DO STOCKS OUTPERFORM TREASURY BILLS?

OR,

"SOME SURPRISING FACTS ABOUT LONG-TERM STOCK RETURNS"

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SOME LITTLE-KNOWN FINANCE RESEARCH HISTORY

- In the late 1960s, CRSP, at the University of Chicago, was assembling the first broad database of historical stock returns.
- The question arose, at what frequency should we measure returns? Annual, quarterly, monthly, weekly?
- The priesthood conferred, and decreed that CRSP would report ***monthly*** returns, and that we should study these.
- Note, this slide is a "spoof" – no such formal decree was made.
  - So, no need to call Snopes
- Still, most studies measure monthly returns and focus on means thereof, which are used for Sharpe ratios, mean-variance optimization, alphas, etc.

BREAKING THE NORM

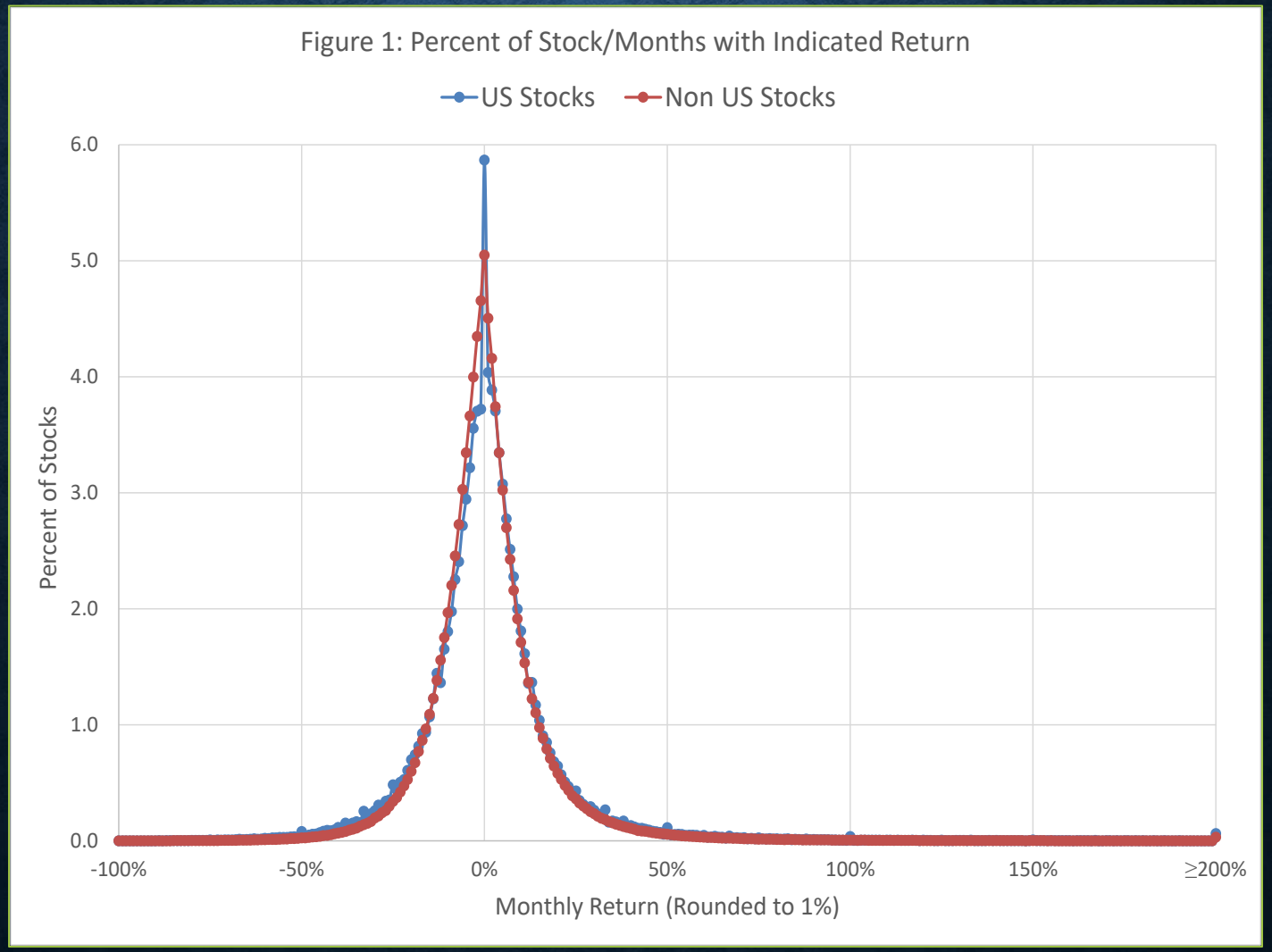
- I will present some findings from a series of studies focusing on ***long term compound returns*** to individual stocks.
- The Original Study:
  - Returns to 26,000 US stocks, 1926 to 2016.
- A Global Follow On Study:
  - Returns to 64,000 Global stocks, 1990 to mid-2020.
- Mutual Fund Returns:
  - U.S. Equity Mutual Funds, 1990 to 2019.
- These and my related papers can be downloaded from ssrn.com (search under Bessembinder)

IN 2017 I WROTE A PAPER TITLED "DO STOCKS OUTPERFORM TREASURY BILLS?" (PUBLISHED IN 2018)

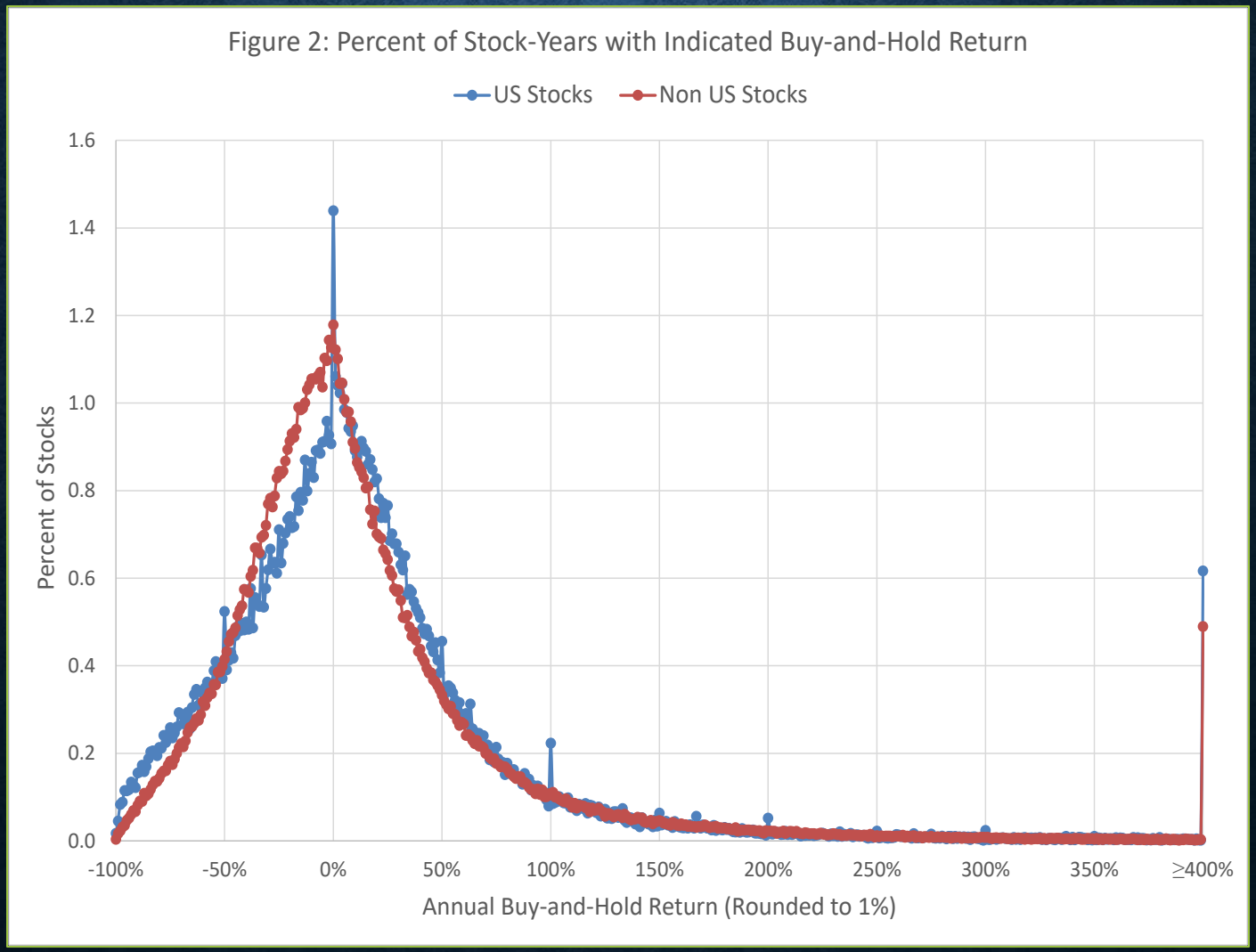
- The paper was really about positive return "skewness".
- But, who reads a paper with "skewness" in the title?

- Key Findings:
- A few stocks have very large compound long-run returns.
- While most (about 4 out of 7) US stocks have negative long-run returns.
- The large positive "market risk premium" is attributable to relatively few stocks.
- When stated in terms of dollar "wealth creation" the top 4% of firms account for all of the realized stock market premium since 1926.

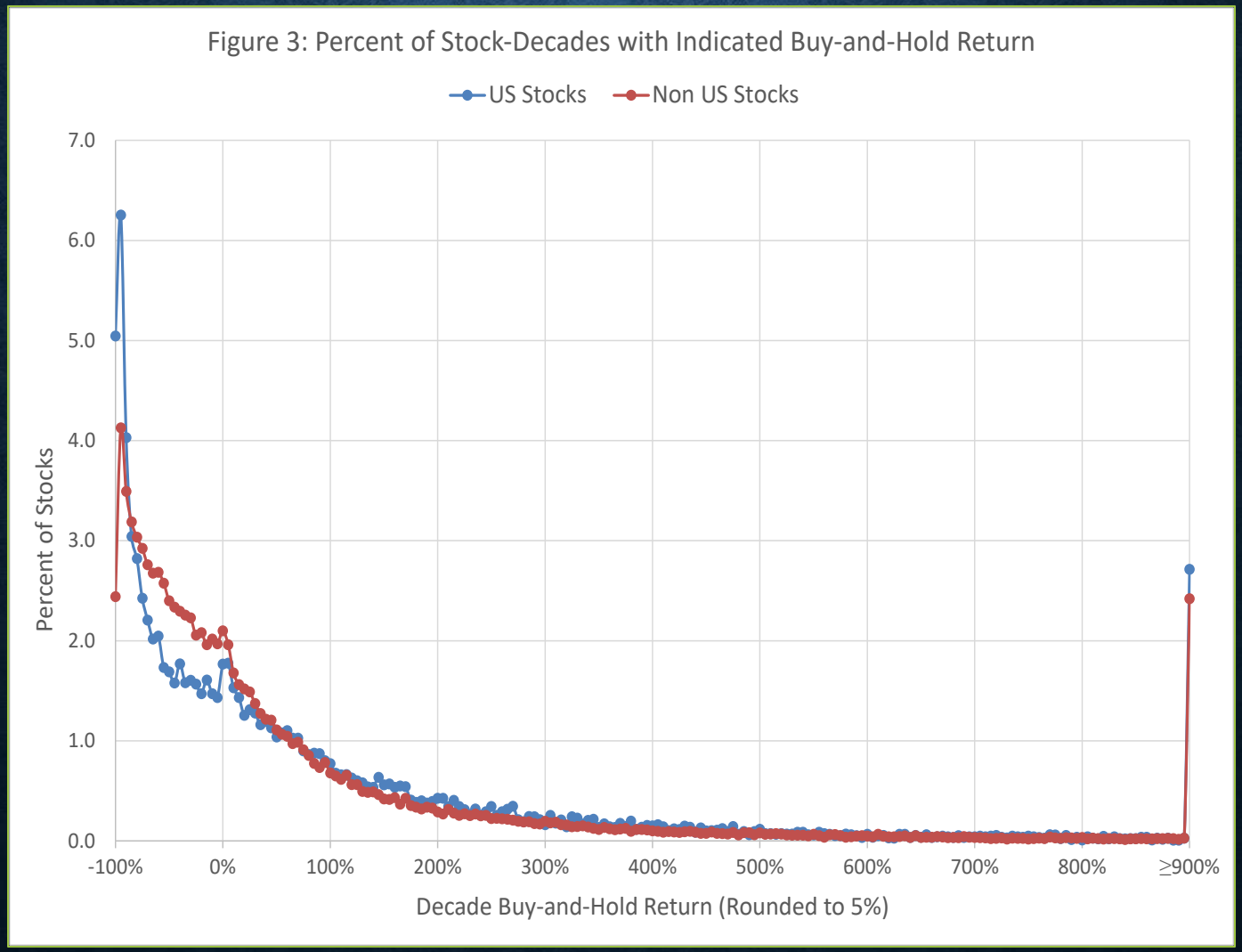
IN 2020, MY COAUTHORS AND I COMPLETED A STUDY OF 64,000 GLOBAL STOCKS FROM 43 COUNTRIES



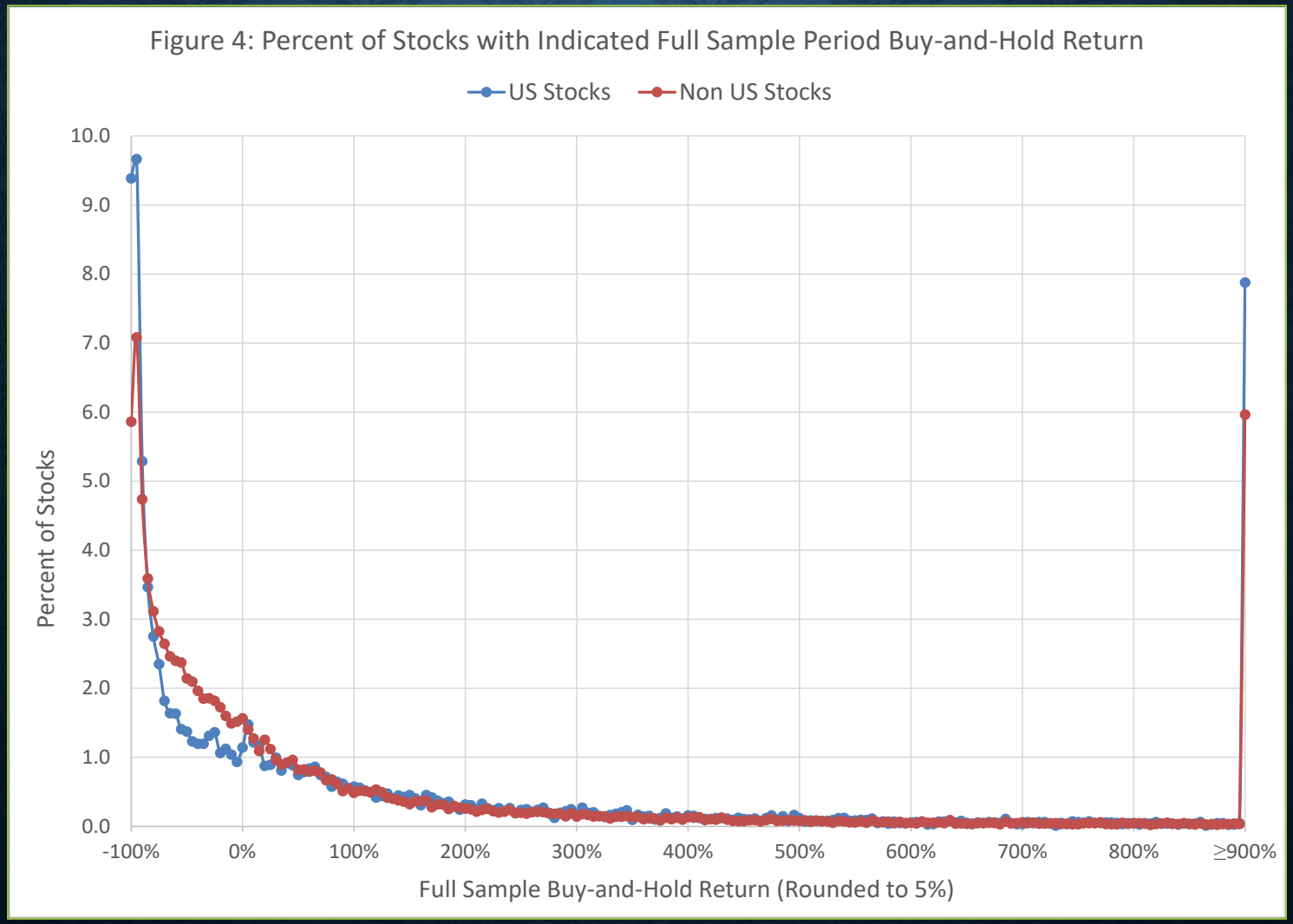
FREQUENCY DISTRIBUTION OF ANNUAL RETURNS TO GLOBAL STOCKS



FREQUENCY DISTRIBUTION OF DECADE RETURNS TO GLOBAL STOCKS



FREQUENCY DISTRIBUTION OF FULL SAMPLE (1990 TO MID-2020) ETURNS TO 64,000 COMMON STOCKS



FULL SAMPLE (1990 TO MID-2020) COMPOUND (BUY-AND-HOLD) RETURNS TO GLOBAL STOCK, COMPARED TO BENCHMARKS

Global	Number Stocks	Mean Return	Median Return	% > 0	% > T-bill	% > VW Mean
Global	64,044	290.4%	-17.1%	45.2%	40.0%	29.4%
Global Excl. US	46,115	244.7%	-19.0%	44.1%	38.7%	26.7%
Developed Excl. US	31,358	248.9%	-16.0%	45.4%	39.5%	28.0%
Emerging	14,757	235.7%	-23.5%	41.4%	37.2%	24.1%
Europe	12,560	234.7%	-12.2%	46.6%	40.7%	30.4%
Asian Pacific	16,773	242.4%	-19.6%	44.0%	37.8%	25.0%
United States	17,695	412.2%	-9.1%	48.1%	43.4%	36.5%
Norway	564	190.1%	-8.8%	47.0%	41.5%	33.5%
United Kingdom	4,175	171.4%	-33.1%	41.0%	35.2%	25.6%

LONG RUN "WEALTH CREATION" FOR SHAREHOLDERS

- The amount of shareholders' wealth as of the end of sample, as compared to the outcome if they had earned U.S. Treasury bill returns instead.
  - Essentially, the ex post risk premium, measured in US $.
- Considers final market capitalization, as well as all earlier cash flows to (dividends and share repurchases) or from (share issuances) shareholders.
- Summed across all 64,000 firms (refer to as Net Wealth Creation) the total is $56.24 trillion for 1990 to mid-2020.
- Summed across all firms with positive outcomes (refer to as Gross Wealth Creation) the total is $79.87 trillion for 1990 to mid-2020.

THE TOP 20 GLOBAL FIRMS IN TERMS OF SHAREHOLDER WEALTH CREATED, 1990 TO MID-2020

Company	Country	Wealth Created ($ Millions)	Accumulated % of Global Gross Wealth Creation	Accumulated % of Global Net Wealth Creation
APPLE INC	United States of America	1,958,436	2.45%	3.48%
MICROSOFT CORP	United States of America	1,758,936	4.65%	6.61%
AMAZON COM INC	United States of America	1,319,515	6.31%	8.96%
ALPHABET INC	United States of America	766,579	7.27%	10.32%
TENCENT HOLDINGS	Hong Kong	611,118	8.03%	11.41%
WALMART INC	United States of America	496,536	8.65%	12.29%
JOHNSON & JOHNSON	United States of America	485,825	9.26%	13.15%
Nestle SA	Switzerland	462,532	9.84%	13.98%
EXXON MOBIL CORP	United States of America	444,369	10.40%	14.77%
FACEBOOK INC	United States of America	442,871	10.95%	15.55%
PROCTER & GAMBLE CO	United States of America	398,655	11.45%	16.26%
HOME DEPOT INC	United States of America	380,263	11.93%	16.94%
ROCHE HOLDINGS AG	Switzerland	379,719	12.40%	17.61%
INTEL CORP	United States of America	379,654	12.88%	18.29%
BERKSHIRE HATHAWAY INC DEL	United States of America	374,793	13.35%	18.96%
ALTRIA GROUP INC	United States of America	358,016	13.80%	19.59%
SAMSUNG ELECTRONICS	South Korea	354,305	14.24%	20.22%
VISA INC	United States of America	340,777	14.67%	20.83%
TAIWAN SEMICONDUCTOR	Taiwan	315,610	15.06%	21.39%
UNITEDHEALTH GROUP INC	United States of America	314,918	15.46%	21.95%

THE TOP 20 NORWAY FIRMS IN TERMS OF SHAREHOLDER WEALTH CREATED, 1990 TO MID-2020

Firm	Wealth Created $ Millions	% of Country Gross Wealth Creation	Annual IRR	First Month	Last Month
EQUINOR ASA	46,276.3	15.36%	7.57%	200107	202006
NORSK HYDRO ASA	44,797.7	14.87%	13.42%	199002	202006
TELENOR ASA	36,479.4	12.11%	13.73%	200101	202006
ORKLA ASA	16,169.2	5.37%	13.82%	199002	202006
YARA INTERNATIONAL ASA	13,349.3	4.43%	18.51%	200404	202006
GJENSIDIGE FORSIKRING BA	9,315.1	3.09%	16.59%	201101	202006
FRONTLINE LTD-OLD	6,823.2	2.27%	36.21%	199802	201511
SCHIBSTED ASA	6,808.4	2.26%	11.57%	199311	202006
SALMAR ASA	5,960.6	1.98%	21.30%	200706	202006
TOMRA SYSTEMS A/S	5,553.2	1.84%	13.89%	199002	202006
AKASTOR ASA	4,170.2	1.38%	23.04%	200407	202006
TANDBERG AS	3,930.3	1.30%	39.31%	199011	201004
LEROY SEAFOOD GROUP ASA	3,875.8	1.29%	19.32%	200207	202006
SUBSEA 7 INC	3,673.1	1.22%	35.44%	200211	201101
AKER ASA	3,521.8	1.17%	16.81%	200410	202006
HAFSLUND ASA	3,285.1	1.09%	8.02%	199002	201707
P/F BAKKAFROST HOLDING	3,140.2	1.04%	28.74%	201005	202006
GJENSIDIGE NOR ASA	2,826.4	0.94%	23.21%	199409	200311
CHRISTIANIA BANK-KREDIT	2,752.7	0.91%	23.52%	199409	200101
VEIDEKKE A/S	2,563.5	0.85%	14.16%	199002	202006

THE BOTTOM 20 GLOBAL FIRMS IN TERMS OF SHAREHOLDER WEALTH CREATED, 1990 TO MID-2020

Company Name	Country	Wealth Creation ($ Millions)
Petrochina Co Ltd	China & Hong Kong	-560,210
Industrial Bank of Japan Ltd	Japan	-177,350
Sumitomo Mitsui Financial Group Inc	Japan	-161,354
Nippon Telegraph & Telephone Corp Ntt	Japan	-153,819
KK Tokyo Mitsubishi Ginko	Japan	-128,489
China Shenhua Energy Co Ltd	China & Hong Kong	-127,747
Fuji Bank Ltd	Japan	-112,459
Dai-Ichi Kangyo Bank Ltd	Japan	-101,090
Sakura Bank Ltd	Japan	-97,319
Sanwa Bank Ltd	Japan	-97,037
Tokyo Electric Power Co Holdings Inc	Japan	-97,032
Worldcom Inc.	U.S.	-94,415
NatWest Group plc	U.K.	-86,501
Viavi Solutions	U.S.	-84,941
Luncent Technologies	U.S.	-84,145
Unicredit SPA	Italy	-80,121
Nomura Holdings Inc	Japan	-78,948
Mitsubishi UFJ Financial Group	Japan	-73,721
DuPont de Nemours, Inc	U.S.	-72,136
Mizuho Financial Group Inc	Japan	-66,925

CONCENTRATION OF WEALTH CREATION

- A large portion of overall stock market wealth creation is coming from just a few firms.
- Of the $79.87 trillion (gross) or $56.24 trillion (net) shareholder wealth created by 64,000 stocks 1990 to mid-2020.
  - The top 20 firms accounted for 15% of gross and 22% of net.
  - The top 50 firms accounted for 24% of gross and 34% of net.

MORE ON THE CONCENTRATION OF WEALTH CREATION

	All Firms			Top 1% of Firms		
	# Firms	Gross Wealth Creation ($ Millions)	Net Wealth Creation ($ Millions)	# Firms	% of Gross Wealth	% of Net Wealth
Global	63,105	79,864,804	56,234,707	632	63.05%	89.55%
Global, Excl. US	45,625	37,771,143	20,080,462	457	59.54%	111.99%
Developed, Excl. US	31,136	28,522,158	15,731,833	312	60.80%	110.23%
Emerging	14,604	9,287,666	4,348,629	147	53.20%	113.63%
Europe	12,395	15,437,345	11,734,558	124	55.75%	73.35%
Asian Pacific	16,758	11,010,134	2,390,427	168	65.40%	301.22%
United States	17,249	41,820,142	35,973,100	173	62.67%	72.85%
Norway	550	301,226	205,477	6	55.24%	80.98%
United Kingdom	4,169	3,631,041	2,500,974	42	59.18%	85.93%

WHAT ABOUT PORTFOLIOS?

- A quick look at US Equity Mutual Fund Compound Returns, 1990 to 2019.
- Compare to "SPY", a traded, net-of-fee proxy for the US market.

Horizon	N	Mean Fund Return (%)	Median Fund Return (%)	Skewness Fund Return	Mean Matched SPY Return (%)	% > SPY	% > T-bill
Monthly	1,019,541	0.63%	0.66%	-0.36	0.70%	46.9%	54.9%
Annual	92,393	7.64%	6.97%	0.74	8.42%	39.9%	60.3%
Decade	14,991	77.42%	24.18%	2.99	89.86%	39.2%	58.0%
Full Sample	7,689	191.17%	74.26%	4.56	204.89%	29.5%	76.0%

WHY THESE (POTENTIALLY) SURPRISING RESULTS?

- Mainly, because the compounding of random returns induces positive skewness.
- Simple example: single-period return is 20% or – 20%, with equal probability.
- Two period returns are:
  - (1-.2)*(1-.2) – 1 = -36%, with probability .25.
  - (1-.2)*(1+.2) – 1 = -4%, with probability .50.
  - (1+.2)*(1+.2) – 1 = 44% with probability .25.
- The mean two-period return remains zero, but the median is -4% and the standardized skewness is 0.412.
- This generalizes: Skewness becomes greater if:
  - The volatility of short horizon returns is larger.
  - Compounding is for more periods.

IMPLICATIONS: I THE NATURE OF ENTREPRENEURIAL PAYOFFS

- It is well known that returns to venture capital investments are highly skewed, with most investments losing money (often -100%), but a few generating outsized payoffs.
- The results here show the strong skewness of returns, including that most investments lose money while a few deliver outsize gains, does not cease after the IPO, i.e. the same long run patterns for public equity.
- Obscured by the fact that most studies focus on short horizon arithmetic mean returns.
- Observing net losses on most investments and big gains on a few seems to be a fundamental attribute of investing in an entrepreneurial economy.

IMPLICATIONS: II
PORTFOLIO CONCENTRATION

- For investors without any unique insights.
  - The results reinforce the importance of diversification.
  - But, from a different perspective – diversification ensures that you will share in the wealth created by big winners.
  - This is probably the key takeaway for many investors.

- For those who don't want to be restricted to broad index funds.
  - A preference for skewness can be rational, but skewness diversifies.
  - The results show that skewness is strong, especially at longer horizons and for narrow portfolios.
  - The results here show how large the gains to an undiversified portfolio can be, if one is lucky or skilled enough to identify the big winners in advance.

IMPLICATIONS: III PERFORMANCE SELECTION AND EVALUATION

- Concentrated portfolios with stocks selected at random will underperform market-wide benchmarks more than 50% of the time.
    - Even in the absence of management fees or trading costs.
- Mean-Variance Optimization and the Sharpe Ratio.
    - Are often justified by the assumption that returns are (nearly) normal.
    - At longer horizons, they clearly are not.
- Alpha also depends on return horizon.
- Do we need to reassess portfolio optimization and performance measurement?