WisdomTree RESEARCH

OUR INDUSTRY'S SECRET: CAP-WEIGHTED INVESTING WAS AN ACCIDENT

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WISDOMTREE®

We're putting WisdomTree's methodology head-to-head against history's accident, the S&P 500 Index.

THE ACCIDENT

The S&P 500 Index has existed in many forms since 1923.[1] Its current market capitalization-weighted[2] construction was implemented in 1957. To appreciate the series of accidents that birthed the index we know today, let's go back to its earliest days.

Charles Dow first calculated the Dow Jones Industrial Average in 1896 by weighting each stock according to its price. If original Dow components like U.S. Rubber and American Tobacco were $25 and $50, respectively, then the latter received twice the weight in the index, regardless of either company's fundamentals. The seeds of the accident were sown—people followed and cited an index that had no regard for fundamental merit.

In retrospect, it's foolish to hold twice as much American Tobacco as U.S. Rubber (or the other way around) for no good reason. Price-weighting is ridiculed by most of the industry, and serious practitioners no longer pay much attention to the Dow.

This raises a question: if you have qualms about the intellectual rigor of the Dow, why kneel at that altar of market capitalization-weighting, the S&P 500 Index, where a $100 billion company gets twice the index weight as a $50 billion company, regardless of fundamentals? I've been asking myself this question for years.

Consider the $9.9 trillion that tracks the S&P 500 Index. Even WisdomTree licenses from Standard & Poor's (S&P) for one of our emerging markets ETFs. The brand is irresistible.

Where does this appeal come from, this obsession with cap-weighting as a methodology? It's the status quo.

Let's continue with the tale of the accident.

In 1957, S&P sought a way to gauge the investment experience of society as a whole. It also wanted to broaden its old index because it was capturing a lot of railroads and utilities—William McKinley and Teddy Roosevelt stuff. The index needed to get with the times and capture the broader stock market of the 1950s.

To do its calculation, S&P chose cap-weighting. But its objective was not investment excellence. In truth, S&P wanted to figure out how the average investor was faring, so it started calculating its old indexes in a more comprehensive way.

That's it. If the objective was to create an investable index, why did it take until the 1970s for Vanguard and Jack Bogle to come along and actually do it?

Because an investable vehicle was never the objective at S&P until it realized there was money to be made in licensing.

And consider what we take for granted today—fundamentally weighted investing strategies, like those used by WisdomTree, need modern computing power. In 1957, beyond pen and paper, they had only primitive electronics. To S&P's credit, it was ahead of the curve when it came to using computers to receive "live" quotes at multiple times during the day. But running the computerized stock screens that we now take for granted was an impossibility.

[1] Marco Sampaolo, "S&P 500," Encyclopedia Britannica, 2016.
[2] Market capitalization-weighting: Market cap = share price x number of shares outstanding. Firms with the highest values receive the highest weights in approaches designed to weight firms by market cap.

We surmise that S&P developed its famous index in 1957 not because academia said cap-weighting was optimal but because index construction was limited by technology.

Our conclusion: the $9.9 trillion tracking the S&P 500[3] is following an index that was created by happenstance. And it was the gap between mutual fund fee structures and index trackers in prior generations that allowed it to become "the benchmark."

AN ALTERNATE UNIVERSE

Compare the S&P 500's past to another path that history could have taken if the objective was a broad market index based on investment merit:

Course that was taken by S&P:	***stock price*** x shares outstanding / ***total value*** of all stocks
Alternate course of history (S&P's mindset = WisdomTree):	***earnings per share*** x shares outstanding / ***total earnings*** of all stocks

REVISIONIST HISTORY

Furthermore—and this is so important—there is the mystery of the broken timeline. Many investors believe that S&P embarked on capitalization-weighting in response to the efficient market hypothesis (EMH). The theory states that all known information is already baked into asset prices, so there is no point in trying to select stocks.

However, the S&P 500 is a 1957 construction, and the definitive EMH papers did not appear until years later. If S&P has any literature in its archives, dated 1957 or earlier, that cite academic theory supporting its decision to cap-weight the 500, we'd be fascinated to see it.

MALKIEL'S CITATIONS: CONFIRMING THE ACCIDENT'S BUSTED TIMELINE

Perhaps the definitive book on efficient markets is the 1973 classic, *A Random Walk Down Wall Street* by Princeton's Burton Malkiel. The EMH was called into question after the 1987 stock market crash and really challenged in the wake of the dot.com bubble. The hypothesis was put on the witness stand to testify as tech stocks collapsed at the beginning of this century. In 2003, Malkiel penned "The Efficient Market Hypothesis and Its Critics,"[4] a 47-page research paper that discussed the most important studies written for and against the theory.

Malkiel referenced no less than 57 papers from heavyweights like Eugene Fama, Ken French, Ben Graham, Robert Shiller, Malkiel himself and numerous others. Aside from a 1934 reference to Graham & Dodd—and that duo represents the antithesis of the EMH—all the studies that Malkiel identified were published *after* 1957.

[3] MS&P Dow Jones Indices, 3/7/19.
[4] Burton Malkiel, "The Efficient Market Hypothesis and Its Critics," CEPS Working Paper No. 91, 2003.

FIGURE 1: Malkiel's Citations (2003)		
Citations in Malkiel, "The Efficient Market Hypothesis & Its Critics" (2003)		
Researcher(s)	Year of Study/Citation	Malkiel's Summary of Conclusion
Graham & Dodd	1934	Value stocks return more than Growth stocks
Nicholson	1960	Low P/Es provide higher rates of return
Cootner	1964	A stock's past performance does not indicate future returns
Benjamin Graham	1965	The stock market is a long run weighing mechanism
Jensen	1969	First study of fund performance; active managers couldn't add value
Eugene Fama	1970	Markets are efficient
Burton Malkiel	1973	Prices reflect all known information
Fama & Schwert	1977	Short-term rates related to future returns
Basu	1977	Low P/Es provide higher rates of return
Ball	1978	Low P/Es provide higher rates of return
French	1980	Higher returns on Mondays
Grossman & Stiglitz	1980	Market cannot be perfectly efficient; otherwise no incentive to study market
Kahneman & Tversky	1982	Investors are overconfident
Keim	1983	Small-cap factor is evident
Keim (cited again)	1983	Small-cap factor is evident (second citation)
Keim & Stambaugh	1986	High-yield sperads have predictive power
Campbell	1987	Interest rate term structure influences stock prices
Poterba & Summers	1988	Stock market mean reversion over long horizons
Haugen & Lakonishok	1988	January effect
Lakonishok & Smidt	1988	Stocks exhibit notable performance patterns around turn of the month
Fama & French	1988	Dividend yields forecast returns
Campbell & Shiller	1988	Dividend yields forecast returns
Bagwell & Shoven	1989	U.S. corporate dividend behavior has evolved
Ariel	1990	Stock market patterns on holidays
Miller	1991	October 1987 crash was the accumulation of unfavorable "fundamental" events
Fama & French	1992	Small-cap factor is evident
Fama & French	1992	Size and price-to-book explain future returns
Roll & Shiller	1992	Market "inefficencies" cannot be exploited
Fama & French	1993	Low price-to-book captures financial distress
Lakonishok, Shleifer & Vishny	1994	CAPM doesn't capture all risk dimensions
DeBondt & Thaler	1995	Investor emotions cause prices to deviate
Hawawini & Keim	1995	Foreign nations' varying average daily returns
Hawawini & Keim	1995	Low price-to-cash flow generates excess returns
De Bondt & Thaler	1995	Stocks underreact to certain new events
Malkiel	1995	Repeat of Jensen (1969); active managers didn't add value
Fluck, Malkiel & Quandt	1997	Stocks with previously low returns subsequently outperformed
Fluck, Malkiel & Quandt	1997	High dividend yields do not earn a high rate of return
Fama & French	1997	Price-to-book effect more powerful outside U.S.
Campbell, Lo & MacKinlay	1997	Stocks underreact to certain new events
Fama	1998	Stocks "respond efficiently to events like earnings surprises"
Campbell & Shiller	1998	P/E ratios partially explain the variance of future returns
Kahneman & Riepe	1998	Value stocks return more than Growth stocks
Lo and MacKinlay	1999	Supportive of serial correlation
Odean	1999	Traders underperform buy-and-hold
Lo, Mamaysky & Wang	2000	Modest predictive power in technical analysis
Shiller	2000	"Irrational exuberance" in 1990s U.S. equities
Shiller	2000	Dot-com bubble is evidence of irrationality
Shleifer	2000	Noise trader risk limits arbitrage when in a bubble
Shleifer	2000	Closed-end funds sell at irrational discounts to NAV
Lesmond, Schill & Zhou	2001	Trading costs negate relative strength strategies
Schwert	2001	Predictable patterns disappear after publication
Fama & French	2001	U.S. corporate dividend behavior has evolved
Schwert	2001	DFA fund based on Fama & French (1993)
Rasches	2001	Stocks with similar tickers experience co-movement
Cooper, Dimitrov & Rau	2001	Adding ".com" to corporate name led to positive stock reaction
Ross	2001	Closed-end fund discounts explained by management fees
Fama & French	2002	High average returns result partlly from large unexpected gains

EARNINGS-WEIGHTING SINCE, AHEM, 1957

Figure 2 uses Dartmouth professor Kenneth French's data library[5] to analyze performance from 1957 to 2018 using price-to-earnings ratios (P/E)[6]. All NYSE, AMEX and NASDAQ stocks are divided into quintiles by the earnings-to-price ratio (the reciprocal of the P/E), excluding companies with negative earnings.

The cheapest stocks (the highest quintile), returned 14.9% annually, or 447 basis points (bps) more than the total market. Because the cheapest group's standard deviation was only marginally higher than the total market (16.42% vs. 14.96%, respectively), it had considerably higher Sharpe and Information Ratios.

FIGURE 2: Long-Term Performance, Portfolios Formed Using Earnings-Price Ratio

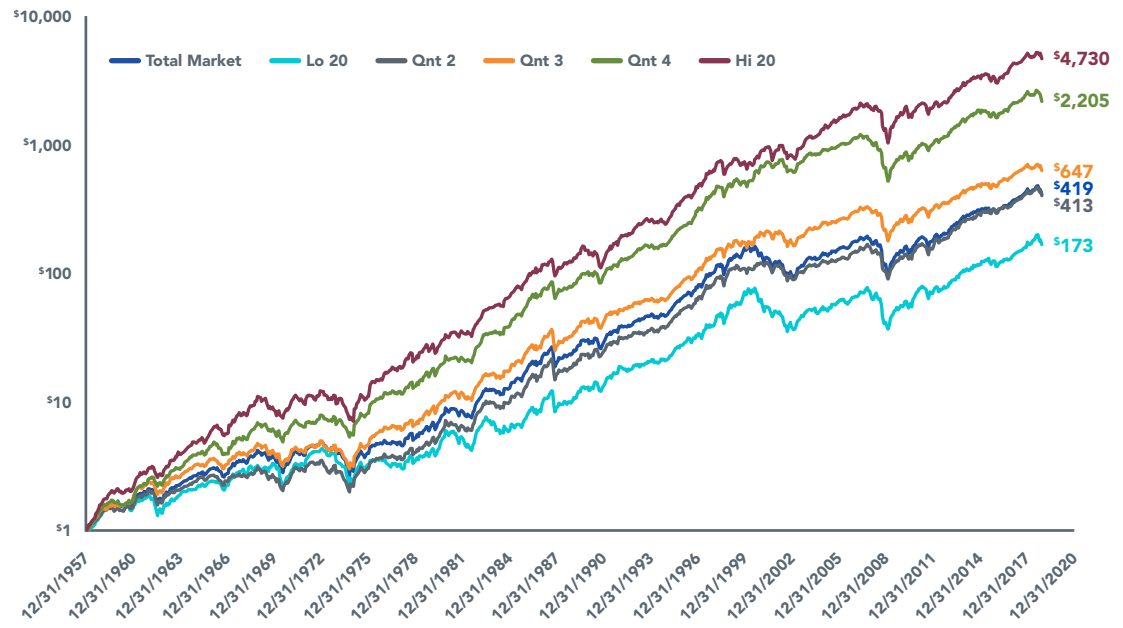
Quintile	Return (%)	Std Dev. (%)	*Beta	Sharpe Ratio	*Information Ratio	*Tracking Error (%)	*Correlation
Highest	14.88%	16.42%	0.97	0.67	0.58	7.67%	0.88
High	13.45%	14.55%	0.89	0.64	0.50	6.14%	0.91
Mid	11.19%	14.40%	0.90	0.51	0.15	5.34%	0.93
Low	10.38%	14.62%	0.93	0.45	-0.01	4.83%	0.95
Lowest	8.81%	17.17%	1.09	0.33	-0.30	5.37%	0.95
Total Market	10.41%	14.96%	1.00	0.45	0.00	0.00%	1.00

Sources: Kenneth French Data Library, WisdomTree, as of 12/31/18. Standard deviation (Std. Dev): measure of how widely an investment or investment strategy's returns move relative to its average returns for an observed period. A higher value implies more "risk," in that there is more of a chance the actual return observed is farther away from the average return. Beta: Measure of the volatility of an index or investment relative to a benchmark. A reading of 1.00 indicates that the investment has moved in lockstep with the benchmark; a reading of -1.00 indicates that the investment has moved in the exact opposite direction of the benchmark. Information ratio: A risk-adjusted return measure calculated by taking the excess return against the benchmark and dividing by the tracking error. Tracking error: A divergence between the price behavior of a position or a portfolio and the price behavior of a benchmark. Correlation: Statistical measure of how two sets of returns move in relation to each other. Correlation coefficients range from -1 to 1. A correlation of 1 means the two subjects of analysis move in lockstep with each other. A correlation of -1 means the two subjects of analysis have moved in exactly the opposite direction.
* Beta, information ratio, tracking error and correlation are calculated relative to the index occupying the last row of each individual table. Past performance is not indicative of future results. You cannot invest directly in an index.

[5] Portfolios formed on earnings/price. French's data is available on Dartmouth's Tuck School of Business website.
[6] Price-to-earnings (P/E) ratio: Share price divided by earnings per share. Lower numbers indicate an ability to access greater amounts of earnings per dollar invested.

In figure 3, a dollar invested in the market on December 31, 1957, appreciated to $419 by December 31, 2018, while the top quintile witnessed a nearly 5,000-fold ROI.

FIGURE 3: Growth of $1, Portfolios Formed on Basis of Earnings-to-Price Ratio



Sources: WisdomTree, Kenneth French Data Library, as of 12/31/18. Past performance is not indicative of future results.

WISDOMTREE'S "BETA"

The WisdomTree U.S. LargeCap Index takes the 500 largest companies and weights them by their total earnings. For example, if all companies combined earn $1 trillion and one company earned $30 billion, its weight in the Index is 3%. This methodology causes the Index to grab more companies that populate the top quintiles, shunning lower-ranked stocks.

WISDOMTREE U.S. LARGECAP INDEX PERFORMANCE

If we had been told when we got into the earnings-weighting business on February 23, 2007, that the S&P 500 Growth Index would outperform the S&P 500 Index by 128bps annually to May 31, 2019, we would have expected a pretty rough decade for our ETFs because the methodology causes a little value tilt in the core.

What happens if the WisdomTree U.S. LargeCap Index (WTEPS), our core-with-a-slight-value-tilt, catches a break in terms of growth versus value? What happens is that some portion of the $9.9 trillion tracking history's accident gets poached.

FIGURE 4: Average Annual Total Returns

	QTD	YTD	1 Yr	3 Yrs	5 Yr	10 Yr	Since Index Inception
WisdomTree U.S. LargeCap Index	13.26%	13.26%	7.24%	13.50%	10.22%	15.67%	8.36%
S&P 500 Value Index	12.19%	12.19%	5.95%	10.64%	8.05%	14.49%	7.08%
S&P 500 Index	13.65%	13.65%	9.52%	13.54%	10.91%	15.92%	7.82%
S&P 500 Growth Index	14.95%	14.95%	12.80%	15.95%	13.37%	17.17%	8.36%

Sources: WisdomTree, Bloomberg, Zephyr StyleADVISOR, as of 03/31/19.
Performance is historical and does not guarantee future results. Current performance may be lower or higher than quoted. Investment returns and principal value of an investment will fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original cost. Performance data for the most recent month-end is available at www.wisdomtree.com.
WisdomTree shares are bought and sold at market price (not NAV) and are not individually redeemed from the Fund. Total returns are calculated using the daily 4:00 p.m. ET net asset value (NAV). Market price returns reflect the midpoint of the bid/ask spread, as of the close of trading on the exchange where Fund shares are listed. Market price returns do not represent the returns you would receive if you traded shares at other times.
You cannot invest directly in an index. Index performance does not represent actual fund or portfolio performance. A fund or portfolio may differ significantly from the securities included in the index. Index performance assumes reinvestment of dividends but does not reflect any management fees, transaction costs or other expenses that would be incurred by a portfolio or fund, or brokerage commissions on transactions in fund shares. Such fees, expenses and commissions could reduce returns.