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Who Is On the Other Side?

A Framework for Understanding Market (In)Efficiency

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Introduction

Market efficiency is a topic of great importance for companies and investors. Capital markets that function well are an essential contributor to the effective allocation of corporate resources.[1] Investors seek inefficiencies to generate excess returns, or returns that are higher than expected after adjusting for risk. Understanding efficiency requires us to examine lots of elements, including the market for information about fundamental value, the cognition and behaviors of investors, and the inherent costs to reduce gaps between price and value.

Our goals are to understand the factors that determine market efficiency and to create a taxonomy of the sources of inefficiency to provide active investors with a robust framework to identify and capture excess returns.

Efficiency Defined. "Efficiency" is a term from physics that measures the relationship between the input of energy and the output of useful work. For example, the human body converts every 100 calories consumed into roughly 20-25 calories of mechanical work such as running. This level of efficiency is similar to that of a common combustion engine. Neither your body nor a machine can translate 100 percent of its energy into work because of the second law of thermodynamics, which says that some energy always disperses and is unavailable for work.[2]

Markets are not machines, but the idea of efficiency still applies. For markets, the input is information, and the output is an asset price that reflects an unbiased reflection of fair value. Fair value, in turn, is the present value of expected future cash flows discounted at an appropriate rate.

Eugene Fama, a professor of finance at the University of Chicago Booth School of Business and a winner of the Nobel Memorial Prize in Economic Sciences for his work on market efficiency, sums it up this way: "A market in which prices always 'fully reflect' available information is called 'efficient'."[3] Just as a perfectly efficient machine cannot exist, neither can a perfectly efficient market.

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Fama distinguished between three forms of efficiency, based on the source of information.[4] The weak form says that you can't use past price movements to anticipate future price movements. The semi-strong form holds that prices fully incorporate all publicly available information, leaving no opportunity to earn risk-adjusted excess returns. The strong form says that information that is held by a small group, say insiders, is impounded in prices. The weak and semi-strong forms hold to some degree, but research has revealed anomalies that violate them. The strong form is not supported by the evidence.

Before turning to the opportunities that market inefficiency may present, we consider the three central considerations that determine efficiency.[5]

- **Fundamental Value: Market for Information About Assets.** This is information about anticipated cash flows and discount rates, the foundation of an asset's fundamental value.

  Sanford Grossman and Joseph Stiglitz, professors of finance and Stiglitz a winner of the Nobel Prize, wrote a paper in 1980 called "On the Impossibility of Informationally Efficient Markets."[6] They argue that markets cannot be perfectly efficient because there is a cost to gathering information and reflecting it in asset prices, which means there must be a proportionate benefit in the form of excess returns that investors will be motivated to capture.

  Active investors need exploitable mispricings as an incentive to participate because they need to recoup the cost of collecting information. You can argue that the benefit should roughly equal the cost, but the benefit must exist.

  The Grossman-Stiglitz paradox says that if markets were perfectly efficient, investors would have no incentive to collect information, yet prices cannot be efficient without informed traders. Lasse Pedersen, a professor of finance, cleverly captures the paradox by saying markets must be "efficiently inefficient."[7] In this market, investors seek to "buy" information and "sell" it at a profit.

- **Investors: Cognition and Behavior.** Some investors trade based on information, others trade on data or factors not relevant to value, and still others free ride. Research reveals that investors fall into certain patterns of behavior. These include overextrapolating recent results, going through swings in sentiment, creating and acting on narratives, having limited attention, and interpreting the same information in different ways. These behaviors can lead to differences between price and value.

  Investors are sometimes forced to buy or sell assets for reasons that have nothing to do with fundamental value. Examples include buying or selling to reflect index rebalancing, selling induced by margin calls, and selling triggered by an asset falling outside of an investment mandate.

- **Arbitrage Costs: Market for Assets.** Arbitrage is the simultaneous buying of an underpriced asset and selling of an overpriced asset with identical or closely related cash flows, creating a profit that is free, or nearly free, of risk. It is a mechanism that leads to convergence between price and value.

  But arbitrage comes with costs, such as identifying and verifying mispricing, implementing and executing trades, tax implications, and financing and funding securities.[8] These are called "arbitrage costs" and are often understated in academic research. Indeed, in an update to his classic paper on the topic, Fama proposes that a more "sensible" version of an efficient market is one in which prices incorporate

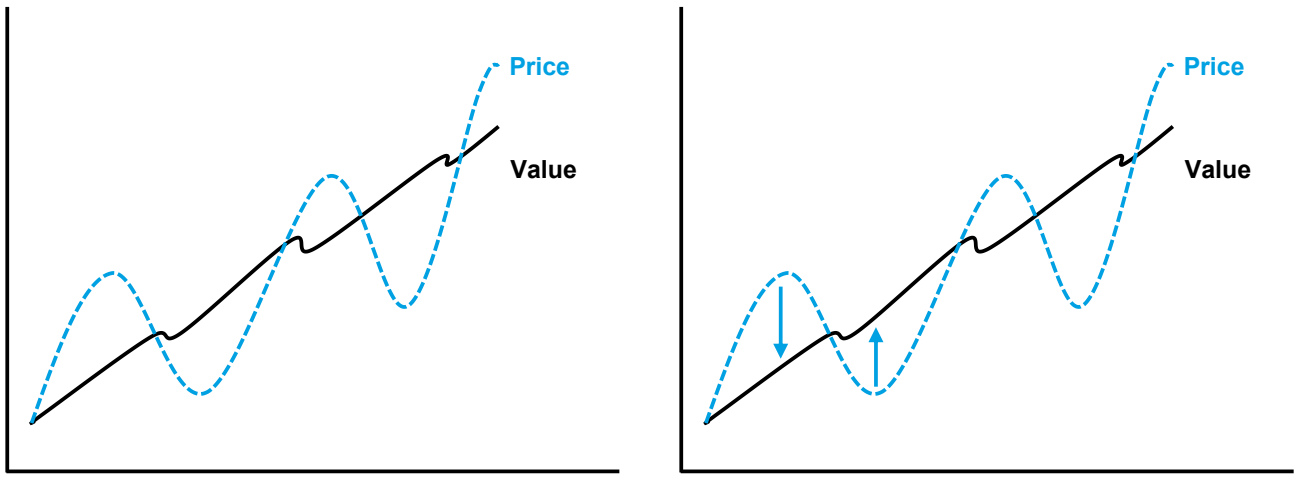
information to the point "where the marginal benefits of acting on information (the profits to be made) do not exceed the marginal costs."[9]

Many of these costs have come down over time, which has made most markets more efficient. For example, Regulation Fair Disclosure, implemented in 2000, reduced selective disclosure of information by companies.

Trading costs have also dropped sharply in recent decades as a result of deregulation and advances in technology that have lowered commissions and bid-offer spreads. For example, a retail investor paid 2.5 percent of the purchase price to buy 100 shares of a $25 stock before the deregulation of commissions on May 1, 1975. Such a purchase today would be effectively free of commission.[10]

Exhibit 1 shows how price and value can diverge as well as the cost to bring them back into line. Having a view that is different than what is priced in, as well as the ability to profit from that view, are both essential to generating excess returns.

Exhibit 1: Prices Reflect Fundamentals, Investor Behavior, and Arbitrage Costs



Need to find gaps between price and value… **…and consider the cost to bring price in line with value**

Source: Counterpoint Global.

Rules-based investment offerings, including index mutual funds and exchange-traded funds (ETFs), control at least one-third of the assets in the U.S. public equity market and more than 60 percent of U.S. domestic equity mutual funds.[11] Many of these strategies do not spend resources to gather information about fundamental value and free ride on prices in the market.

Active managers play a vital role in markets because they contribute to price discovery and provide liquidity. In other words, price and value tend to converge through their efforts, and they facilitate the ability to convert cash into stocks and stocks into cash. These functions are valuable public goods, and it stands to reason that markets cannot operate effectively if composed entirely of index funds.

Paths to Market Efficiency. Let's consider the three theoretical ways that investors can make markets efficient.[12] The first is to assume that all investors are rational, which means they process information correctly, form unbiased expectations, and maximize expected utility. This is close to what Fama had in mind when he coined the term "efficient market" in 1965.[13] No one really believes this and no one ever did. But it remains a touchstone for efficiency.

Next, we can assume that some investors, rather than all of them, are rational. These investors are arbitrageurs who seek mispricings and buy low and sell high when they find them. This ensures the convergence of price and value.

These are the investors in the Grossman-Stiglitz model who incur costs to find inefficiencies and benefit from excess returns as they remove them. There are large, sophisticated, and profitable firms that function in this role in markets every day.[14]

The challenge, as we will see later, is that arbitrageurs fail to show up from time to time. Notably, this often occurs during periods of market dislocations where arbitrage opportunities are among the richest.

The final way to get to efficient markets is the wisdom of crowds, the idea that the aggregation of the information from many independent individuals produces an accurate output.[15] Crowds are wise, however, only when certain conditions are in place: a diversity of views, a mechanism to aggregate those views, and proper incentives.

The notion that markets excel at synthesizing dispersed information to discover accurate prices is central to why Friedrich Hayek (1974) and Vernon Smith (2002) were awarded Nobel Prizes in economics.[16]

Scott Page, a social scientist at the University of Michigan and external faculty member at the Santa Fe Institute, popularized “the diversity prediction theorem” to show why this works.[17] The theorem demonstrates that a group’s collective error—the wisdom of the crowd—equals average individual error minus prediction diversity.

What follows from the theorem is that the collective is always more accurate than the average person within the collective, and that the wisdom of crowds relies equally on smarts (average individual error) and diversity. Markets succeed in large part because they provide a robust mechanism for aggregating this dispersed information.[18]

Incentives are also important. In markets, incentives reflect profits for being right and losses for being wrong. This sharpens predictions and ensures that views that are far from the consensus and correct provide a sizable payoff.

Crowds can go from wisdom to madness when any of these conditions are violated. Diversity is the most vulnerable. Instead of investors having a range of opinions, their views become correlated. When this happens, either because they synchronize their views or dissenters sit out, the crowd loses the diversity that is the foundation for its accuracy.

Measuring market efficiency is inherently hard because of the “joint hypothesis problem.”[19] The first hypothesis is that there is a reliable model that predicts asset price returns. The capital asset pricing model (CAPM), which describes the relationship between systematic risk and expected returns, is commonly used by executives and investors, but lots of other models exist.[20] The second hypothesis is that the market is efficient.

The problem is that you can consider an asset return anomalous only if you have an accurate model of expected returns. As a consequence, an anomalous return may be the result of an asset-pricing model that is wrong, a market inefficiency, or both. It is therefore hard to deem an asset mispriced unless you are confident that the model is accurate.

Let’s see how these approaches fit with the three considerations for efficiency: fundamental value, investor behavior, and arbitrage costs.

Assessing Efficiency: Prices Are Right and No Free Lunch. Robert Shiller, a professor of economics at Yale University who shared the Nobel Prize with Fama in 2013, developed a model based on the concept of a noise trader.[21] These investors trade "on noise as if it were information," and "from an objective point of view they would be better off not trading."[22] The model suggests that an asset price is jointly determined by its fundamental value and the cost of arbitrage.

When noise traders push prices away from fundamental value, informed investors can profit by trading against them when arbitrage costs are sufficiently low. Under these conditions, arbitrageurs earn excess profits and make markets efficient in the process.

When arbitrage costs are high, mispricings can persist because the cost to correct them exceeds the potential benefit. Market efficiency, where price equals value, lies on a continuum from very inefficient to very efficient across and within asset classes. Where it lies depends on the vagaries of investor behavior and the cost to correct prices.

Paul Samuelson was an influential economist who was awarded the Nobel Prize in 1970. He articulated what has become known as the "Samuelson Dictum": the stock market shows "micro efficiency" and "macro inefficiency." Micro efficiency suggests that individual stocks are accurately priced relative to one another. Macro inefficiency says that prices for the market overall can stray far from fundamental value. Empirical studies support the distinction.[23]

Fischer Black, another major contributor to finance theory, defined "an efficient market as one in which price is within a factor of 2 of value, i.e., the price is more than half of value and less than twice value."[24] This is a remarkably wide band. Indeed, there is evidence that investors form expectations for returns without a strong view of what the proper price should be, what academics call "price agnostic demand."[25]

A strict interpretation of the efficient market hypothesis (EMH) says that "at any point in time the actual price of a security will be a good estimate of its intrinsic value."[26] It is hard to take this idea too seriously if we accept Black's range of gaps between price and value.

On the other hand, the efficient market hypothesis makes a specific prediction that active investment managers overall will struggle to produce returns consistently in excess of the market after considering risk. The data support this.[27]

These observations allow for a useful distinction between "prices are right" and "no free lunch."[28] Prices are right means that price is an unbiased estimate of value, or correct on average. No free lunch says that there is no investment strategy that reliably generates excess returns. If prices are right, it stands to reason that there is no free lunch.

But the opposite need not hold. There can be no free lunch even when prices are wrong if the cost and risk of correcting a mispricing are sufficiently high. Identifying and exploiting these pockets of inefficiency should be the main focus of active managers.

Before we discuss inefficiencies and potential sources of excess returns, we will spend some time trying to understand the investing landscape. This analysis focuses on the U.S. equity market, but the concepts extend to most markets. The first approach examines the relationship between equity returns and fundamentals.

What Game Are We Playing? (Part 1)

In the short term, the trio of fundamentals, investor behavior, and arbitrage costs are all important contributors to equity returns. In the long term, fundamentals tend to be the dominant determinant of equity returns.[29]

Skewed Long-Term Wealth Creation. Let's start with the pattern of returns. Hendrik Bessembinder, a professor of finance at Arizona State University, studied 28,600 public companies in the U.S. that were listed from 1926 to 2024 and defined wealth creation as earning a return higher than one-month Treasury bills, commonly considered to be the "risk-free" rate. He found that 59 percent of stocks that have traded in the last century have destroyed wealth.[30] Analysis of stocks outside the U.S. produced a similar result.[31]

Further, just 2 percent of the stocks that beat Treasury bills were responsible for $72.6 trillion of the aggregate $79.3 trillion of wealth created, or more than 90 percent of the total. The top 5 stocks alone contributed 20 percent of the total wealth created. In the long term, a small number of large winners determine overall results for the stock market.[32] Actively-managed equity mutual funds share these characteristics.[33]

There are two main ways to participate in markets if you assume the pattern of future results will be similar to that of the past. The first is to buy an index fund. In this case, you will be guaranteed to own the majority of stocks that fail to create wealth but will also own the massive winners.

The second is to attempt to build a more concentrated portfolio that has a reasonable probability of including the stocks of the great wealth creators. Bessembinder examined the extreme winners and found that they had good growth in fundamentals, were not just technology companies, and tended to suffer large drawdowns, price declines from peak to trough, at some point.[34]

Most institutional money managers have guidelines for portfolio diversification and risk management. The practical challenge in owning and holding a stock that compounds in value is that it may become too large a position in a portfolio and violate parameters for diversification, market capitalization, or risk.

Lifetime Earnings to Price. The next issue is the link between stock price returns and company fundamentals, including earnings and cash flow growth.

Three professors of accounting, Sanjeev Bhojraj, Ashish Ochani, and Shiva Rajgopal, examined 13,800 U.S. public firms that started trading between 1975 and 2019, excluding companies in the financial sector.[35] They set out to assess stock market efficiency by calculating the present value of future earnings, the basis for fair value, and comparing it to the stock price at which the company first came public. They call this the ratio of "remaining lifetime earnings to price," or RLTEP.

Remaining lifetime earnings are tricky to measure because less than 20 percent of the sample survived in the period they examined. More than 40 percent of companies were acquired and just under 40 percent delisted.

The professors calculate the discounted lifetime earnings per share as the sum of the discounted actual earnings per share in each year of the remaining life plus a terminal value. That terminal value is estimated for surviving companies. It is assumed to be the acquisition price per share for merged firms and the delisting price per share for delisted firms.[35] Price is as of the close on day one for initial public offerings and reflects equivalent measures for spin-offs and direct listings.

The results, shown in exhibit 2, have something for everyone. Believers in market efficiency can go to the bottom cell of the third column, which shows that the average ratio of lifetime earnings to stock price for the full sample is 0.9. This says that value is within 10 percent of price for all of the stocks that started trading in this period.

Exhibit 2: Ratio of Lifetime Earnings to Stock Price, 1975-2019

Category	Number	Ratio of Lifetime Earnings to Stock Price (Mean)	Ratio of Lifetime Earnings to Stock Price (Median)	Percent of Firms with Lifetime Earnings That Do Not Justify Stock Price
Surviving	2,463	1.1	0.1	71.8%
Merged	5,896	1.7	1.0	48.6%
Delisted (Non-Merged)	5,425	0.0	-0.1	94.7%
Total	**13,784**	**0.9**	**0.2**	**70.9%**

Source: Counterpoint Global and Sanjeev Bhojraj, Ashish Ochani, and Shiva Rajgopal, "Firms' Stock Prices, Stock Returns, and Remaining Lifetime Earnings," Management Science*, forthcoming.*

Believers in market inefficiency can point to the bottom cell of the fourth column, the median ratio of lifetime earnings to stock price. That number for the total sample is 0.2, which means that one-half of the values were less than 20 percent of the initial price. Further, that the average is substantially higher than the median tells you that a small percentage of stocks had a disproportionate impact on the total. This is completely consistent with Bessembinder's findings.

The column on the right shows that in total, 71 percent of all companies fail to produce sufficient earnings to justify their price. This is true for less than one-half of the companies that merge but 95 percent of companies that delist. This, too, is similar to the results from Bessembinder.

Another feature of these results is that the average lifetime earnings to price ratio is 1.7 for the stocks of companies that merge, 1.1 for those that survive, and zero for those that delist. A narrower disparity exists using a median ratio. The problem of value and price does not go away if one company buys another; it gets passed on to the buyer.

Both studies, one focused on returns and the other on fundamentals, show the same pattern: a small fraction of firms create nearly all the wealth over time. This is a natural effect of long-term compounding. These results are less important for investors who do not hold investments for a long time, which is a growing part of the investment ecosystem.

What Game Are We Playing? (Part 2)

Franklin Allen, a professor of finance and economics at Imperial College London, used his presidential address to the American Finance Association in 2001 to point out what was then a puzzling dichotomy: the role of institutions is central to the study of corporate finance but had been nearly absent in the study of asset pricing.[37]

Scholars have long studied the potential conflicts that arise between the owners of a business, or principals, and the managers who act on their behalf, or agents.[38] Agency theory focuses on the costs that agents create when they pursue actions that benefit themselves at the expense of the principals. These costs create inefficiency and reduce shareholder value.

The question of who buys and sells stocks received little attention when the foundations of modern finance theory were established. In part, this reflects the key assumptions in classical finance theory, including frictionless markets and homogenous expectations, that together suggest the demand curve for stocks is flat. The theory implies that investors can buy or sell any amount of stock without affecting the prevailing price, and that trading that is unrelated to new information should not influence the price.

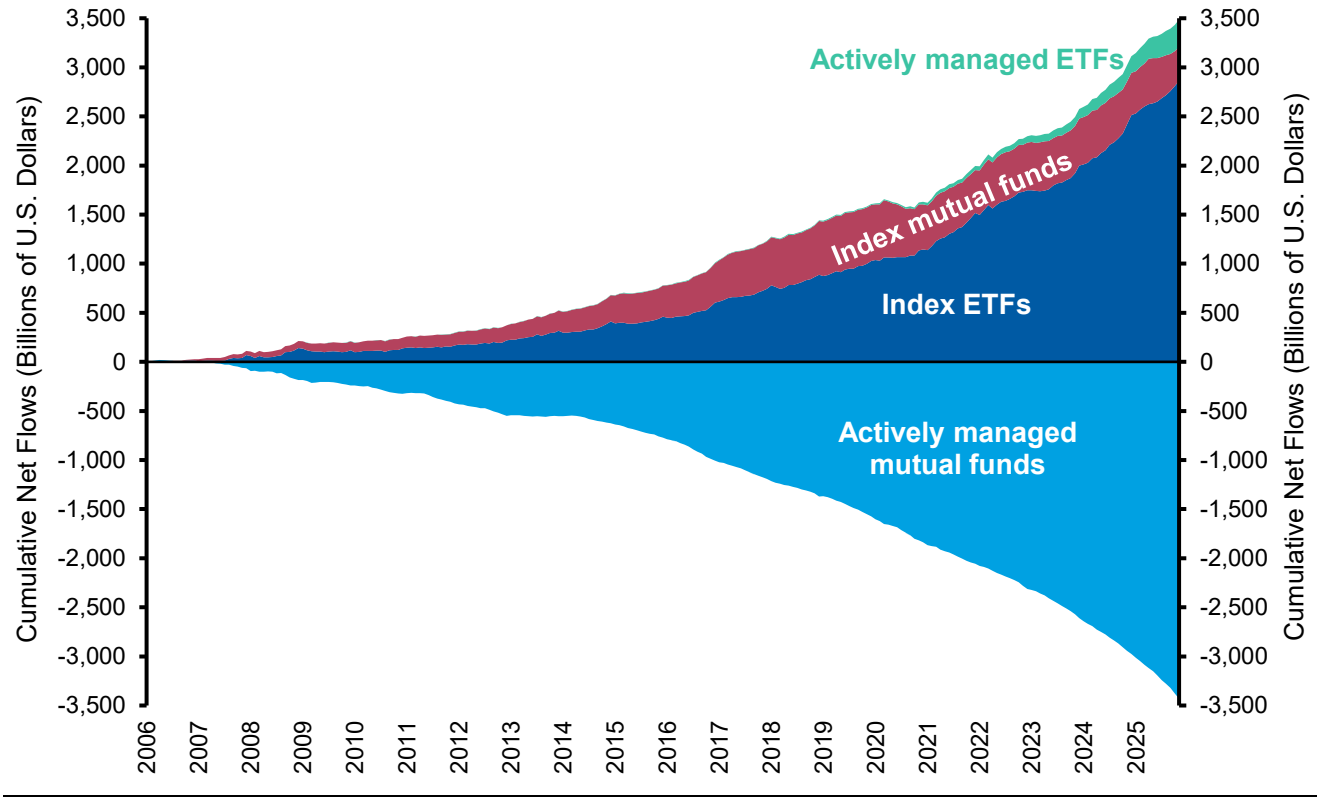
But in recent decades, a flood of research has shown that demand curves in the stock market slope downward.[39] This means that a stock's price goes up when many investors seek to buy it at the same time. The result is symmetrical for selling.

One way to see whether demand curves slope downward is to measure what happens when a stock is added or removed from an index. In the case of an addition to an index, there is no new fundamental information, but index funds and some rules-based investors have to buy the shares, leading to a boost in the price. This effect, while still relevant, has attenuated.[40]

The evidence now shows that who is doing the buying and selling matters.[41] We will focus on three big trends. The first is the massive flow out of actively-managed funds and into index mutual funds and ETFs. The second is the migration from funds with longer-term to shorter-term investment horizons within the actively-managed portion of the market. The final trend is the rise in trading by retail investors, especially since the onset of the COVID-19 pandemic in 2020.

Active to Passive. Exhibit 3 shows cumulative net flows for U.S. mutual funds and ETFs from 2006 to 2025. Flows represent the buying (inflow) or selling (outflow) of funds by investors. Over this period, the net inflow into index mutual funds and index ETFs was $3.2 trillion, and almost 90 percent of the flows went to ETFs. The net outflow from active mutual funds and active ETFs was $3.2 trillion, with an outflow of $3.4 trillion from active mutual funds offset by an inflow of almost $300 billion into active ETFs.

Exhibit 3: Cumulative Net Flows for U.S. Mutual Funds and ETFs, 2006-2025



Source: Counterpoint Global and Morningstar Direct.
Note: Monthly data, 1/31/2006-11/30/25; U.S.-domiciled funds that invest in U.S. equity.

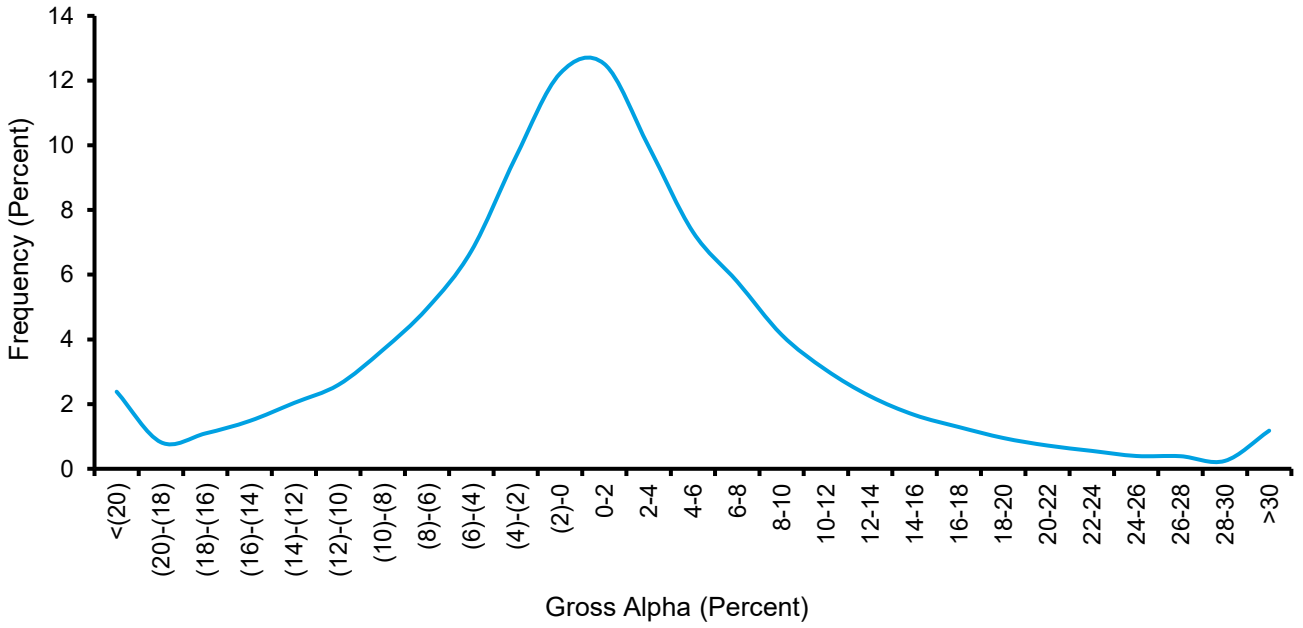
Index funds are appropriate for investors who are satisfied with market returns. But index funds rely on active managers to keep price and value in line and to be a ready source of liquidity. Further, while index funds contribute nothing to price discovery, they must trade to accommodate flows, reflect inclusions and deletions to the index, and capture the issuance and repurchase of stock by the companies in the index.[42] This trading imposes costs on the funds.

One question that looms large is whether the pattern of investor flows out of active management and into indexing affects price discovery and liquidity. Despite some bold claims from practitioners that indexing has led to less efficient markets, as well as assertions from proponents of indexing that it has not affected efficiency, the academic research on this topic is equivocal.[43] Appendix A provides a list of papers that find indexing increases or decreases efficiency. Many, if not most, offer qualified assessments.

Active management creates value by contributing to price discovery and liquidity, and the results of active management are often depicted as worse than they are. In fact, studies show that active managers are skilled at selecting stocks but charge fees that largely obviate that ability.[44] Further, active and index funds within the same investment category produce similar returns when their fees are comparable.[45]

Exhibit 4 shows the distribution of annual gross alpha, a fund's risk-adjusted return before fees minus the return of its benchmark, for all mutual funds that invested primarily in U.S. stocks from 1976 to 2024. The average is 67 basis points, the median is 35 basis points, and more than one-half of all funds are positive. However, the fees that the funds charge were roughly equal to the gross alpha.

Exhibit 4: Distribution of Annual Gross Alpha, U.S. Mutual Fund Industry, 1976-2024



Source: Counterpoint Global and Morningstar Direct.
Note: Mutual funds that invest primarily in U.S. equity; Gross alpha is the difference between a fund's pre-fee return and its expected return given the fund's beta and the return of the fund's primary benchmark, as stated in its prospectus.

Advocates and critics of indexing agree that some active management is essential for the market to function well. If indexing creates inefficiency, the Grossman-Stiglitz framework says that the potential benefit of excess returns will exceed the cost of becoming informed, thereby encouraging active managers to participate and profit.

This leads to the point that active investors have to believe both in inefficiency and efficiency. You need inefficiency to buy or sell an asset with a price different than its value, and you need efficiency to make sure that price and value converge.

There would be no reason to try to outperform the market through active management if it were perfectly efficient. This is the basis for the "prices are right" argument.

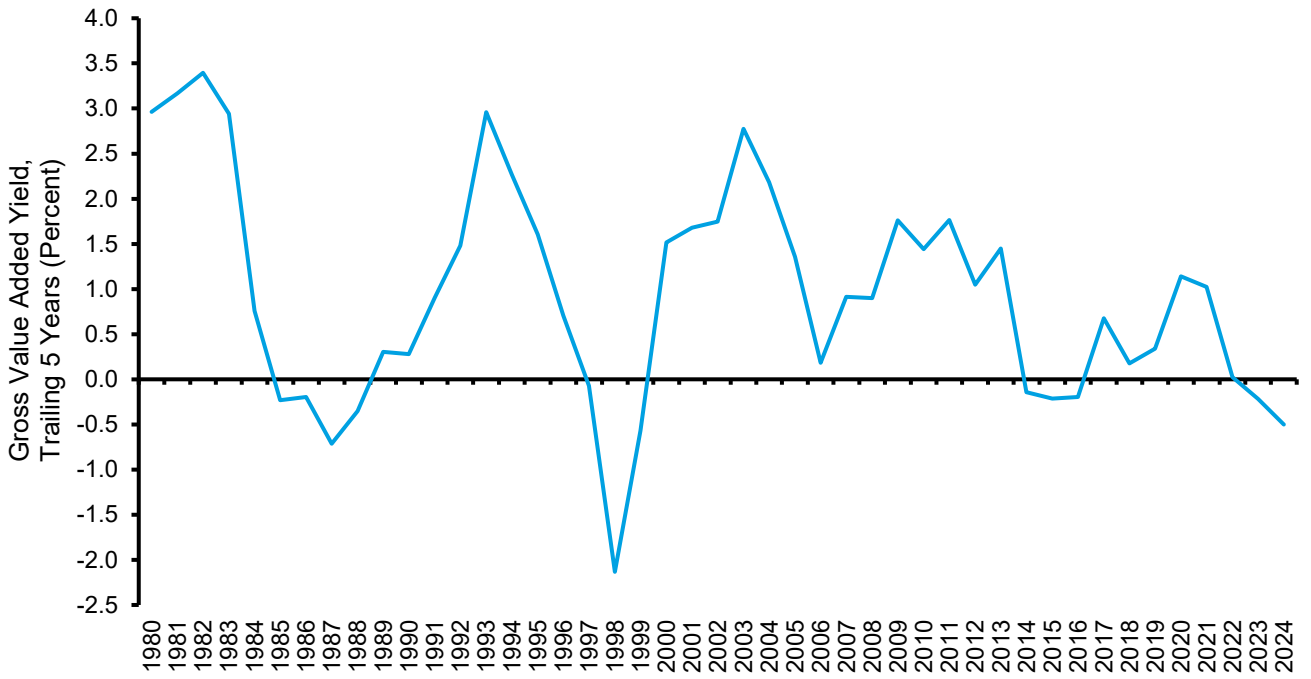
But there would also be no reason to try to beat the market through active management if you thought it were perpetually *in*efficient. The reason is that even if you were smart enough to buy a dollar of value for the price of fifty cents, there would be no basis to believe that the gap between price and value would close.

You would expect active managers to provide better results if the rise of indexing has led to more exploitable inefficiencies. Gross value added for a fund is its gross alpha times assets under management.

Exhibit 5 shows the average gross value added yield over the trailing five years from 1980 through 2024 for the universe of mutual funds that invest in U.S. stocks. This yield is the sum of gross value added for all funds divided by the total assets under management. You can think of this yield as the pre-fee value that these mutual funds extracted from the market.

Over the full period, the gross value added yield nets close to zero. But the trend is generally down since the Great Recession (2007-2009), which coincides with an acceleration of flows into index funds.

Exhibit 5: Gross Value Added Yield, 5-Year Rolling, U.S. Mutual Funds, 1980-2024



Source: Counterpoint Global and Morningstar Direct.
Note: Mutual funds that invest primarily in U.S. equity.

Another factor that has created a challenge for active managers is the rise in stock market concentration in the U.S.[46] For example, the market capitalization of the top 10 stocks was 15 percent of the U.S. equity market at the end of 2015 and more than doubled to roughly 35 percent at the end of 2025.

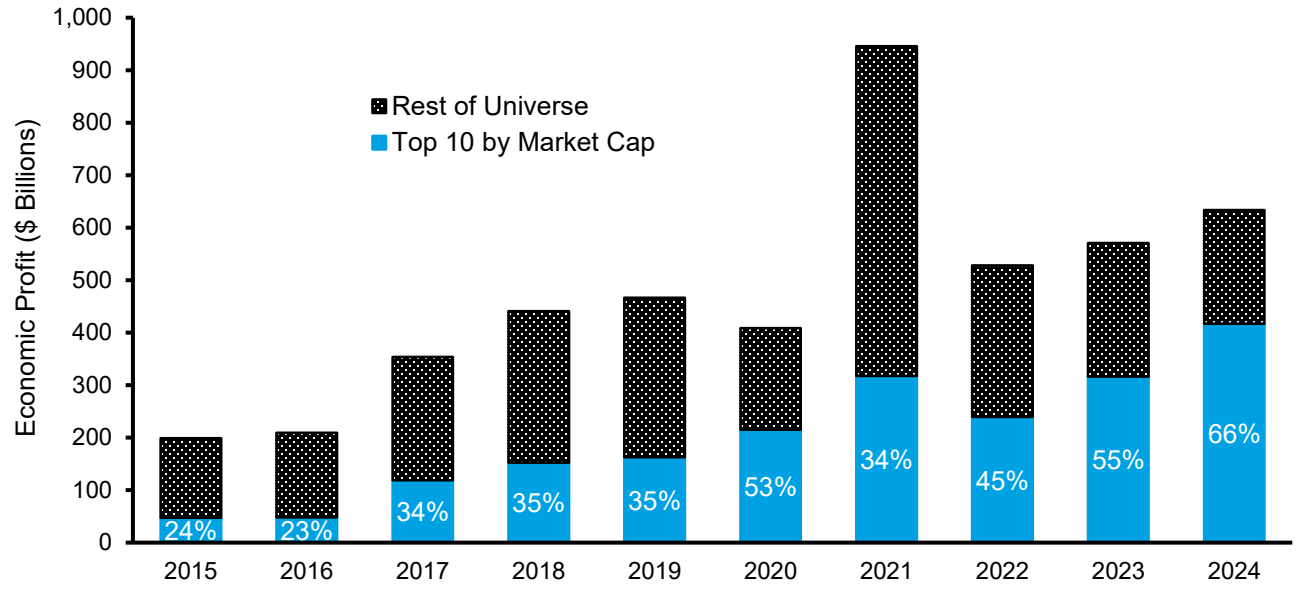
Increased concentration introduces difficulty for many active mutual funds because most benchmarks are weighted by market capitalization and a majority of funds have an average market capitalization less than that of their benchmark.[47] As a result, when large capitalization stocks perform well, which is by definition what happens when concentration rises, funds struggle to meet or exceed their benchmarks.

Some academics and practitioners have argued that indexing has caused the rise in concentration.[48] This concern is tempered by the fact that we have had similar levels of concentration in the past before indexing existed, there is a large dispersion of price returns among the biggest stocks (in 2025, Alphabet's total shareholder return was 60 percentage points higher than Amazon), and the fundamentals of these businesses arguably support their weighting.

Economic profit is to companies what gross value added is to mutual funds. It equals return on invested capital (ROIC) minus the cost of capital times invested capital. The first part of the equation, ROIC minus the cost of capital, indicates whether the company creates value. The second part, invested capital, reveals how much the company has been able to deploy at that spread. We estimate the aggregate economic profit for all U.S. public companies annually. The total was $633 billion in 2024.

Exhibit 6 shows the percentage of total economic profit earned by the top 10 companies as measured by market capitalization over the past decade. In 2024, for example, the top 10 companies were about one-third of the total market capitalization and two-thirds of the economic profit. The percentage of total economic profit is consistently higher than the percentage of market capitalization for these companies.

Exhibit 6: Share of Economic Profit for Top 10 Companies by Market Cap, 2015-2024

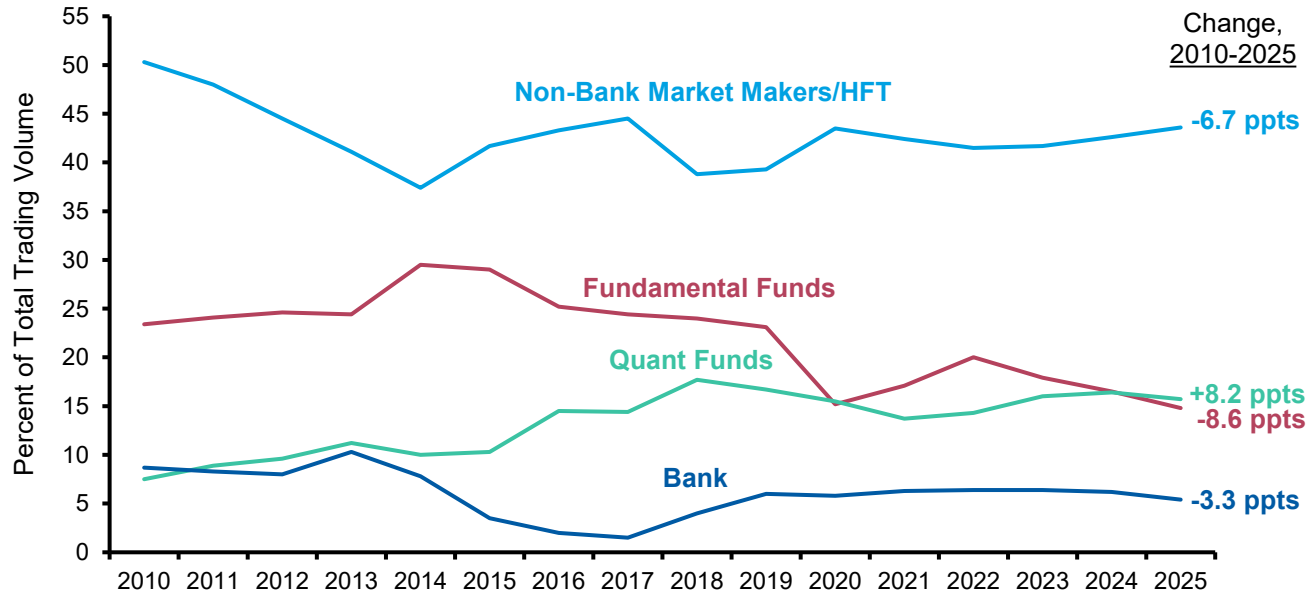


Source: Counterpoint Global and FactSet.

If indexing is creating exploitable inefficiencies, active equity mutual funds do not appear to be the beneficiaries. This leads to the second trend: within the actively-managed portion of the market, funds with longer investment horizons are losing assets to funds with shorter horizons.

Active Management: Shortening Time Horizons. Take a look at exhibit 7, which provides a breakdown of U.S. equity trading volume by institutional category from 2010 to 2025. The total share of trading for fundamental funds shrinks from 23.4 percent in 2010 to 14.8 percent in 2025. Within this category (not shown), funds that are only long went from 11.3 to 6.2 percent, and hedge funds declined from 12.1 to 8.6 percent. Note that the assets under management for the long-only funds are substantially larger than those for hedge funds.

Exhibit 7: U.S. Equity Trading Volume by Institutional Participant, 2010-2025



Source: Counterpoint Global and Bloomberg.
Note: 2025 data through Q3.

The exhibit also shows that quantitative funds increased their share of trading from 7.5 to 15.7 percent of the total. Within quantitative funds (not shown), lower-frequency funds went from 6.0 to 4.1 percent of the volume while higher-frequency funds soared from 1.5 to 11.6 percent.

The picture that emerges is a shift away from fundamental investing toward quantitative investing. One area of particular interest is the rise of multi-manager hedge funds in recent years. These funds, colloquially called “pod shops,” allocate capital across numerous portfolio managers and proactively manage risk across the platform. Many also have “center books” that aggregate positions and manage overall firm-level risk. These funds commonly have total market exposures that are four to five times their invested capital.

In recent years, multi-manager funds have delivered strong returns for fundholders when evaluated using volatility to adjust for risk. They have thrived as a result. One estimate suggests that the total number of employees at these funds has jumped from 5,100 in 2017 to 24,000 in 2025.

A high percentage of investor flows into hedge funds have gone into these strategies, and their collective growth in assets under management, now about $425 billion, has substantially exceeded that of the rest of the industry. And because these funds use substantial leverage, they are 37 percent of hedge fund trading volume while only about 10 percent of the industry’s assets under management.[49]

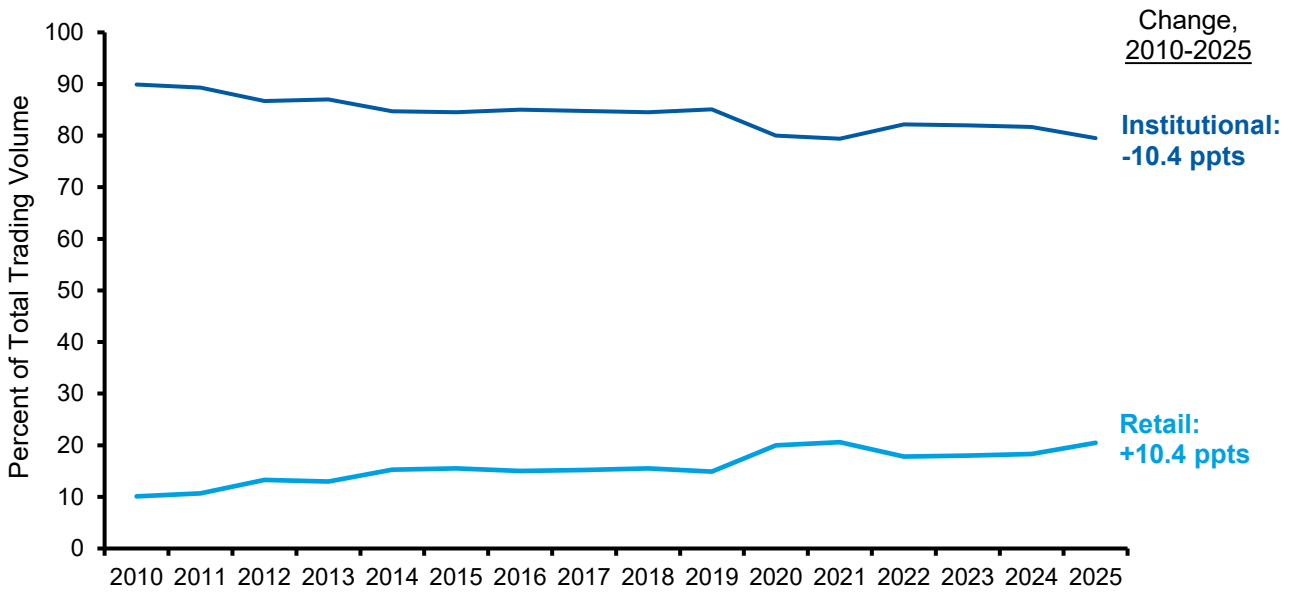
The important point is that many of the portfolio managers within these funds focus on generating short-term returns. Specifically, they spend a great deal of time forecasting the results of quarterly earnings releases and the ensuing stock price movement.

Hedge funds generally make the market more efficient.[50] But they also introduce risks such as crowding, when multiple funds hold similar positions, creating the possibility of wide price swings when views of the assets shift.[51]

For the smart money to have a positive excess return, the dumb money must have an equivalent negative excess return (leaving aside the impact of investors transacting directly with companies through equity issuance and retirement). Historically, retail investors have been considered the dumb money. But the current situation has more nuance.[52]

The Rise of Retail. Exhibit 8 shows that retail investors have doubled their market share of equity trading from 2010 to 2025, going from about 10 to 20 percentage points. Nearly one-half of that share increase occurred from 2019 to 2020 alone. An article in the business press suggested that individual investors went from “fringe players” to a “dominant market force.”[53]

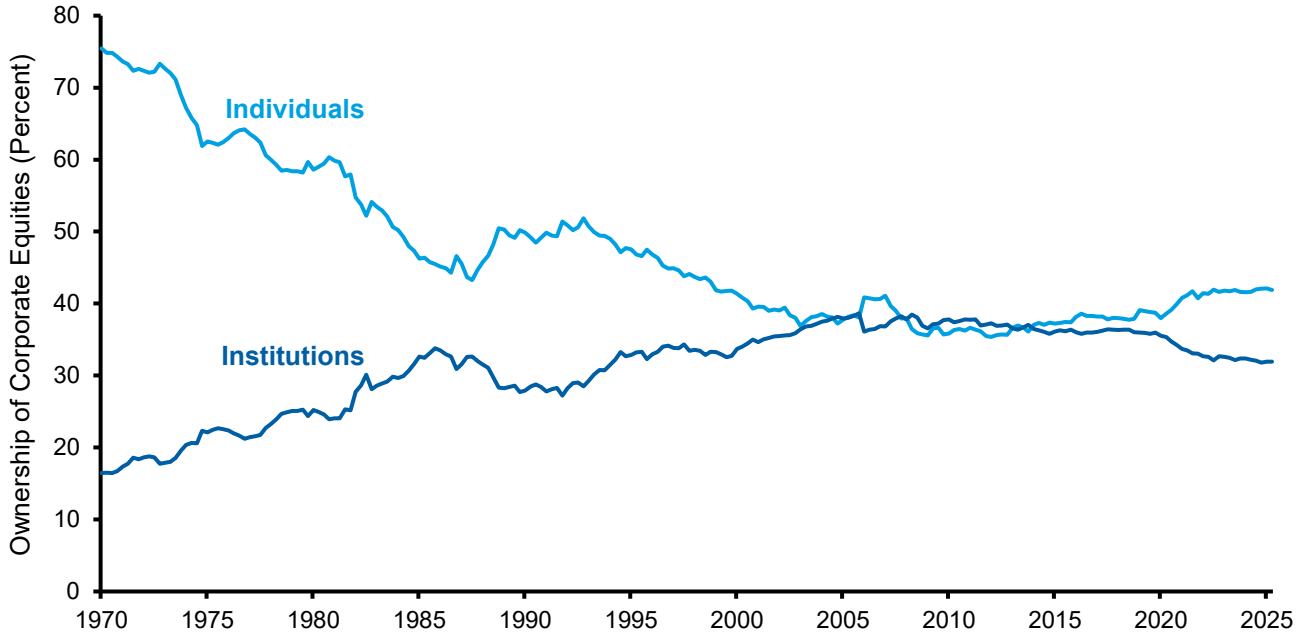
Exhibit 8: U.S. Equity Trading Volume, Institutional Versus Retail, 2010-2025



Source: Counterpoint Global and Bloomberg.
Note: 2025 data through Q3.

We see this shift in U.S. equity ownership in data from the Federal Reserve (exhibit 9). Individual ownership fell steadily for the three decades preceding the early 2000s, was stable for about a decade, and then rose again. Retail ownership was last at current levels at the end of 1999.

Exhibit 9: U.S. Equity Ownership, Individuals and Institutions, 1970-2025



Source: Federal Reserve.
Note: Quarterly data, through second quarter of 2025; Institutional investors include insurance companies, private pension funds, mutual and closed-end funds, and exchange-traded funds; Individual investors include households and nonprofit organizations.

There are three main causes of the recent rise in retail activity. The first is the introduction of free trading. Robinhood Markets, a trading platform, started with commission-free trading in 2014, but it was not until the industry heavyweights, including Charles Schwab, went to no commissions in the fall of 2019 that this feature became conventional.

Brokerage firms can offer free trading because they make money by selling orders to wholesale market makers in what is called “Payment for Order Flow.” These wholesalers can afford to pay for flow because they make money capturing part of the bid-offer spread and can cross trades on their platform. The risk of being on the wrong side of a trade is also minor because retail activity is relatively uninformed and the trade sizes tend to be small.

The ability to trade for free naturally reduces the barrier for activity. This created an ideal setting for more retail trading preceding the second cause, the onset of the COVID-19 pandemic.

Retail trading took off during COVID for various reasons: trading was free, many individuals received stimulus checks, the curtailment of professional sports meant no sports betting, and markets were volatile.

Three rounds of stimulus checks, issued in the U.S. from April 2020 to March 2021, correlated with growth in retail trading accounts and activity in stocks that retail investors have favored. Some estimates suggest individuals invested 10-15 percent of their stimulus payments in the stock market.[54]

Matt Levine, a columnist at *Bloomberg*, came up with the “boredom market hypothesis,” the “basic theory is that ordinary people will do more trading (1) if trading is entertaining and (2) if other things are less entertaining: The more bored they are, the more they will trade stocks.”[55] In other words, the stock market was “a casino that happens to still be open.”[56]

The last cause is the gamification of investing, which should be understood as the gamification of speculating. Gamification encourages activity by using concepts from playing games, including scoring, instant feedback, and rewards. Experiments show that gamification increases risk-taking, especially among those with lower financial literacy.[57] A great deal of retail activity today, especially in the equity options market, is veiled gambling.

For example, academic research suggests that retail investors do not understand completely the risks they are taking in their options trading strategies, and that their average percentage losses over three days are in the mid-teens.[58]

Further, retail investors are the most likely to be victimized by “pump and dump” schemes, where swindlers artificially pump up the price of a stock through false or misleading statements, quickly dump their shares at the elevated price, and leave credulous investors with large losses.[59]

We will again discuss retail investors in the context of analytical skill. But first is the surprising point that individual investors, by one measure, have outperformed mutual funds from 2014 to mid-year 2025.

Vanda Research, an independent data and research firm, analyzes the activity in single stocks listed in the U.S. within the brokerage accounts of individual investors and estimates the return of the average portfolio. This analysis does not consider transactions in mutual funds, ETFs, or those made through advisors or retirement accounts.[60]

This narrow definition of returns shows that retail investors earned about 200 basis points more, per annum, than the S&P 500 over this period.[61] The reasons include the fact that retail investors are generally overweight

the “Magnificent Seven,” seven of the largest technology companies that have benefitted from the rise in concentration, as well as the proclivity to buy dips in the market.[62]

Notwithstanding this research, it should be noted that a subset of retail investors are very active, both in markets for equities and equity options, and tend to lose money over time.[63]

In recent years retail traders have also created a commotion by organizing their actions. The traders commonly coordinated through r/wallstreetbets, a forum on the social media platform Reddit. Their strategy was to buy stocks that were heavily shorted by institutional investors.[64]

GameStop, a video game retailer, is a well-known example. At the peak, 140 percent of GameStop’s public float was sold short, meaning that short sellers would have to purchase those shares eventually to close out their positions.

In a short sale, an investor borrows shares (often at a cost) from another shareholder and immediately sells them in the market. If the stock goes down, the investor then buys back the shares and returns them to the lender, profiting from the difference between the high selling price and low purchase price.

When GameStop’s stock went up, short sellers were compelled to buy shares to limit their losses. Estimates show that short sellers had $20 billion in mark-to-market losses in January 2021 alone.[65] To put this in context, the company’s equity market capitalization at the end of 2020 was $1.2 billion.

The environment for equity investment in the U.S. has changed substantially in recent years. The rise in indexing means there is a steady flow into equity markets without consideration of value. Funds that are actively-managed have shifted toward strategies with shorter-term holding periods than traditional funds. Retail investors have re-emerged, fueled by commission-free trading, the demand created by the time and funds that the COVID pandemic afforded, and the gamification of trading and easy access to activities that are more akin to gambling than long-term investing.

Before we turn to paths that lead to potential excess returns in public equity, we review briefly how the concepts of price discovery and liquidity apply in private equity.

Market Efficiency in Private Equity

Private equity, an asset class that includes buyout funds and venture capital, has grown meaningfully in recent decades.[66] In the U.S., private equity as a percent of private plus public equity went from 1 percent in 2000 to 8 percent in 2025.[67] Notwithstanding this growth, the market for public equity remains vastly larger than that for private equity.

Sophisticated institutions have been the main investors behind the rise in private equity. For example, state and local pension funds in the U.S. had about 15 percent of their assets dedicated to private equity in 2024, up from essentially no allocation in 1990.[68] Large endowments had nearly 29 percent of their portfolios committed to private equity in 2024, at least four times what it was in 1990.[69]

Public equity and private equity have different profiles with regard to price discovery, correction mechanisms, and liquidity. Broadly, neither price discovery nor liquidity is as good in private markets as it is in public markets.

Prices are set by a double-auction market for public equities in the U.S. Within this market structure, buyers bid a price they are willing to pay and simultaneously sellers offer a price they are willing to accept. Transactions happen when a bid meets or exceeds an offer. Trading is continuous and bids and offers are transparent.

Investors who want to bet on a stock going down can generally short it in a public market. There are also ways to correct the prices of the stocks of public companies that get too cheap. Buyout firms, which currently have about $1 trillion of capital that limited partners have committed but is not yet invested (called “dry powder”), are always on the lookout for favorable deals. Activist investors also scour the landscape for the stocks of undervalued companies that can be improved through changes in corporate governance and operations.

Private markets do not have double-auction markets or a practical way for bearish investors to express their views. With a buyout, the seller is motivated by economic interest and responsibility to take the highest viable offer. In venture capital, the seller, usually the founder, will also seek the top feasible bid. In subsequent rounds of financing in venture, the overall price is generally revised to reflect the valuation of the most recent stake sold. Price discovery is limited in private markets.

Institutional investors in public equity markets, such as mutual fund managers, value their portfolios daily based on prevailing market prices. Funds that invest in private companies generally estimate the values of what they own. Because private equity funds normally have a limited life, typically 10 years, the prices at which they sell investments ultimately determine the returns of the funds. But in the interim, they have a lot of discretion in the prices at which they mark their positions.

Buyout funds generally seek companies that generate decent cash flows, and the valuation of comparable companies in the public market can guide price discovery. That noted, the volatility in the marks is understated relative to what the public equity markets suggest. This means that the risk-adjusted returns of buyout funds appear better than they would otherwise.[70]

Venture capital generally involves younger firms with prospects that are more uncertain. Recent deals tend to determine marks as it is often challenging to find suitable comparable companies in the public market.

One way to see whether the valuations in buyout and venture portfolios are reasonable is through secondary market transactions. In these cases, a fund (general partner) or an investor (limited partner) seeks to sell a position. In the half dozen years ending in 2024, the discount to the marked value has been in the range of 8-10 percent in buyouts and 25-27 percent in venture capital.[71]

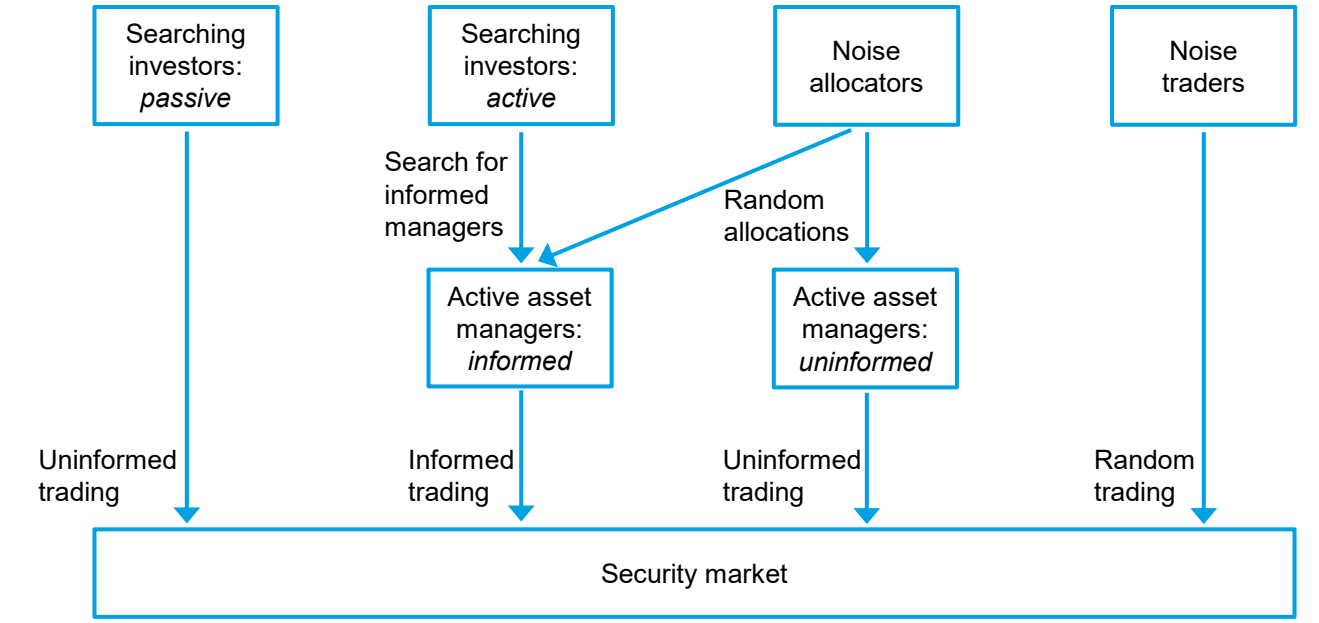
Liquidity is also relevant. Liquidity measures the ability to turn an asset into cash or cash into an asset. High liquidity means the cost is small, and low liquidity means the cost is high. As such, investors demand a higher return (implying a lower price) for owning an asset that is illiquid, or an “illiquidity premium.” Financial economists have documented this premium empirically.[72] The discount that we see in secondary markets reflects in part the illiquidity premium.

Using the Grossman-Stiglitz framework, private equity has a higher cost of information than public markets and hence higher fees.[73] But overall, the price discovery and liquidity in private equity is not as good as it is in public equity.

Who Is On the Other Side?

The first step in winning a game is understanding the game you are playing. The dynamics of who is involved and what behaviors they are expressing are relevant for appreciating where opportunities may arise. Nicolae Gârleanu, a professor of finance, collaborated with Lasse Pedersen on a model that considers the interaction between markets and managers, investors, allocators, and traders (see exhibit 10). Market participants can both place themselves in the scheme as well as consider their counterparties.

Exhibit 10: How Markets Interact with Investors, Allocators, and Noise Traders



Source: Counterpoint Global based on Nicolae Gârleanu and Lasse Heje Pedersen," Efficiently Inefficient Markets for Assets and Asset Management," Journal of Finance*, Vol. 73, No. 4, August 2018, 1663-1712.*

Let's start in the middle of the exhibit. Informed active asset managers pay a requisite cost to acquire a signal about an asset and hence produce excess returns over time. Uninformed active asset managers do not pay to gain an edge and are therefore uninformed traders.

In this model, those who deal directly with markets are either indexers or noise traders, who are uninformed. Some active investors can identify skillful managers and allocate capital to them, while noise allocators allocate between skilled and unskilled managers.

Our Part 2 section of "What Game Are We Playing" suggests there has been an increase in activity among indexers and noise traders (retail) and a shift within active management to firms that allocate substantial resources to delivering short-term returns.

Public and private markets have historically been largely separate asset classes, but the distinction is blurring. For example, MSCI, a global provider of indices, has launched the MSCI All Country Public + Private Equity Index, which combines MSCI's All Country World Investable Equity Index with its new All Country Private Equity Index. The former captures 99 percent of listed stocks in the world and the latter the performance of 10,000 private equity funds around the world.[74]

Further, there has been a push in the U.S. to make alternative assets accessible to investors who have 401(k) plans, retirement savings accounts sponsored by employers.[75] 401(k) plans held $9.3 trillion in assets in mid-2025.[76]

The open question is how relatively unsophisticated investors in 401(k) plans will fare investing in private equity, where the dispersion of fund returns is high. In other words, some funds do much better, and others much worse, than the median returns for the asset class. Access to the best funds also tends to be limited. Finding informed asset managers is critical and challenging.

Let's go back to investing in individual securities. The question you should ask every time that you anticipate excess returns when buying or selling is "who is on the other side?" The goal is to understand your counterparty's motivation to act and assess whether you have an edge.

Ed Thorp, a mathematician and hedge fund manager with excellent returns, claims that you have an edge only when you "can generate excess risk-adjusted returns that can be logically explained in a way that is difficult to rebut."[77] In other words, you can articulate why an inefficiency exists and how it will be extinguished.

Gaining edge is hard. For instance, the anomalies that academic research finds do not provide the same returns in practice as they do in theory.[78] One reason is statistical bias: with lots of data and lots of relationships, some factors will correlate with attractive returns by chance and lack predictive value. Accordingly, some researchers suggest academic journals should raise their hurdle of what constitutes a legitimate factor.[79]

Smart investors also exploit the factors that do predict excess returns and therefore compete away the opportunity. This is especially true if investors can identify and capture them at a reasonable cost.

We now turn to a taxonomy of structural inefficiencies based on behavioral, analytical, informational, or technical (BAIT) sources. Most of the inefficiencies we will describe are the result of multiple sources, but we will attempt to place opportunities in the categories that make the most sense.

A particular investment opportunity may have multiple sources of inefficiency. Documenting the perceived reason for mispricing and evaluating whether the mispricing dissipates for the right reasons is an effective way to assess process.

Behavioral Inefficiencies

A behavioral inefficiency exists when an investor, or group of investors, behaves in a way that causes price and value to diverge. Behavioral inefficiencies may be at once the most persistent source of opportunity and the most difficult to capture. The persistence is the result of the constancy of human nature. Ben Graham, a professor, investor, and the father of value investing, put it this way:[80]

> Though business conditions may change, corporations and securities may change, and financial institutions and regulations may change, human nature remains the same. Thus the important and difficult part of sound investment, which hinges upon the investor's own temperament and attitude, is not much affected by the passing years.

The challenge stems from the fact that humans are social and investing is inherently a social activity. The combination of human nature and human sociality explains why behavioral inefficiencies are hard to exploit.

The core determinant of behavioral inefficiency, correlated beliefs, makes it difficult to take advantage of opportunities. Most of us have a desire to be part of the crowd and an aversion to being separated from the crowd. The psychological pull to conform is strongest at the extremes of fear and greed.[81]

Ben Graham created the parable of Mr. Market to explain how price and value diverge, as well as why it is important to have a sense of an asset's value.

In this story, you own a stake in a private company that costs you $10,000. One of your partners is an obliging fellow named Mr. Market who tells you, every day, the price he'd pay to buy your stake and the price at which he'd sell you an additional interest. Mr. Market captures the collective action of investors.

Mr. Market has "incurable emotional problems." Warren Buffett, chairman of Berkshire Hathaway and Graham's best-known student, elaborates, "Sometimes he is euphoric and sees only favorable outcomes and hence names a very high buy-sell price. Other times he is depressed and sees only negative outcomes and provides a very low buy-sell price. Mr. Market is there to serve you, not to guide you. It is his pocketbook, not his wisdom, that you will find useful."[82] The point is that markets generally offer sensible prices, but we have seen, and will continue to see, bouts of extreme optimism and pessimism.

There are a number of reasons to consider the influence of behavior on asset prices. To begin, typically less than one-half of short-term stock price moves can be directly linked to changes in fundamentals, such as revisions in expectations for earnings or interest rates.[83] Fundamentals ultimately matter a great deal but can be overshadowed by investor behavior in the short run.

In a similar vein, studies have examined the biggest moves in the stock market since the 1940s and whether the media provided a causal explanation. There was no clear fundamental determinant of value in a number of cases. One of these studies, which covered 1988 to 2012, concluded, "Only a minority of the 50 largest moves in the last 25 years can be tied to fundamental economic information that could have had a pronounced impact on cash-flow forecasts or discount rates."[84]

In exhibit 11, we update this analysis for the S&P 500, an index of the largest U.S. public companies, from 1988 to 2025. Consistent with past research, plausible reasons support some of the big moves, but others defy simple explanation (e.g., "Late rally on Wall Street as rebound in stocks defies latest economic news."). This line of research makes clear that changes in asset prices have fundamental and behavioral sources.

Exhibit 11: Largest Moves in the S&P 500 Index, 1988-2025

Rank	Date	Daily Return	News
1	March 16, 2020	-12.0%	Fed surprises market by cutting rates to zero and concerns grow over the coronavirus.
2	October 13, 2008	11.6%	Governments throughout the world announce moves to support troubled banks.
3	October 28, 2008	10.8%	Late rally on Wall Street as rebound in stocks defies latest economic news.
4	April 9, 2025	9.5%	S&P 500 has third-best day since World War II after Trump suspends tariffs.
5	March 12, 2020	-9.5%	Fear grips markets over a potential coronavirus pandemic. Fed can't halt decline despite injecting trillions.
6	March 24, 2020	9.4%	Stocks rebound on expectations lawmakers will pass a stimulus bill to offset damage from coronavirus and shutdowns.
7	March 13, 2020	9.3%	Stocks rally to regain some losses from coronavirus on hopes of bigger fiscal stimulus.
8	October 15, 2008	-9.0%	Falling retail sales and rising wholesale prices spikes fears of recession and erases Monday's record rally.
9	December 1, 2008	-8.9%	Obama reveals national security team. NBER says U.S. entered recession in December 2007. Bernanke warns of weak economic conditions.
10	September 29, 2008	-8.8%	$700 billion TARP bill rejected by House of Representatives. President Bush disappointed.

Source: Counterpoint Global and FactSet.

Behavioral influences are not just relevant for U.S. stocks but for nearly all markets.[85] For example, bubbles and crashes have occurred across geographies and asset classes. There is even evidence that we share some of these behavioral issues with other primates. Experiments show that capuchin monkeys exhibit loss aversion, the tendency to suffer more from losses than enjoy gains of a similar size.[86]

Naïve Application of Behavioral Economics. Behavioral economics shows how psychological factors can lead individuals or organizations to make decisions that deviate from economic theory.[87] It also shows how the use of heuristics, or rules of thumb, can lead to biases that affect choices. This body of research is extremely useful for anyone who seeks to make informed and unbiased decisions.

But it is important to recognize that individual errors, however widespread, are rarely relevant in determining market efficiency. The interaction of investors with little information or rationality can yield prices with surprising efficiency. The essential conditions include investors with heterogeneous views and decision rules, as well as an effective way to aggregate the information. The researchers who wrote one of the seminal papers on the subject summarize their finding as follows:[88]

> Allocative efficiency of a double auction derives largely from its structure, independent of traders' motivation, intelligence, or learning. Adam Smith's invisible hand may be more powerful than some may have thought; it can generate aggregate rationality not only from individual rationality but also from individual irrationality.

The lesson is that faulty individuals need not lead to inefficient markets because their errors can cancel out, resulting in accurate prices. If you are an overconfident buyer and I am an overconfident seller, the net result may be the correct price.

When considering market inefficiency, the key is assessing when the wisdom of crowds flips to the madness of crowds. That happens when one or more of the core conditions for a wise crowd are breached.

Critical to understanding behavioral sources of inefficiency is identifying when the beliefs of investors correlate with one another and push price away from value. Strong believers in efficient markets, including Gene Fama, claim that behavioral explanations are a compilation of stories that researchers craft to fit the facts.[89] In some cases, those stories can come into conflict. For example, some explain underreaction and others overreaction.[90]

Nicholas Barberis, a professor of finance at the Yale School of Management, suggests that many of the key concepts in behavioral finance are based on the psychology of belief formation and decision making. He contends that these affect asset prices.[91]

Overextrapolation. The excessive projection of recent experience is one of the most important ideas that explain the psychology of belief formation. For example, financial economists have shown that investor expectations for stock returns in the next year are highly correlated with returns in the past year. Investors expect high returns after realizing high returns and expect low returns after realizing low returns.[92]

Valuations are generally higher after a period of strong price advances and lower subsequent to price declines because stock prices are more volatile than corporate earnings. Empirically, high initial valuations are associated with low expected returns over a period of years and low starting valuations with high expected returns.[93] This contradicts the expectations from overextrapolation. This relationship between valuation and returns also holds for asset classes beyond stocks, including bonds, real estate, and sovereign debt.[94]

The ability to avoid and ultimately benefit from this type of overextrapolation relies on the ability to “disregard mob fears or enthusiasms and to focus on a few simple fundamentals.”[95] Seth Klarman, founder, chief executive officer, and portfolio manager of The Baupost Group, captures the concept this way: “Value investing is at its core the marriage of a contrarian streak and a calculator.”[96] “Contrarian” urges examination of the other side of a popular view. “Calculator” ensures that valuation is sufficiently extreme to produce high expected excess returns.

Overextrapolation is also linked to the momentum factor, the observation that returns for the past 3 to 12 months, commonly excluding the most recent month, predict returns for the next 3 to 12 months. For example, a stock that has done well in the last half year will tend to outperform on average in the upcoming six months before reversing over the longer term. A disciplined momentum strategy is more rigorous than simple return chasing and relies on rules for how to rank stocks and determine which ones to buy and sell.[97]

Performance chasing is another manifestation of overextrapolation.[98] Both retail and institutional investors have a tendency to buy funds that have done well and sell those that have performed poorly.

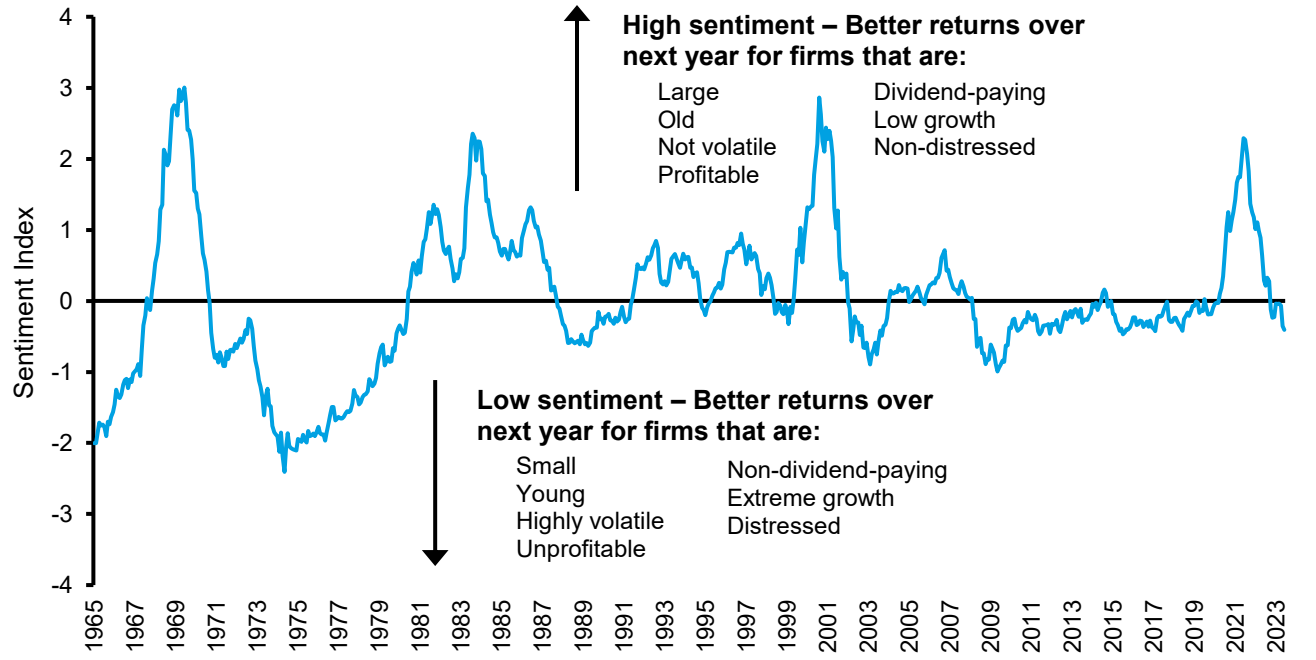
For example, a study of pension plan sponsors found that in the two years preceding a decision to fire or hire, the investors they fired had underperformed, and the investors they hired had outperformed, their benchmarks. But in the two years following the decision, the fired managers produced higher returns than the hired ones.[99] Economists doing related work conclude, “Clearly, plan sponsors could have saved hundreds of billions of dollars in assets if they had simply stayed the course.”[100]

Sentiment. Beliefs also shape sentiment, which captures the prevailing attitude investors have toward a market. Sentiment can lead to decisions to buy and sell beyond what fundamentals would justify. Factors that explain sentiment include trading volume, valuation measures, and the volume of, and returns to, initial public offerings.

Financial economists have created sentiment indexes to capture when sentiment appears too bullish or bearish.[101] Sentiment most affects the stocks of speculative companies. These are typically young companies that are growing rapidly and have stocks with small market capitalizations. Their futures are less clear than those of older companies, and arbitrage costs are generally higher. Elevated sentiment regarding speculative companies is associated with low excess returns.

One well-known sentiment index was developed by two professors of finance, Malcolm Baker and Jeff Wurgler.[102] Exhibit 12 shows the monthly values of the index from 1965 to 2023. Readings above zero suggest better returns in the next year for the stocks of firms that are large, old, low growth, profitable, and stable. Readings below zero suggest better returns in the next year for the stocks of firms that are small, young, high growth, unprofitable, and volatile.

Exhibit 12: Investor Sentiment and Future Returns Based on Firm Characteristics



Source: Counterpoint Global; Malcolm Baker and Jeffrey Wurgler, "Investor Sentiment and the Cross-Section of Stock Returns," Journal of Finance, Vol. 61, No. 4, August 2006, 1645-1680; homepage of Jeffrey Wurgler, see https://pages.stern.nyu.edu/~jwurgler/.

Our analysis supports the relationship between the index levels and the predicted stock price results using the appropriate factor returns as proxies, based on the data library of Kenneth French, a professor of finance at the Tuck School of Business at Dartmouth College.

Sentiment can also lead to underestimating the power of regression toward the mean, which says that results that are far from average will be followed by results with an expected value closer to the average.[103]

The appearance of a company on the cover of a popular business magazine is an example of this phenomenon. On average, positive magazine cover stories follow strong stock price performance and negative stories follow

weak stock price performance. One study concluded that "positive stories generally indicate the end of superior performance and negative news generally indicates the end of poor performance."[104]

Bubbles. There have been bubbles and crashes as long as there have been markets.[105] We define a stock market bubble as a sustained increase in the price of securities that pushes them in excess of any reasonable estimate of fundamental value. The rise of bubbles is commonly determined more by beliefs about future price gains than by fundamentals. An essential point is that some bubbles ultimately burst.

Charles Kindleberger, an economic historian, inspired by Hyman Minsky, an economist, developed a model of bubbles with five phases:[106]

- *Displacement*. Bubbles almost always start with some sort of displacement, whether from a new technology or a change in government policy. Asset prices start to rise, and most early investors are considered the smart money.[107]
- *Boom*. Continued price increases lead to rising confidence in the assets and often an emergence of stories to explain what is going on. For example, in the housing boom in the U.S. from 2005 to 2007, it was the idea that "the aggregate prices of houses never go down." Extrapolation is important here, too, as investors expect high past returns to continue.[108] Institutional investors take note and generally get involved.
- *Mania*. Asset prices rise well above what traditional measures of valuation suggest are justified, and some investors make up new measures of value to justify their holdings. Retail investors are drawn in. Credit expansion commonly happens, increasing risk. A clear sign the bubble is in this phase is that companies sell equity.[109]
- *Distress.* Prices do not fall right away but they fail to go up. The supply of buyers is exhausted, and the smart money, including companies, continues to sell. Bad news leads to sharp price drops. Doubt enters into the stories that carried prices higher.
- *Panic.* The bubble bursts, with "people crowding to get through the door before it slams shut."[110] There can be triggers, such as the failure of the investment bank Lehman Brothers in the Great Recession of 2007-2009, but there need not be. Investors who used debt to buy assets during the run-up can face margin calls and increases in margin requirements, accelerating the selling.[111] Asset prices not only decline, they can drop to a level below what fundamentals support.

Bubbles are a fascinating subject from the point of view of sociology, social psychology, and market history. A great deal has been written on the topic, and appendix B includes a list of books on bubbles.

We want to focus on two aspects of bubbles. First is what happens to asset prices following a run-up and second is the interplay between financial capital and technological revolutions.

Gene Fama expressed reasonable skepticism about bubbles:[112]

> I think most bubbles are twenty-twenty hindsight. Now after the fact you always find people who said before the fact that prices are too high. People are always saying that prices are too high. When they turn out to be right, we anoint them. When they turn out to be wrong, we ignore them. They are typically right and wrong about half the time.

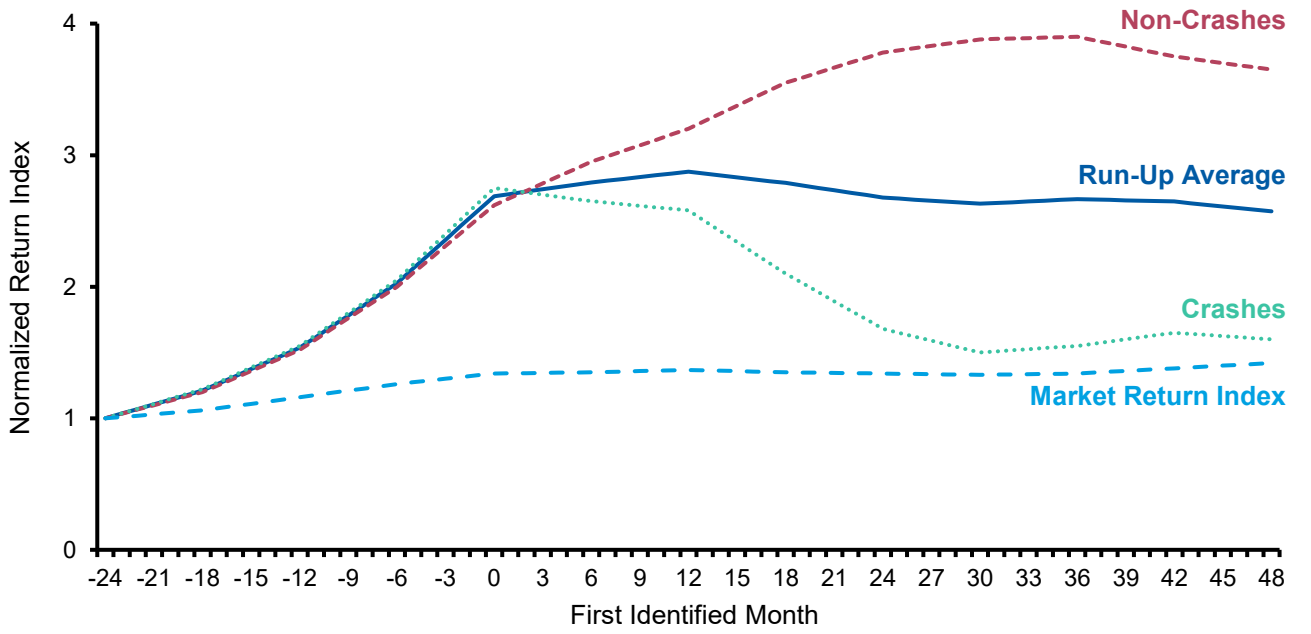
Fama's comment that naysayers who suggest the market is overvalued get it correct one-half of the time is a proposition that researchers can test. And they did.

Three financial economists, Robin Greenwood, Andrei Shleifer, and Yang You, wanted to see the stock price returns of industries following a price run-up or bubble.[113] They defined a run-up as a cumulative return of 100 percent or more, both absolute and relative to the market, over the prior two years for a value-weighted portfolio of stocks within an industry. Further, they specified that the industry's absolute return had to be up 50 percent or more over the previous five years. The run-up started the first month that the conditions were met.

They identified 40 such run-ups in the U.S. from 1926 to 2014 and 107 in international sectors from 1985 to 2014. Their headline findings, which prompted them to call their paper "Bubbles for Fama," was that Fama is right in the sense that a run-up does not predict unusually low future returns, *on average*.

Exhibit 13 shows the results for run-ups of U.S. industries. On the left are the 24 months prior to the first month in which the industry's return crosses their threshold of a run-up, and on the right is the price performance for the following 48 months. Just over one-half of the run-ups had a crash, defined as a 40 percent drawdown from any price in the two years following the first run-up. The average return of all episodes after run-ups was not dissimilar to the market overall.

Exhibit 13: The Return After a Run-Up Is Similar to the Market on Average



Source: Counterpoint Global based on Figure 1 from Robin Greenwood, Andrei Shleifer, and Yang You, "Bubbles for Fama," Journal of Financial Economics*, Vol. 131, No. 1, January 2019, 24.*

But the economists also found run-ups increased significantly the probability of a crash and that signals along the way of the run-up, including volatility, turnover, and equity issuance, help predict it. A separate academic paper found that crashes often followed sharp increases in invested capital, a measure of investment intensity.[114]

Economists have also shown that arbitrageurs, who aim to profit from keeping price and value in line, can fail to synchronize their behavior. This allows a bubble to persist despite a growing gap between price and value.[115]

The second aspect of bubbles we will address is the interplay between the displacement stage, driven by technological innovation, and financial capital. Carlota Perez, an economist, wrote *Technological Revolutions and Financial Capital*, the seminal book on this topic.[116]

The main insight is that there are two processes going on at the same time. First is how the emergence of a new technology will affect economic activity. Examples of these technologies include railroads, electricity, the internet, and artificial intelligence. Second is how investors position themselves to profit from these technologies.

We like to use the example of neural development in children as an analogy for this process.[117] Neurons are cells in the nervous system that connect and communicate with other neurons via synapses. The insight is that the number of neurons does not change that much throughout human life, but the number of synaptic connections rises sharply in early life and then falls precipitously, creating an inverted "U." The brain reinforces the synapses that the individual uses and prunes the ones they don't.

This process is akin to what happens when new technologies emerge: lots of companies sprout up seeking to take advantage of the novelty, but the market ruthlessly weeds out the businesses that fail to meet its demands.

The brain is roughly 2 percent of body mass but 20 percent of energy consumption. Creating lots of connections only to discard them later appears wasteful. But nature found this solution to learn about the environment.

Likewise, creating lots of companies and having many go out of business also looks inefficient. Yet this process also allows for a fit between what a new technology offers and what the market demands.

Another way to think about it is that investors buy stakes in companies that are best considered as options. An option is the right, but not the obligation, to do something. If a business takes off the option becomes very valuable, but if it fails the option-holder can walk away.

Technological revolutions encourage investors to invest in an array of options, but we know in advance that most options will end up with little or no value. Many of these options appear expensive, and traditional measures such as sales and profits will not substantiate their price. Ultimately, this process produces companies that serve the market well and offer new ways of doing business.

This investment also funds infrastructure that adds value to society.[118] For example, during the dot-com boom there was massive investment in fiber optics, the backbone for internet, telecom, and data services. Following the dot-com bust, a very high percentage of that capacity was unused and numerous telecommunications companies went bankrupt. But that infrastructure was critical to the internet's subsequent rapid growth.

Bubbles are an enduring feature of markets. While all bubbles are unique, they do tend to follow similar patterns. In many cases, valuable companies emerge from a sea of losses and the spending on new technologies provides a setup for economic growth.

The Wisdom and Madness of Crowds. The crowd is often wise, which means that the market is often efficient. But we also know that this wisdom can transition to madness, making the market inefficient. This switch from wisdom to madness may be the most significant recurring behavioral opportunity.

For a crowd to be wise, the members need to have heterogeneous views. Markets lose efficiency when investors lose diversity. Proxies for loss of diversity breakdowns include sentiment indicators, put/call ratios (trading volume of bearish put options to bullish call options), measures of crowdedness (lots of institutional investor ownership relative to a stock's liquidity), and absolute valuation.

One of the challenges in dealing with diversity breakdowns is that their effect tends to be non-linear. In other words, you can lose diversity consistently for some time and the asset price will not react. Then a small change on the margin leads to a large change in the price. This is called a “phase transition” and is common in physical and social systems.[119]

Observing diversity loss directly is difficult. But we can use agent-based models to examine the interplay between asset prices and diversity. These models create investors (“agents”) in silico, endow them with decision rules and objectives, allow them to interact with one another, and provide them with the ability to learn and adapt.

Blake LeBaron, a professor of economics at Brandeis University, built such an artificial stock market.[120] His model has 1,000 investors with well-defined objectives for portfolio allocations, an asset that is risk-free, an asset that pays a dividend at a rate calibrated to the empirical record in the U.S. since the end of World War II, and 250 active decision rules.

The investors made or lost money as they traded with one another. LeBaron set it up so that those with the lowest levels of wealth were eliminated. He also evolved the decision rules by removing those the investors did not use and replacing them with new ones. The beauty of the model is that we can observe the interaction between diversity and asset prices.

LeBaron’s artificial market replicates many of the empirical features of real markets, including clustered volatility, variable trading volumes, and fat tails. The critical observation is that run-ups in the asset price are preceded by a reduction in the number of rules the traders used. This is the definition of a loss of diversity. LeBaron explains it as follows:[121]

> During the run-up to a crash, population diversity falls. Agents begin to use very similar trading strategies as their common good performance begins to self-reinforce. This makes the population very brittle, in that a small reduction in the demand for shares could have a strong destabilizing impact on the market. The economic mechanism here is clear. Traders have a hard time finding anyone to sell to in a falling market since everyone else is following very similar strategies. In the Walrasian setup used here, this forces the price to drop by a large magnitude to clear the market. The population homogeneity translates into a reduction in market liquidity.

Diversity dropped and pushed the asset price into bubble territory because the investors converged on the same rules. Before the crash, the asset price rose but so did the market’s fragility.

LeBaron’s artificial stock market reinforces some important lessons about the behavioral source of inefficiency. One is that investors get rich in the short term when they imitate one another. George Soros, the highly-successful investor, famously said, “When I see a bubble forming I rush in to buy, adding fuel to the fire."[122] The unspoken premise is that he is astute enough to sell before the break.

This is why it is so hard to bet against a bubble. Correlated actions produce positive feedback that pushes price away from value, creating lots of gains during the run-up. Being wrong in the short term creates career risk, where a portfolio manager’s job is in jeopardy as a result of poor short-term results.[123] This is true even if the portfolio manager is eventually proven correct.

Second, rising asset prices in the short term obscure the fact that fragility rises while diversity falls. Indeed, an investor base may approach a critical point and back off, revealing no adverse result. But an incremental drop

in diversity will lead to a large drop in the asset price if the market reaches the critical point. Crowded trades work until they don't.[124]

Crowding not only creates mispricing but also results in a lack of liquidity.[125] Models reveal that the price has to drop sharply to clear the market when buyers use the same rule and sellers, using different rules, have nothing left to sell. That a small change in diversity leads to a large drop in price feels shocking in retrospect.

Explaining the results of the stock market with the wisdom of crowds is useful because the conditions reveal when and why markets are wise or mad. The framework predicts that it is hard for an investor to beat the market and that markets periodically go haywire. Both predictions are borne out by the results.

If correlated beliefs are an important part of the story, understanding the mechanisms by which beliefs spread is essential.

How Beliefs Spread. How ideas or information propagate across a network is analogous to the model that epidemiologists commonly use to describe the spread of disease.[126] This model includes the degree of contagiousness, the degree of interaction, and the degree of recovery. What determines the output is intuitive: the higher the contagiousness and interaction, the higher the likelihood that a disease or belief will spread.

There are a few noteworthy considerations with regard to belief propagation in markets. To begin, experiments and experience tell us that it is inherently difficult to anticipate which ideas or products will become popular.

For example, if fans prefer one song slightly more than another of equal quality early on, if only by luck, the process of cumulative advantage takes over and the first will be much more successful than the second.[127] This is why film and music studios struggle to forecast hits and why Wiliam Goldman, a screenwriter, declared "Nobody knows anything."[128]

Next, humans are inherently social and most have a desire to conform to the beliefs of the crowd. Neuroscientists even have a sense of the neurobiological basis for conformity.[129] Informational cascades occur when individuals follow the decisions of those who preceded them without regard to their own personal information. For a fad or fashion, conforming means you won't stand out in a way that makes you uncomfortable.

Investors feel the pressure to conform. A survey by the CFA Institute of more than 700 investors from around the world found that "being influenced by peers to follow trends" was the behavioral bias that affected their decision making the most.[130] Beating peers is difficult if everyone is doing the exact same thing.

Diversity breakdowns often include both new investors participating as well as seasoned investors sitting it out. These new investors are commonly individuals.[131]

Owen Lamont, a former academic and now a portfolio manager and researcher at Acadian Asset Management, looked at accounts of past bubbles and the descriptions of the new participants. These included milkmaids, philosophers, poets, shoeshine boys, Buddhist monks, and taxi drivers. Lamont notes that what unifies them is a lack of financial knowledge.[132]

The likelihood of a diversity breakdown rises when these types of individuals converge on a particular investment or investment theme. Likewise, seasoned investors contribute to the lack of diversity if they stop betting against them. Decision rules converge and diversity suffers when there is no countervailing opinion voting in the market.

Keith Stanovich, a psychologist, distinguishes between "testable" and "distal" beliefs.[133] Testable beliefs are verifiable by observation. Distal beliefs, a form of conviction, cannot be verified by observation or experience.

The amount the U.S. government spends on social security is a testable belief. The belief that spending on social security is too high (or too low) is distal. Confirmation bias occurs when we interpret new information in a way that is consistent with distal beliefs.

Distal beliefs tend to propagate through shared identity precisely because they are unprovable. As a result, they serve as social signals rather than maps of reality. This is relevant in markets as facts ultimately prevail.

How does an investor effectively take advantage of behavioral inefficiencies?

- **Be on the watch for overextrapolation.** Mr. Market, to use Ben Graham's metaphor, is largely sensible and price is roughly equivalent to value. But Mr. Market is also prone to extremes, and investors often assume the pattern of recent results in the market will continue into the future. As a result, investors run the risk of buying high and selling low.
- **Take stock of sentiment.** When sentiment is uniformly positive or negative, be prepared to visit the opposite side of the argument. Being a contrarian for the sake of being a contrarian is a bad idea because the consensus can be correct. But opportunities can appear when the signals from sentiment and valuation align.

  The key question is, "What expectations for future financial results are implied by the current price?"[134] Determine what you have to believe about measures such as sales growth, operating profit margins, and investment needs to justify today's price and compare them to plausible scenarios.
- **Bubbles.** While the details are always different, bubbles tend to go through similar phases. If you suspect the market is in a bubble, assess which phase it is in. Note that following run-ups, industries earn a return similar to the market on average. But there is an elevated risk of a crash. For the companies involved, certain fundamental characteristics, including rapid invested capital growth, increase that risk.
- **The wisdom and madness of crowds.** The wisdom of crowds depends on investors with heterogeneous views, a mechanism to aggregate information, and incentives to be right. Diversity is the most likely condition to fail. When diversity breaks down, the wisdom of crowds transitions to the madness of crowds. One of the most vexing features of this transition is that it is non-linear. Some reduction in diversity does not affect asset prices and then a small change leads to a large drop.
- **Belief spreading.** Beliefs spread in a way similar to disease, with contagious beliefs reaching a connected audience having the largest impact. The distinction between testable and distal beliefs underscores the need to separate fact from opinion. A fact is information that is presumed to have objective reality and therefore can be disproved. An opinion is a belief that is more than an impression but does not meet the standard of positive knowledge. As a result, an opinion is difficult to disprove. Both facts and opinions are useful for investors, but facts should rule the day.[135]

Behavioral inefficiencies dissipate over different time cycles. For example, momentum tends to reverse over a relatively short period of time (less than a year). Large bubbles can take years to burst. Capitalizing on behavioral inefficiencies can take longer than what investment managers perceive they can afford.

Ben Graham offered excellent advice on capturing the benefits of behavioral patterns. He wrote, "Have the courage of your knowledge and experience. If you have formed a conclusion from the facts and if you know your judgment is sound, act on it—even though others may hesitate or differ. (You are neither right nor wrong because the crowd disagrees with you. You are right because your data and reasoning are right.)"[136]

Analytical Inefficiencies

An analytical inefficiency arises when all participants have identical, or nearly identical, information and some can analyze it better than others. Financial information includes earnings results (especially relative to analyst estimates), cash flow data, and capital structure. Non-financial information includes corporate strategy, governance, and management quality.[137] An analytical edge can be the result of more analytical skill, updating views more effectively than others, operating on a different time scale, or anticipating a change in the market's narrative.

Analytical Skill. Tennis provides an analogy for understanding analytical skill.[138] Consider the difference between a professional and an amateur. They play on the same court, use the same equipment, and follow the same rules. But the professional will have better technique and strategy, and will be less error-prone, than the amateur. In the world of investing, institutions tend to be the professionals and individuals are often the amateurs.

Institutional investors generally beat individual investors when they go head-to-head, which means that individuals can be a good source of excess returns for institutions.[139] A comprehensive survey of the behavior of individual investors noted that "the evidence indicates that the average individual investor underperforms the market—both before and after fees."[140]

Excess positive and negative returns must sum to zero before fees for the market as a whole. Differential skill plus luck explains the magnitude of positive and negative returns. A detailed study of all the investors in Taiwan revealed that institutions earned abnormal excess returns of 1.5 percentage points per year while individuals lost 3.8 percentage points.[141] The individuals often have too little skill and too much confidence.

Institutions generally have better information and analytical skill than individuals. For example, institutions tend to buy stocks from individuals in cases when the stock underreacts to good news about future cash flows, outperforming individuals by 1.4 percentage points per year in these cases.[142] In addition, initial public offerings with high participation rates by retail investors underperform those dominated by institutions.[143]

In practice, it can be difficult to assess whether investors are acting based on different information or a different interpretation of the same information. Both contribute to action, and studies of events where information is widely-disseminated, such as earnings releases, reveal the importance of varied analytical takes.[144]

Updating Views Better Than Others. The next source of analytical edge is updating your views better than others by properly integrating new information. Bayes' Theorem provides a formal framework for updating prior beliefs in light of new information.[145] The evidence is clear that investors do not do this as well as they could, and specific patterns of overreaction and underreaction emerge.[146]

Francesca Bastianello and Alex Imas, professors of finance at the University of Chicago Booth School of Business, provide a framework to explain these patterns.[147] To gain insight into how they work it is useful to separate the tasks of inference and forecasting. For example, an investor can use the information that a stock price went up to infer whether the company is good or bad or to forecast a future price. Investors overreact or underreact to news based on which task they do.

Bastianello and Imas used a classic model of balls and urns to isolate the patterns of updating. They had two urns, one for a good company with profits that varied around a high number and one for a bad company with variation around zero profit.

Participants saw 30 months of data from one of them and had to either infer if the results were from a good or bad company or forecast the future profits. The researchers held constant the difference in average profits, the prior expectations of investors, and volatility so that they could measure reactions versus a benchmark.

The results showed that participants generally underreact in the task of inference and overreact in forecasting. This is because the participants defaulted to the assumption that market processes are persistent. As a result, a single piece of news does not feel informative about the firm's quality (inference) but does seem informative about tomorrow's price (forecasting).

Individuals are often not as sensitive to a strong or weak signal as they should be. Most people consider new information in the context of their experience and fail to adjust their views sufficiently when new data arrives.

People also have limited attention. This means that investors don't appreciate the significance of strong signals and therefore tend to underreact to them.

Time horizon also plays a central role in these biases of belief. In this model, today's profit is a stronger signal for next month than it is for three years in the future. Participants don't fully consider this decay and therefore tend to underreact at short horizons and overreact at long horizons for forecasting tasks.

These patterns help explain certain empirical results, such as the excessive volatility of survey forecasts of macro and financial variables. Exhibit 14 shows the model's pattern of over- and under-reaction.

Exhibit 14: Trade-Off between Signal Weight and Strength

Feature	Description	Rational (Bayesian) Response	Observed Bias in Forecasting
Shock size	Amount of unexpected news	Larger difference equals stronger signal	Underreaction to large differences
		Smaller difference equals weaker signal	Overreaction to small differences
Persistence	How much today's news resembles tomorrow's	High persistence equals stronger signal	Underreaction when persistence is high
		Low persistence equals weaker signal	Overreaction when persistence is low
Time horizon	Length of time being forecasted	Shorter horizon equals stronger signal	Underreaction at short horizons
		Longer horizon equals weaker signal	Overreaction at long horizons
Attention	**Increasing attention**		
Feature in isolation	Tempers under/overreaction to feature		
Multiple features interacting	Depends on how features interact–may temper or intensify over/underreaction		

Source: Counterpoint Global based on Francesca Bastianello and Alex Imas, "Biases in Belief Updating Within and Across Domains," Working Paper*, December 12, 2025.*

Recency bias is a related concept that comes from placing too much weight on recent events.[148] As we have seen, surveys of investors and executives consistently show a strong inclination to extrapolate from a small sample of what just happened. Considering base rates, or the results of an appropriate reference class, can help mitigate this potential mistake.[149]

Phil Tetlock, a professor of psychology at the University of Pennsylvania, identifies other common mistakes.[150] One is overreacting to information that appears to explain causality but in fact does not.

Analysis of merger and acquisition (M&A) deals is a case in point. Equity analysts commonly comment favorably about the stock of an acquirer as the result of anticipated earnings accretion, only to see the stock drop in a high percentage of the cases. The reason is that the change in earnings per share is not the best way to capture causality in M&A.[151]

Another is underreacting to information that is causal. Continuing with the theme of M&A, a comparison of the present value of synergies with the premium pledged provides meaningful but underappreciated information. This analysis requires some modest calculations but is demonstrably more relevant than earnings changes based on accounting figures.[152]

Decision makers who are able to distinguish between what information does and does not matter have an analytical edge.

The contrast effect also explains overreaction to new information. The idea is that good news is perceived as more impressive than it should be if it is preceded by bad news, and less impressive than it should be if it follows good news. These errors can lead to mispricing, and a strategy to capture the contrast effect appears to generate excess returns.[153]

Most of this discussion is focused on how individuals update their beliefs in ways that depart from the normative ideal. But "superforecasters" are an example of people who provide forecasts that are well above the average.[154] They are the small percentage of participants who demonstrated excellent skill in a forecasting tournament.

Superforecasters tend to share some common traits. They are open-minded, pragmatic, analytical, numerate, and hardworking. They also change their probability estimates often and do so in small increments. Training in base rates tends to help improve forecasting skills.[155]

The lessons are that individuals do not update their beliefs as well as they could, and there are methods to improve this skill as a potential source of edge.

Time Arbitrage. Jack Treynor was an economist and leader in the investment industry who suggested that an investor can gain an edge by operating on a different timescale than others. Writing in the 1970s, Treynor suggested that there are:[156]

> two kinds of investment ideas: (a) those whose implications are straightforward and obvious, take relatively little special expertise to evaluate, and consequently travel quickly (e.g., "hot stocks"); and (b) those that require reflection, judgment, special expertise, etc., for their evaluation, and consequently travel slowly . . . Pursuit of the second kind of idea . . . is, of course, the only meaningful definition for "long-term investing."

Treynor refers to John Maynard Keynes, the renowned economist, to explain the source of this opportunity. Keynes adds two essential elements:[157]

> The energies and skill of the professional investor . . . are, in fact, largely concerned, not with making superior long-term forecasts of the probable yield of an investment over its whole life, but with foreseeing changes in the conventional basis of valuation a short time ahead of the general public. They are concerned, not with what an investment is really worth to a man who buys it "for keeps", but with what the market will value it at, under the influence of mass psychology, three months or a year hence.

He goes on to emphasize how challenging it is to be a long-term investor:

> Finally it is the long-term investor, he who most promotes the public interest, who will in practice come in for most criticism, wherever investment funds are managed by committees or boards or banks. For it is in the essence of his behaviour that he should be eccentric, unconventional and rash in the eyes of average opinion. If he is successful, that will only confirm the general belief in his rashness; and if in the short run he is unsuccessful, which is very likely, he will not receive much mercy. Worldly wisdom teaches that it is better for reputation to fail conventionally than to succeed unconventionally.

Both Treynor and Keynes emphasize the importance of time horizon and suggest outsized returns are available to the long-term investor. But they make clear that long-term investing requires "reflection" and "judgment" and that those who practice it will "come in for most criticism." This is a blend of analytical and behavioral issues.

Let's first build on Treynor's point. Investors commonly use the term "time arbitrage" to reflect cases where the market reflects short-term noise as if it were long-term signal. Using coin tosses as an example, an opportunity for time arbitrage exists if the market prices a fair coin as if it were biased after 7 of the first 10 flips are tails.

Successfully taking advantage of time arbitrage requires three things. First, an investor must be able to accurately separate signal from noise. In the coin toss example, the signal is an even split between tails and heads, and the noise is the appearance of a bias toward tails. Second, the signal must eventually reveal itself. After lots of additional flips, the ratio of tails to heads will settle at close to one-to-one. Finally, an investor must have access to capital that is sufficiently patient to allow the signal to surface.

Nearly all investors seek satisfactory results in the long term but find poor results in the short term to be a challenge. Shlomo Benartzi and Richard Thaler, both economists and Thaler a winner of the Nobel Prize, developed a concept called "myopic loss aversion." They were motivated to understand the empirical puzzle of why the equity risk premium, the premium for owning stocks rather than risk-free bonds, is higher than theory would suggest.[158]

Benartzi and Thaler combine two ideas in their attempt to explain the historical equity risk premium. The first is loss aversion, which says humans (along with capuchin monkeys) suffer losses roughly twice as much as they enjoy equivalent gains.[159] This is inconsistent with classical utility theory.

The second is myopia, or "nearsightedness." This reflects how frequently you look at your investment portfolio. The stock market tends to go up over time, but it rises by fits and starts.

Based on a century of data in the U.S., the probability you will see a gain in your diversified stock portfolio is about 54 percent for a day, 63 percent for a month, and 75 percent for a year. The probability of a profit over 15 years or longer is very close to 100 percent.

Benartzi and Thaler put together these ideas to offer a new way to address the issue of time horizon for an investor. The more often an investor looks at her portfolio, the more likely she is to see losses and suffer from loss aversion. An investor examining her portfolio all the time would therefore require a higher return to compensate for suffering from losses than someone who looks at her portfolio less frequently.

As a result of this psychological factor, a long-term investor is willing to pay a higher price for the same asset than a short-term investor.[160] This concept does not just apply to retail investors. Evidence from the field suggests that professional investors also suffer from myopic loss aversion.[161]

The portfolio evaluation period consistent with the realized equity risk premium from 1926 through 1990 was about one year. Investors may not be able to select their degree of loss aversion, but they can select how frequently they evaluate their portfolios.

Researchers at Renaissance Technologies, an investment firm, used a simulation technique grounded in realistic parameters and found that the evaluation period that worked best to assess money managers was longer than three years. They summarize by pointing out that "the most profitable degree of patience is very different from that found in current industry practice."[162]

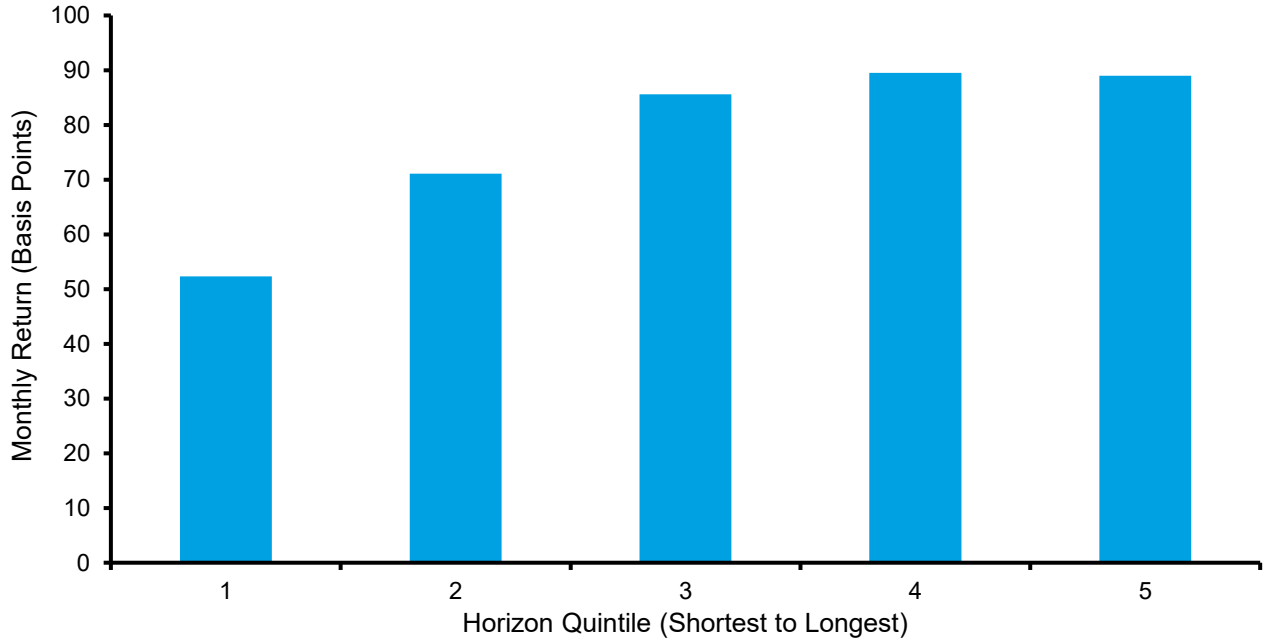
Now let's build on Keynes's point that emphasizes the difficulty in taking a long-term approach. Kalash Jain, a professor of accounting, and Dian Jiao, a PhD student, both at Columbia Business School, examine time horizon from the point of view of the turnover in ownership of a stock.[163] Specifically, they look at a variable they call "horizon," defined as the average number of consecutive quarters active institutional investors hold a stake in a firm, weighted by each institution's stake. They exclude index and quasi-index funds.

They ask whether the average ownership horizon of a firm predicts subsequent returns after controlling for fundamentals and standard factors, as well as what drives such a premium if it exists.

They show that horizon is a significant predictor of returns and is not subsumed by traditional characteristics used in cross-sectional asset pricing models. Exhibit 15 summarizes their results. Returns for stocks in the quintile with the longest horizon produced returns 37 basis points per month, or 440 basis points per year, higher than the quintile with the shortest horizon.

Consistent with Keynes's comment about the lack of success in the short run, the premium is highest with stocks that have high idiosyncratic volatility and poor recent performance. The results also suggest that horizon reflects mispricing among these stocks that are difficult to hold, as this mispricing does not appear among stocks that are easier to hold. Investors who can weather the challenges of high idiosyncratic volatility and poor short-term stock price returns are rewarded.

Exhibit 15: Time Arbitrage: Long Horizon Predicts Excess Returns



Source: Counterpoint Global based on Kalash Jain and Dian Jiao, "Exploiting Myopia: The Returns to Long-Term Investing," Working Paper*, September 2025.*

Gathering information and reflecting it in stock prices is a costly endeavor. Long-term investing allows a shareholder to amortize that cost over an extended holding period. As Cliff Asness, founder, Managing Principal, and Chief Investment Officer at AQR Capital Management, has said, “Having, and sticking to, a true long term perspective is the closest you can come to possessing an investing super power [*sic*].”[164]

The Power of Narratives. Stories and narratives play an important role in belief formation and economic results. While the terms “story” and “narrative” are commonly used interchangeably, Robert Shiller distinguishes between them by noting that a narrative includes a causal or justificatory account of what happened or what is happening.[165] Shiller defines “narrative economics” as the study of how narratives spread, change, and influence economic outcomes. He uses an epidemiological model to explain how narratives disseminate.

The stories that investors tell, and believe, also play a meaningful role in revisions of expectations.[166] Nicholas Mangee, a professor of finance, has developed what he calls the “novel narrative hypothesis.” It states that novelty creates uncertainty in the stock market, and as a result investors create narratives to explain what is going on to resolve the uncertainty. Those narratives shape investor sentiment and expectations.[167]

One of the great puzzles in equity markets is how very large companies, which are extremely well followed by analysts and reasonably predictable, can see huge swings in value.

One recent example is Alphabet, the parent company of Google. OpenAI launched ChatGPT, a generative artificial intelligence (GenAI) model, in November 2022. Investors immediately worried that Google had been caught flat-footed and that its internet search franchise might come under challenge. The release of Gemini 3, Google’s latest GenAI model, in the fall of 2025 capped a narrative swing from imminent obsolescence to one of inevitable dominance.

ChatGPT’s launch took the world by storm. Google seemed competitively unprepared even though researchers at the company developed the transformer architecture, the “T” in GPT.

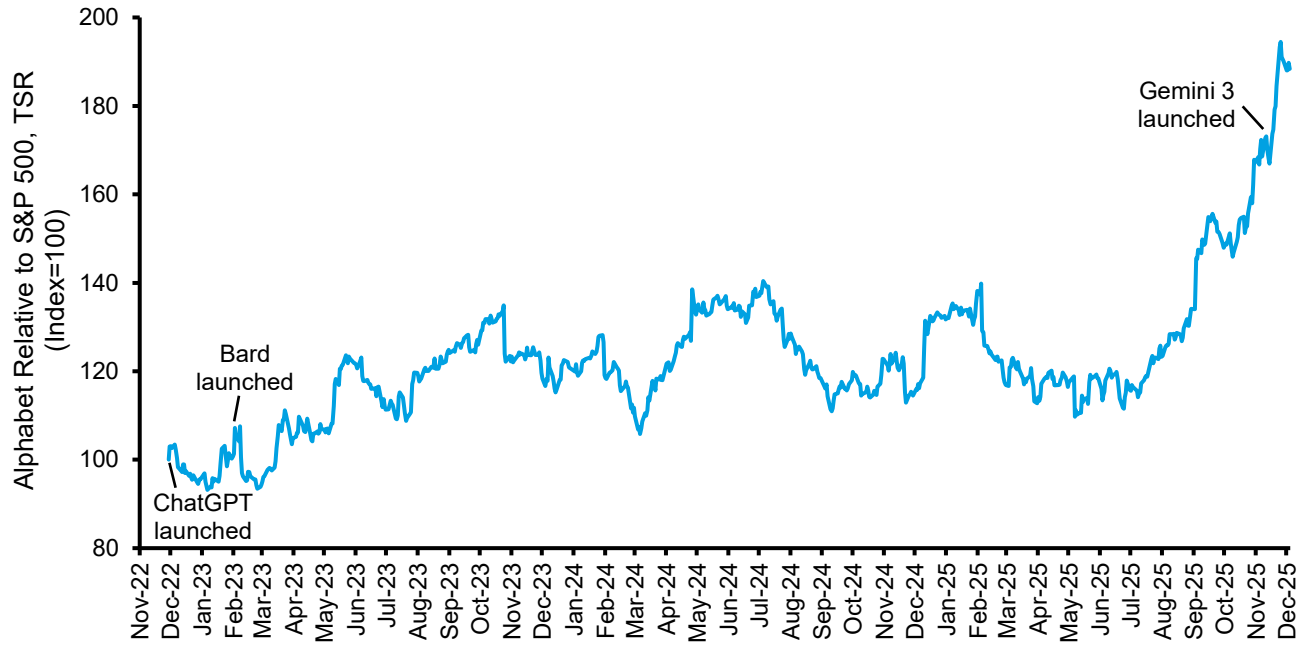
In early February 2023, Google demonstrated their GenAI model, Bard, in part to preempt a meeting by Microsoft a few days later featuring the integration of ChatGPT into some of Microsoft’s products. Even Google employees complained the demo was “rushed, botched, and myopic.”[168]

In the days that followed, Alphabet lost about $100 billion in market capitalization. The narrative featured concerns about the future of search, a pending anti-trust case filed by the Department of Justice, and the risk of being left behind in the next wave of technology.

The stock then performed roughly in line with the market until a shift started in the spring of 2025 (see exhibit 16). The company’s market share in search, although down, was not devastated. While the company lost its lawsuit to the Department of Justice, the remedies were not as bad as feared. And the company’s launch of Gemini 3 in November 2025 was well received by the market. For example, Marc Benioff, the chief executive officer of Salesforce, publicly disclosed that he was switching to Gemini 3.

The narrative shifted from Google being behind OpenAI to being one of the best positioned companies with the infrastructure, distribution, and financial resources to deploy AI at scale. The discount for obsolescence risk was replaced by a premium for capabilities.[169]

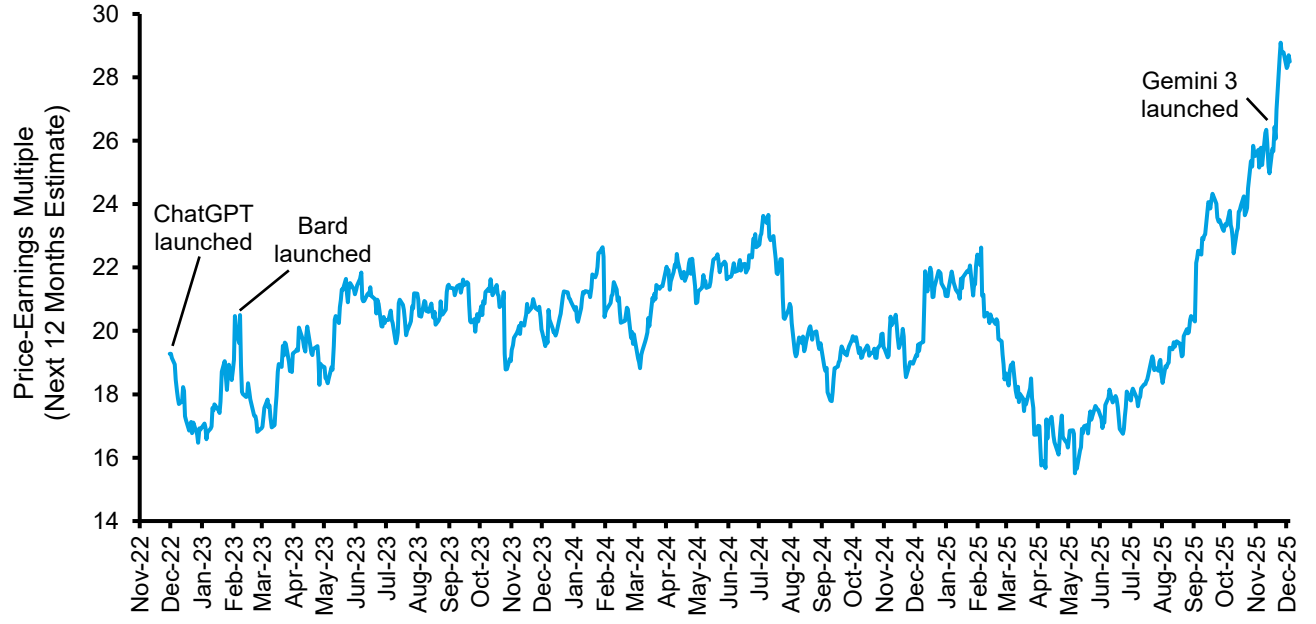
Exhibit 16: Alphabet's Relative Total Shareholder Return, November 2022-December 2025



Source: Counterpoint Global and FactSet.

Reflecting this shift, Alphabet's price-earnings multiple based on estimates for the next 12 months of earnings went from the high teens to the high 20s (see exhibit 17). As the result of a change in narrative, Alphabet's market capitalization rose by $1.8 trillion, net of the market, an increase larger than the assets under management for the U.S. venture capital industry.

Exhibit 17: Alphabet's Forward Price-Earnings Multiple, November 2022-December 2025



Source: Counterpoint Global and FactSet.

Here are a couple of final thoughts on narratives. First, psychologists have shown that "alternative descriptions of the same event often produce systematically different judgments."[170] It is important to recognize that descriptions can be a centerpiece of narratives, but rarely is it the case that there is but one plausible description. How you describe a situation will influence how you, and potentially others, decide about it.

John Griffin, founder and portfolio manager at Blue Ridge Capital, is fond of saying "Why try to predict the unpredictable when we can observe the observable?" He argues that simple observation may demonstrate facts that counter the current narrative or anticipate the next one. There is no need for superlative foresight, just an ability to see clearly what is happening now. Griffin's observation aligns with the research that showed that people tend to underreact in the task of inference.

How does an investor effectively take advantage of analytical inefficiencies?

- **Find easy games.** The objective is to have more analytical skill than your counterparty when you buy or sell a stock. One example that has been studied in detail is institutions competing against individuals. Research shows that "dumb money" creates market anomalies that the "smart money" can correct.[171]

- **Update your beliefs effectively.** Changing your mind so that your views offer an accurate map of the world is a core analytical skill. There is a proper way to do this using Bayes' Theorem, but researchers have identified patterns of over- and underreaction to information. One way to provide yourself with accurate feedback is to write down the signposts you expect to see, including probabilities of specific outcomes, should your thesis unfold as you anticipate. Use the signposts to verify whether your thesis remains intact or if you should change your mind.

- **Time as a source of analytical edge.** An investment process can be tailored to a short- or long-term holding period. Jack Treynor argued that ideas that "travel slowly" define long-term investing because they require reflection, judgment, and special expertise. Taking a long view is difficult because of client pressures and career risk, but holding stocks with idiosyncratic risk and poor short-term results can produce excess returns in the long run.

- **Narratives influence value.** Humans are natural storytellers who have an innate desire to explain causality. Narratives, which link cause and effect, satisfy that need. We know that narratives evolve and can lead to gaps between price and value, and that even different descriptions can lead to different decisions. Anticipating how the narrative about a company will evolve can help you to benefit from material changes in valuation.

  This also explains why some of the biggest companies in the world, measured by the market capitalizations of their stocks, can provide outsized returns. Reported fundamentals matter over the long haul, but the stories that the investment community tells along the way can introduce opportunities to buy or sell.[172]

Informational Inefficiencies

An informational inefficiency arises when some market participants have information that is different from that of others and can trade profitably on that asymmetry.[173] As Grossman and Stiglitz pointed out, collecting information relevant to value can be expensive, and investors who do so can reasonably expect to earn excess returns to compensate them for their effort.

At the same time, regulation seeks to ensure that companies disclose and disseminate information uniformly, and technology makes it quick and cheap to do so. As a consequence, there has been an escalation in the cost of gathering legal and non-traditional ("alternative") data.

In information theory, information is a measure of how unexpected, or surprising, an outcome is relative to a probability model. The efficient market hypothesis assumes asset prices fully reflect all available information and that only new, unanticipated information should lead to abnormal price changes. Digging up that information is what leads to excess returns.

Sharing and acquiring information from others is foundational in learning and collective behavior among organisms, including humans. But misinformation is transmitted when this process breaks down. Misinformation refers to any message that a recipient interprets in such a way that it pushes their beliefs away from the true state.[174]

Specifically, someone who receives information without the full context may misinterpret it, the message itself may have degraded as it was passed from one person to the next, or a group enters into collective distortion and views information as ambiguous.[175]

The efficient market hypothesis assumes that investors process available information in the same way. No one believes this proposition and, as we saw, there are ways to get to efficient markets without such a strong assumption.

It is fun to ask how investors would do if they had a crystal ball that allowed them to see information in advance.[176] Victor Haghani and his colleagues at Elm Wealth, an investment advisory firm, translated this question into an experiment.

Participants were shown the front page of *The Wall Street Journal* 36 hours in advance of the day they placed their trades. For instance, they might see the *WSJ* cover for a Thursday and bet based on prices from the close of markets on Tuesday.

They could make long or short bets on the S&P 500 or the 30-year U.S. Treasury bond and were able to use leverage. They bet over 15 "days" using headlines from 2008 to 2022 that were presented randomly. The ultimate payoffs reflected being correct about the direction of the trade as well as betting an appropriate amount given the perceived value of the information the crystal ball revealed.

Haghani started the experiment in person, recruiting 118 young adults who were nearly all studying for a master's degree in finance. He gave them all $50 to start and capped their profits at $100.

About one-half of the students lost money in the exercise, and the average payout of $51.62 was statistically equivalent to breaking even. One in six lost all of their money. Of the 2,000-plus trades, the students guessed the correct direction 51.5 percent of the time. The students also did a poor job of position sizing, contributing to their woes.

Elm Wealth then put the game on their website and invited people to play for fun.[177] The median loss was 30 percent for the 1,500 people who participated online, and more than one-third went bust.

In more encouraging news, Haghani found that the five experienced macroeconomic traders who played the game all grew their wealth. Their median gain was 60 percent, and their average gain was 130 percent.

The professionals anticipated the correct direction of market moves 63 percent of the time and did not make any bets when they felt they had no insight, which turned out to be about one-third of the days. They placed bigger bets than the amateurs when they felt they had edge.

As we will see, there is value in having information that is not yet in the market. But profiting from information is challenging because it has to be different than what is priced in and an individual's interpretation of the information has to be accurate.

An informational edge can come in a number of forms. One way is to legally acquire relevant information that others don't have and is not reflected in prices. Another form of edge can come from paying attention to the right information. Paying attention is costly and as a result there are exploitable inefficiencies from limited attention. Finally, anticipating the impact of the spread of information may confer advantage, as research shows that complexity slows the diffusion of information.

Find Out First. The first and most obvious source of informational edge is to learn something relevant to value before others do. At this point it is useful to distinguish between data and information. Data is the plural of datum, which means "something given." Data need not be useful.

Information organizes data in a way that is useful. Information reduces uncertainty. Access to data does not confer an informational edge automatically, but the ability to translate data into information can be a source of edge. This source is likely linked to size and scale. Bigger investment firms can amortize the cost of data and have the ability to turn it into information more cost effectively than smaller firms can.

There is no doubt that some investors generate excess returns by acquiring information that other investors don't have. Studying insider trading is one way we know this. While insider trading is illegal and wrong, examining past cases provides insight into how information affects prices.

From 2010 to 2015, hackers stole about 150,000 earnings press releases that had yet to be published from newswire companies and sold the information to traders.[178] Researchers reviewed this event to understand how this information was reflected in prices as well as how well the traders could use the information to predict price movements.

One paper separated "hard" from "soft" information.[179] Hard information reflects the magnitude of an earnings surprise while soft information measures the wording and tone of the releases. The researchers found that both contribute about equally to the change in stock price and they were only weakly correlated with one another.

The paper also found that after the earnings were made public, stock prices changed only about 85 percent of what they were expected to, as measured by a control group, which means that the illegal trades captured roughly 15 percent of the move.

Another paper had access to trade data and therefore could estimate how much of the excess returns the traders could predict (considering constraints).[180] It showed that while the traders could identify signal, the ratio of signal

to noise was 1-to-2.5. In practical terms, that means signal was valuable but ran the risk of being overwhelmed by randomness for any individual trade.

Some hedge funds made lots of money legally by using the Freedom of Information Act to collect non-public information about pharmaceutical companies from the U.S. Food and Drug Administration.[181] Not only do the investors need to determine which requests to make, the responses can be technical and require the investors to have sufficient scientific knowledge to interpret the information accurately.

There are lots of innovative, if costly, ways to gather potentially useful information. Estimates suggest that investment firms spend at least $2.5 billion annually on alternative data sets, and forecasts call for continued rapid growth in this market for information.[182] On top of that, investors often hire business experts to understand companies, top law firms to interpret legal issues, or consultants to grasp particular political dynamics.

Another approach is to collect public and non-public information from a variety of sources, including suppliers, competitors, customers, and former employees in an attempt to create an edge. Phil Fisher, a legendary investor, called this the “scuttlebutt” method, and investors today often refer to it as the mosaic theory.[183] This approach relies not on a single piece of information but rather on how various pieces of information come together to create a view that is different from that of the market.

Broadly speaking, society benefits when asset prices are more efficient. As a result, regulation has focused on making access to corporate information uniform.

For example, Regulation Fair Disclosure (Reg FD) was implemented in October 2000 in the U.S. Reg FD prohibits companies “from privately disclosing material information to select investors or securities markets professionals without simultaneously disclosing the same information to the public.”[184]

The evidence shows that Reg FD has resulted in greater informational efficiency and that some investment firms that had previously benefited from privileged disclosure lost an informational edge.[185]

Reg FD’s implementation unwittingly created a natural experiment to test market efficiency. Credit rating agencies were exempt from the regulation when it was enacted, which meant that credit analysts had access to confidential information unavailable to equity analysts.

The Dodd-Frank legislation repealed that exemption in 2010. Analysis shows that bond rating upgrades and downgrades had a greater effect on prices after Reg FD than before it, and that the effect faded after the credit agencies lost access to that privileged information in 2010.[186]

Another source of asymmetric information that leads to wealth transfers is the repurchase and issuance of equity by corporations. Generally speaking, firms buy back stock when it is undervalued and issue stock when it is overvalued, which benefits ongoing shareholders at the expense of the shareholders who sell or buy.[187] This is relevant because it means that companies earn some of the excess returns that investors seek.

Companies can do this because executives are better informed about their company than investors. Researchers who studied the topic found that “these wealth transfers can be predicted using a variety of firm characteristics and that future wealth transfers are an important determinant of current stock prices.”[188]

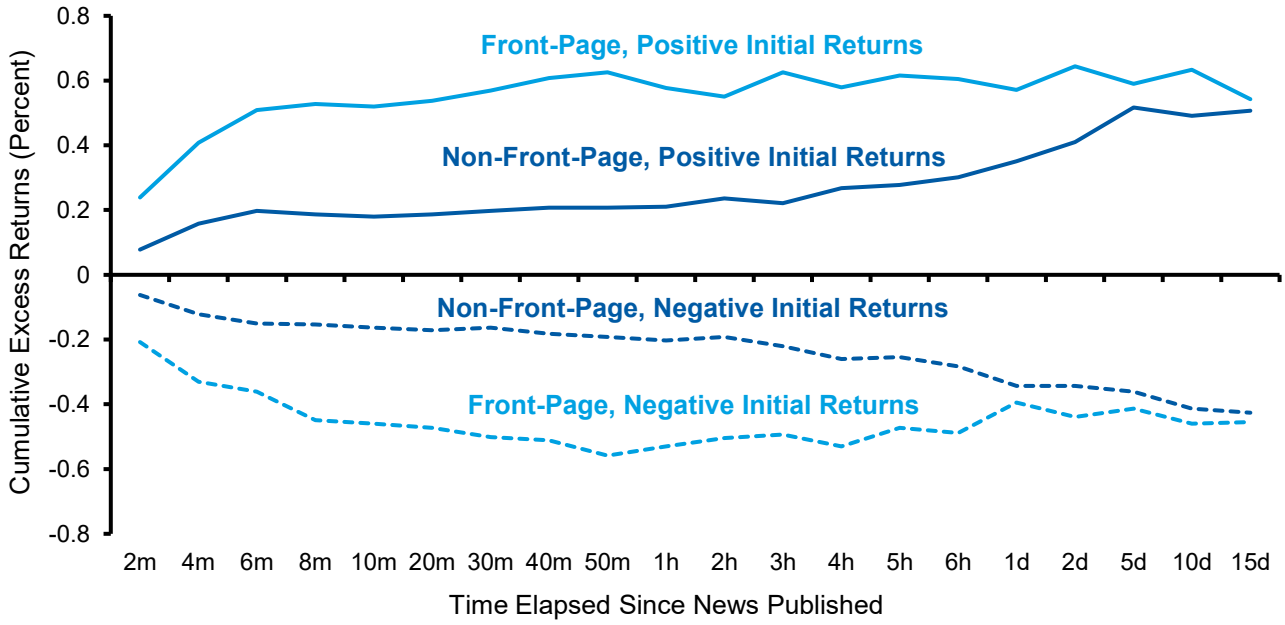
Pay Attention. The *New York Times* published a front-page article on May 3, 1998 about a potential breakthrough in cancer treatment. EntreMed (since renamed CASI Pharmaceuticals) was mentioned as it had the licensing rights to the technology.[189]

The stock skyrocketed the next day, going from around $12 to more than $51 per share on heavy trading volume. The elevated stock price persisted throughout the year. What makes this story remarkable is that *Nature*, a leading science magazine, as well as the *New York Times* ran stories covering the substance of this research months before.[190] There was no new news.

This brings us to our second source of informational edge: paying attention.[191] There is substantial evidence that investors have limited attention and hence do not incorporate all available information. This presents an opportunity to those who can properly assimilate relevant information.

Simply where information is shared can affect the rate at which it is reflected in prices.[192] For example, exhibit 18 shows the speed at which positive and negative news stories categorized as "secondary important" are priced in based on whether the story was placed on the front page or non-front page of the news screen on the Bloomberg terminal.

Exhibit 18: Cumulative Excess Returns Following Placement of Secondary News



Source: Counterpoint Global based on Anastassia Fedyk, "Front-Page News: The Effect of News Positioning on Financial Markets," Journal of Finance*, Vol. 79, No. 1, February 2024, 5-33.*
Note: Based on Bloomberg *"Secondary Important" news articles that are pinned to the front page and those that are not; Initial returns reflect excess returns within the first five minutes; m=minutes, h=hours, and d=days.*

Bloomberg designates news as secondary important if it is very significant (only 0.5 percent of all news) but not quite significant enough for the front page unless there are not enough "primary important" articles. Both the price impact and trading volume are much higher for stories on the front page, although the excess returns for front- and non-front-page stories converge over time.

A basic model of the impact of attention considers the fraction of investors who are inattentive. Markets tend to be informationally efficient when that fraction is very low. But asset prices fail to reflect available information, and an opportunity for a variant perception arises, when that fraction is high.

Research in psychology points to a handful of factors that determine the fraction of inattentive investors. These include the salience of the information, the resources investors use to address the information, and how easily

investors can process the information. In general, the more stimuli investors face the harder time they have paying attention. That is how information gets lost in the shuffle.

Researchers have found that individual investors, in particular, are drawn to stocks that grab attention.[193] For example, stocks that host Jim Cramer recommends on the television show *Mad Money* enjoy large short-term gains.[194] Institutional investors, who are more rigorous in how they allocate their attention, are less susceptible to this effect.[195]

Task Complexity. The final source of informational edge is task complexity. The principle is that the market takes longer to digest new information the less obvious that the implications are. As a result, seeing through the complexity can be a source of excess returns.

For instance, financial economists examined how new information about an industry affected companies with a single business versus conglomerates with multiple businesses.

As a hypothetical example of new information, they imagine a study that shows eating chocolate improves human longevity. The stock price of a company that operates only in the chocolate business would react more quickly than the stock of a conglomerate that has a fraction of its business in chocolate. The economists "find strong evidence that easy-to-analyze firms incorporate industry information first, and hence their returns strongly predict the future updating of firm values that require more complicated analyses."[196]

Another example of task complexity is how the market reacts to information related to trading partners in a supply chain. In cases where two companies are related, such as one acting as a supplier to the other, the market reflects new information about the first company into the stock of the second company with a lag. Investors can generate excess returns purchasing shares of the supplier following the release of positive news about its customer.[197]

How does an investor effectively take advantage of informational inefficiencies?

- **Gather legal information that others do not have.** This source of edge is difficult to achieve and can be expensive. Capturing information that the market has yet to digest produces excess returns for the investor and creates a benefit for society in the form of more efficient prices. A related idea is to capture lots of weak signals that, when combined, generate a strong signal.[198]
- **Recognize that not all information is immediately reflected in prices.** Investors have limited attention and as a result information that is relevant to value is not always immediately reflected in stock prices. Investors tend to respond more quickly to information that draws attention than to information that is less noticeable.
- **The market can be slower to reflect less direct information.** Research shows that the market can be less efficient at incorporating information if the task of doing so is complex. Informational edge may arise from seeing the implication of new information on parts of the market where the impact is not immediately obvious.

Technical Inefficiencies

A technical inefficiency arises when some market participants have to buy or sell securities for reasons that are unrelated to fundamental value. Laws, regulations, contracts, and internal policies may impose rules that shape the actions of certain institutions. These actions may make sense for an individual firm but can create inefficiency. Further, some trades are prompted by limits, requirements, or unavoidable constraints.

William Sharpe, an economist who won the Nobel Prize in 1990, wrote a paper about active management that makes two basic arguments. The first is that the return on the average dollar managed actively will equal that of a dollar managed passively before costs. The second is that the return on the average dollar managed actively will be less than that of a dollar managed passively after costs.[199]

Sharpe's analysis ignores the fact that index funds have to buy and sell securities to reflect inclusions and deletions from the index as well as stock sales and purchases by companies.

There is a large literature documenting these costs for well-known equity indexes.[200] The relative costs can be even larger for bond funds.[201] A similar argument applies to the arbitrage costs of keeping the price equal to the net asset value for exchange-traded funds.[202]

We can tie this back to our discussion of what game we are playing. This rise in indexing means these funds are doing more of this type of trading and require counterparties. Note that managers of traditional index funds are not concerned about whether prices are efficient but rather seek to minimize tracking error versus the index.

That the active investors that remain are more short-term oriented also fits this story. There is now good profit in trading with the index funds. Firms have to be sophisticated and have low costs to do so profitably. But the opportunity has never been better because indexing has never been bigger.

Beyond this, there are other opportunities to exploit technical edge for fundamentally-oriented investors. Each case requires access to capital.

One is to be on the other side of forced sellers or buyers. For example, some investors receive margin calls following a drawdown and have to sell assets. Second is to consider the opposite side of securities affected by fund flows. In this case, investment managers have to buy or sell securities and do so with a predictable pattern. The final opportunity is to step in when traditional arbitrageurs have limited access to capital and hence fail to fulfill their normal function.

Forced Sellers or Buyers. Regulations effectively encourage insurance companies to own investment-grade bonds, and these companies have portfolios that look similar. These requirements also compel insurance companies to sell bonds that the credit agencies downgrade from investment grade to high yield. This is an example of forced selling.

Research shows that these fire sales lead to an increase in yield spreads beyond what the fundamentals justify. This creates a temporary mispricing, which tends to get corrected within months of the event.[203]

John Geanakoplos, a professor of economics, developed the leverage cycle, a useful framework for understanding forced selling. Central to the leverage cycle is the idea that the ability to borrow is more important than the level of interest rates when trying to understand booms and crashes.[204]

One measure of the ability to borrow is the margin requirement, the percentage of a security's value an investor must fund with equity. For example, under Federal Reserve Regulation T, the minimum initial margin to buy most stocks is 50 percent, which means that to buy $100 worth of stock an investor has to put up $50 and can

borrow the rest. There are also equity maintenance requirements, typically 25 percent of the current market value, which means if the stock drops to $66.67 or less the investor will get a margin call.[205] In many cases, the investor has to sell some of the position to pay down the debt.

Access to leverage as measured by margin requirements is procyclical, which means that it tends to be easier to borrow following a rise in asset prices and harder following a fall.

Geanakoplos argues that because investors have heterogenous views, some will place a higher value on an asset than others. These optimists will use debt to bid up asset prices when it is easy to borrow.

The optimistic buyers drive prices higher, creating a setup for a crash. The asset price may drop as the result of perceived bad news, which increases volatility, uncertainty, and disagreement.

Because the optimistic asset owners have used a lot of leverage, this initial drop causes a large decline in their wealth. The decline triggers margin requirements, forcing the optimists to sell. This leads to additional declines in asset values, which triggers further selling, and so forth. These optimistic asset owners are selling for reasons that are unrelated to their view of fundamental value.

Before prices find a new equilibrium, lenders make borrowing harder by increasing margin requirements. This eliminates the holdings of some buyers, leaving fewer investors to support asset prices. This process introduces the risk of spillovers, when owners in one asset class cover their losses by selling assets in other classes.

The leverage cycle shows that asset prices can drop meaningfully below fair value because of forced selling stemming from margin calls and more stringent margin requirements. This is a fire sale that creates a technical edge for investors who can take the other side of the trade. [206]

Not all forced trading is selling. There can also be forced buying. The clearest example is short sellers who have to buy shares to close their positions. This can be caused by significant increases in a stock price that create the risk of untenable losses, increases in the cost of borrowing the stock, or short squeezes precipitated by insider buying, lenders demanding their shares back, or coordinated buying by retail investors.[207]

The Importance of Fund Flows. One form of technical edge comes from funds buying or selling specific securities as a result of inflows or outflows.

Here's a sketch of the story.[208] Investors tend to give money to investment funds that have done well and withdraw money from investment funds that have done poorly. Investment managers who receive additional capital tend to buy the securities they already own, and those who face withdrawals have to sell securities in the portfolio and commonly start with those that are most liquid.

As a result, positive flows tend to create positive price pressure and negative flows negative price pressure. These effects are particularly pronounced for securities that are hard to trade and hence have a high cost of liquidity. This adds or detracts from fund results in the short run, but the price effects reverse within months or in some cases years. One analysis concludes that one-third of excess return for hedge funds, or alpha, is attributable to investor flows.[209]

The debate about the impact of flows into index funds and out of active funds continues. At the core, the question is how much these flows affect asset prices. One camp argues that because demand curves for stocks slope downward, these demand shocks create a consequential and lasting effect on price.[210] Offsetting this is research that shows companies themselves create supply to meet that demand, that the impact of demand shocks tends to reverse, and that valuations for large capitalization stocks are not extreme.[211]

One way to consider “Who is on the other side?” is to sort trades based on whether they were induced by fundamental value or liquidity. Stocks bought or sold for fundamental reasons reveal “stock-picking skill,” whereas stocks traded for liquidity reasons exhibit “negative performance effects.”[212] Evidence suggests that sophisticated funds benefit at the expense of those that sell for technical reasons.[213]

When Arbitrageurs Fail to Show Up. A technical inefficiency can also arise when arbitrageurs have insufficient capital to close gaps between price and value. One example is cross-exchange arbitrage, where an investor buys and sells an identical asset at different prices, say Bitcoin in the U.S. and in South Korea, and locks in a profit. In theory there is no risk and no capital needed but these opportunities are scarce because there is almost always a cost of some sort.

With risk arbitrage, an investor buys and sells assets but is not assured a profit, hence the introduction of “risk.”[214] Arbitrageurs are plentiful in the investment community, and under normal conditions they have sufficient capital to profitably remove divergences between price and value. But they do not have unlimited capital.

Professional arbitrageurs are generally agents. Their capital comes from principals such as wealthy individuals, endowments, or pension funds. They negotiate with prime brokers to set the amount and cost of leverage they can use. History shows that both principals and lenders retrench in instances of extreme stress, and the prospects for meaningful arbitrage persist. This can create opportunity.

Long-Term Capital Management (LTCM) is a case study that incorporates many of the sources of inefficiency we have reviewed. Founded in 1994, LTCM enjoyed compound annual returns in excess of 30 percent in its first 4 years but effectively went bust in 1998.

Reasons for its demise included exposure to Russia, which in August 1998 devalued its currency and defaulted on its debt, as well as losses in highly-leveraged positions. A consortium of banks bailed out the fund, and they eventually earned a modest profit when the fund was finally liquidated.

One aspect of LTCM’s troubles that tends to get overlooked is the degree to which other funds and banks mimicked the fund’s positions. Similar to Blake LeBaron’s agent-based model, financial institutions copied LTCM’s trades, making them crowded and increasing the market’s fragility. Also consistent with LeBaron’s model, imitation was a benefit to returns early on but made finding profitable new trades increasingly difficult.

In July 1998, Sandy Weill, then chief executive officer of the Travelers Group, decided to shut down the U.S. arbitrage desk of Salomon Brothers. Travelers had acquired Salomon in the fall of 1997 and had just agreed to merge with Citicorp.

Salomon decided to let a separate group within the firm liquidate the arbitrage book, which meant that the process of unwinding the positions was quicker and lost more money than would be the case normally. This created stress for LTCM and other firms that had made similar trades.[215]

Leverage also played a role in LTCM’s demise. The firm’s ratio of assets to equity was 27-to-1 in early 1998. Many of LTCM’s positions demanded high leverage to generate satisfactory returns, and that leverage ratio was equivalent to the average of the five largest investment banks at the time.

Substantial leverage can make sense for convergence trades that have low risk and are part of a well-diversified portfolio. Using five-year historical data, the correlation coefficients between LTCM’s positions was less than 0.10 through early 1998 (zero means there is no correlation at all and 1.0 means a perfect positive correlation).

To stress test the portfolio, LTCM's risk managers assumed the correlations could reach 0.30, a figure they deemed improbable. As the crisis unfolded the correlation skyrocketed to 0.70, rendering traditional risk management tools essentially useless.[216]

LTCM lost 44 percent of its capital in August 1998 and sent out a letter to its clients in early September suggesting that the opportunity set looked unusually attractive. The message immediately became public.

Rather than having the intended outcome of attracting new capital, the letter created further concern among LTCM's counterparties and added pressure on its positions. LTCM is a vivid example of how the leverage cycle plays out.

The story of LTCM shows how technical inefficiencies emerge as the result of a lack of well-capitalized arbitrageurs. These were extreme conditions, but these episodes occur in markets from time to time. Access to capital is key to the ability to take advantage of these chances.

Before leaving the topic of technical inefficiencies, it is worth mentioning spin-offs, the result of a distribution of shares of a wholly-owned subsidiary to a parent company's shareholders on a pro-rata and tax-free basis.

Joel Greenblatt, founder of Gotham Capital, explains that the opportunity for technical edge arises because, "Once the spinoff's shares are distributed to the parent company's shareholders, they are typically sold immediately without regard to price or fundamental value."[217]

Historically, spin-offs have created value on average for the companies spun off as well as the parents.[218] One meta-analysis of the literature on spin-offs summarized their findings by saying: "The main conclusion is consistent: spin-offs are associated with strongly significant abnormal returns."[219]

Factors that contribute to this value creation include sharpened corporate focus, better information for investors, enhanced M&A opportunities, and in some cases more favorable tax treatment.[220] Spin-offs potentially combine analytical, informational, and technical inefficiencies and are worth monitoring in the search for edge.

How does an investor effectively take advantage of technical inefficiencies?

- **Be on the lookout for forced sellers.** Periodically, some market participants buy or sell securities without regard for fundamental value. One example is the unwinding of the leverage cycle, where optimistic buyers have to sell as the result of margin calls.
- **Watch investor flows.** On a market level, the issue to watch is inflows into indexes and outflows from active managers. On a fund level, the simple story is that inflows follow good short-term returns and the managers who receive them often buy more of what they own creating a short-term boost. Outflows generally follow poor performance, and managers have to sell what they own, commonly starting with the most liquid positions in their portfolio.[221]
- **Seek situations where arbitrageurs are stretched.** Under normal conditions, arbitrageurs do a very good job of aligning price and value. In fact, their ability to find and close these gaps is one of the ways to explain why markets are efficient. But from time to time, arbitrageurs fail to coordinate their actions or lack access to the capital they need to close gaps between price and value.
- **Keep an eye on spin-offs.** For a long time, spin-offs have been a great illustration of a technical inefficiency. While their returns in recent years have not been as good as they were decades ago, they continue to offer opportunity. We believe it is worthwhile to evaluate spin-offs as they are announced to see if an informational, analytical, or technical opportunity exists.

Conclusion

Markets cannot be fully informationally efficient because there is a cost to gather information and reflect it in asset prices. The degree of efficiency is a function of how difficult it is to acquire information and the friction associated with buying and selling securities to capture value.

There is a continuum of efficiency across countries and asset classes. Exhibit 19 summarizes some of the qualitative determinants of efficiency, most of which are discussed in the report.

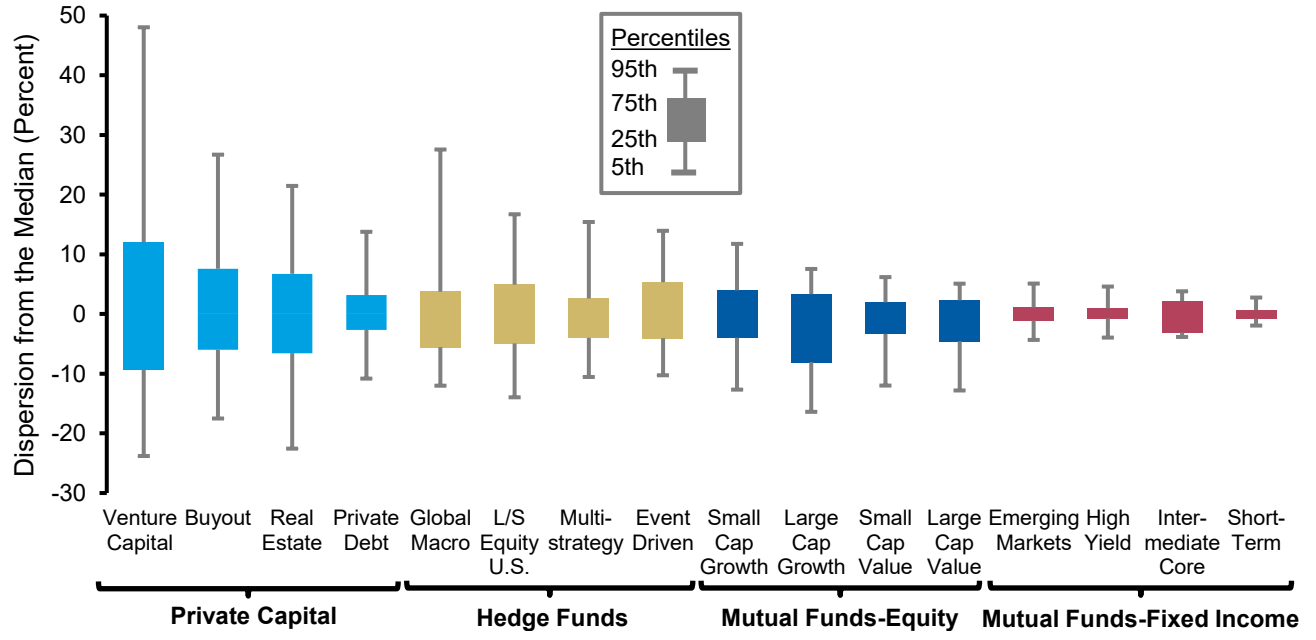
Exhibit 19: Market Efficiency Continuum

Less Efficient	More Efficient
Limited analyst coverage	Lots of analyst coverage
Information is complex	Information is straightforward
Low investor diversity (crowded)	High investor diversity
Forced buyers or sellers	Neutral flow of buyers or sellers
Few substitutes	Lots of substitutes
Constrained ability to short	Easy to short
Costly to finance	Cheap to finance
Costly to trade	Cheap to trade
Arbitrageurs have limited access to capital	Arbitrageurs well financed

Source: Counterpoint Global.

The late David Swenson, formerly the chief investment officer of the Yale endowment, proposed a simple measure of investment opportunity based on the distribution of returns for active managers.[222] His concept is that asset classes with wide dispersion provide skillful active managers with more opportunities to generate excess returns than those with narrow dispersion. Exhibit 20 shows dispersion based on annual returns, net of fees, for 16 asset classes. Dispersion is highest for venture capital and lowest for short-term bond portfolios.

Exhibit 20: Dispersion of Returns for Active Managers in Various Asset Classes



Source: Counterpoint Global and Morningstar Direct.
Notes: Funds domiciled in U.S.; Private equity: internal rate of return since inception as of 1/6/26 for vintage years 1980-2022; Hedge funds and mutual funds: 5-year annualized total returns as of 12/31/25; L/S=long/short.

We categorize market inefficiencies into four areas: behavioral, analytical, informational, and technical. The categories overlap with one another quite a bit. Behavioral inefficiencies are likely the most enduring because human nature has not changed much over time and is unlikely to change much in the future. Behavioral inefficiencies are also among the most difficult to capture because of our individual tendencies to stick with the crowd and as a result of pressure from investors in a fund during inevitable periods of underperformance.[223]

To generate excess returns, investors should seek easy games where their skill will pay off.[224] In investing as in poker, the key to winning is participating in a game where there is differential skill and you are among the most skilled players. This is a challenge because investing is generally highly competitive, markets where participant skill is low are often small, and agency costs commonly compel the wrong behaviors.

The main goal of this report is to encourage active investors to ask and formulate an informed answer to the question of "Who is on the other side?" We recommend documenting those perceived inefficiencies to measure how well they predict excess returns. David Shaw, founder of the hedge fund D.E. Shaw, put it this way:[225]

> A single inefficiency may not be sufficient to overcome transaction costs. When multiple inefficiencies happen to coincide, however, they may provide an opportunity to trade with a statistically expected profit that exceeds the associated transaction costs. Other things being equal, the more inefficiencies you can identify, the more trading opportunities you're likely to have.

Please see Important Disclosures on pages 95-97

Checklist

- ☐ Are investors overextrapolating results, leading to unrealistic expectations?
- ☐ Is there evidence of performance chasing in a security, sector, or asset class?
- ☐ Do sentiment indicators suggest extreme fear or greed?
- ☐ Do investors have correlated views that create fragility in the market?
- ☐ Do you have a different time horizon and the opportunity for time arbitrage?
- ☐ Can you hold through high idiosyncratic risk and short-term drawdowns?
- ☐ Are you more analytically skillful than other investors you compete with?
- ☐ Are you placing different, and more precise, weights on information?
- ☐ Are you accurately updating your views based on new information?
- ☐ Do you have reason to believe that the narrative about a security will change?
- ☐ Do you understand a complex investment opportunity better than others?
- ☐ Have you legally acquired information that other investors don't have?
- ☐ Are you paying attention to all relevant information?
- ☐ Are you trading with forced buyers or sellers?
- ☐ Can you take the other side of fund flows?
- ☐ Can you step in when arbitrageurs are tapped out?

Appendix A: Papers On Indexing and Its Impact on Market Efficiency

Papers that support the idea that indexing, on balance, increases efficiency:

Glosten, Lawrence, Suresh Nallareddy, and Yuan Zou, "ETF Activity and Informational Efficiency of Underlying Securities," *Management Science*, Vol. 67, No. 1, January 2021, pp. 22-47.

Huang, Da, "The Rise of Passive Investing and Active Mutual Fund Skill," *Working Paper*, June 2024.

Palia, Darius, and Stanislav Sokolinski, "Strategic Borrowing from Passive Investors," *Review of Finance*, Vol. 28, No. 5, September 2024, 1537-1573.

von Beschwitz, Bastian, Pekka Honkanen, and Daniel Schmidt, "Passive Ownership and Short Selling," *Review of Finance*, Vol. 29, No. 4, July 2025, 1137-1188.

Papers that support the idea that indexing, on balance, decreases efficiency:

Baruch, Shmuel, and Xiaodi Zhang, "The Distortion in Prices Due to Passive Investing," *Management Science*, Vol. 68, No. 8, August 2022, 5557-6354.

Ben-David, Itzhack, Francesco Franzoni, and Rabih Moussawi, "Do ETFs Increase Volatility?" *Journal of Finance*, Vol. 73, No. 6, December 2018, 2471-2535.

Brown, David C., Shaun William Davies, and Matthew C. Ringgenberg, "ETF Arbitrage, Non-Fundamental Demand, and Return Predictability," *Review of Finance*, Vol. 25, No. 4, July 2021, 937-972.

Gabaix, Xavier, and Ralph S. J. Koijen, "In Search of the Origins of Financial Fluctuations: The Inelastic Market Hypothesis," *NBER Working Paper 28967,* June 2021.

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Appendix C: Do Factors Reflect Risk or Investor Behavior?

One lively debate in finance is whether the excess returns of certain factors, relative to the capital asset pricing model, reflect risk or mispricing due to behavioral issues. Practitioners cannot viably use most of the 450-plus such anomalies that finance researchers have identified and many that they can use are less robust than the research suggests.[226] The ability to implement a trading strategy and robustness are essential standards for empirical finance.

Within this "factor zoo,"[227] six factors are widely used in the investment community, including beta (measured though the capital asset pricing model),[228] size (small capitalization stocks generate higher returns than large capitalization stocks), value (low-multiple stocks outperform high-multiple ones),[229] momentum (stocks that rise continue to rise in the short term),[230] quality (high-quality companies outperform low-quality companies),[231] and asset growth (companies with low asset growth outperform those with high asset growth).[232] Gene Fama and Kenneth French recommend a five-factor model that includes all of the above except for momentum.[233]

The critical question is whether the excess returns these factors imply reflect risk or a combination of arbitrage costs and behavioral mistakes by investors.[234] If the returns are the result of risk the CAPM misses, the factors are useful for capturing that risk. This brings us back to efficient markets, where long-term rewards are commensurate with the risk that investors accept.

Excess returns from factors likely reflect both risk and behavioral mistakes. But some may be more behaviorally-oriented than others. Andrew Ang, formerly Head of Factors, Sustainable and Solutions at BlackRock, a large asset management firm, recommends asking whether a factor works based on whether it rewards risk, takes advantage of a structural impediment, or capitalizes on behavioral biases.[235]

While explaining the exact source of excess returns for any factor is inherently difficult, solid evidence suggests that the value,[236] momentum,[237] and quality[238] factors have a large dose of behavioral influence. Risk appears to be the main driver of excess returns for the CAPM and size factors.

The source of excess return from a given factor is relevant for answering the question of who is on the other side of a trade. If excess returns relative to the CAPM's predictions reflect risk, then the factors are helpful in making sure you are receiving proper compensation. If excess returns reflect behavioral issues, they suggest a source of returns that are both extra and recurring. But the sums that winners earn must be offset by the sums that losers surrender.

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