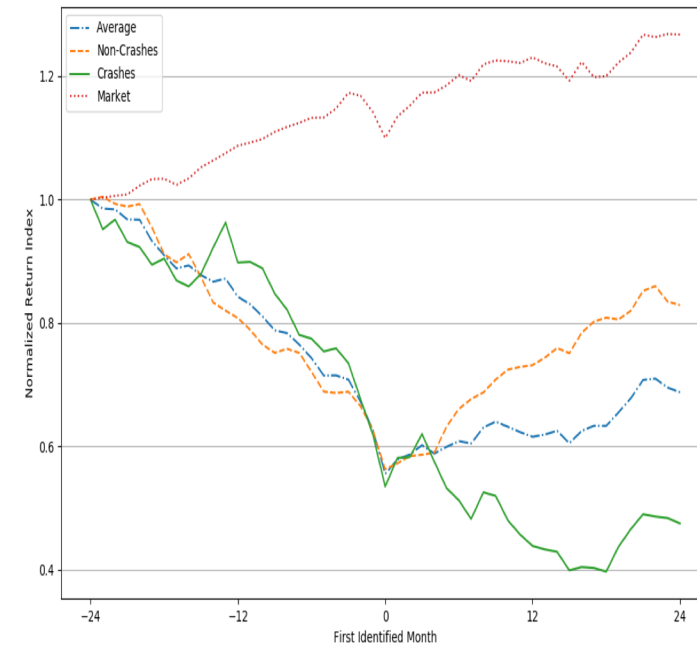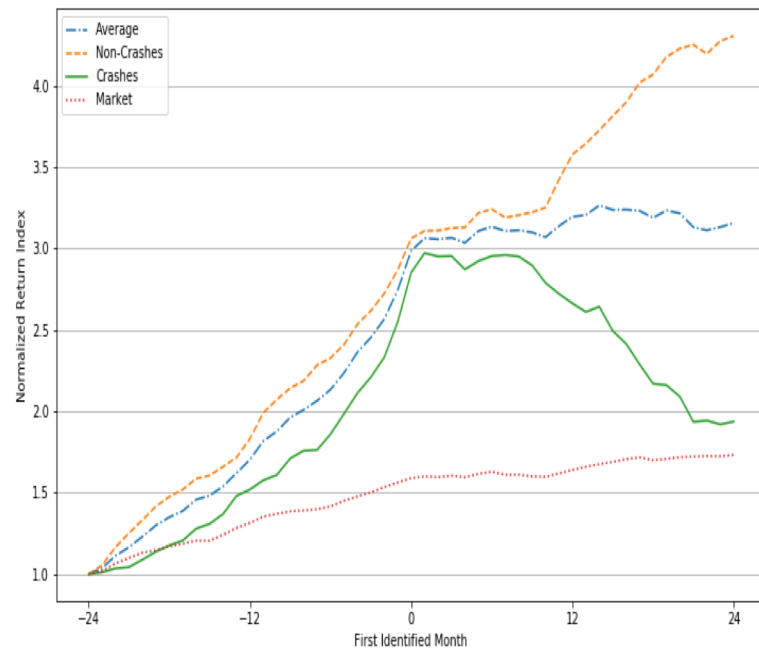# Simulated 2-year DD$_{Max}$
Expected Value & Probability

B does predict higher probability of a crash (call this **C**).

B does predict higher probability of a crash (call this **C**). But so does **–B !!!**

B does not forecast future returns; neither does -B

What's going on?

- Theoretically, $E[\mathbf{DD_{Max}}]$ & $Prob[\mathbf{DD_{Max}}]$ are linear in σ, and, more generally, depend on other moments of the distribution like skewness/kurtosis/other tails.

- Perhaps, big run-ups (**B**) or run-downs (**-B**) are just capturing the changing conditional distribution of that industry, i.e., current large σ and other tails.

- This is why you get high **C** probability for both **B** and **–B** (like earlier AAPL), not sure it is about Fama's "*Bubbles*".

One final thought:
Sample size

- Not a ton of data
  - 40+ nonoverlapping 2-year periods; **B**: maybe 1 per sample
  - 48 industries but correlated (median correlation 55%, net of mkt 10%)
  - 48 but theoretically have maybe 16-24; looks like 20 in the data

- So 20 **B**, with half of them resulting in a subsequent **C** , i.e., 10**C** versus 10 non-**C**.
  - Look at multiple characteristics (turnover, vol, age, issuance, fundamentals, …) to try and differentiate between 2 sets of just 10 events (**???)**
  - No magical SE procedure can change this. (Maybe look at SE properties in small samples.)