

TABLE 1. Parametric Models of Discrete Random Variables

	S_x	p_k	m_x	σ_x^2	$\Gamma_X(z)$
Bernoulli(p)	$\{0, 1\}$	$\binom{1}{k} p^k q^{1-k}$	p	pq	$q + pz$
Binomial(p, n)	$\{0, 1, \dots, n\}$	$\binom{n}{k} p^k q^{n-k}$	np	npq	$(q + pz)^n$
Geometric(p)	$\{1, 2, 3, \dots\}$	pq^{k-1}	$\frac{1}{p}$	$\frac{q}{p^2}$	$\frac{pz}{1-qz}$
	$\{0, 1, 2, \dots\}$	pq^k	$\frac{q}{p}$	$\frac{q}{p^2}$	$\frac{p}{1-qz}$
Negative Binomial(p, r)	$\{r, r + 1, \dots\}$	$\binom{k-1}{r-1} p^r q^{k-r}$	$\frac{r}{p}$	$\frac{rq}{p^2}$	$\left(\frac{pz}{1-qz}\right)^r$
	$\{0, 1, \dots\}$	$\binom{k+r-1}{r-1} p^r q^k$	$\frac{rq}{p}$	$\frac{rq}{p^2}$	$\left(\frac{p}{1-qz}\right)^r$
Hypergeometric(N, M, K)	$\{0, 1, \dots, K\}$	$\frac{\binom{M}{k} \binom{N-M}{K-k}}{\binom{N}{K}}$	$\frac{KM}{N}$	$\frac{KM}{N} \left(\frac{(N-M)(N-K)}{N(N-1)} \right)$	
Uniform(L)	$\{1, 2, \dots, L\}$	$\frac{1}{L}$	$\frac{L+1}{2}$	$\frac{L^2-1}{12}$	$\frac{z}{L} \frac{1-z^L}{1-z}$
Zipf(L)	$\{1, 2, \dots, L\}$	$\frac{k^{-1*}}{C_L}$	$\frac{L}{C_L}$	$\frac{L(L+1)}{2C_L} - \frac{L^2}{C_L^2}$	
Poisson(α)	$\{0, 1, 2, \dots\}$	$\frac{\alpha^k}{k!} e^{-\alpha}$	α	α	$e^{\alpha(z-1)}$

* $(C_L \equiv \sum_{i=1}^L \frac{1}{i})$

From Leon-Garcia, P115.