

CONSULTATION ON POTENTIAL ENHANCEMENTS TO THE MSCI CAPPED INDEXES

August 2018

Note that this consultation may or may not lead to the implementation of any or all of the proposed changes in the highlighted or any other MSCI indexes. Consultation feedback will remain confidential. MSCI may publicly disclose feedback if specifically requested by specific market participants. In that case, the relevant feedback would be published together with the final results of the consultation.

OVERVIEW

- Proposed enhancements to the MSCI Capped Indexes
 - **Increase index review advance notification period** for the MSCI Capped Indexes, including the MSCI 10/40 and 25/50 Indexes, from five days to nine days to align their rebalancing schedule with the rest of the MSCI Derived indexes (Factor, ESG etc.)
 - **Introduce an additional security level relative weight constraint** in the MSCI 25/50 index methodology to avoid potential capacity concentration issues
- MSCI also proposes to increase the advance notification period for the **MSCI GDP Weighted and Equal Weighted Indexes** from five to nine days
- MSCI proposes to implement these enhancements starting from the February 2019 Index Review

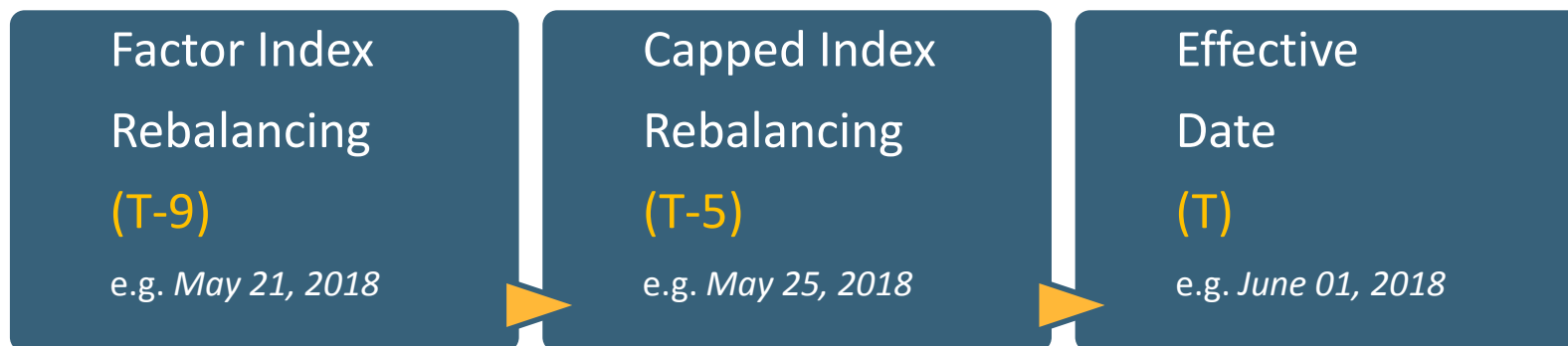
MSCI welcomes feedback from market participants until October 31, 2018 and will announce the results of the consultation on or before November 30, 2018

INCREASED ADVANCE NOTIFICATION PERIOD

Proposal: To increase the advance notification period for the MSCI Capped Indexes (including the MSCI 10/40 and MSCI 25/50 Indexes), GDP Weighted and Equal Weighted Indexes from 5 to 9 days

CURRENT INDEX REVIEW ANNOUNCEMENT TIMELINE

- At each index review, the MSCI Capped Indexes, including the MSCI 10/40 and MSCI 25/50 Indexes, MSCI GDP Weighted and MSCI Equal Weighted Indexes are rebalanced and the pro forma indexes announced 5 business days prior to the effective date of the rebalancing
- All the other derived indexes (e.g. Factor, ESG etc.) are rebalanced and announced 9 business days prior to the effective date



CURRENT INDEX METHODOLOGY SPECIFIC DETAILS

- **Portfolio Drift:** As the pro forma index is announced a few days before the effective date, the actual constituent weights on the effective date are different due to price performance between announcement date and effective date
 - For example – the constituents of the MSCI Equal Weighted Indexes do not have exactly equal weights on the effective date
- **Conditional Rebalancing:** During the advance notification period, if the pro-forma index violates the constraints for the MSCI 10/40 and MSCI 25/50 Indexes, a fresh rebalancing is triggered again, such that the pro-forma index is always compliant with the constraints

COMPARISON OF DIFFERENT ANNOUNCEMENT DATES

T - 5

Less likelihood of a conditional rebalancing for the MSCI 10/40 & MSCI 25/50 Indexes

Less drift away from Equal Weighting on effective date for the Equal Weighted Indexes

T - 9

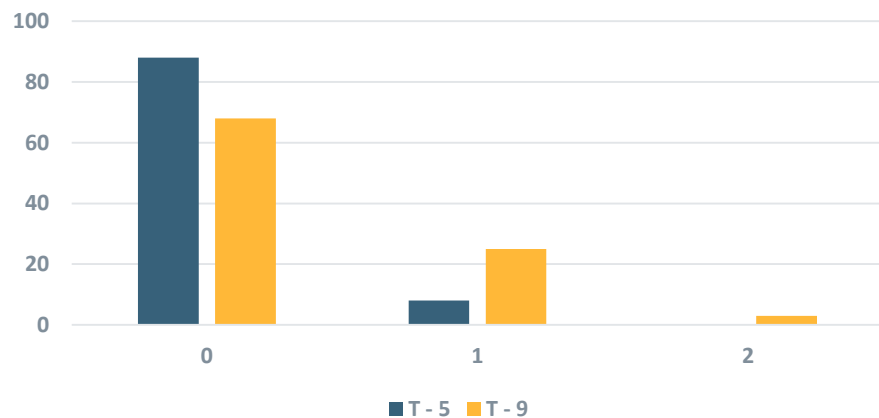
Aligned with the rest of the MSCI Derived indexes (Factor, ESG etc.)

Increased notification period provides additional time to manage index review implementation

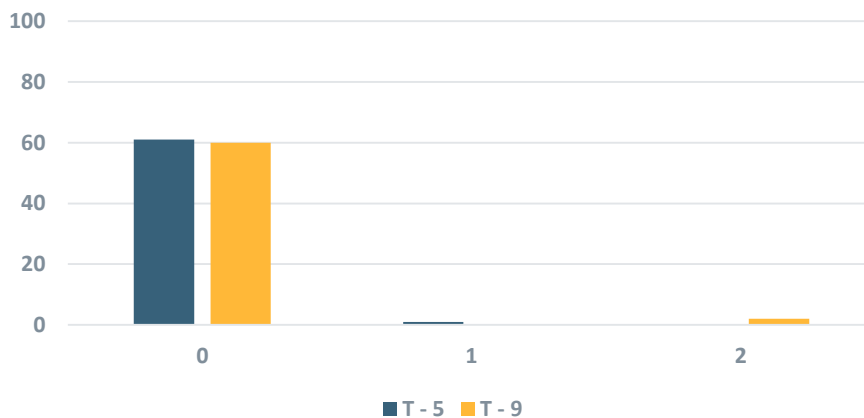
AD-HOC REBALANCES - SIMULATION STATISTICS

Based on the statistics presented in the charts, it may be concluded that the impact of increase in the notification period is not significantly high

10 / 40



25 / 50



WEIGHT DRIFTS - SIMULATION STATISTICS (EQUAL WEIGHTED INDEXES)

The drift in the weights for indexes rebalanced nine days before is *not significantly higher* than for those announced five days before

Δ (Drift)	Jun-18	Mar-18	Dec-17	Sep-17	Jun-17	Mar-17	Dec-16	Sep-16
< 0%	4	2	7	4	1	1	7	4
0% - 3%	93	95	93	97	100	99	94	85
> 3%	0	0	1	0	0	1	0	0

Delta (drift) = (Drift between T-9 and effective date) – (Drift between T-5 and effective date)

PROPOSAL SUMMARY

- The proposed enhancement aligns the rebalancing schedule of the MSCI Capped, 10-40 and 25-50, Equal Weighted and GDP Indexes with the rest of the MSCI Derived (Factor, ESG etc.) Indexes
 - ✓ The benefits in terms of a common rebalancing schedule for all the MSCI derived indexes and increased time to manage index review implementation are significantly higher
 - ✓ The chances of conditional rebalancing are not significantly higher
 - ✓ There is no significant drift from the pro forma weights for indexes such as the MSCI Equal Weighted indexes

Do you agree with the proposed increase in the advance notification period?

MSCI 25/50 INDEX METHODOLOGY – ENHANCEMENT PROPOSAL

PROPOSAL: ADDITIONAL SECURITY RELATIVE WEIGHT CONSTRAINT

- **Proposed Enhancement: Additional Relative Weight Constraint:**
 - ✓ In the MSCI 25-50 Index, a security can have a maximum weight of 4x its weight in the Parent Index
- This additional constraint would avoid excessive weight allocation to the smaller securities, by capping the weight relative to the market cap weight
- The constraint would be relaxed in steps of 1x in cases of infeasibilities

OVERVIEW OF THE MSCI 25/50 INDEX METHODOLOGY

- The MSCI 25/50 Indexes aim to offer a pertinent methodology for RIC compliant funds such that
 - ✓ no issuer has a weight of 25% and the sum of weights of all issuers with weights greater than 5% is less than 50%
 - ✓ *tracking error*¹ with respect to the parent index is kept low, and
 - ✓ turnover is kept at a minimum
- Mathematically, the objective function for the 25/50 rebalancing problem is formulated as follows:

$$\underset{\mathbf{h}}{\text{Maximize}}: f(\mathbf{h}) = -100(\mathbf{h} - \mathbf{h}_B)^T (\lambda_F \mathbf{X} \mathbf{F} \mathbf{X}^T) (\mathbf{h} - \mathbf{h}_B) - TC(\mathbf{h}, \mathbf{h}_0) - g(\mathbf{h})$$

λ_D :	Common Factor Risk Aversion (0.0075)
\mathbf{h} :	Portfolio Holding Weights
\mathbf{h}_0 :	Initial Portfolio Weights
\mathbf{h}_B :	Parent Holding Weights
$TC(\mathbf{h}, \mathbf{h}_0)$:	Transaction Cost Function (0.0050)
$\mathbf{X} \mathbf{F} \mathbf{X}^T$:	Variance – Covariance Matrix (\mathbf{I})
$g(\mathbf{h})$:	Applicable (25/50) constraints

¹ defined as the sum of squared weight differences between the constituent weights of the MSCI 25/50 Index and Parent Index

MSCI 25/50 INDEXES: POTENTIAL CAPACITY CONCENTRATION ISSUE

- Currently, it is possible that some of the smaller securities in the portfolio may receive a relatively larger over-weight. This could happen because,
 - ✓ The tracking error is defined as the sum of squared differences between the weights of securities in the MSCI 25-50 Index and the Parent Index

$$tracking_error = \sqrt{\sum_{i=1}^n (w_{2550,i} - w_{par,i})^2}$$

- ✓ When the excess weight resulting from the capping constraints is equally distributed among the remaining securities, the tracking error as defined above is mathematically minimized
 - ✓ And so the optimizer could assign the same absolute overweight to each *uncapped* security, thereby resulting in a large relative overweight for the smallest securities
- This is illustrated with an example on the next slide

MSCI 25/50 INDEX METHODOLOGY – WEIGHT REDISTRIBUTION ILLUSTRATION WITHOUT TRANSACTION COSTS

Security Id	Parent Weight	Proforma 25/50	Diff
01	63.48%	22.50%	-40.98%
02	5.85%	7.18%	1.33%
03	5.43%	6.76%	1.33%
04	4.03%	5.35%	1.33%
05	3.29%	4.50%	1.21%
06	2.85%	4.18%	1.33%
07	1.72%	3.05%	1.33%
08	1.39%	2.71%	1.33%
09	1.20%	2.53%	1.33%
10	1.10%	2.42%	1.33%
11	1.07%	2.39%	1.33%
12	0.84%	2.17%	1.33%
13	0.74%	2.07%	1.33%
14	0.73%	2.06%	1.33%
15	0.70%	2.03%	1.33%
16	0.68%	2.01%	1.33%
17	0.59%	1.92%	1.33%
18	0.58%	1.91%	1.33%
19	0.58%	1.90%	1.33%
20	0.47%	1.80%	1.33%
21	0.46%	1.78%	1.33%
22	0.40%	1.73%	1.33%
23	0.32%	1.64%	1.33%
24	0.24%	1.57%	1.33%
25	0.23%	1.56%	1.33%
26	0.22%	1.55%	1.33%
27	0.22%	1.55%	1.33%
28	0.19%	1.52%	1.33%
29	0.10%	1.43%	1.33%
30	0.10%	1.42%	1.33%
31	0.09%	1.42%	1.33%
32	0.09%	1.41%	1.33%

This security is being capped at 4.5%

This security is being capped at 22.5%

Excess weight (39.77%/30 = 1.33%) distributed equally among the non-capped securities. Mathematically, this would give the smallest tracking error

MSCI 25/50 INDEX METHODOLOGY – WEIGHT REDISTRIBUTION ILLUSTRATION WITH RELATIVE WEIGHT CONSTRAINT BUT WITHOUT TRANSACTION COSTS

Security Id	Parent Weight	Proforma 25/50	Diff
01	63.48%	22.50%	-40.98%
02	5.85%	7.66%	1.80%
03	5.43%	7.24%	1.80%
04	4.03%	5.83%	1.80%
05	3.29%	4.50%	1.21%
06	2.85%	4.50%	1.65%
07	1.72%	3.53%	1.80%
08	1.39%	3.19%	1.80%
09	1.20%	3.01%	1.80%
10	1.10%	2.90%	1.80%
11	1.07%	2.87%	1.80%
12	0.84%	2.64%	1.80%
13	0.74%	2.55%	1.80%
14	0.73%	2.53%	1.80%
15	0.70%	2.51%	1.80%
16	0.68%	2.49%	1.80%
17	0.59%	2.36%	1.77%
18	0.58%	2.32%	1.74%
19	0.58%	2.31%	1.73%
20	0.47%	1.88%	1.41%
21	0.46%	1.84%	1.38%
22	0.40%	1.62%	1.21%
23	0.32%	1.26%	0.95%
24	0.24%	0.98%	0.73%
25	0.23%	0.92%	0.69%
26	0.22%	0.89%	0.67%
27	0.22%	0.89%	0.67%
28	0.19%	0.78%	0.58%
29	0.10%	0.41%	0.31%
30	0.10%	0.39%	0.29%
31	0.09%	0.36%	0.27%
32	0.09%	0.34%	0.26%

This security is being capped at 4.5%

This security is being capped at 22.5%

Excess weight ($39.77\%/30 = 1.33\%$) will not be distributed equally among the non-capped securities due to the multiplier constraint. This may not result in the minimum tracking error possible but helps keep the index liquid

PROPOSAL SUMMARY

- The proposal to introduce additional security relative weight is expected to improve the liquidity of the MSCI 25/50 Indexes on narrow parent indexes
- ✓ Do you agree with the proposal to keep the initial multiplier value at 4?
- ✓ Do you agree with the proposal to relax the constraint in steps of 1 in case of infeasibilities?

Do you agree with the proposal to introduce the additional security relative weight constraint?

MSCI 25/50 INDEX METHODOLOGY - ADDITIONAL TOPICS FOR DISCUSSION (1/2): RANK ORDERING

- Due to the application of the transaction cost term, the weights of the securities in the MSCI 25/50 Indexes are not in the same order as the Parent Index
 - ✓ Additional constraints could be used to enforce rank ordering
 - ✓ However, these constraints may lead to ‘bunching’ of weights in the resultant portfolio due to the transaction costs, as the algorithm still tries to minimize turnover from the current weights
 - ✓ Complete rank ordering can only be ensured by dropping the transaction cost term from the rebalancing algorithm. However, that would significantly increase the turnover incurred at index reviews

Do you think it would be useful to enforce rank ordering in the MSCI 25/50 Indexes at the cost of higher rebalancing turnover?

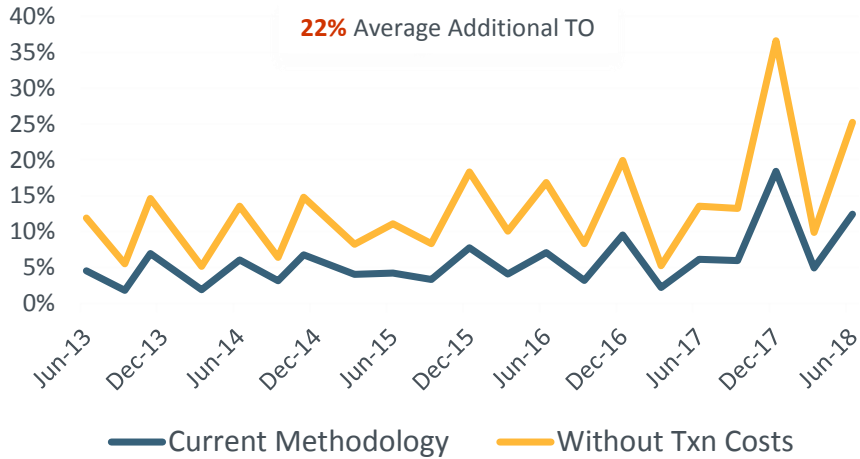
SIMULATED RESULTS – SNAPSHOT

It can be noted that while the imposition of rank-order constraints preserves the relative ranking of each issuer in the 25/50 portfolio, it assigns them nearly identical weights (bunching)

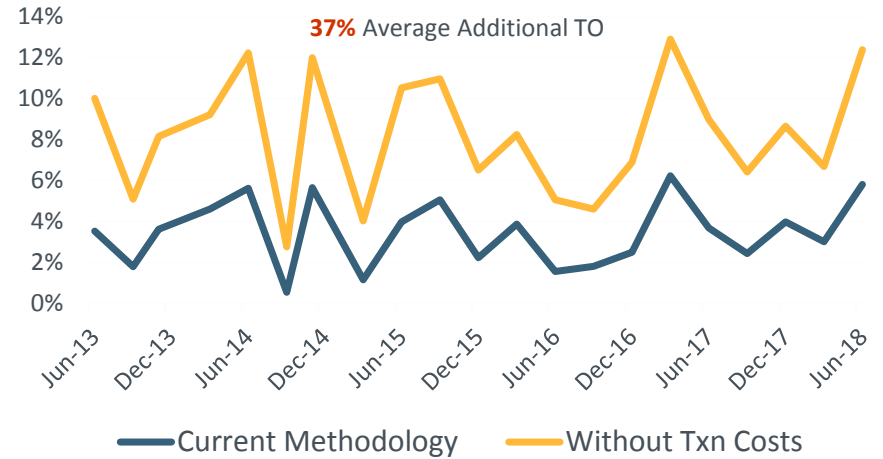
Security Id	Parent Weight	Current 25/50	Proforma 25/50	Proforma 25/50 with Rank Order Constraints	Proforma 25/50 without Transaction Costs
01	63.48%	21.34%	22.50%	22.50%	22.50%
02	5.85%	7.74%	7.50%	7.58%	7.18%
03	5.43%	7.08%	7.08%	7.08%	6.76%
04	4.03%	4.84%	5.01%	5.09%	5.35%
05	3.29%	5.15%	4.50%	4.50%	4.50%
06	2.85%	4.29%	4.29%	4.29%	4.18%
07	1.72%	2.78%	2.78%	2.79%	3.05%
08	1.39%	2.60%	2.60%	2.60%	2.71%
09	1.20%	2.50%	2.50%	2.50%	2.53%
10	1.10%	2.39%	2.39%	2.39%	2.42%
11	1.07%	2.12%	2.12%	2.22%	2.39%
12	0.84%	2.22%	2.22%	2.22%	2.17%
13	0.74%	2.39%	2.39%	2.22%	2.07%
14	0.73%	1.96%	1.96%	1.96%	2.06%
15	0.70%	1.71%	1.71%	1.93%	2.03%
16	0.68%	1.93%	1.93%	1.93%	2.01%
17	0.59%	1.74%	1.74%	1.93%	1.92%
18	0.58%	2.44%	2.23%	1.93%	1.91%
19	0.58%	1.90%	1.90%	1.92%	1.90%
20	0.47%	2.11%	2.11%	1.92%	1.80%
21	0.46%	1.88%	1.88%	1.88%	1.78%
22	0.40%	1.93%	1.93%	1.88%	1.73%
23	0.32%	1.26%	1.30%	1.52%	1.64%
24	0.24%	1.17%	1.23%	1.52%	1.57%
25	0.23%	1.49%	1.49%	1.52%	1.56%
26	0.22%	2.19%	1.87%	1.52%	1.55%
27	0.22%	1.40%	1.40%	1.52%	1.55%
28	0.19%	1.74%	1.74%	1.52%	1.52%
29	0.10%	1.52%	1.52%	1.52%	1.43%
30	0.10%	1.74%	1.74%	1.52%	1.42%
31	0.09%	1.16%	1.16%	1.28%	1.42%
32	0.09%	1.28%	1.28%	1.28%	1.41%
Turnover			1.42%	2.84%	4.44%

SIMULATION OF SELECT 25/50 INDEXES WITHOUT TRANSACTION COSTS

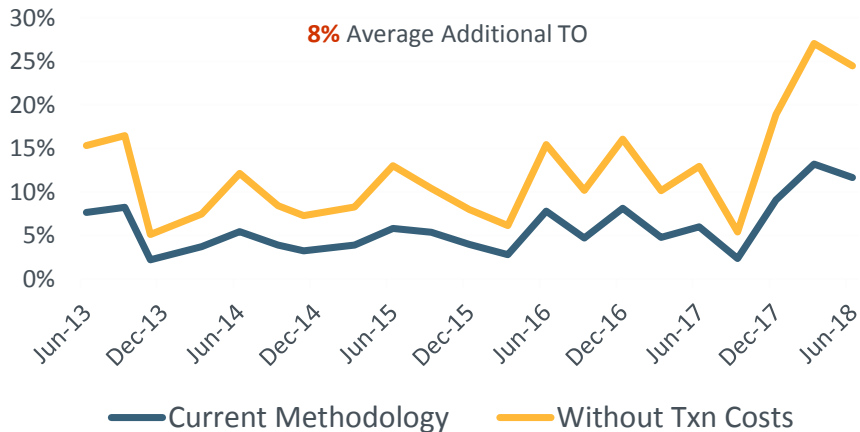
US IMI/TECH HARD ST&PERIPH SVC 25-50



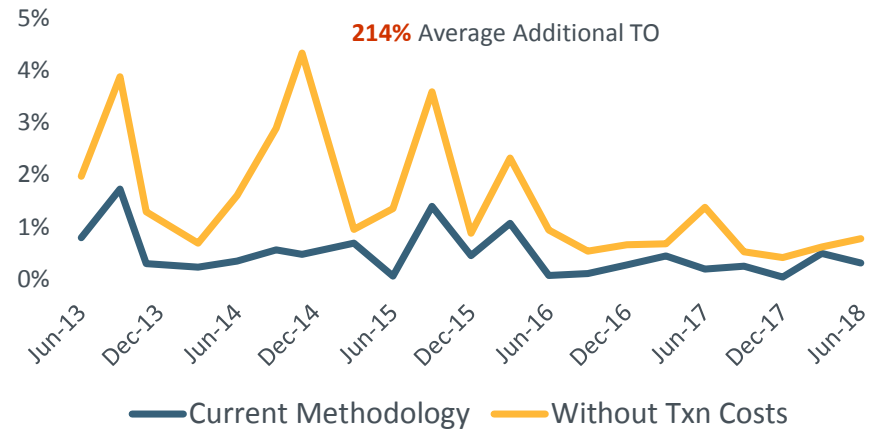
US IMI/TELECOM SVC 25-50



EGYPT IMI 25-50



US IMI/SOFTWARE & SERVICES 25-50



MSCI 25/50 INDEX METHODOLOGY - ADDITIONAL TOPICS FOR DISCUSSION (2/2): INTRA-QUARTER REBALANCING

- Intra-quarter additions result in a full rebalancing of the MSCI 25/50 Indexes, including the application of the 5/25/50 constraints
 - ✓ Under the RIC guidelines, the 5/25/50 constraints are only applicable quarterly and not on a daily basis
 - ✓ Removing the 5/25/50 constraints may avoid some of the excess turnover that is incurred in making the MSCI 25/50 Indexes compliant
 - ✓ The 25% constraint would still be imposed only on the new security in order to avoid potential reverse turnover at the next index review
 - ✓ A reduction in turnover may not be always possible - since the 5/25/50 constraints are no longer applicable, the optimizer may try to still match the weights of the Parent Index to improve tracking error, which may result in higher turnover

Would you prefer to have a different approach to handling intra-quarter additions, such as not applying the 5/25/50 constraints?

APPENDIX

AD-HOC REBALANCES - SIMULATION STATISTICS

Following table enumerates the instances where MSCI 10/40 or 25/50 indexes were conditionally rebalanced during the advance notification period due to breach of constraints for both scenarios

		Jun-18	Mar-18	Dec-17	Sep-17	Jun-17	Mar-17	Dec-16	Sep-16
10/40	Total	96	96	96	96	96	96	96	96
	Current	2	1	1	1	0	2	1	0
	9D Period	7*	3	1	2	0	5*	6*	2
25/50	Total	62	62	62	62	62	62	62	62
	Current	0	0	0	0	0	1	0	0
	9D Period	0	0	0	1	1	1	1	0

*the increase in ad-hoc rebalances during these index reviews were due to the performance of specific securities in select countries.

WEIGHT DRIFTS – AN ILLUSTRATION

The following (hypothetical) example illustrates the calculation of weight drifts for general case.

Security	DDate: T-9 AoDate: T	DDate: T AoDate: T	Abs(Difference)	DDate: T-5 AoDate: T	DDate: T AoDate: T	Abs(Difference)
A	21%	23%	2%	25%	26%	1%
B	7%	7%	0%	9%	8%	1%
C	15%	14%	1%	12%	13%	1%
D	24%	25%	1%	19%	18%	1%
E	17%	14%	3%	16%	15%	1%
F	16%	17%	1%	19%	20%	1%
	Drift		8%	Drift		6%
$\Delta (\text{Drift}) = 8\% - 6\% = 2\%$						

WEIGHT DRIFTS - SIMULATION STATISTICS (GDP WEIGHTED INDEXES)

- There is some drift in the MSCI GDP Weighted Index constituent weights as of the effective date, relative to the weights announced on the rebalancing date due to price performance
- The following table summarizes the change in the drift caused due to the increase in the advance notification period.

Δ (Drift)	Jun-18	Mar-18	Dec-17	Sep-17	Jun-17	Mar-17	Dec-16	Sep-16
< 0%	0	0	13	1	0	0	1	2
0% - 3%	55	55	41	53	54	54	53	52
> 3%	1	0	0	0	0	0	0	1

Conclusion: The drift in the weights for indexes rebalanced nine days before is *not significantly higher* than for those announced five days before

MSCI 25/50 INDEX METHODOLOGY – WEIGHT REDISTRIBUTION ILLUSTRATION WITH RELATIVE WEIGHT CONSTRAINT & TRANSACTION COSTS

Security Id	Parent Weight	Current 25/50	Proforma 25/50	Diff
01	63.48%	21.34%	22.50%	-40.98%
02	5.85%	7.74%	7.74%	1.89%
03	5.43%	7.08%	7.23%	1.80%
04	4.03%	4.84%	5.82%	1.80%
05	3.29%	5.15%	4.50%	1.21%
06	2.85%	4.29%	4.50%	1.65%
07	1.72%	2.78%	3.52%	1.80%
08	1.39%	2.60%	3.18%	1.80%
09	1.20%	2.50%	3.00%	1.80%
10	1.10%	2.39%	2.89%	1.80%
11	1.07%	2.12%	2.86%	1.80%
12	0.84%	2.22%	2.64%	1.80%
13	0.74%	2.39%	2.54%	1.80%
14	0.73%	1.96%	2.53%	1.80%
15	0.70%	1.71%	2.50%	1.80%
16	0.68%	1.93%	2.48%	1.80%
17	0.59%	1.74%	2.36%	1.77%
18	0.58%	2.44%	2.32%	1.74%
19	0.58%	1.90%	2.31%	1.73%
20	0.47%	2.11%	1.88%	1.41%
21	0.46%	1.88%	1.84%	1.38%
22	0.40%	1.93%	1.62%	1.21%
23	0.32%	1.26%	1.26%	0.95%
24	0.24%	1.17%	0.98%	0.73%
25	0.23%	1.49%	0.92%	0.69%
26	0.22%	2.19%	0.89%	0.67%
27	0.22%	1.40%	0.89%	0.67%
28	0.19%	1.74%	0.78%	0.58%
29	0.10%	1.52%	0.41%	0.31%
30	0.10%	1.74%	0.39%	0.29%
31	0.09%	1.16%	0.36%	0.27%
32	0.09%	1.28%	0.34%	0.26%

This security is being capped at 4.5%

This security is being capped at 22.5%

Excess weight (39.77%/30 = 1.33%) will not be distributed equally among the non-capped securities due to the multiplier constraint and transaction costs. This may not result in the minimum tracking error possible but helps keep the index liquid

MAX SEC WEIGHT MULTIPLIER – SIMULATION STATISTICS

- Proposal Impact: Number of indexes that have a high parent weight multiple reduces from 35-40 in the current methodology to just 5-6 in the proposed methodology

	Jun-18	Mar-18	Dec-17	Sep-17	Jun-17	Mar-17	Dec-16	Sep-16
# of Indexes	105	105	107	107	107	107	107	107
Current Methodology	37	34	36	36	35	38	36	44
Proposed Methodology	4	5	5	6	6	6	6	6

SIMULATION OF LARGE IQ ADD WITHOUT 25/50 CONSTRAINTS

The turnover incurred by not imposing 25/50 constraints (except for capping all securities at 22.5%) is more (22.8%) than that with the standard methodology (22.5%).

Security Id	Parent Weight	Std 25/50 Weight	Mod 25/50 Weight
01	33.3%	22.5%	22.5%
02	7.4%	7.0%	7.6%
03	5.3%	5.0%	5.5%
04	5.2%	4.5%	5.5%
05	4.2%	3.8%	4.4%
06	3.6%	3.3%	3.8%
07	3.5%	2.7%	3.2%
Other Constituents – Total Weight	37.5%	51.2%	47.5%
Tracking Error:		1.25%	1.20%
2-Way Turnover:		45%	45.6%
Utility: (0.6 * TE + 0.4 * TO)		0.097512	0.098405

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