

SHALLOW MARKET HYPOTHESIS

The (not so) Brave New World of Thinner Markets, Erratic
Price Discovery, and Decreased Liquidity

The sizable stock price declines of late 2018 and rapid recovery in early 2019 illustrate an increasingly self-evident feature of modern financial markets: there are far fewer traditional investors in the marketplace. They have been replaced with the faceless flows of index funds, quant funds, and paired-risk strategies who tag along on the back of the information processing, profit seeking, and price discovery of active investors. As of this writing, the active/passive split is purported to be about 50/50 in terms of actual shares held by passive or active strategies, with the share of passive edging progressively higher from one quarter to the next. My hypothesis is that this dynamic understates the impact of the meaningful de-forestation of the active equity investor landscape – leading to a variety of unintended consequences.

The features of a structurally shallower market for active investors include:

- A much more volatile “price discovery” process for individual stocks,
- A higher frequency of stock market “squalls” that lead to assorted price dislocations (i.e., flash crashes),
- More random stock price movements and cross-stock correlations due to the concentration of investors in index and sector-ETF vehicles,
- A market that is generally less reliable in its capacity to provision liquidity in times of stress, and
- Overall, a less dependable marketplace in terms of the accuracy of pricing signals.

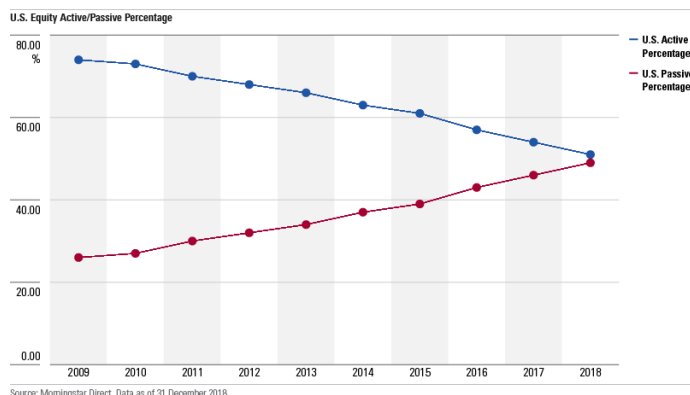
The above lead to two distinct challenges for investors:

- Timing. Individual stock and/or asset allocation decisions may be theoretically correct, but overwhelmed by volatility events in a shallower market. Asset allocation decisions implemented in 2018 are a stark reminder on this front.
- Second, the asset allocation framework probably needs some amendment. Investors face not one but two forms of systemic risk, the markets themselves, and market structure.

To shorten your read, the upshot of a shallower market is not a lot different from “the small cap effect”. This refers to the challenges of stock pricing and liquidity in smaller stocks. Large buyers or sellers can move

small cap stocks significantly in a short window of time. When a large investor or two elects to vacate a name, the valuation compression can be significant, as bringing the stock price down to a low enough level as to cause new buyers to emerge and clearing the marketplace can be a daunting (and very inexact) process. Liquidity, price discovery, and the behavior of stocks to changes in available information are inherently inexact processes. We see the small cap effect working its way well up the capitalization spectrum, to larger and theoretically more efficiently valued/liquid names. What’s the solution? Dedicated small cap investors understand that liquidity is fragile and price swings can be violent in this corner of the market, and may often hold a higher percentage of portfolio cash in happier times to prepare for the inevitable choppy periods. Given the pace and frequency at which liquidity disruptions can envelop larger stocks, we believe a similar mindset is in order in other capitalization ranges in global stock markets.

In the First Half of 2019, Passive Appears Set to Break 50%



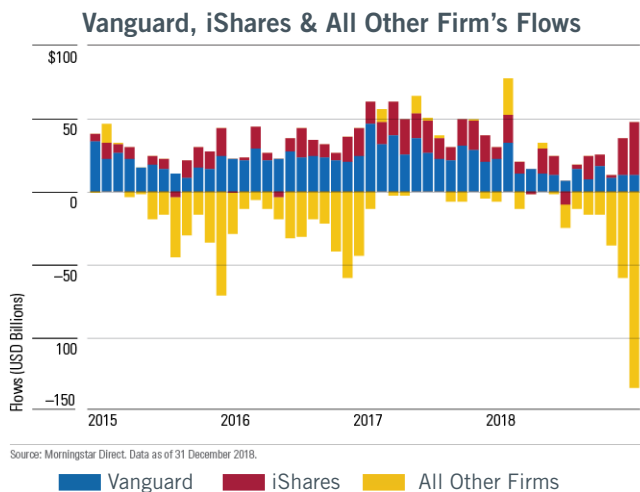
On a given day, over 90% of volume in any given stock is not fundamental investors electing to buy or sell a specific name, but the buying or selling of baskets and intraday trading related to passive and/or quantitative strategies¹. This thinning out of the marketplace means that investors motivated to buy or sell a specific stock because of a change in their view of it (i.e., acting on “new information”) will find that the cost to implement their decisions has gone up, in many cases by a considerable margin. “Liquidity” has a specific meaning in the context of stock markets. The old school definition of liquidity, which reflected market depth, is relevant. It’s not the daily average volume per se, and not the commission cost to trade shares. Before decimalization, it was the amount of buying or selling needed to move a stock ¼ of a point. This now antiquated notion presumed that investors (the regular kind) would care more about the ease with which they

¹Source: JP Morgan

could change their minds about a specific position. In a less-passive world, an increase in a stock price because of buying pressure would bring out the sellers. But not so when most volume has no reaction to price. That traditional liquidity cost has gone up, as the price of expressing new information, whether good or bad, means motivating an increasingly small subset of daily trading to take the other side.

In 2013 the SEC commissioned a study of smaller capitalization stock liquidity to determine if modern market practices, such as high-frequency trading, were leading to improved or inferior liquidity. This data-driven SEC study thoroughly refuted claims that high frequency trading shrinks spreads and adds liquidity in the stock market. The study revealed that beyond the most active stocks, most other stocks trade with wide spreads and with very little liquidity, and even that liquidity is conditional on prevailing volatility conditions. High frequency trading was shown in this study and others to disappear under moderate volatility episodes, thereby not providing liquidity as it purports to do.

That was in 2013. In the ensuing 5 years, outflows have accelerated (as shown below), with passive share complexes (Vanguard, iShares) inflows dwarfing the aggregate flows into equity markets. One can only assume that the liquidity depth issues are a good deal worse today, with anecdotal proof points abundant.



DRAG ALONGS AND TAG ALONGS

Modern securities law features the concept of “tag along” rights for minority shareholders to participate

in stock takeovers or other major corporate actions, and not be forced into accepting a lower bid for their shares. In parallel, majority shareholders generally enjoy “drag along” rights that prevent a small minority of shareholders from blocking corporate actions such as a change in control. With passive “tag along” shareholder flows and basket trades representing the vast preponderance of trading volume on a given day, this concept probably needs to be updated to reflect how stocks will move in general. Given the sheer size of indexed funds, traditional investors are in effect, *dragged along* by index flows and which stocks of theirs belong to the sector ETF that may be used to gain or hedge an exposure. For investment professionals (such as myself) whose careers date back to the 20th century, the current market structure is simply not the same. While trading costs are infinitesimally lower, not only is the true cost of liquidity *higher*, but the predominance of passive inflows and shareholdings are a whole new form of risk. How do you price the risk of the market structure on top of transitional systemic risks?

The efficient-market hypothesis (EMH) that underpins much of the theoretical basis for indexing requires that agents have rational expectations and seek to maximize their own utility. The investing population is correct (even if no one person is), and agents update their expectations appropriately as new information appears. EMH allows for individual agents to be irrational; when faced with new information, some investors may overreact and some may underreact. All that is required by the EMH is that investors’ reactions be random and follow a normal distribution pattern so that the net effect on market prices cannot be reliably exploited to make an abnormal profit.

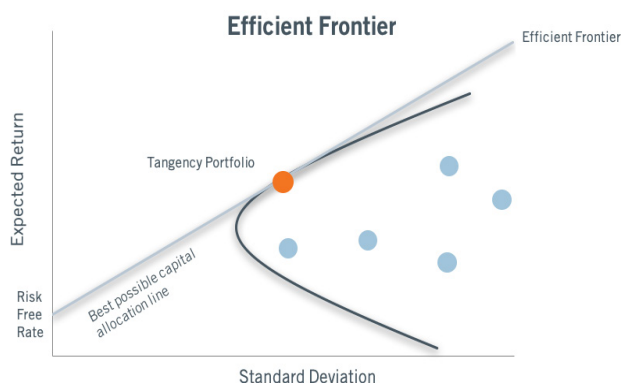
WHAT TO EXPECT IN A SHALLOW MARKETS HYPOTHESIS (SMH) WORLD?

A revised CAPM model of risk/return

In an SMH-bound world, not all agents in the market have “rational expectations”, or update their views of stocks to reflect new information. In fact, a large component have no specific expectations or information

about stocks, and have assigned this role to the market (and essentially to other investors). The pool of traditional investors that are profit-seeking and do take the time to update their expectations is small in relation to the flock of passives. Accordingly, in times of stress, their capacity to provide liquidity is limited relative to passive flows. Like global warming, this (seems likely) to become worse before it gets better. If passive flows themselves experience a change in information, such as Presidential tweets or central bank actions, the price of liquidity/market clearance may be high. There will be a non-normal distribution of trading days when these market structure squalls create outsized trading opportunities in individual names. Profit-maximizing investors will need to provision some liquidity to take adequate advantage of such periods.

The EMH and modern portfolio theory are closely linked. In modern portfolio theory, risk-averse investors can construct portfolios to optimize or maximize expected return based on a given level of market risk. Risk is an inherent part of higher reward. According to the theory, it's possible to construct an "efficient frontier" of capital allocation offering the maximum possible expected return for a given level of risk. This theory was pioneered by Harry Markowitz in 1952.



Individual stocks and portfolio manager return evaluations are bound up together in an equation taught to finance students in first-year textbooks, the Capital Asset Pricing Model, or CAPM. It goes:

$$\text{Expected Return} = \text{risk-free return} + \beta \times (\text{market return} - \text{risk free return})$$

To evaluate investment manager performance, the CAPM equation is edited slightly. Returns are a product of a manager's portfolio alpha, or non-market specific return, plus the market-linked beta.

In a CAPM-governed world, all stocks ought to be priced in a clear relationship to their risk, which is generally price as volatility. As for alpha - this may not really exist if the EMH holds true in strong form, but it's assumed that surely some form of alpha lies out there for the right portfolio construction. Portfolio management careers are made or broken based on how effectively some form of alpha measurably results.

In a shallow market, market participants contend with two forms of risk. One is the traditional "market" form of risk expressed above. The second is a "market structure" form of risk, where individual stock price returns depend not just on the actions of traditional market "agents," but also on the actions or inactions of the tag along passive actors. For big household name stocks like Apple, Disney, Visa, or Caterpillar, there may be more than enough traditional investors to drown out the market-structure risk. But as you move down the capitalization spectrum, market structure becomes a greater controlling factor. In effect, CAPM needs to be restated as:

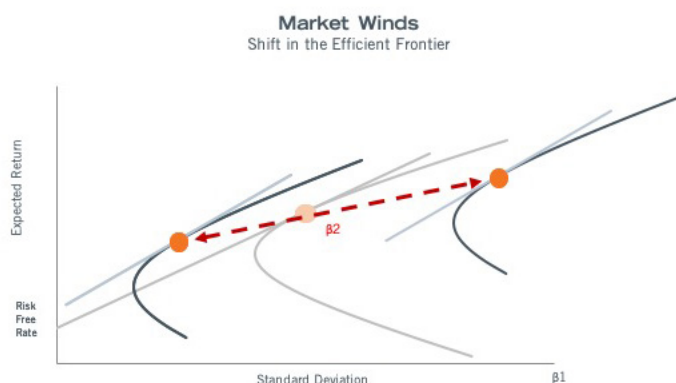
$$\text{Expected Return} = R_f + \beta_1 \times (\text{market return} - R_f) + \beta_2 \times (\text{market structure return} - R_f), \text{ where}$$

R_f = Risk free rate

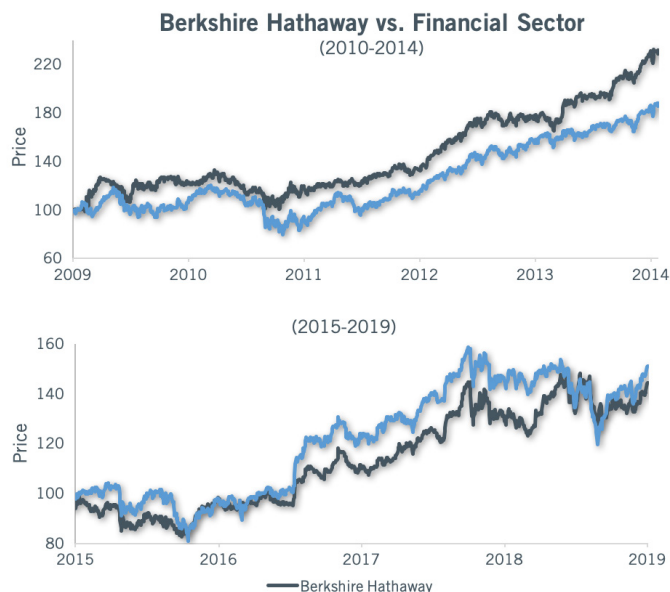
β_1 = Market Beta

β_2 = Market Structure Beta

The implications from a CAPM perspective may be that the added "market structure" form of Beta just adds to risk, or alternatively for evaluating portfolio managers, alpha may not be uniquely separable from the two forms of beta. Having theorized about the implications of shallower markets and the variances in pricing signals, there might be differing efficient frontiers or definitions of risk, but we are not clear exactly how to contemplate them. In a two-dimensional space, the efficient frontier may not be static, requiring investors to vary risk-free asset levels as market winds dictate.



Even among the very biggest of stocks, the more pronounced impact of market structure and correlation are visible. While we can't really explain why, it seems market structure-related correlations accelerated in the 2014-15 time frame. Consider a gigantic stock that is classified as a financial, Berkshire Hathaway. It marched largely to its own beat from the market lows to 2014. From 2015 onwards, it moves almost tick for tick with a financials stocks ETF, which is far more sensitive to bank credit, the yield curve, etc. than Berkshire's diversified range of holdings. Maybe it's become inevitable as Berkshire is a market proxy given its size, but the increase in correlation is surprising.



Source: Bloomberg. Prices rebased to 100. Financial sector represented by XLF Sector SPDR

A traditional antitrust framework may explain the anecdotally visible increases in stock market correlations.

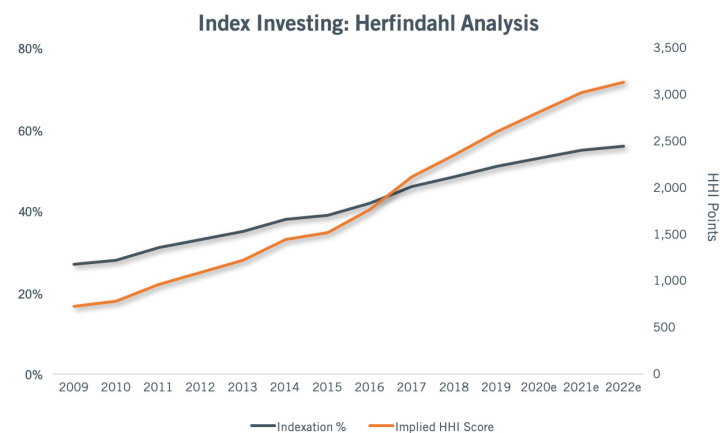
The U.S. Department of Justice and Federal Trade Commission use the Herfindahl-Hirschman Index (HHI) as a commonly accepted measure of market concentration to determine whether industrial mergers may be anti-competitive.

The HHI is calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers. The HHI takes into account the relative size distribution of the firms in a market. It approaches zero when a market is occupied by a large number of firms of relatively equal size and reaches its maximum of 10,000 points when a market is controlled by a single firm. The HHI increases both as the number

of firms in the market decreases and as the disparity in size between those firms increases.

According to the DoJ's website, "The agencies generally consider markets in which the HHI is between 1,500 and 2,500 points to be moderately concentrated, and consider markets in which the HHI is in excess of 2,500 points to be highly concentrated." Transactions that increase the HHI by more than 200 points in highly concentrated markets are presumed likely to enhance market power under the Horizontal Merger Guidelines issued by the Department of Justice and the Federal Trade Commission.

Based on the description, the HHI of index investing became moderately concentrated in the 2015-16 time period, and have become highly concentrated now. The pricing mechanism of the stock market has become a trust of the index funds, so to speak, with the HHI score pushing above 2,500 at present.



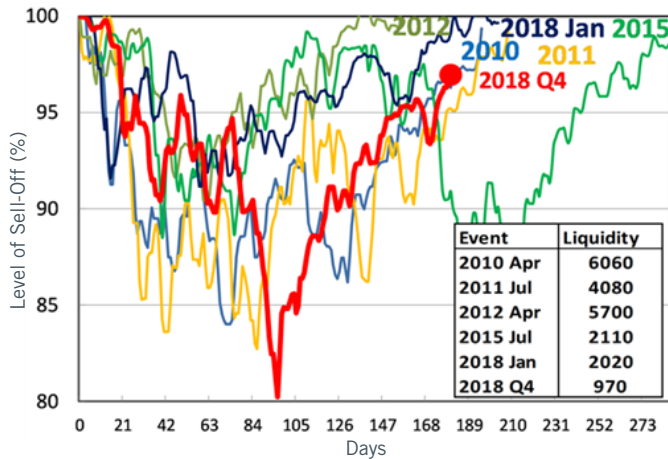
Source: Cambiar & Morningstar

PROOF?

During the first quarter, a variety of strategists whose work we receive offered their own assessments of the market action in 2018 and recovery potential in 2019. One particular chart caught my attention, showing not just the severity of the Q4 2018 market decline, but how much less market-related selling pressure led to the event in terms of e-mini futures contracts. The *Shallow Markets Hypothesis* has been a working thought project for some time. This piece is the result of having "caught one in the wild" so to speak, in terms of a market event that could only be explained by much thinner market composition.

Trajectory of Recent Market Sell-Offs

(inset table shows avg. S&P 500 E-Mini Futures Market Contracts)



Source: JP Morgan Liquidity is expressed as the average number of S&P 500 E-Mini Futures Market Contracts available during the sell-offs.

EXPECT MORE SQUALLS

Our work points to an increasing propensity for sudden and severe moves down in stock markets in the current decade versus prior decades. Markets do go down for a number of fundamental or structural reasons – wars, recessions, depressions, financial crises, central bank policies. It's the change in frequency that is notable.

First, some definitions:

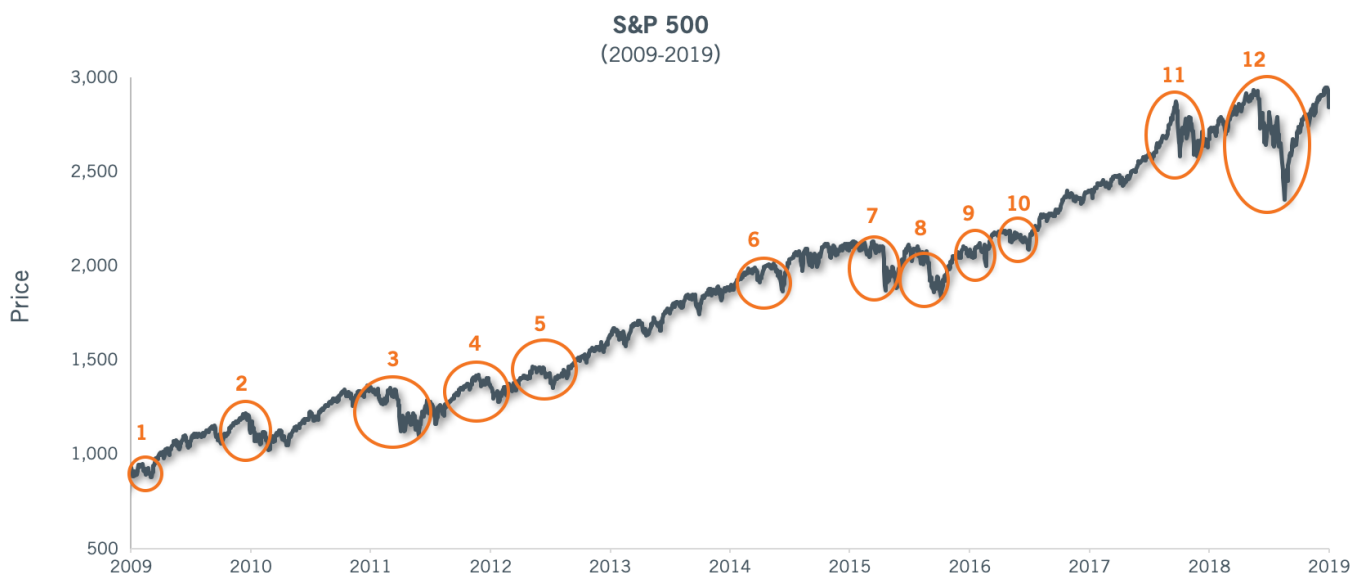
- “Sell-off” = stock market loss >5%.

- “Correction” = stock market loss of about 10%. A correction would also be a sell off, but not all sell offs would be corrections.
- “Major correction” = loss of about 15%. Same as the above, all major corrections are corrections, but not all corrections are major.
- “Bear market threshold” = loss of ~20%, but not worse than 25%.
- “Crash” = Something worse than -25% loss in a more or less straight line, a la 2008 or 1987.

All of these market-decline definitions are characterized differently from a true bear market, which tends to be more of multi-quarter process as opposed to a sharp market action. A true bear market would contain many of/all of the above sell-down legs, but the main difference versus a bull market is the recoveries are smaller than the sell-offs, leading to net negative performance.

During the entire 2009-present bull market period, one can observe the following sporadic sell-off events in large cap stocks:

1. an 8% sell-off May-July 2009,
2. a 15% major correction May-July 2010 (the flash crash),
3. a 20% bear market threshold decline in July/August 2011, a subsequent 9% correction in 4Q 2011,
4. a 10% correction in 2Q 2012,
5. a 9% pre-election correction in 2012,
6. a 9% correction in the fall of 2014, which preceded the onset of the oil crash,



Source: Bloomberg

7. a 12% fast correction in 3Q 2015,
8. a 14% major correction from about Christmas 2015 to early Feb 2016.
9. a 6% sell-off in summer 2016 (Brexit),

Items 7-9 formed a true bear market in small caps, commodities, and EM stocks in the 2014-16 time period.

10. a 5% pre-election sell-off in October 2016,
11. a 10% correction in February 2018, and
12. a 20% threshold bear market from September 2018-December 2018.

These are for the S&P 500 index; a total of 13 events in a 10-year time frame of exemplary aggregate market performance, or one every 9 months. There are two notable long periods devoid of material sell offs: the 20 months post-2012 election, and the 14 months after the 2016 election. These may simply be odd

coincidences. There are 4 major correction/bear market threshold declines, so one every 2.5 years.

Looking at the same time frame for the Russell 2000 index, there have been seven small cap major correction/bear market threshold declines and three statistical bear markets, or about one major correction or worse every 15 months, with a statistical bear market erupting once every three years in small caps. A 27% decline in 2015-16 was more of a “real bear market” from an aggregate market behavior/value destruction perspective. 7%+ sell offs or smaller corrections happen frequently, eight times in ten years alongside the larger events.

As a point of reference, the entire 1981-1999 bull market featured 11 selloffs in 19 years. Two of the selloffs, the 1987 crash (-33%), and the 1998 Long Term Capital episode (-19%) were clearly linked to/ exaggerated by market structure, while another (1990-91 threshold bear market) related to a war and



Source: Bloomberg

recession. A sub-10% selloff corresponded to the initial onset of the Asian financial crisis in 1997. So one event every 20 months, one related to a recession, and one related to a severe set of disruptions outside the USA.

Looking at international markets, the frequency of squalls post 2009 lows is similar to those of small cap USA stocks. Currency movements, which have tended to be unfavorable this decade for international stocks, have generally amplified the declines to include four bear markets (2010, 2011, 2015-16, and 2018), five major corrections not as legs of a bear market, and several other moderate selloffs along the way. So a total of 21 events in 10 years, or one about every 5 months.

CONCLUSIONS

The SMH leads to a couple of intuitive results. With heightened stock price correlations and episodic volatility bouts to be expected, day-to-day portfolio management perspective may include some commitment to sustaining a higher cash level as a % of the portfolio, with the aim of rapidly deploying cash into new names and making adds to existing names during quick hitting declines, and some commitment to rebuilding cash in market recoveries. While this thought might smack of market timing, it is axiomatic that market squalls will happen every few months even in positive markets, and that correlations between stocks will be high during these events, making it practically difficult to sell one name to buy another. Depending on the investment discipline, a standardized or uniform position weight model may be better at capturing investment insights, given the random liquidity dislocation and timing risks of individual stocks.

In the larger picture, shallower markets lack the investor depth to provision liquidity effectively in times of stress. This is concerning, and an irony in the context of modern finance and a heavy reliance on market efficiency. The 2018 market losses represented the worst broad market breadth since the peak of the 2008-09 financial crisis, and *yet there wasn't any appreciable credit stress*. This isn't a good formula for stability or an orderly market when real credit stress eventually hits.

In the day to day portfolio management at Cambiar Investors LLC, we have been implementing the above as "best realistic practices" to contend with shallower market dynamics. In some investment strategies, we

have used more standard or uniform position sizes for many years with generally favorable effects. Some willingness to let cash build in market upswells and to wait patiently for downside episodes has also generally been beneficial over time, but takes on greater importance given the observable thinning of the market and the risk of more unruly liquidity dislocations.

Ultimately there may be a saving grace to shallower markets: the alpha that has proven so elusive to active management in the past decade may become more readily attainable. That is, if you have the stomach for it. If stronger forms of the SMH are generally accurate, some of the Market Structure Beta (β_2 in our jargon) tends to drain returns from active portfolio management approaches, due to odd stock correlations, the more systematic market squalls, and ongoing liquidation pressure from outflows. Adhered to correctly, the waves of passive correlations and volatility dislocations lead to inefficient price discovery, aka "bargains", that provide the fuel for positive alpha in the first place. Portfolio managers will need some capability to modulate portfolio cash and keep a fairly active watch list of stocks worth attaching to at the correct price to earn positive β_2 returns instead of negatives ones. From there, buying and selling and timing decisions become a bit of an art form.

THIS MIGHT NOT END WELL

As a larger and larger percentage of investment capital flows into the passive tag along mandates, and market depth evaporates further, historians might ask what led to this state of affairs? In the wake of the market declines in 2008, active management and asset re-allocation strategies between active sub styles was not effective at mitigating losses. Passive to some extent did better. This failure in the context of a broad market failure was deeply disillusioning, leading to extensive flows to passive.

But that was a long time ago and represented an unusual series of events. It has become more of an accepted lifestyle to go passive and limit active risk in the form of sub-market potential returns, while abdicating the actual stewardship of capital, corporate governance, and other key features of our system. A loose parallel is the decision to not having a landline phone anymore; however, this is not a matter of technological substitution of an antiquated device. Indexes, which were given birth to in the 19th century

as a form of journalistic reporting, have become all-encompassing, dwarfing the number of stocks in issue globally by nearly 100-fold. No regulatory, political, or legislative actions led to this state of affairs. Pools of investment capital large and small just decided to head this way. It is a deep irony that the 2008 financial crisis was largely caused by the liquidity problems that followed the explosive growth of structured financial products as and when defects in their construction and underlying characteristics became visible. Equity markets don't possess the leverage that banks did entering 2008, but don't have the depth of capital either to absorb an unwinding of index positions appreciably. In that sense, the evolution of the marketplace is eerily similar.



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Brian the President and Chief Investment Officer at Cambiar Investors and is responsible for the oversight of all investment functions at the firm. Mr. Barish

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