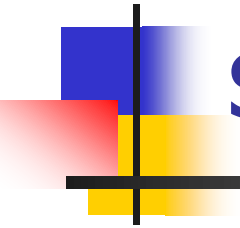
Genentech and capacity strategy



Other Avastin demand (expected)

	Cancer Patients				Patients using Avastin		
Cancer	**2005**	**2010**	**2015**	**prob**	**2005**	**2010**	**2015**
lung -Front	3.75	22.5	22.5	0.38	1.425	8.55	8.55
Other	0.7	5.25	5.25	0.25	0.175	1.3125	1.3125
Breast-Front		42	42	0.38	0	15.96	15.96
other		12	12	0.5	0	6	6
Kidney-Front		5.4	5.4	0.5	0	2.7	2.7
Other		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**
Panc- F		4.8	4.8	0.25	0	1.2	1.2
Other		2.4	2.4	0.5	0	1.2	1.2
Other - F		7.5	15	0.25	0	1.875	3.75
Other		4	7.5	0.25	0	1	1.875
Total patients					1.60	40.47	43.22
Total kg					14.4	364.3	389

Total demand

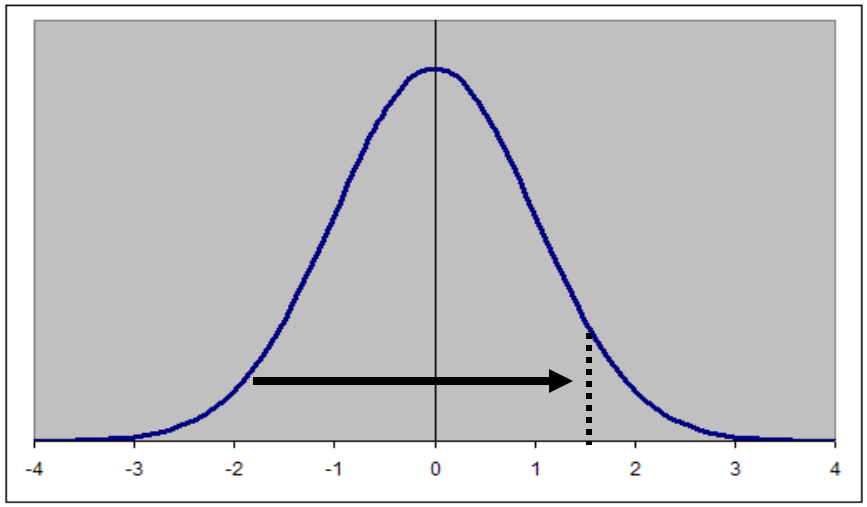
	colorectal	Other Avastin	Other	Total	Plus safety
2005	263	14	1000	1277	1609
2010	322	364	1500	2188	2756
2015	383	389	1850	2622	3303

How do deal with variability?

- 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)

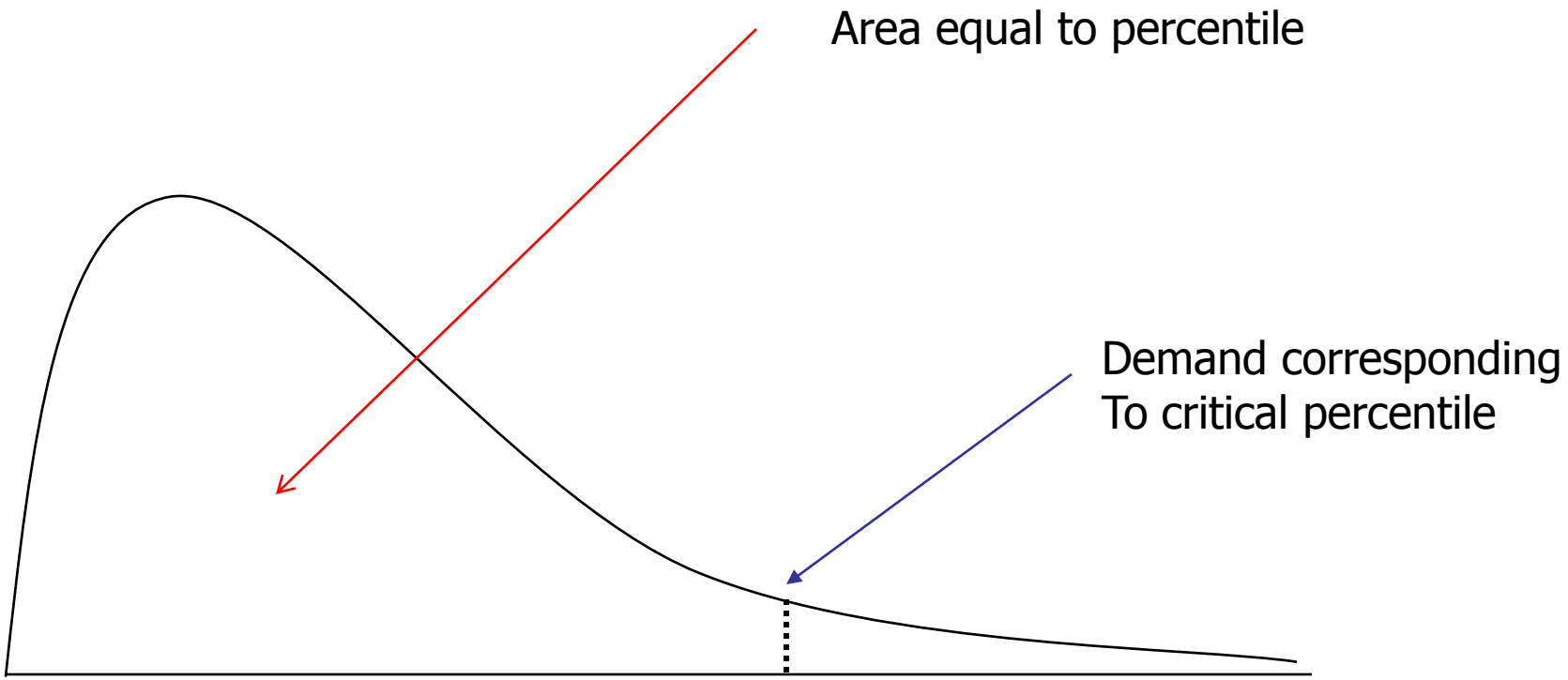


CSL	Z
84%	1
90%	1.28
95%	1.64
99%.	2.33

Calculate required capacity as:

Average demand + z * standard deviation of demand

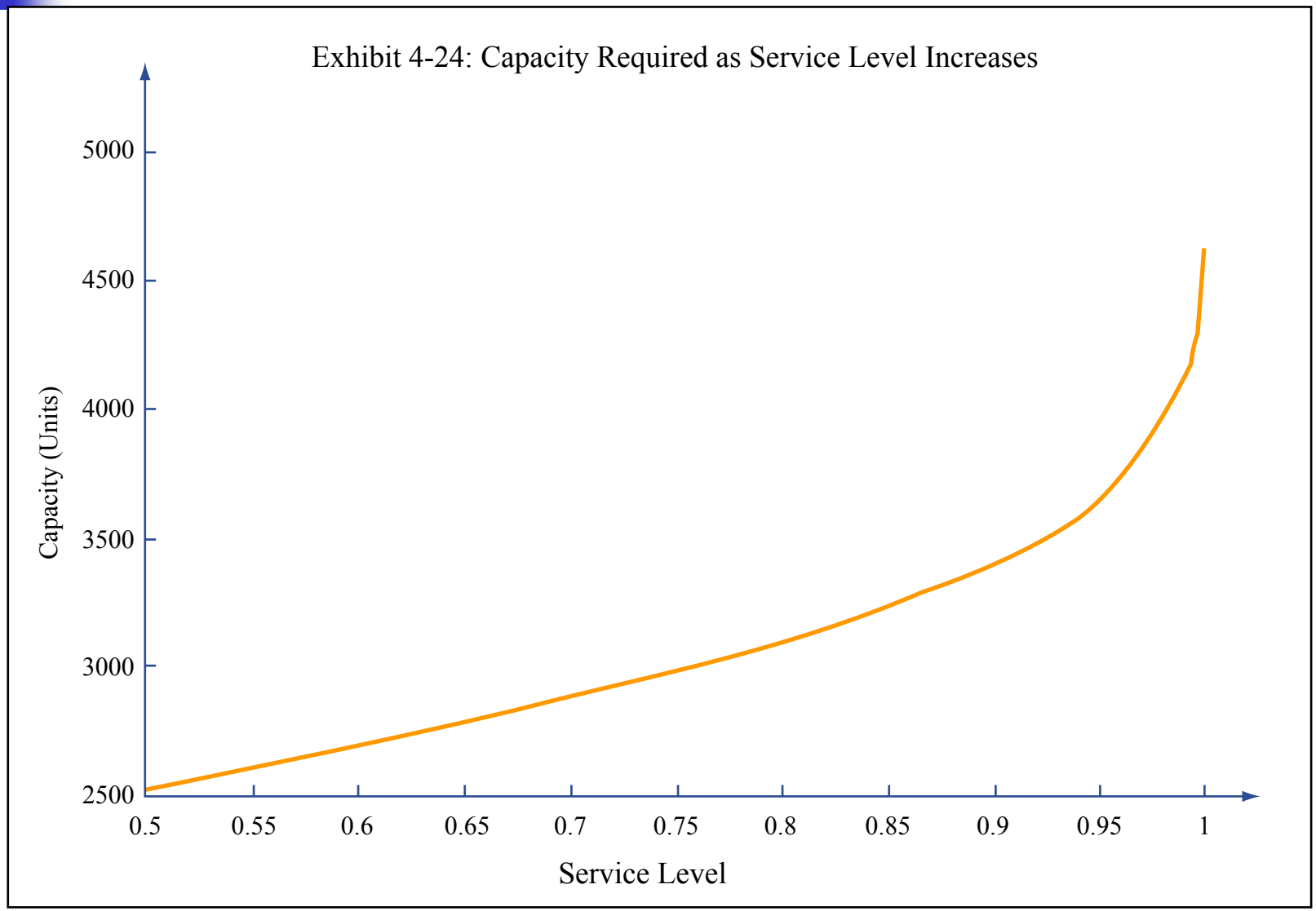
Concept: Find percentile corresponding to cost balance point (critical fractile or percentile)



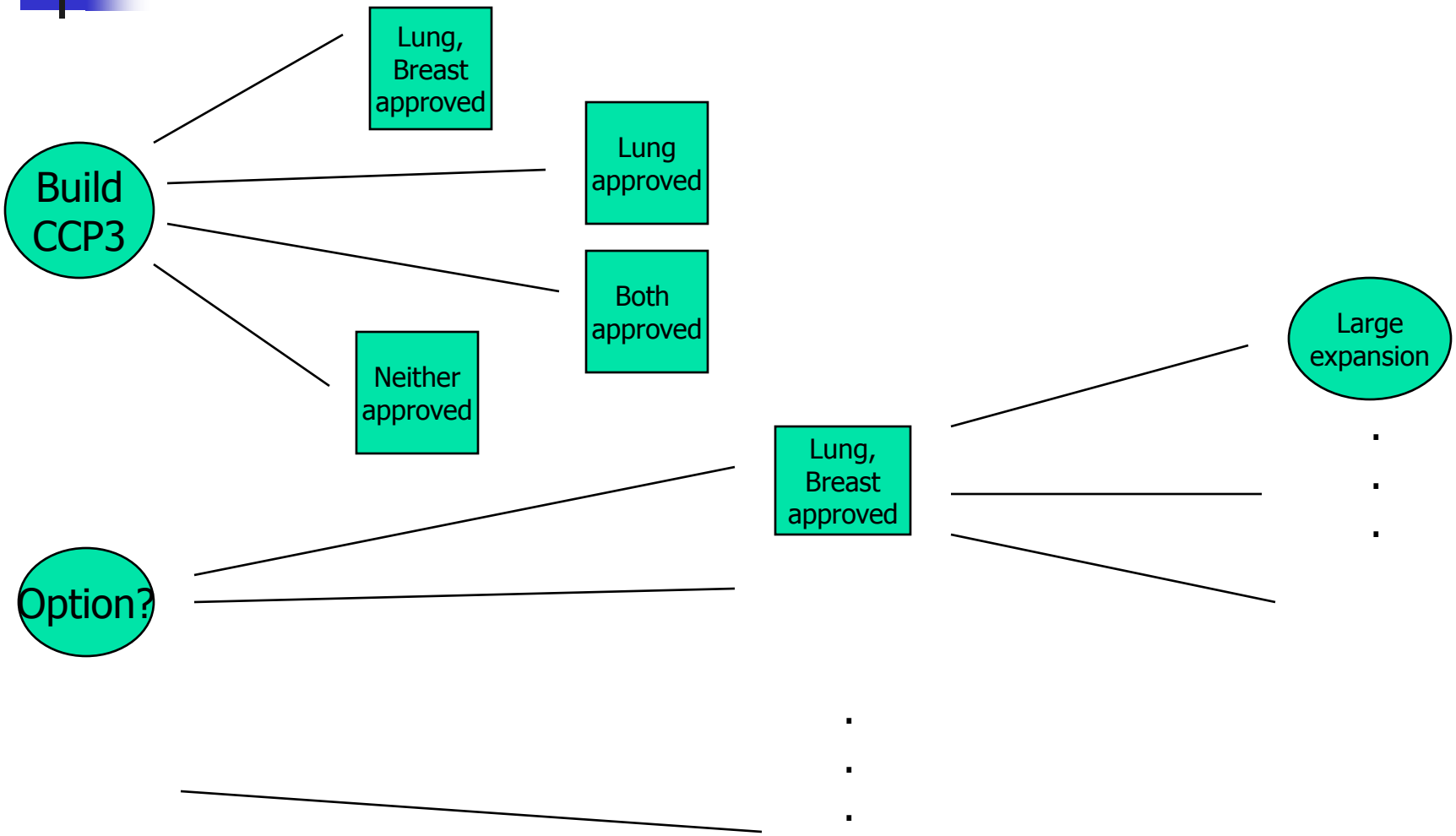
What percentile?

- 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
  - Co = Cost of overage, or cost of having one too many units of capacity
  - Cu = Cost of underage, or cost of having one too few units of capacity
  - Find z such that P(d<z) = Cu/(Co+Cu)
  - 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

- 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