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The viability of alternative indexation when including all costs

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ABSTRACT

We ascertain the performance and viability of alternative indexation after including all relevant costs. Onerous costs, associated with forgoing the automatic rebalancing of traditional price-weighted indexes, may occur as a consequence of the frequent trading required to replicate alternatives accurately. The largest cost associated with replication is the cost of adversely moving the stock price as a result of trading the stock, known as price impact cost. It is unknown to what extent alternative index funds suffer degraded performance as a consequence of such costs. We compare the performance of a number of well-known alternative indexes before and after costs with the traditional market-capitalization benchmark index under various alternative rebalancing frequencies, considering differing assets under management, and using various competing price impact cost models in order to measure the extent of the performance erosion that occurs due to costs associated with rebalancing. We find that if we exclude all costs, the alternative indexes generate higher returns compared to the traditional benchmark, mainly as a consequence of higher risk exposures. However, as fund size and consequently the costs of rebalancing increase, the outperformance is reduced to a statistically insignificant level. In effect, we find that as assets under management and consequently rebalancing costs increase, those greater costs almost completely erode the higher returns due to the innate risk exposures of alternative indexes. This finding is robust to the choice of price impact model. We also consider alternative index viability in terms of execution and holdings and find that many alternative indexes are not viable from this perspective either. The salient lesson is that we should not ignore the implementation of alternative indexes when considering their performance. We conclude that the traditional market-capitalization-weighted index will remain popular due to its reliance on elegant theory, simplicity, ease of implementation, vast investment capacity, and inherent low costs.

1. Introduction

Recently, alternatives to traditional market-capitalization-weighted indexes have become popular in the search for enhanced investment yield. Alternative indexing is motivated by the success of traditional indexing, but promises enhanced performance. Such alternative indexes do not weight their constituent stocks by market price or, equivalently, market capitalization, but instead use various alternative weighting procedures to do so.

Their departure from the reliance on market price to generate index weights sacrifices both theoretical and practical benefits. In an efficient market, prices reflect all available information; hence, a market-capitalization index is theoretically optimal. Furthermore, by investing in proportion to a stock's market capitalization, portfolio rebalancing (but not reconstitution) occurs automatically as prices change, minimizing any need to trade and leading to very low trading costs associated with replicating the index. market-capitalization-weighted indexation (MCWI) guarantees both optimal market performance and low costs, resulting in long-term outperformance after costs.

However, various theoretical mechanisms exist which may subvert efficient pricing and hence the optimality of traditional MCWI. One mechanism, the Grossman–Stiglitz paradox (Grossman & Stiglitz, 1980), states that if investors do not stay vigilant and instead assume that efficient markets will always deliver accurate prices, they will not undertake costly "due diligence," and paradoxically, mispricing may occur.[2] Since MCWI weights are price dependent, mispricing will lead to overpriced (underpriced) stock being overweight (underweight) in the index, ultimately leading to a sub-optimal index (Hsu & Campollo, 2006; Siegel, 2006; Treynor, 2005).

In order to mitigate such "structural drag," alternative indexes that do not use market price to determine index weights have been developed. However, these alternative indexes sacrifice the automatic

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[2] For example, recently Stiglitz (2014) argued that such conditions may occur with the prevalence of high-frequency trading.

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rebalancing of market-capitalization schemes; the frequent deleterious costly rebalancing they require is undesirable, but essential for accurate index replication. It is unknown to what extent alternative index funds suffer degraded performance as a consequence of forgoing price dependence (Arnott et al., 2005; McQuarrie, 2008). The primary aim of this work is to ascertain the extent of the performance degradation associated with replicating an alternative index, given the additional costs, and to determine whether any outperformance is sustained after costs.

Accurate index replication requires dynamic portfolio rebalancing and reconstitution, which entails trading. The largest cost associated with trading in general, and with replicating an alternative index in particular, is price impact cost. Price impact cost is the cost associated with adversely moving the stock price as a result of trading in the stock. Price impact accounts for 3–5% of trading value for small stocks (Keim & Madhavan, 1998), as compared to bid–ask spreads, which account for 0.5%, and commission fees, which represent about 0.1% of trading value (Jones, 2002).

The cost of price impact increases as an index's assets under management, small firm "tilt", and rebalancing frequency (and, consequently, trading) increase. Price impact is not directly observable and is thus difficult to estimate accurately, even though it makes up the greatest proportion of total transaction costs (e.g., Almgren et al., 2005; Keim & Madhavan, 1998; Kissell et al., 2003).

Price impact costs may be particularly severe for alternative indexes as they are not anchored to price and therefore sacrifice the automatic, price-dependent, rebalancing of traditional indexing. This results in the need to rebalance the many small stocks in the index-replicating portfolio frequently so as to accurately replicate the index's return characteristics and reduce any tracking error between the replicating portfolio and the benchmark index. This generates portfolio turnover, which increases transaction costs in general and price impact costs in particular, ultimately eroding performance.

We evaluate the performance of a number of well-known alternative indexes and compare them with the traditional market-capitalization-weighted index under various alternative rebalancing frequencies, considering differing assets under management, and using various price impact models to incorporate oft-neglected costs of rebalancing. Our key finding is that when we exclude all costs, given the "tilts" of alternatives to size and value risk factors, the alternative indexes generate higher returns than MCWI. However, as the fund size and consequently transaction costs increase, the outperformance relative to MCWI is reduced to the point where it is no longer statistically significant for most alternative indexes. We find that those alternative indexes which perform best when they have low assets under management have high turnover, and therefore frequent trading occurs when assets under management grow, resulting in high costs and severe performance erosion. This finding is robust to the choice of price impact model. In effect, the additional transaction costs associated with rebalancing the alternatives completely erode the higher returns from the increased size and value tilts they possess. We find that many of the alternative indexes we examine are viable as long as the fund remains relatively small. However, the results ultimately suggest that the market MCWI strategy will forever remain popular due to its simplicity, vast investment capacity, and low costs.

2. Literature review

The literature review is divided into two sections. They focus on the academic literature pertaining to indexing costs and to exchange-traded funds (ETFs), which replicate alternative indexes.

2.1. The costs of trading alternative indexes

As stated in the introduction, the primary aim of this work is to ascertain the extent of the performance degradation of alternative indexing when the most important variable cost, price impact trading cost, is included. Transaction costs can be broken into two components: explicit and implicit costs. Explicit costs consist of brokerage fees and commissions, taxes, and bid–ask spreads associated with transacting. These costs are easy to measure, as they are most often known before a trade takes place (Collins & Fabozzi, 1991). Implicit costs, on the other hand, are unobservable, are difficult to measure accurately, and make up the greatest proportion of total transaction costs (Kissell et al., 2003). Implicit costs include timing risk, price appreciation, and, most importantly, price impact.[3]

Price impact is best defined by Kissell et al. (2003, p.97) as "the difference between the stock's price trajectory with the order and what the price trajectory would have been had the order not been submitted to the market" (Arnott & Wagner, 1990; Kissell et al., 2003). For a large fund, even a relatively small-dollar trade may represent a large portion of the daily trading volume of a small stock and therefore may incur substantial price impact costs, eroding any returns that may otherwise be realized.

An ongoing issue with many studies on index viability is that the transaction costs, particularly price impact costs, are not included. Furthermore, models that estimate price impact are notoriously inaccurate. For example, Almgren et al. (2005) note that their cost model is calibrated on very little data relating to small-cap stock trades and large-volume trades, yet the subsequent R^2s are less than 1%. Condon (1981) reports an R^2 of below 5%, and Korajczyk and Sadka (2004) produce a model with reported R^2s of less than 10%. There are models that claim to have robust predictive power; however, these remain the proprietary information of their owners, such as Investment Technology Group Inc. (2007).

Keim and Madhavan (1998) provide a comprehensive review of the numerous transaction cost models, mostly price impact models, and estimates of implicit transaction costs proposed by academics. It is shown that smaller, less liquid stocks have larger transaction costs associated with them, primarily due to price impact costs. In addition, the larger the trade size, the greater the price impact cost.

Price impact is particularly pernicious on index reconstitution dates, when new stocks enter and old stocks leave the index. On such dates, the stocks that enter or leave the index are subject to a large degree of buying pressure (index additions) or selling pressure (index deletions). Even though a property of MCWI is that, once invested, very little rebalancing is required (Handley, 2011), significant reweighting is still required when stocks are added to or removed from the index and for corporate actions such as mergers and spinoffs, all of which incur transaction costs as they require an adjustment of portfolio weights (Russell Investments, 2011).

These adjustments, and those related to reconstitutions, are often required to be made as quickly as possible[4] in order for the portfolio to track the index closely (Blume & Edelen, 2004). Such issues concerning viability are also examined in this work (see Section 4c). Large funds that use alternative indexes may encounter difficulty in this regard, as they require frequent rebalancing in small stocks.

The rebalancing of an alternative index is more onerous because the weightings are not anchored to price. Therefore, the rebalancing process of the Fundamental Index (FI) portfolio index (see Section 3c for details about FI and the other alternative indexes used in this work) induces more trades and, ultimately, greater transaction costs. In Arnott et al. (2005), the annual turnover of the Composite FI portfolio was reported as 10.55%, almost double that of the MCWI portfolio but still low in terms of active managers, which approach 100% per annum. Although the Equal Weight (EW) turnover is not reported, Arnott et al. (2005) suggest that it is much greater than the FI and MCWI turnovers. As increased turnover is a consequence of the alternative indexing, greater transaction costs are incurred as a result, eroding any outperformance.

In terms of the volume of stocks traded and associated costs that are incurred when rebalancing an MCWI portfolio, Hsu and Campollo (2006), and later Arnott and Wagner (1990), argue that the trades

[3] For an in-depth breakdown of equity transaction costs, see Kissell et al. (2003).

[4] Index fund managers may begin trading in the days leading up to a reconstitution to take advantage of lower prices and stock liquidity (Madhavan & Ming, 2003).