

Lec 5: Risk Pooling in Insurance

- If n policies, each has independent probability p of a claim, then the number of claims follows the binomial distribution. The standard deviation of the fraction of policies that result in a claim is
- Probability that fraction of policies that result in loss will lie between $P1$ and $P2$, using Excel Normdist

$$f(x) = P^x (1 - P)^{(n-x)} n! / (x!(n - x)!)$$

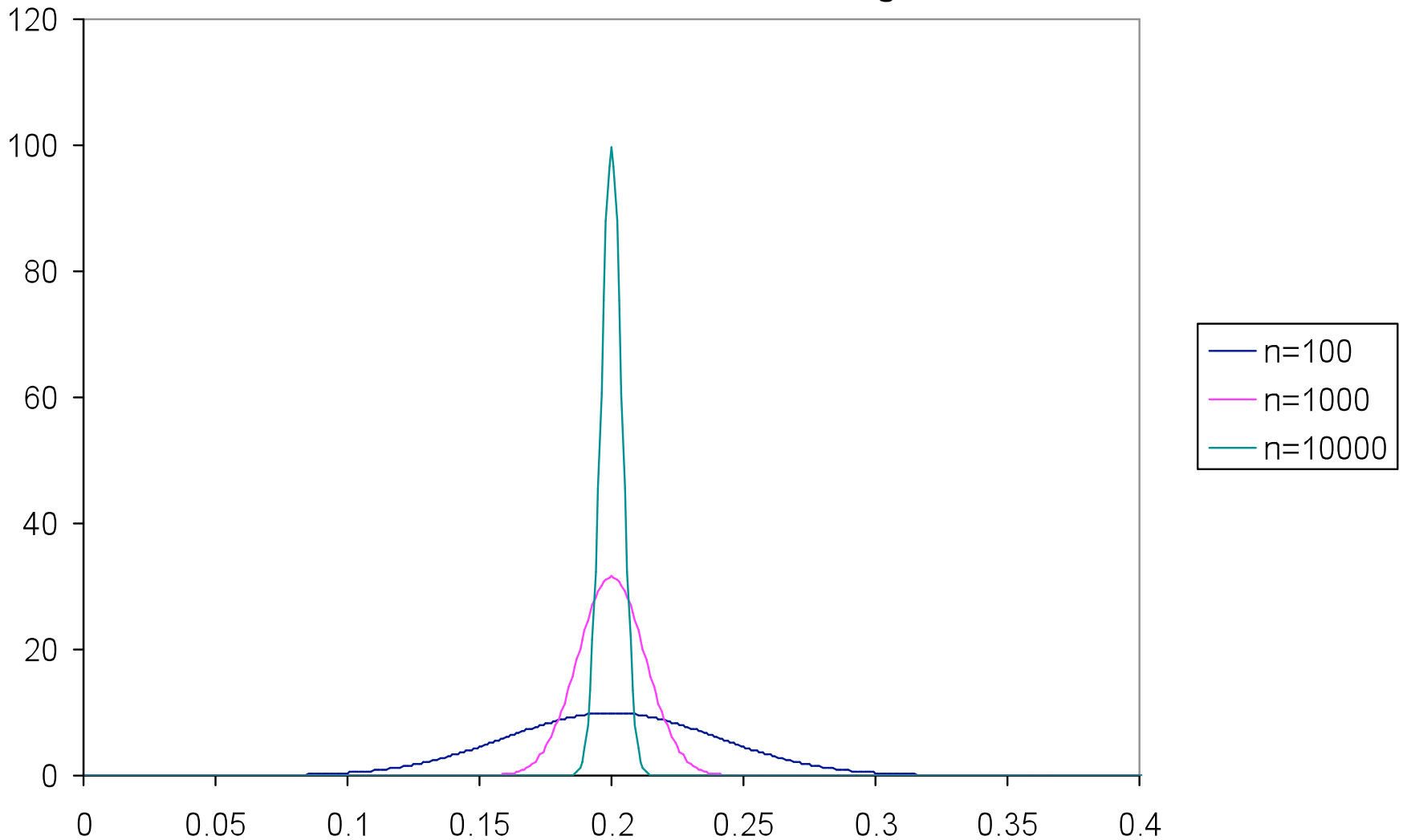
$$\sigma = \sqrt{p(1 - p) / n}$$

$$Normdist(P2, P, \sigma, 1) - Normdist(P1, P, \sigma, 1)$$

Example

- If probability of loss is .2, I write 100 policies, then expected number of losses is 20% and the standard deviation σ of the fraction of losses is $(.2*0.8/100)^{.5}=.04$
- Change n to 1000, get $\sigma=.013$
- Change n to 10000, get $\sigma=.004$

Distribution of Fraction of Policies Resulting in Losses $P=.2$



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