Ten Investment Insights that Matter

Bruce I. Jacobs and Kenneth N. Levy

Bruce I. Jacobs
is a principal of Jacobs Levy Equity Management in Florham Park, NJ.
bruce.jacobs@jlem.com

Kenneth N. Levy
is a principal of Jacobs Levy Equity Management in Florham Park, NJ.
ken.levy@jlem.com

Creating a successful investment practice requires examining a wide array of issues, from a philosophical inquiry into the nature of financial markets to the fine details about the definition of earnings. Our early empirical research indicated that, contrary to the prevailing belief in efficient markets, the equity market is not totally efficient. Opportunities for profitable active investment existed and continue to exist despite the rapid evolution of financial markets.

Detecting and exploiting these opportunities to achieve excess returns at reasonable risk requires continuous research to keep up with an ever-changing world. However, research alone will not ensure success. With more than 30 years of experience managing portfolios, we have gained many insights into the nature of the markets and the investing process. The most important of these insights—the ones that continually guide our efforts—are discussed below.

THE STOCK MARKET IS A COMPLEX SYSTEM

Scientists classify systems as ordered, random, or complex. The swings of a pendulum or the structure of crystals, for example, are ordered and can be described with a fixed set of rules. Order implies a high degree of predictability. The movement of individual gas molecules (Brownian motion) is, by contrast, random. Randomness implies a lack of predictability. Complex systems combine elements of order and randomness and are challenging to predict.

The equity market is obviously not ordered, because price changes do not follow simple, unchanging rules. For example, buying low-P/E, small-cap, or momentum stocks does not provide superior returns on a consistent basis.

The efficient market hypothesis (EMH) asserts that the equity market is a random system, with price movements that are totally unpredictable. Research dating back to the 1970s, however, has detected stock price behavior that is anomalous in the context of a random system. Examples include return-reversal, earnings-surprise, and calendar effects. These anomalies suggest that the equity market is not completely random.

Rather, the market is a complex system permeated by a *web of return regularities* (persistent price behaviors) created by the interaction of numerous factors—company fundamentals, macroeconomic conditions, behavioral biases of investors, and institutional factors, such as the regulatory environment. Regularity implies predictability, which may be exploited to produce value-added performance.[1]

MARKET COMPLEXITY CAN BE EXPLOITED WITH A RICH, MULTIDIMENSIONAL MODEL

Given the market's complexity, detecting the full spectrum of investment opportunities requires human ingenuity combined with rigorous statistical analysis and computational power to make sense of the ever-increasing amount of data. The opportunities investigated should be theoretically plausible and intuitively sensible so that spurious relationships are avoided.

To increase robustness and performance potential, breadth of inquiry is important. An approach that investigates numerous potential return-predictor relationships across a large number of securities has an informational advantage over an approach that focuses on just one or a few potential return predictors.

The approach can also benefit from a depth of analysis. Relationships between returns and potential return predictors may vary over different types of stocks and different market environments. Earnings revisions, for example, may have a greater impact on growth stocks than on value stocks. Furthermore, return effects may be nonlinear; increasing earnings surprises, for instance, may result in diminishing marginal returns. Depth of analysis enables the development of proprietary return predictors that are more promising than commonly used factors.

Breadth of inquiry increases the number of potentially profitable investment opportunities, and depth of analysis should improve the accuracy of predicted returns. This combination permits the construction of portfolios that are diversified across small exposures to numerous proprietary return predictors, which can result in more consistent investment performance.[2] An additional benefit of proprietary return predictors is that resulting portfolio holdings differ from those of managers using more well-known factors and hence are less likely to be replicated or front-run, making them more resistant to overcrowding.[3]

RETURN-PREDICTOR RELATIONSHIPS SHOULD BE DISENTANGLED

In a complex market characterized by a web of return regularities, the relationships between regularities are key. Research approaches such as deciling or simple univariate regression, which assume that prices respond only to the regularity under consideration, are naïve. They do not take the relationships between regularities into account. For example, the low-P/E and small-size effects are related: Stocks with lower than average P/Es tend to have smaller capitalizations.

A simultaneous analysis of all return predictors, taking into account cross-correlations, provides a clearer picture of return-predictor relationships. Multivariate regression can *disentangle* return effects. Disentangling purifies the measurement of each return effect.[4]

A *pure* return to low P/E, for example, can be thought of as the return to a portfolio that has a low P/E but is market-like in other respects (capitalization, yield, industries, and so on). Such a portfolio would be immunized against other effects that could contaminate the measurement of the pure return to low P/E.

Pure returns afford a clearer picture of which market inefficiencies are real and which are merely proxies for other return effects. Based on naïve analyses of returns to market capitalization, for example, investors long believed that small-cap stocks delivered abnormal returns in the month of January. A sophisticated, multivariate analysis reveals that these returns reflect the bounce back from year-end tax-loss selling, not firm size.

By controlling for cross-correlations, multivariate regression produces pure returns, which we have found to be less volatile and more predictable than naïve, univariate returns.

AN INVESTMENT FIRM SHOULD ABIDE BY THE LAW OF ONE ALPHA

A coherent framework for analysis preserves the law of one alpha.[5] Specifically, any investment firm that generates return predictions should come up with one, and only one, alpha estimate for each stock. This allows each stock to be consistently valued relative to every other stock in the investment universe. A firm that uses different models for the same stock in different strategies would produce multiple alpha estimates. Yet there can be only one true mispricing for each stock.

Consider a firm that offers a value strategy and a momentum strategy. The value strategy may recommend buying a stock that drops in price because it is a better value, while the momentum strategy may suggest selling that same stock because of its negative momentum. The firm is essentially assuming that the expected excess return from this single stock is both positive and negative.

THE INVESTMENT PROCESS SHOULD BE DYNAMIC AND TRANSPARENT

The investment process should be dynamic in several respects. For any given level of investor risk tolerance, for instance, a portfolio's optimal level of active risk should be allowed to vary depending on the level of mispricing in the market and the manager's skill at detecting and exploiting mispricing. Too strict an emphasis on risk control—for example, targeting a fixed level of residual risk at all times—can needlessly reduce potential return. Allowing portfolio residual risk to vary opportunistically within an acceptable range can enhance portfolio performance.[6]

Furthermore, pure returns to various return predictors change over time depending on market and economic conditions, creating opportunities for a dynamic process. For instance, small-cap stocks predictably outperform large-cap stocks in some economic environments and underperform in others. Our early research showed that pure returns to small cap are sensitive to unexpected changes in the spread between corporate and Treasury bonds.[7]

Of course, excess returns to a factor may diminish as other investors begin to exploit similar factors. Constant research into existing and potential return predictors is necessary to stay one step ahead of the crowd and keep insights pertinent and profitable.

A transparent investment process allows the manager to distinguish between what the investment system knows and does not know.[8] The manager may have to intervene when the model is affected by events that it is unaware of. Immediately after 9/11, airline stocks seemed cheap on a valuation basis, because their prices had plummeted while analysts had yet to update their earnings estimates. P/E ratios using forward-looking earnings were based on stale information.

Another example was the restriction on short selling financial stocks during the recent credit crisis, which affected models using short interest data. On such occasions, managers may have to determine if models are consistent with real-world conditions. Effective intervention, however, requires transparent models that the manager fully understands. Automated, black-box systems and rigid rules-based approaches do not allow for human judgment and intervention.

We have found that a dynamic and transparent investment system, constantly refreshed with research insights, provides the best opportunity for outperformance.[9]

A CUSTOMIZED, INTEGRATED INVESTMENT PROCESS PRESERVES INSIGHTS

No matter how potentially valuable the insights derived from research and security selection, they are only as good as the processes used to implement them. Poor portfolio construction can erode or even eliminate the return potential of good ideas.

A portfolio optimization process that is customized to include the same dimensions found relevant by the stock selection process helps to ensure that the opportunities detected by the modeling process are exploited, while the known risks are accounted for and controlled.[10]

This argues for a customized, proprietary portfolio optimization process that is aligned with the valuation process. One-size-fits-all solutions will not be as effective. A commercial portfolio optimizer that recognizes only some of the factors in the prediction model, for example, will control exposures only along the dimensions it recognizes. The portfolio will tend to be more exposed to factors recognized by the prediction model but not the optimizer, and less exposed to those recognized by both the model and the optimizer.

A properly customized system will relate transaction costs to the factors driving trades, providing estimates to the portfolio optimizer in order to prevent uneconomical trades. It also will include a performance attribution system customized along the same dimensions as the prediction model, offering the transparency needed to ensure that all systems are working as expected and providing feedback for the research process.

INTEGRATED LONG-SHORT OPTIMIZATION CAN PROVIDE ENHANCED RETURNS AND RISK CONTROL FOR MARKET-NEUTRAL AND 130-30 PORTFOLIOS

Short sales undertaken systematically within the context of risk-controlled portfolios that contain both long and short positions can provide enhanced returns and risk control vis-à-vis long-only investing. The full benefits emerge if long and short positions are determined simultaneously, in an integrated framework.

Some portfolio managers optimize the long portfolio independently of the short portfolio. Although separately optimized long and short portfolios can be combined, each portfolio remains benchmark-constrained. This is because securities' portfolio weights must converge toward their benchmark weights in order to control risk. When long-short portfolios are constructed in this suboptimal manner, the advantage over long-only portfolios stems from a less-than-one correlation between the returns of the long portfolio and those of the short portfolio.

We have found that the better solution is to determine long and short positions simultaneously, in an integrated optimization.[11] With an integrated optimization, neither long positions nor short positions need to converge toward index weights in order to control risk. Securities can be underweighted or overweighted by as much as the investment insights and risk considerations dictate, with risk exposures controlled via hedged security positions. Freed from index weight constraints, the manager enjoys more flexibility than a long-only manager in implementing investment insights, which should translate into improved performance.

Market-neutral long-short portfolios, which are designed to provide alpha independent of the overall market's performance, will benefit from integrated optimization.[12] So, too, will 130-30 long-short portfolios, which maintain full exposure to the market with incremental security positions adding further alpha potential.[13]

Even limited amounts of shorting, as in a 130-30 portfolio, can add significantly to portfolio excess return. Moreover, integrated optimization of long and short positions releases the full benefits of long-short portfolios.

ALPHA FROM SECURITY SELECTION CAN BE TRANSPORTED TO ANY ASSET CLASS

With shorting and derivatives, investors can transport alpha from one asset class to another, or from one subset within an asset class to another.[14] For example, the investor can equitize a market-neutral long-short portfolio by purchasing stock index futures or by using swaps. The return to the resulting portfolio will reflect the market return plus the alpha from the long-short portfolio.

Alpha transport can help solve an issue investors often face: how to maximize the returns available from security selection while also achieving an asset class allocation that meets desired return and risk goals. For example, an investor may believe that small-cap stocks offer a greater opportunity for security selection than large-cap stocks, but also entail greater risk. To benefit from small-cap security selection while maintaining a desired asset allocation, an investor can use shorting or derivatives to neutralize the market-sector exposure of a portfolio of selected small-cap stocks and transport the security selection alpha to a large-cap equity allocation.

Alpha transport affords flexibility in pursuit of return and control of risk.

PORTFOLIO OPTIMIZATION SHOULD TAKE INTO ACCOUNT AN INVESTOR'S AVERSION TO LEVERAGE

Conventional mean-variance optimization considers the tradeoff between expected portfolio return and volatility risk (as measured by portfolio variance), but ignores the unique risks of leverage that arise from selling short, using derivatives, or borrowing on margin. These include the risks and costs of margin calls, which can force borrowers to liquidate securities at adverse prices due to illiquidity; losses exceeding the capital invested; and the possibility of bankruptcy.

In the past, investors have relied on mean-variance optimization with a constraint to control the amount of leverage. Such an approach, however, provides no guidance about where to set the leverage constraint and cannot identify the optimal portfolio for an investor who cares about leverage risk. We developed a mean-variance-leverage optimization model, which augments conventional portfolio theory with a term for investor leverage aversion and allows the investor to consider simultaneously the tradeoffs between expected portfolio return, portfolio variance, and leverage risk.[15]

When leverage aversion is not considered, traditional mean-variance optimization can result in portfolios with very high levels of leverage, because increasing leverage increases expected portfolio return, while the unique risks of leverage are ignored. Mean-variance-leverage optimization recognizes that leverage has unique risks and results in portfolios with lower levels of leverage, such as 130-30 portfolios. Given the role that excessive leverage played in several financial crises, less-leveraged portfolios may be beneficial not only for leverage-averse investors, but also for the global economy and markets.

BEWARE OF RISK SHIFTING, FREE LUNCHES, AND IRRATIONAL MARKETS

History is rife with examples of investment strategies that promised investors the proverbial free lunch—reduced risk with higher returns. Again and again, however, events have confirmed there is no free lunch.

For example, portfolio insurance emerged in the 1980s as a means of *guaranteeing* a predetermined floor for a portfolio's value by replicating the behavior of a portfolio protected by a put option while promising increased returns.[16] In the 1990s, Long-Term Capital Management (LTCM) offered high returns at supposedly low risk by using leveraged, low-risk arbitrage strategies.[17] In the 2000s, structured finance products, such as residential mortgage-backed securities (RMBS) and collateralized debt obligations (CDOs) based on subprime mortgages, had triple-A credit ratings and appeared to offer high yields.[18]

The risks underlying these sophisticated products were essentially systematic in nature. Systematic risk cannot be diversified; control of systematic risk relies largely on being able to shift the risk from those who don't want it to those who will accept it in exchange for an appropriate return. With portfolio insurance, risk is shifted by selling stock from insured portfolios to other investors. With arbitrage strategies, risk is offset by holding long and short positions in related assets, which requires the ability to both establish and unwind these positions. RMBS and CDOs shift risk from lenders to buyers of the products, and from buyers of triple-A-rated tranches to buyers of subordinate tranches.

The ability to shift risk is ultimately dependent on the willingness of counterparties to take on the risk. However, as the demand increases for products purported to reduce risk and increase returns, the level of risk that must be shifted increases. The availability of counterparties to take on the risk becomes more and more questionable. Liquidity begins to dry up. At some point, the markets affected by free-lunch products become fragile and prone to crashes.[19]

Free lunch strategies can lead to markets that are irrational in the sense that prices rise above or fall below the fair price suggested by fundamentals. The fall is usually preceded by the rise, as was the case in 1987, 1998, and 2008. The Internet bubble and its deflation in 2000 provide a related example, which was not product driven, but rather investor driven. The bubble in this case was likely caused by momentum traders chasing inflating Internet stock prices. Momentum traders buy (often on margin) as prices rise and sell as prices fall, essentially attempting to obtain the benefits of a call option with upside potential and limited downside.[20]

It is difficult to time market extremes caused by manias and panics.[21] However, prices do eventually revert to more normal levels. A period of higher-than-average returns tends to be followed by a period of lower-than-average returns, and vice versa. This suggests that, lacking evidence of an ability to time periods of market irrationality, investors may be better served by weathering them, in the knowledge that irrational pricing will self-correct over time. The ability to do so depends on maintaining one's investment approach. Sticking with a theoretically sound, economically sensible investment strategy should provide rewards that more than compensate for the losses experienced during periods of irrationality.

CONCLUSION

Achieving success in investing requires systems for organizing and making sense of vast amounts of information, a thorough understanding of investor behavior as well as the fundamental drivers of security prices, and the ability to adapt to new developments. As the financial markets have evolved, the number of time-tested truths—those that form the foundation of our approach to investing—have accumulated one by one, over a period of many years.

We began our investing careers with a conviction that the market was far more complex than many realized and have watched over time as some have offered shorter, simpler paths to investing success. Paradoxically, if the market were simpler, and investing were easier, the rewards to active management would be smaller, because many would have the skills to succeed. It is the market's very complexity that offers the opportunity to outperform—to those investors willing and able to grapple with that complexity.

ENDNOTES

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[1]See Jacobs and Levy [1989b and 2014b].

[2]See Grinold and Kahn [1999] and Jacobs and Levy [1995a and 2014b].

[3]A manager also should enforce strict capacity limits so that portfolios remain liquid and nimble. Asset *managers* can succeed for their clients. Asset *gatherers* only handicap themselves and their clients' returns by amassing ever-larger position sizes, which become increasingly costly to trade. On the importance of setting capacity limits, see Perold and Salomon [1991].

[4]See Jacobs and Levy [1988 and 2014b]; also, see Green et al. [2014].

[5]See Jacobs and Levy [1995b].

[6]See Jacobs and Levy [1996a].

[7]See Jacobs and Levy [1989a].

[8]However, the investment process must be opaque to competitors to preserve its competitive advantage.

[9]See Jacobs and Levy [2014b].

[10]See Jacobs and Levy [1995a].

[11]See Jacobs et al. [1998 and 1999]. Note that the same methods used for optimizing long portfolios can be used to optimize long-short portfolios, provided the long-short portfolio satisfies a certain *trimability* condition. See Jacobs et al. [2005 and 2006].

[12]See Jacobs and Levy [1993, 1996b, and 1997].

[13]130% of capital is invested in long positions and 30% of capital is sold short, with the short-sale proceeds providing capital for the additional long positions. Jacobs et al. [1998] showed how to combine a benchmark exposure with long and short securities to create a 130-30 type portfolio. See also Clarke et al. [2004] and Jacobs and Levy [2006, 2007a, and 2007b].

[14]See Jacobs and Levy [1999].

[15]See Jacobs and Levy [2012, 2013a, 2013b, 2014a, and 2014c]. Also, interestingly, we have shown that conventional optimization will result in the optimal portfolio only if the investor does not use leverage or has no aversion to the unique risks of leverage.

Mean-variance-leverage optimization can be used to define optimal portfolios that lie along a two-dimensional mean-variance efficient frontier corresponding to the investor's level of leverage aversion. It can also be used to generate a three-dimensional efficient surface showing the tradeoffs between expected portfolio return, portfolio variance, and leverage risk.

[16]Risk was controlled by shifting portfolio assets between stock and cash, in line with the Black-Scholes option pricing model. As stock prices rose, the strategy purchased more stock, and as stock prices fell, the strategy sold stock. When prices began to fall sharply in mid-October 1987, the substantial sales required by portfolio insurance programs contributed significantly to the market crash on October 19, which in turn led many programs to fall below their guaranteed floors. See Jacobs [1999a].

[17]LTCM's arbitrage strategies involved buying high-yielding (higher-risk) assets that were considered to be *cheap* and selling short low-yielding (lower-risk) assets that were considered to be *expensive*. High returns were achieved by using large amounts of leverage, justified on the basis of the supposedly low risk of the underlying arbitrage positions. Russia's de facto default on its debt in the summer of 1998, however, led to a general flight to quality, and LTCM's long, risky positions plummeted while its safer, short positions soared. Faced with overwhelming margin calls, LTCM was forced to liquidate positions at adverse prices, exacerbating the turmoil in several asset markets and setting itself up for an eventual takeover by its lenders and counterparties. See Jacobs [1999b].

[18]The diversification and tranching used in structured products supposedly reduced the risks to a level that justified high credit ratings. But when housing prices leveled off and began to decline in 2007, defaults and foreclosures undermined the value of mortgage-backed products, sapping the resources of banks holding large quantities of such products and strangling liquidity. Economies around the globe plunged into recession. See Jacobs [2009].

[19]When these products are in operation, prices have a greater tendency to gap up or down, rather than following the continuous path often assumed by theory. Discontinuity can occur because of the option-like nature of many of these products as well as the nonlinearity introduced by leverage. The protection in portfolio insurance is provided by a replicated put. Leverage gives lenders to hedge funds a trigger that can act like an option strike price and lead to sudden and unprofitable unwinding of arbitrage positions. Mortgage-related products rest on mortgages that contain an explicit option allowing borrowers to put the house back to the bank. See Jacobs [2004 and 2009].

[20]For a discussion of the option-like nature of momentum trading, see Jacobs [2000].

Asynchronous discrete-time simulation allows for nonlinear behavior, something that continuous-time models such as classic option pricing formulas cannot do. We showed using the Jacobs Levy Markowitz Simulator (Jacobs et al. [2004 and 2010]) that a relatively small proportion of momentum investors can destabilize a market.

[21]For instance, few observers foresaw the credit crisis.

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