

On the number of empty boxes in the Bernoulli sieve

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Abstract:

Suppose we are given a multiplicative random walk (a stick-breaking set) generated by a random variable W taking values in the interval $(0,1)$ and a sample from the uniform $[0,1]$ law which is independent of the stick-breaking set. The Bernoulli sieve is a random occupancy scheme in which ‘balls’ represented by the points of the uniform sample are allocated over an infinite array of ‘boxes’ represented by the gaps in the stick-breaking set. Assuming that the number of balls equals n I am interested in the weak convergence of the number of empty boxes within the occupancy range as n approaches infinity. Depending on the behavior of the law of W near the endpoints 0 and 1 the number of empty boxes can exhibit quite a wide range of different asymptotics. These will be carefully discussed with an emphasis on the methods exploited.