MIT Supply Chain
MANAGEMENT

MIT GLOBAL
SCALE NETWORK

Pattern Recognition in CPG Data

- **Capstone Advisor: James B. Rice**
- **Capstone Co-Advisor: Sergio cabarello**

- **By: Hanin Aboutaleb**

1. Introduction
2. Data Analysis
3. Observations and Results
4. Limitations and Future Exploration

1 Introduction

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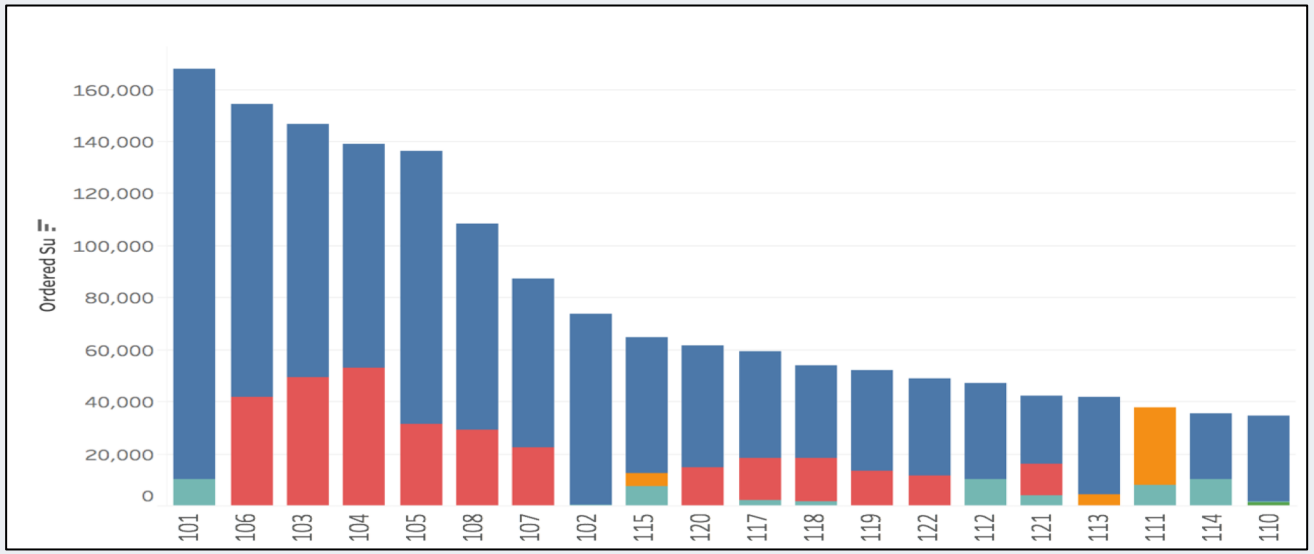
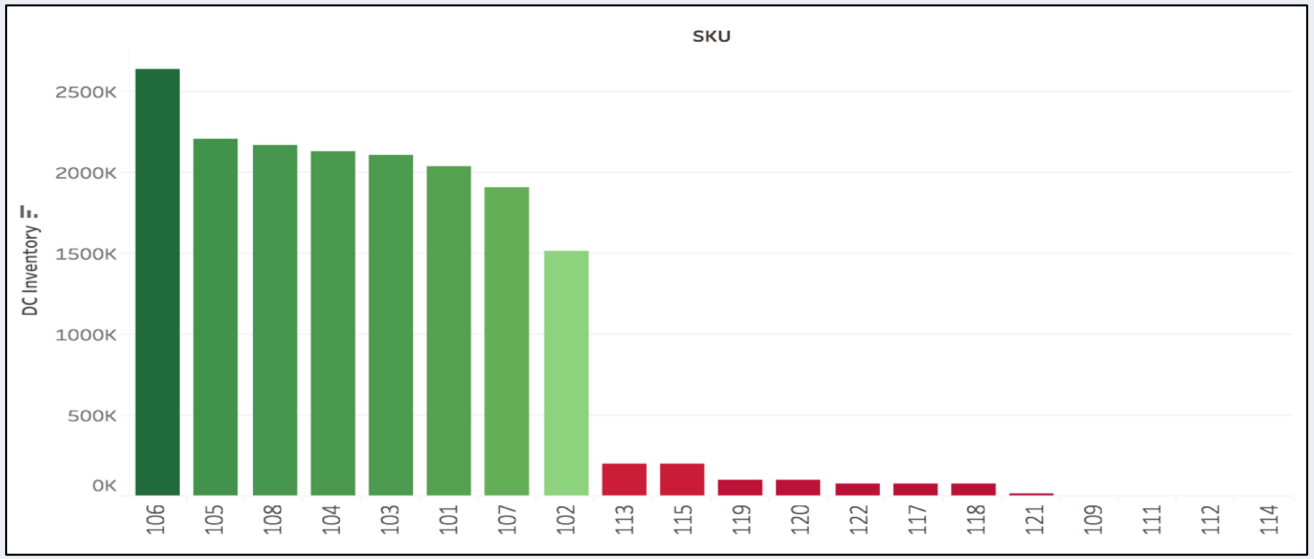
- 20 SKUs= **65%** of ordered volume

#	SKU	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5	Total	Cumulative Weight
1	101	150229			10239		160469	6.9%
2	106	107985		39572	4		147561	13.2%
3	103	92360		46889	70		139319	19.2%
4	104	81833		50705	37		132576	24.9%
5	105	100044		29832	38		129915	30.5%
6	108	75925		27692	4		103621	34.9%
7	107	61252		21479	24		82755	38.5%
8	102	70469			484		70952	41.5%
9	115	49662	4906		7259		61826	44.2%
10	120	44814		13862	149		58825	46.7%
11	117	39123		16154	1948		57225	49.2%
12	118	33582		16037	1715		51334	51.4%
13	119	36638		12712	155		49505	53.5%
14	122	35471		11144	94		46709	55.5%
15	112	35326			9746		45072	57.5%
16	121	24967		11861	3626		40454	59.2%
17	113	35667	4316		98		40081	60.9%
18	111		27936		7713		35649	62.5%
19	114	24037			9763		33800	63.9%
20	110	31716			7	1630	33354	65.3%
21	109	7226		25051			32278	66.7%
22	123		25135		7083		32218	68.1%
23	116	28360			3440		31800	69.5%

5 Replenishment Streams:

- Base Demand
- Unplanned Activity
- Initiatives
- Promotions
- Phase Out





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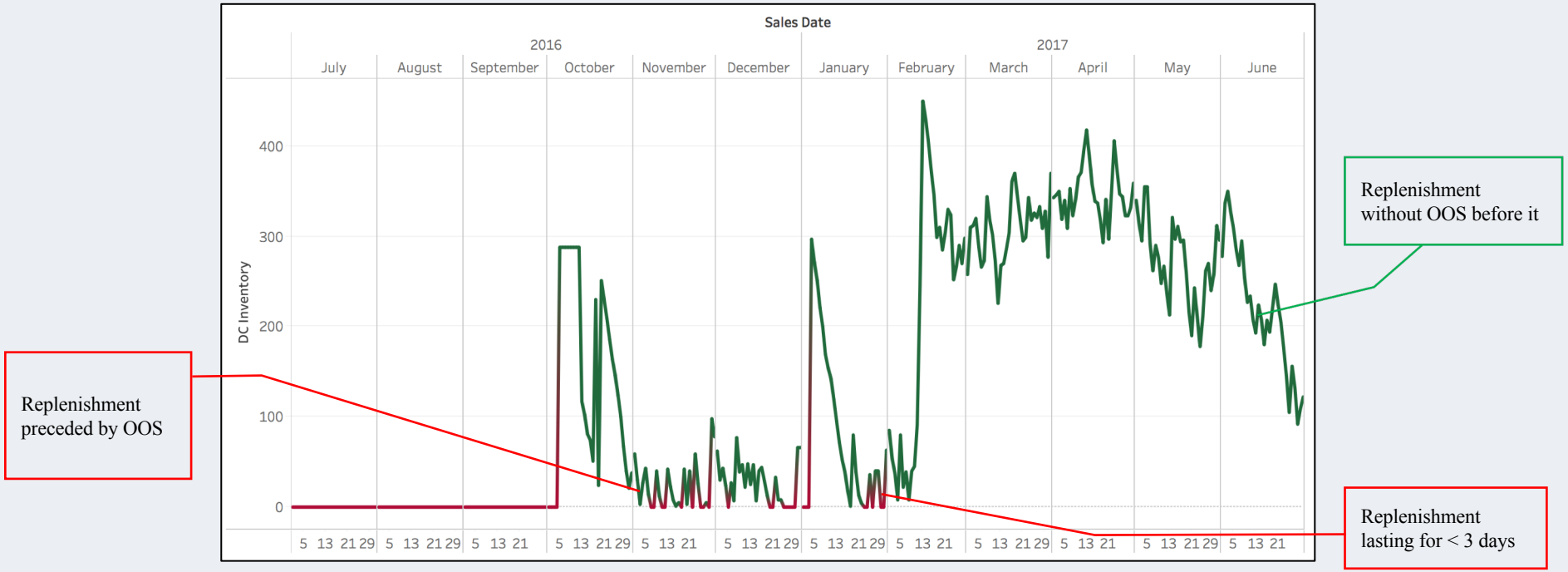
- Same SKU
- Different DCs

- Pattern 1: Replenishment Preceded by OOS
- Pattern 2: Short-lasting Replenishment

$$Frequency\ (\%) = \frac{\#\ of\ events}{Total\ \#\ of\ replenishments}$$



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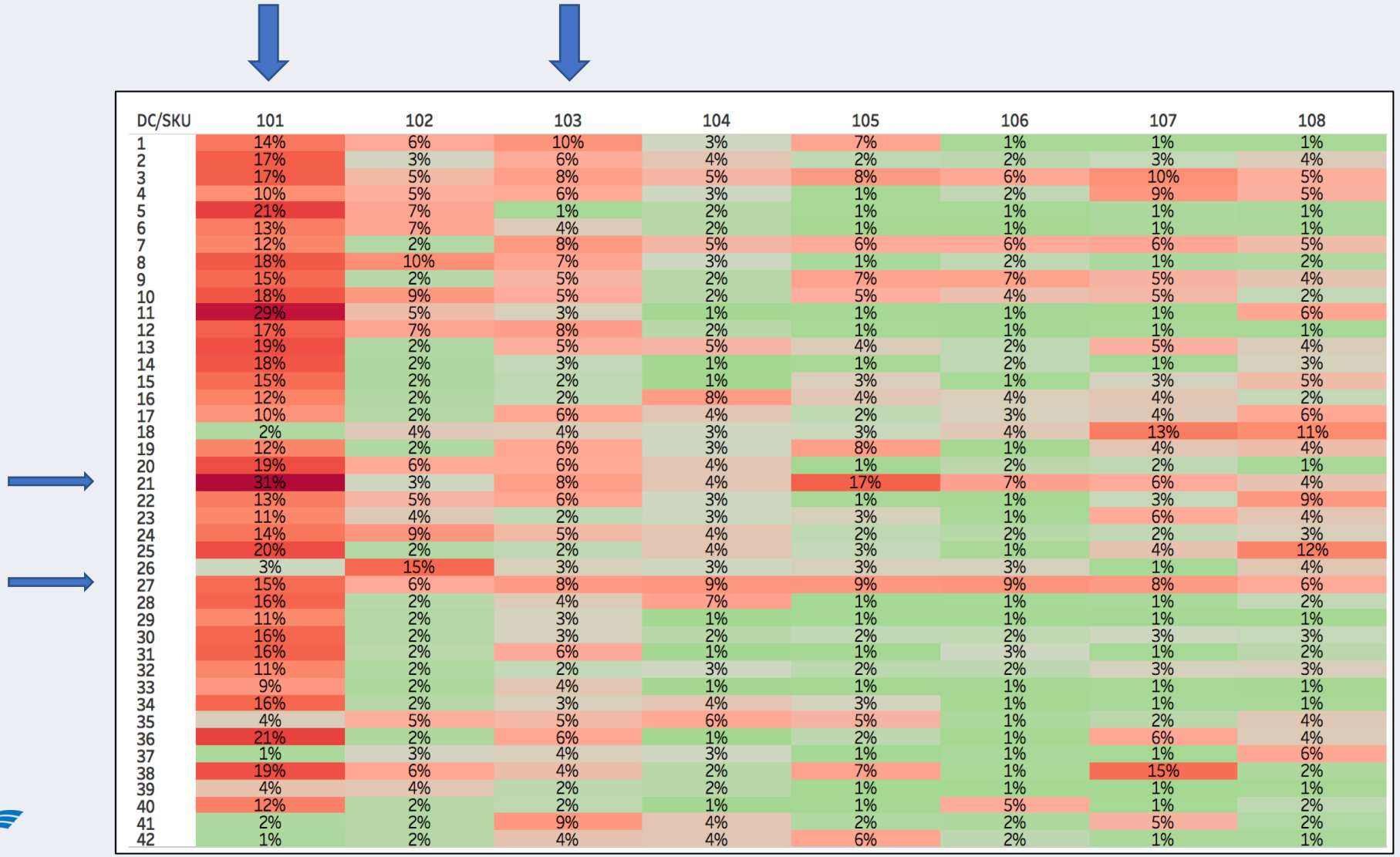
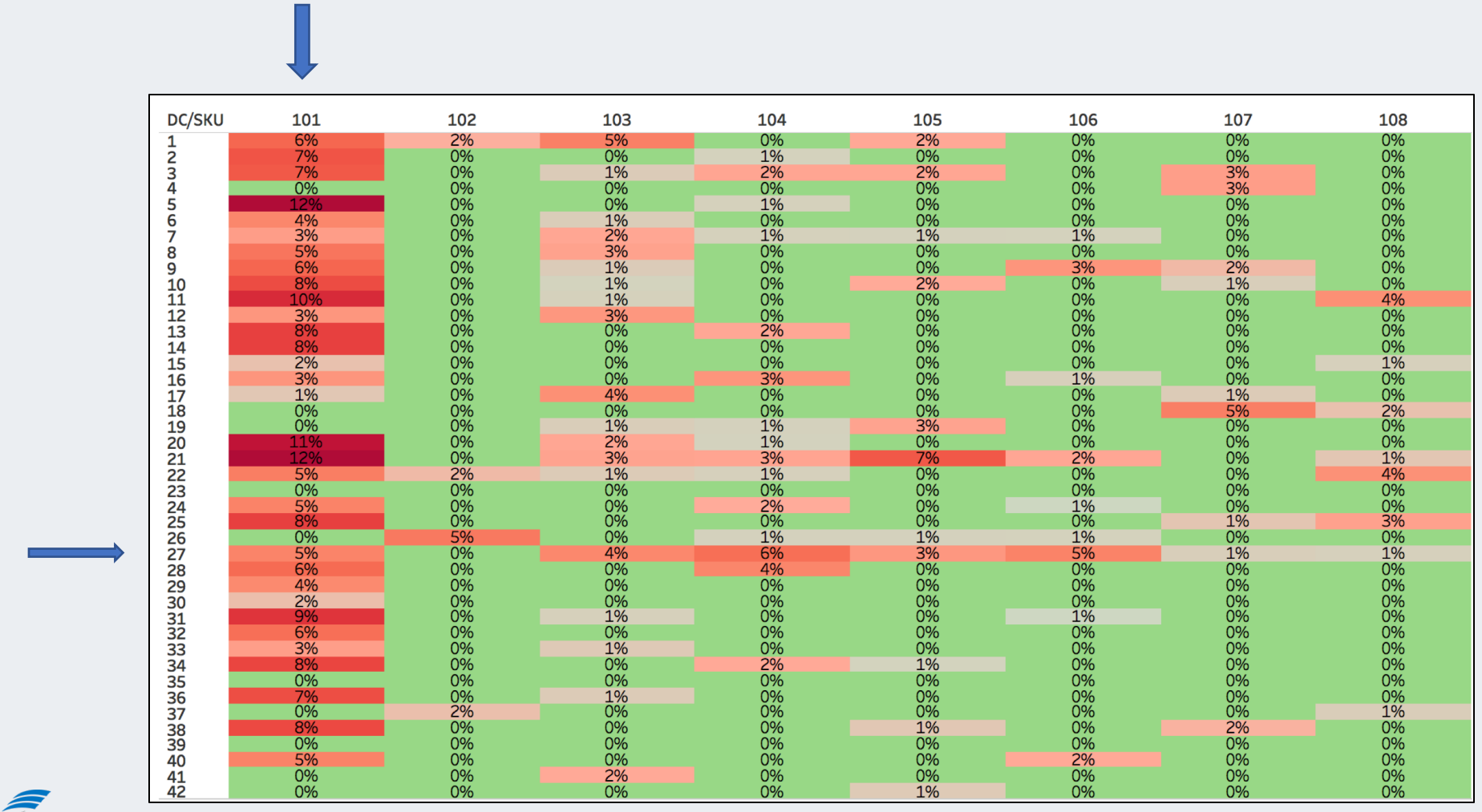
Pattern 1: Replenishment Preceded by OOS



DC/SKU	101	102	103	104	105	106	107	108
1	14%	6%	10%	3%	7%	1%	1%	1%
2	17%	3%	6%	4%	2%	2%	3%	4%
3	17%	5%	8%	5%	8%	6%	10%	5%
4	10%	5%	6%	3%	1%	2%	9%	5%
5	21%	7%	1%	2%	1%	1%	1%	1%
6	13%	7%	4%	2%	1%	1%	1%	1%
7	12%	2%	8%	5%	6%	6%	6%	5%
8	18%	10%	7%	3%	1%	2%	1%	2%
9	15%	2%	5%	2%	7%	7%	5%	4%
10	18%	9%	5%	2%	5%	4%	5%	2%
11	29%	5%	3%	1%	1%	1%	1%	6%
12	17%	7%	8%	2%	1%	1%	1%	1%
13	19%	2%	5%	5%	4%	2%	5%	4%
14	18%	2%	3%	1%	1%	2%	1%	3%
15	15%	2%	2%	1%	3%	1%	3%	5%
16	12%	2%	2%	8%	4%	4%	4%	2%
17	10%	2%	6%	4%	2%	3%	4%	6%
18	2%	4%	4%	3%	3%	4%	13%	11%
19	12%	2%	6%	3%	8%	1%	4%	4%
20	19%	6%	6%	4%	1%	2%	2%	1%
21	31%	3%	8%	4%	17%	7%	6%	4%
22	13%	5%	6%	3%	1%	1%	3%	9%
23	11%	4%	2%	3%	3%	1%	6%	4%
24	14%	9%	5%	4%	2%	2%	2%	3%
25	20%	2%	2%	4%	3%	1%	4%	12%
26	3%	15%	3%	3%	3%	3%	1%	4%
27	15%	6%	8%	9%	9%	9%	8%	6%
28	16%	2%	4%	7%	1%	1%	1%	2%
29	11%	2%	3%	1%	1%	1%	1%	1%
30	16%	2%	3%	2%	2%	2%	3%	3%
31	16%	2%	6%	1%	1%	3%	1%	2%
32	11%	2%	2%	3%	2%	2%	3%	3%
33	9%	2%	4%	1%	1%	1%	1%	1%
34	16%	2%	3%	4%	3%	1%	1%	1%
35	4%	5%	5%	6%	5%	1%	2%	4%
36	21%	2%	6%	1%	2%	1%	6%	4%
37	1%	3%	4%	3%	1%	1%	1%	6%
38	19%	6%	4%	2%	7%	1%	15%	2%
39	4%	4%	2%	2%	1%	1%	1%	1%
40	12%	2%	2%	1%	1%	5%	1%	2%
41	2%	2%	9%	4%	2%	2%	5%	2%
42	1%	2%	4%	4%	6%	2%	1%	1%

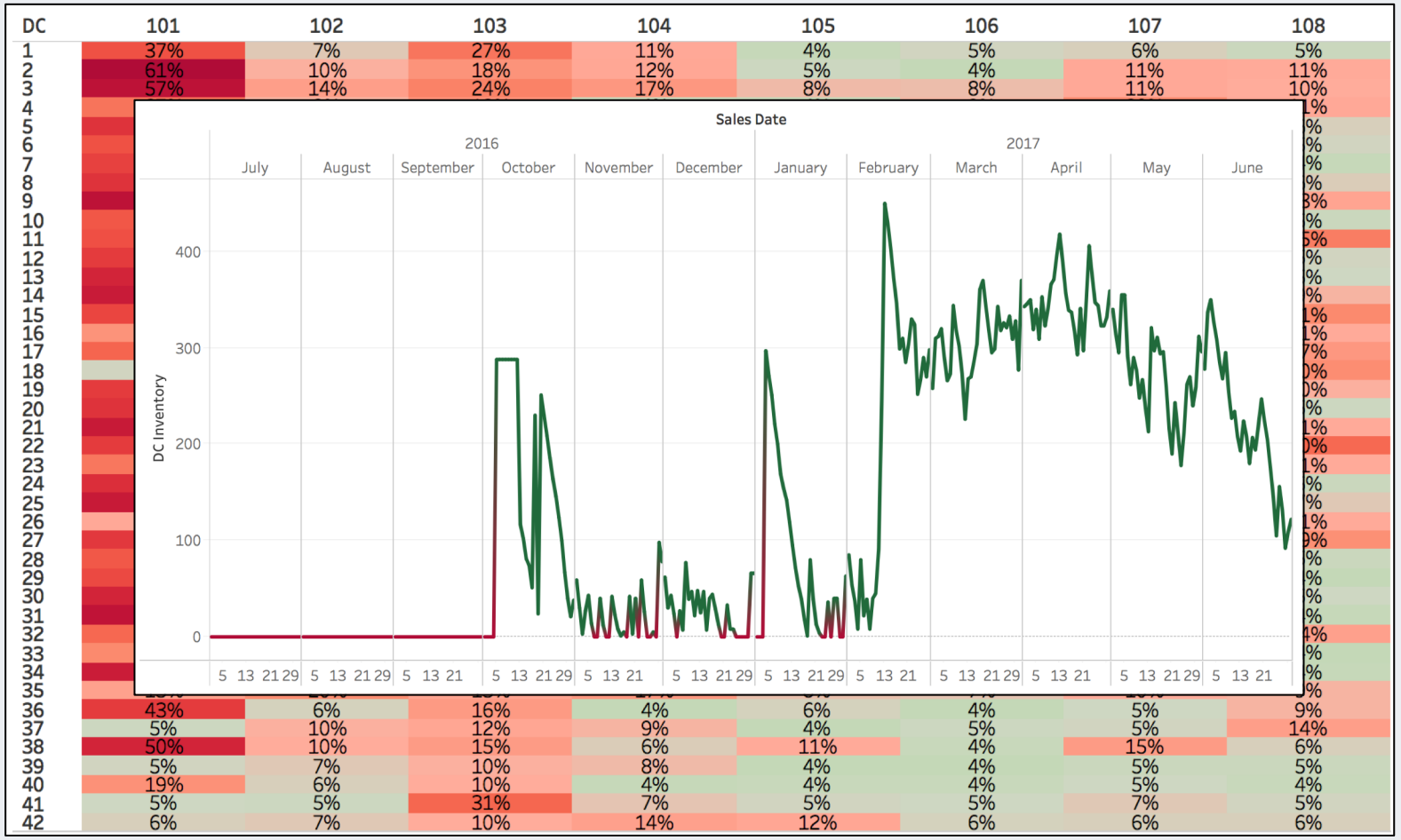
Pattern 2: Short-lasting Replenishment



DC/SKU	101	102	103	104	105	106	107	108
1	6%	2%	5%	0%	2%	0%	0%	0%
2	7%	0%	0%	1%	0%	0%	0%	0%
3	7%	0%	1%	2%	2%	0%	3%	0%
4	0%	0%	0%	0%	0%	0%	3%	0%
5	12%	0%	0%	1%	0%	0%	0%	0%
6	4%	0%	1%	0%	0%	0%	0%	0%
7	3%	0%	2%	1%	1%	1%	0%	0%
8	5%	0%	3%	0%	0%	0%	0%	0%
9	6%	0%	1%	0%	0%	3%	2%	0%
10	8%	0%	1%	0%	2%	0%	1%	0%
11	10%	0%	1%	0%	0%	0%	0%	4%
12	3%	0%	3%	0%	0%	0%	0%	0%
13	8%	0%	0%	2%	0%	0%	0%	0%
14	8%	0%	0%	0%	0%	0%	0%	0%
15	2%	0%	0%	0%	0%	0%	0%	1%
16	3%	0%	0%	3%	0%	1%	0%	0%
17	1%	0%	4%	0%	0%	0%	1%	0%
18	0%	0%	0%	0%	0%	0%	5%	2%
19	0%	0%	1%	1%	3%	0%	0%	0%
20	11%	0%	2%	1%	0%	0%	0%	0%
21	12%	0%	3%	3%	7%	2%	0%	1%
22	5%	2%	1%	1%	0%	0%	0%	4%
23	0%	0%	0%	0%	0%	0%	0%	0%
24	5%	0%	0%	2%	0%	1%	0%	0%
25	8%	0%	0%	0%	0%	0%	1%	3%
26	0%	5%	0%	1%	1%	1%	0%	0%
27	5%	0%	4%	6%	3%	5%	1%	1%
28	6%	0%	0%	4%	0%	0%	0%	0%
29	4%	0%	0%	0%	0%	0%	0%	0%
30	2%	0%	0%	0%	0%	0%	0%	0%
31	9%	0%	1%	0%	0%	1%	0%	0%
32	6%	0%	0%	0%	0%	0%	0%	0%
33	3%	0%	1%	0%	0%	0%	0%	0%
34	8%	0%	0%	2%	1%	0%	0%	0%
35	0%	0%	0%	0%	0%	0%	0%	0%
36	7%	0%	1%	0%	0%	0%	0%	0%
37	0%	2%	0%	0%	0%	0%	0%	1%
38	8%	0%	0%	0%	1%	0%	2%	0%
39	0%	0%	0%	0%	0%	0%	0%	0%
40	5%	0%	0%	0%	0%	2%	0%	0%
41	0%	0%	2%	0%	0%	0%	0%	0%
42	0%	0%	0%	0%	1%	0%	0%	0%

Pattern 1: Replenishment Preceded by OOS

First Three Months



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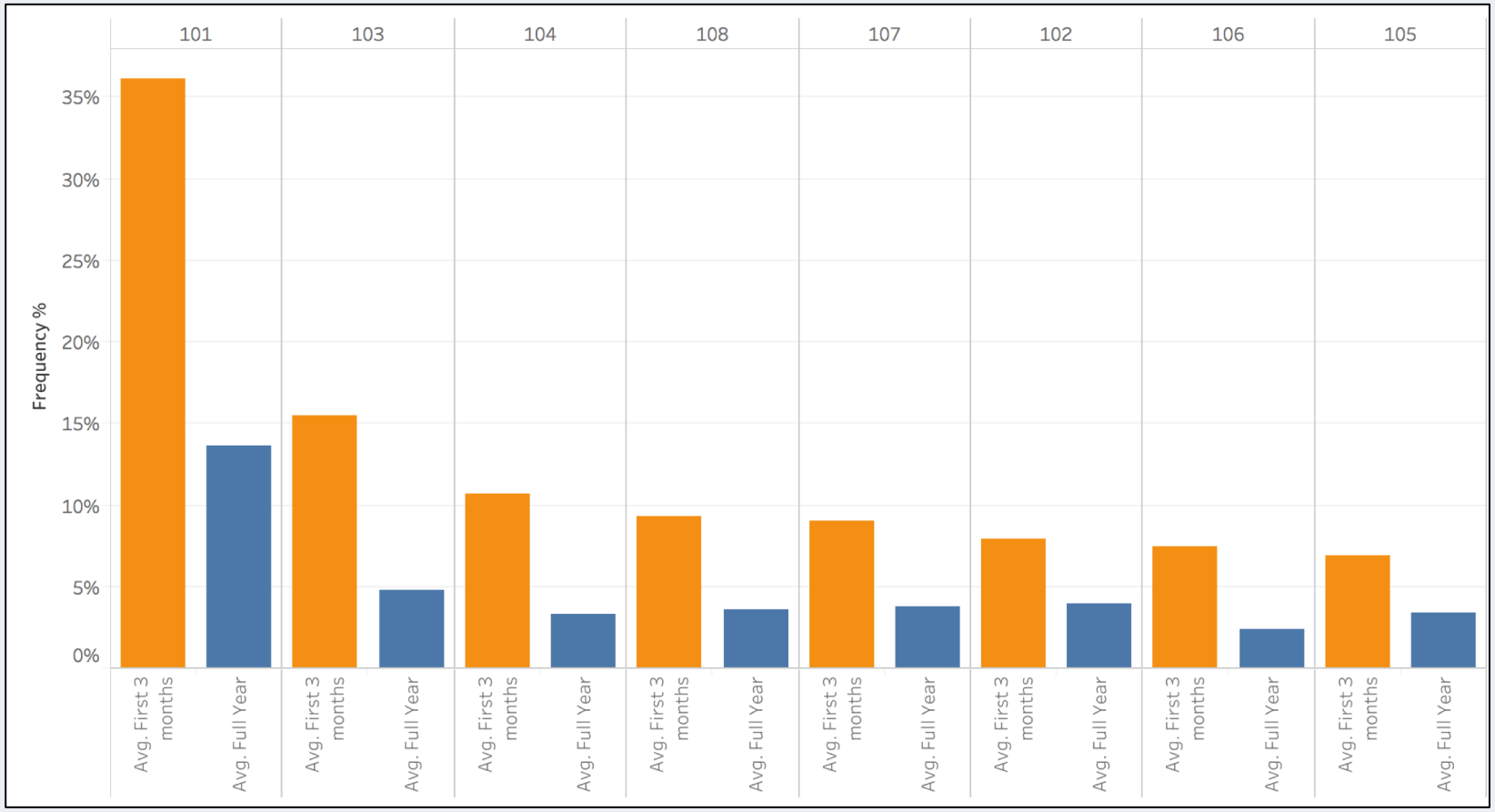
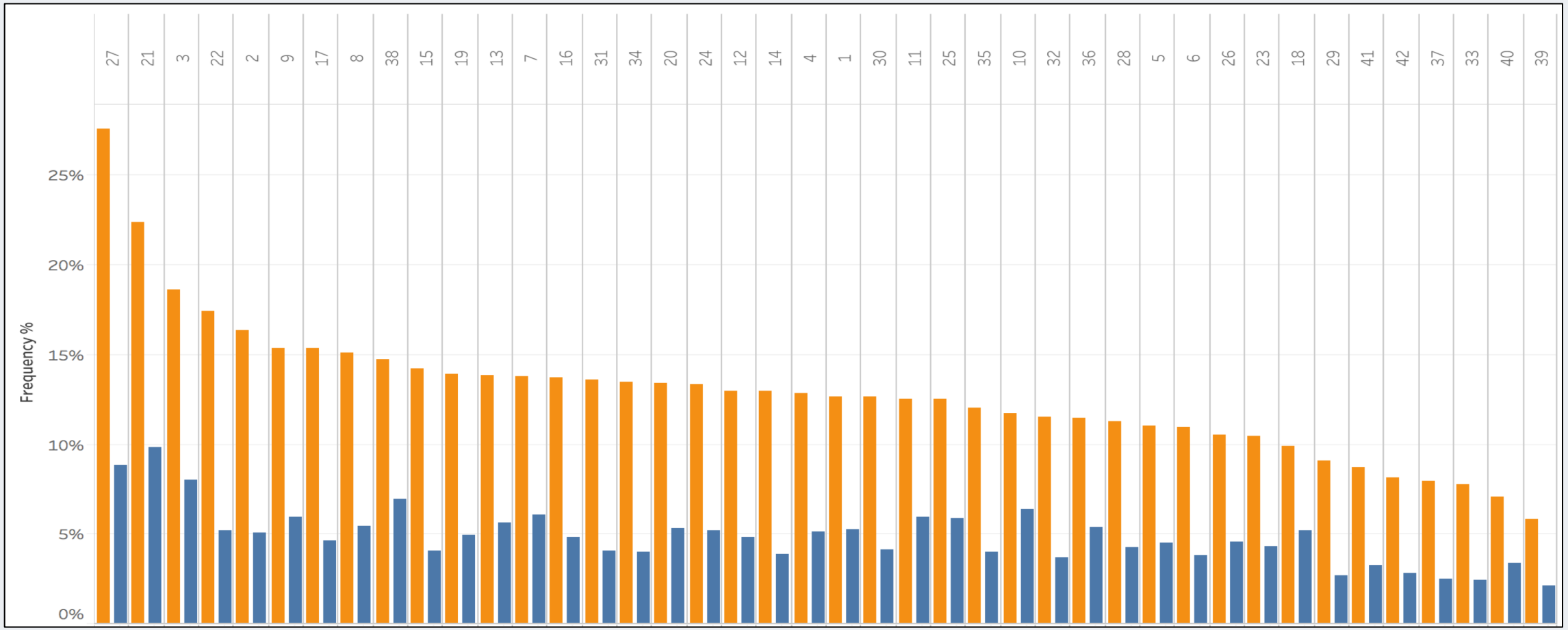
- First 3 month VS. Full-year average by SKU



- First 3 month VS. Full-year average by DC



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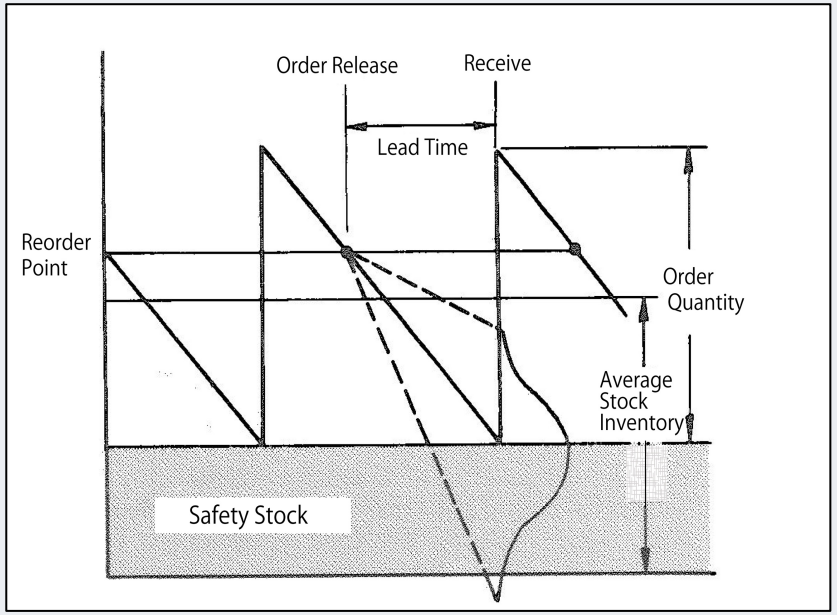
- Microsoft Excel, MySQL, Tableau VS. **Python**
- Baby Product vs. **Other SKUs**
- Use **heat-maps** and histograms
- Look into **drivers of replenishment** that would lead to OOS
  - Lead times, Safety stock, Reorder quantity
- Quantify **how much an OOS** at the DC is **worth**



https://www.asprova.jp/mrp/glossary/en/cat249/post-622.html

- What? Frequent OOS → Lack of On-shelf Availability
- Where, When? Specific SKUs, DCs, Time of year
- Why?..

Thank You..
Questions?