

Using POS to Create an Order Forecast

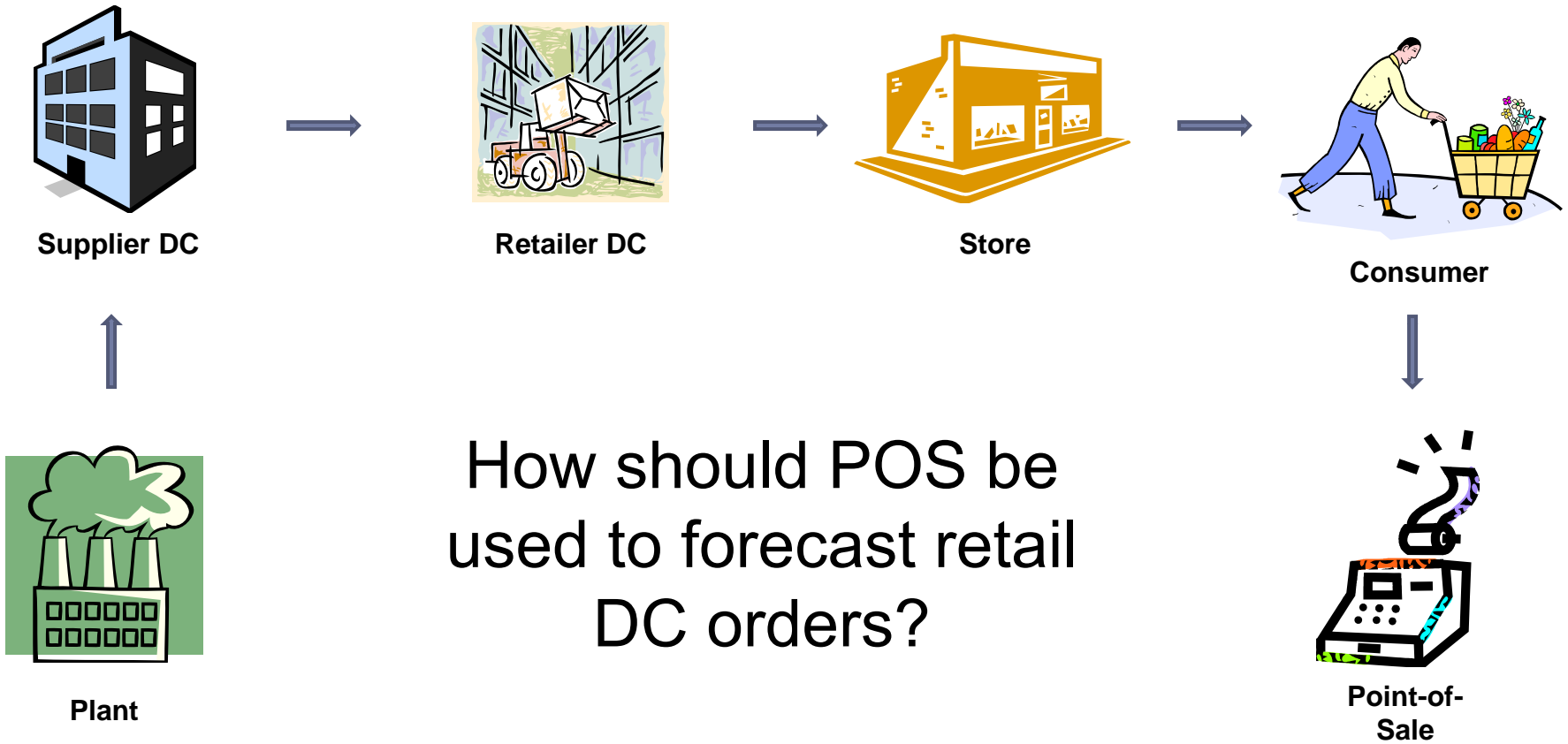
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Agenda

- ▶ Issue
- ▶ OF-Competition
- ▶ Models
- ▶ Preliminary results
- ▶ Questions



Retail supply chain

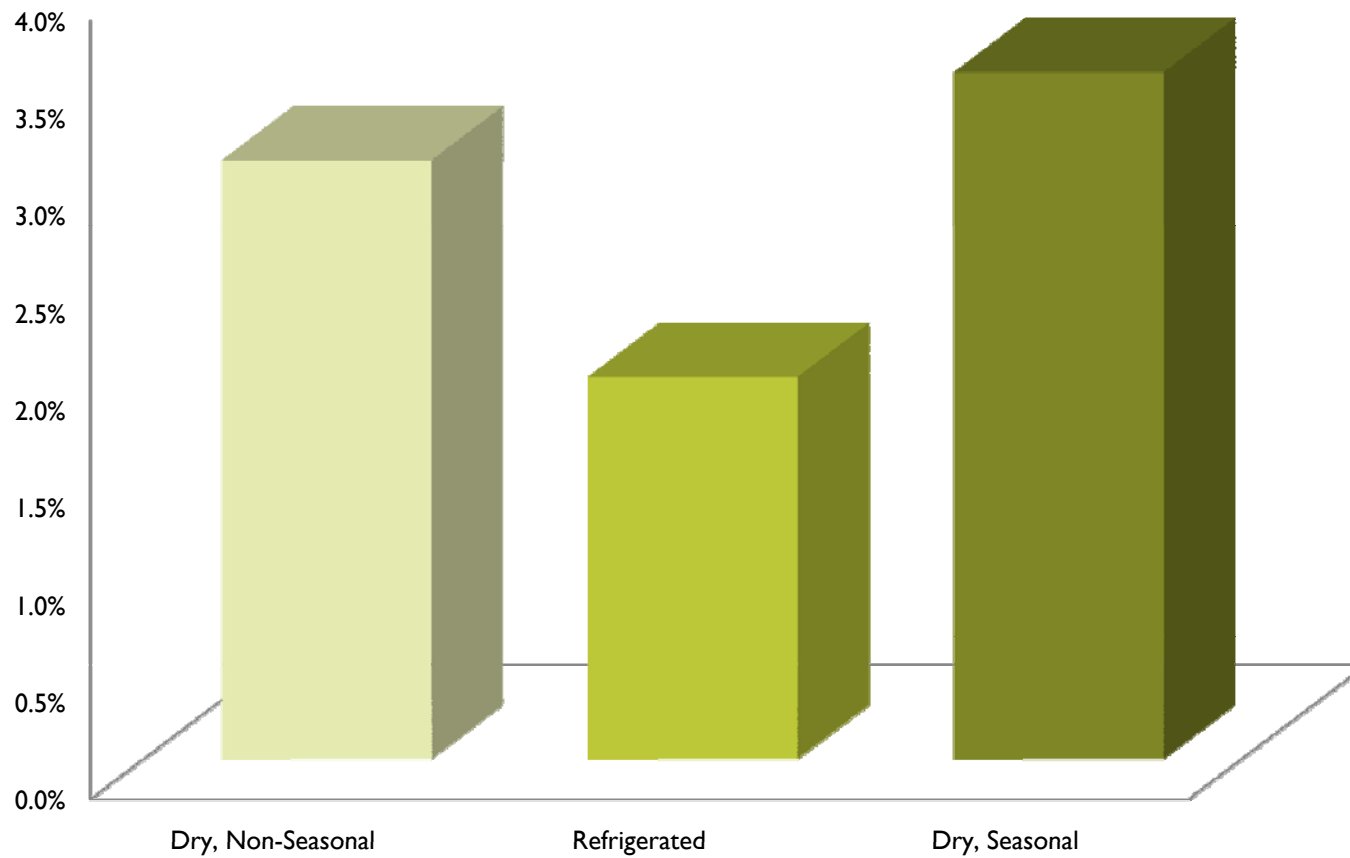


Order forecast competition

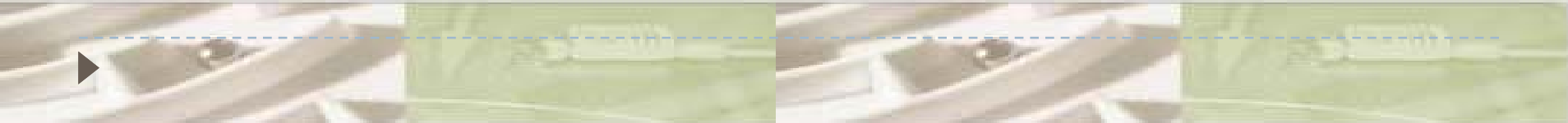
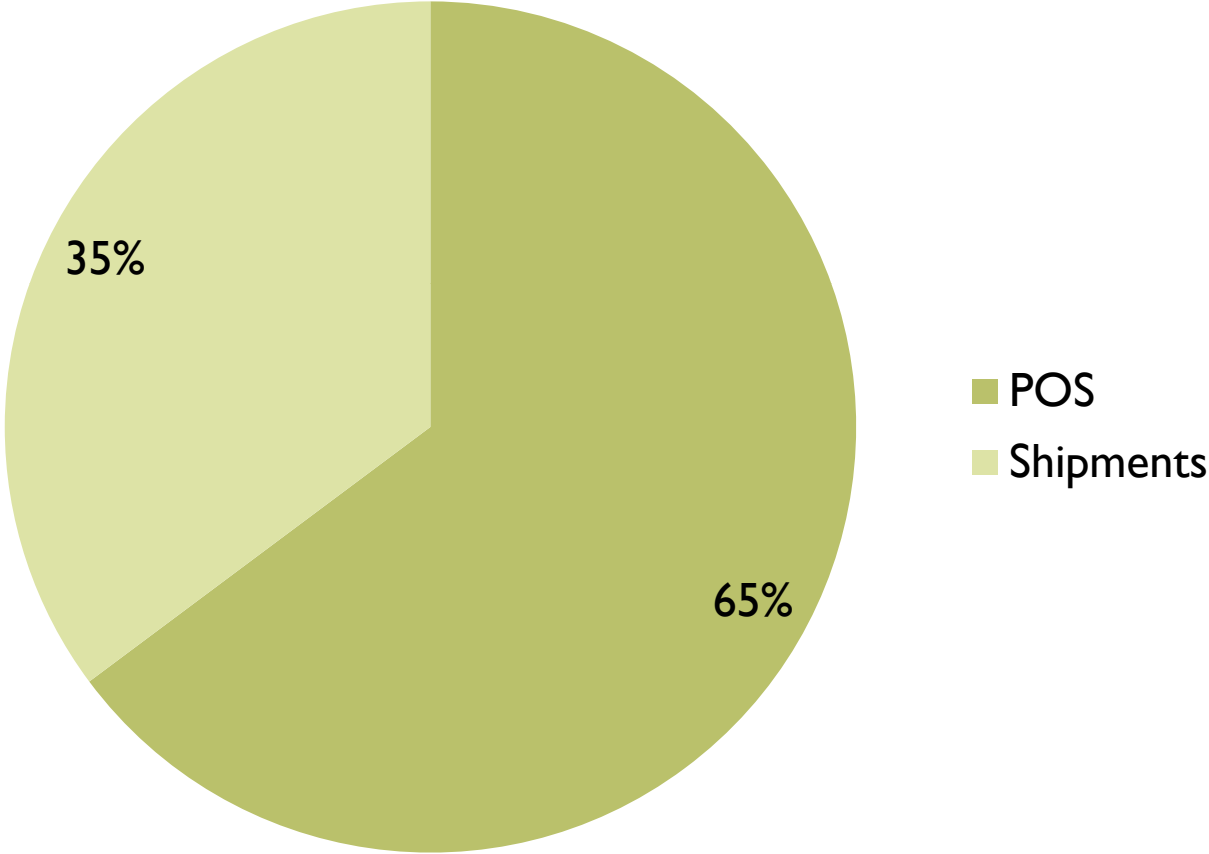
- ▶ Compare POS and shipment history
 - ▶ Categories
 - ▶ Dry, non-seasonal
 - ▶ Dry, seasonal
 - ▶ Refrigerated
 - ▶ Time span
 - ▶ Weekly
 - ▶ Distribution centers (DC)
 - ▶ 18 regional DCs
 - ▶ Mean absolute deviation (MAD)



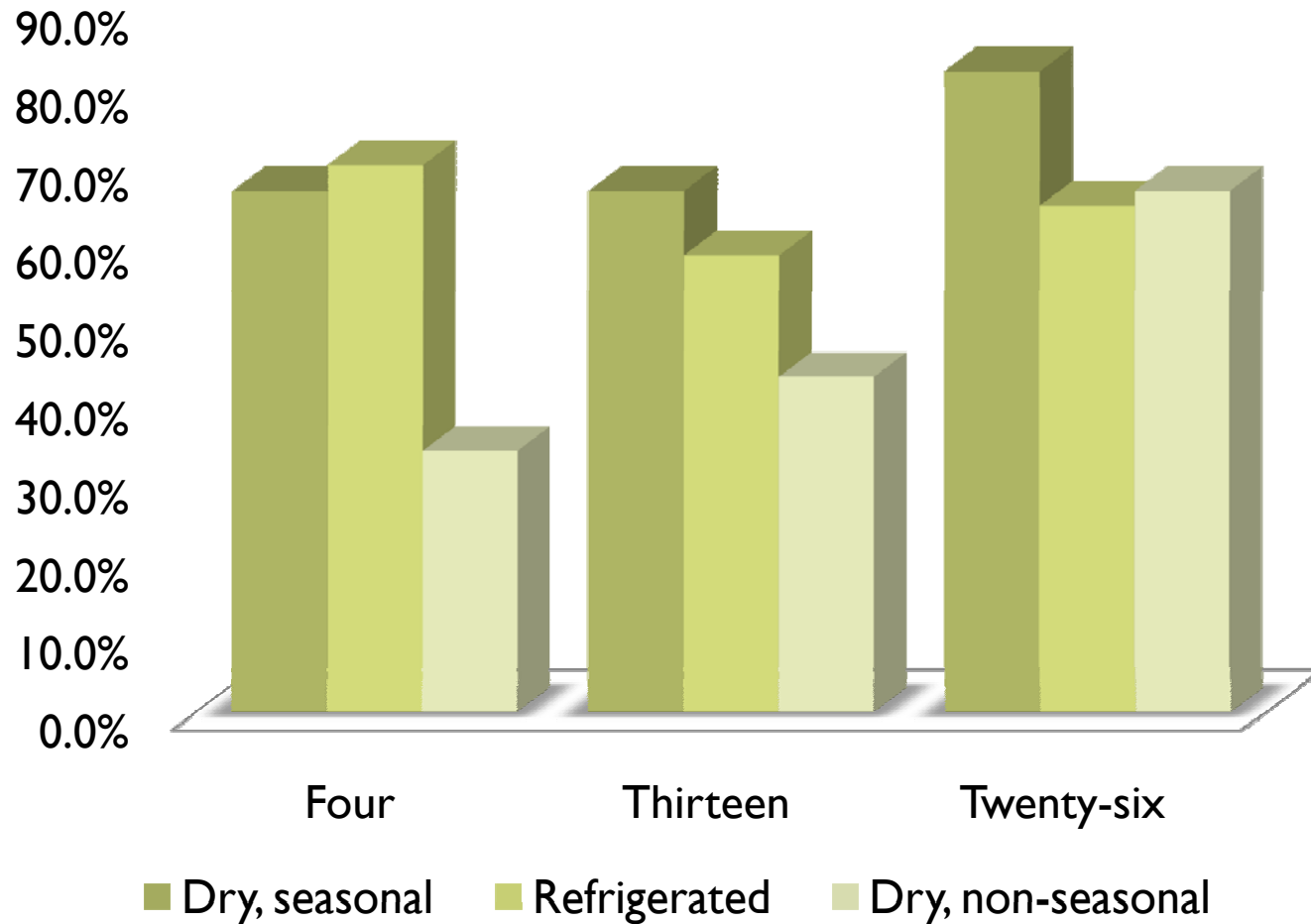
Average POS improvement



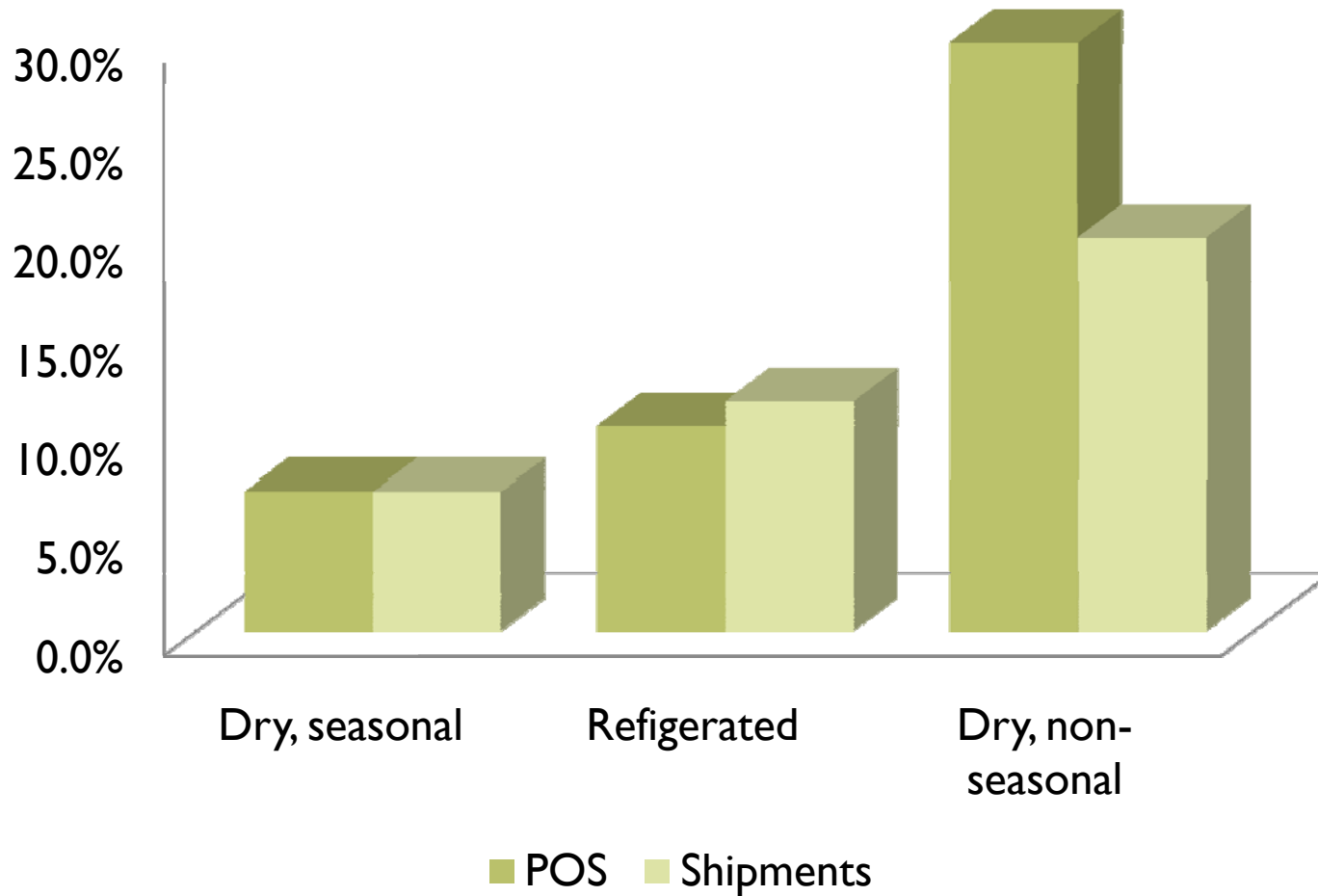
Frequency of POS improvement



Frequency of POS improvement



Average category improvement

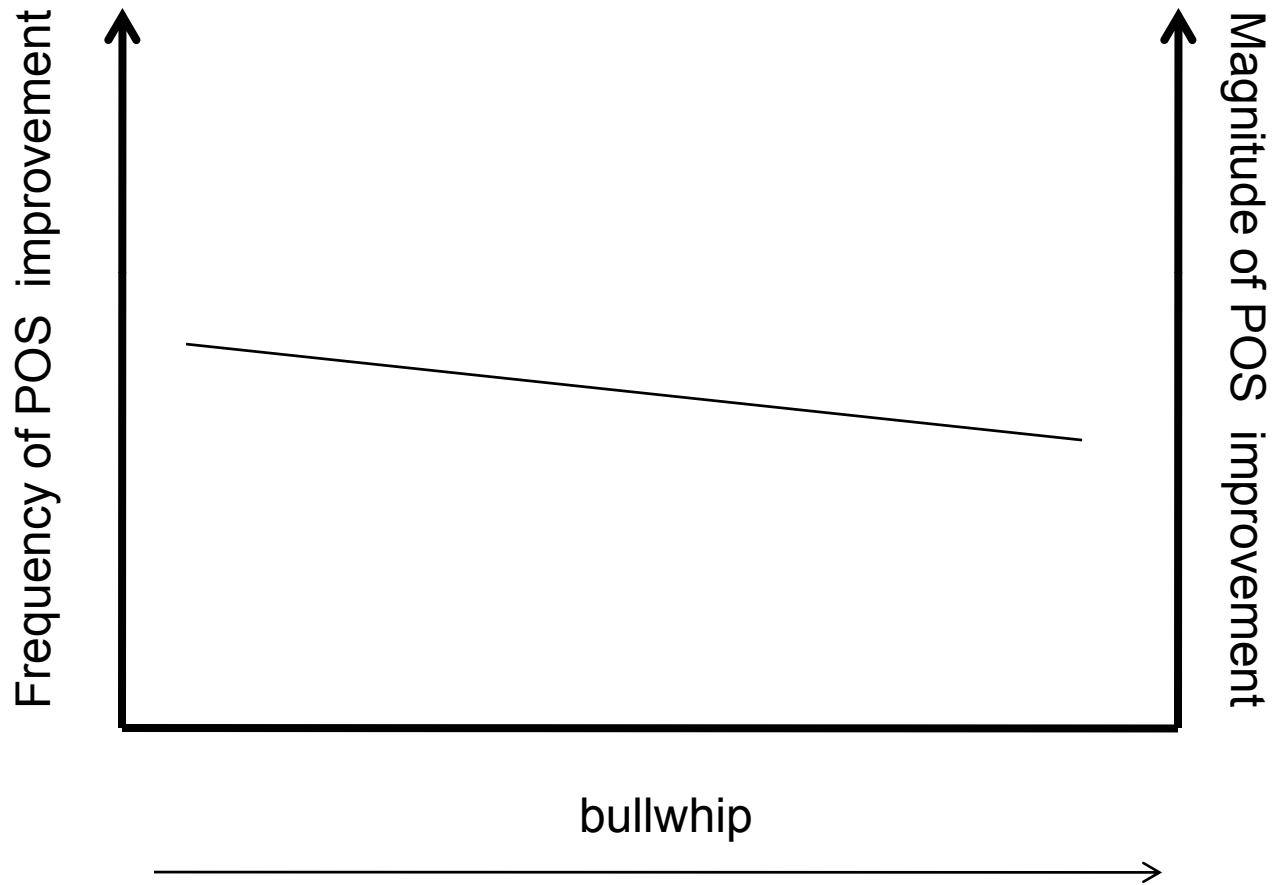


Impacting factors

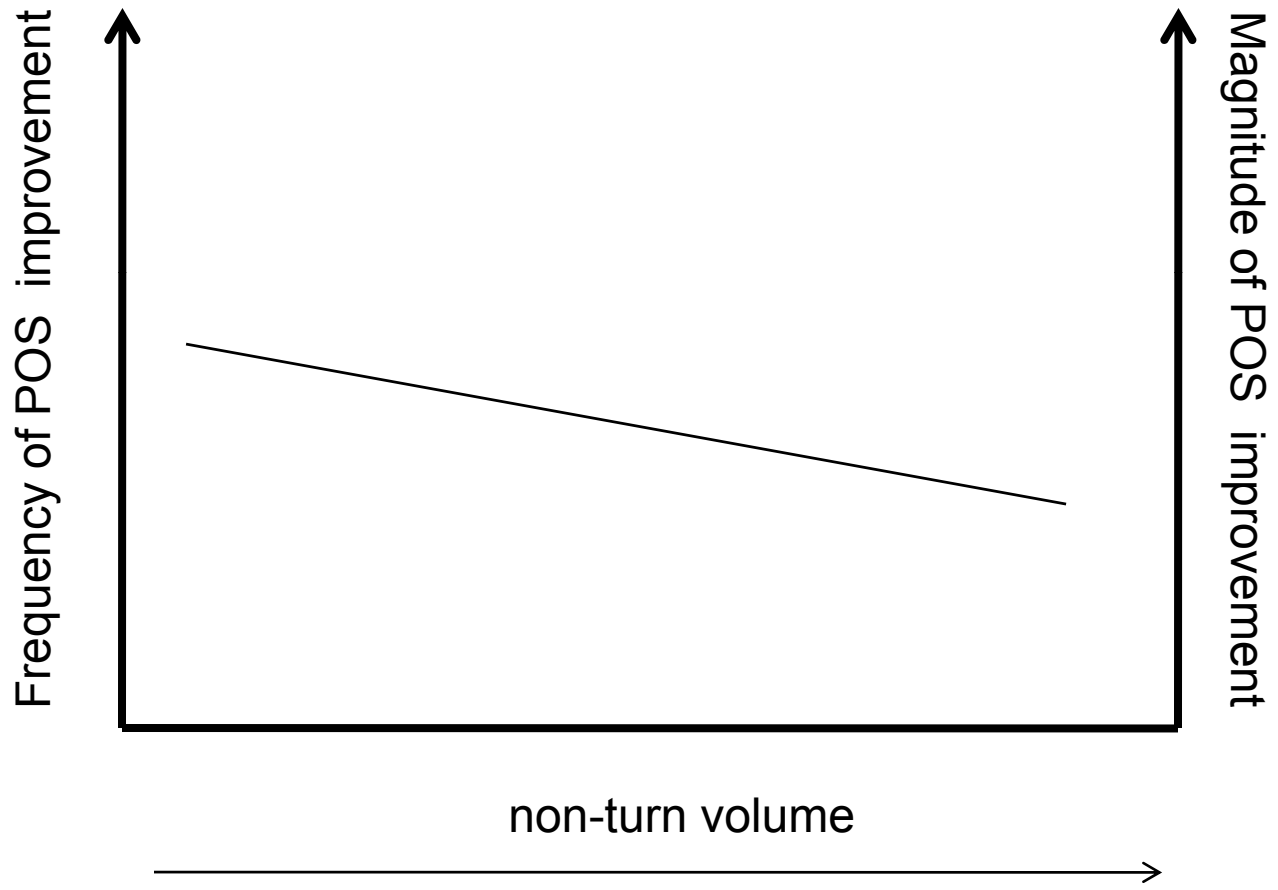
- ▶ Bullwhip
- ▶ % of non-turn volume
- ▶ Rate-of-sale



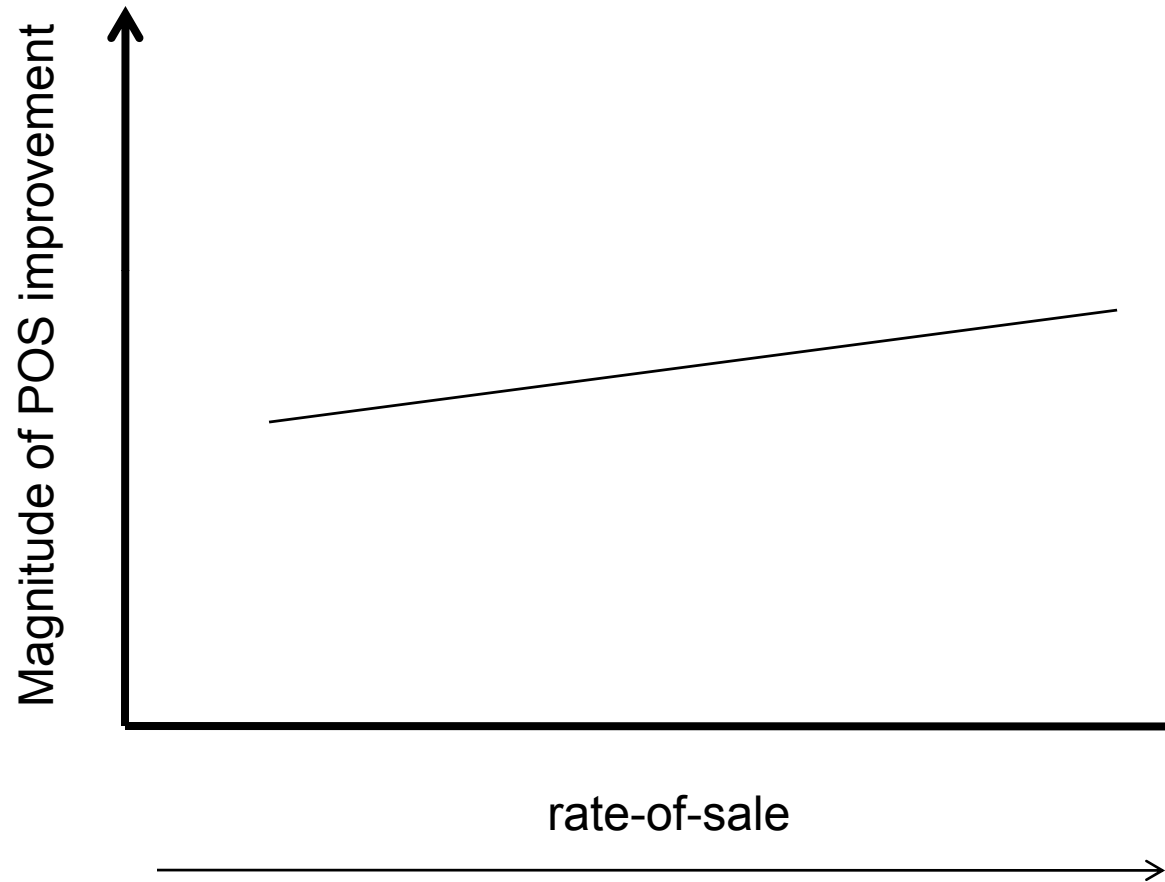
Direct effect of bullwhip



Direct effect of non-turn volume



Direct effect of rate-of-sale



OF-Competition implications

- ▶ Empirical evidence of order forecast accuracy improvement depending on forecast input
- ▶ Frequency and magnitude of benefit may depend on category or SKU specific factors
- ▶ Both inputs contain useful information

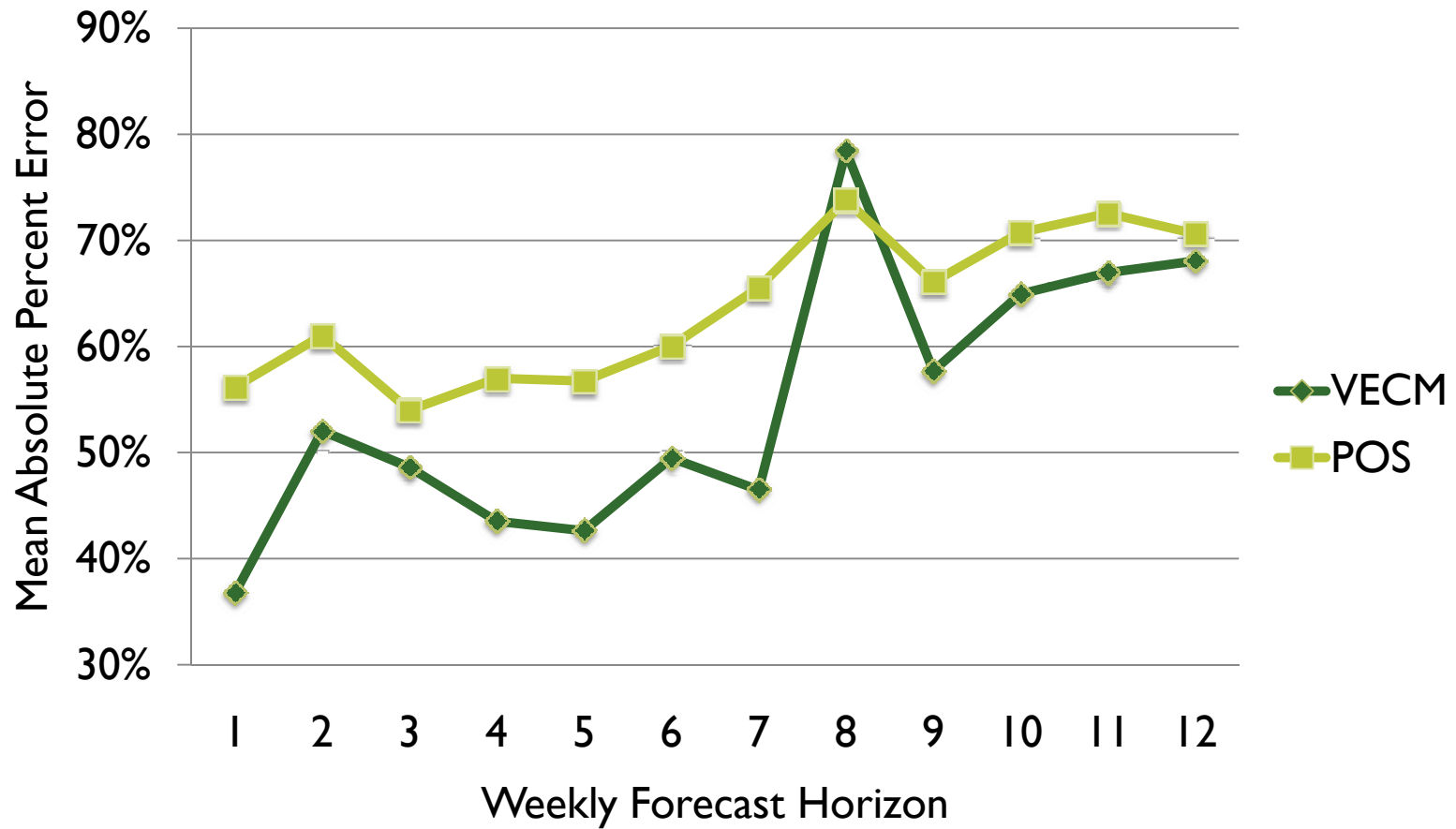


Error correction model

- ▶ Econometric model commonly used in economics and finance
 - ▶ Multivariate model
 - ▶ POS
 - ▶ Shipments
 - ▶ Estimates system's disequilibrium correction
 - ▶ Changes in retail echelon inventory position
 - ▶ Only applicable on non-stationary items



Error correction model results



Combined order forecast model

- ▶ Practical adaptation of econometric model
- ▶ Model inputs
 - ▶ POS
 - ▶ Shipment
 - ▶ Estimates changes in retail echelon inventory position
- ▶ Model input weighting system
 - ▶ Based on 2 years of history
 - ▶ Standard non-linear optimization algorithm



Combined model preliminary results

- ▶ **Dry, non-seasonal**
 - ▶ 10 SKUs
 - ▶ 1 retail DC
 - ▶ Test period: 4 months
- ▶ **Comparison**
 - ▶ Best-fit model based on POS
- ▶ **Average improvement**
 - ▶ 2-week ahead MAPE: 9%



Questions?



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