May 2019

More Superstar Investors:

Neil Woodford and Terry Smith

Executive Summary

In their 2019 article, "Superstar Investors," [1] Brooks, Tsuji and Villalon examine the track records of four famous investors from a factor perspective. They find that for each of the "superstar" investors, success is partly attributable to long-term exposure to factors that have historically produced positive returns.

In this short article we apply a similar analysis to two renowned U.K. fund managers: Neil Woodford and Terry Smith. Our findings confirm that these managers' investment returns are consistent with their stated philosophies. As in the original paper by Brooks et al., we find that a large part of Woodford's and Smith's long-term success is attributable to patient exposure to well-rewarded factor premia (i.e., "fishing in the right pond").

We stress that after-the-fact studies do not detract from real performance. The managers studied in Brooks et al., and additionally Woodford and Smith from this study, "figured it out" first, stuck to their philosophies, and rightly deserve their reputations. We have the clear benefit of hindsight. But our analysis reinforces the point made by Brooks et al., that "investors may be able to become more superstar-like by identifying edges such as the ones we analyze here, and having the patience to stick with them over the long term."

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1 Brooks, Tsuji and Villalon, (2019), "Superstar Investors," *The Journal of Investing*, Vol. 28, No. 1.

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Introduction

In this article we extend the research of Brooks, Tsuji and Villalon (2019), which analyzed the performance of four famous investors from a factor perspective,[2] namely Berkshire Hathaway, PIMCO's Total Return Fund in the Gross era, George Soros's Quantum Fund, and Fidelity's Magellan Fund under Peter Lynch. That analysis explored the value of identifying structural edges (factor tilts or otherwise) and then having the patience to stick with them for the long term.

Here, we present additional results for two of the most successful U.K. fund managers in recent history, Neil Woodford and Terry Smith. We choose these managers due to their long and successful track records and also their well-documented investment philosophy. In a separate article, "More Superstar Investors: Francisco Garcia Paramés," we analyze the returns of a well-known Spanish investor, Francisco Garcia Paramés — famed for introducing value investing to Spain nearly three decades years ago.

Some caveats from Brooks et al are important enough to reiterate here: any study such as this one has (unavoidable) hindsight bias when choosing which factors to include. This results in some overfitting and "over-explanation" of the track record studied. In addition, the factors used here are gross of fees, trading costs, and other real-world frictions. Therefore, the alpha from our regressions is likely understated.

2 Other research attempting to "demystify" successful track records includes Gergaud and Ziemba (2012), and Frazzini, Kabiller, and Pedersen (2018).

1. Invesco Perpetual: Neil Woodford

Value, Quality, Low-Risk and Size

"I am... absolutely convinced that, in the long term, valuation and fundamentals of a company are the only things that matter and, like gravity, those things will reassert themselves." — Neil Woodford[3]

8/1993-2/2014	Average Return	Volatility	Sharpe Ratio	Annual Outperformance	Information Ratio
Invesco	6.7%	15.3%	0.44	3.1%	0.37
U.K. Equities*	3.6%	16.1%	0.22	-	-

* U.K. Equities is the FTSE All-Share Index, a capitalization-weighted index comprising of the FTSE 350 and the FTSE SmallCap Indices.

Source: AQR, Bloomberg. Returns are excess of cash denominated in USD. Risk-free rate is 1-month T-Bill. Past performance is not a guarantee of future performance; please read important disclosures at the end of this presentation.

We start with the Invesco Perpetual U.K. High Income fund over the period from August 1993 to February 2014. This covers the fund's earliest available data through to Woodford's departure in March 2014. Over the period, Invesco's High Income fund exhibits higher returns than the U.K. stock market (excess of cash returns of 6.7% versus 3.6%), with slightly lower volatility. The fund's Sharpe ratio is 0.44 compared to 0.22 for the broad market.

The fund has produced significant alpha to traditional risk factors. However, we find that this alpha becomes statistically insignificant when controlling for exposure to several systematic investment styles. Specifically, our factors for this analysis are:[4]

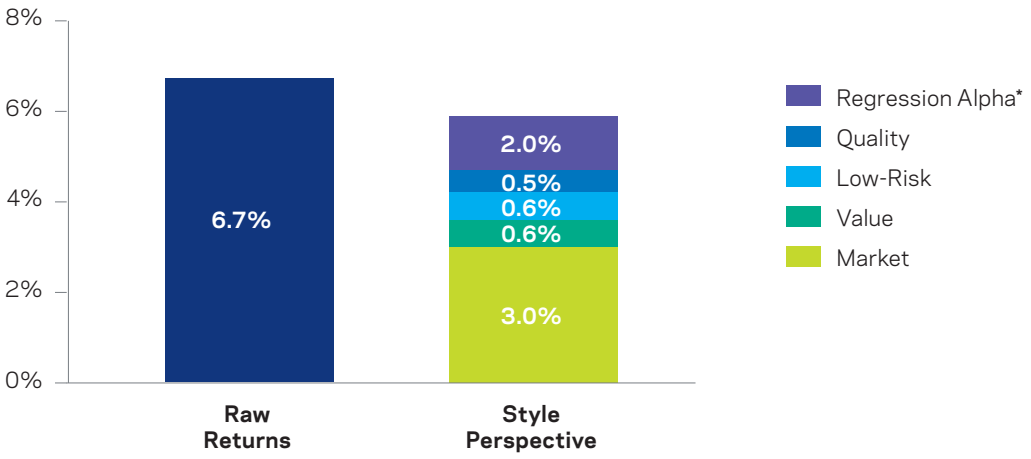
- **Market**: the U.K. equity market, represented by the FTSE All-Share Index
- **Value**: the "HML Devil" factor[5] from AQR's data library (U.K. universe)
- **Low-Risk**: the "Betting-Against-Beta" (BAB) factor[6] from AQR's data library (U.K. universe)
- **Quality**: the "Quality-Minus-Junk" (QMJ) factor[7] from AQR's data library (U.K. universe)

3 *The Guardian* (2013), "Neil Woodford, the man for taking the long view, takes a short walk."
4 See Appendix for details on factor construction.
5 As defined in Asness and Frazzini (2013).
6 As defined in Frazzini and Pedersen (2014).
7 As defined in Asness, Frazzini and Pedersen (2013).

Our regression results are presented in the table on the left of **Exhibit 1**. We find statistically significant exposure to all three factors, suggesting that each of these investment styles played a role in Woodford's success during this time at Invesco Perpetual. To provide a sense of magnitudes, we also show an attribution (based on the regression results) in the chart on the right of Exhibit 1. Factor exposures account for nearly half of the CAPM alpha.

Exhibit 1
Invesco, August 1993 – February 2014 Regression Statistics

	Alpha (ann'l)	Market	Value	Low-Risk	Quality	R^2
Coefficient	2.0%*	**0.83**	**0.11**	**0.07**	**0.14**	75%
T-stat	1.1	22.8	2.9	2.4	2.2	



* Not statistically significant at the 95% confidence level.

Source: AQR, Bloomberg. All variables are excess of cash. Risk-free rate is 1-month T-Bill. Return attribution is factor coefficient multiplied by average factor premium over this period.

2. Fundsmith: Terry Smith

Quality

"Third, don't worry too much about valuations ... If you are a long-term investor, buying shares in a good business is more important than valuation."— Terry Smith[8]

12/2010 - 3/2019	Average Return	Volatility	Sharpe Ratio	Annual Outperformance	Information Ratio
Fundsmith	15.2%	11.4%	1.33	6.1%	1.00
Global Developed Equities*	9.2%	12.2%	0.75	-	-

* Global Developed Equities is the MSCI World Index, a free-float-adjusted market capitalization weighted index designed to measure the equity market performance of developed markets.

Source: AQR, Bloomberg. Returns are excess of cash denominated in USD. Risk-free rate is 1-month T-Bill. Past performance is not a guarantee of future performance; please read important disclosures at the end of this presentation.

Next, we explore Fundsmith's Equity Fund over the period from the fund's inception in December 2010 to March 2019. Over this period, Fundsmith exhibits higher returns than the broad market (excess of cash returns of 15.2% versus 9.2%), with lower volatility. The fund's Sharpe ratio is 1.33 compared to 0.75 for the broad market.

The fund's significant positive alpha becomes statistically insignificant when controlling for the same investment styles we used for Woodford. These factors are constructed from a global universe to match Fundsmith's investment policy:[9]

- **Market**: Global Developed Equities, represented by the MSCI World Net Index
- **Value**: the "HML Devil" factor[10] from AQR's data library (global universe)
- **Low-Risk**: the "Betting-Against-Beta" (BAB) factor[11] from AQR's data library (global universe)
- **Quality**: the "Quality-Minus-Junk" (QMJ) factor[12] from AQR's data library (global universe)

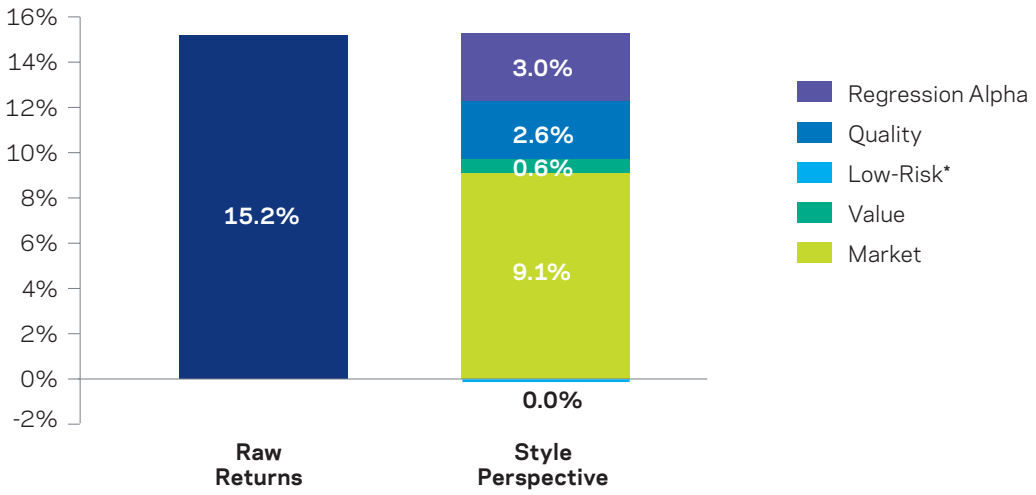
8 *The Telegraph* (October 2016), "Terry Smith: Stay focused on the 'known knowns.'"
9 See Appendix for details on factor construction.
10 As defined in Asness and Frazzini (2013).
11 As defined in Frazzini and Pedersen (2014).
12 As defined in Asness, Frazzini and Pedersen (2013).

Our regression results are presented in the table on the left of **Exhibit 2**. Exposure to the Quality factor is statistically significant, suggesting that stock selection based on Quality has played a role in Smith's success in managing Fundsmith. Interestingly, there is significant negative exposure to the Value factor, apparently consistent with the above quotation. To provide a sense of magnitudes, we also show an attribution (based on the regression results) in the chart at the right of Exhibit 2. Again, factor exposures (and the factor-adjusted market beta) account for nearly half of the CAPM alpha.

Exhibit 2

Fundsmith, December 2010 – March 2019 Regression Statistics

	Alpha (ann'l)	Market	Value	Low-Risk	Quality	R^2
Coefficient	3.0%*	**0.99**	**-0.23**	0.01*	**0.40**	83%
T-stat	1.3	18.2	-2.7	0.0	3.4	



* Not statistically significant at the 95% confidence level.

Source: AQR, Bloomberg. All variables are excess of cash. Risk-free rate is 1-month T-Bill. Return attribution is factor coefficient multiplied by average factor premium over this period.

Conclusion

Neil Woodford and Terry Smith are among the most successful U.K. fund managers in recent history, and our findings shed some light on the sources of their returns. We find that these superstars' investment returns are consistent with their investment philosophies. Woodford's emphasis on identifying "valuation" and "fundamentals" is captured by our Value and Quality factors respectively, while Smith's emphasis on "good businesses" is captured by our Quality factor and a negative exposure to Value.

Woodford's and Smith's success can be attributed to skill in identifying sources of return which proved to be fruitful, and discipline in implementing them over long periods. As Brooks et al. conclude in their research, these findings should encourage investors to understand which styles their managers are giving them exposure to and decide whether they believe in the long-term efficacy of those styles (regardless of whether the manager is discretionary or quantitative/systematic)[13]. If there is sufficient evidence to support the persistence of those styles,[14] then investors should have the patience to stick with them through market volatility and reap the long-term rewards.

Given the current low expected return environment for traditional asset classes[15] any non-market sources of return are especially valuable to investors. Historically, any excess return was considered opaque alpha; however, today much of this can be attributed to well-researched styles. With enough patience and the right implementation,[16] exposure to these styles has the potential to provide a significant edge.

13 See "AQR Alternative Thinking Q3 2017: Systematic vs. Discretionary," where we argue that diversifying across high-quality systematic and discretionary managers may be the most reliable course to long-term investment success.
14 See Asness, Ilmanen, Israel and Moskowitz (2015) for decades of evidence across multiple regions and asset classes.
15 The expected real return of the traditional U.S. 60/40 portfolio is 2.9%, compared to a long-term average of 5% (since 1900). This is based on historical real yields for U.S. large-cap equities and 10-year Treasuries; methodology and sources described in Appendix. See AQR Alternative Thinking 1Q2019 for a detailed discussion of realistic capital market assumptions.
16 See Israel, Jiang and Ross (2017), "Craftmanship Alpha: An Application to Style Investing."

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Appendix

Factor Descriptions:

For Invesco

- **Market** (U.K. Equities): The FTSE All-Share Index, a capitalization-weighted index comprising of the FTSE 350 and the FTSE SmallCap Indices.

- **Value**: the "HMLdevil" (High Minus Low) factor from AQR's data library, as defined in Asness and Frazzini (2014). Formed from the United Kingdom universe of stocks. "HMLdevil" is the average return on the two value portfolios minus the average return on the two growth portfolios, HMLdevil = 1/2 (Small Value + Big Value) - 1/2 (Small Growth + Big Growth). The superscript "devil" indicates that to compute book-to-market ratios, we scale book equity (BE) by the current total market value of equity (ME) at the end of each month following Asness and Frazzini (2013). HMLdevil portfolios are value-weighted. The size and book-to-market breakpoints are refreshed every calendar month, and the portfolios are rebalanced every calendar month to maintain value weights.

- **Low-Risk**: the "Betting-Against-Beta" (BAB) factor from AQR's data library, as defined in Frazzini and Pedersen (2014). Formed from the United Kingdom universe of stocks. BAB factors are portfolios that are long low-beta securities and that short-sell high-beta. To construct each BAB factor, all securities in a country are ranked in ascending order on the basis of their estimated beta, and the ranked securities are assigned to one of two portfolios: low-beta and high-beta. In each portfolio, securities are weighted by the ranked betas (lower-beta securities have larger weights in the low-beta portfolio and higher-beta securities have larger weights in the high-beta portfolio). The portfolios are rebalanced every calendar month. To construct the BAB factor, both portfolios are rescaled to have a beta of one at portfolio formation. The BAB is the self-financing zero-beta portfolio that is long the low-beta portfolio and that short-sells the high-beta portfolio.

- **Quality**: the "Quality-Minus-Junk" (QMJ) factor from AQR's data library, as defined in Asness, Frazzini and Pedersen (2014). Formed from the United Kingdom universe of stocks. The Quality Score is the average of four aspects of quality: Profitability, Growth, Safety and Payout. We use a broad set of measures to compute each of four aspects of quality; the score for each aspect is the average of the individual z-scores of the underlying measure. Each variable is converted each month into ranks and standardized to obtain the z-score. 1) Profitability is measured by gross profits over assets, return on equity, return on assets, cash flow over assets, gross margin, and the fraction of earnings composed of cash. 2) Growth is measured by the five-year prior growth in profitability, averaged across the measures of profitability. 3) Safety is defined as companies with low beta, low idiosyncratic volatility,

low leverage, low bankruptcy risk and low ROE volatility. 4) Payout is defined using equity and debt net issuance and total net payout over profits. QMJ factors are constructed as the intersection of six value-weighted portfolios formed on size and quality. At the end of each calendar month, we assign stocks to two size-sorted portfolios based on their market capitalization. For U.S. securities, the size breakpoint is the median NYSE market equity. We use conditional sorts, first sorting on size, then on quality. Portfolios are value-weighted, refreshed every calendar month, and rebalanced every calendar month to maintain value weights. The QMJ factor return is the average return on the two high-quality portfolios minus the average return on the two low-quality (junk) portfolios.

For Fundsmith

- **Market** (Global Developed Equities): The MSCI World Index is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of developed markets.
- **Value**: the same as used for the Invesco analysis but based on the Global universe of stocks.
- **Low-Risk**: the same as used for the Invesco analysis but based on the Global universe of stocks.
- **Quality**: the same as used for the Invesco analysis but based on the Global universe of stocks.

Sources and Methodology for Long-Term Historical Expected Returns:

Sources for historical equity and bond expected returns are AQR, Robert Shiller's data library, Kozicki-Tinsley (2006), Federal Reserve Bank of Philadelphia, Blue Chip Economic Indicators, Consensus Economics and Morningstar. Prior to 1926, stocks are represented by a reconstruction of the S&P 500 available on Robert Shiller's website, which uses dividends and earnings data from Cowles and associates, interpolated from annual data. After that, stocks are the S&P 500. Bonds are represented by long-dated Treasuries. The equity yield is a 50/50 mix of two measures: 50% Shiller E/P * 1.075 and 50% Dividend/Price + 1.5%. Scalars are used to account for long-term real Earnings Per Share (EPS) Growth. Bond yield is 10-year real Treasury yield minus 10-year inflation forecast as in Expected Returns (Ilmanen, 2011), with no rolldown added.

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