

Dealer Hoarding, Sales Push & Seed Returns: On the Interdependency between Incentives and Salesforce Management

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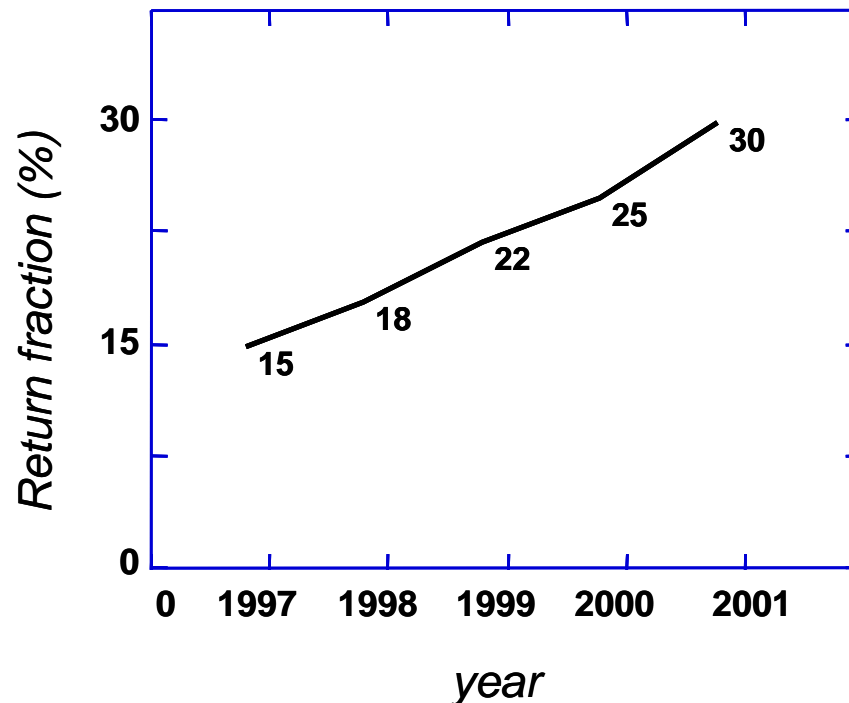
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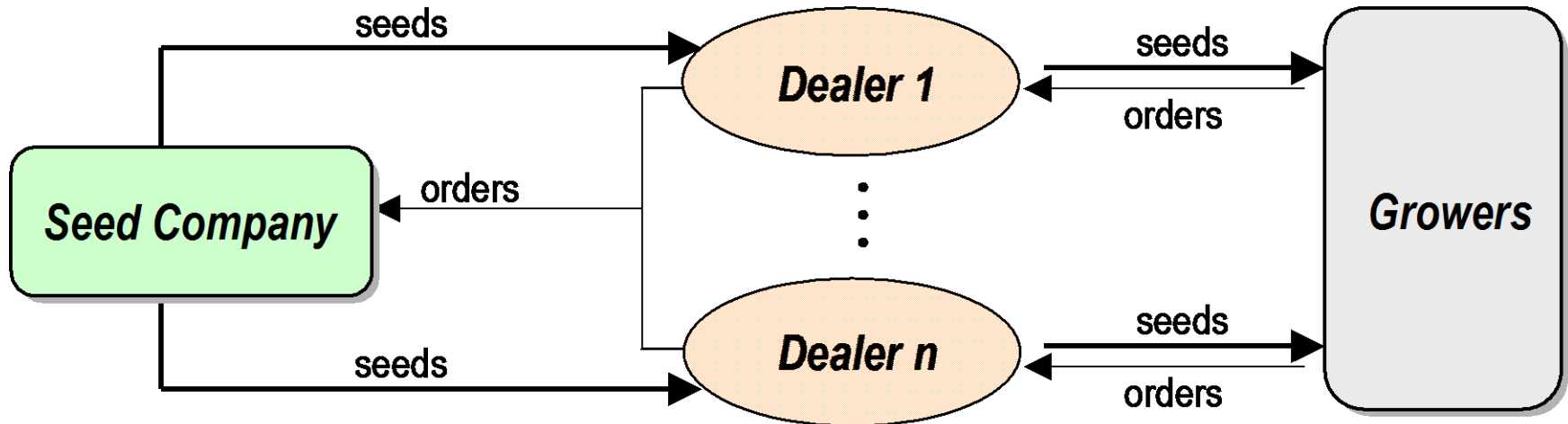


Motivation: High Corn Returns

- Leading provider of genetically modified seeds facing a rapid increase in corn returns:
 - 30% of all seeds sold returned (twice industry average)
 - Sizable costs impacting the bottom line: 15% of NI



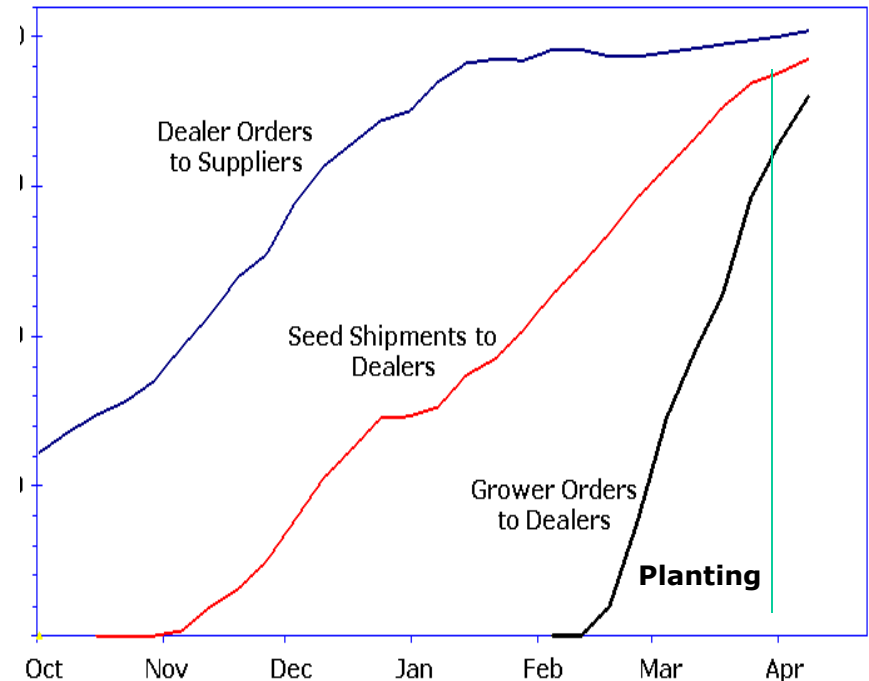
Supply Chain Structure & Challenges



- Supply side:
 - Seeds produced and sold only once a year
 - Long product development and production delays
 - Short and unpredictable product lifecycles/rapid turnover of SKUs
 - Little visibility of stocks in supply chain
- Demand side:
 - Volatile and unpredictable customer demand
 - Fierce competition for scarce supply

Dealers *Order Early* & *Overorder* to Secure Supply

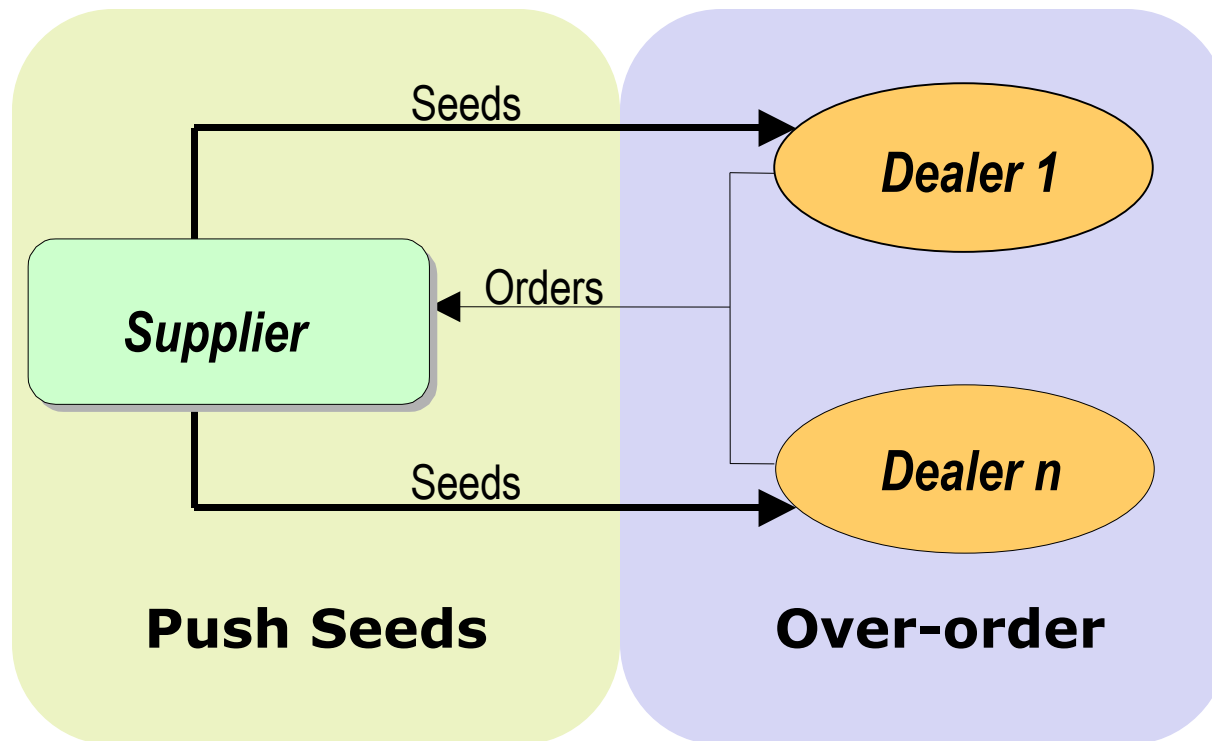
“We base our orders on last year’s sales and typically increase 10 to 20% ... If my sales rep would tell me that a certain variety is on short supply, I would order as much as I could, or as much as he would allow.”



...and Pressured Salespeople *Push* Sales

“We start out really trying to load toward true grower demand. Everybody makes an honest effort of **positioning** seeds. But when it gets down to crunch time and teams are looking that they need another 10 thousand units to move up a notch on their bonuses you finally break down and you get to a point where you are just shipping [**pushing** seeds] what you can get, where you can get it, and when you can get it.”

Locus of Channel Problems



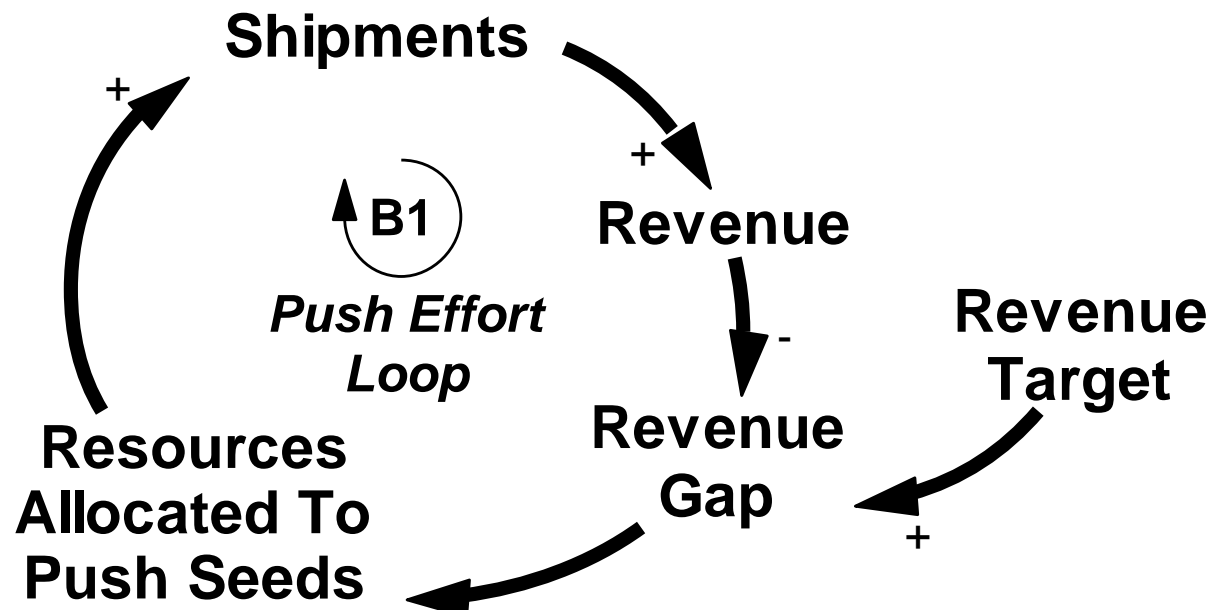
Vicious Circles of Sales Returns

- “When it gets down to crunch time, [we face] pressure that is coming from above... we need to make the quarterly goals ... but we get ourselves in a vicious circle ... when all of that corn starts coming back, we have a big problem on our hands.”

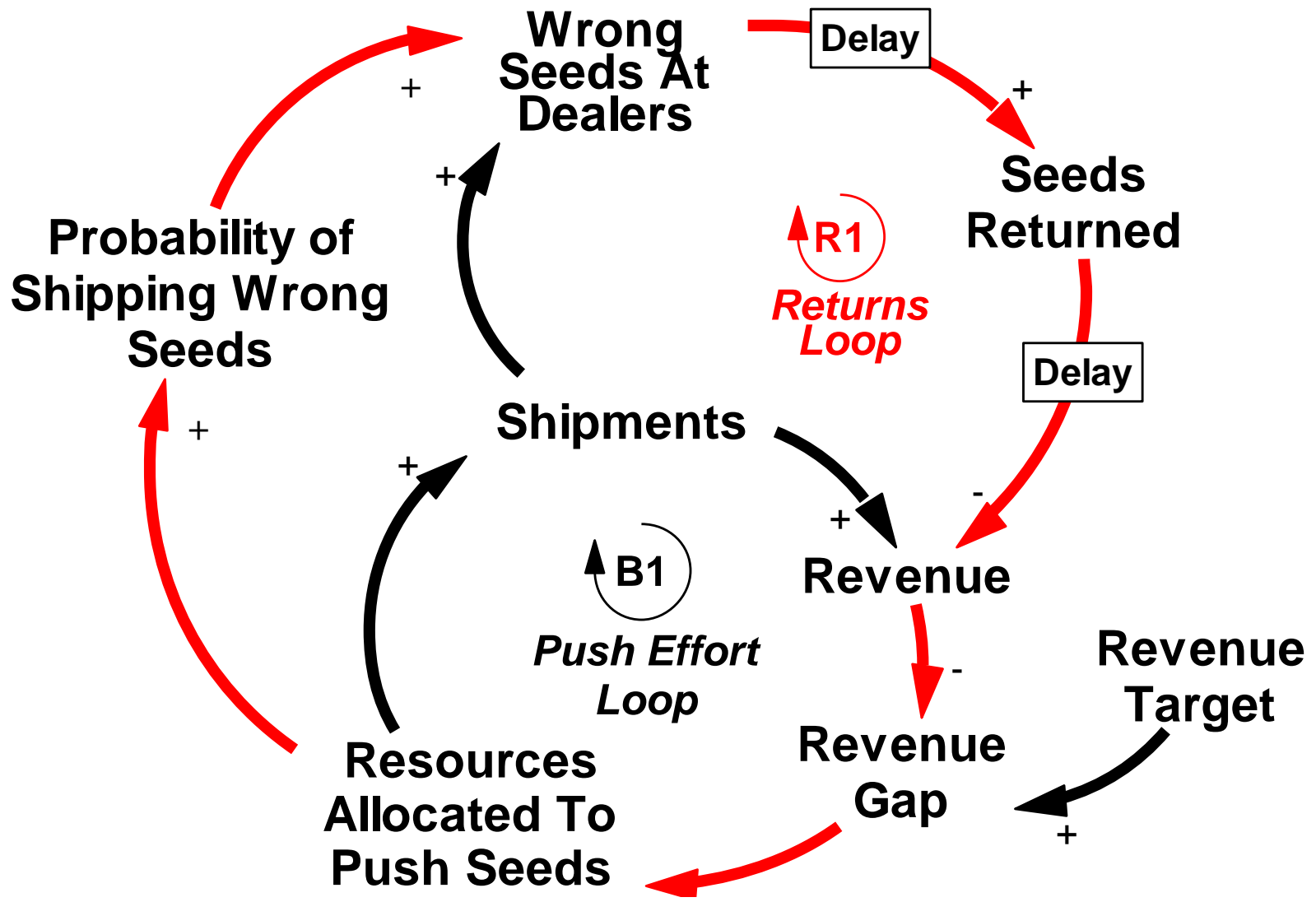
- Sales Manager at Seed Supplier

- Salespeople are compensated on contribution to net income. Returns are discounted from net income but only in following sales season
 - Meeting this year’s sales quotas via returns increases the gap to meet next year’s sales quotas

Actions to Fix Problem: Pushing More Seeds...



... Only Intensifies Problem in Following Period



Managerial Contribution

1. Commonly accepted that incentives for sales performance lead to more sales.
 - However, incentive for working harder key factor causing product returns, through **push** activities
2. Sales environments w/limited resources are highly sensitive to changes in demand
 - Task interdependence and bias toward short-term benefits reinforce initial errors in resource allocation.
 - **Transient** increase in demand can lead to *permanent* deterioration in performance.

Main Arguments: Seed Returns Problem

A1: Excessive orders poorly aligned with demand:

- Poor demand visibility
- **“Typically increase orders by 10 to 20%”**

A2: Task interdependence:

- Scarce sales resources allocated among tasks
- **Decision to allocate more effort to pushing is also a decision to reduce effort to positioning**

A3: Errors in effort allocation are self-reinforcing:

- Initial errors in effort allocation are self-reinforcing, driving the system to low level of performance.
- **“We get ourselves in a vicious circle.”**

Why people may be biased toward pushing seeds?

- People overweight salient and tangible features of their environment
 - **Pushing seeds is more salient and tangible than positioning seeds**
- People are biased toward activities that produce immediate results
 - **The benefits of positioning seeds take longer to realize than the benefits of pushing them**
- People are risk averse and 'ambiguity' averse
 - **Resources allocated to pushing seeds have more certain outcome than resources allocated to positioning them**

Formulation Main Variables

- Dealers Inflated Demand:

“Typically increase orders by 10 to 20%”

- Dealers inflate grower demand (G) to compensate for previous year’s returns ($r(s-1)$).

$$O^*(s) = \frac{G}{(1 - r(s-1))}$$

- Sales effort (salespeople’s hours)

“We start out trying to load true grower demand”

“when [in] crunch time ... you are just shipping what you can get.”

- Salespeople (W) allocate a available hours (H) to position (H_A) & push (H_B) seeds
- Total sales hours available (WH)

$$WH = W(H_A + H_B)$$

Sales Tasks, Return Probability and Pressure

- Positioning rate (A):

- Time-intensive task: Field site visits to dealers/growers
- Gives a good forecast on grower demand before realized
- Leads to **LOW** probability of future returns (P_L)

$$A = \frac{W \cdot H_A}{T_A}$$

- Pushing rate (B):

- Quick task: Calls to dealers to receive early shipments
- Fast increase in revenue contribution, with no forecast
- Leads to **HIGH** probability of future returns ($P_L + P_H$)

$$B = \frac{W \cdot H_B}{T_B}$$

- Probability of returns:

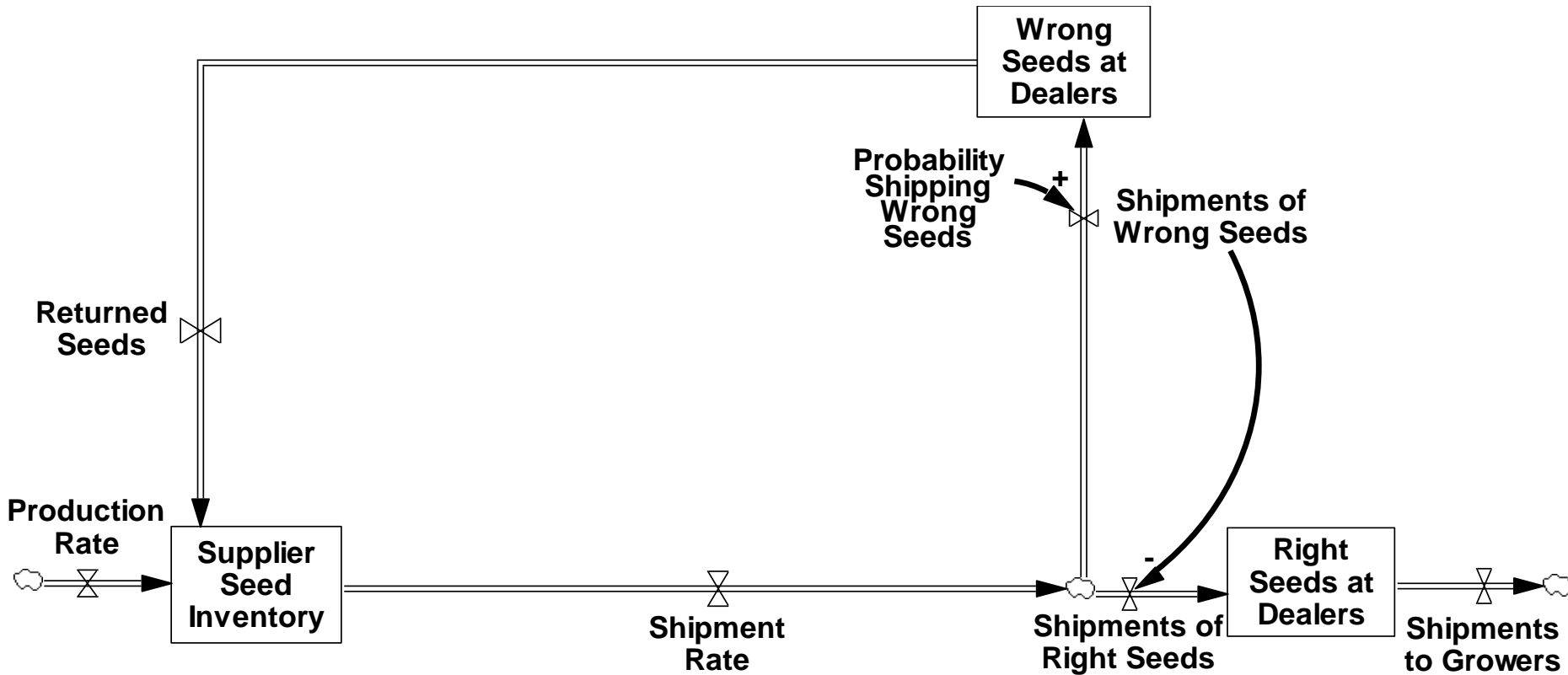
- Low probability of returns (P_L) when positioning
- High probability of returns ($P_L + P_H$) when pushing

- Sales Pressure (p):

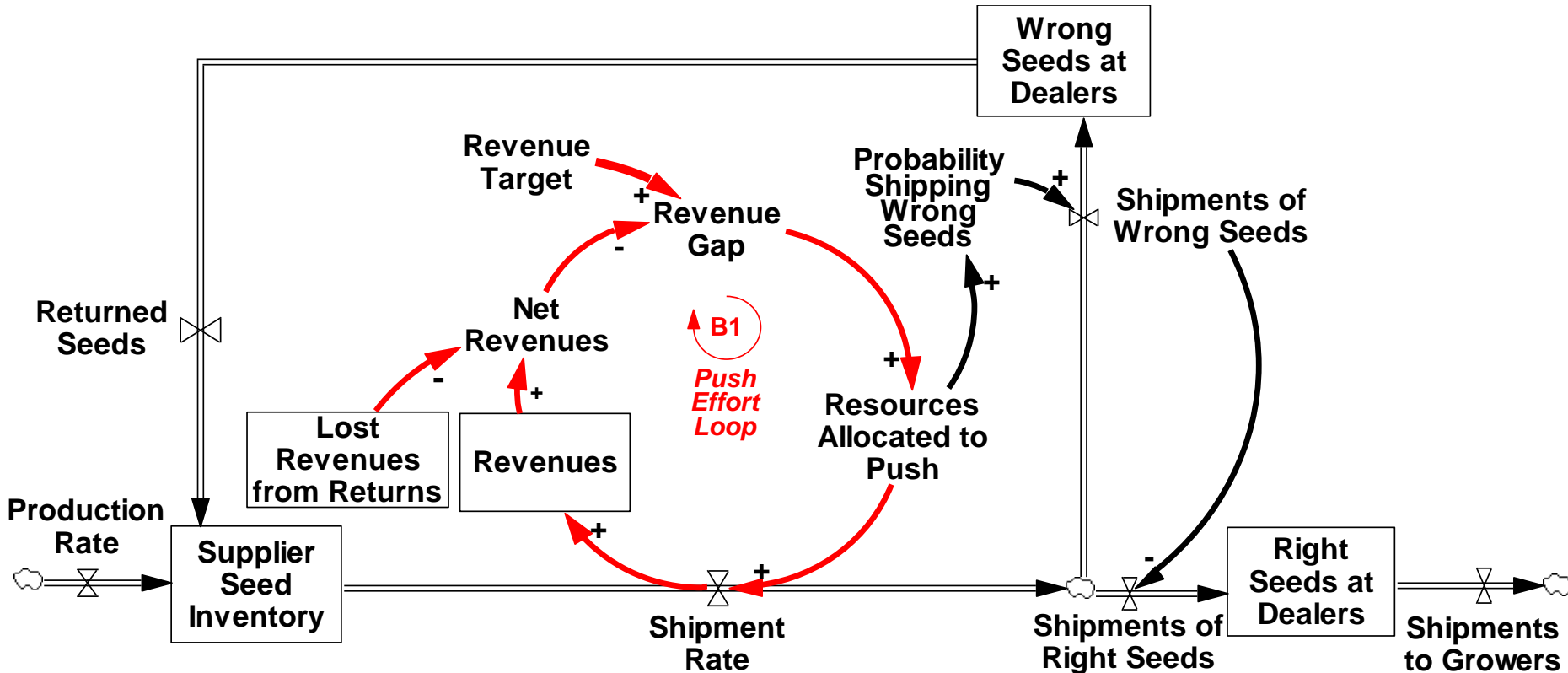
- Tradeoff between revenue and time remaining

$$p(t) = \frac{RG_F(t)}{TR_F(t)}$$

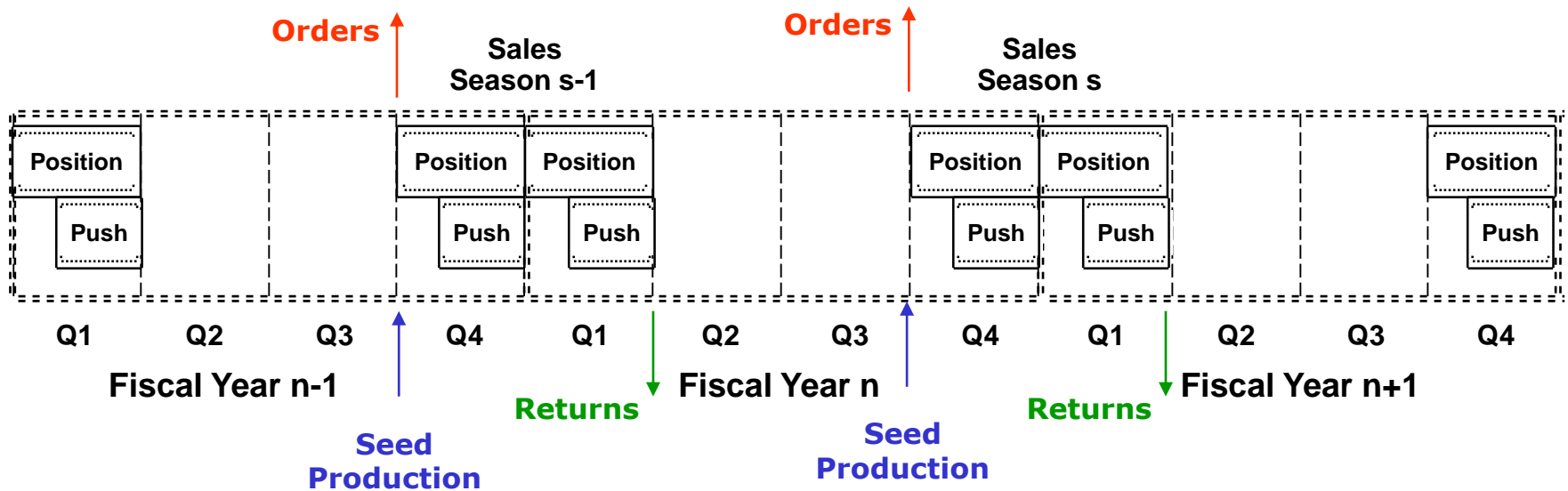
Model Structure and Main States



Push Effort Closes Revenue Gap...

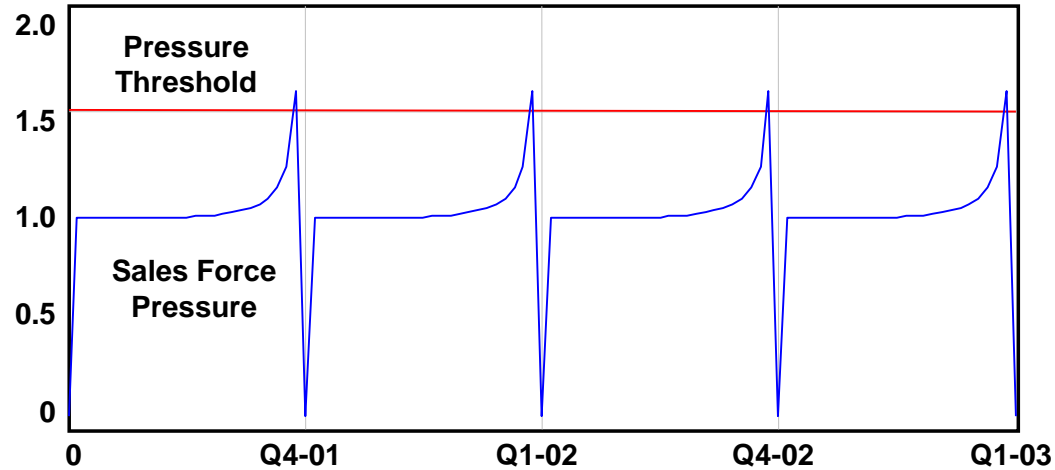


Overview of Sales Process

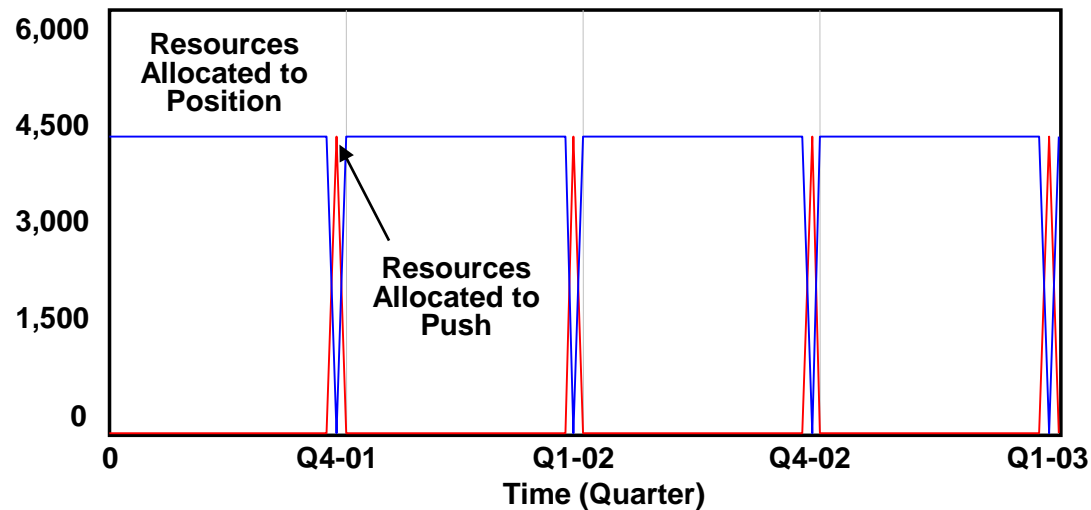


Base Case Simulations

Sales Force Pressure



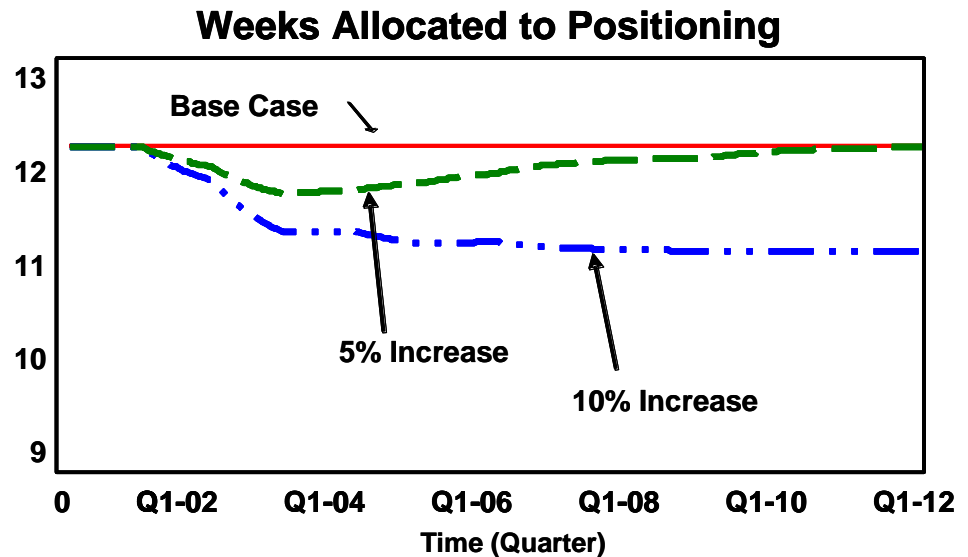
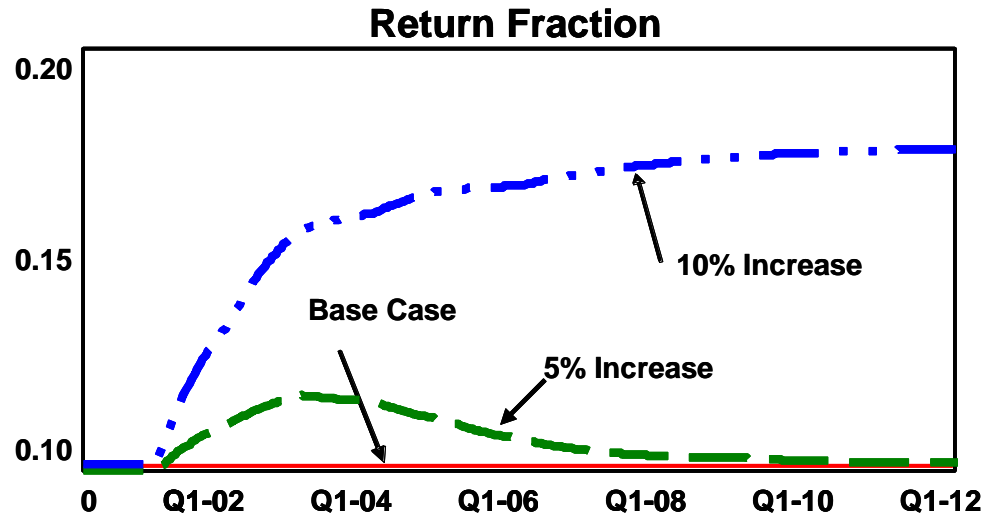
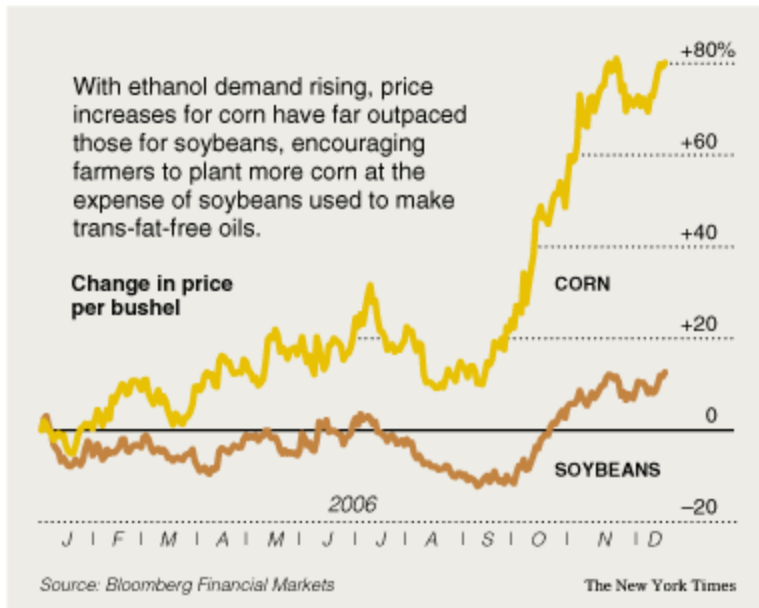
Resource Allocation



Simulation Experiments: Increase in Demand

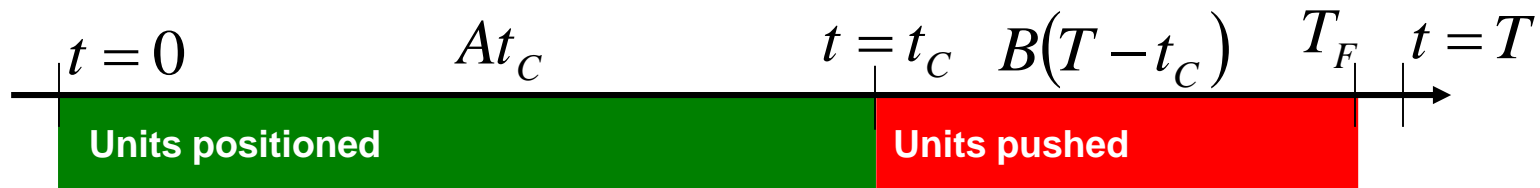
Farmers will plant more corn next season due to high ethanol demand leading to high corn prices

(NYTimes, Dec 29 2006)



Model Analysis: *Between* quarter dynamics

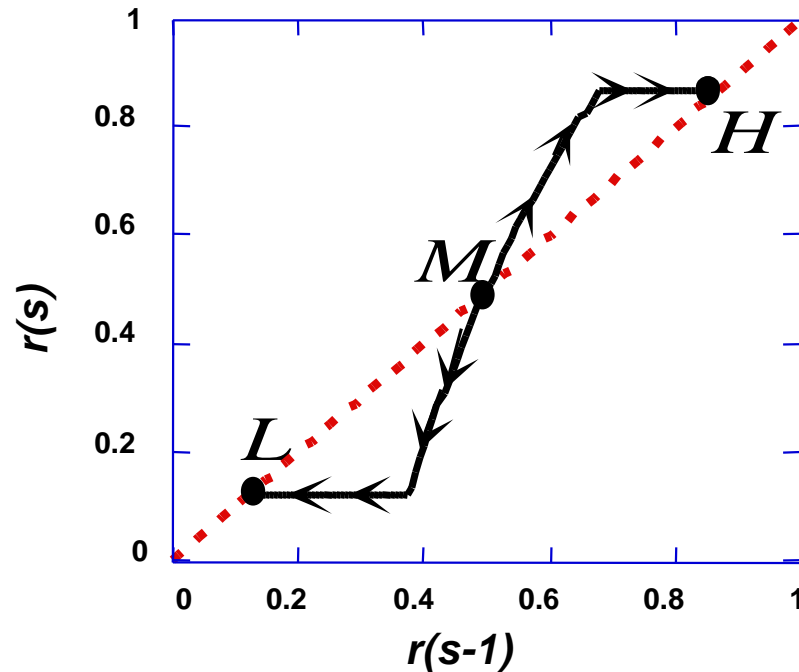
- The fraction of seed returns $r(s)$ allows us to measure system performance
 - $r(s) = \frac{\text{total returns}}{\text{total shipments}}$
- **Solution:**
 - Find threshold the pressure (at critical time t_C), where salespeople change activities from positioning to pushing



Model Analysis: Phase result for returns $r(s)$

- Extreme critical times yield simple solutions:
 - If $T_F \leq t_C \leq T$ (critical time t_C is high) then salespeople only *position* seeds
 - There are sufficient sales resources to reach targets
 - High performance = low seed returns (L) equilibrium
 - If $t_C = 0$ (critical time t_C is low) then salespeople only *push* seeds
 - There are insufficient sales resources to reach any targets
 - Low performance = high seed returns (H) equilibrium
- All other results determined by nonlinear phase plot.

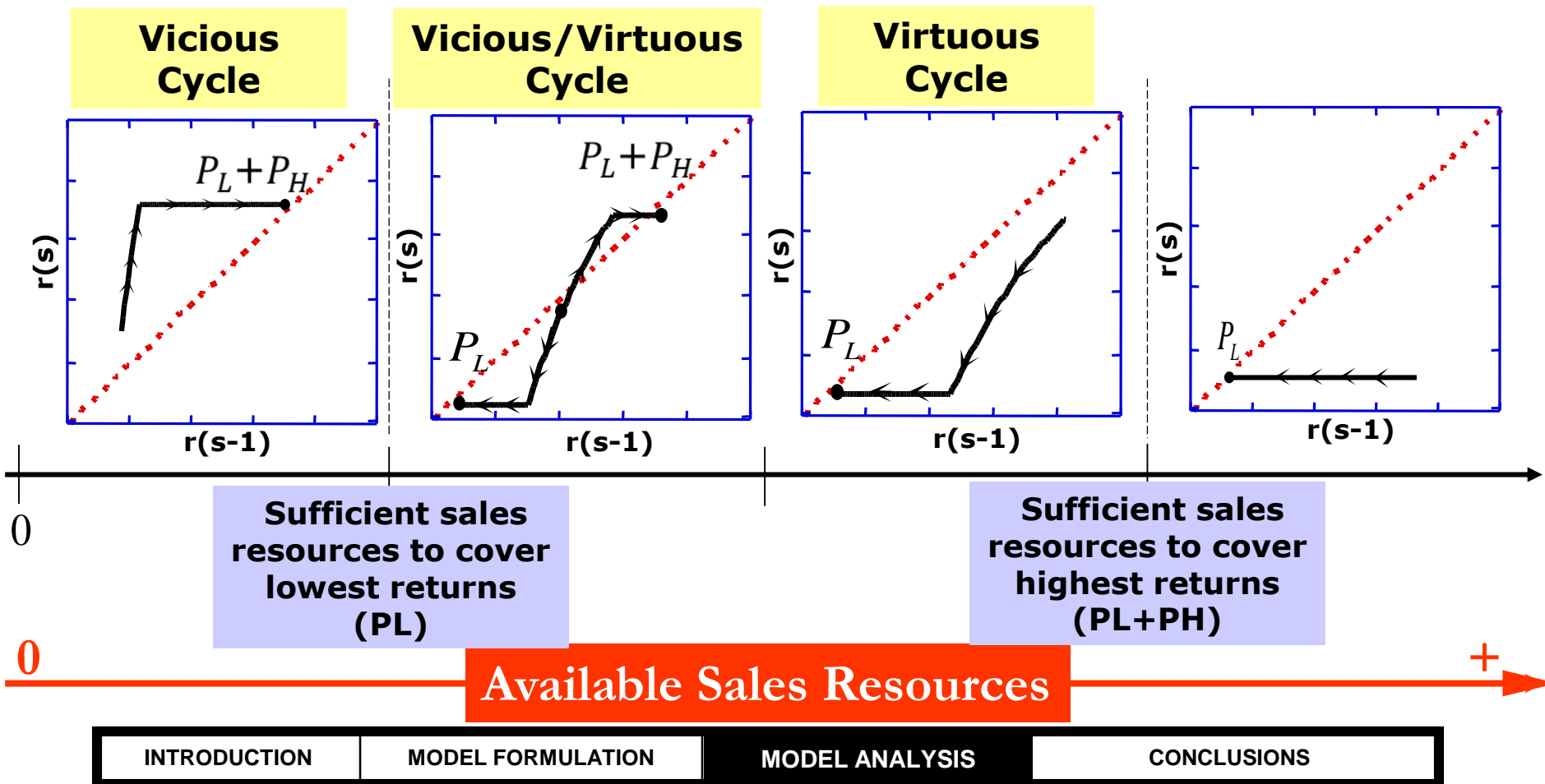
Phase Plot for Return Fraction $r(s)$



- Solid circles (fixed points) represent equilibria
- Return fractions L & H are stable equilibria
 - High performance = Low (L) seed returns
 - Low performance = High (H) seed returns
- M equilibrium is unstable; the system will follow the arrows toward one of the two stable equilibria

Results Yield General Phase Maps

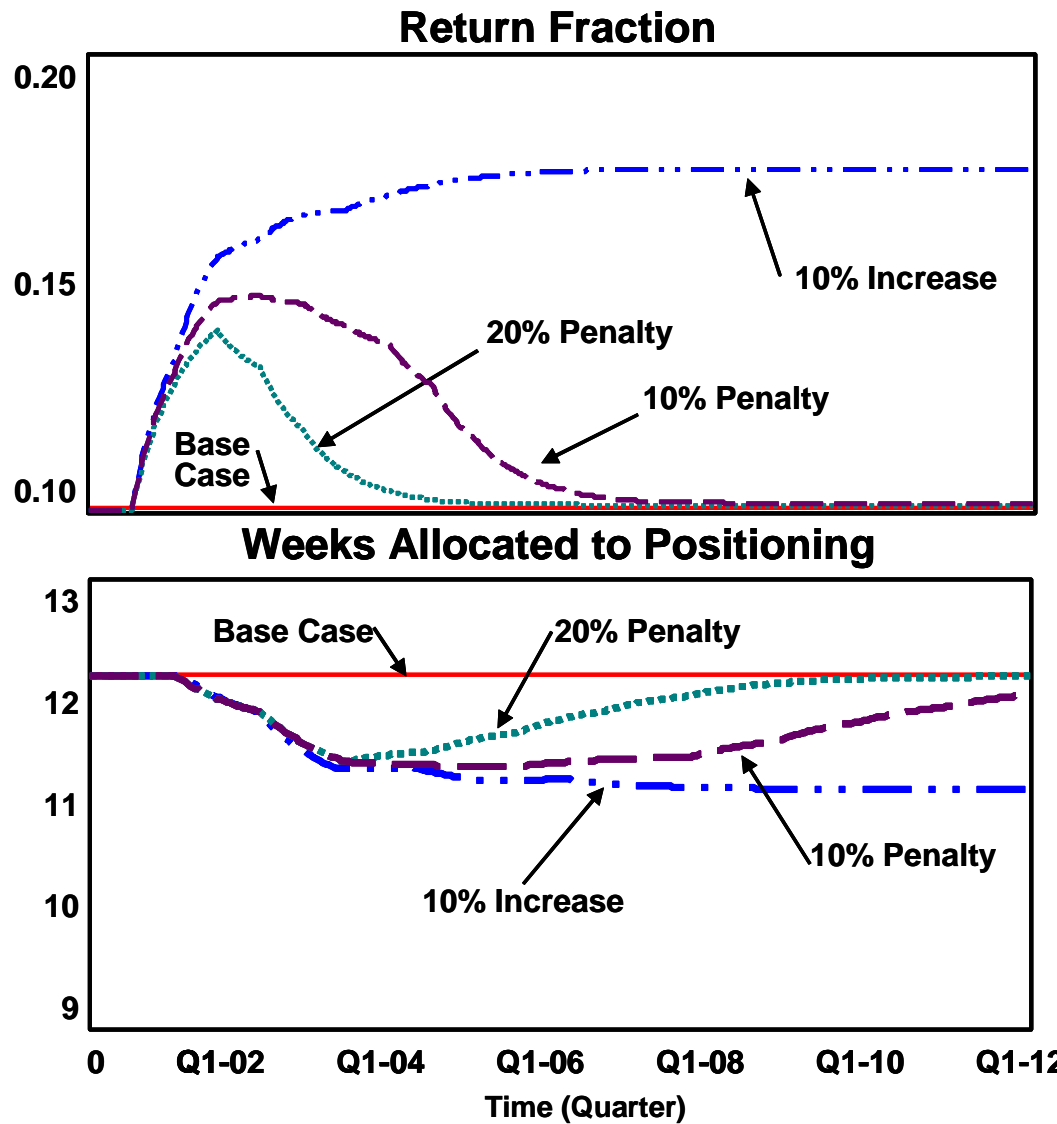
- Different phase plots result from the amount of sales resources available:



Dealer Incentives Alone Are Insufficient

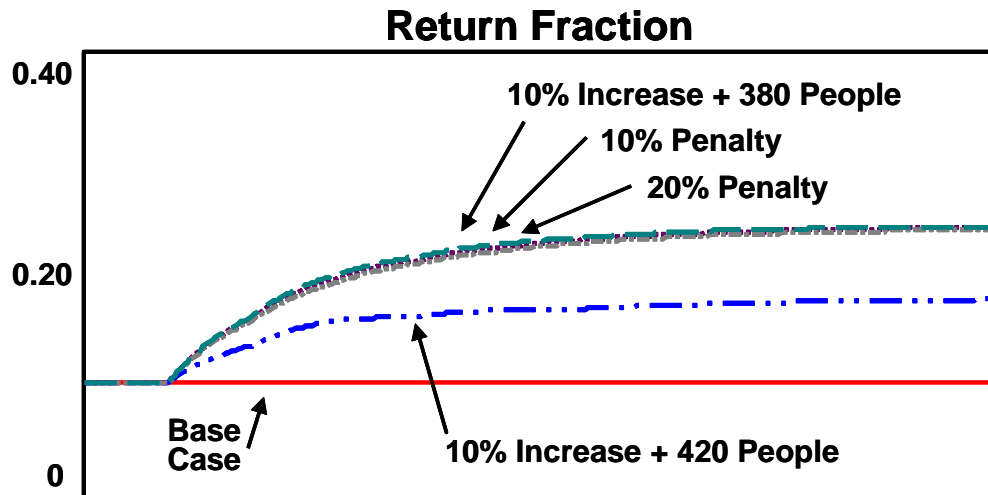
- Level of returns depend not only on the appropriate incentives, but also on
 - *Level of sales resources*
 - *Sales target levels*
- Because of interaction among ***dealer incentives***, ***sales resources*** and ***sales targets*** effective solutions must address all of them

Dealer Incentive Reduces Over-ordering



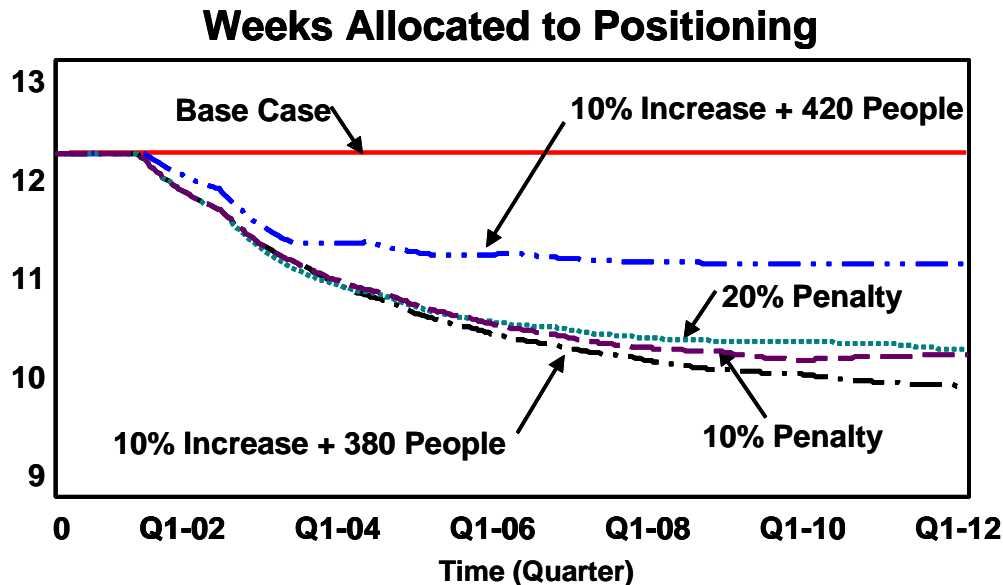
$$\gamma / (1 - r(s - 1))$$

Dealer Incentive Not Effective w/Sales Reduction



$$\gamma / (1 - r(s - 1))$$

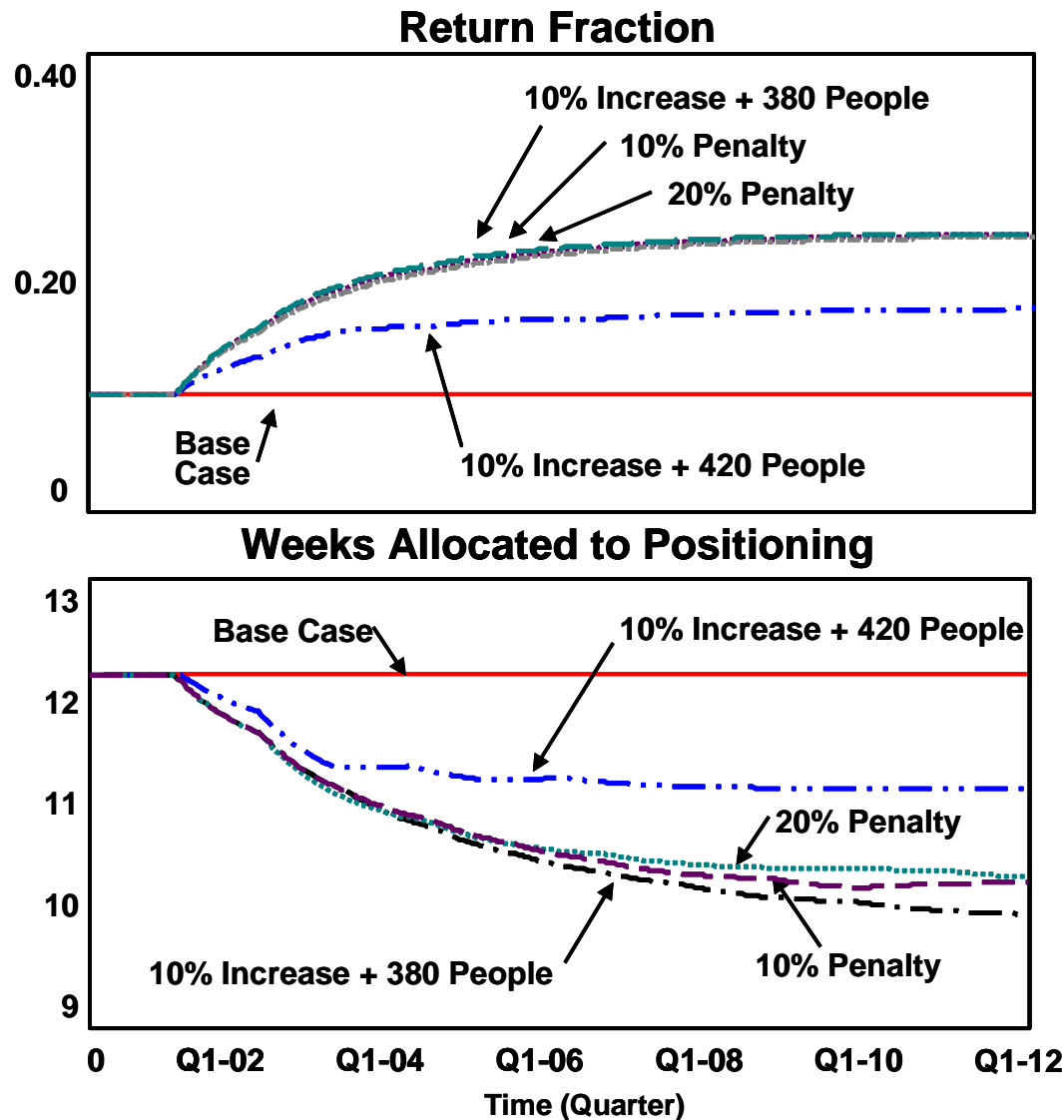
$$A(1 - \sigma)$$



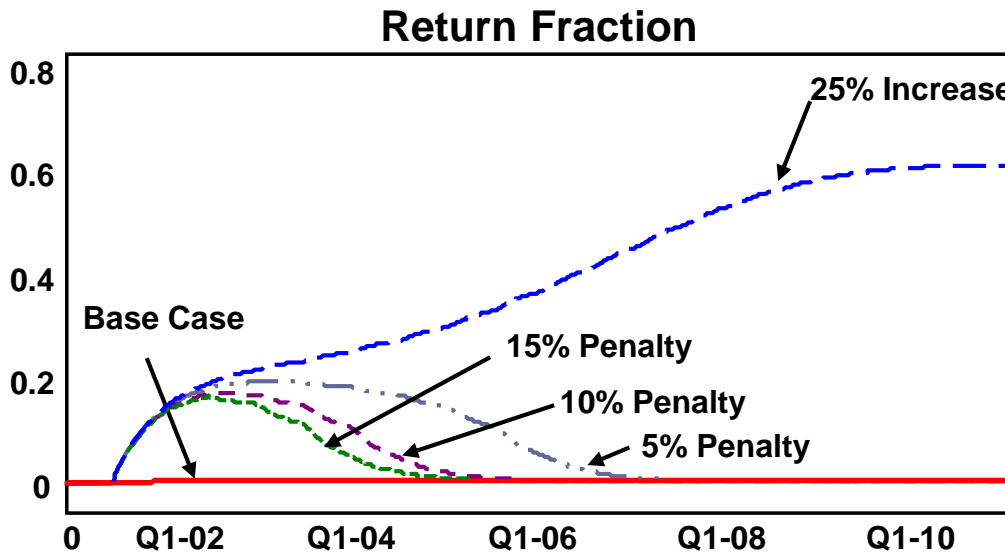
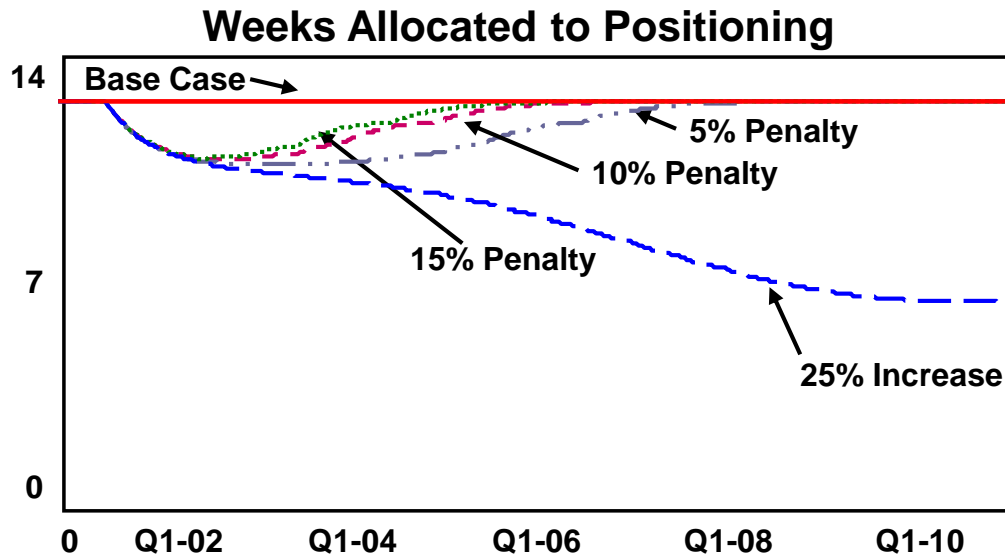
Suggested Policies

- Increase sales force resources
- Manage sales force pressure
- Introduce incentives to dealers
- Introduce incentives to sales force
- Change timing of sales pressure

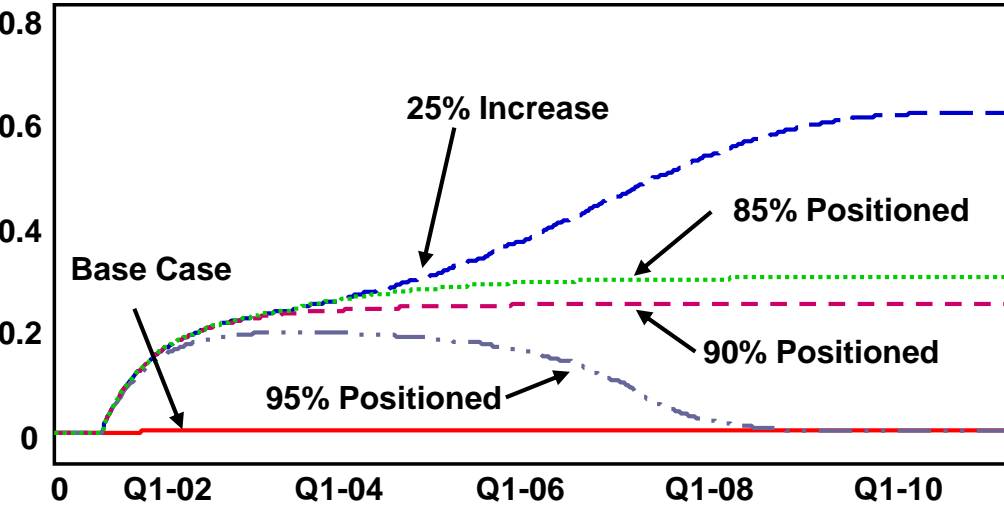
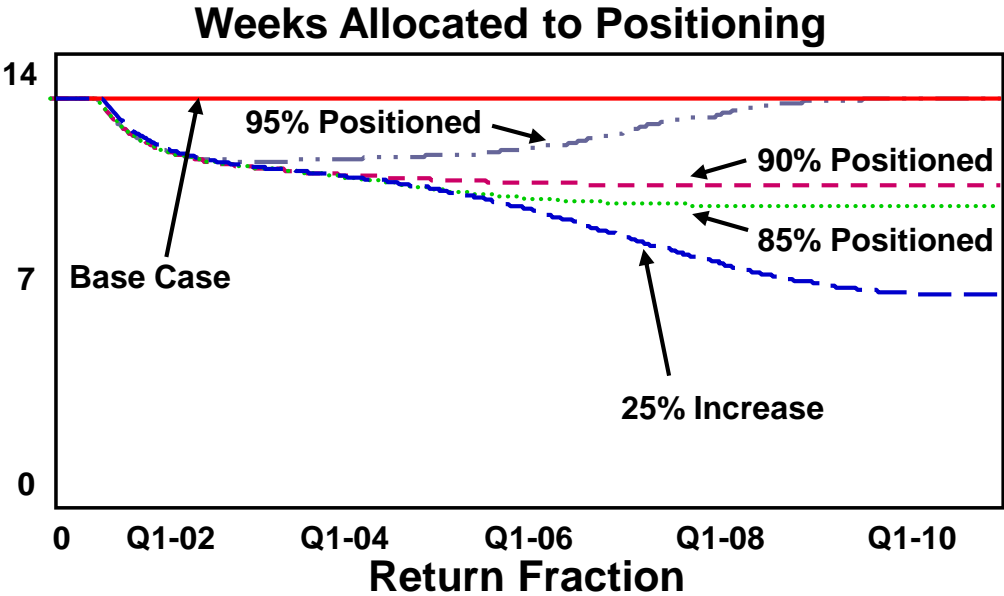
Dealer Incentive: 10% Less Sales Resources



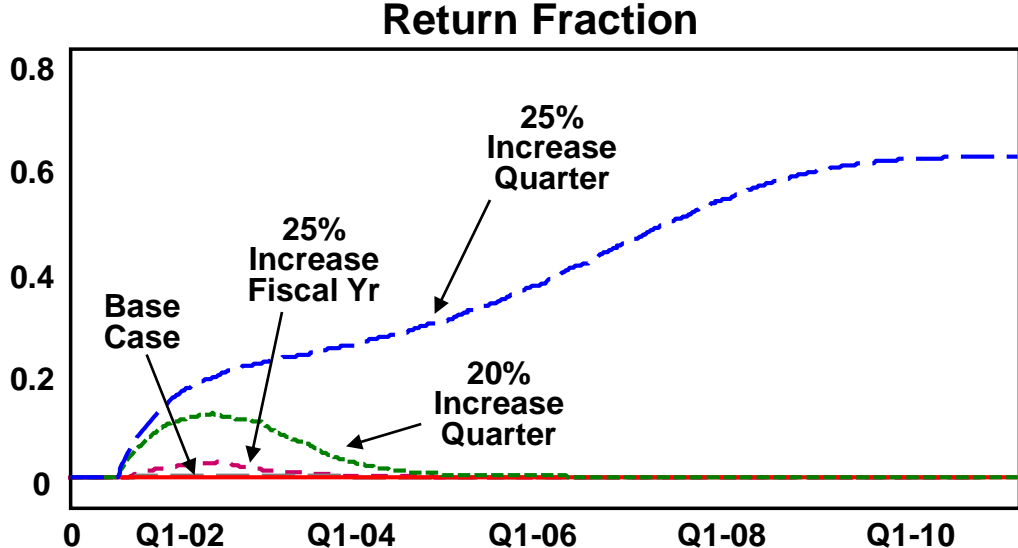
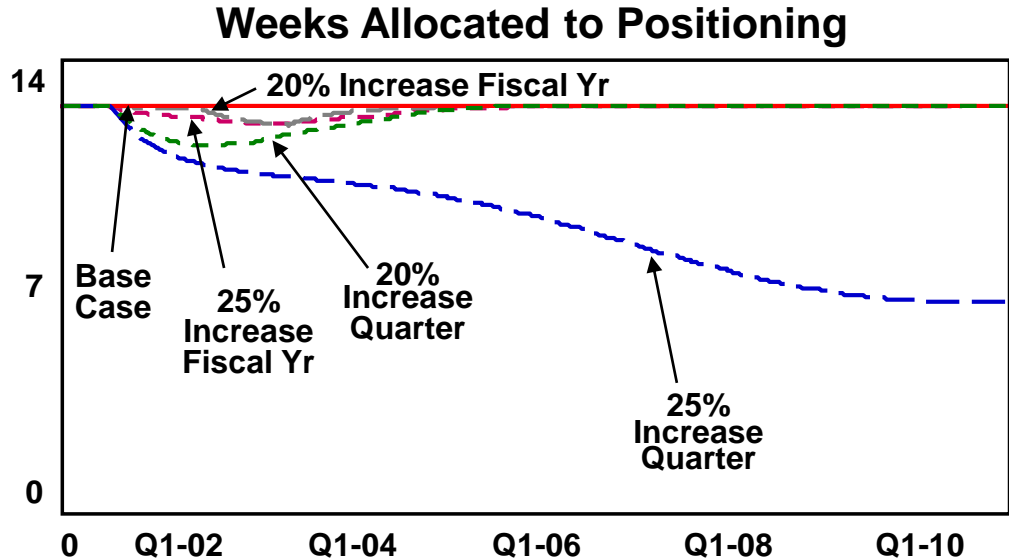
Dealers Incentive Policy



Sales Force Incentive Policy



Fiscal Year Policy



Sales Force Incentives

- It is commonly accepted that:
 - Rewards for better performance are worth extra effort;
 - Salespeople can sell more by working harder (pushing sales) or by being trained to work smarter
 - Marketing typically blames customers for product returns
- Field data in the seed industry suggests that:
 - Rewards for better performance lead salespeople to work harder (pushing sales), key factor to product returns
 - Managerial incentives to salespeople are partly to blame for product returns
- A better understanding of the impact of performance incentives on returns is needed for more robust sales force management

Summary

- Sales environments characterized by allocation of scarce resources among different tasks are *highly* sensitive to small changes in demand
 - Task interdependence and bias toward short-term benefits reinforce initial errors in resource allocation
 - A *Transient* increase in demand can cause a *permanent* increase in the amount of returns due to a reinforcing mechanism
- Insights applicable to channel stuffing and over-ordering problems faced by many other industries