A Scientific Beta Publication

Scientific Beta
An EDHEC-Risk Institute Venture

Do we Need Active Management to Tackle Capacity Issues in Factor Investing? Exposing Flaws in the Analysis of Blitz and Marchesini (2019)

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Abstract

Blitz and Marchesini (2019) question the investability of factor indices and argue that active management is needed to avoid capacity issues. We show that these claims do not hold. Well-designed implementation rules avoid capacity problems that may arise with poorly designed indices. Pre-announcement of index rebalancing trades eases implementation and helps reduce price impact. Gradual rebalancing allows improving investability of factor indices. Active management is not only unnecessary to improve investability; it also creates hidden risks for investors due to a lack of transparency.

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1. Introduction

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A paper by Robeco researchers questions the investability of factor indices (Blitz and Marchesini, 2019). The paper shows that trades to replicate some factor indices would generate more volume than is available on markets. It also argues that transparent rebalancing leads to price distortions. It concludes that there are severe shortcomings to replicating factor indices, and recommends active factor strategies instead. We show that the conclusions in the Blitz-Marchesini paper are erroneous.

2. Severe Capacity Constraints are Specific to Carefully Chosen Indices

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The Blitz-Marchesini paper considers a selection of MSCI indices, hardly a representative sample of factor indices. The paper consistently cites evidence for only one, the MSCI Minimum Volatility[1]. The paper emphasises that trades to replicate the index exceed average available volume. With assets of USD100bn, about 12% of the trades to replicate the MSCI USA Minimum Volatility index exceed 500% of average daily trading volume (ADTV).

Do such results also arise for other factor indices? We analysed the breakdown of trades in Scientific Beta multi factor indices by ease of implementation[2]. Exhibit 1 shows the results for the Scientific Beta USA Six-Factor[3] index, compared to the results for the MSCI Minimum Volatility index from the Blitz-Marchesini paper.

We find important differences between the two. At USD10bn of assets, 99% of trades in the Scientific Beta index require less than 25% of available volume[4] and all trades remain below 50% of volume. In contrast, for the MSCI Min Vol index, trades start to exceed 100% of the available volume[5], even at this low level of assets.

When assuming that USD100bn of assets track each index, the differences are even more remarkable. While 70% of the trades to replicate the Scientific Beta index are easy to implement (requiring below 25% of available volume), this is the case for only 19% of trades for the MSCI Minimum Volatility index. The differences are even starker for the trades that are hardest to implement. More than 10% of trades in the MSCI Minimum Volatility index exceed 500% of available trading volume. The percentage of trades in the Scientific Beta index with such high exceedance of capacity is zero.

Exhibit 1: Breakdown of Trades by Ease of Implementation: Comparison of the MSCI US Minimum Volatility index with the Scientific Beta United States High-Factor-Intensity Diversified Multi-Beta Multi-Strategy 6-Factor 4-Strategy EW index.

2012-2017	United States			
	AUM USD10bn		AUM USD100bn	
Proportion of ADTV absorbed	MSCI Min Vol	Scientific Beta Six Factor Index	MSCI Min Vol	Scientific Beta Six Factor Index
0-25%	76%	99%	19%	70%
25-50%	13%	1%	12%	11%
50-100%	7%	0%	15%	10%
100-500%	4%	0%	42%	8%
500-1000%	0%	0%	9%	0%
1000-10000%	0%	0%	3%	0%

The table shows the average distribution of the hypothetical of the proportion of the average daily trading volume (ADTV) absorbed by the trade size for two indices: the US MSCI Min Vol and the US SB HFI MBMS6F EW (Scientific Beta United States High-Factor-Intensity Diversified Multi-Beta Multi-Strategy 6-Factor 4-Strategy EW). At each rebalancing day the proportion is obtained as the ratio of the hypothetical trade size to the average daily trading volume for each traded stock in the index. We consider two levels of assets under management: USD10bn and USD100bn. Percentages for the MSCI Min Vol are approximated and are obtained by looking at exhibit 1 of Blitz and Marchesini (2019), whose period of analysis is from May 2012 to December 2017. For the Scientific Beta index the percentages for each range of RTS are obtained by averaging the percentages for all the rebalancing days in the considered period which is June 2012 to December 2017. Source: Scientific Beta database.

1 - The paper also reports results for other factor indices from MSCI. It does not include indices from any other provider in its analysis. Results for price effects are cited only for the MSCI Minimum Volatility index and not for any other factor index.
2 - Trades that only require 0-25% of volume are easiest to implement. Trades that require 1000-10000% of daily volume are obviously tough to implement.
3 - The full name of the index is Scientific Beta United States High-Factor-Intensity Diversified Multi-Beta Multi-Strategy 6-Factor 4-Strategy EW.
4 - All the values reported for the Scientific Beta indices in exhibit 2 and 3 are rounded to the closest integer.
5 - All the values reported in exhibit 2 and 3 for the MSCI Min Vol are approximated by looking at the graphical representation in exhibit 1 in Blitz and Marchesini (2019).

2. Severe Capacity Constraints are Specific to Carefully Chosen Indices

Exhibit 2 shows a similar analysis for global indices[6]. Again, the severely bothersome trades that Blitz and Marchesini report for the MSCI Min Vol indices do not occur for the Scientific Beta multi factor indices. Blitz and Marchesini report that – with assets of USD50bn – the percentage of trades in the MSCI Min Vol index exceeding 500% of available volume is 10%. In the Scientific Beta index, the percentage of trades exceeding 500% is zero.

Exhibit 2: Breakdown of Trades by Ease of Implementation: Comparison of the MSCI Global Minimum Volatility index with the Scientific Beta Global High-Factor-Intensity Diversified Multi-Beta Multi-Strategy 6-Factor 4-Strategy EW index.

2012-2017	Global			
	AUM USD10bn		AUM USD50bn	
Proportion of ADTV absorbed	MSCI Min Vol	Scientific Beta Six Factor Index	MSCI Min Vol	Scientific Beta Six Factor Index
0-25%	61%	95%	21%	76%
25-50%	15%	3%	17%	10%
50-100%	13%	1%	18%	7%
100-500%	11%	1%	34%	6%
500-1000%	0%	0%	6%	0%
1000-10000%	0%	0%	4%	0%

The table shows the average distribution of the hypothetical of the proportion of the average daily trading volume (ADTV) absorbed by the trade size for two indices: the Global MSCI Min Vol and the US SB HFI MBMS6F EW (Scientific Beta Global High-Factor-Intensity Diversified Multi-Beta Multi-Strategy 6-Factor 4-Strategy EW). At each rebalancing day the proportion is obtained as the ratio of the hypothetical trade size to the average daily trading volume for each traded stock in the index. We consider two levels of asset under management: USD10bn and USD100bn. Percentages for the MSCI Min Vol are approximated and are obtained by looking at exhibit 1 of Blitz and Marchesini (2019), whose period of analysis is from May 2012 to December 2017. For the Scientific Beta index the percentages for each range of RTS are obtained by averaging the percentages for all the rebalancing days in the considered period which is June 2012 to December 2017. Source: Scientific Beta database.

Clearly, the results reported by Blitz and Marchesini for the MSCI Minimum Volatility index do not carry through to the Scientific Beta indices. This differences in capacity across indices can be linked to differences in investability rules applied by index providers.

If we wanted to improve the ease of trading, we could of course impose constraints. This is exactly what the Scientific Beta investability rules do[7]. In addition to turnover control, liquidity filters and buffer rules when selecting stocks, Scientific Beta adjusts index weights to foster liquidity[8]. First, Scientific Beta caps constituent weights relative to their market capitalisation to avoid high weights in less liquid stocks. Second, to prevent large trades on the least liquid stocks, the indices constrain weight changes relative to available volume. This rule effectively limits the days-to-trade (DTT) of the indices. For the MSCI Minimum Volatility indices, we did not find a constraint that limits the DTT[9] in the ground rules. In addition, the rules for the maximum weight of an index constituent in the MSCI Min Vol index allow for 122% higher weights than those applied by Scientific Beta[10]. It is not surprising that an index without stringent investability rules faces capacity constraints. But this does not allow conclusions about indices which do have them.

6 - We compute the breakdown of trades by ease of implementation, assuming different levels of assets, which correspond to amounts of assets reported in the Blitz-Marchesini paper.
7 - Note that Scientific Beta has continuously improved its investability rules, notably during the June 2017 and June 2019 release of its indices. The analysis above covers the period since 2012 to achieve comparability with the results reported in the Blitz-Marchesini paper. For the Scientific Beta indices, results over a more recent period would be more favourable since the improved investability rules are not fully reflected in the analysis above.
8 - For a detailed description of these rules, see Amenc et al. (2019).
9 - See the 2018 MSCI Minimum Volatility Indexes Methodology, available at: <https://www.msci.com/eqb/methodology/meth_docs/MSCI_Minimum_Volatility_Methodology_May2018.pdf>
10 - The ground rules for the MSCI Min Vol index indicate that the maximum weight of a constituent is restricted to the lesser of 1.5% or 20 times the weight in the parent index. In contrast, Scientific Beta imposes a multiple of 9 relative to the parent index in its multi factor indices. Thus, the MSCI Min Vol index allows for a multiple of the market cap weight that is 122% higher than what the Scientific Beta multi factor indices allow.

3. Index Transparency Keeps Costs Low, rather than Generating Front-Running Costs for Investors

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The Blitz-Marchesini paper argues that transparency of rebalancing will have a negative effect on index performance. The intuition is that pre-announcement allows front-running ahead of index trackers, pushing up the price of stocks they need to buy, and pushing down the price of stocks they need to sell.

In support of this theory, the Blitz-Marchesini paper cites evidence of price effects in the MSCI Minimum volatility index. But this evidence stems from a partial analysis of selected index trades, and a methodology that may inflate significance levels[11]. More importantly, one cannot extrapolate from the MSCI Minimum Volatility index to all factor indices. Bregnard et al (2019) analyse Scientific Beta indices and find zero price effects at index rebalancing.

The Blitz-Marchisini paper argues that transparency of trades is necessarily harmful for investors, due to price distortions. This argument is based on a misunderstanding. Price effects arise if trades are based on proprietary information or insights[12]. However, trades by factor index investors do not stem from any proprietary information or insights. Such investors have an incentive to announce their trades. Announcing the trades will signal to liquidity providers that there is no insight involved in the trade. This reduces the risk for liquidity providers, leading them to offer prices that are more competitive. In addition, announcing trades will give liquidity providers the necessary time to prepare for increased demand, thus increasing competition and lowering costs for index trackers. Pre-announcement of index trades, rather than hurting investors, can help to increase competition among liquidity providers and keep costs low[13].

Pre-announcing of trades achieves two effects: signalling that there is no superior information and allowing liquidity providers to prepare. Petajisto (2011) issues a clear recommendation for index providers: "*the more predictable the index changes and the longer the pre-announcement period, the less the index funds will suffer*" whereas a "*silent index […] where index changes are made public only after the indexer has updated his portfolio, would be on the wrong side of both effects*". This recommendation is supported not only by economic reasoning but also by evidence in Petajisto (2011) that longer lead times ahead of rebalancing lead to lower price effects[14].

11 - The analysis only considers additions and deletions and ignores other weight changes, which may be more important in magnitude. It does not account for event clustering which is liable to inflate t-statistics and does not account for time variation in stocks' factor exposures. See Bregnard et al. (2019) for a discussion.
12 - Alternatively, price effects arise if index inclusion has a real effect on company value through a certification effect or increasing investor awareness. This is plausible for major cap-weighted indices, but implausible for frequently rebalanced factor indices.
13 - Theories describing the benefits of announcement of large trades have been described in Admati and Pfleiderer (1991) and Bessembinder et al. (2016).
14 - Petajisto analyses the S&P 500 index. Across history, lead times for announcing changes in this index ahead of the effective date have varied substantially.

4. Active Management is not a Good Answer to the Challenges of Smart Beta Implementation

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The Blitz-Marchesini paper argues it is necessary to adopt an active approach to factor investing in order to mitigate capacity constraints. The paper analyses strategies that apply gradual rebalancing to avoid concentrating trades in one day. Of course, stretching out the rebalancing trades over several days is a valid proposition. In fact, such gradual rebalancing is widely implemented in passive management. It does not require active management.

The assumption in the Blitz-Marchesini paper, that all trades are strictly implemented on the effective date, is unrealistic. Index replicators have expertise in trade execution and do not blindly apply index weights. Smart implementation of the less liquid trades and spreading out such trades is common practice. In addition, index providers offer custom versions of their indices that spread out the trades over a longer period.

Exhibit 3: Comparison of stretching trades vs trading in one day. Transition from Cap-Weighted portfolio to Smart Beta Portfolio (US Long Term Data – 42 years)

USA LTTR Long-Term 31-Dec-1972 to 31-Dec-2014				
	Transition	Efficient Minimum Volatility	Maximum Deconcentration	Multi-Beta Multi-Strategy 4-Factor EW
DTT (95%)	Non-stretched	1.72	1.98	2.64
	Stretched 10-days	0.17	0.2	0.26
	Stretched 20-days	0.09	0.1	0.13
Tracking-Error	Non-stretched	-	-	-
	Stretched 10-days	0.08%	0.08%	0.09%
	Stretched 20-days	0.12%	0.11%	0.12%
Difference in Gross Returns by Stretching	Non-stretched	-	-	-
	Stretched 10-days	0.00%	0.01%	0.00%
	Stretched 20-days	-0.01%	0.00%	-0.01%

Results taken from Esakia et al. (2017). The time period of analysis is 31-Dec-1972 to 31-Dec-2014. The strategies considered for this analysis are the Scientific Beta USA LTTR Efficient Minimum Volatility Index, the Scientific Beta USA LTTR Maximum Deconcentration Index and the Scientific Beta USA LTTR Multi-Beta Multi-Strategy (4-Factor) EW Index. All statistics are quarterly estimates and are averaged across all quarters. Results of three types of scenarios are estimated and presented: i) The switch from Cap-Weighted portfolio to Smart Beta portfolio happens completely on the day of rebalancing (1-day Transition); ii) The switch from Cap-Weighted portfolio to Smart Beta portfolio happens equally distributed across 10-days (10-day Transition i.e. assuming only one-tenth of the portfolio switches every day for 10 days); iii) The switch from Cap-Weighted portfolio to Smart Beta portfolio happens equally distributed across 20 days (20-day Transition, i.e. assuming only one-twentieth of the portfolio switches every day for 20 days). Days to Trade (DTT) is reported as a time-series average of the cross-sectional 95th percentile of DTT at each quarterly rebalancing. Days to trade (DTT) refers to the time it takes to trade an initial investment given the stock weights at every quarterly rebalancing date, assuming 10% of the average daily dollar traded volume can be traded. The nominal amount considered by Esakia et al. (2017) for the initial investment equals USD1bn and is deflated back in time in line with the return of the cap-weighted market index. Tracking Error of stretched transition (both 10-days and 20-days) over non-stretched transition is computed quarterly and average is reported. Difference in Gross Returns is computed quarterly between stretched (both 10-days and 20-days) transition and non-stretched transition.

As long as factor indices are well-diversified, small deviations from the exact index weights will not generate high tracking error. Esakia et al. (2017) analyse the stretching out of trades over several days when investing in a smart beta index[15]. Exhibit 3 reports the impact that stretching has on implementability and on performance differences and tracking error with the original strategy. The table shows that the ease of implementation increases substantially when stretching out trades over 10 or 20 days. The number of days required to implement the trades decreases by a factor of

15 - Note that the analysis considers the trades necessary to switch from a cap-weighted index to the Scientific Beta index, rather than rebalancing trades of the smart beta index. However, these switching trades are substantial compared to rebalancing trades, so we do not expect an analysis of rebalancing trades to yield a substantially different picture.

4. Active Management is not a Good Answer to the Challenges of Smart Beta Implementation

10 or 20. Thus it is easy for index replicators to multiply the capacity of such strategies. The tracking error and performance difference with the original strategy is small. When stretching trades over 20 days, the highest tracking error across the indices is 0.12% and the impact on returns is at most 0.01%.

Stretching the trades across multiple days comes at the cost of a minimal deviation from the original strategy. Importantly, such gradual rebalancing does not require active management. Gradual rebalancing of factor indices is possible either through a replicator that accepts small levels of tracking error or through a custom version of the index. Both approaches are common practice in the passive management industry and do not require resorting to the lack of transparency and high fees of active management.

The Blitz-Marchesini paper praises the benefits of active management: "*Other factor offerings do not commit themselves to a fixed set of relatively simple rules but take an active approach toward harvesting factor premiums. These factor strategies have the flexibility to use more sophisticated techniques and also to adapt their approach over time*." Insisting on the benefits of not committing to rules is inconsistent with the evidence in the Blitz-Marchesini paper that shows how a fixed set of relatively simple rules of gradual rebalancing alleviates capacity problems. The paper concludes that "*an active factor strategy […] can offer higher capacity*". But it does not show any empirical evidence that active managers face fewer capacity issues than indices. In fact, there is not a single data point analysed in the paper that reflects an actively managed portfolio. Other studies have provided evidence that active strategies may face unexpected capacity constraints[16].

The paper also fails to mention the drawbacks of not committing to rules. Such flexibility means that the strategy is not transparent, so that investors and liquidity providers face higher uncertainty. Flexibility makes it difficult for investors to understand which risks they are exposed to, since the rules may change at any time.

16 - It has been argued that a factor in the 1998 crisis around the hedge fund LTCM was that "*copycat firms … put on similar positions and unwound them at the same time*" (Ziemba, 2007, p. 876). Khandani and Lo (2011) argue that discretionary long/short equity funds in 2007 were faced with "*firesale liquidation of similar portfolios that happened to be quantitatively constructed*".

5. A Biased Analysis that Leads to Flawed Conclusions

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The Blitz-Marchesini paper concludes that "*the trades of factor indexes become highly problematic*" while "*an active factor strategy […] can offer a higher capacity than a passive factor index replication strategy […]*". This conclusion is not justified by the empirical analysis in the paper. Rather, it results from combination of logical fallacies.

First, the Blitz-Marchesini paper is a victim of hasty overgeneralisation. It cites results for a particular index (the MSCI Min Vol index) and then draws conclusions on the properties of all factor indices. Just because one factor index has low capacity does not mean that all factor indices have low capacity. The jack-o'-lantern mushroom is poisonous. Should we therefore conclude that eating mushrooms is highly problematic? Hasty generalisation clearly leads to false conclusions. A factor index may have low capacity, if it does not have explicit rules to limit days to trade and if it allows for excessive concentration. However, other factor indices with better investability rules will avoid such problems.

Second, the paper constructs a false dilemma. It shows capacity problems with blind replication of a factor index and concludes that we need to resort to active factor strategies to avoid such problems. Of course, just because replicating an index blindly leads to problems does not mean that we cannot replicate the index in a different way. We might as well start with the problem that free markets lead to concentration of power and wealth in the hand of a few, and then conclude that we should embrace communism. This ignores that there are other options, such as free markets subject to antitrust policy and progressive income taxes. Omitting alternative solutions leads to false conclusions. Likewise, there are other alternatives to blind replication of factor indices than pursuing active factor strategies. Whether through customised indices or through smart index replication, replication of factor indices can address capacity issues by rebalancing gradually[17].

Because they rely on combining these two fallacies, the conclusions in the Blitz-Marchesini paper are erroneous.

17 - In fact, none of the rules suggested in the Blitz-Marchesini paper justifies any active management, as the smart rebalancing rules are perfectly systematic, and do not involve any discretion. Documenting advantages of systematic rules, which can be implemented passively, does not allow concluding that there are benefits to active strategies.

Conclusion: Careful Analysis of Investability is Needed to Make Informed Investment Decisions

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Although the criticism in the Blitz-Marchesini paper builds on logical fallacies and is not backed by evidence, it does align with intuitive claims about the dangers of indexing. Of course, it may be convenient to rely on such intuitive arguments: they correspond to widely held beliefs[18]. But answering questions about investability requires careful analysis of the facts. Index providers and replicators need to offer transparency and evidence to allow for factual analysis. In their due diligence, index investors need to address how the index provider achieves investability and how the passive manager adds value when replicating the index.

For active strategies that also face investability issues investors need to analyse the risk of not committing to transparent rules. This lack of transparency leaves investors on their own because they cannot rely on the market's insights about competing products or its scrutiny of information coming from the provider. Investors are thus faced with information asymmetry; they have less information than the fund manager.

Conducting a thorough analysis of the investability of both indices and discretionary products for multi-factor investing may be less convenient than relying on simplistic conclusions, but it is needed to make sound investment decisions.

18 - See claims about indexing being "*worse than Marxism*", and pushing up prices of index components "*to bubble levels*", as discussed in the *Wall Street Journal*: https://www.wsj.com/articles/is-indexing-worse-than-marxism-1479857852

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About Scientific Beta

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EDHEC-Risk Institute set up Scientific Beta in December 2012 as part of its policy of transferring know-how to the industry. Scientific Beta is an original initiative which aims to favour the adoption of the latest advances in "smart beta" design and implementation by the whole investment industry. Its academic origin provides the foundation for its strategy: offer, in the best economic conditions possible, the smart beta solutions that are most proven scientifically with full transparency of both the methods and the associated risks. Smart beta is an approach that deviates from the default solution for indexing or benchmarking of using market capitalisation as the sole criterion for weighting and constituent selection.

Scientific Beta considers that new forms of indices represent a major opportunity to put into practice the results of the considerable research efforts conducted over the last 30 years on portfolio construction. Although these new benchmarks may constitute better investment references than poorly-diversified cap-weighted indices, they nevertheless expose investors to new systematic and specific risk factors related to the portfolio construction model selected.

Consistent with a full control of the risks of investment in smart beta benchmarks, Scientific Beta not only provides exhaustive information on the construction methods of these new benchmarks but also enables investors to conduct the most advanced analyses of the risks of the indices in the best possible economic conditions.

Lastly, within the context of a Smart Beta 2.0 approach, Scientific Beta provides the opportunity for investors not only to measure the risks of smart beta indices, but also to choose and manage them. This new aspect in the construction of smart beta indices has led Scientific Beta to build the most extensive smart beta benchmarks platform available which currently provides access to a wide range of smart beta indices.

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