Sample Size for Emperical CDF

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I want to use the bootstrap to make confidence intervals for a statistic. The quality of a bootstrap's output depends heavily on the quality of the empirical cdf. If my sample is of size n, how big does n have to be so that the empirical cdf is a good approximation of the underlying cdf? I don't know anything about the underlying cdf.

I think the solution might be to watch the change in the empirical cdf after I take each new sample. Eventually the empirical cdf won't be changing that much after each new sample. At that point I can stop sampling. Is this on the right track? I don't know how to quantify that change and when the change in that quantity can be considered small.

Thanks,
Peter