

Do Stair Step Incentives Help or Hurt?

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Chrysler's Stair Step Incentive in Feb 2001

Sales	Incentive (for each car sold)
Less than 75% of target	0
75-100% of target	\$150
100-110% of target	\$250
More than 110% of target	\$500

What Happened With Chrysler?

New York Times, May 1, 2001

"A Chrysler program intended to reward dealers who meet sales goals backfired in April. Analysts have forecast that Chrysler's sales will fall 15-20 percent in April, while the industry as a whole will be down 8-12 percent."

Some Questions

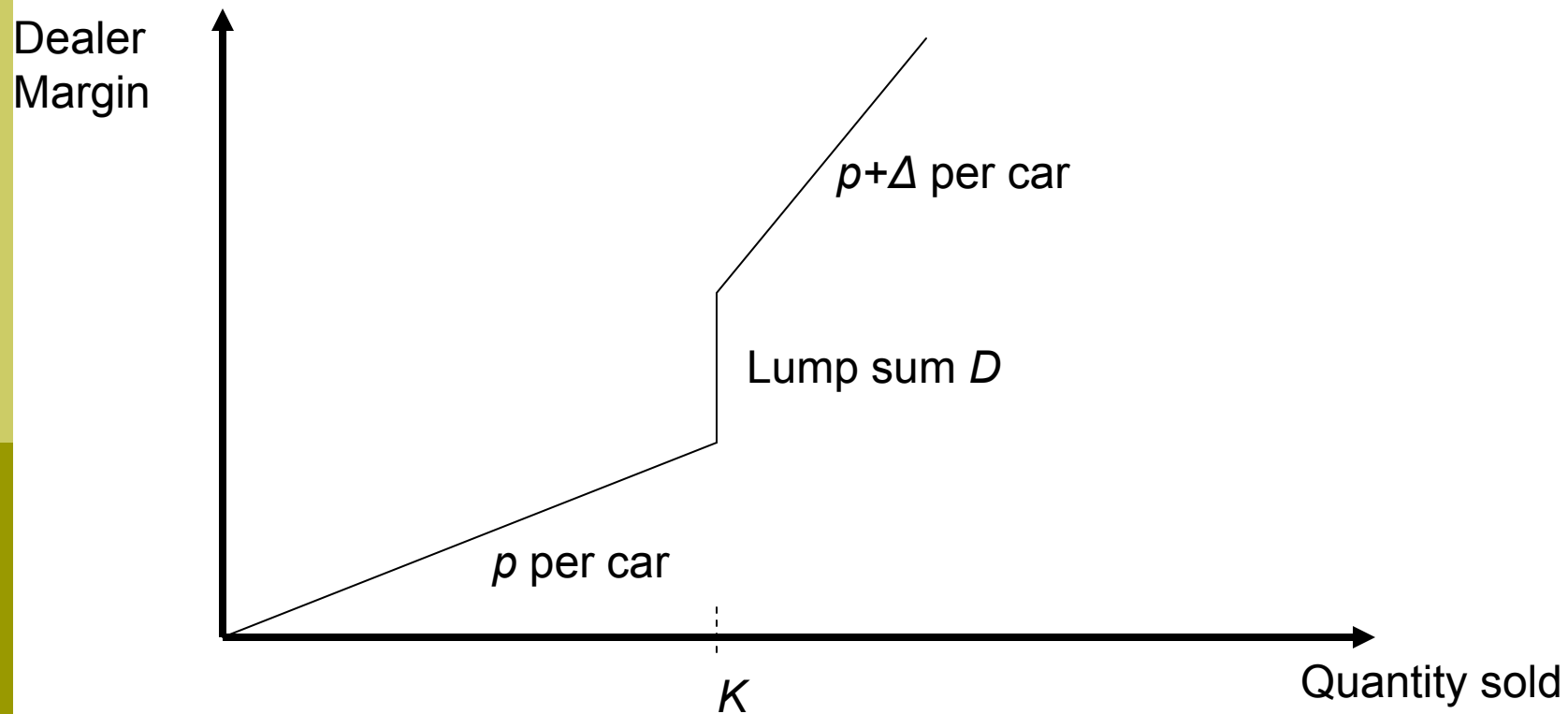
- Why were stair step incentives offered?
- What can explain Chrysler's performance drop after the incentives?

Outline

- Brief history of incentives in the auto industry
- Model and results for exclusive and non-exclusive dealers
- Conclusions and further research

Brief History of Incentives in the Auto Industry

- Stair step incentives have been prevalent



How Dealer Structures have Evolved

- The U.S. started with a history of exclusive dealers for each manufacturer
- Over the last ten years in particular, there has been a significant growth of non-exclusive dealers
- How does dealer structure affect the response to incentives?

Basic Structure of Analysis

- Study stair step incentives in the context of
 - Exclusive dealers
 - Non-exclusive dealers

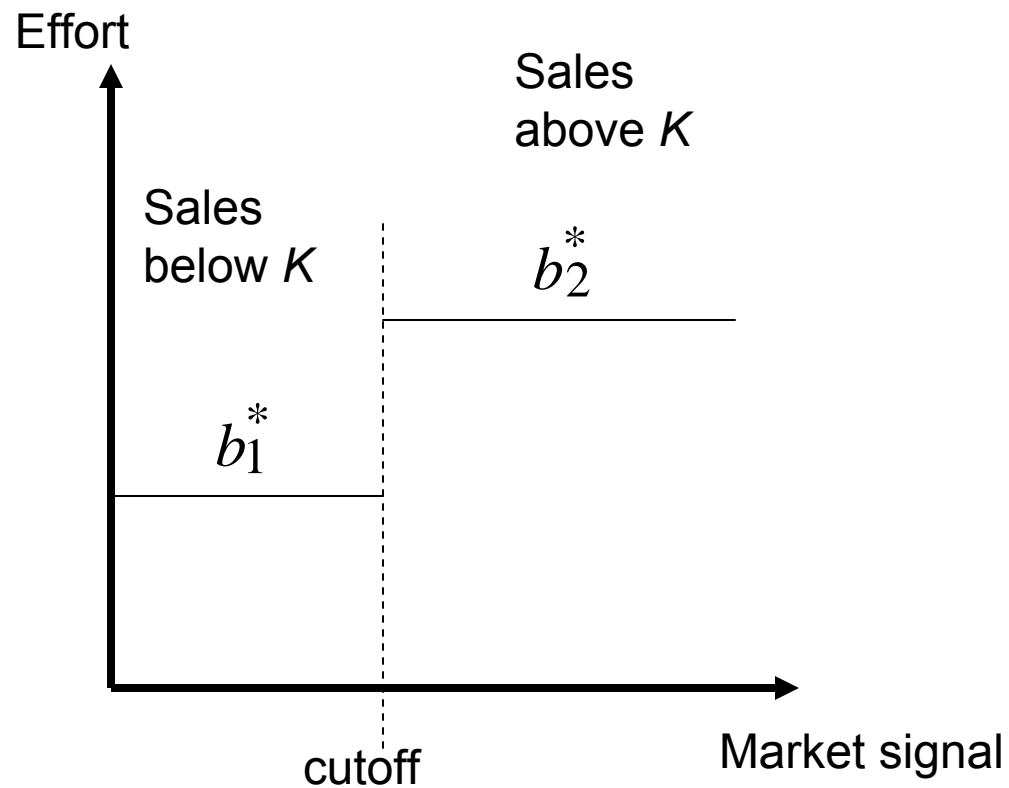
Exclusive Dealer Model

- Manufacturer incentive: Dealer makes p per car up to threshold K . Upon reaching K , dealer gets lump sum bonus $D \geq 0$. For all sales above K , dealer makes $p + \Delta$ per car
- Dealer observes market signal x , determines effort b at cost $c(b)$, to achieve sales $x + g(b)$
 - $c()$ is convex, increasing and $g()$ is concave, increasing

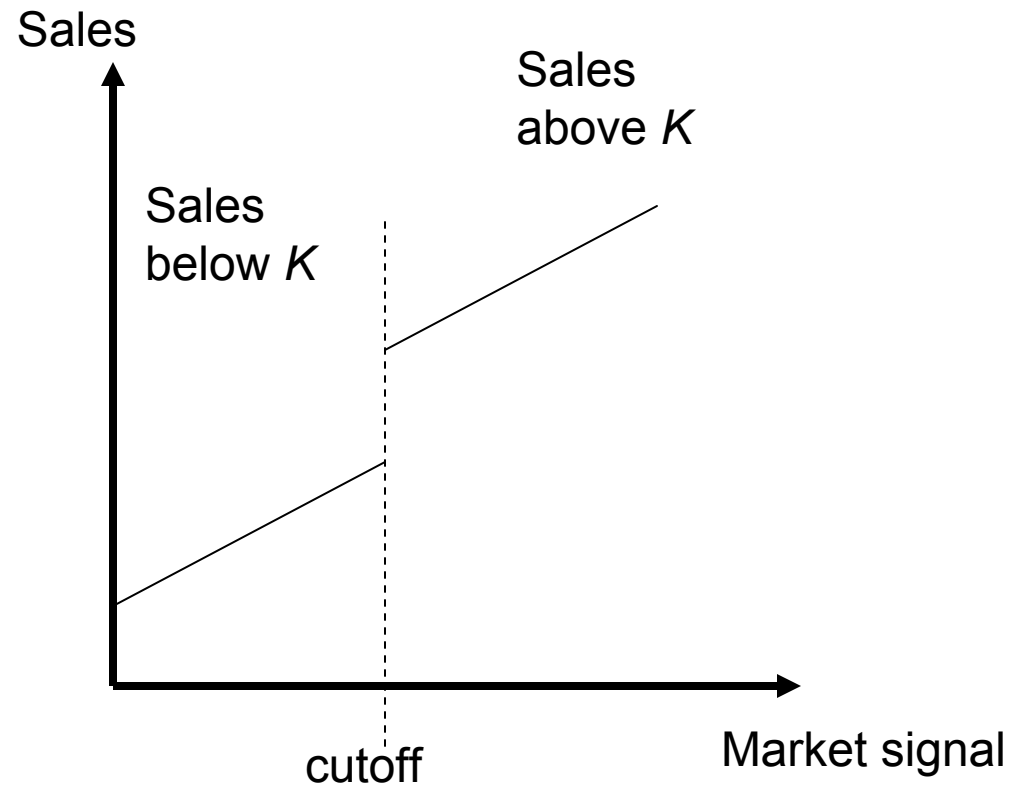
Exclusive Dealer's Problem

- Select effort to maximize profits (sales growth is concave with effort, whereas cost of effort is convex in effort)

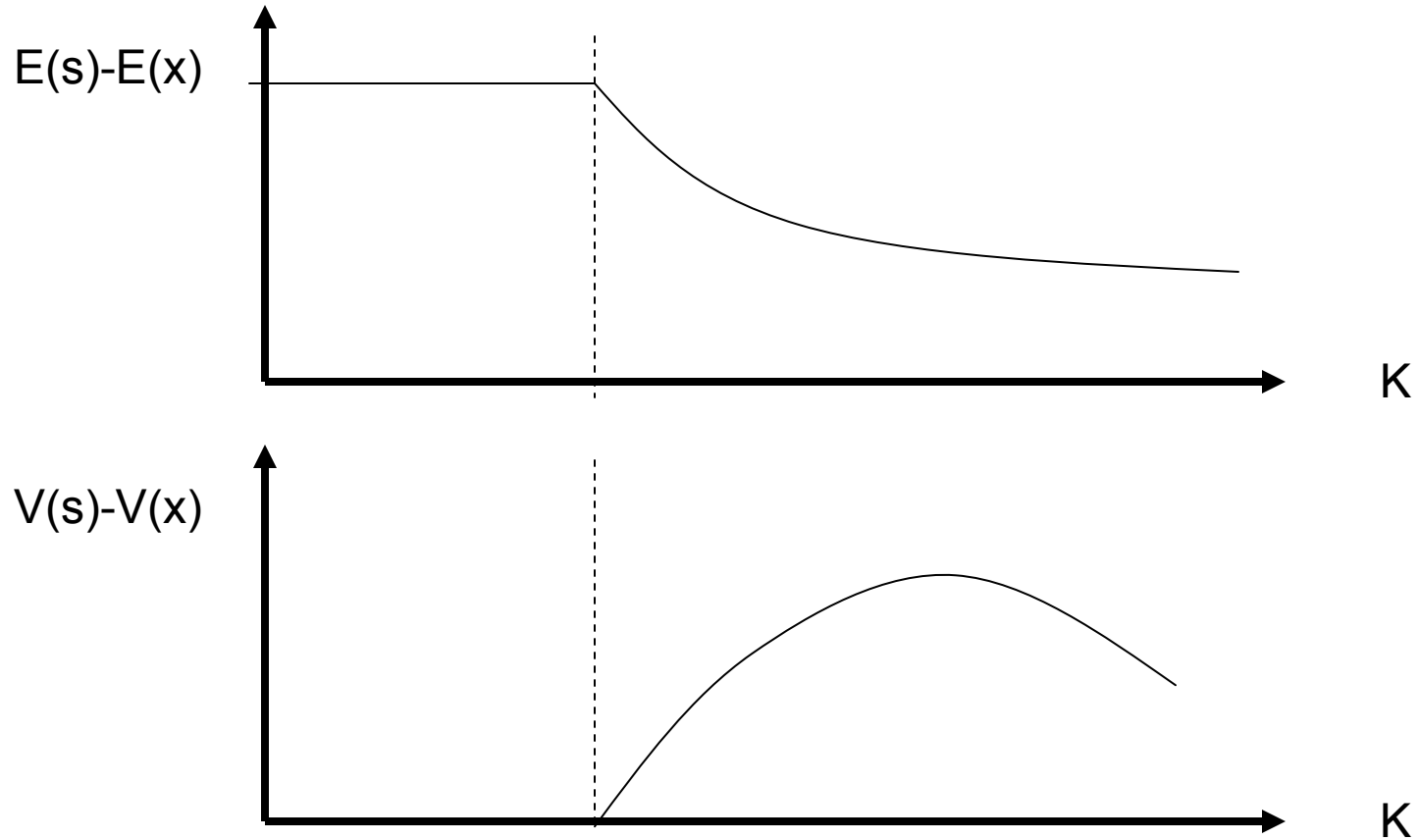
Dealer's Optimal Response for $D=0$



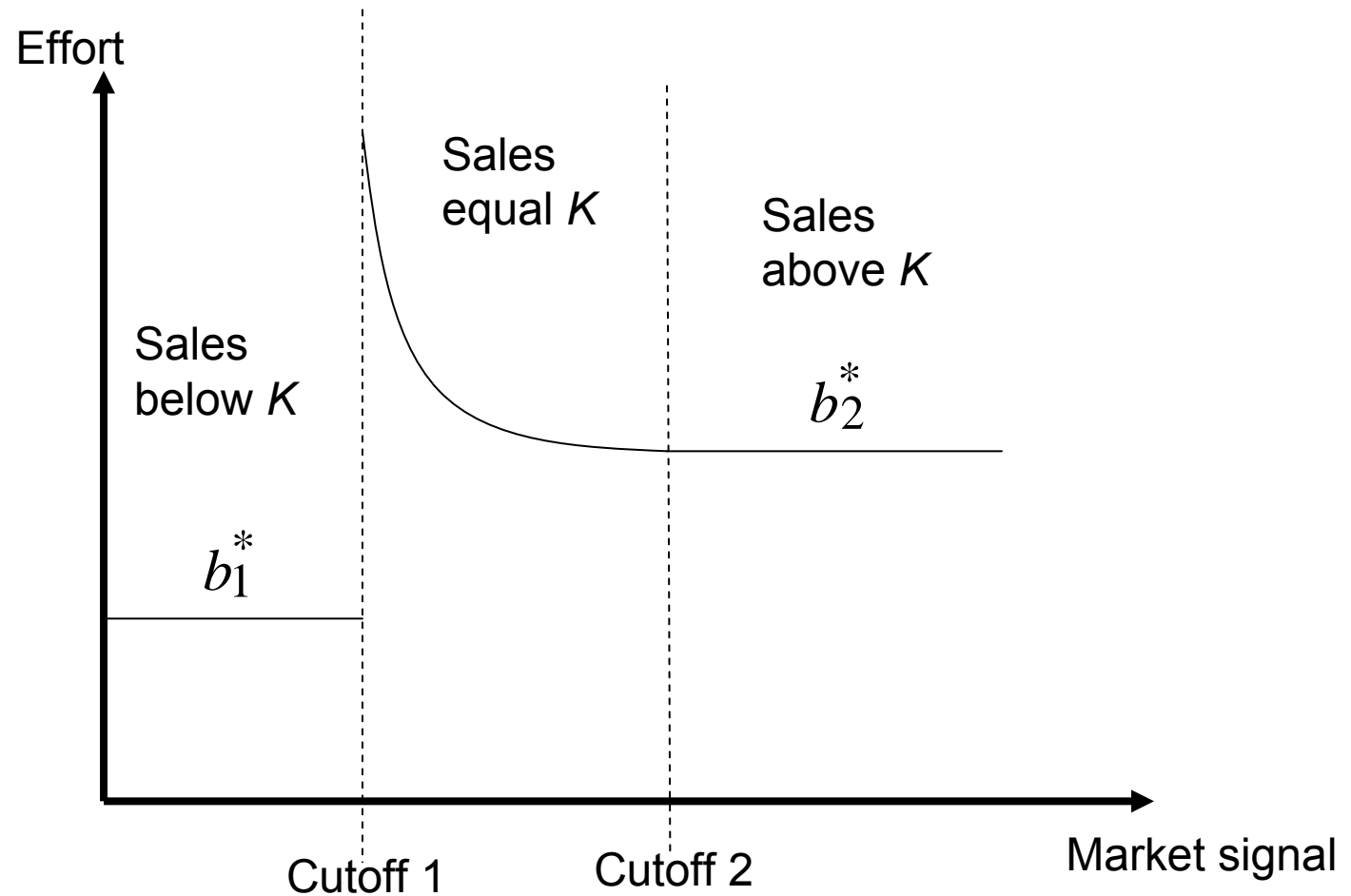
Sales Given Dealer's Optimal Response for $D=0$



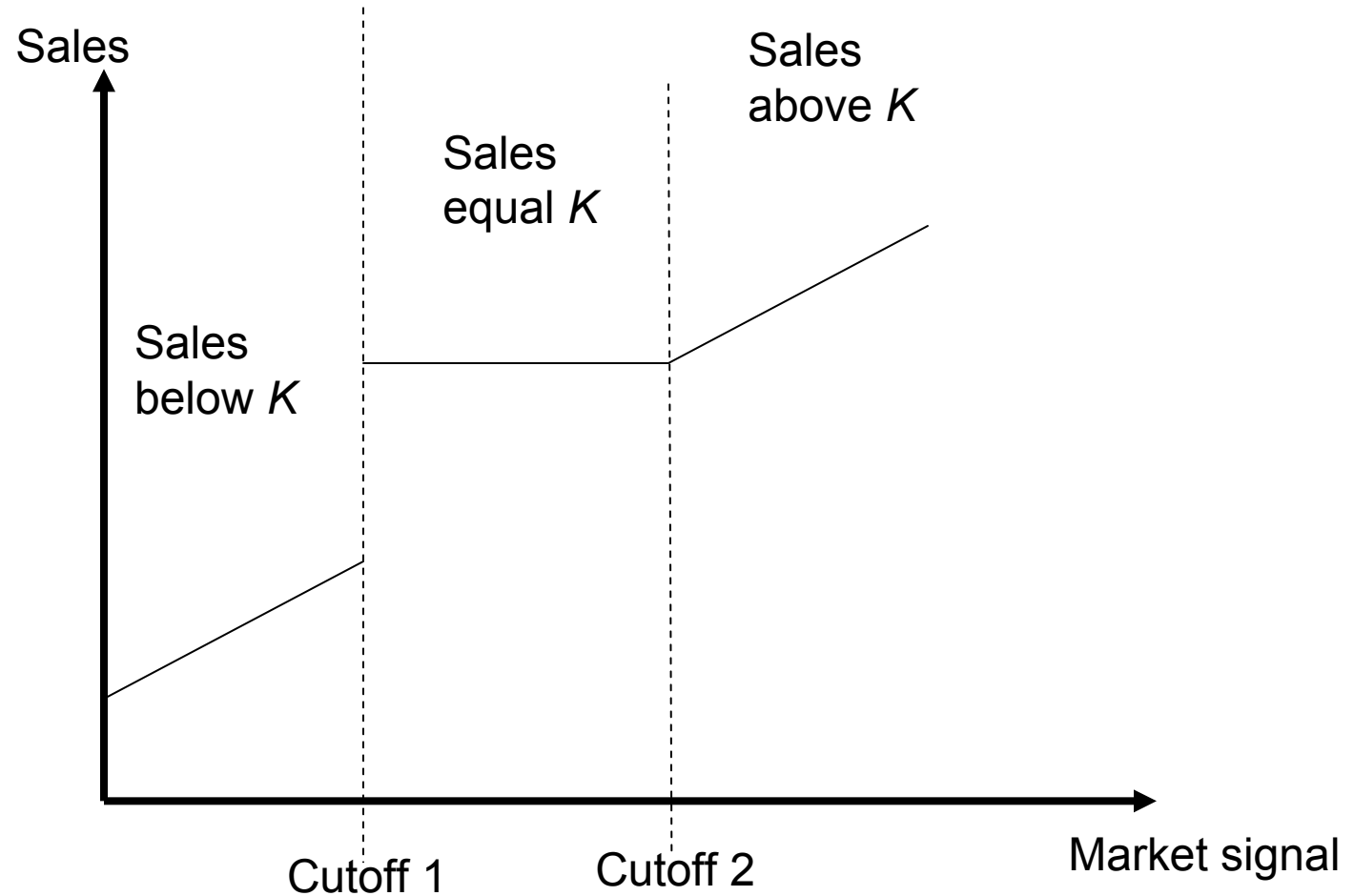
Expected Sales / Variance of Sales for $D=0$



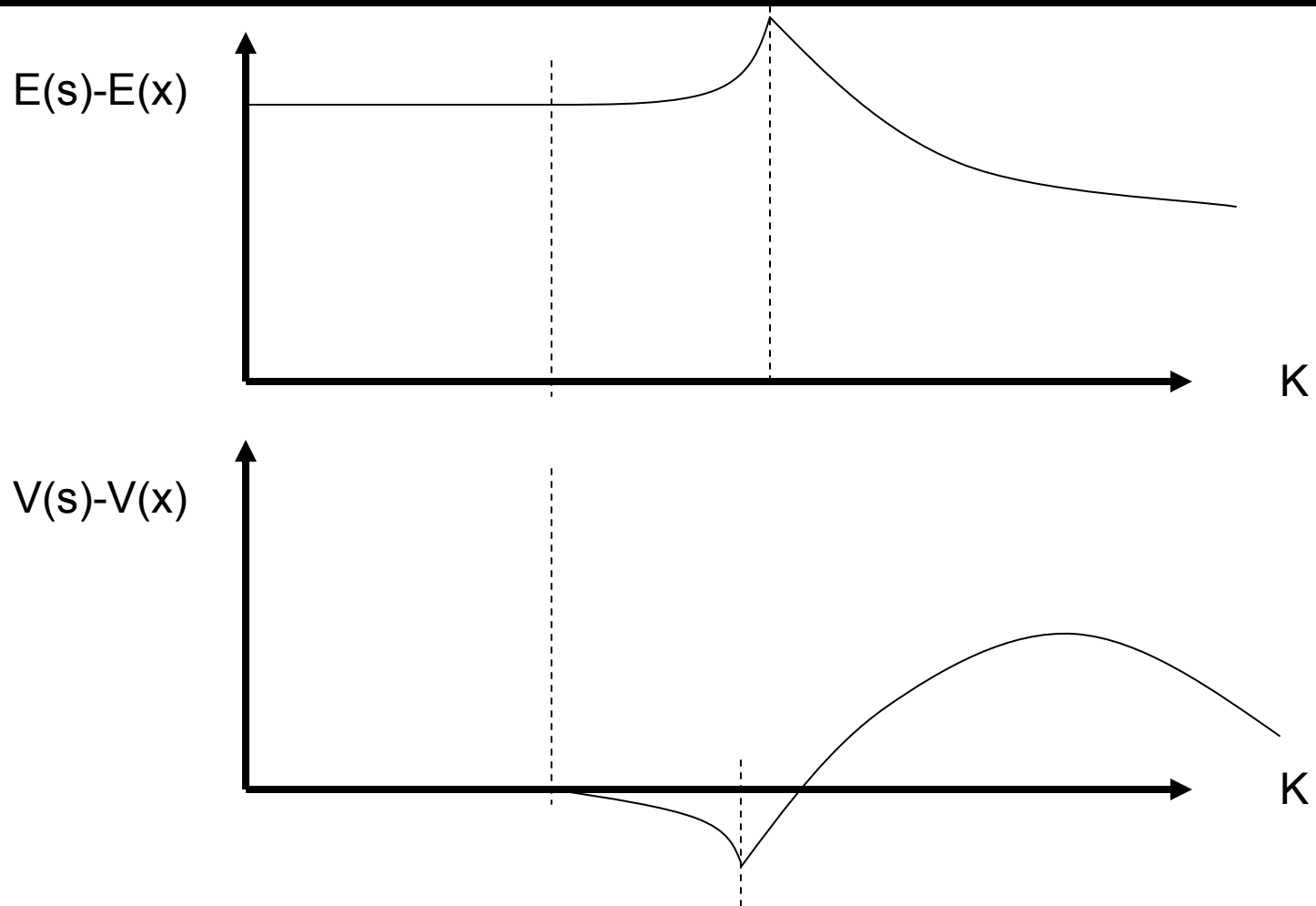
Dealer's Optimal Response for $D > 0$



Sales for Dealer's Optimal Response for $D > 0$



Expected Sales / Variance of Sales for $D > 0$



Observations

- A large K decreases sales
- $D > 0$ (with appropriate K) increases sales and decreases variance of sales

Claim: For $K \leq \text{Expected Sales}$,
 $V(S) < V(x)$.

The Manufacturer's Problem

- Objective: The manufacturer is helped by increasing sales (for a given incentive) and hurt by increasing sales variance

The manufacturer's goal is to set an incentive (and K) to maximize profits.

The Use of Stair Step Incentives for Exclusive Dealers

Claim: For a manufacturer (selling through an exclusive dealer) with a high cost of sales variance, a stair step incentive with $D > 0$ is **superior** to a linear incentive or a stair step incentive with $D = 0$.

Proof: The manufacturer offers the stair step with $D > 0$ to lower the sales variance. There is a range of market signals for which the exclusive dealer adjusts effort to ensure that sales equal K .

The Non-Exclusive Dealer

- Two manufacturers (identical to begin with) selling through the same dealer.
- Dealer observes market signals x_1 and x_2 . Decides on effort levels b_1 and b_2 . Sales are $x_1 + g(b_1)$ and $x_2 + g(b_2)$. Cost of effort is $2c((b_1+b_2)/2)$.

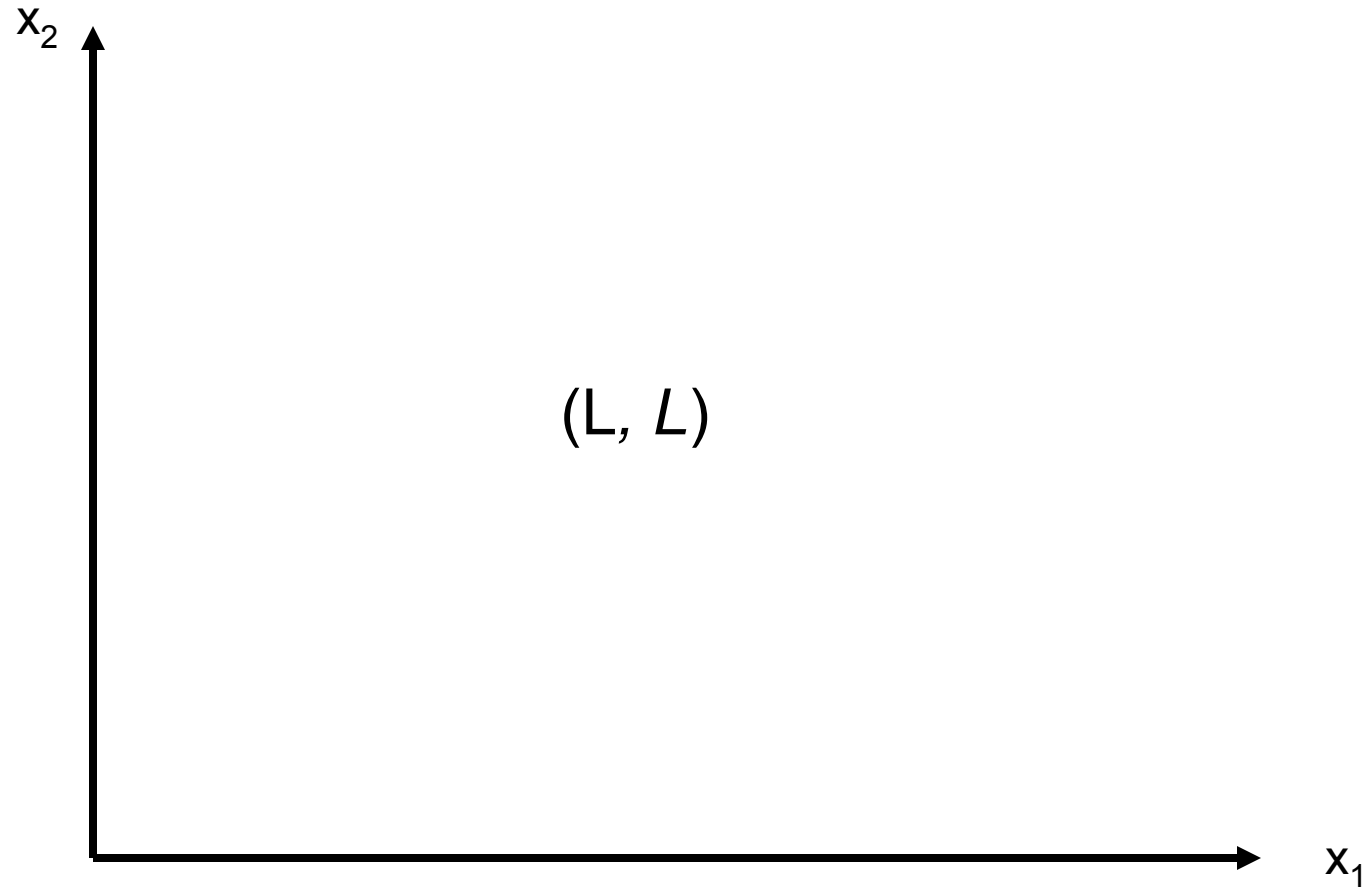
Dealer's Optimal Response for Identical Linear Incentives

- $b_1^* = b_2^* = L$ for all x_1 and x_2 .
- $\text{Variance}(\text{sales}) = \text{Variance}(x)$

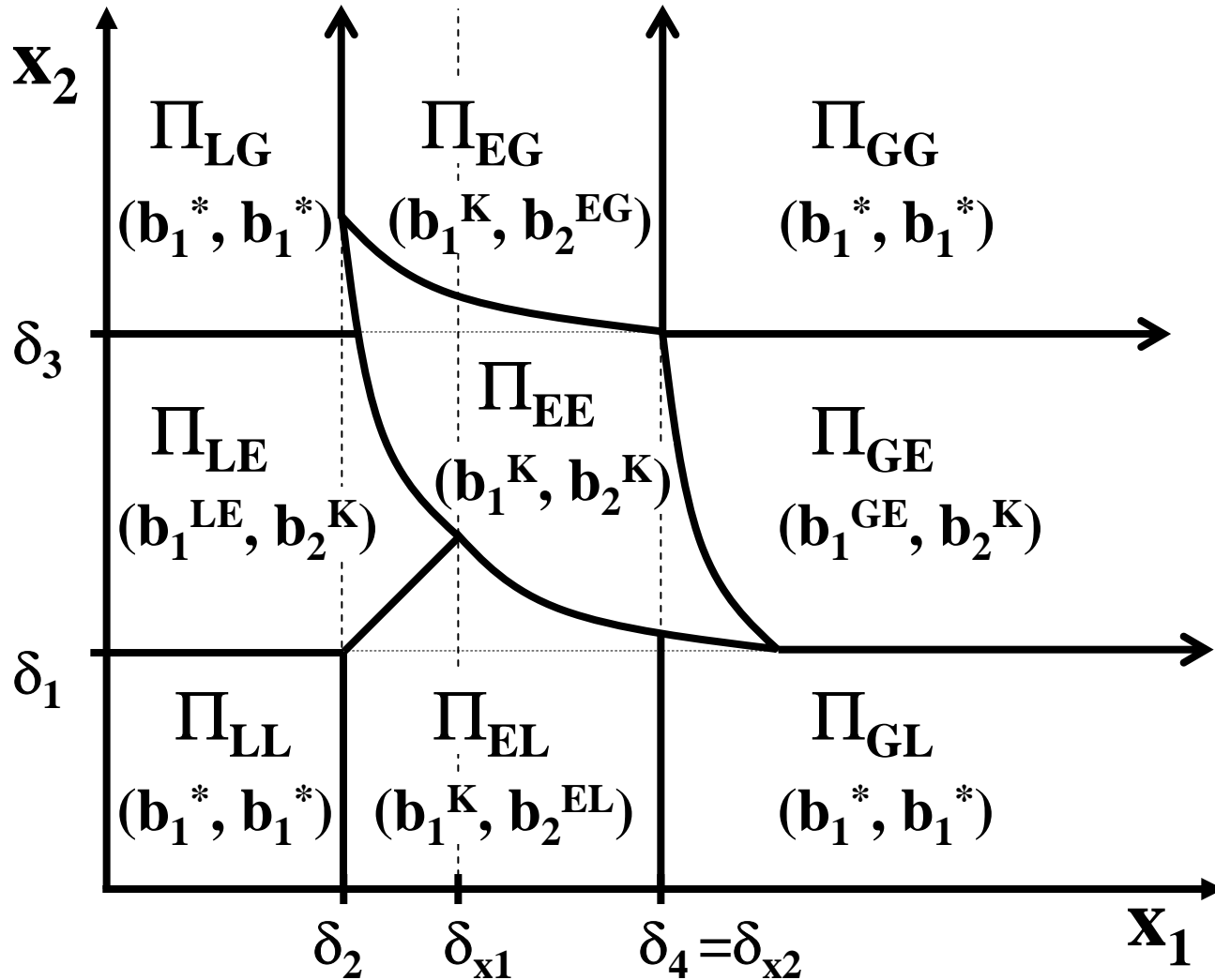
Proof: $g()$ is concave and dealer maximizes profits by splitting effort evenly among manufacturers.

Dealer's effort is **independent** of market signal of each firm.

Dealer's Optimal Response for Identical Linear Incentives



Dealer's Optimal Response for Identical Stair Step $\Delta = 0, D > 0$



Observations

- For the same market signal for a manufacturer, the dealer decreases effort as the market signal for the other manufacturer increases.
- With a non-exclusive dealer, a manufacturer sees different level of sales for a given market signal as the other manufacturer's market signal changes

Impact of Δ and D

- Under certain conditions, increasing Δ increases the overall sales variance.
- ***Symmetric manufacturers through a non-exclusive dealer should set $\Delta = 0$.***
- Offering $D > 0$, increases the range over which the dealer's response is variable. The dealer makes no effort to vary effort to ensure that each manufacturer's sales are K . The dealer does so for one manufacturer at the expense of the other. The manufacturer selected, however, depends on the relative market signals.
- **Unlike the exclusive dealer case, using $D > 0$ does not lower sales variance with non-exclusive dealers.**

Observations

- ***Chrysler could have seen a larger than industry drop in sales because $\Delta > 0$, $D > 0$ and their market signal was lower than that of other manufacturers and dealers shifted their effort away from Chrysler.***

Manufacturers Offering Non-Identical Stair Step Incentives

- If $\Delta_2 > \Delta_1$, then the variable cutoff range for manufacturer 2 is smaller than that for manufacturer 1.
- **The manufacturer with the higher margin has a narrower range of market signals over which it experiences sales variance.**

Recent Changes in Auto Incentives

Automotive News, January 9, 2006

“Ford and Mercury dealers have a new 2006 bonus program that lowers the bar to earn rewards. Ford Motor Co. is switching to a flat pay-per-unit bonus from a bonus based on meeting sales objectives. During the first phase of the 2006 program, the automaker will pay \$300 per retail sale.”

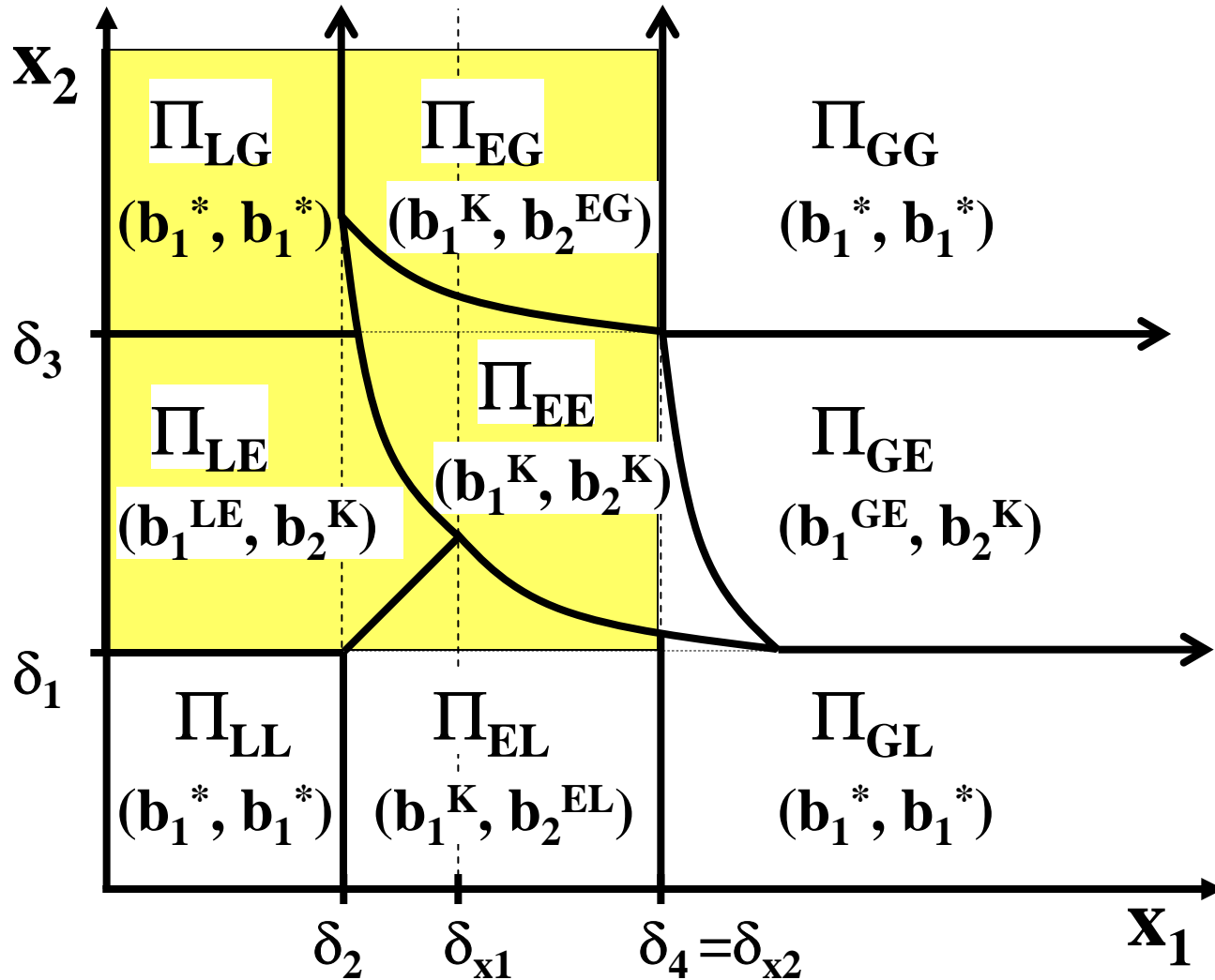
Some Sales Data for Ford in 2005

Month	% Change in Sales
Feb 2005	-3.0
May 2005	-5.6
Aug 2005	+0.9
Sept 2005	-1.3
Oct 2005	-3.6
Nov 2005	-4.5

Current Work

- Consider one of the two manufacturer's as more likely to have a downward surprise in market signal (Ford has seen shrinking market share and identified it as one reason for their switch to linear incentives).
- ***Are both manufacturer's better off if the one with the (generally) lower signal offers a linear incentive and the one with the (generally) higher signal offers a stair step?***

Dealer's Optimal Response for Identical Stair Step $\Delta = 0, D > 0$



A Rationale for Claim

- If signal is in the shaded region, Ford (the manufacturer with the consistently lower signal) gains expected sales by switching to a linear contract with $D=0$.
- If signal is in the shaded region, the manufacturer with the consistently higher signal reduces variance by staying with a stair step contract with $D>0$.

Auto Sales in January 2006

- Ford, Lincoln and Mercury brand car sales rose 23 percent from January 2005

Associated Press, February 1, 2006

Some Conclusions

- Stair step incentives with a positive lump sum bonus help a manufacturer **decrease** sales variance (relative to linear or stair step without positive lump sum) in the case of exclusive dealers
- With a non-exclusive dealers, symmetric manufacturers should set $\Delta=0$. $\Delta > 0$ adds to variance with non-exclusive dealers. $D>0$ does not help reduce variance with non-exclusive dealers.
- With non-exclusive dealers, a manufacturer whose signal tends to have a negative surprise much more often than the competitor, may be better off with a linear incentive (to grow expected sales), while the competitor with a positive surprise may be better off with a lump sum ($D>0$) to decrease variance.