Standard Error Analysis

Gary Jordan

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Policy 5

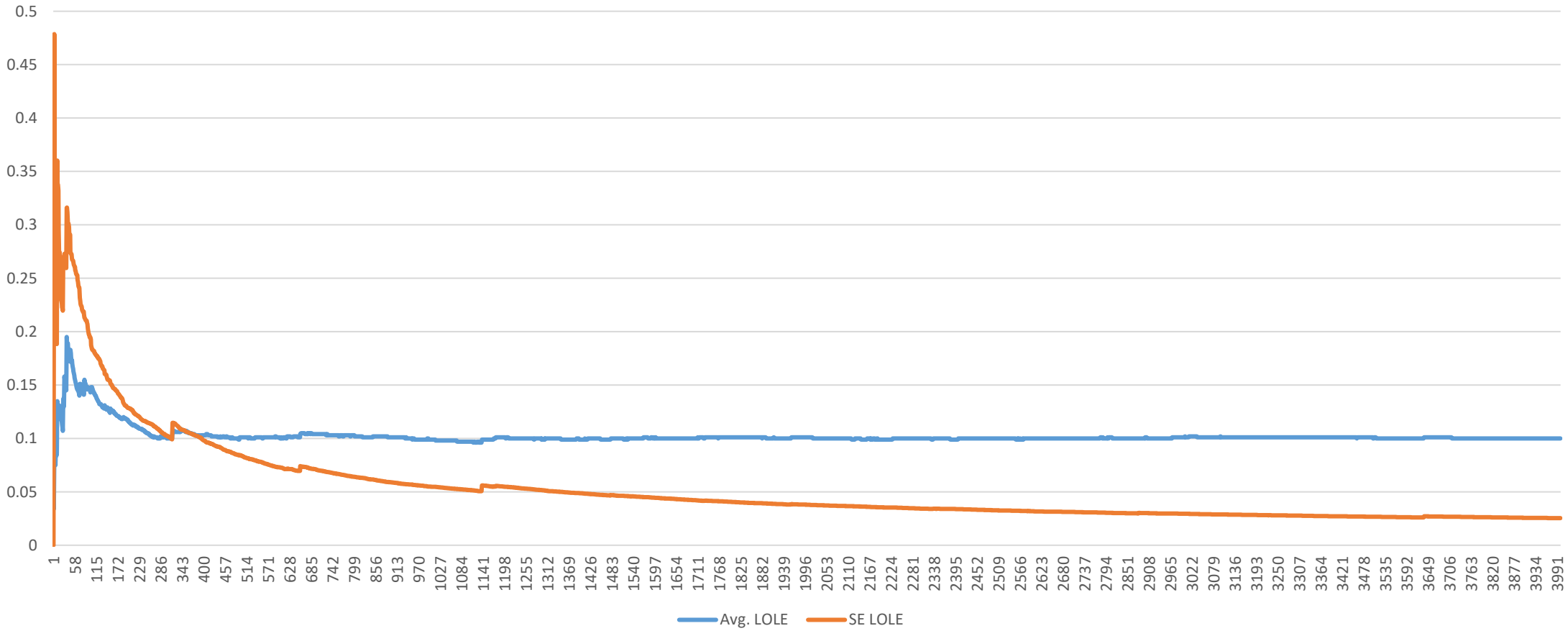
3.8 Standard Error

Another step in assuring a quality result is to determine whether the standard error is acceptable. The MARS model is run for a set number of iterations at increments of 250. Ideally, the standard error value remains less than 0.025 throughout the entire IRM Study. However, to provide a quality result, the ICS has determined that the desired standard error value for the mean Loss of Load Expectation (LOLE) at the 95% confidence level shall be less than or equal to 0.025 at the final iteration at three critical points; a) the beginning of the IRM Study; b) at the conclusion of the Preliminary Base Case prior to the Tan 45 process; and c) at the conclusion of the Final Base Case prior to the Tan 45 process. If the standard error is not met at these critical points, the number of iterations is increased by 250 iterations until the condition is met. The MARS model is then returned to criteria as necessary and the results reported to ICS as part of the parametric analysis of the respective base cases. The Tan 45 process then proceeds as planned for either the preliminary or final Base Case.

Problem Statement

- Some replications may produce results that are much greater than the average. Even though their probability is low, and they have minimal impact on the expected value, they can significantly affect the convergence of the Standard Error.

LOLE and Standard Error

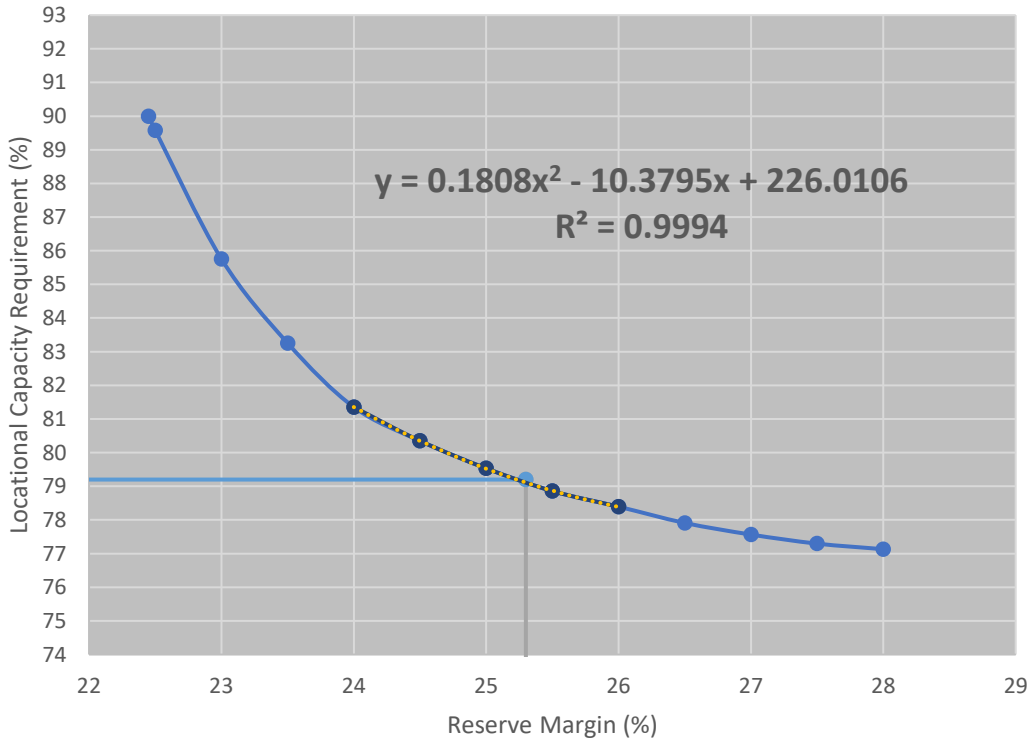


2,3,4K Tan45s - # of replications makes little difference

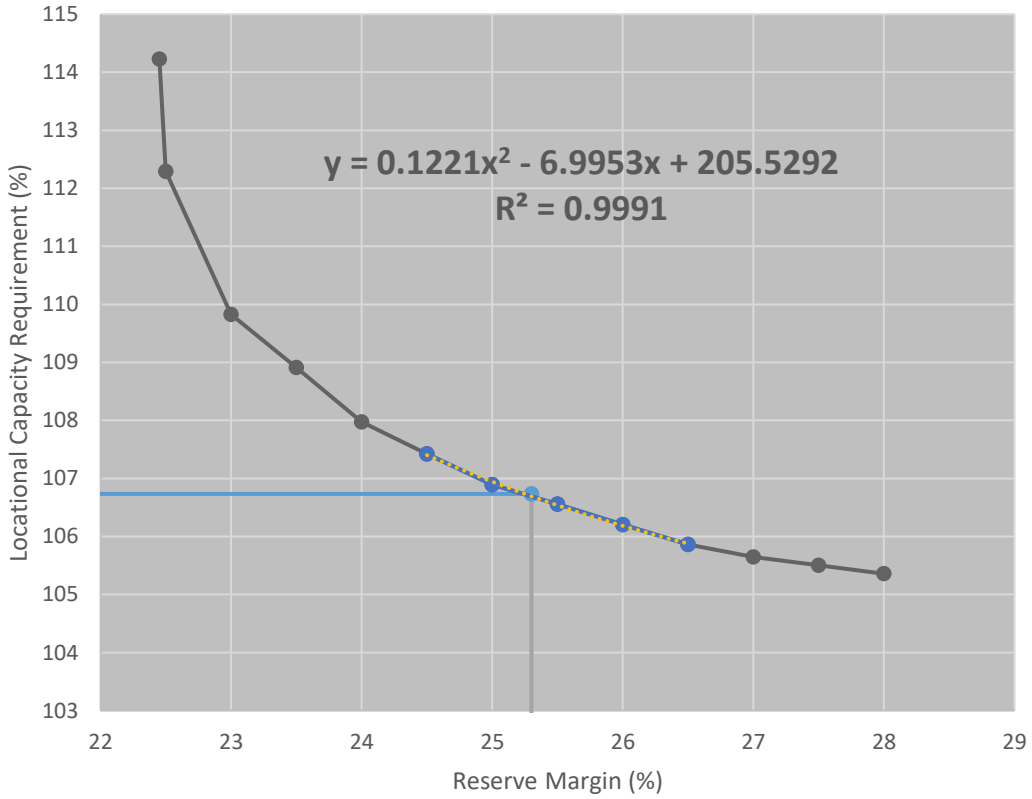
Number of Replications	IRM	J LCR	K LCR	"MARS Standard Error"
2,000	25.636	79.730	107.522	0.0390
3,000* IRM26-27 SS	25.631	79.845	107.502	0.0304
4,000	25.493	79.820	107.570	0.0253
Alignment @3000	24.500	86.400	110.300	0.0211

FBC Tan-45 Results – Note: Most points are below the TSL limits of 86.4 and 110.3

NYC [IRM = 25.3%, J LCR = 79.2%]



LI [IRM = 25.3%, K LCR = 106.7%]



Obstacles to Convergence

Top 3 Largest LOLE by Replication for Special Sensitivity			
Iteration	LOLE	Zone K	All Others
317	2.817	2.744	0.104
656	2.253	2.2324	0.031
1138	3.12	3.107	0.031
All	0.1003	0.0731	0.0634
Top 3 Largest LOLE by Replication for Alignment Case			
Iteration	LOLE	Zone K	All Others
317	1.721	1.636	0.177
656	1.023	1.005	0.037
1138	1.017	0.9918	0.044
All	0.0912	0.0563	0.0717

- The obstacles to convergence are the “outlier” replications that are much greater than the mean. In these two scenarios the three largest replications were due to transmission outages into Zone K where the vast majority of the system risk occurred.

Recommendation

- **In order to keep the number of replications at a reasonable level (~3000) it is recommended that the convergence criteria be reduced to 90%. The impact on the Tan45 results are minimal.**