Table B Standard normal distribution; cdf $\Phi(x)$ and stop-loss premiums $\pi(x)$

	+0.00		+0.05		+0.10		+0.15		+0.20	
x	$\Phi(x)$	$\pi(x)$	$\Phi(x)$	$\pi(x)$	$\Phi(x)$	$\pi(x)$	$\Phi(x)$	$\pi(x)$	$\Phi(x)$	$\pi(x)$
0.00	0.500	0.3989	0.520	0.3744	0.540	0.3509	0.560	0.3284	0.579	0.3069
0.25	0.599	0.2863	0.618	0.2668	0.637	0.2481	0.655	0.2304	0.674	0.2137
0.50	0.691	0.1978	0.709	0.1828	0.726	0.1687	0.742	0.1554	0.758	0.1429
0.75	0.773	0.1312	0.788	0.1202	0.802	0.1100	0.816	0.1004	0.829	0.0916
1.00	0.841	0.0833	0.853	0.0757	0.864	0.0686	0.875	0.0621	0.885	0.0561
1.25	0.894	0.0506	0.903	0.0455	0.911	0.0409	0.919	0.0367	0.926	0.0328
1.50	0.933	0.0293	0.939	0.0261	0.945	0.0232	0.951	0.0206	0.955	0.0183
1.75	0.960	0.0162	0.964	0.0143	0.968	0.0126	0.971	0.0111	0.974	0.0097
2.00	0.977	0.0085	0.980	0.0074	0.982	0.0065	0.984	0.0056	0.986	0.0049
2.25	0.988	0.0042	0.989	0.0037	0.991	0.0032	0.992	0.0027	0.993	0.0023
2.50	0.994	0.0020	0.995	0.0017	0.995	0.0015	0.996	0.0012	0.997	0.0011
2.75	0.997	0.0009	0.997	0.0008	0.998	0.0006	0.998	0.0005	0.998	0.0005
3.00	0.999	0.0004	0.999	0.0003	0.999	0.0003	0.999	0.0002	0.999	0.0002
3.25	0.999	0.0002	1.000	0.0001	1.000	0.0001	1.000	0.0001	1.000	0.0001
3.50	1.000	0.0001	1.000	0.0000	1.000	0.0000	1.000	0.0000	1.000	0.0000

Table C Selected quantiles of the standard normal distribution

x	1.282	1.645	1.960	2.326	2.576	3.090	3.291	3.891	4.417
$\Phi(x)$	0.900	0.950	0.975	0.990	0.995	0.999	0.9995	0.99995	0.999995

Examples of use: $\Phi(1.17) \approx 0.6\Phi(1+0.15)+0.4\Phi(1+0.20) \approx 0.879$; $\Phi^{-1}(0.1) = -1.282$; $\Phi(-x) = 1-\Phi(x)$; $\pi(-x) = x+\pi(x)$.

NP approximation: If S has mean μ, variance σ^2 and skewness γ, then

$$\Pr\left[\frac{S-\mu}{\sigma} \le x\right] \approx \Phi\left(\sqrt{\frac{9}{\gamma^2}+\frac{6x}{\gamma}+1}-\frac{3}{\gamma}\right)$$

$$\text{and} \quad \Pr\left[\frac{S-\mu}{\sigma} \le s+\frac{\gamma}{6}(s^2-1)\right] \approx \Phi(s)$$

Translated gamma approximation: If $G(\cdot;\alpha,\beta)$ is the gamma cdf, then

$$\Pr[S \le x] \approx G(x-x_0;\alpha,\beta) \quad \text{with} \quad \alpha = \frac{4}{\gamma^2}; \beta = \frac{2}{\gamma\sigma}; x_0 = \mu - \frac{2\sigma}{\gamma}.$$

Table D The main classes of distributions in the GLM *exponential dispersion family*, with the customary parameters as well as the (μ,ϕ) and (θ,ϕ) reparameterizations, and more properties

Distribution	**Density** **Domain**	**(μ,ϕ) reparameterization** **Canonical link $\theta(\mu)$** **Variance function $V(\mu)$**	**Cumulant function $b(\theta)$** $\mathrm{E}[Y;\theta]=\mu(\theta)=b'(\theta)$
$\mathrm{N}(\mu,\sigma^2)$	$\frac{1}{\sigma\sqrt{2\pi}}\mathrm{e}^{-\frac{(y-\mu)^2}{2\sigma^2}}$	$\phi=\sigma^2$ $\theta(\mu)=\mu$ $V(\mu)=1$	$\frac{\theta^2}{2}$ θ
$\mathrm{Poisson}(\mu)$	$\mathrm{e}^{-\mu}\frac{\mu^y}{y!}$ $y=0,1,2,\ldots$	$\phi=1$ $\theta(\mu)=\log\mu$ $V(\mu)=\mu$	e^{θ} e^{θ}
$\mathrm{Poisson}(\mu,\phi)$	$\mathrm{e}^{-\mu/\phi}\frac{(\mu/\phi)^{(y/\phi)}}{(y/\phi)!}$ $y=0,\phi,2\phi,\ldots$	$\theta(\mu)=\log\mu$ $V(\mu)=\mu$	e^{θ} e^{θ}
$\mathrm{Binomial}(m,p)$ ($m\in\mathbb{N}$ fixed)	$\binom{m}{y}p^y(1-p)^{m-y}$ $y=0,\ldots,m$	$\mu=mp$; $\phi=1$ $\theta(\mu)=\log\frac{\mu}{m-\mu}$ $V(\mu)=\mu(1-\frac{\mu}{m})$	$m\log(1+\mathrm{e}^{\theta})$ $\frac{m\mathrm{e}^{\theta}}{1+\mathrm{e}^{\theta}}$
$\mathrm{Negbin}(r,p)$ ($r>0$ fixed)	$\binom{r+y-1}{y}p^r(1-p)^y$ $y=0,1,\ldots$	$\mu=\frac{r(1-p)}{p}$; $\phi=1$ $\theta(\mu)=\log\frac{\mu}{r+\mu}$ $V(\mu)=\mu(1+\frac{\mu}{r})$	$-r\log(1-\mathrm{e}^{\theta})$ $\frac{r\mathrm{e}^{\theta}}{1-\mathrm{e}^{\theta}}$
$\mathrm{Gamma}(\alpha,\beta)$	$\frac{1}{\Gamma(\alpha)}\beta^{\alpha}y^{\alpha-1}\mathrm{e}^{-\beta y}$ $y>0$	$\mu=\frac{\alpha}{\beta}$; $\phi=\frac{1}{\alpha}$ $\theta(\mu)=-\frac{1}{\mu}$ $V(\mu)=\mu^2$	$-\log(-\theta)$ $-\frac{1}{\theta}$
$\mathrm{IG}(\alpha,\beta)$	$\frac{\alpha y^{-3/2}}{\sqrt{2\pi\beta}}\exp\frac{-(\alpha-\beta y)^2}{2\beta y}$ $y>0$	$\mu=\frac{\alpha}{\beta}$; $\phi=\frac{\beta}{\alpha^2}$ $\theta(\mu)=-\frac{1}{2\mu^2}$ $V(\mu)=\mu^3$	$-\sqrt{-2\theta}$ $\frac{1}{\sqrt{-2\theta}}$
$\mathrm{Tweedie}(\lambda,\alpha,\beta)$ (α fixed; $p=\frac{\alpha+2}{\alpha+1}$)	$\sum_{n=1}^{\infty}\frac{\beta^{n\alpha}y^{n\alpha-1}\mathrm{e}^{-\beta y}}{\Gamma(n\alpha)}\frac{\lambda^n\mathrm{e}^{-\lambda}}{n!}$ for $y>0$; $\mathrm{e}^{-\lambda}$ for $y=0$	$\mu=\frac{\lambda\alpha}{\beta}$; $\phi=\frac{\alpha+1}{\beta}\mu^{1-p}$ $\theta(\mu)=\frac{\mu^{1-p}}{p-1}$ $V(\mu)=\mu^p$	$\frac{\{(1-p)\theta\}^{(2-p)/(1-p)}}{2-p}$ $\{(1-p)\theta\}^{1/(1-p)}$