

MONEY LEFT ON THE TABLE – A DEEPER LOOK INTO THE EFFECTS OF LIQUIDITY AND RECONSTITUTION

White Paper

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EXECUTIVE SUMMARY

In this paper, we investigated the effect of liquidity on the impact of reconstitution using a spectrum of indices moving from float market capitalization weights towards liquidity weights. As the overlap with the initial float market-capitalization-weighted index fell steeply, we observed a decrease in the impact of reconstitution accompanied by higher turnover. Therefore, investors should weigh the trade-off between the impact of reconstitution and costs from turnover in order to achieve a breakeven in overall costs.

HIGHLIGHTS OF THE PAPER

Over the period from December 27, 2002, to December 27, 2019, we observe:

- > the overlap was less than 80% between the float market-capitalization-weighted and the liquidity-weighted indices for all the size segments
- > The liquidity-weighted indices had an impact of 2, -3, and 8 basis points as opposed to 11, 18, and 29 basis points for float market-capitalization-weighted indices within the large-, mid-, and small-cap segments, respectively

WHY DOES LIQUIDITY MATTER?

Conventionally, the stock price is believed to have incorporated liquidity premium [Reference 1]. When illiquidity is properly rewarded, some investors may forfeit short-term liquidity and harvest the liquidity premium [Reference 2]. However, when it comes to passive investments, the performance is heavily reliant on the replicability and tradability of the components of the underlying index. With thinly traded securities, or at times of financial stress with dried-up liquidity, reconstitution may be challenging and lead to a significant tracking error.

Moreover, at the time of reconstitutions, indices invariably suffer an impact from the advance actions of the index arbitrageurs, and we called this the impact of reconstitution in our paper 'Money

Left on the Table - Passive Investing and the Effects of Reconstitution' [Reference 3]. While the tracking error can be reduced with more liquid securities, the effect on the 'Impact of Reconstitution' will be interesting to observe.

In our research paper 'Money Left on the Table - Why You Should Think About the Timing of the Reconstitution' [Reference 4], we already discovered that spreading the reconstitution over different periods may be one of the options to mitigate the impact of unmanageable timing factor on reconstitutions. Therefore, to study the effect of liquidity on the impact of reconstitution without affecting the results from the timing factor, we use the same strategy of averaging it over all the twelve months in a year, as we presented in our previous paper.

We use the constituents of the average indices of the respective segments and present a spectrum of indices moving from float market capitalization weights towards liquidity weights. We first introduce our elementary capping and reweighting process that was used in the formation of a spectrum of indices. Then we examined the trade-off between the impact of reconstitution and the turnover exhibited by these indices.

OUR UNDERLYING METHODOLOGY

In this paper, we use the constituents of simulated average indices of each size segment from our earlier research paper on 'Money Left on the Table - Passive Investing and the Effects of Reconstitution' [Reference 3] and weight them by their float market capitalization subject to a capping limit and redistributing the excess weight in proportion to the float market capitalization of the unaffected components of the index. The capping limit for each security in the index was defined as 'X' times the liquidity weight of the respective security. The liquidity weight of a security was calculated by dividing the average daily value traded of the



security over the past one year by the sum of average daily value traded over the past one year of all the securities in the index. We present our observations with X varying from 1 to 3.5 (both inclusive) in steps of 0.25. Additionally, we also present X when $X \rightarrow \infty$ (tends to infinity). We like to mention that when $X = 1$, then the index is purely liquidity weighted, and when $X \rightarrow \infty$, then the index is float market-capitalization-weighted.

Therefore, moving right on the horizontal axis in Exhibits 1, 2, 3, 5, and 6 tilts the index away from float market capitalization towards liquidity weights of the securities in the index.

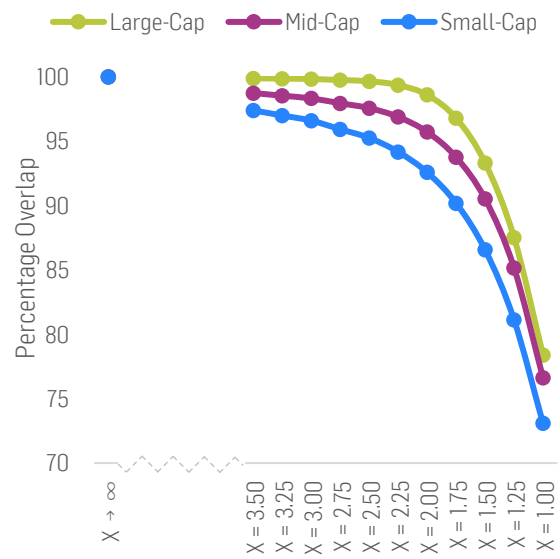
As in our earlier paper, we again acknowledge that for a more robust study, various permutations and combinations of cumulative weight cutoff limits for the initial universe, size segments, buffers, dates of reconstitution, and selection as well as liquidity measures could be assessed.

HISTORICAL OBSERVATIONS ON OVERLAP AND IMPACT

We observed that the overlap between float market-capitalization-weighted index ($X \rightarrow \infty$) and indices with capping limit fell steeply when X moved from 2 to 1 for all size segments (see Exhibit 1). The overlap was less than 80% between the float market-capitalization-weighted indices ($X \rightarrow \infty$) and the liquidity weighted indices ($X = 1.00$) for all the size segments.

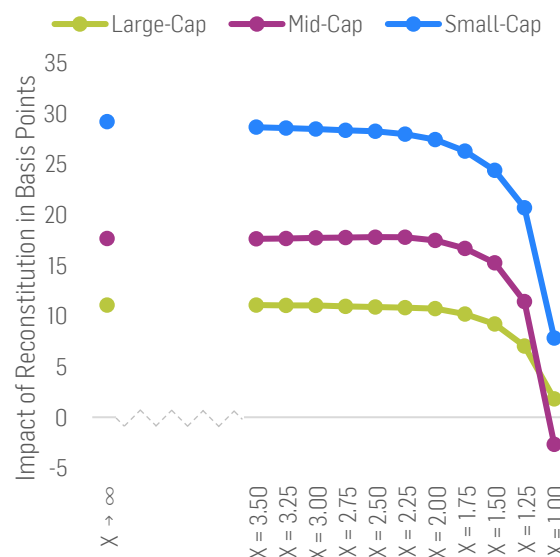
Although the overlap reduces as we move closer to liquidity weights, the impact of reconstitution also reduces dramatically (see Exhibit 2). The liquidity weighted indices ($X = 1.00$) had an impact of 2, -3, and 8 basis points as opposed to 11, 18, and 29 basis points for float market-capitalization-weighted indices ($X \rightarrow \infty$) within the large-, mid- and small-cap segments respectively.

Exhibit 1: Percentage Overlap with the Float Market-Capitalization-Weighted Index



Source: Solactive and FactSet. Data from December 27, 2002 to December 27, 2019. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 2: Annualized Impact of Reconstitution of the Indices



The impact of reconstitution for ranking was calculated over four-week advance reconstitution period. The annualized Impact of Reconstitution was calculated by subtracting the annualized total return of the underlying index from the annualized total return of the hypothetical portfolio over the entire back-tested period.

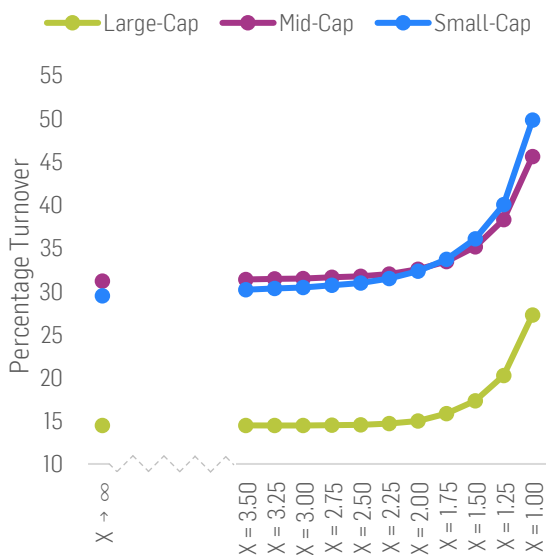
Source: Solactive and FactSet. Data from December 27, 2002 to December 27, 2019 in USD. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.



In our earlier paper on 'Money Left on the Table - Passive Investing and the Effects of Reconstitution' [Reference 3], we mentioned that the impact of reconstitution became statistically significant in a majority of months for all the size segments when the hypothetical portfolios reconstituted four weeks before the actual reconstitution of the underlying indices. Therefore, we used the impact of reconstitution calculated over a four-week advance reconstitution period for our analysis in this paper.

Whilst there was a reduction in the impact of reconstitution as we moved closer to liquidity weights, it was also accompanied by an increase in the turnover of the indices (see Exhibit 3). Therefore, if the turnover costs are known, a breakeven point could be established where total cost, including the impact of reconstitution, is minimized.

Exhibit 3: Annualized One-Way Turnover of the Indices



Source: Solactive and FactSet. Data from December 27, 2002 to December 27, 2019. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

CONCLUSION

In this research paper, we studied the effect of liquidity on the impact of reconstitution. Liquidity was measured as average daily value traded over

the past year. We presented a spectrum of indices moving from float market-capitalization weights towards liquidity weights.

We observed that the overlap with the float market-capitalization-weighted index fell steeply as the weights moved closer to liquidity weights.

Although the overlap reduced as we moved closer to liquidity weights, the impact of reconstitution also reduced significantly. However, the reduction in impact was accompanied by an increase in turnover.

Therefore, a breakeven point could be established where the total cost, which includes the cost of turnover as well as the impact of reconstitution, is minimized.

REFERENCES

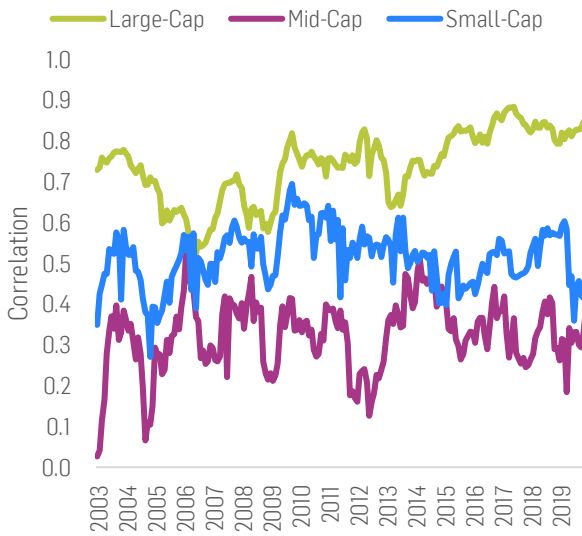
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https://www.solactive.com/wp-content/uploads/2020/08/Solactive_Money_Left_on_the_Table_Why_You_Should_Think_About_the_Timing_of_the_Reconstitution.pdf



APPENDIX

The historical correlation between market cap and liquidity of stocks, measured as average daily value traded over past one year in our sample data, was less than 0.9, 0.6, and 0.7 in the large-, mid-, and small-cap segments respectively (see Exhibit 4).

Exhibit 4: Correlation between Float Market Capitalization and Liquidity

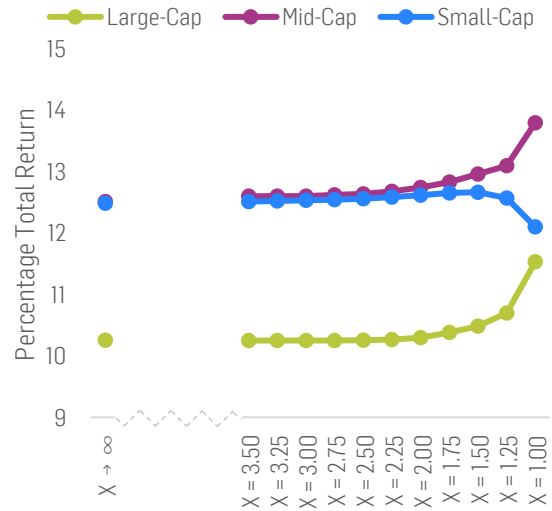


Liquidity was measured as average daily value traded over past one year. Source: Solactive and FactSet. Data from December 27, 2002 to December 27, 2019. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

Weighting by liquidity (average daily value traded over the past year) redistributes the weights of the larger stocks to relatively smaller stocks within the same segment. Therefore, the outperformance of the liquidity-weighted large- and mid-cap indices over the respective float market-capitalization-weighted versions in our sample data is not surprising (see Exhibit 5).

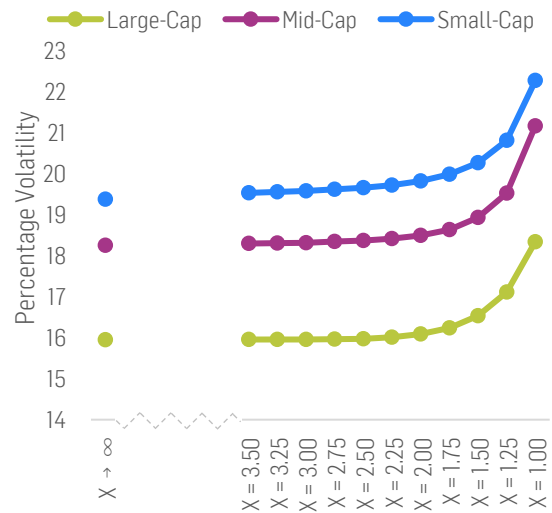
The historical increase in volatility of the liquidity (average daily value traded over past one year) weighted indices over the float market-capitalization-weighted indices was 2.4%, 2.9%, and 2.9% for large-, mid-, and small-cap segments, respectively (see Exhibit 6).

Exhibit 5: Annualized Total Return of the Indices



Source: Solactive and FactSet. Data from December 27, 2002 to December 27, 2019 in USD. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 6: Annualized Volatility of the Indices



Source: Solactive and FactSet. Data from December 27, 2002 to December 27, 2019 in USD. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.



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