

# Do Stocks Outperform Treasury Bills? Evidence and Implications

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For presentation at the  
**Investment Research Retreat**  
April 8, 2019

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# Roadmap

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- ✦ (1) Overview of my 2018 paper titled “Do Stocks Outperform Treasury Bills?”
- ✦ (2) Preview of work-in-progress regarding returns to individual stocks globally.
- ✦ (3) Preview of work-in-progress regarding returns to individual active domestic mutual funds.
- ✦ (4) Preview of work-in-progress regarding characteristics of stocks that turn out to be big winners or big losers.
- ✦ (5) Discussion

# I. My 2018 Paper Was Titled “Do Stocks Outperform Treasury Bills?”

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- ✦ I studied accumulated returns to all publicly-listed US common stocks from 1926 to 2016.
- ✦ The paper was really about positive return “skewness.”
  - ◆ A few stocks have very large returns.
  - ◆ This pulls up the mean market return, so that the mean is not representative of typical stocks.
  - ◆ In fact, most U.S. stocks have negative returns.
  - ◆ Can be seen in monthly returns, but stronger when returns are compounded over time.
- ✦ But, who reads a paper with “skewness” in the title?

Frequency Distribution of Monthly CRSP Returns, 1926 to 2016  
(to nearest 1%)

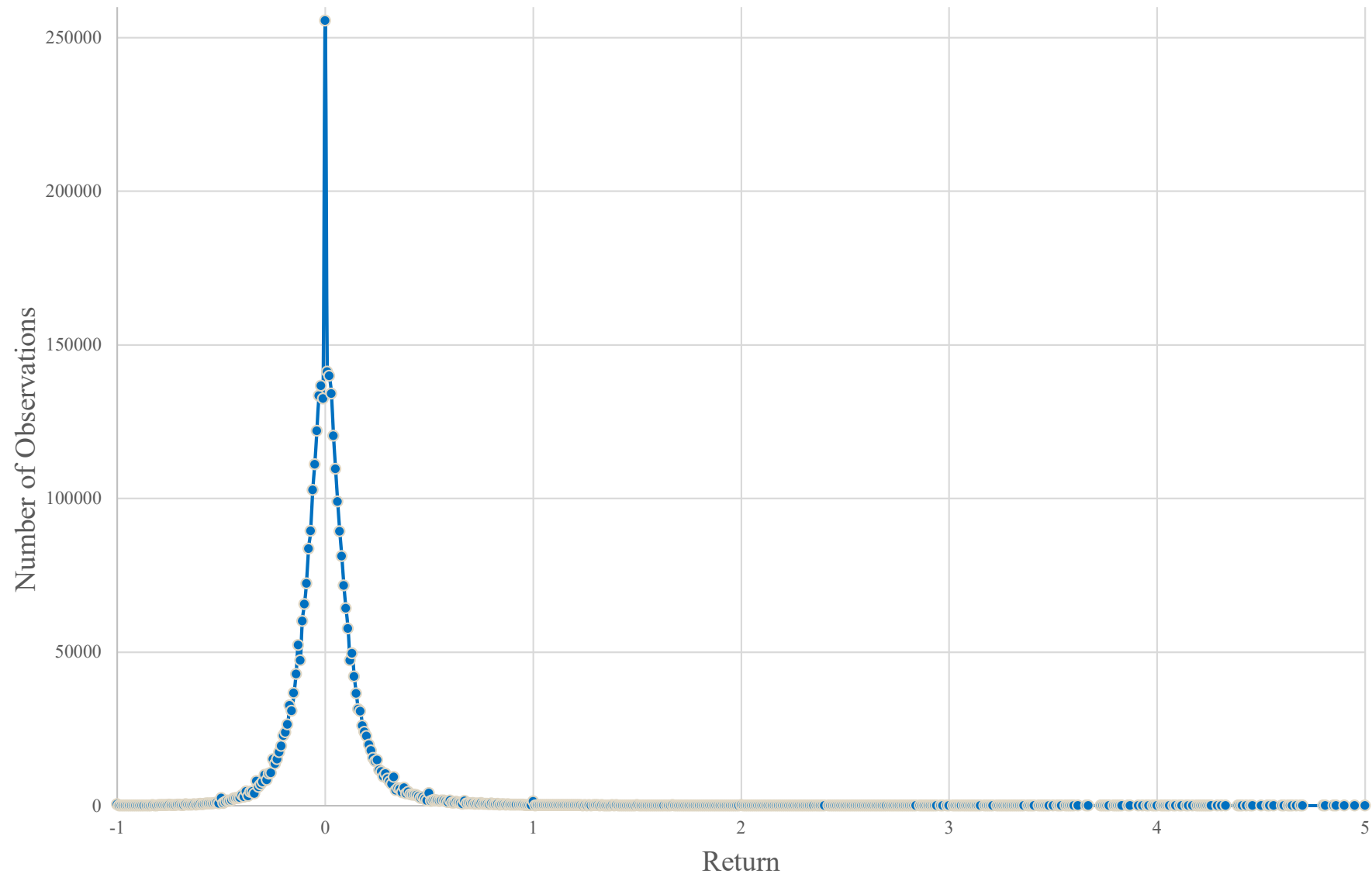
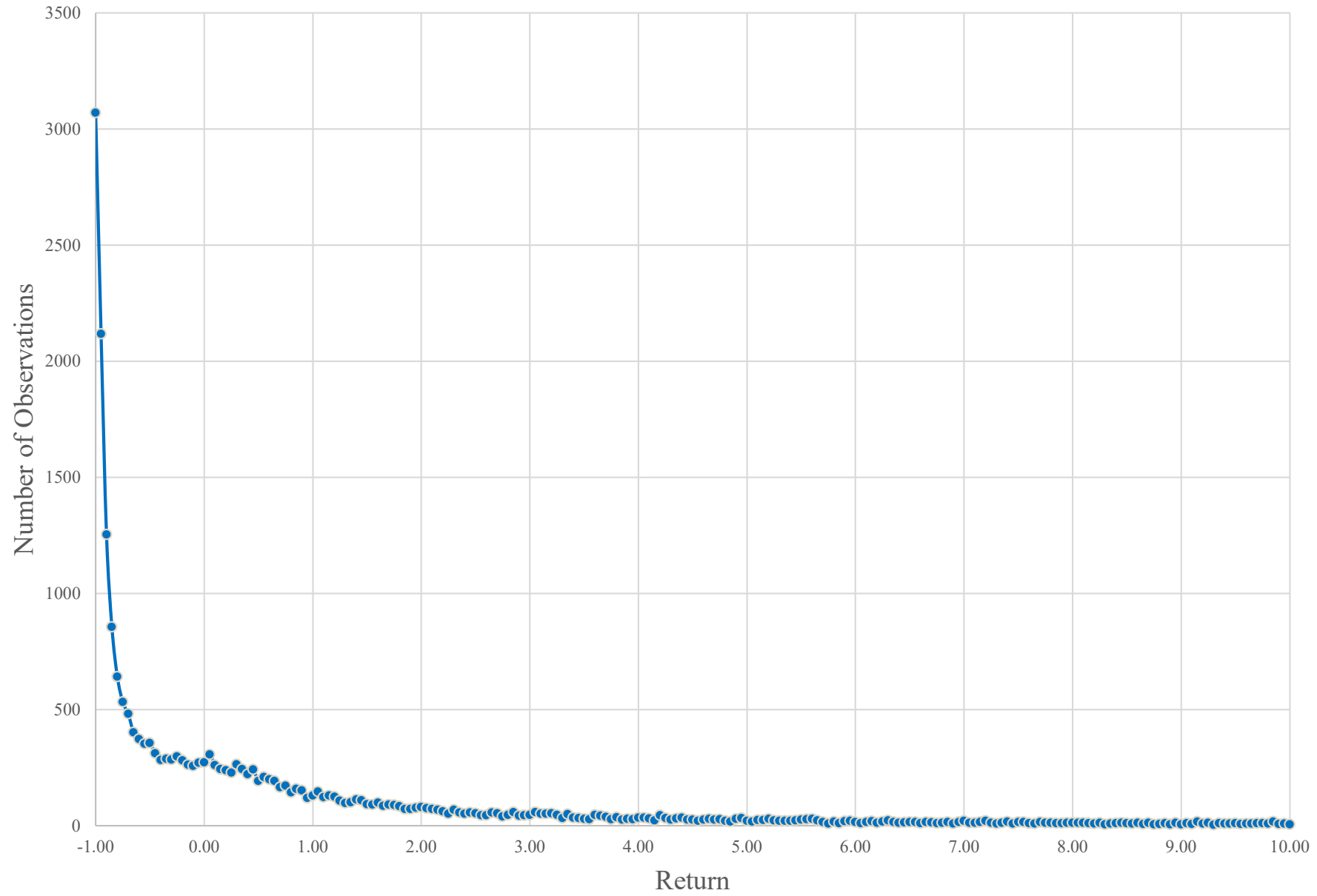


Figure 1C: Lifetime Buy-and-Hold Returns (rounded to 5%)



# Buy-and-Hold Returns (incl. reinvested dividends) to all 26,000 U.S. Common Stocks, 1926 to 2016

Horizon	Mean stock return	Median Stock Return	Greater than VW Average	Greater than T-Bill	Greater than zero
Monthly	1.13%	0.00%	46.30%	47.80%	48.40%
Annual	14.74%	5.23%	44.40%	51.60%	55.70%
Decade	106.80%	16.00%	37.30%	49.50%	56.30%
Lifetime	18747%	-2.29%	30.80%	42.60%	49.50%

## Aggregate “Wealth Creation”

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- ✦ I measure dollar wealth creation to investors in aggregate.
- ✦ The difference between the end-of-sample wealth of investors who held common stock rather than investing the same capital in Treasury bills.
- ✦ Allows for dividends not reinvested and net share issuance/repurchase.

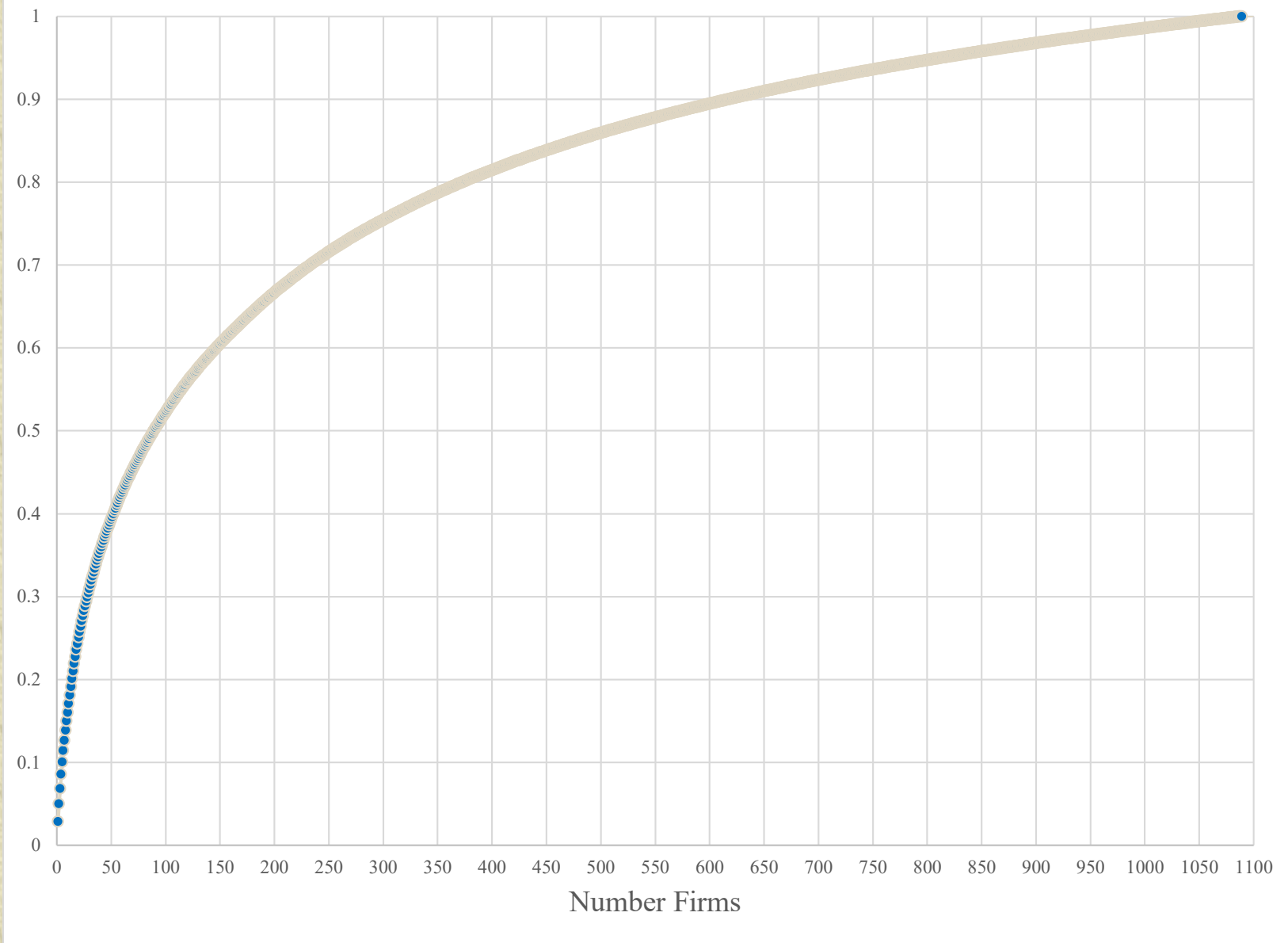
# Lifetime Wealth Creation, Top 20 Stocks

(measured as of December 2016, aggregated across share classes)

PERMCO	Company Name (most recent )	Lifetime Wealth Creation (\$ Millions)	% of Total	Cumulative % of Total	PERMNO	Annualized Return	Start Month	End Month	Life (Months)
20678	EXXON MOBIL CORP	1,002,144	2.88%	2.88%	11850	11.94%	Jul-26	Dec-16	1086
7	APPLE INC	745,675	2.14%	5.02%	14593	16.27%	Jan-81	Dec-16	432
8048	MICROSOFT CORP	629,804	1.81%	6.83%	10107	25.02%	Apr-86	Dec-16	369
20792	GENERAL ELECTRIC CO	608,115	1.75%	8.57%	12060	10.67%	Jul-26	Dec-16	1086
20990	INTERNATIONAL BUSINESS MACHS COR	520,240	1.49%	10.07%	12490	13.78%	Jul-26	Dec-16	1086
21398	ALTRIA GROUP INC	470,183	1.35%	11.42%	13901	17.65%	Jul-26	Dec-16	1086
21018	JOHNSON & JOHNSON	426,210	1.22%	12.64%	22111	15.53%	Oct-44	Dec-16	867
20799	GENERAL MOTORS CORP	425,318	1.22%	13.86%	12079	5.04%	Jul-26	Jun-09	996
20440	CHEVRON CORP NEW	390,427	1.12%	14.98%	14541	11.03%	Jul-26	Dec-16	1086
21880	WAL MART STORES INC	368,214	1.06%	16.04%	55976	18.44%	Dec-72	Dec-16	529
45483	ALPHABET INC	365,285	1.05%	17.09%	90319	24.86%	Sep-04	Dec-16	148
540	BERKSHIRE HATHAWAY INC DEL	355,864	1.02%	18.11%	17778	22.61%	Nov-76	Dec-16	482
21446	PROCTER & GAMBLE CO	354,971	1.02%	19.13%	18163	10.45%	Sep-29	Dec-16	1048
15473	AMAZON COM INC	335,100	0.96%	20.09%	84788	37.35%	Jun-97	Dec-16	235
20468	COCA COLA CO	326,085	0.94%	21.03%	11308	13.05%	Jul-26	Dec-16	1086
20606	DU PONT E I DE NEMOURS & CO	307,976	0.88%	21.91%	11703	10.57%	Jul-26	Dec-16	1086
20103	A T & T CORP	297,240	0.85%	22.77%	10401	7.81%	Jul-26	Nov-05	953
21188	MERCK & CO INC NEW	286,671	0.82%	23.59%	22752	13.79%	Jun-46	Dec-16	847
21305	WELLS FARGO & CO NEW	261,343	0.75%	24.34%	38703	13.26%	Jan-63	Dec-16	648
2367	INTEL CORP	259,252	0.74%	25.09%	59328	17.70%	Jan-73	Dec-16	528



Figure 2B: Cumulative Percent of Wealth Creation, Top 1100



## Concentration of Wealth Creation

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- ✦ All of the dollar wealth creation in the public U.S stock market since 1926 can be attributed to slightly more than 4% of stocks, and over half of the value creation can be attributed to 0.36% of the stocks.
- ✦ Another 38% of stocks created wealth, but only enough to offset the value destruction of the remaining 58%.
- ✦ So, 96% of stocks collectively matched T-bills, while 4% did better and created wealth equal to the overall market.

## II. Extension to Global Stocks

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- ✦ 62,679 individual common stocks, from November 1990 to December 2018.
- ✦ Data from Compustat Global, Compustat North America, and CRSP.
- ✦ Returns measured in U.S. dollars for comparability.

# Global Stocks, Full Sample Returns

	Number Stocks	Mean Buy-and-Hold Return	Median Buy-and-Hold Return	Skewness of Buy-and-Hold Return	Percent > 0	Percent > T-Bill	Percent > Global VW Return
Global	62,679	274.64%	-10.90%	43.018	46.86%	42.00%	31.43%
Global, excl US	45,492	221.46%	-14.03%	57.699	45.43%	40.35%	28.78%
Developed, excl US	31,589	214.39%	-8.68%	70.824	47.28%	41.58%	29.95%
NorthAmerica	19,415	413.24%	4.13%	26.415	50.91%	46.70%	38.69%
Europe	12,523	204.11%	-4.53%	10.287	48.58%	43.09%	32.00%
AsiaPacific	16,838	197.92%	-13.45%	65.986	45.59%	39.46%	27.04%
Developing	13,903	237.53%	-22.91%	37.987	41.21%	37.56%	26.12%

# Top “Wealth Creation” Since 1991

Name (most recent)	Primary Country	Wealth Creation (\$Million)	% of Global Gross	% of Global Net
APPLE INC	United States	1,007,163	1.49%	2.07%
MICROSOFT CORP	United States	951,491	2.91%	4.03%
AMAZON COM INC	United States	696,738	3.94%	5.47%
ALPHABET INC	United States	528,536	4.72%	6.56%
EXXON MOBIL CORP	United States	513,141	5.48%	7.61%
BERKSHIRE HATHAWAY INC DEL	United States	443,546	6.14%	8.53%
JOHNSON & JOHNSON	United States	430,688	6.78%	9.41%
WALMART INC	United States	397,467	7.37%	10.23%
TENCENT HOLDINGS LTD	Hong Kong	377,356	7.93%	11.01%
NESTLE SA/AG	Switzerland	355,000	8.46%	11.74%
ALTRIA GROUP INC	United States	345,250	8.97%	12.45%
INTEL CORP	United States	315,448	9.44%	13.10%
PROCTER & GAMBLE CO	United States	307,094	9.89%	13.73%
JPMORGAN CHASE & CO	United States	300,720	10.34%	14.35%
SAMSUNG ELECTRONICS CO LTD	South Korea	285,352	10.76%	14.94%
HOME DEPOT INC	United States	281,609	11.18%	15.52%
CHEVRON CORP NEW	United States	270,657	11.58%	16.08%
COCA COLA CO	United States	268,863	11.98%	16.63%
MERCK & CO INC NEW	United States	265,033	12.37%	17.17%
UNITEDHEALTH GROUP INC	United States	264,400	12.77%	17.72%
NOVARTIS AG	Switzerland	251,779	13.14%	18.24%
ORACLE CORP	United States	250,381	13.51%	18.75%
GENERAL ELECTRIC CO	United States	236,114	13.86%	19.24%
WELLS FARGO & CO NEW	United States	232,352	14.21%	19.72%
VISA INC	United States	231,202	14.55%	20.19%
PFIZER INC	United States	230,908	14.89%	20.67%
INTERNATIONAL BUSINESS MACHS COR	United States	220,058	15.22%	21.12%
CHINA MOBILE LTD	Hong Kong	219,742	15.54%	21.57%
TAIWAN SEMICONDUCTOR MFG CO	Taiwan	217,222	15.87%	22.02%
FACEBOOK INC	United States	214,652	16.18%	22.46%

# Concentration of Global “Wealth Creation,” 1990 to 2018

	Wealth Creation (\$ Millions)	Top 0.25% of Stocks		Top 0.50% of Stocks		Top 1% of Stocks	
		Number of Stocks	Percent of Net Wealth	Number of Stocks	Percent of Net Wealth	Number of Stocks	Percent of Net Wealth
Global	48,566,702	155	50.73%	310	67.08%	619	84.91%
Global, excl US	18,695,065	113	57.68%	226	78.62%	451	102.20%
Developed, excl US	16,155,314	79	52.21%	158	71.18%	315	92.64%
NorthAmerica	31,458,071	48	40.99%	95	53.99%	190	69.13%
Europe	10,749,190	31	36.71%	62	52.77%	124	70.95%
Asia Pacific	3,819,690	43	93.97%	85	123.98%	169	155.25%
Developing	2,539,747	35	83.82%	69	119.39%	138	156.41%

### III. Mutual Fund Returns

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- ✦ Study active U.S. Equity Mutual Funds
  - ✦ January 1991 to December 2017
  - ✦ CRSP Mutual Fund Database

# Lifetime (Full Sample) Buy-and-Hold Returns to Active Domestic Equity Funds, 1991 to 2017

Variable	N	Mean	Median	Std. dev.	Skewness
Fund life (months)	7803	115.6	96.0	86.2	0.93
Outperform VW Market Indicator	7803	0.222***	0.000	0.416	1.33
Outperform SPY Indicator	7803	0.274***	0.000	0.446	1.02
Outperform T-Bill Indicator	7803	0.790***	1.000	0.407	-1.43
Fund buy-and-hold return	7803	1.863	0.702	3.643	4.52
VW Market buy-and-hold return	7803	2.185	1.267	3.170	2.60
SPY buy-and-hold return	7803	2.012	1.225	2.859	2.51



# How Informative Is Alpha Regarding Long Term Performance?

- ✦ Alpha is a (conditional) arithmetic mean. We know that the arithmetic mean exceeds the geometric mean, which when compounded gives the buy-and-hold return.
- ✦ Lifetime mutual fund outcomes, based on sign of estimated alpha against SPY:

Variable	Alpha Estimate Positive					Alpha Estimate Negative				
	N	Mean	Median	Std. dev.	Skewness	N	Mean	Median	Std. dev.	Skewness
Fund life (months)	2872	140.7	112.0	97.4	0.4	4931	101.0	83.0	75.2	1.3
Outperform VW Market Indicator	2872	0.563***	1.000	0.496	-0.254	4931	0.024***	0.000	0.153	6.202
Outperform SPY Indicator	2872	0.674***	1.000	0.469	-0.743	4931	0.040***	0.000	0.197	4.671
Outperform T-Bill Indicator	2872	0.876***	1.000	0.330	-2.277	4931	0.740***	1.000	0.438	-1.097
Fund buy-and-hold return	2872	3.337	1.459	5.215	3.180	4931	1.004	0.512	1.779	3.533
VW Market buy-and-hold return	2872	2.812	1.585	3.843	1.945	4931	1.820	1.210	2.634	3.177
SPY buy-and-hold return	2872	2.550	1.475	3.464	1.882	4931	1.698	1.161	2.384	3.038

# Costs and Fees vs. Compounding Lifetime Outcomes, All Active Equity Funds

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Add back fund/month specific fees:

Variable	Mean	Median	Std. dev.	Skewness
Outperform VW Market Indicator	.382***	0.000	0.486	0.487
Outperform SPY Indicator	.437***	0.000	0.496	0.255
Outperform T-Bill Indicator	.828***	1.000	0.378	-1.734
Fund buy-and-hold return	2.538	0.880	5.057	4.605
VW Market buy-and-hold return	2.185	1.267	3.170	2.599
SPY buy-and-hold return	2.012	1.225	2.859	2.506

There is substantial evidence of outperformance in *mean* pre-fee returns.

But still, a majority of funds underperform.

## IV. Which Stocks Are the Big Winners (Focusing On U.S. Individual Stocks Once Again)

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- ✦ Do the big winner (and big loser) stocks have any common characteristics?
- ✦ Can these be identified in advance, or do they only emerge after the fact?
- ✦ 1967 to 2017
  - ◆ Need Compustat accounting data.
- ✦ Focus on results measured over decades.

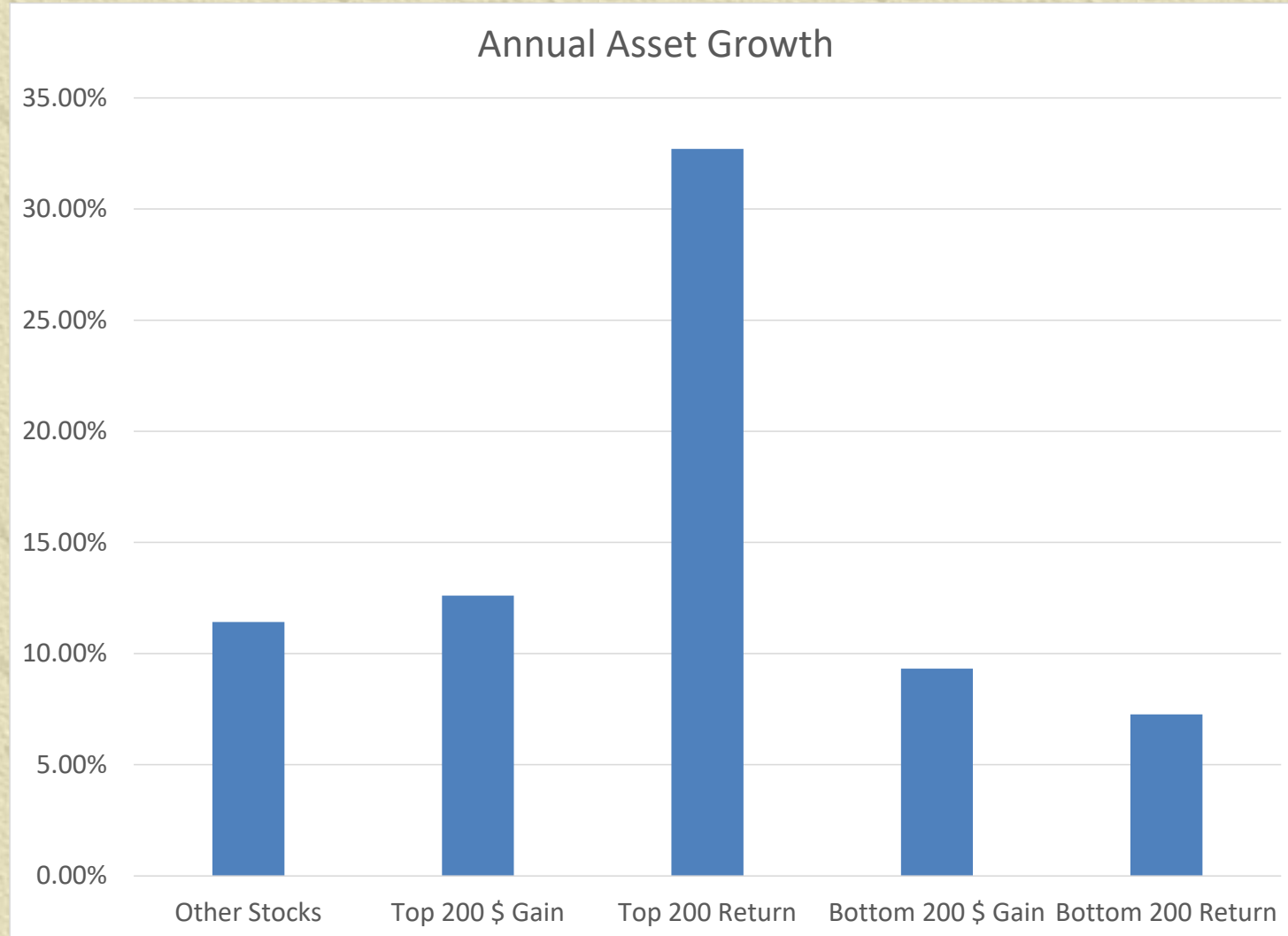
# Illustrating the Challenges: Apple

<u>Decade</u>	<u>Wealth Created (\$ millions)</u>	<u>Wealth Creation Ranking</u>	<u>Decade Excess Return</u>	<u>Return Ranking</u>	<u>Return Volatility</u>	<u>Return Skewness</u>	<u>End Decade Market to Book</u>
1981-1986	-2,492.2	8,600	-54.8%	5,457	15.41%	0.275	3.53
1987-1996	-1,691.2	10,978	-57.2%	6,056	13.19%	0.263	1.49
1997-2006	65,676.6	22	1483.3%	168	15.85%	-0.345	8.44
2007-2017	975,827.5	1	1445.3%	64	8.94%	-0.700	6.66

# Firm Means, Measured Same Decade as Performance Outcome



# Firm Means, Measured Same Decade as Performance Outcome



# Firm Means, Measured Decade Prior to Performance Outcome



# Multivariate Evidence: Same Decade Return

Variable	Bottom 200 Return Outcome		Top 200 Return Outcome	
	Coefficient	T-statistic	Coefficient	T-statistic
Constant	0.0000	0.00	-0.0339	-9.59
Cash Growth Rate	0.0136	2.27	0.2005	16.78
Other Current Asset Growth Rate	0.0007	0.13	0.1132	10.90
Dividend to Asset Growth Rate	0.0892	0.40	1.8108	4.10
Initial Market Capitalization	0.0000	-0.30	0.0000	-1.15
Fixed Asset Growth Rate	0.0077	1.41	0.0903	8.34
Income to Asset Growth Rate	-0.0578	-7.96	0.0012	0.08
Final Equity to Asset	-0.0084	-3.91	0.0447	10.49
Final Market to Book	-0.0005	-6.34	0.0038	23.90
Dividend to Assets	0.0853	2.63	-0.0151	-0.23
Income to Assets	-0.0515	-10.40	0.0480	4.87
Net Issuance to Assets	-0.0133	-4.76	-0.0206	-3.71
R&D to Assets	-0.0046	-0.66	0.0359	2.62
Sales to Assets	0.0012	2.03	0.0020	1.74
Other Asset Growth Rate	0.0212	4.50	-0.0425	-4.54
Sales to Assets Growth	-0.0109	-3.23	0.0266	3.98
Return Volatility	0.0872	13.78	0.0592	4.70
Return Skewness	-0.0086	-17.32	0.0003	0.30
Regression Adj. R2	0.0310		0.0650	



# Multivariate Evidence: Forecasting Decade Return

Variable	Bottom 200 Return Outcome		Top 200 Return Outcome	
	Coefficient	T-statistic	Coefficient	T-statistic
Intercept	0.0046	1.10	0.0219	3.63
Indicator, Bottom 200 \$ Last Decade	-0.0019	-0.39	-0.0063	-0.90
Prior Cash Growth	-0.0207	-1.61	-0.0084	-0.45
Prior Other CA Growth	0.0213	1.92	0.0013	0.08
Prior Dividend to Asset Growth	-0.1984	-0.40	0.6102	0.85
Prior Fixed Asset Growth	0.0111	0.94	0.0023	0.13
Prior Income to Asset Growth	-0.0568	-2.80	0.0038	0.13
Prior Equity to Assets	-0.0113	-2.28	-0.0150	-2.10
Prior Market Capitalization	0.0000	0.09	0.0000	-0.14
Pror Market to Book	-0.0013	-4.70	-0.0005	-1.20
Prior Dividend to Asset	0.1148	1.57	-0.2963	-2.80
Prior Income to Assets	-0.0954	-7.47	0.0150	0.81
Prior Net Issuance to Assets	0.0098	1.49	-0.0145	-1.53
Prior R&D to Assets	-0.0263	-1.49	0.1272	4.98
Prior Sales to Assets	0.0010	0.80	-0.0010	-0.58
Prior Other Asset Growth	0.0234	2.13	-0.0088	-0.56
Prior Sales to Assets Growth	0.0018	0.23	0.0125	1.11
Indicator, Top 200 \$ Last Decade	0.0003	0.05	-0.0114	-1.53
Indicator, Top 200 Return Last Decade	0.0024	0.40	-0.0071	-0.80
Return Volatility Prior Decade	0.0974	4.94	0.0879	3.08
Return Skewness Prior Decade	-0.0034	-2.67	-0.0001	-0.05
Regression Adj. R2	0.0210		0.006	

# Discussion I: Active vs. Passive

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## ✦ For unsophisticated investors:

- ◆ These results reinforce the desirability of broad diversification.
- ◆ Avoid the risk of missing the few stocks that will account for most of the gain.

## ✦ For sophisticated investors:

- ◆ We know markets cannot be perfectly efficient.
- ◆ Some investors or managers with the right comparative advantage should be able to profit.
- ◆ “Small investors should remain uninformed, but large and sophisticated investors benefit from searching for informed active managers.” Garleanu and Pedersen, *Journal of Finance*, 2018.
- ◆ This work highlights the potential upside.
- ◆ Some stocks will increase in value by 10x or 100x in upcoming years.

## Discussion II: Arithmetic Mean Returns

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- ✦ Mean-Variance Optimization (based on the arithmetic mean) is often justified based on (near) normality.
- ✦ But compound long run returns are highly skewed.
- ✦ Skewness preference can be rational.
- ✦ Even if we remain focused on mean and variance, over what horizon?
- ✦ Virtually all empirical asset pricing research focuses on learning more about the arithmetic mean monthly returns.
- ✦ This does not tell us the mean annual, decade, or other horizon return.

## Discussion III: Comparison to Venture Capital

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- ✦ Most VC investments lose money (often -100%), but a few generate outsized payoffs.
- ✦ I document the same pattern for compounded returns to public stocks, and to a lesser extent active mutual funds.
- ✦ This pattern may be fundamental to entrepreneurial investing.