ARTICLE

The Advisor's Case for Smart Beta Direct Indexing

September 2019

AUTHORS

John West, CFA
Partner, Executive Office

Amie Ko, CFA
Senior Vice President, Product Management

Key Points

- Technological advances are making smart beta direct indexing increasingly accessible to investors, possibly allowing for tax management and strategy customization benefits.
- By understanding a client's tax circumstances, ESG beliefs, and professional circumstances relative to a sector or specific company, the advisor can help their client assess and maximize the benefits of a smart beta direct indexing approach.
- Complementing smart beta ETFs and mutual funds, smart beta direct indexing can be an important part of the advisor's toolkit.

Introduction

Advisors often serve as their clients' educator or coach about how the capital markets function and how best to navigate available investment options, a role that requires them to stay on the leading edge of new developments such as smart beta direct indexing. As direct indexing becomes increasingly available to investors given rapid advances in technology, advisors are uniquely positioned to assess whether this opportunity fits into their clients' portfolios, and if so, to maximize its potential.

Smart beta direct indexing can be an important part of the advisor's toolkit. The advisor understands a client's tax situation and can help determine the tax advantages afforded by smart beta direct indexing. The advisor can also guide clients in aligning their equity portfolio with personal beliefs, strongly held values, and human capital considerations. For clients who adopt smart beta direct indexing, the advisor can maximize its potential in ways that mark the essence of a long-term fiduciary relationship through framing client conversations, establishing philosophical buy-in, and sharing narratives grounded in research.

In his 2001 article "Personal Indexes," Andrew Lo foresaw that advancements in computing power and artificial intelligence would likely lead to investors having personalized indices purposed for their unique financial picture. Lo admitted that such customized asset management sounded like science fiction, but noted the technology existed and "as with the transformation of all great ideas from theory into practice, it is only a matter of time."

According to Dave Nadig of ETF.com, the time for growing mass customization has come. At the 2019 Research Affiliates Advisor Symposium, Nadig's "Radical Disruption: Post-ETF Investing" presentation advanced the premise that direct indexing[1]—investing in a portfolio of individual stocks instead of a wrapped product such as an ETF or mutual fund—is emerging as a core building block of equity portfolios. This "unwrapping" allows for the kind of customization Lo described 18 years ago. While we believe ETFs and mutual funds will remain a staple of investment alternatives, smart beta direct indexing may increasingly offer advisors an additional tool for producing better outcomes for some of their clients.

What Is Direct Indexing?

Suppose an advisor invests $250,000 of client assets in one of the four equity ETFs available on US exchanges that closely track the S&P 500 Index. With this approach, the client's assets are commingled with the assets of others (i.e., everyone owns the same portfolio). The asset management firm that sponsors the ETF does the trading and administration necessary to track the index.

In contrast, a direct indexing strategy bypasses the fund structure and, using a separate account, purchases the individual securities associated with a specific index on behalf of the end investor. In this case, the direct index would hold all 500 stocks in the S&P 500 individually according to their respective weights in the index.[2] Theoretically, the return from buying the individual stocks should closely match the return of investing in them through an ETF wrapper. Both approaches adjust for corporate actions, such as a merger, and follow standard reconstitution rules when a company's stock is added or dropped.

Importantly, the index being tracked does not have to be a headline cap-weighted passive index. A smart beta index, such as the RAFI Fundamental Index™ or a factor index that targets a specific outcome such as low volatility or dividend income, works just as well.

Of course, mutual funds and ETFs were created because these vehicles make investing easier and more affordable for small investors, many of whom do not have the asset base or financial resources needed to directly buy a broadly diversified basket of individual securities.[3] Until recently, a direct indexing strategy was largely impractical because of high brokerage costs and arcane portfolio accounting systems. That being said, over the last few years dramatic technological advances[4] have improved the robustness, speed, and capacity of systems and lowered the asset levels necessary to make direct indexing accessible to investors.

Smart Beta Direct Indexing in an Advisor's Toolkit

Smart beta direct indexing can be one of many important tools an advisor has to help them achieve their clients' financial objectives. Our belief is founded on the advantages advisors have which result from the strong relationships they build with their clients.

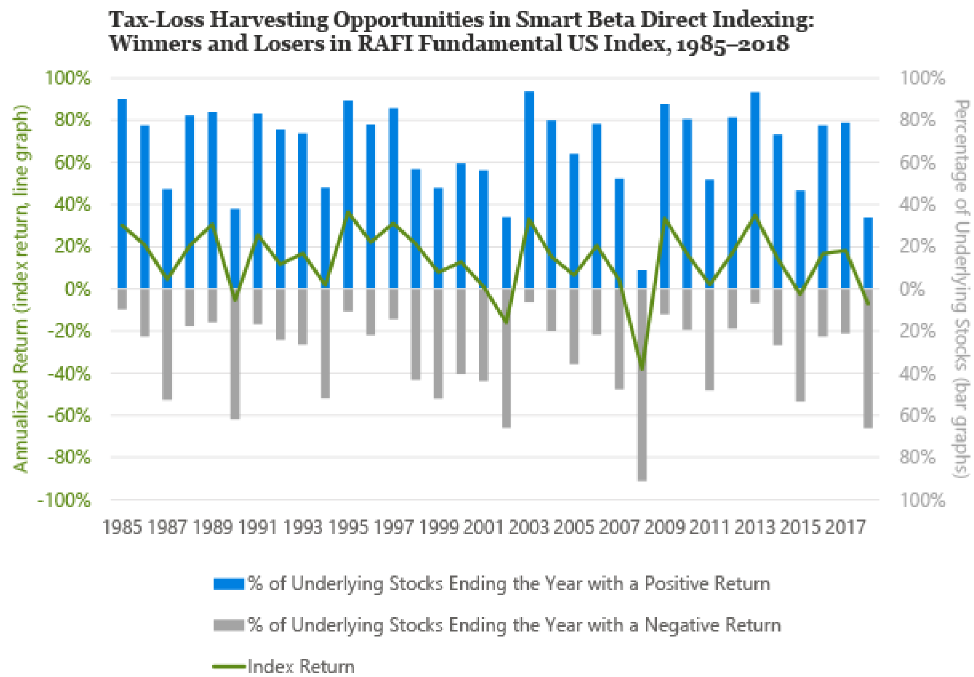
First off, advisors are well positioned to understand their clients' tax situation and to suggest investment strategies that can minimize taxes. In particular, positive *tax alpha* (Arnott, 2018) is more easily achieved with direct indexing than with a wrapped vehicle. Tax management strategies, such as deferring gains and loss harvesting, can increase a portfolio's after-tax return. Realized losses in one portfolio can increase after-tax returns by offsetting capital gains in the client's other investment portfolios. Holdings of potentially hundreds of individual securities (often having multiple cost-basis lots) offer sizeable opportunities for efficiencies in tax management, such as lot selection when selling and in wash-sale management.

Stein and Narasimhan (1999), Arnott, Berkin, and Ye (2001), and Berkin and Ye (2003) showed how tax management techniques applied to cap-weighted indices can substantially improve a portfolio's after-tax return. In the longest survey, Berkin and Ye demonstrated that a tax-loss harvesting strategy, using the highest-in-first-out method, in a traditional cap-weighted index appreciably improved the after-tax return of the index. They found that following this strategy over 25 years added an excess return, relative to the portfolio without tax management, of 73 basis points (bps) before liquidation and 56 bps after liquidation.[5]

Like cap-weighted portfolios, smart beta indices generally have large breadth in their securities positions on which to apply these tax management techniques. For instance, the RAFI Fundamental US Index held 478 securities as of December 31, 2018. The RAFI-based single-factor index portfolios, such as RAFI Value Factor, Quality Factor, and Low Volatility Factor, typically hold over 100 securities each. Thus, even in calendar years when these indices post positive returns, some securities in each index should have a negative return that dips below cost basis and could be used in loss harvesting.

Vadlamudi and Bouchey (2014) applied tax management techniques to smart beta strategies and found that from 1993 to 2012 the average after-tax return of the Fundamental US Index strategy was 69 bps higher than without any tax management and 35 bps higher post liquidation. This pattern of results is largely consistent with the eight other US smart beta strategies in their study.

Advisors are in a unique position to work with their clients to understand their individual tax situations and suggest how direct indexing can help. For example, are stock option awards on the horizon? Has a marriage or divorce prompted a review of newly combined or divided assets? Would a client like to diversify away from her employer's stock or sector, particularly one that dominates broad market indices? In discussing the advantages of tax management, such a strategy should likely be shown in dollar terms so the client can easily see and value the tax savings from loss harvesting. As a client's life circumstances change, through the advisor-client relationship the advisor remains in a position to communicate the tax advantages of smart beta direct indexing and oversee its implementation.



Source: Research Affiliates, LLC, based on data from FactSet.

Along with an understanding of a client's tax situation, advisors have insight into their clients' personal circumstances and beliefs, such as specific and strongly held ESG preferences that may not be addressed by existing ESG indices. For instance, some may choose to exclude certain market sectors, such as those with a poor ESG score, sometimes known as "sin stocks." Because the client owns individual securities rather than a share of a mutual fund or ETF portfolio, direct indexing allows the advisor to offer an unprecedented level of customization.

According to Research Affiliates' investment beliefs (Brightman, Treussard, and Masturzo, 2014), investors have preferences beyond risk and return—for example, investing in companies that follow socially responsible business practices. Increasingly, investors are interested in aligning their investing beliefs with their personal values and social preferences.[6] Hartzmark and Sussman (2019) found that Morningstar's newly introduced Sustainability Rating had a significant impact on mutual fund flows. Over the 11 months after sustainability ratings were first published in March 2016, high sustainability-rated funds received more than $24 billion in positive flows, while funds rated low in sustainability experienced more than $12 billion in outflows. Both social preferences and social signaling influence investors' decisions to buy socially responsible mutual funds (Riedl and Smeets, 2017). In turn, a client's socially responsible preferences influence the approach the advisor implements—a stronger or more distinctive preference requires a greater level of customization.

Seeking to diversify a portfolio by considering a client's human capital is another critical reason for customization. Ibbotson et al. (2005) described human capital as "the present value of future wage income." The source of a client's future earnings should be incorporated into their asset allocation just like the income-generating source of stocks and bonds. Perhaps the most salient example is one of the starkest and harshest in recent memory: employees of Enron and of Worldcom who had invested all of their savings in the stock of their employer experienced the double whammy of losing their future wages and retirement savings in one cruel swoop.

Because of the close advisor-client relationship, advisors understand the issues important to their clients and can customize an equity portfolio that appropriately reflects their clients' preferences. In his presentation at the 2019 Research Affiliates Advisor Symposium, Dave Nadig suggested an augmented client questionnaire that moves beyond the basics of age, income, assets, and risk tolerance. The themes he included nicely align with our observations around ESG and human capital customization. Advisors who guide clients using the types of questions Dave Nadig suggests can deliver a rich client experience, and the resulting portfolio may then align more closely with the client's personal beliefs and circumstances.

Augmenting Advisor–Client Conversations: ESG and Human Capital Customization

What matters to you?

- When you invest, you become a co-owner in companies. Please list the industries you do not want to invest in (answers ranged from abortion to social media to tobacco).
- Are there any individual companies you want to avoid? Or do not want to be an owner of?
- Please rate the degree to which you agree with the following statements:
    - I believe that global warming is a man-made phenomenon and that we should control our carbon emissions.
    - I believe there should be more gender diversity in board rooms and at the executive level of corporations
    - I believe that all companies around the world should respect basic conventions for human and labor rights.

What is unique about you?

- What company do you work for?
- What sector do you work in?
- What is the value of your company stock/options positions?

Source: Nadig, Dave. 2019. "Radical Distruption: Post-ETF Investing," presentation at Research Affiliates' 2019 Advisor Symposium.

Potential Obstacles

While the opportunity for advisors to improve client outcomes via smart beta direct indexing can be compelling, it may also present some limitations. (Our focus here is on the *approach* of direct indexing and not on a comparison of direct indexing to individual exchange-traded products, which would require an analysis of fees, custody services, and trading cost differentials.)

A direct index approach raises the number of individual holdings in a client's portfolio. Any large increase in line items likely requires more time, effort, and resources to address and manage client concerns around company-specific risks. In recent months, frequent headlines have trumpeted problems associated with human error, negligence, or social controversy, engulfing many large firms such as Facebook, Boeing, Johnson and Johnson, and Goldman Sachs in corporate scandal.[7] Responding to "line-item" risk, often requiring higher levels of administration and management activities, can shift time and resources away from higher value-add activities.

Even as technology rapidly evolves and transaction costs sink, making it easier to engage in direct indexing, trading numerous securities in a portfolio is more complex and time consuming than investing one time in a wrapped product. Greater operational complexity could also exacerbate errors; for instance, it may be hard to identify and correct a tax-related error in the algorithm widely applied across a portfolio and thus to reduce the error's impact on the portfolio and the related tax consequences.

Finally, not every client needs the tax advantages of smart beta direct indexing. As we discussed earlier, one of the benefits of direct indexing is that it allows for tax-loss harvesting to offset realized taxable gains in a client's portfolio. Such benefits are muted, however, if a client's portfolio is expected to generate limited taxable gains and, of course, are irrelevant in a tax-deferred account such as an IRA.

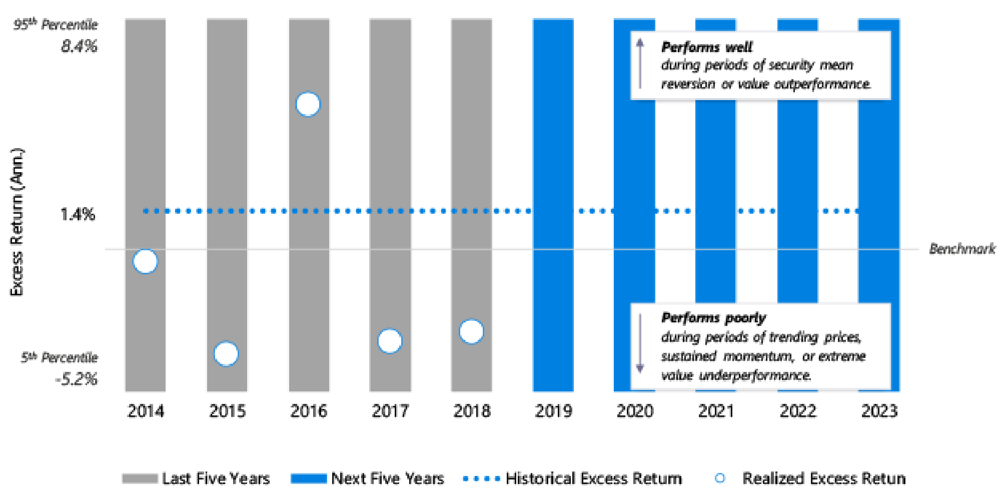
Wrapped products remain an important part of the advisor's toolkit. Indeed, we view smart beta direct indexing as a complement to smart beta ETFs and mutual funds. Advisors can access the same smart beta index exposure across their practice using an ETF or a direct index, depending on the individual client's preference for tax management and customization.

Guiding Clients toward Better Outcomes

After assessing best approaches and implementation routes to meet client objectives, the advisor is in a unique position to help clients realize the full potential of the approach they jointly select in ways that mark the essence of a long-term fiduciary relationship: establishing philosophical buy-in, framing client conversations, and sharing narratives grounded in research.

Let's begin with establishing philosophical buy-in and plausibility. Recall that the investment industry has identified a handful of rules-based approaches or investment styles, such as the Fundamental Index strategy, value, low volatility, and quality, which have produced meaningful excess returns and/or reductions in risk over the long run. Granted, outside of a select few, the majority of these smart beta strategies are backtests, involve data mining, and have not delivered live outcomes that come close to backtested results (Arnott et al., 2019).

Expected Long-Term Calendar Excess Returns and One-Year Interim Returns of a Hypothetical US Fundamental Index Strategy, 2014–2023



Note: Based on rolling returns from simulated data. Data as of 12/31/2018. The hypothetical example is the RAFI™ Fundamental US Index strategy. This graph, among others, are available in RAFI Roadmaps at https://www.rafi.com/investor-support/resources#rafi-roadmap.
Source: Research Affiliates, LLC, based on data from CRSP/Compustat and Worldscope/Datastream.

That said, certain academic studies and practitioner papers have provided a framework for determining factor robustness and have used these frameworks to document a few robust, well-established factors or styles. These studies include, but are not limited to, the work of Fama and French (1992, 2015), Asness (1994), Asness, Moskowitz, and Pedersen (2013), Ang (2013), Novy-Marx (2013), and Beck et al. (2016). Accordingly, the investment industry has acquired a deep and rich understanding of the economic plausibility underlying the reasons why a particular style or factor produces a more efficient outcome over the long run.[8] More importantly, practitioners such as Chow et al. (2011) have developed and tested so-called smart beta strategies to capture the expected returns of the style or factor after considering real-world transaction costs. Applying these smart beta strategies in multiple geographies and across multiple definitions has improved our understanding of their likely long-term excess returns (the destination) and potential range of performance results that will be encountered along the way (the journey).[9]

An abundance of academic and practitioner literature in support of smart beta and factor investing is available, but rarely makes its way into the hands of end investors. People are busy. Many do not have the time for or interest in gaining a deep understanding of the more theoretical and empirical aspects of investing their money.[10] Quantitative research and its resulting investment strategies are especially difficult to translate into understanding or action. Few of us are "wired" to intuitively grasp implications of regression tables, but are highly receptive to narratives and stories, as Shiller (2017) observed:

> The human species, everywhere you go, is engaged in conversation. We are wired for it: the human brain is built around narratives. We call ourselves *Homo sapiens*, but that may be something of a misnomer—sapiens means wise. The evolutionary biologist Stephen Jay Gould said we should be called *Homonarrator*.

Many smart beta styles substantially overlap with the techniques of active managers, but can be accessed at far lower cost. The lower-cost advantage arises from smart beta strategies' rules-based construction as well as from careful craftsmanship (Israel, Jiang, and Ross, 2017), which allows for higher capacity, improved liquidity, lower turnover, and a wider universe coverage (Li and Shepherd, 2018). Hence, smart beta strategies have enjoyed widespread adoption as their popularity has grown.

Advisors—especially those willing to synthesize the industry's large body of research and build effective narratives to educate their clients—are positioned to gain client buy-in and tap into the potential opportunity of smart beta direct indexing. Using narratives grounded in research, advisors can build their clients' trust and educate them on the prudence of adopting a long-term view. By consistently establishing philosophical buy-in of the factor or style *and* by framing client conversations with an expected range of returns, advisors give clients the tools they need to stay the course through the inevitable highs and lows of the market cycle. The regular and customary high-bandwidth in-person conversations advisors engage in with their clients make this possible.

Conclusion

Legendary coach John Wooden has said that he considers the powerful influence that a leader, particularly a teacher or coach, has on those he or she leads to be a "sacred trust" (Wooden and Jamison, 1997). Increasingly, we are witnessing advisors becoming their clients' teacher or coach in financial markets. At its core, the advisor-client relationship entails the same type of sacred trust. This relationship undergirds the need for advisors to assess the potential value-add of smart beta direct indexing for their clients.

By understanding a client's particular tax situation, advisors can oversee the tax advantages afforded by smart beta direct indexing. Just as important, advisors can guide clients in aligning their equity portfolio with personal beliefs, values, and employment circumstances. Finally, to help the client stay the course and maximize the potential of any strategy, advisors can establish and reinforce the theoretical framework that builds philosophical buy-in and long-termism through performance cycles. Accordingly, a careful consideration of smart beta direct indexing needs to be near the top of an advisor's to-do list in the years ahead.

Endnotes

1. The term *direct indexing* may be new, but the concept of replicating an index by owning the individual securities held in the index is a long-standing one. For example, Parametric's Custom Core separately managed account (SMA) has given clients the ability to flexibly customize tax-managed index-based portfolios since 1992.

2. In addition to buying all 500 securities according to their weights, a process known as replication, a direct index manager could also use a technique known as sampling, which uses a smaller subset of securities, as a means to achieve index returns.

3. Zweig (1999) explained that before the world's first open-end mutual fund in 1924, buying an "investment "trust" required that "you'd shell out a 10% sales charge and fork over up to 12.5% of your profits for the manager's annual fees. And your 'trust' would probably refuse to tell you what stocks and bonds it held."

4. Because of newer technological systems, direct indexing providers and software vendors can more economically monitor large quantities of tax lots and individual positions, even for accounts with low assets.

5. Liquidation in this case means selling the entire portfolio at a single terminal date at which time the gains are realized. In the interim, because the gains remain unrealized, the taxes are deferred, which allows a larger portion of the portfolio to grow and compound over time. Thus, the ability to defer capital gains and their associated taxes has been described as an interest-free loan. Berkin and Ye (2003) used a 35% tax rate, acknowledging that taxpayers with a higher marginal rate should care more about the impact of taxes than the authors' results suggest and taxpayers with a lower marginal tax rate should care somewhat less.

6. For interested readers, our colleagues discuss why we believe investors can achieve their dual objectives of social responsibility and long-horizon outperformance using a thoughtfully designed strategy (Treussard, Li, and Sherrerd 2018).

7. The total market value of US firms involved in corporate crisis incidents that have become public since 2016 is over $1.5 trillion (*The Economist*, 2019).

8. In his Presidential Address to the American Finance Association in 2017, Cam Harvey (a Research Affiliates partner and senior advisor) asserted that we as an industry must establish the economic plausibility of why a strategy will produce a higher return. For practitioners, an interesting thought experiment related to economic plausibility is "Who's on the other side of the trade?"

9. More information is available on the Smart Beta Interactive tool on the Research Affiliates website.

10. John can attest. As a coauthor of the *Fundamental Index: A Better Way to Invest* (Wiley, 2008), he sees the book proudly displayed on his retired parents' bookshelf. They have the time to spend and the interest in learning more about their son's work, but they have yet to read the book cover to cover since its publication 11 years ago!

References

Ang, Andrew. 2013. "Factor Investing." Columbia Business School Research Paper No. 13-42 (June 10). Available on SSRN.

Arnott, Rob. 2014. "What 'Smart Beta' Means to Us." Research Affiliates Fundamentals (August).

———. 2018. "Is Your Alpha Big Enough to Cover Its Taxes? A Quarter-Century Retrospective." Research Affiliates Publications (June).

Arnott, Rob, Andrew Berkin, and Jia Ye. 2001. "Loss Harvesting." *Journal of Wealth Management*, vol. 3, no. 4 (Spring):10–18.

Arnott, Rob, Cam Harvey, Vitali Kalesnik, and Juhani Linnainmaa. 2019. "Alice's Adventures in Factorland: Three Blunders That Plague Factor Investing." *Journal of Wealth Management*, vol. 45, no. 4 (April):18–36.

Arnott, Robert D., Jason C. Hsu, and John M. West. 2008. *The Fundamental Index: A Better Way to Invest*. Hoboken, NJ: John Wiley & Sons, Inc.

Asness, Clifford. 1994. "Variables That Explain Stock Returns." PhD dissertation, University of Chicago.

Asness, Clifford, Tobias Moskowitz, and Lasse Heje Pedersen. 2013. "Value and Momentum Everywhere." *Journal of Finance*, vol. 68, no. 3 (June):929–985.

Beck, Noah, Jason Hsu, Vitali Kalesnik, and Helge Kostka. 2016. "Will Your Factor Deliver? An Examination of Factor Robustness and Implementation Costs." *Financial Analysts Journal*, vol. 72, no. 5 (September/October):55–82.

Berkin, Andrew, and Jia Ye. 2003. "Tax Management, Loss Harvesting, and HIFO Accounting." *Financial Analysts Journal*, vol. 59, no. 4 (July/August):91–102.

Brightman, Chris, Jonathan Treussard, and Jim Masturzo. 2014. "Our Investment Beliefs." Research Affiliates Fundamentals (October).

Chow, Tzee-man, Jason Hsu, Vitali Kalesnik, and Bryce Little. 2011. "A Survey of Alternative Index Strategies." *Financial Analysts Journal*, vol. 67, no. 5 (September/October):37–57.

Economist, The. 2019. "Scandals Suggest Standards Have Slipped in Corporate America." *The Economist*, April 6.

Fama, Eugene F., and Kenneth R. French. 1992. "The Cross-Section of Expected Stock Returns." *Journal of Finance*, vol. 47, no. 2 (June):427–465.

———. 2015. "A Five-Factor Asset Pricing Model." *Journal of Financial Economics*, vol. 116, no. 1 (April):1–22.

Hartzmark, Samuel, and Abigail Sussman. 2019. "Do Investors Value Sustainability? A Natural Experiment Examining Ranking and Fund Flows." ECGI Working Paper Series in Finance (April). Available on SSRN.

Harvey, Campbell R. 2017. "Presidential Address: The Scientific Outlook in Financial Economics." *Journal of Finance*, vol. 72, no. 4 (August):1399–1440.

Ibbotson, Roger, Peng Chen, Moshe Milevsky, and Xingnong Zhu. 2005. "Human Capital, Asset Allocation, and Life Insurance." Yale International Center for Finance Working Paper No. 05-11 (May). Available on SSRN.

Israel, Ronen, Sarah Jiang, and Adrienne Ross. 2017. "Craftsmanship Alpha: An Application to Style Investing." *Journal of Portfolio Management*, vol. 44, no. 2 (December Multi-Asset Special Issue):23–39.

Li, Feifei, and Shane Shepherd. 2018. "Craftsmanship in Smart Beta." Research Affiliates Publications (February).

Lo, Andrew. 2001. "Personal Indexes." Available at https://alo.mit.edu/wp-content/uploads/2015/08/PersonalIndexes2001.pdf.

Novy-Marx, Robert. 2013. "The Other Side of Value: The Gross Profitability Premium." *Journal of Financial Economics*, vol. 108, no. 1 (April):1–28.

Riedl, Arno, and Paul Smeets, 2017. "Why Do Investors Hold Socially Responsible Mutual Funds?" *Journal of Finance*, vol. 72, no. 6 (August):2505–2550.

Shiller, Robert. 2017. "Economics and the Human Instinct for Storytelling." *Chicago Booth Review* (May 8).

Stein, David, and Premkumar Narasimhan. 1999. "Of Passive and Active Equity Portfolios in the Presence of Taxes." *Journal of Wealth Management*, vol. 2, no. 2 (Fall):55–63.

Treussard, Jonathan, Feifei Li, and Katrina Sherrerd, 2018. "Unlocking the Performance Potential in ESG Investing." Research Affiliates Publications (March).

Vadlamudi, Hemambara, and Paul Bouchey. 2014. "Is Smart Beta Still Smart after Taxes?" *Journal of Portfolio Managemen*t, vol. 40, no. 4 (Summer):123–134.

Wooden, John, and Steve Jamison. 1997. *Wooden: A Lifetime of Observations and Reflections On and Off the Court*. New York City: McGraw-Hill.

Zweig, Jason. 1999. "Look Back and Learn: A History of Mutual Funds." *Money Magazine* (April).

The material contained in this document is for general information purposes only. It is not intended as an offer or a solicitation for the purchase and/or sale of any security, derivative, commodity, or financial instrument, nor is it advice or a recommendation to enter into any transaction. Research results relate only to a hypothetical model of past performance (i.e., a simulation) and not to actual results or historical data of any asset management product. Hypothetical investor accounts depicted are not representative of actual client accounts. No allowance has been made for trading costs or management fees, which would reduce investment performance. Actual investment results will differ. Simulated data may have under-or-over compensated for the impact, if any, of certain market factors. Simulated returns may not reflect the impact that material economic and market factors might have had on the advisor's decision-making if the advisor were actually managing clients' money. Simulated data is subject to the fact that it is designed with the benefit of hindsight. Simulated returns carry the risk that actual performance is not as depicted due to inaccurate predictive modeling. Simulated returns cannot predict how an investment strategy will perform in the future. Simulated returns should not be considered indicative of the skill of the advisor. Investors may experience loss of all or some of their investment. Index returns represent backtested performance based on rules used in the creation of the index, are not a guarantee of future performance, and are not indicative of any specific investment. Indexes are not managed investment products and cannot be invested in directly. This material is based on information that is considered to be reliable, but Research Affiliates, LLC and its related entities (collectively "Research Affiliates") make this information available on an "as is" basis without a duty to update, make warranties, express or implied, regarding the accuracy of the information contained herein. Research Affiliates is not responsible for any errors or omissions or for results obtained from the use of this information. Nothing contained in this material is intended to constitute legal, tax, securities, financial or investment advice, nor an opinion regarding the appropriateness of any investment. The information contained in this material should not be acted upon without obtaining advice from a licensed professional. Research Affiliates, LLC, is an investment adviser registered under the Investment Advisors Act of 1940 with the U.S. Securities and Exchange Commission (SEC). Our registration as an investment adviser does not imply a certain level of skill or training.

Investors should be aware of the risks associated with data sources and quantitative processes used to create the content contained herein or the investment management process. Errors may exist in data acquired from third party vendors, the construction or coding of indices or model portfolios, and the construction of the spreadsheets, results or information provided. Research Affiliates takes reasonable steps to eliminate or mitigate errors and to identify data and process errors, so as to minimize the potential impact of such errors; however, Research Affiliates cannot guarantee that such errors will not occur. Use of this material is conditioned upon, and evidence of, the user's full release of Research Affiliates from any liability or responsibility for any damages that may result from any errors herein.

The trademarks Fundamental Index™, RAFI™, Research Affiliates Equity™, RAE™, and the Research Affiliates™ trademark and corporate name and all related logos are the exclusive intellectual property of Research Affiliates, LLC and in some cases are registered trademarks in the U.S. and other countries. Various features of the Fundamental Index™ methodology, including an accounting data-based non-capitalization data processing system and method for creating and weighting an index of securities, are protected by various patents, and patent-pending intellectual property of Research Affiliates, LLC. (See all applicable US Patents, Patent Publications, Patent Pending intellectual property and protected trademarks located at http://www.researchaffiliates.com/Pages/legal.aspx, which are fully incorporated herein.) Any use of these trademarks, logos, patented or patent pending methodologies without the prior written permission of Research Affiliates, LLC, is expressly prohibited. Research Affiliates, LLC, reserves the right to take any and all necessary action to preserve all of its rights, title, and interest in and to these marks, patents or pending patents.

The views and opinions expressed are those of the author and not necessarily those of Research Affiliates, LLC. The opinions are subject to change without notice.

AMERICAS

Research Affilates, LLC
620 Newport Center Drive, Suite 900
Newport Beach, California 92660
USA

+1.949.325.8700
info@researchaffiliates.com

EUROPE

Research Affiliates Global Advisors (Europe) Ltd
16 Berkeley Street
London W1J 8DZ
United Kingdom

+44 (0) 203 929 9880
uk@researchaffiliates.com

AUSTRALASIA

+6.129.160.2290
australia@researchaffiliates.com