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FACTOR-BASED STRATEGIES

The Invisible Octopus

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Let's be honest: You can't throw a stick into the exchange-traded fund (ETF) marketing machine these days without hitting a fund that is promising some form of "smart beta." And if traditional market beta is the mathematical embodiment of Adam Smith's "invisible hand," then the proliferation of factor-based strategies has led to an increasingly complex playing field for investors. The hand has become an octopus.

Depending on how you count, more than half of the ETF market is factor-based. After all, the original Fama-French factors are small-minus-big (market cap) and high-minus-low (book-to-market, or value). Investors have so absorbed these original factors into their thinking that I doubt many would describe their investment in the S&P 500 as their "large-cap bet," even though it absolutely is.

Smart beta hasn't taken over the entire market for ETFs, but the flows into funds targeting factors and combinations of factors have become a consistent source of flows (see figure 1).

Despite this steady march of new assets, however, the tools we use to analyze investments for factor exposures are often crude and misunderstood, leading to a higher likelihood of accidental exposures and unintended consequences.

THE QUILT

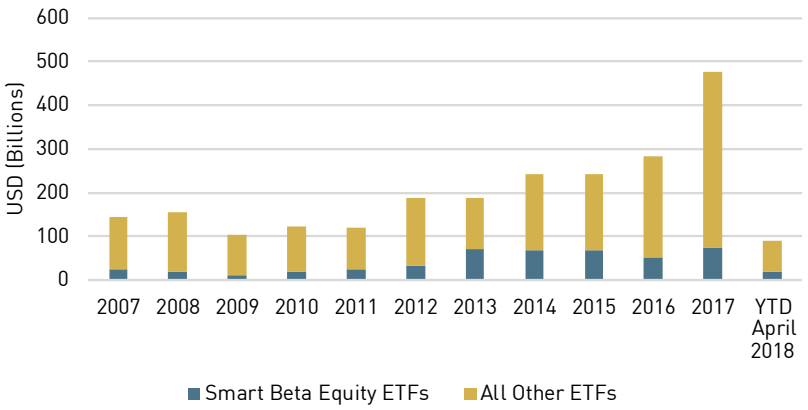
So why do investors focus on factors? Because they seem to perform differently. If Adam Smith's invisible hand is the force behind the overall market—beta—then behind and underneath that beta we have myriad tentacles, seemingly pushing and pulling on the levers of price discovery day after day. It's enormously tantalizing to look at a quilt chart of factor performance and see the variance in returns; in fact, it's probably the most-used type of chart by fund wholesalers in the business (see table 1).

The data shown in table 1 is based on MSCI All-Country World (ACWI) Factor Indexes performance for the past decade, and it's worth noting how random the octopus' actions seem to be. In 2017, momentum stocks beat all, with 33-percent total return versus just 17.9 percent for minimum volatility (min vol). In 2016, value stocks beat all comers. And just a few years ago, in 2014, min vol was the dominant factor, returning nearly 11 percent, while momentum underperformed.

Even traditional style-box factor analysis—focusing only on size and the growth-value split—shows similar random walks (see table 2).

Figure 1

NET FLOWS



Sources: ETF.com, FactSet

Table 1

FACTOR PERFORMANCE QUILT

Factor	2013	2014	2015	2016	2017
Momentum	26.84	5.92	1.94	4.29	33.41
Value	22.43	2.86	-6.26	12.48	18.36
Growth	23.17	5.43	1.55	3.44	29.78
Quality	23.24	8.22	1.48	5.78	28.06
Min Vol	16.90	10.95	2.76	7.46	17.90
High Dividends	18.15	1.27	-5.36	9.84	19.09

Sources: Bloomberg, MSCI

Table 2

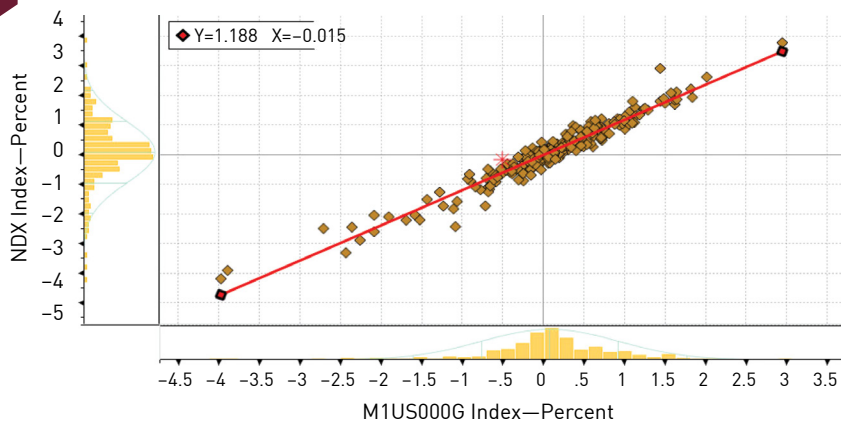
STYLE-BOX FACTOR ANALYSIS QUILT

Factor	2013	2014	2015	2016	2017
Large	31.28	12.85	1.22	11.25	20.97
Large Growth	31.66	14.56	5.39	6.82	28.72
Large Value	34.06	13.99	-0.07	18.49	16.51
Mid	34.38	11.92	-2.04	12.23	18.83
Mid Growth	35.33	12.46	0.49	7.44	22.17
Mid Value	37.80	15.00	-2.66	23.00	18.36
Small	37.63	7.07	-4.11	19.61	16.31
Small Growth	42.54	5.35	-2.43	14.27	22.52
Small Value	32.69	8.90	-5.83	25.11	10.39

Sources: Bloomberg, MSCI

Figure 2

NASDAQ 100/MSCI USA GROWTH REGRESSION



Source: Bloomberg, one year as of May 22, 2018

In 2017, large growth beat small value by more than 18 percent. In 2016, small value beat large growth by more than 18 percent. Clearly, which factor you're in matters. And although the most die-hard passive investor would say it's impossible to predict, most portfolio managers have opinions about whether they want to be exposed to, say, momentum, just as much as they have an opinion about whether today is a good day to be exposed to emerging market local currency debt or wheat futures.

The challenge, then, is how to know what your factor exposure actually is.

DOING THE MATH

Traditionally, there are two ways of assessing how "factor-y" a given portfolio is, and they both have merits. The easy way is to simply do regression analysis. If I have a given portfolio or security with a one-year track record, I can take that full year of observations and run a regression against a previously established index for a given factor. For instance, let's say I have a portfolio that just tracks the Nasdaq-100. I want to see how "growthy" that portfolio is. So I set my portfolio as the dependent variable and run a regression against the MSCI USA Growth Index (see figure 2).

From this analysis, we get statistics that summarize the relationship between these two patterns of returns. The R-squared of the relationship is 0.94. That's pretty high correlation in investment terms, so the two indexes tend to move in the same direction on any given day. The beta of the relationship is 1.125. So for every movement in the growth index, we expect bigger movements in the Nasdaq-100, making it pretty growthy indeed.

By itself, this isn't all that intuitive, unless we're comparing it to other potentially explanatory variables: The Nasdaq-100 has just a 0.61 correlation to the MSCI USA Value Index, for instance. But even with that context, there are numerous reasons these regressions aren't that useful for real investors.

First, regressions are more accurate the longer the time period you consider, but for our purposes, the correlation between a portfolio today is much more important than its correlation five years ago. You can correct for this using math, but as investors we care far less about what happened yesterday and much more about what might happen today or tomorrow.

For this reason, many investors turn to portfolio analysis rather than return attribution in assessing their exposures.

EXPOSURES

Instead of looking at returns, let's just assume we know all of the stocks we own in a portfolio. We're really interested in understanding just how growthy those stocks are. Here, we need to lean on someone else to do a lot of work for us. For the purposes of this analysis, I'm leaning on MSCI, which recently launched a factor classification standard (MSCI FaCS); however, there are numerous competitors in this space with their own methodologies. Importantly, if you choose, say, Axioma's model or Northfield's model, you have to stay within the model, because the models have significant differences in approach. Depending on the tools you use, you may have to take some additional steps to get the data to match up with ETF holdings.

MSCI defines a company as growthy based on a handful of common

accounting metrics: sales-per-share growth trends, internal growth rates, long-term earnings-per-share growth, and so on. It does this for essentially every company in the investable universe, and based on those metrics, it can assign relative value versus the mean-company in the universe. Traditionally this is done by finding the standard deviation of the data set, then normalizing the individual values to a Z-score. So if a company has a 1.0 Z-score, it's one standard deviation away from the mean "growthiness" of the universe (see figure 3).

Interpreting a histogram of Z-scores is pretty straightforward. The median stock in the universe has, by definition, the Z-score of zero. In this dataset, the "growthiest" stock in the universe has a Z-score four standard deviations from that. We don't need to know the raw measurement, so this analysis can apply equally to a single financial metric such as price-to-earnings (P/E) or to a complex score derived from multiple inputs. All that really matters is that we're looking at a broad range of growthiness for stocks to choose from when constructing a portfolio, and now we have a scale on which to measure them.

These scores can be assigned for pretty much any measurable statistic, whether from balance sheet metrics or price

Table 3

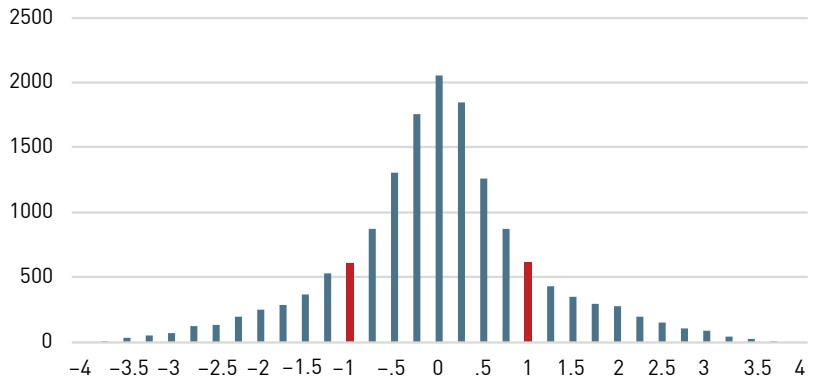
APPLE (AAPL)

Factor	Z-score
Growth	0.0255
Liquidity	0.0054
Momentum	0.4619
Size	0.9475
Value	0.1435
Volatility	0.1596
Yield	-0.171
Quality	0.0305

Source: MSCI FaCS

Figure 3

GROWTH Z-SCORES OF 15,154 STOCKS



Source: MSCI FaCS

Table 4

Ticker	Name	Growth	Value	Momentum	Size	Quality	Yield	Liquidity	Volatility
FMDG	Fieldstone Merlin Dynamic Large Cap Growth ETF	0.74	-0.19	0.75	0.03	0.10	-0.64	0.56	0.74
PXLG	PowerShares Russell Top 200 Pure Growth Portfolio	0.48	-0.48	0.60	0.46	0.22	-0.40	0.20	0.17
PWB	PowerShares Dynamic Large Cap Growth Portfolio	0.45	-0.42	0.80	0.46	0.32	-0.35	-0.01	0.08
JKE	iShares Morningstar Large-Cap Growth ETF	0.40	-0.45	0.45	0.40	0.21	-0.42	0.07	0.15
MGK	Vanguard Mega Cap Growth ETF	0.36	-0.31	0.40	0.60	0.22	-0.26	0.03	0.18
VUG	Vanguard Growth ETF	0.35	-0.32	0.38	0.33	0.14	-0.32	0.12	0.14
SCHG	Schwab U.S. Large-Cap Growth ETF	0.33	-0.25	0.34	0.22	0.08	-0.46	0.13	0.13
FTC	First Trust Large Cap Growth AlphaDEX Fund	0.33	-0.22	0.71	-0.25	0.03	-0.42	0.27	0.18
NULG	NuShares ESG Large-Cap Growth ETF	0.30	-0.33	0.46	0.23	0.22	-0.38	0.08	0.07
IWF	iShares Russell 1000 Growth ETF	0.23	-0.28	0.41	0.31	0.19	-0.26	0.07	0.13
VONG	Vanguard Russell 1000 Growth ETF	0.23	-0.28	0.41	0.31	0.19	-0.26	0.07	0.13
IWY	iShares Russell Top 200 Growth ETF	0.21	-0.26	0.41	0.68	0.27	-0.20	-0.04	0.17
IVW	iShares S&P 500 Growth ETF	0.20	-0.24	0.48	0.49	0.22	-0.24	0.01	0.18
VOOG	Vanguard S&P 500 Growth ETF	0.20	-0.24	0.48	0.49	0.22	-0.24	0.01	0.18
SPYG	SPDR Portfolio S&P 500 Growth ETF	0.20	-0.24	0.47	0.49	0.22	-0.24	0.01	0.18

movements or how many characters are in a company's annual report. In the case of the MSCI FaCS, we see eight distinct factors reported, so each stock has a table that contains information similar to that shown in table 3 for Apple (AAPL).

This information gives us a fingerprint of sorts for a given stock; in this case, we can say Apple is—compared to the universe of stocks—definitely large-cap and momentum, a little bit more value and momentum oriented, and a bit on the low-yielding side.

This fingerprint is interesting, but it gets us only so far. The next step is to apply individual stock Z-scores to portfolios. By matching up MSCI FaCS data with daily ETF holdings information from FactSet, we can calculate the weighted exposure of any equity fund to these factors. Then, by looking across these factor exposures, we can start to make some intuitive comparisons across funds. Consider the universe of ETFs that call themselves large-cap growth funds (see table 4).

Table 4 shows that, if all you care about as an investor is growthiness, then you'd pick the relatively unknown and recently launched Fieldstone Merlin Dynamic Large Cap Growth ETF (FMDG). It has real, meaningful portfolio tilts toward stocks that rate high on growth as well as stocks that are high-momentum and high-volatility. But we can easily glean a few other tidbits from this data as well: FMDG clearly holds stocks with very little dividend yield, and it has no meaningful skew toward large-cap. If truly being in large stocks is important to you, this matrix might lead you down the list toward something like the Vanguard Mega Cap Growth ETF (MGK), which, although still growthy, is significantly exposed to large-cap stocks and eschews some of the volatility exposure of FMDG.

These are meaningful, real-world portfolio distinctions that can help guide

Table 5

FACTOR Z-SCORES OF POPULAR GROWTH ETFS

Ticker	Name	Growth	Value	Momentum	Size	Quality	Yield	Liquidity	Volatility
DVP	Deep Value ETF	-0.50	0.96	0.25	-0.74	0.95	0.66	0.91	0.36
SPVU	PowerShares S&P 500 Enhanced Value Portfolio	-0.23	0.92	0.02	0.05	-0.14	0.22	0.10	0.28
FTA	First Trust Large Cap Value AlphaDEX Fund	-0.38	0.62	-0.23	-0.47	0.06	0.36	0.22	-0.19
PXLV	PowerShares Russell Top 200 Pure Value Portfolio	-0.38	0.61	-0.11	0.25	-0.18	0.53	-0.16	-0.10
SPVM	PowerShares S&P 500 Value with Momentum Portfolio	-0.12	0.61	0.17	-0.34	-0.19	0.12	0.10	0.03
PWV	PowerShares Dynamic Large Cap Value Portfolio	-0.35	0.60	-0.05	0.43	0.17	0.45	-0.13	0.07
SPDV	AAM S&P 500 High Dividend Value ETF	-0.50	0.55	-0.15	-0.35	0.02	1.09	0.27	-0.12
FVAL	Fidelity Value Factor ETF	-0.19	0.54	-0.04	0.14	0.17	0.22	0.06	0.09
JKF	iShares Morningstar Large Cap Value ETF	-0.40	0.50	-0.14	0.62	-0.03	0.57	-0.25	0.05
JVAL	JPMorgan U.S. Value Factor ETF	-0.31	0.48	-0.11	-0.25	0.10	0.44	0.07	-0.04
OVLU	Oppenheimer Russell 1000 Value Factor ETF	-0.21	0.40	0.07	-0.03	0.01	0.16	0.03	-0.03
IWX	iShares Russell Top 200 Value ETF	-0.24	0.37	-0.13	0.63	-0.02	0.41	-0.35	0.03
IWD	iShares Russell 1000 Value ETF	-0.25	0.34	-0.15	0.10	-0.12	0.35	-0.15	-0.06
VONV	Vanguard Russell 1000 Value ETF	-0.25	0.34	-0.15	0.10	-0.12	0.35	-0.15	-0.06
SPYV	SPDR Portfolio S&P 500 Value ETF	-0.26	0.34	-0.23	0.26	-0.06	0.40	-0.16	-0.07
IVE	iShares S&P 500 Value ETF	-0.26	0.34	-0.23	0.26	-0.06	0.40	-0.16	-0.07
VOOV	Vanguard S&P 500 Value ETF	-0.26	0.34	-0.23	0.26	-0.06	0.40	-0.16	-0.07
VTV	Vanguard Value ETF	-0.32	0.32	-0.05	0.35	0.00	0.37	-0.22	-0.01
MGV	Vanguard Mega Cap Value ETF	-0.32	0.31	-0.04	0.57	0.04	0.39	-0.32	0.02
NULV	NuShares ESG Large-Cap Value	-0.43	0.29	-0.10	0.19	-0.15	0.58	-0.16	-0.05
SCHV	Schwab U.S. Large-Cap Value ETF	-0.33	0.27	-0.04	0.31	0.04	0.51	-0.22	-0.04

Sources: FactSet Classification & Fund Holdings, MSCI FaCS

investment decision-making, and this analysis holds true regardless of which universe of ETFs you're looking to analyze. For example, table 5 presents the same information for funds classified as large-cap value.

We can tease out surprising results here as well—notably that the most "valuey" ETF, DVP, also has a few huge red flags. DVP clearly is a high-quality, deep value fund, but it's definitely not a large-cap fund, and it has significant exposure to illiquid securities. This should prompt a deeper investigation for any investor who is conducting due diligence, and indeed, the fund is heavily midcap-focused and contains just 20 names that are screened for not just value, but quality factors. Conversely, if you're hunting for true large-cap exposure, but with just a value tilt, IWX leaps off the page.

CAVEATS

This kind of exposure analysis leads to some real "aha" moments, but it's worth pointing out the limitations of this approach.

First, these analyses are only as good as your data sources and methodologies. Collecting information on every company in the investable universe is a big lift, which is one reason there aren't dozens of competitors in this space. And although Apple's P/E ratio is something we can all agree on, figuring out, say, the book value of an emerging-market small-cap stock can be more problematic. How a firm handles inputs and errors, and then how it takes all that data to get a factor score is as much art as science. It's worth doing the homework to read up on those processes and methodologies—after all, it's your and your clients' money at stake.

Second, these are by necessity snapshots in time. Many ETFs have consistent portfolios, tracking indexes that change slowly over time. However, increasingly we see more and more active management in the space, and this can complicate the analysis. If a fund is explicitly targeting a factor, and also scores well for that factor, it's reasonable to assume that correlation will continue as the portfolio manager or index methodology adjusts the portfolio. But to use the growth example from above, it's not clear that the top-scoring growth fund (FMDG) is really targeting high-volatility as part of its active-management approach, so that should perhaps be taken with a grain of salt.

Last, nothing in this analysis changes the fact that anyone who can tell you which factor will outperform tomorrow is either lying or an actual wand-carrying wizard. That doesn't mean it's not worth knowing what you own, and what your factor exposures are, but I'd be cautious of any magic bullets. As an investor or portfolio manager, your job is to have opinions about things, and if you don't have an opinion on, say, whether we're in a growth- or value-rewarding cycle, then no amount of math is going to help your investment strategy.

FROM THEORY TO PRACTICE

The core of any portfolio analytics process is always "Know what you own," and for that, we need portfolios. One great advantage of ETFs is that most of them publish their full holdings on a daily basis. That enables third parties to collect those portfolios and present these kinds of analysis prepackaged, but it also enables diligent investors to conduct this kind of analysis—or any other kind of portfolio analysis—on their own. The underlying stock data used to create these factor indexes—trading volumes, market caps, price movements, trading—are often easily available from many financial data providers. So if you don't like someone else's definition of a factor, use your own if you're willing to define those particular "tentacles of the octopus."

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