

# Genentech and capacity strategy





# Other Avastin demand (expected)

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Cancer	Cancer Patients				Patients using Avastin		
	2005	2010	2015	prob	2005	2010	2015
<b>lung -Front</b>	3.75	22.5	22.5	0.38	1.425	8.55	8.55
<b>Other</b>	0.7	5.25	5.25	0.25	0.175	1.3125	1.3125
<b>Breast- Front</b>		42	42	0.38	0	15.96	15.96
<b>other</b>		12	12	0.5	0	6	6
<b>Kidney- Front</b>		5.4	5.4	0.5	0	2.7	2.7
<b>Other</b>		2.7	2.7	0.25	0	0.675	0.675



# Other Avastin demand

	Cancer patients				Patients using Avastin		
	2005	2010	2015	orob	2005	2010	2015
<b>Panc- F</b>		4.8	4.8	0.25	0	1.2	1.2
<b>Other</b>		2.4	2.4	0.5	0	1.2	1.2
<b>Other - F</b>		7.5	15	0.25	0	1.875	3.75
<b>Other</b>		4	7.5	0.25	0	1	1.875
<b>Total patients</b>					1.60	40.47	43.22
<b>Total kg</b>					14.4	364.3	389



# Total demand

	colorectal	Other Avastin	Other	Total	Plus safety
2005	263	14	1000	1277	1609
2010	322	364	1500	2188	2756
2015	383	389	1850	2622	3303



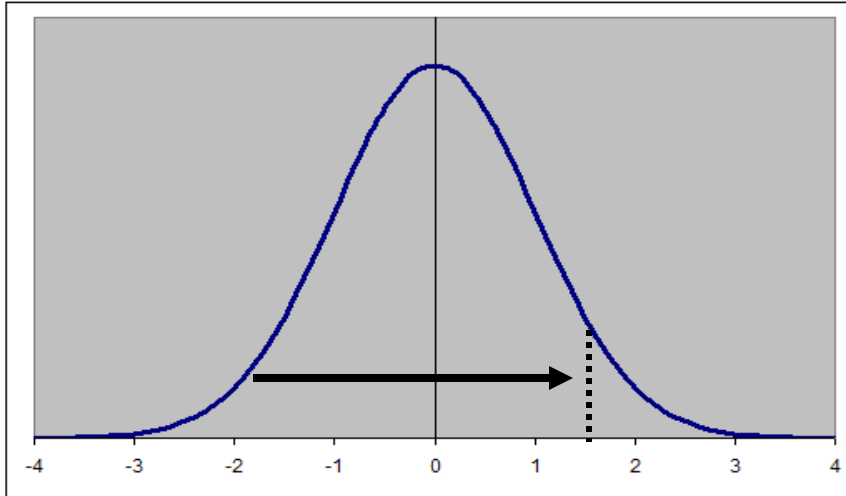
# How do deal with variability?

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- Sources?
- Distribution?
  - Normal?
  - Skewed?
- How to analyze?
- Percentile?
  - 85%?
  - Cost of underage versus overage (extra capacity)

Normal distribution is an easy way to determine the appropriate demand levels

84% of area  
Under curve  
( $Z=1$ )



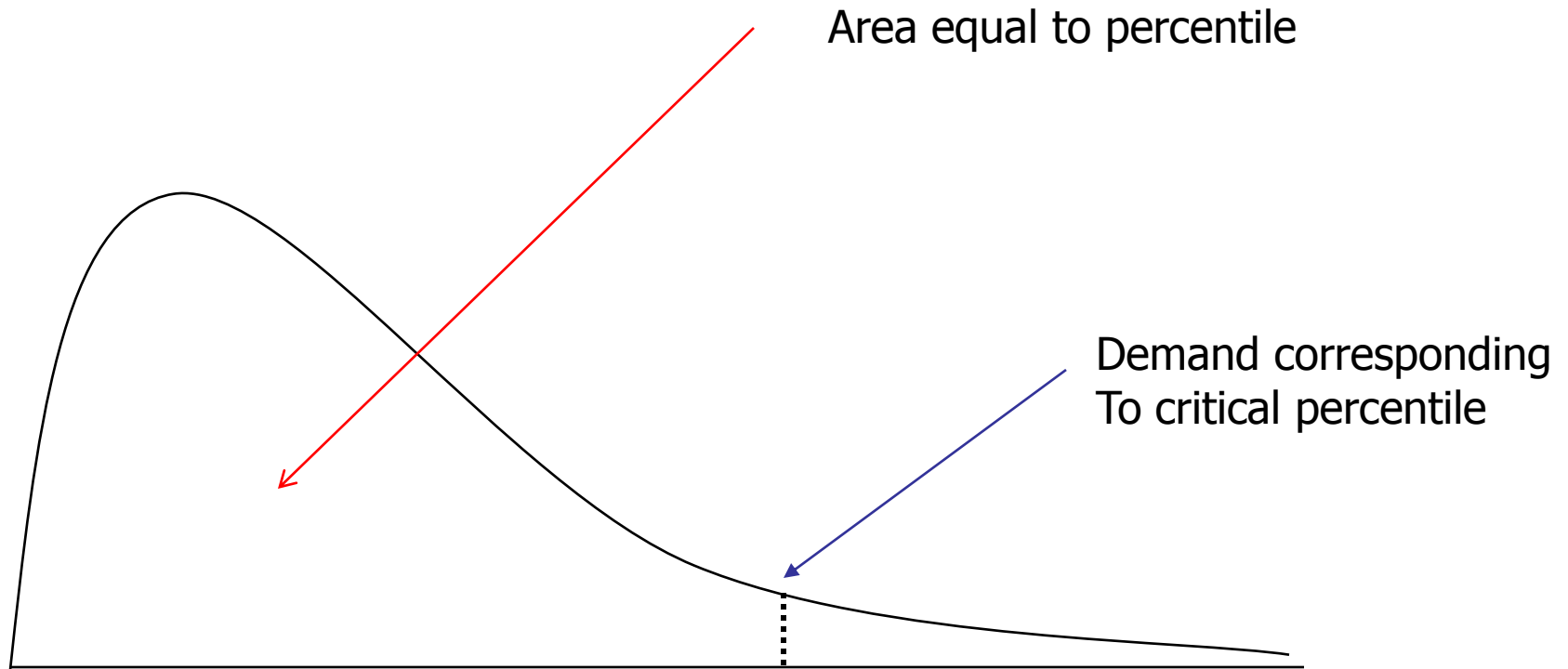
CSL	Z
84%	1
90%	1.28
95%	1.64
99%	2.33

Calculate required capacity as:

Average demand +  $z$  \* standard deviation of demand

Concept: Find percentile corresponding to cost balance point (critical fractile or percentile)

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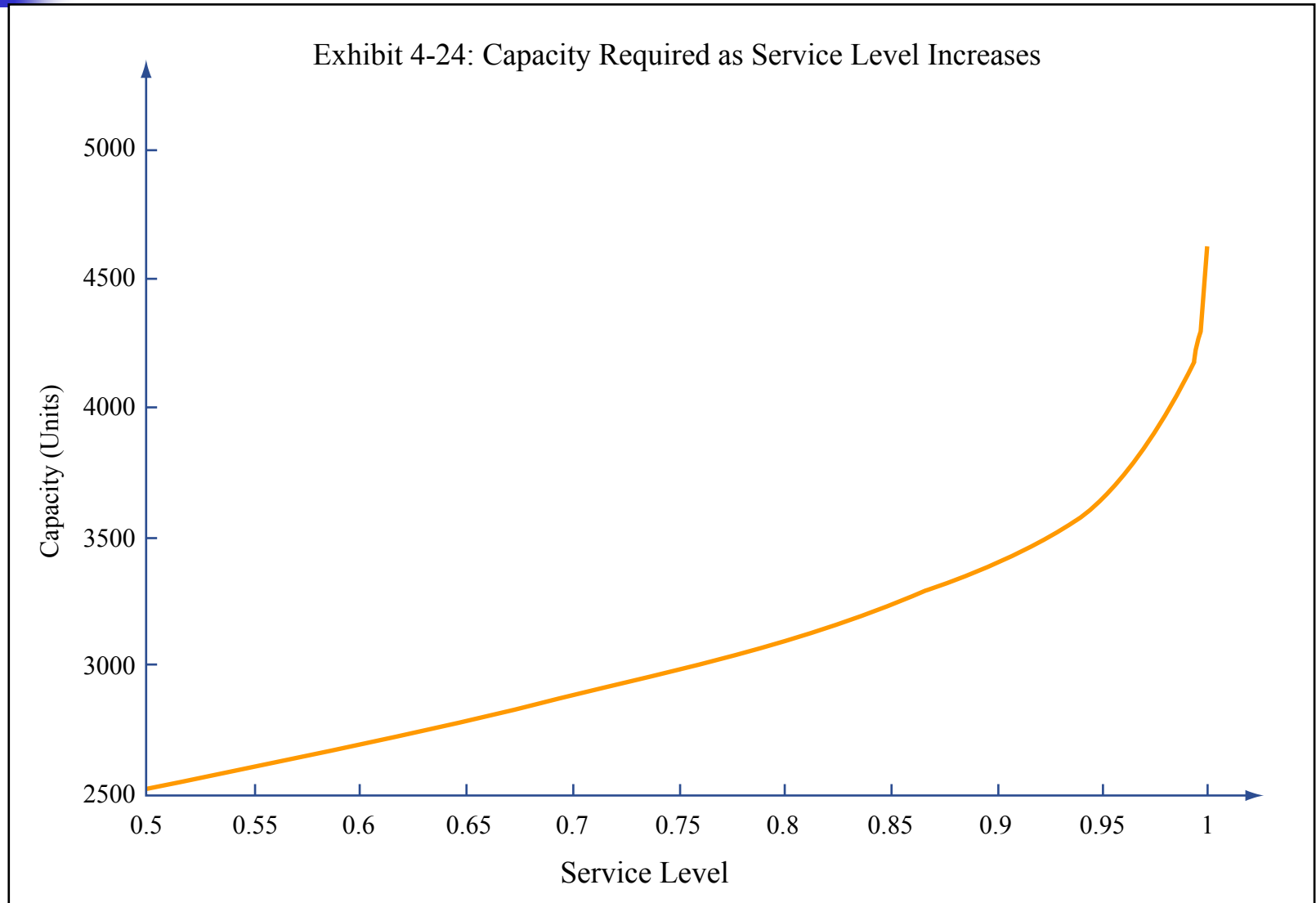
# What percentile?

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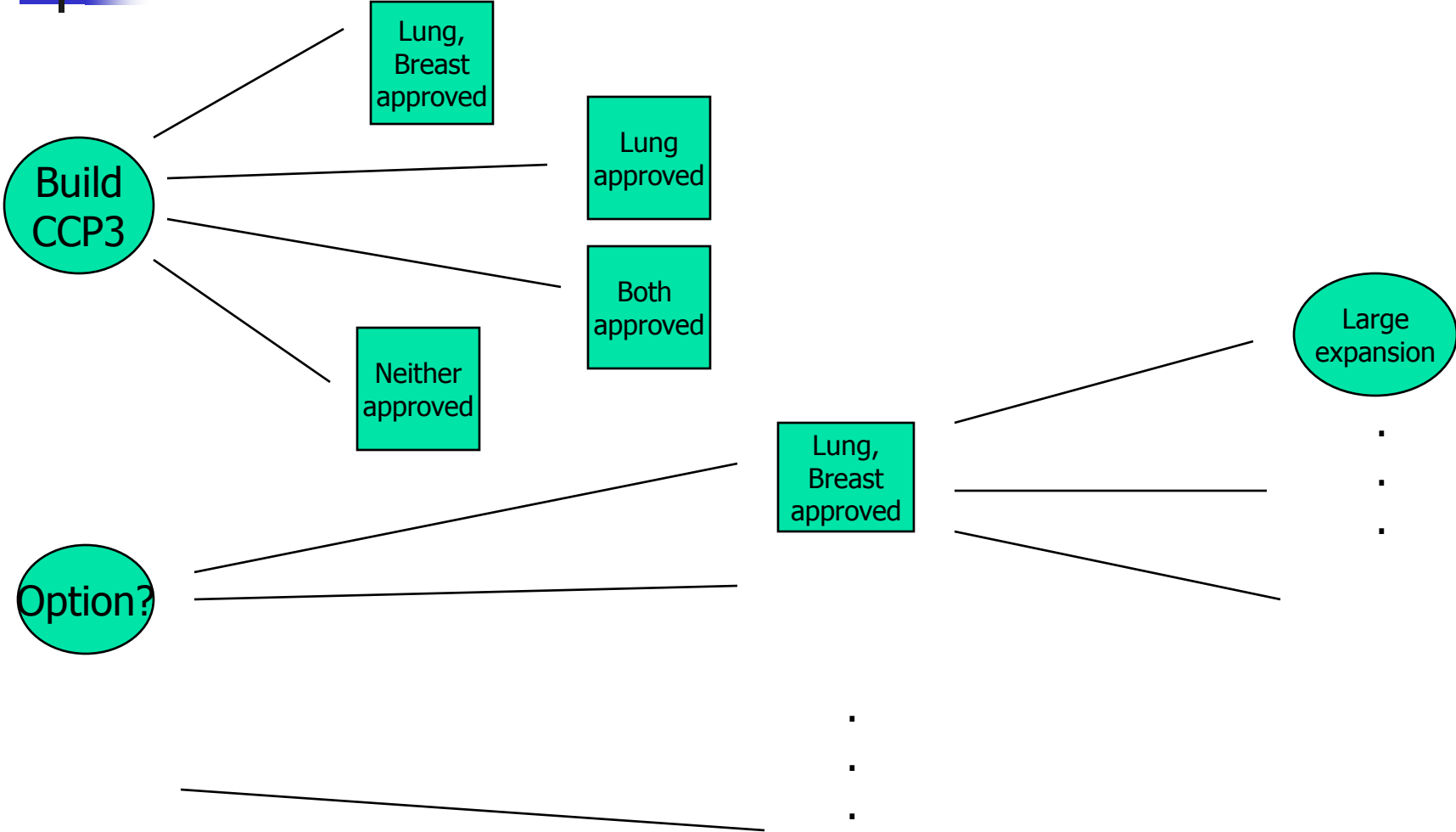
- Costs of not meeting demand are extremely large: \$5,333,333 per kg!
- Costs of extra capacity are large, but two orders of magnitude lower (\$51,280 for a ten-year life)
- Use newsvendor approach of costs of underage and overage
  - $C_o$  = Cost of overage, or cost of having one too many units of capacity
  - $C_u$  = Cost of underage, or cost of having one too few units of capacity
  - Find  $z$  such that  $P(d < z) = C_u / (C_o + C_u)$
  - For Genentech, this is 99.05%
- The high service level suggests maximum credible demand



# Note that high services greatly increase capacity!



# Hedging strategy: Option





# Summary issues

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- Long lead times and (often) high financial impact make capacity a strategic priority
- Need to address risk of overage versus underage
- Variability has a major impact and is not trivial
- Perhaps there is a hedging strategy

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15.769 Operations Strategy  
Fall 2010

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