

Supply Contracts

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ESD.260J, 15.770J, 1.260J

Outline

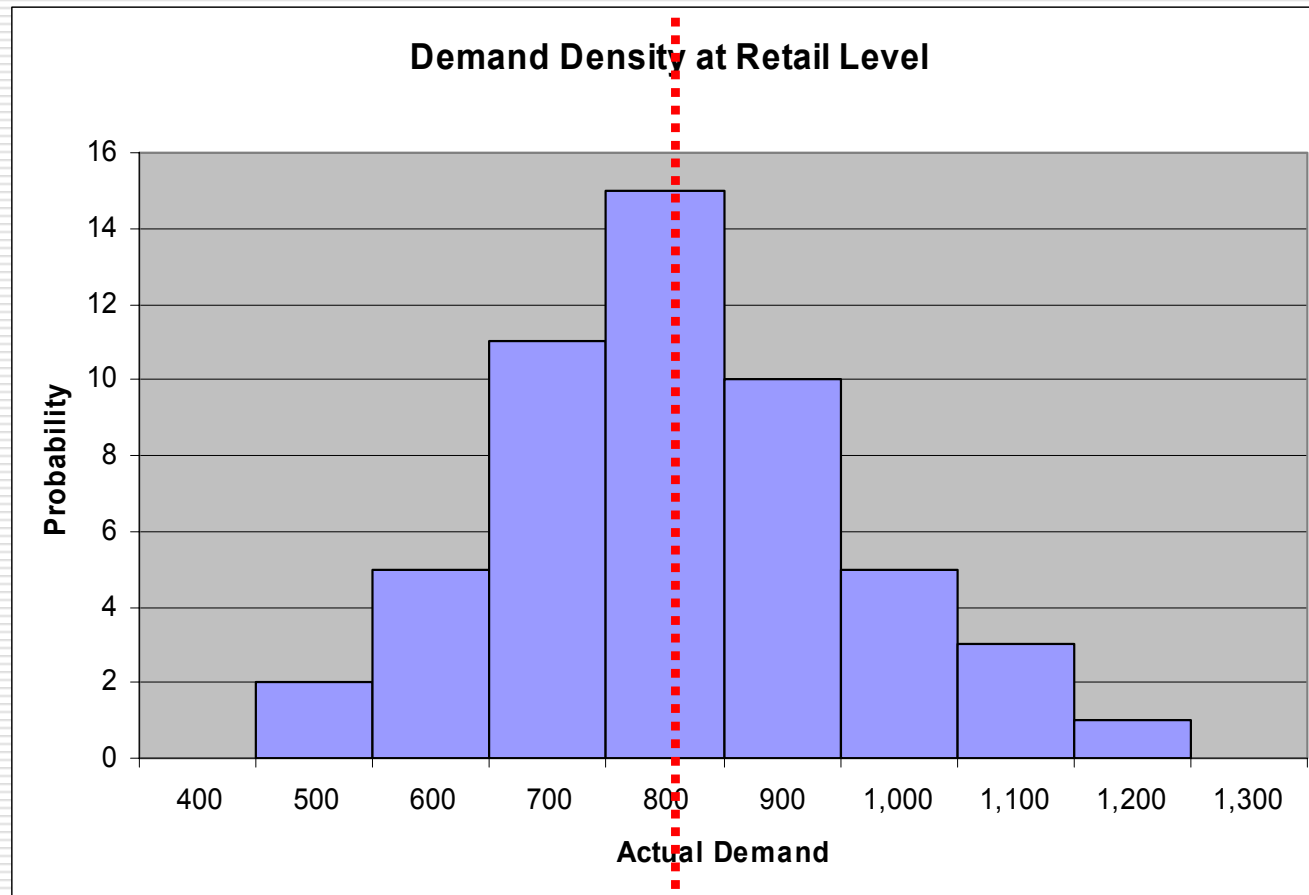
- Supply contracts
- Wholesale contracts
- Buyback contracts
- Revenue sharing contracts
- Option contracts

The Scenario:



- ❑ Contract is negotiated
- ❑ Retailer places order (a single period)
- ❑ Supplier makes and sends the stuff
- ❑ The selling season takes place
- ❑ Accounting (sales, salvage, etc.)

Consumer Demand

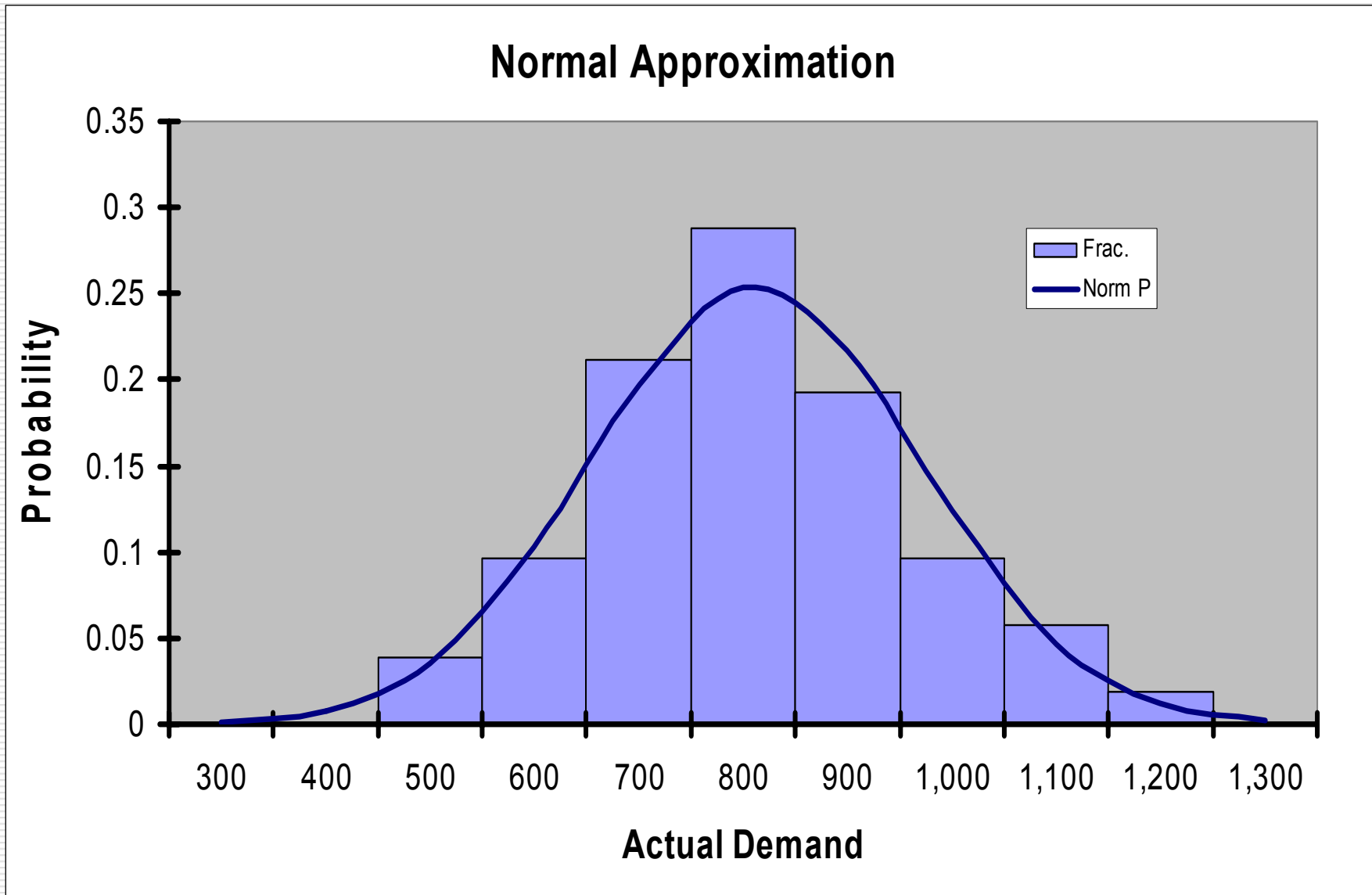


Bin	Freq.
400	0
500	2
600	5
700	11
800	15
900	10
1,000	5
1,100	3
1,200	1
1,300	0

Average: 811.54
Std Dev: 154.23

Average: 811.54
Std Dev: 154.23

Demand Distribution



Notations:

Retail Price	R
Wholesale Price	W
Supplier's Cost	C
Salvage Value	S
Quantity Ordered	Q
Actual Retail Demand	d
Retail Demand Density	$f(D)$
Retail Cum. Demand Distribution	$F(D)$

Wholesale Contracts

- Prices and costs:
 - Supplier has a cost to make/purchase ($C = \$50$)
 - Supplier is selling and retail is buying at a wholesale price ($W = \$135$)
 - Retailer is selling for a retail price ($R = \$200$)
 - Retailer can salvage ($S = \$10$)
- Retailer is facing a Newsboy problem and supplier's profit is trivial

R=\$200
W=\$135
C=\$50
S=\$10

Wholesale Price Contract

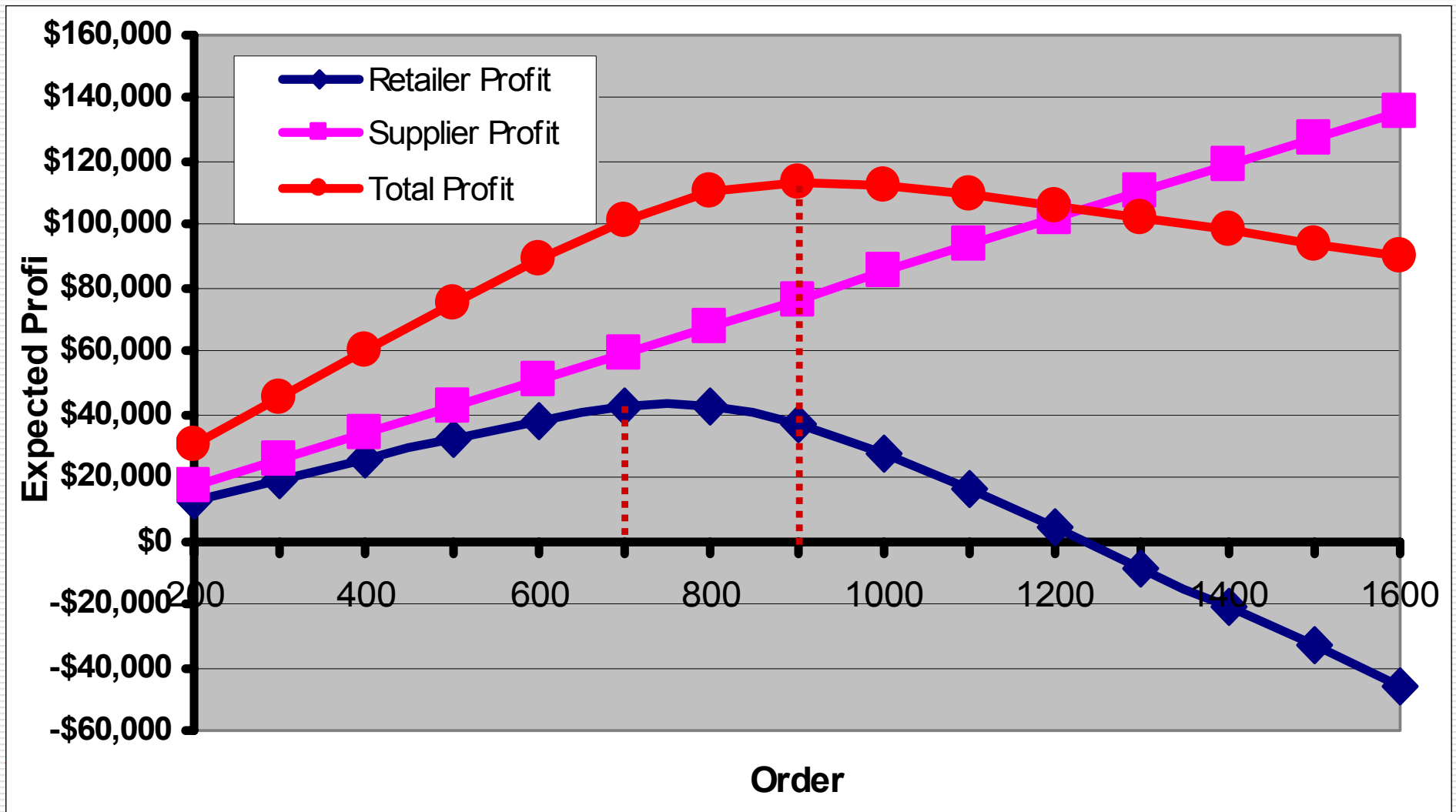
Retailer:		Order:	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
Demand	Prob																
400	0.00		\$13,000	\$19,500	\$26,000	\$13,500	\$1,000	-\$11,500	-\$24,000	-\$36,500	-\$49,000	-\$61,500	-\$74,000	-\$86,500	-\$99,000	-\$111,500	-\$124,000
500	0.04		\$13,000	\$19,500	\$26,000	\$32,500	\$20,000	\$7,500	-\$5,000	-\$17,500	-\$30,000	-\$42,500	-\$55,000	-\$67,500	-\$80,000	-\$92,500	-\$105,000
600	0.10		\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$26,500	\$14,000	\$1,500	-\$11,000	-\$23,500	-\$36,000	-\$48,500	-\$61,000	-\$73,500	-\$86,000
700	0.21		\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$33,000	\$20,500	\$8,000	-\$4,500	-\$17,000	-\$29,500	-\$42,000	-\$54,500	-\$67,000
800	0.29		\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$52,000	\$39,500	\$27,000	\$14,500	\$2,000	-\$10,500	-\$23,000	-\$35,500	-\$48,000
900	0.19		\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$52,000	\$58,500	\$46,000	\$33,500	\$21,000	\$8,500	-\$4,000	-\$16,500	-\$29,000
1,000	0.10		\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$52,000	\$58,500	\$65,000	\$52,500	\$40,000	\$27,500	\$15,000	\$2,500	-\$10,000
1,100	0.06		\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$52,000	\$58,500	\$65,000	\$71,500	\$59,000	\$46,500	\$34,000	\$21,500	\$9,000
1,200	0.02		\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$52,000	\$58,500	\$65,000	\$71,500	\$78,000	\$65,500	\$53,000	\$40,500	\$28,000
1,300	0.00		\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$52,000	\$58,500	\$65,000	\$71,500	\$78,000	\$84,500	\$72,000	\$59,500	\$47,000
Expected Profit:			\$13,000	\$19,500	\$26,000	\$32,500	\$38,269	\$42,212	\$42,135	\$36,577	\$27,365	\$16,327	\$4,192	-\$8,308	-\$20,808	-\$33,308	-\$45,808
Maximum Profit:								1									

Supplier:		Order:	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
Demand	Prob																
400	0.00		\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$110,500	\$119,000	\$127,500	\$136,000
500	0.04		\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$110,500	\$119,000	\$127,500	\$136,000
600	0.10		\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$110,500	\$119,000	\$127,500	\$136,000
700	0.21		\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$110,500	\$119,000	\$127,500	\$136,000
800	0.29		\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$110,500	\$119,000	\$127,500	\$136,000
900	0.19		\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$110,500	\$119,000	\$127,500	\$136,000
1,000	0.10		\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$110,500	\$119,000	\$127,500	\$136,000
1,100	0.06		\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$110,500	\$119,000	\$127,500	\$136,000
1,200	0.02		\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$110,500	\$119,000	\$127,500	\$136,000
1,300	0.00		\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$110,500	\$119,000	\$127,500	\$136,000
Expected Profit:			\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$110,500	\$119,000	\$127,500	\$136,000
Maximum Profit:																	!!!

Total Profit:	\$30,000	\$45,000	\$60,000	\$75,000	\$89,269	\$101,712	\$110,135	\$113,077	\$112,365	\$109,827	\$106,192	\$102,192	\$98,192	\$94,192	\$90,192		
Maximum Profit								!!!									

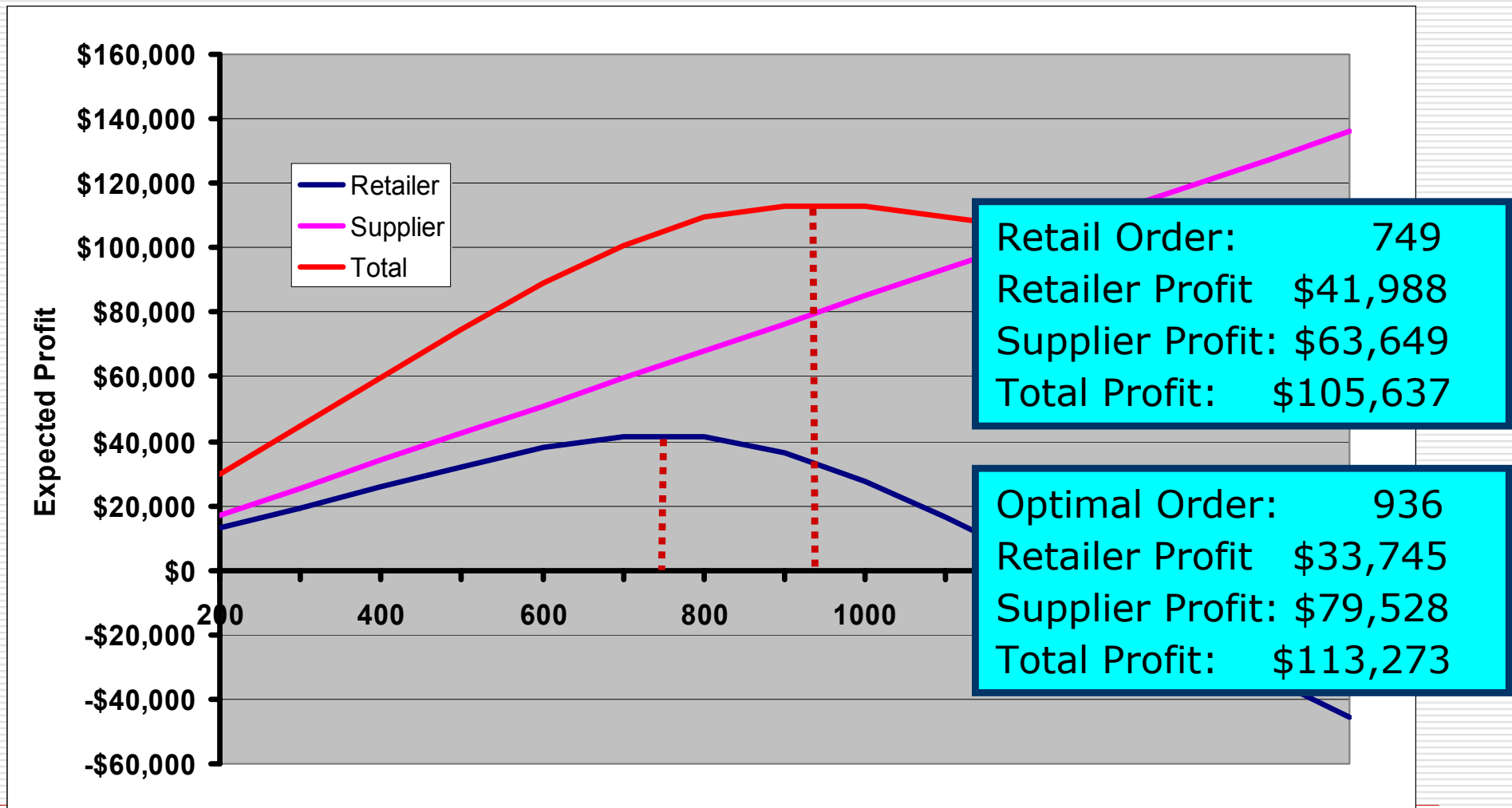
Wholesale Price Contract Expected Profits

$R = \$200$
 $W = \$135$
 $C = \$50$
 $S = \$10$

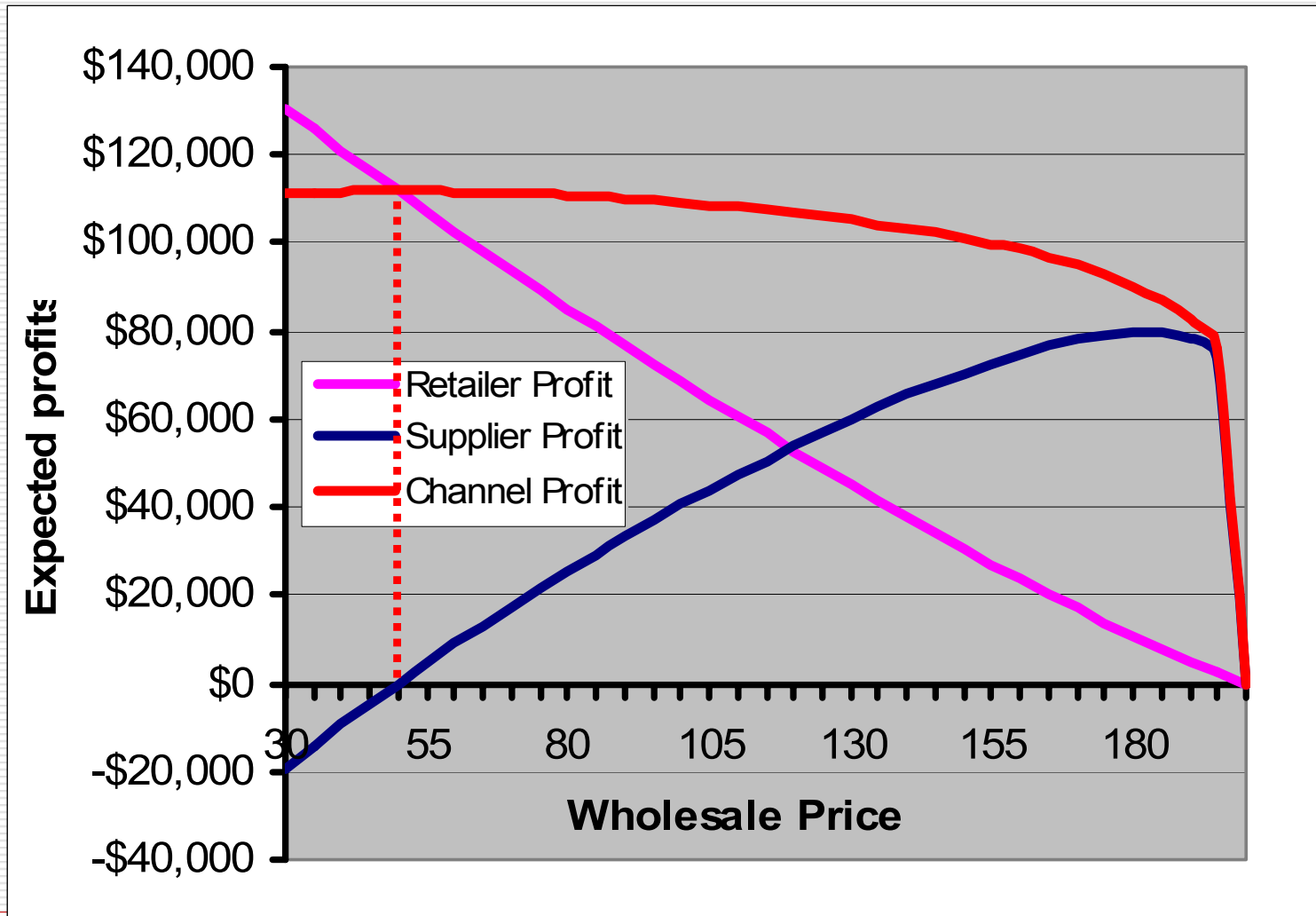


Wholesale Price Contract Exp Profits (Normal Approx)

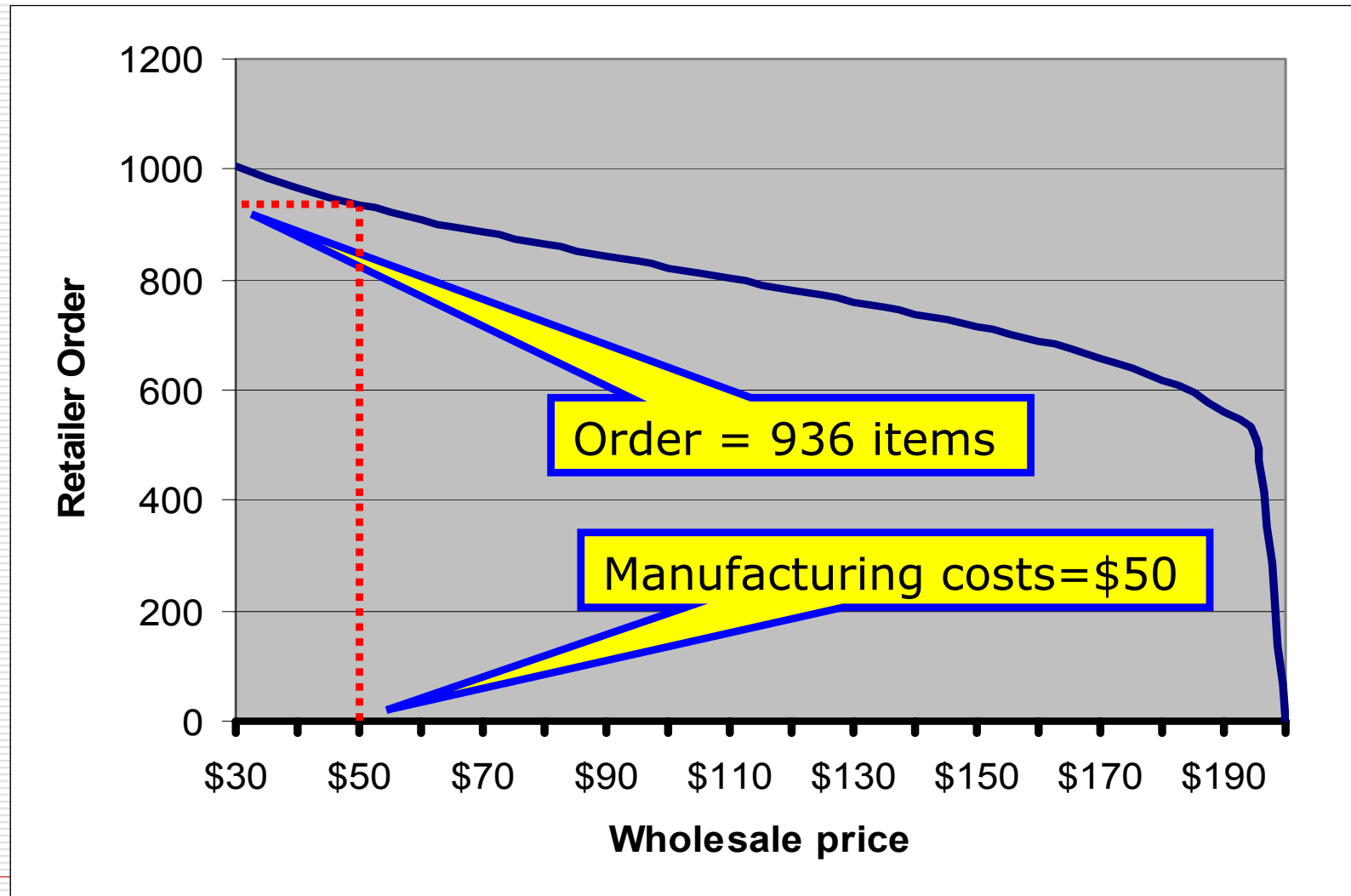
$R = \$200$
 $W = \$135$
 $C = \$50$
 $S = \$10$



Effects of Wholesale Price on Profits



Optimal Retail Order as a Function of the Wholesale Price



Wholesale Price Contract Coordination the Channel

$$Q_{Retailer}^* = Q_{Channel}^*$$

$$F^{-1}\left(\frac{R-W}{R-S}\right) = F^{-1}\left(\frac{R-C}{R-S}\right)$$

$$\left(\frac{R-W}{R-S}\right) = \left(\frac{R-C}{R-S}\right)$$

$$W = C$$

Buyback Contract

- The problem: how can the supplier convince the retailer to move towards the optimal order size?
- The supplier offer to the retailer to buy back all unsold items ($\$B/\text{item}$).
- For the retailer – this is like a higher salvage value, so he will order more.
- The supplier now shares in the overage risk (he can still salvage, though, at the same price).
- Note: supplier may simply pay $(\$B - \$S)$ rather than actually buy back (unless he has a better use for it)

Buyback Contract Calculations

R=\$200
W=\$135
C=\$50
S=\$10
B=\$80

Retailer:

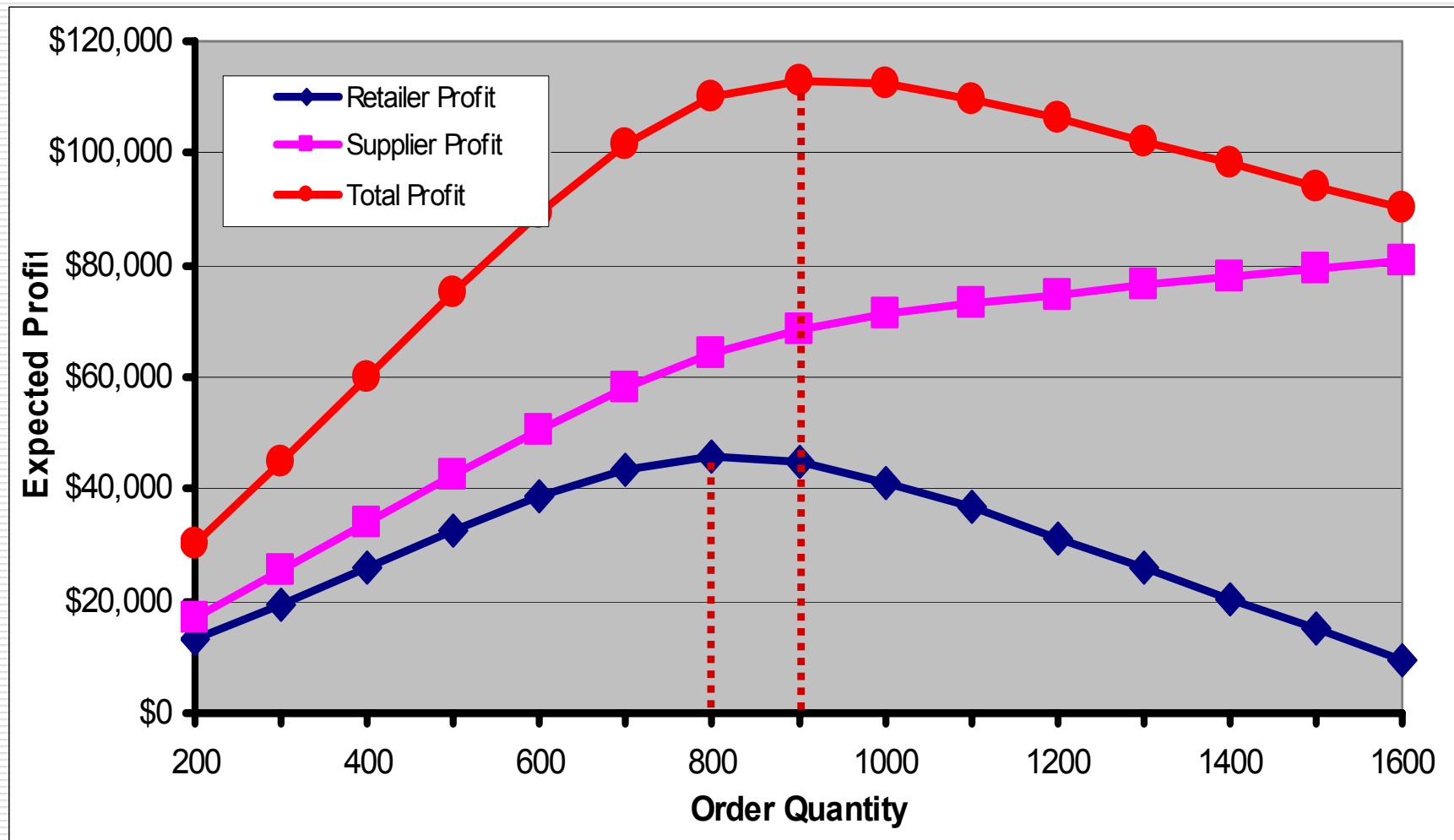
Order:	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
Demand	Prob														
400	0.00	\$13,000	\$19,500	\$26,000	\$20,500	\$15,000	\$9,500	\$4,000	-\$1,500	-\$7,000	-\$12,500	-\$18,000	-\$23,500	-\$29,000	-\$34,500
500	0.04	\$13,000	\$19,500	\$26,000	\$32,500	\$27,000	\$21,500	\$16,000	\$10,500	\$5,000	-\$500	-\$6,000	-\$11,500	-\$17,000	-\$22,500
600	0.10	\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$33,500	\$28,000	\$22,500	\$17,000	\$11,500	\$6,000	\$500	-\$5,000	-\$10,500
700	0.21	\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$40,000	\$34,500	\$29,000	\$23,500	\$18,000	\$12,500	\$7,000	\$1,500
800	0.29	\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$52,000	\$46,500	\$41,000	\$35,500	\$30,000	\$24,500	\$19,000	\$13,500
900	0.19	\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$52,000	\$58,500	\$53,000	\$47,500	\$42,000	\$36,500	\$31,000	\$25,500
1,000	0.10	\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$52,000	\$58,500	\$65,000	\$59,500	\$54,000	\$48,500	\$43,000	\$37,500
1,100	0.06	\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$52,000	\$58,500	\$65,000	\$71,500	\$66,000	\$60,500	\$55,000	\$49,500
1,200	0.02	\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$52,000	\$58,500	\$65,000	\$71,500	\$78,000	\$72,500	\$67,000	\$61,500
1,300	0.00	\$13,000	\$19,500	\$26,000	\$32,500	\$39,000	\$45,500	\$52,000	\$58,500	\$65,000	\$71,500	\$78,000	\$84,500	\$79,000	\$73,500
Expected Profit:		\$13,000	\$19,500	\$26,000	\$32,500	\$38,538	\$43,423	\$45,769	\$44,654	\$41,231	\$36,654	\$31,385	\$25,885	\$20,385	\$14,885
Maximum Profit:								1							

Supplier:

Order:	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
Demand	Prob														
400	0.00	\$17,000	\$25,500	\$34,000	\$35,500	\$37,000	\$38,500	\$40,000	\$41,500	\$43,000	\$44,500	\$46,000	\$47,500	\$49,000	\$50,500
500	0.04	\$17,000	\$25,500	\$34,000	\$42,500	\$44,000	\$45,500	\$47,000	\$48,500	\$50,000	\$51,500	\$53,000	\$54,500	\$56,000	\$57,500
600	0.10	\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$52,500	\$54,000	\$55,500	\$57,000	\$58,500	\$60,000	\$61,500	\$63,000	\$64,500
700	0.21	\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$61,000	\$62,500	\$64,000	\$65,500	\$67,000	\$68,500	\$70,000	\$71,500
800	0.29	\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$69,500	\$71,000	\$72,500	\$74,000	\$75,500	\$77,000	\$78,500
900	0.19	\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$78,000	\$79,500	\$81,000	\$82,500	\$84,000	\$85,500
1,000	0.10	\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$86,500	\$88,000	\$89,500	\$91,000	\$92,500
1,100	0.06	\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$95,000	\$96,500	\$98,000	\$99,500
1,200	0.02	\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$103,500	\$105,000	\$106,500
1,300	0.00	\$17,000	\$25,500	\$34,000	\$42,500	\$51,000	\$59,500	\$68,000	\$76,500	\$85,000	\$93,500	\$102,000	\$110,500	\$112,000	\$113,500
Expected Profit:		\$17,000	\$25,500	\$34,000	\$42,500	\$50,731	\$58,288	\$64,365	\$68,423	\$71,135	\$73,173	\$74,808	\$76,308	\$77,808	\$79,308
Maximum Profit:															!!!
Total Profit:		\$30,000	\$45,000	\$60,000	\$75,000	\$89,269	\$101,712	\$110,135	\$113,077	\$112,365	\$109,827	\$106,192	\$102,192	\$98,192	\$94,192
Maximum Profit									!!!						

Channel profit with Buyback

$R = \$200$
 $W = \$135$
 $C = \$50$
 $S = \$10$
 $B = \$80$

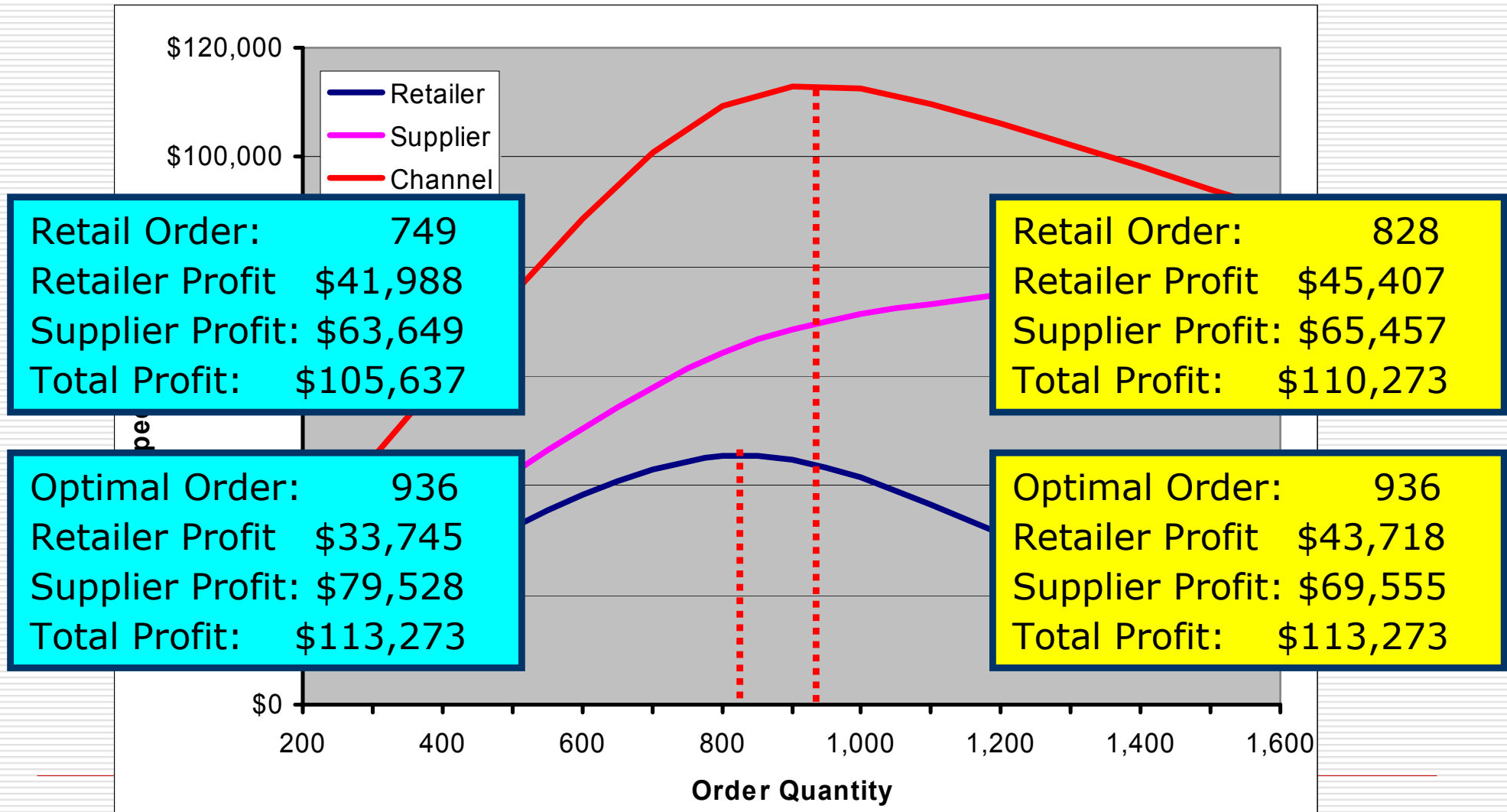


Optimal Buyback and Wholesale price

- Higher wholesale price requires a _____ buyback rate
- As the wholesale price (and the buyback rate) grows the supplier's share of the profit _____
 - Wholesale price ranges from \$50 (supplier's cost) to \$200 (retail price)
 - Buyback rate ranges from \$10 (salvage value) to \$200.

Expected Profits with Buyback Contract

$R = \$200$
 $W = \$135$
 $C = \$50$
 $S = \$10$
 $B = \$80$



Optimal Buyback Price

$$Q_{Retailer}^* = Q_{Channel}^*$$

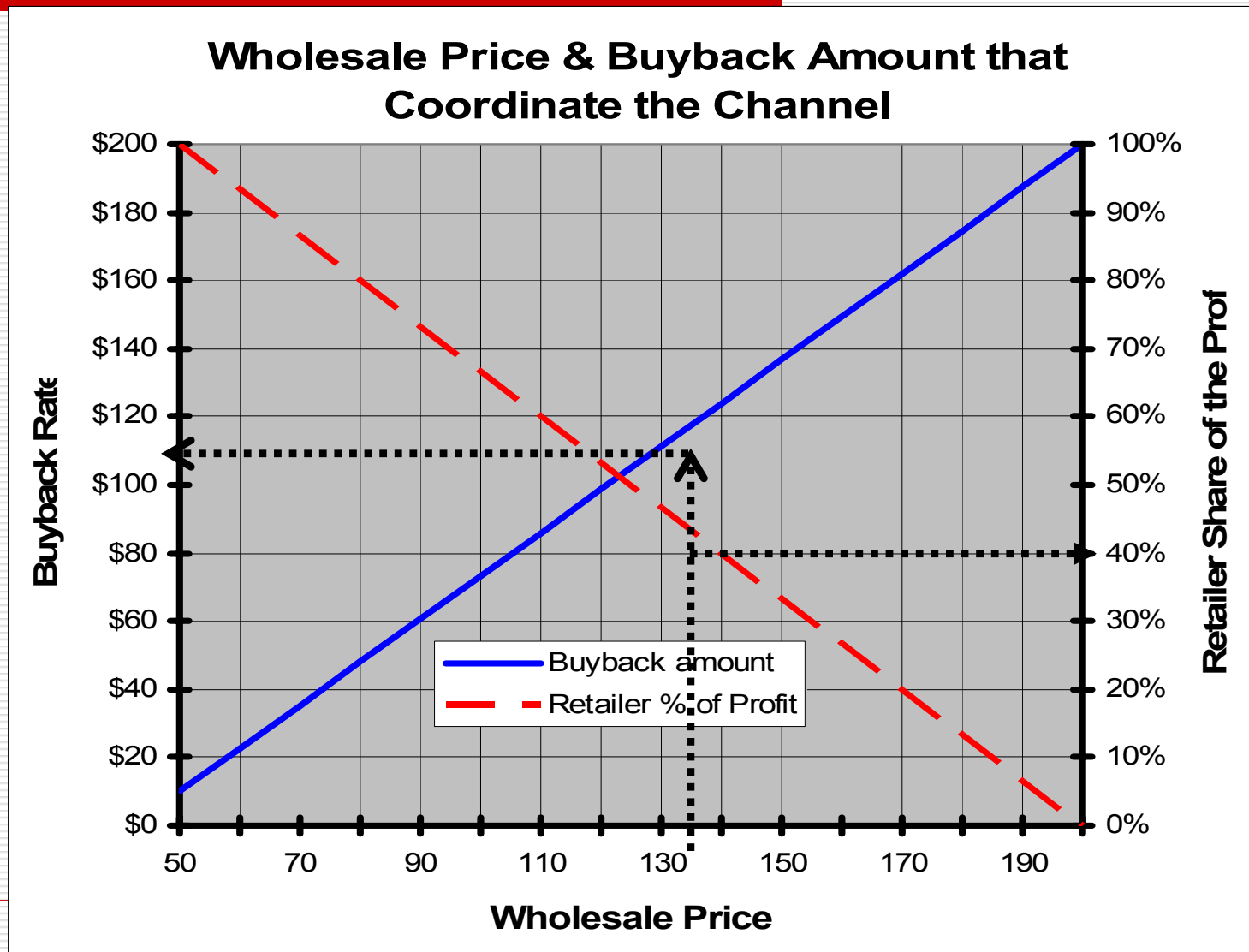
$$F^{-1}\left(\frac{R-W}{R-B}\right) = F^{-1}\left(\frac{R-C}{R-S}\right)$$

$$\left(\frac{R-W}{R-B}\right) = \left(\frac{R-C}{R-S}\right)$$

$$B = \left(\frac{R-S}{R-C}\right) \cdot W - \left(\frac{R \cdot (C-S)}{R-C}\right)$$

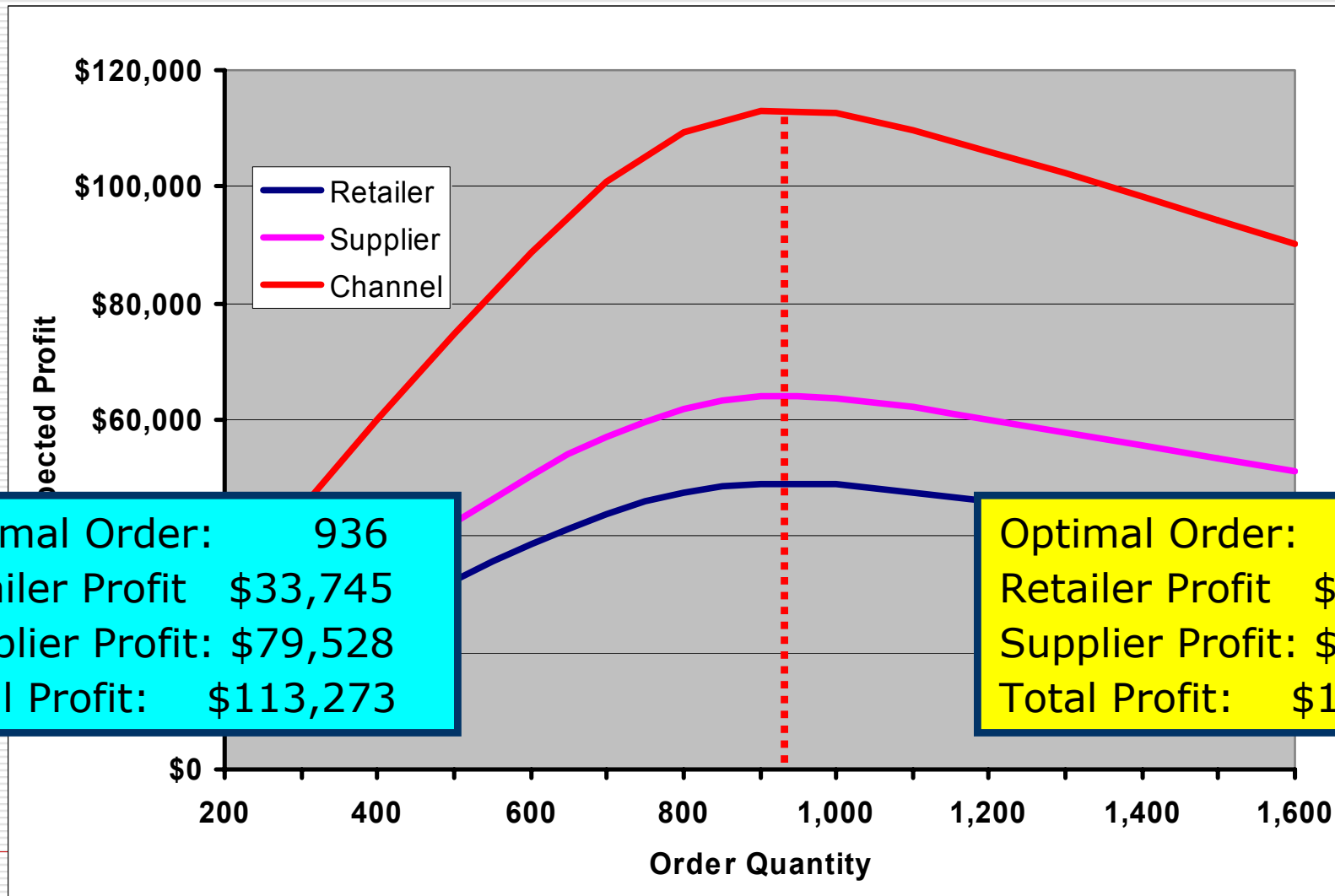
Channel Coordination with Buyback

$R = \$200$
 $W = \$135$
 $C = \$50$
 $S = \$10$
 $B = \$80$



Expected Profit with Coordinating Buyback Rate

$R = \$200$
 $W = \$135$
 $C = \$50$
 $S = \$10$
 $B^* = \$118$



Optimal Order: 936
Retailer Profit: \$33,745
Supplier Profit: \$79,528
Total Profit: \$113,273

Optimal Order: 936
Retailer Profit: \$49,086
Supplier Profit: \$64,188
Total Profit: \$113,273

Buyback Contracts in Practice

- ☐ Book publishing
- ☐ Periodicals/newspapers
- ☐ Price support in consumer electronics

Revenue Sharing

- ❑ Supplier still needs to get the retailer to order more
 - ❑ Another risk-sharing scheme: supplier lowers the wholesale price but takes a percentage $(1-p)$ of the revenue
 - ❑ Question: how to choose W and p so the retailer will order the optimal amount
 - ❑ Note: wholesale price has to be lower than the supplier's cost.
-

The Players

Paramount

Blockbuster

The Economics of Revenue Sharing

The Economics of Revenue Sharing

In the video industry, revenue sharing may increase profits for the supplier and the retailer alike, as this hypothetical example reveals.

FOR THE RETAILER

	Traditional Pricing	Revenue Sharing
A. Number of tapes purchased	10	30
B. Price per tape	\$60	\$9
C. Purchase cost	\$600	\$270
D. Number of rentals	300	500
E. Total retail revenue (D x \$3/rental)	\$900	\$1,500
F. Retailer's share of rental revenue	\$900 (100%)	\$750 (50%)
G. Retailer's profit	\$300	\$480
H. Profit per dollar of inventory	\$0.50	\$1.78

FOR THE SUPPLIER

	Traditional Pricing	Revenue Sharing
I. Number of tapes purchased	10	30
J. Price per tape	\$60	\$9
K. Revenue from selling tapes	\$600	\$270
L. Number of rentals	300	500
M. Total rental revenue (L x \$3/rental)	\$900	\$1,500
N. Supplier's share of rental revenue	\$0 (0%)	\$750 (50%)
O. Supplier's total revenues	\$600	\$1,020
P. Supplier's production and distribution cost (I x \$10/tape)	\$100	\$300
Q. Supplier's profit	\$500	\$720

Revenue Sharing

R= \$200
W= \$40
C= \$50
S= \$10
p= 0.40

Retailer:

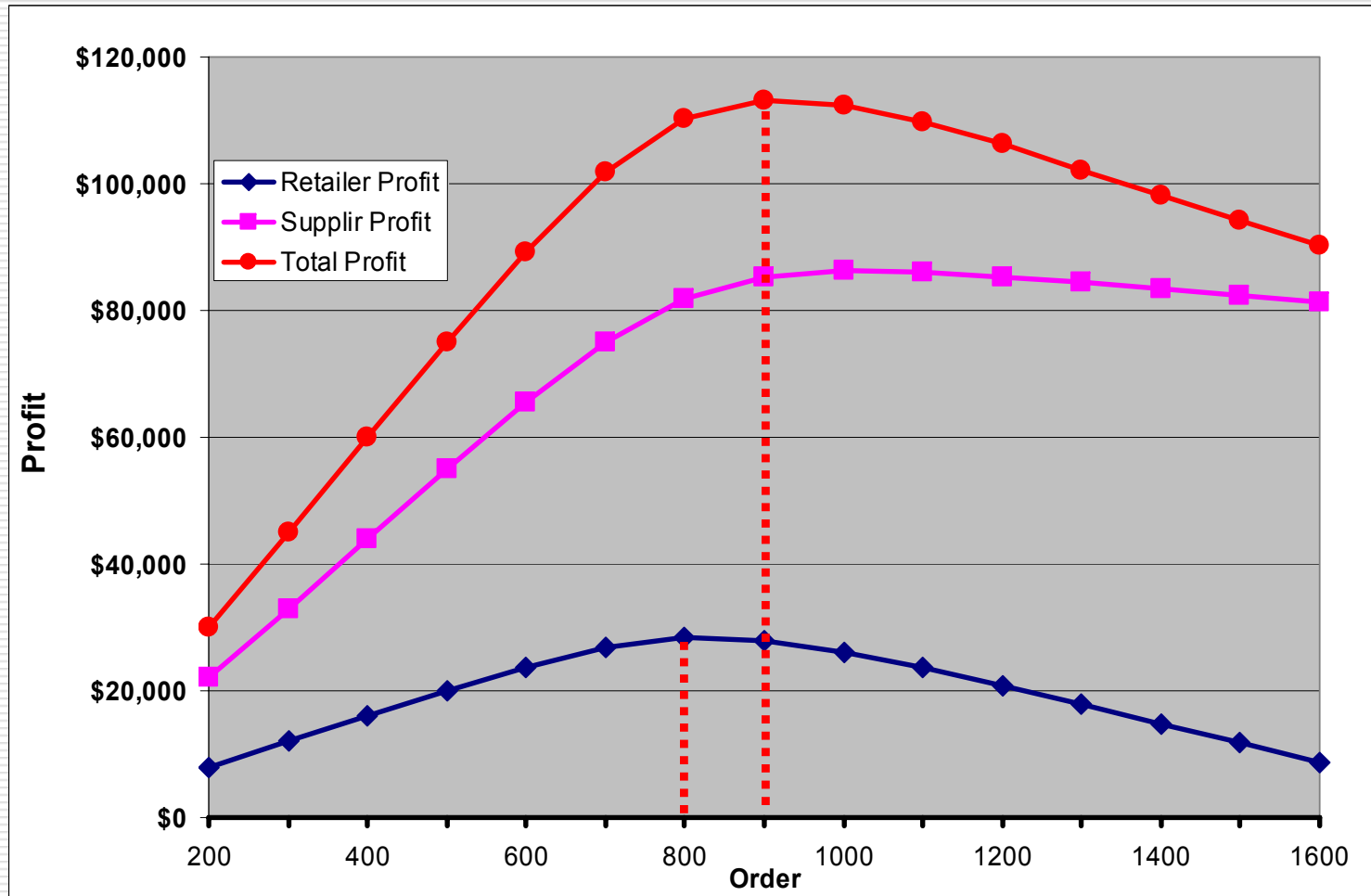
	Order:	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
Demand	Prob															
400	0.00	\$8,000	\$12,000	\$16,000	\$13,000	\$10,000	\$7,000	\$4,000	\$1,000	-\$2,000	-\$5,000	-\$8,000	-\$11,000	-\$14,000	-\$17,000	-\$20,000
500	0.04	\$8,000	\$12,000	\$16,000	\$20,000	\$17,000	\$14,000	\$11,000	\$8,000	\$5,000	\$2,000	-\$1,000	-\$4,000	-\$7,000	-\$10,000	-\$13,000
600	0.10	\$8,000	\$12,000	\$16,000	\$20,000	\$24,000	\$21,000	\$18,000	\$15,000	\$12,000	\$9,000	\$6,000	\$3,000	\$0	-\$3,000	-\$6,000
700	0.21	\$8,000	\$12,000	\$16,000	\$20,000	\$24,000	\$28,000	\$25,000	\$22,000	\$19,000	\$16,000	\$13,000	\$10,000	\$7,000	\$4,000	\$1,000
800	0.29	\$8,000	\$12,000	\$16,000	\$20,000	\$24,000	\$28,000	\$32,000	\$29,000	\$26,000	\$23,000	\$20,000	\$17,000	\$14,000	\$11,000	\$8,000
900	0.19	\$8,000	\$12,000	\$16,000	\$20,000	\$24,000	\$28,000	\$32,000	\$36,000	\$33,000	\$30,000	\$27,000	\$24,000	\$21,000	\$18,000	\$15,000
1,000	0.10	\$8,000	\$12,000	\$16,000	\$20,000	\$24,000	\$28,000	\$32,000	\$36,000	\$40,000	\$37,000	\$34,000	\$31,000	\$28,000	\$25,000	\$22,000
1,100	0.06	\$8,000	\$12,000	\$16,000	\$20,000	\$24,000	\$28,000	\$32,000	\$36,000	\$40,000	\$44,000	\$41,000	\$38,000	\$35,000	\$32,000	\$29,000
1,200	0.02	\$8,000	\$12,000	\$16,000	\$20,000	\$24,000	\$28,000	\$32,000	\$36,000	\$40,000	\$44,000	\$48,000	\$45,000	\$42,000	\$39,000	\$36,000
1,300	0.00	\$8,000	\$12,000	\$16,000	\$20,000	\$24,000	\$28,000	\$32,000	\$36,000	\$40,000	\$44,000	\$48,000	\$52,000	\$49,000	\$46,000	\$43,000
Expected Profit:		\$8,000	\$12,000	\$16,000	\$20,000	\$23,731	\$26,788	\$28,365	\$27,923	\$26,135	\$23,673	\$20,808	\$17,808	\$14,808	\$11,808	\$8,808
Maximum Profit:		1														

Supplier:

	Order:	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
Demand	Prob															
400	0.00	\$22,000	\$33,000	\$44,000	\$43,000	\$42,000	\$41,000	\$40,000	\$39,000	\$38,000	\$37,000	\$36,000	\$35,000	\$34,000	\$33,000	\$32,000
500	0.04	\$22,000	\$33,000	\$44,000	\$55,000	\$54,000	\$53,000	\$52,000	\$51,000	\$50,000	\$49,000	\$48,000	\$47,000	\$46,000	\$45,000	\$44,000
600	0.10	\$22,000	\$33,000	\$44,000	\$55,000	\$66,000	\$65,000	\$64,000	\$63,000	\$62,000	\$61,000	\$60,000	\$59,000	\$58,000	\$57,000	\$56,000
700	0.21	\$22,000	\$33,000	\$44,000	\$55,000	\$66,000	\$77,000	\$76,000	\$75,000	\$74,000	\$73,000	\$72,000	\$71,000	\$70,000	\$69,000	\$68,000
800	0.29	\$22,000	\$33,000	\$44,000	\$55,000	\$66,000	\$77,000	\$88,000	\$87,000	\$86,000	\$85,000	\$84,000	\$83,000	\$82,000	\$81,000	\$80,000
900	0.19	\$22,000	\$33,000	\$44,000	\$55,000	\$66,000	\$77,000	\$88,000	\$99,000	\$98,000	\$97,000	\$96,000	\$95,000	\$94,000	\$93,000	\$92,000
1,000	0.10	\$22,000	\$33,000	\$44,000	\$55,000	\$66,000	\$77,000	\$88,000	\$99,000	\$110,000	\$109,000	\$108,000	\$107,000	\$106,000	\$105,000	\$104,000
1,100	0.06	\$22,000	\$33,000	\$44,000	\$55,000	\$66,000	\$77,000	\$88,000	\$99,000	\$110,000	\$121,000	\$120,000	\$119,000	\$118,000	\$117,000	\$116,000
1,200	0.02	\$22,000	\$33,000	\$44,000	\$55,000	\$66,000	\$77,000	\$88,000	\$99,000	\$110,000	\$121,000	\$132,000	\$131,000	\$130,000	\$129,000	\$128,000
1,300	0.00	\$22,000	\$33,000	\$44,000	\$55,000	\$66,000	\$77,000	\$88,000	\$99,000	\$110,000	\$121,000	\$132,000	\$143,000	\$142,000	\$141,000	\$140,000
Expected Profit:		\$22,000	\$33,000	\$44,000	\$55,000	\$65,538	\$74,923	\$81,769	\$85,154	\$86,231	\$86,154	\$85,385	\$84,385	\$83,385	\$82,385	\$81,385
Maximum Profit:		!!!														
Total Profit:		\$30,000	\$45,000	\$60,000	\$75,000	\$89,269	\$101,712	\$110,135	\$113,077	\$112,365	\$109,827	\$106,192	\$102,192	\$98,192	\$94,192	\$90,192
Maximum Profit		!!!														

Expected Profit with Revenue Sharing

$R = \$200$
 $W = \$40$
 $C = \$50$
 $S = \$10$
 $p = 0.40$



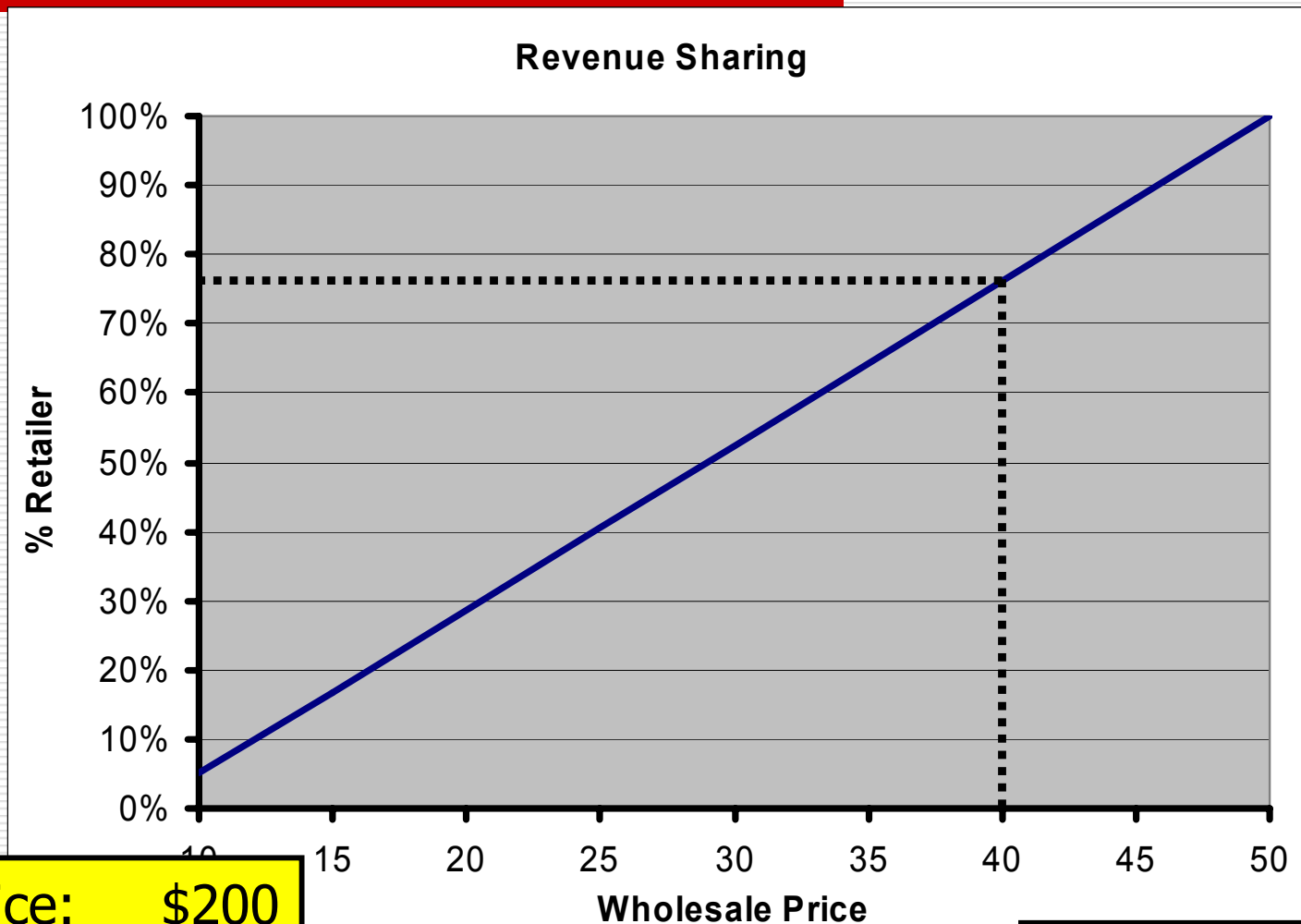
Optimal Revenue Share

$$Q_R^* = F^{-1}\left(\frac{p \cdot R - W}{p \cdot R - S}\right)$$

$$\left(\frac{p \cdot R - W}{p \cdot R - S}\right) = \left(\frac{R - C}{R - S}\right)$$

$$p = W \cdot \frac{(R - C)}{R \cdot (C - S)} - \frac{S \cdot (R - C)}{R \cdot (C - S)}$$

Coordination with Rev. Sharing

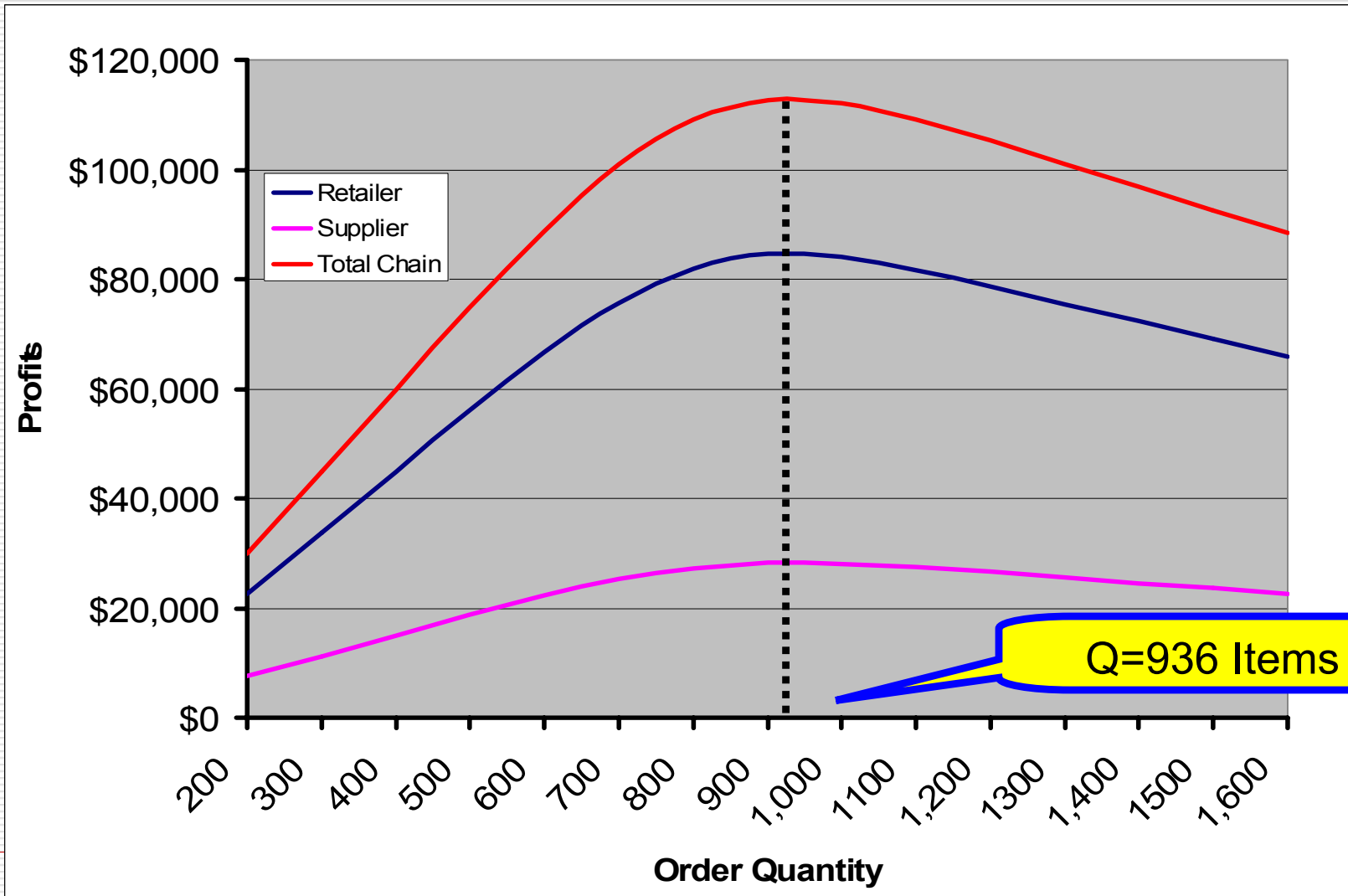


Retail Price: \$200
Supplier Costs: \$50
Salvage value: \$10

Wholesale price: \$40
Retail Rev Share: 76%

Revenue Sharing (Normal Approx)

$R = \$200$
 $W = \$40$
 $C = \$50$
 $S = \$10$
 $p = 0.76$

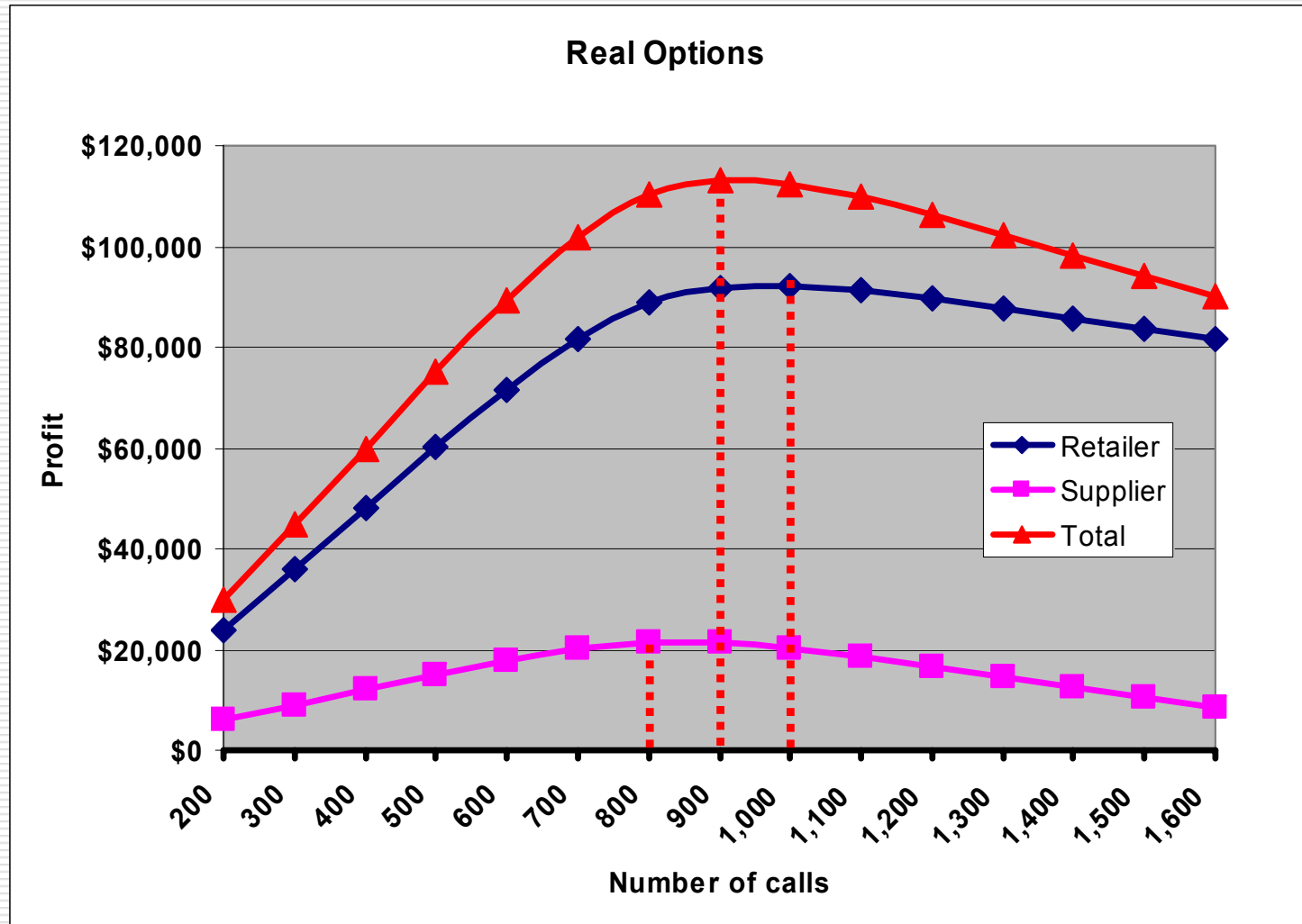


Real Options

- The retailer buys Q call options at a price w .
- The supplier makes Q items.
- Each option can be exercised at a unit price E .
- As demand materializes the retailer can take deliveries at a price E .
- No more than Q items can be bought from the supplier

Real Options

R= \$200
W= \$20
C= \$50
S= \$10
E= \$60



Coordination with Real Options

Retailer's optimal order:

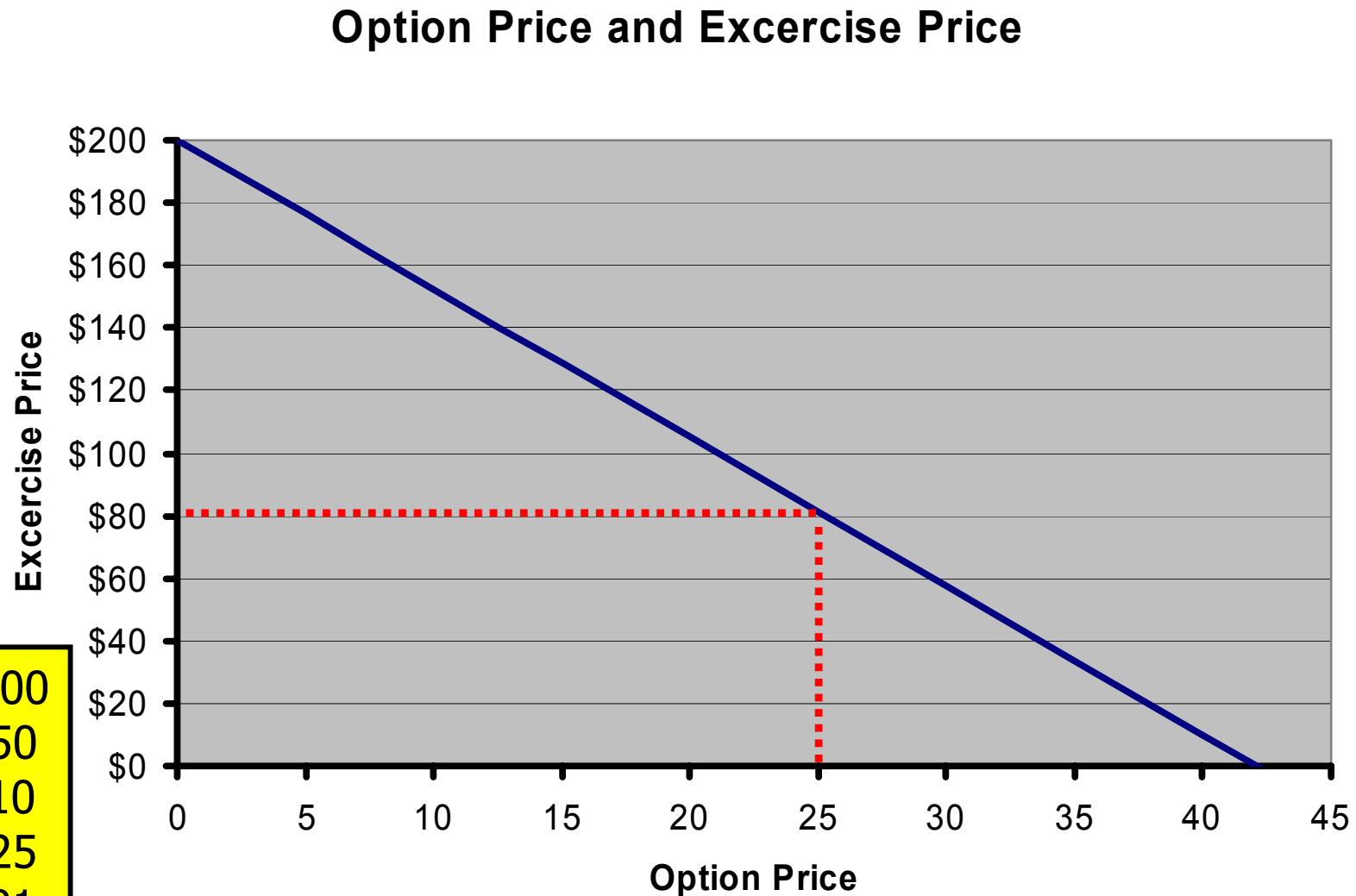
$$\frac{d\Pi_R(Q)}{dQ} = 0 \quad \Rightarrow \quad Q^* = F^{-1}\left(\frac{R-E-W}{R-E}\right)$$

Comparing to a single channel:

$$Q^* = F^{-1}\left(\frac{R-C}{R-S}\right) \quad \Rightarrow \quad E = -\left(\frac{R-S}{C-S}\right) \cdot W + R$$

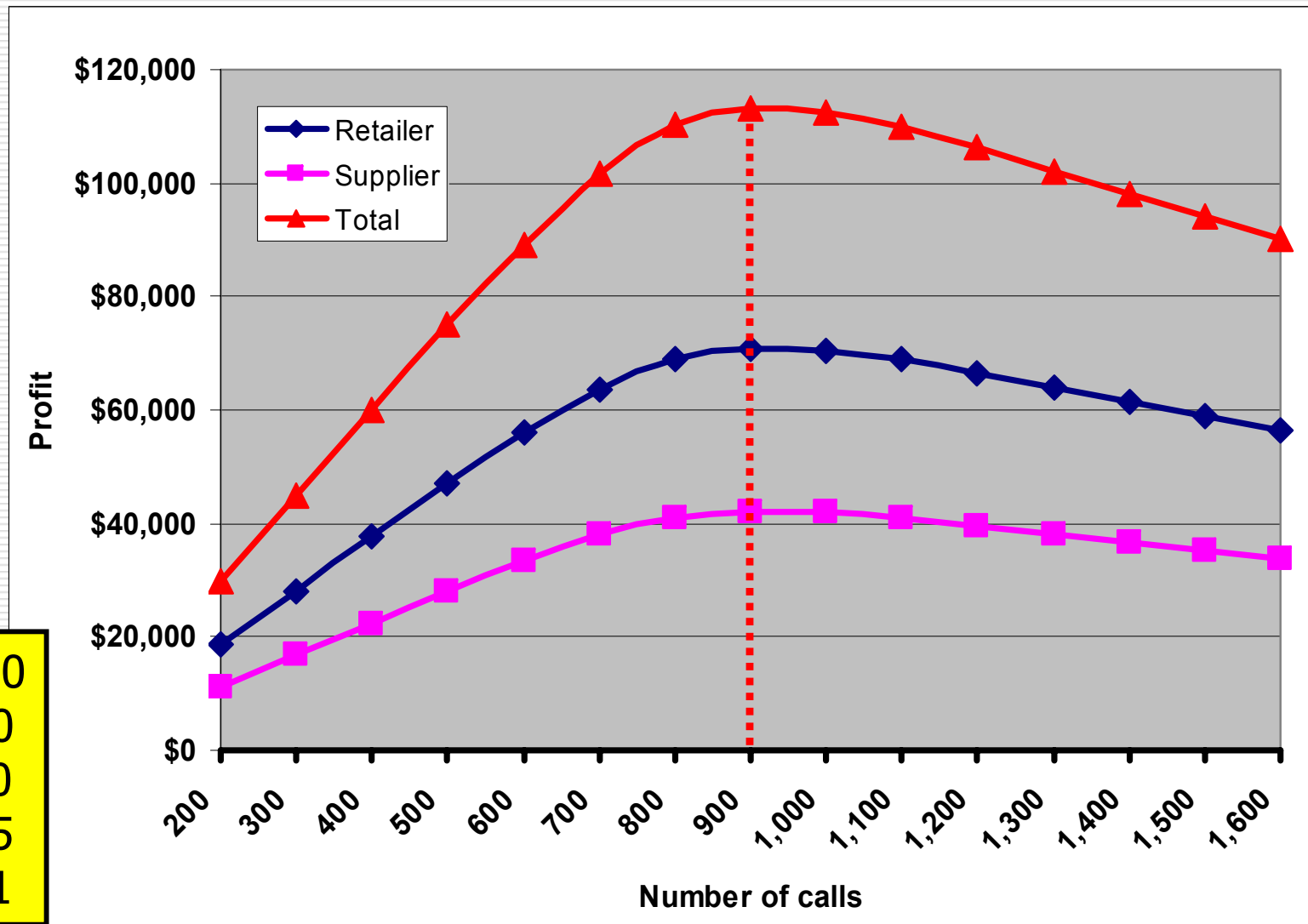
$$\text{Where: } W \in \left(0, R \cdot \frac{C-S}{R-S}\right)$$

Coordination with Real Options



R = \$200
C = \$50
S = \$10
W = \$25
E = \$81

Expected Profits with Options



R = \$200
C = \$50
S = \$10
W = \$25
E = \$81

Summary

- ❑ Wholesale contracts give too much risk and not enough expected reward to the retailer
 - ❑ To make the retailer order more (and increase the channel's profit) the supplier has to take on part of the risk
 - ❑ Risk sharing mechanisms covered include:
 - Buybacks; revenue sharing, option contract
 - ❑ Other mechanisms
 - Quantity-flexibility (refund on a portion of the unsold units)
 - Sales-rebate (rebate on unsold units above a threshold)
 - There are many other mechanisms
 - ❑ Each mechanism can coordinate the channel with various allocations of the profit between the retailer and the supplier.
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Any Questions?

Yossi Sheffi
