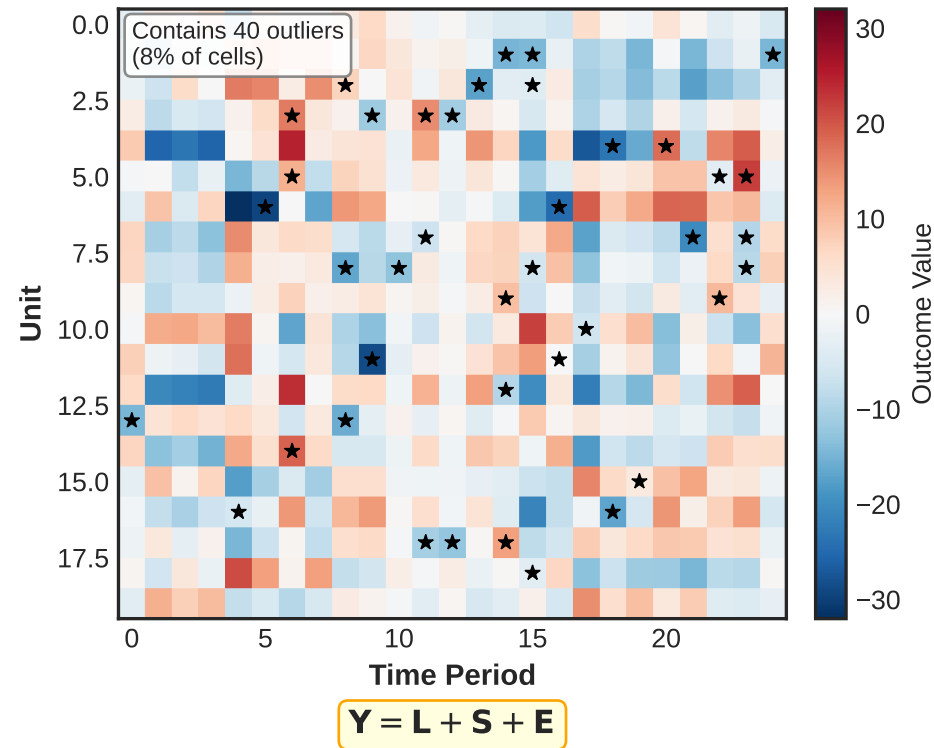
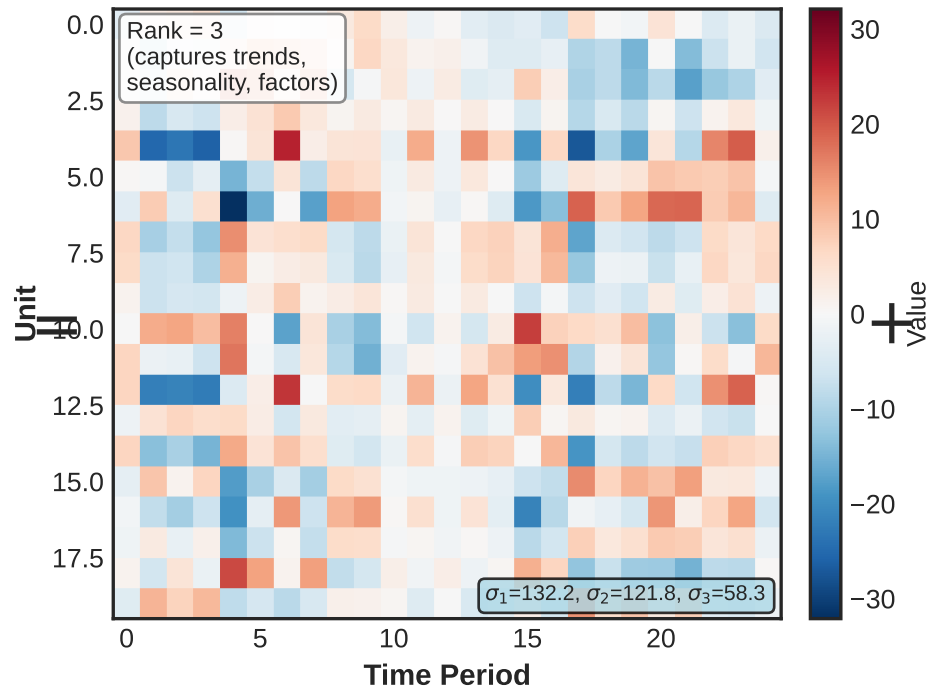


Robust Matrix Completion: Decomposing $Y = L + S + E$

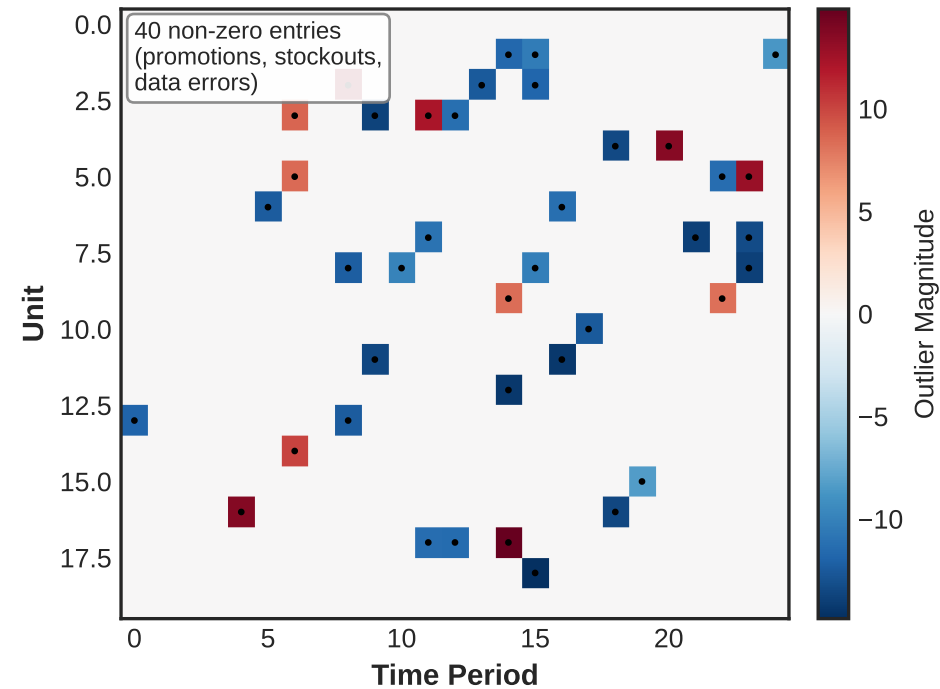
Panel A: Observed Matrix Y
(with outliers marked *)



Panel B: Low-Rank Component L
(smooth systematic structure)



Panel C: Sparse Component S
(outliers/anomalies only)



Panel A: Observed outcome matrix with outliers (*). Panel B: Estimated low-rank component capturing systematic trends and factor structure.
Panel C: Estimated sparse component isolating outliers (promotions, stockouts, anomalies). Counterfactuals use L only; S identifies cells requiring special treatment.