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Bias and misrepresentation revisited: Perspective on major equity indices

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ABSTRACT

We analyze the characteristics of 22 leading equity indices and discuss common biases relative to their respective national equity markets. Findings demonstrate systematic risk-factor exposures on a universally consistent basis in form of a large-cap, low beta, growth and contrarian tilt. These systematic biases are also relevant given their knock-on effect on public changes in consumption due to a changes in net wealth, especially as more private investors are utilizing ETFs on the basis of these indices rather than delegated mandates in form of mutual or pension funds.

“Dow published the first U.S. stock market index in 1884, [...] Even practitioners who disdained Dow theory, however, found the Dow indices were tremendously useful for following the stock market as a whole.”

[Lo \(2016, p.22\)](#)

1. Introduction

How representative are leading equity indices to their total stock markets, given that they are only composed of a small fraction of the overall cross-section of publicly listed companies in a country? In this study, we analyze the common characteristics of leading stock market indices across 22 countries and aim to identify common misrepresentation biases relative to an approximation of their respective national equity markets as a whole.

Investors utilize leading stock market indices – such as the S&P 500 for the U.S. or the Nikkei 225 for Japan – as an important indicator for their respective stock markets. Moreover, these indices tend to be used regularly as a benchmark for fund managers to evaluate their performance ([Cremers et al., 2012](#); [Seifried and Zunft, 2012](#)) and form the cornerstone of the stark growth of passive investment products. In contrast, the scientific community use market portfolios rather than lead indices to evaluate the performance of portfolios, thereby considering a much larger cross-section. Widely considered examples of such market portfolios are the various country and region portfolios, which are provided by Kenneth French, amongst others, and constructed on the basis of data by the Center for Research in Security Prices (CRSP). Whilst these market portfolios are also only an approximation of the overall market,

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their cross-section spans far beyond the large-cap focus of most leading indices. Given the discrepancy in these two approaches, the question arises whether leading stock market indices are a legitimate representation of the whole market or if substantial biases have to be accepted in exchange for a simple and straight forward stock market barometer.

Seifried and Zunft (2012) argue, that leading stock market indices are indeed a questionable market-proxy as they are predominantly considering the largest (in terms of market-capitalization) and most liquid stocks. Besides a sample restriction, the underlying weighting scheme (equal-, price- or value-weighted) further adds to the subject of implicit size and style tilts. Daniel et al. (1997) and Cremers et al. (2012) report statistically significant nonzero alphas when testing index returns in various asset pricing models. These results indicate, that there are likely alternative drivers not captured by common multi-factor models and consequently resulting in non zero intercepts. Possible explanations are certain shortcomings in asset pricing models as discussed by Chan et al. (2009), who propose a different approach in constructing asset pricing factors to better account for different portfolio-styles or Asness et al. (2013) who argue in favour of a different methodology for the HML-factor. Moreover, index returns are potentially influenced by a reconstitution effect that occurs when stocks are added or removed from indices (Cremers et al., 2012). Given the mixed results and the criticism concerning the construction of leading stock market indices, the question whether leading stock market indices are a valid market proxy emerges as a natural consequence.

2. Data

We utilize two sources of data. For the leading equity indices all data was gathered from Thomson Reuters DataStream/EIKON. The market factors, the risk-free rate as well as data on the market-capitalization of each whole stock market were taken from the website by AQR Capital Management.¹ All data was gathered in U.S. dollars – where necessary exchange rates from DataStream were considered – and as such we take the perspective of a U.S. investor. The overall observation period is from 07/1997 to 03/2017 which corresponds to 238 monthly observation, with the exception of Italy (12/1997–03/2017), New Zealand (01/2001–03/2017), Norway (09/1999–03/2017) and Singapore (08/1999–03/2017). In case of the market portfolio for Ireland we observe an abnormally high return of 59.96% in October 2010, which we cannot explain and therefore set to n/a.²

Table 1 provides the sample statistics for all leading equity indices by country and corresponding market portfolios (in italics). We observe an overall close alignment in risk-adjusted returns (Sharpe ratios), with slightly higher differences observable for Ireland, Israel, Italy and Switzerland. Consistent with what we would expect, we observe on average higher mean returns (in 77% of the cases) and higher standard deviations (in 91% of the cases) for the market portfolios, which we contribute to the inclusion of medium- and small-cap stocks in the overall market vis-à-vis the corresponding leading (large-cap) indices and, therefore benefiting from a positive exposure towards the size premium. This becomes particularly relevant after the financial crisis, when most market portfolios recover much quicker than major indices resulting in structural breaks between the two time-series per country, as indicated by the results of the Chow test.

3. Empirical results

3.1. Index characteristics

Table 2 provides some key characteristics on the 22 international equity indices, such as the index type, underlying weighting scheme and rebalancing frequency. Furthermore, we report the degree of market coverage of each index by taking the ratio of the index market-capitalization relative to the market-capitalization of the overall stock market. This builds on the notion that indices with a higher degree of market coverage should, at least in theory, also exhibit a higher degree of representativeness for the whole stock market of its respective country. Consequently, a low degree of market coverage could be interpreted as a potential source of misrepresentation.³ Subsequently, we report the correlation between the academic market factor and the leading equity index of the corresponding country. As such, we get a first indication on the linear relationship between both lead indices and the corresponding market portfolios.

First, with respect to the index type, we report 17 of 22 leading indices (77%) to be price indices and consequently are a pure reflection of capital gains/losses, whilst disregarding dividends. As such, a direct comparison between Germany (DAX-30) and the UK (FTSE 100) is likely to result in a favorable performance chart for the former, given that dividends are included in the DAX. In this respect, Patel et al. (2006) show that dividends contributed over 40% to the overall performance of the S&P 1500 between 1926 and 1990. Thereon, a common ground for comparison is crucial but which one is preferable? Whilst one could argue that this is down to the individual investor preferences, this argument has its flaws given alternative tax systems depending on (i) the country of residence (capital gains vs. income tax), as well as (ii) alternative tax systems depending on the source of the dividend (withholding tax). Consequently, price indices are less sensitive to a specific setting and, thereon provide better comparability.

Secondly, the index providers strongly favor the market-capitalization approach in all cases of our sample except for the Nikkei

¹ All data made available by AQR can be accessed under this [LINK](#).

² Including the October 2010 return for Ireland results in an increase in the time-series kurtosis from 2.51 to 11.07. More generally, the results for Ireland should be handled cautiously given the high market concentration of four firms contributing approx. 80% of the market capitalization.

³ We calculated market coverage as the historical average over the period under investigation.

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