REPRESENTATIONS OF DISTRIBUTIONS
Risk and Asset Allocation - Springer – `symmys.com`

Attilio Meucci

www.symmys.com

Formulas and figures in this presentation refer to the book **Risk and Asset Allocation**, Springer.

The notation, say, (5.24) refers to Formula 24 in Chapter 5 of the book

The notation, say, (T4.12) refers to Formula 12 in the Technical Appendices for Chapter 4, which can be downloaded from **www.symmys.com**

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Fig. 1.1
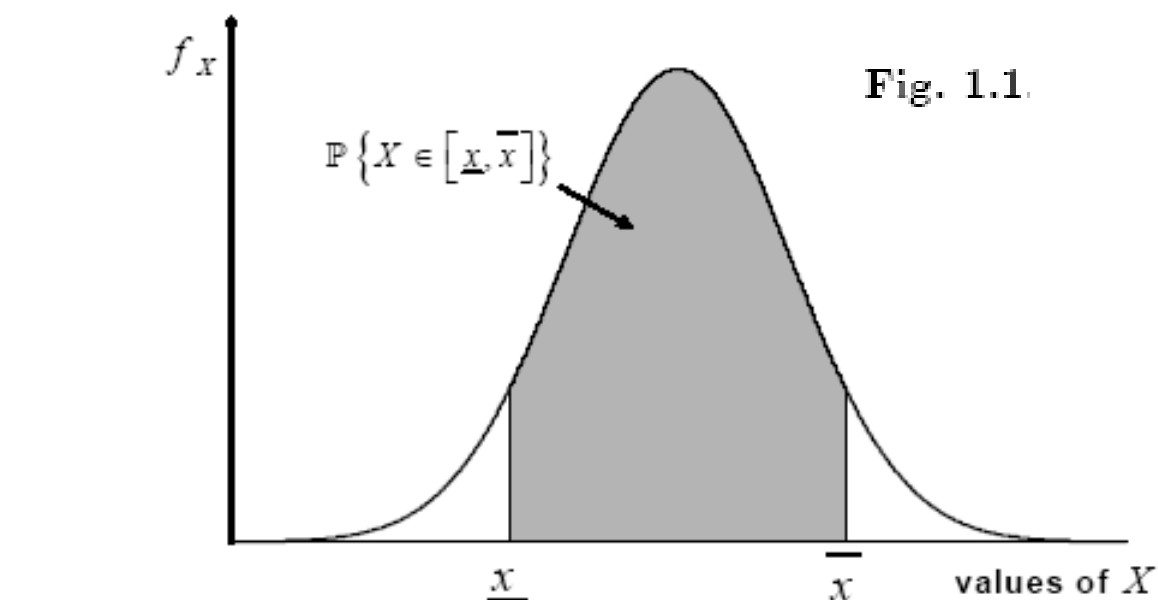
$\mathbb{P}\left\{X \in \left[\underline{x}, \overline{x}\right]\right\}$

probability density function f_X

$$\mathbb{P}\{X \in [\underline{x}, \overline{x}]\} \equiv \int_{\underline{x}}^{\overline{x}} f_X(x)\, dx. \qquad (1.3)$$

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$$F_X(x) \equiv \mathbb{P}\{X \leq x\} = \int_{-\infty}^{x} f_X(u)\, du. \qquad (1.7)$$

cumulative distribution function F_X
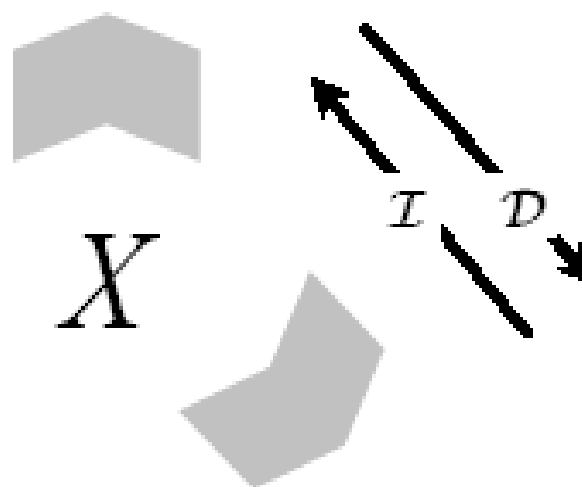
$$\mathcal{I} \quad \mathcal{D}$$

$$X$$

Fig. 1.3.

probability density function f_X

$$\mathbb{P}\{X \in [\underline{x}, \overline{x}]\} \equiv \int_{\underline{x}}^{\overline{x}} f_X(x)\, dx. \qquad (1.3)$$

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$$\boxed{Q_X(p) \equiv F_X^{-1}(p)} \ (1.17) \Longleftrightarrow \boxed{F_X(x) \equiv \mathbb{P}\{X \le x\} = \int_{-\infty}^{x} f_X(u)\, du} \ (1.7)$$

quantile

cumulative distribution
function F_X
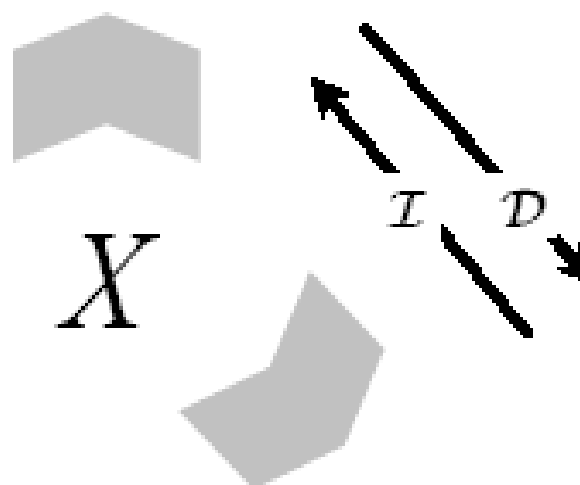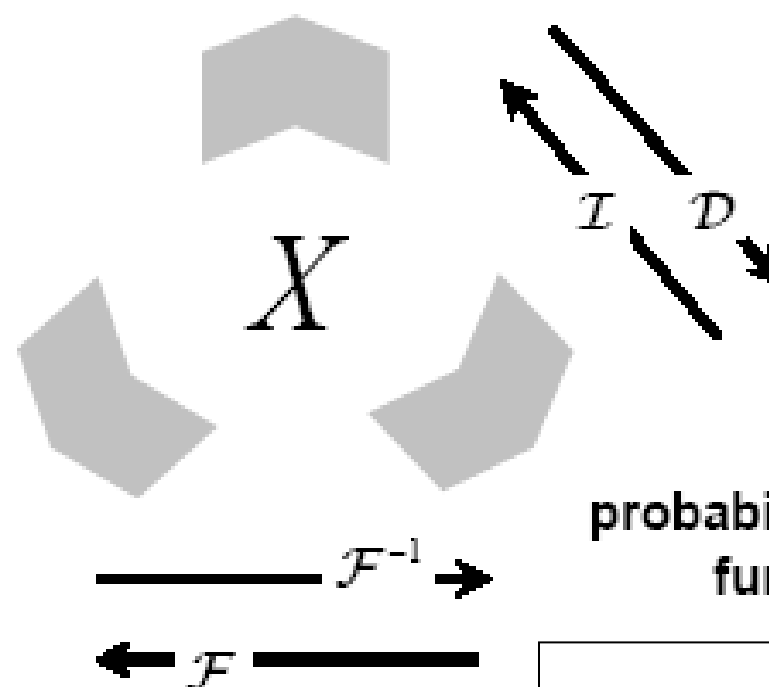
X

$\mathcal{I}$ $\mathcal{D}$

Fig. 1.3.

probability density
function f_X

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$$Q_X(p) \equiv F_X^{-1}(p) \quad (1.17) \quad \Longleftrightarrow \quad F_X(x) \equiv \mathbb{P}\{X \leq x\} = \int_{-\infty}^{x} f_X(u)\, du. \quad (1.7)$$

quantile

cumulative distribution
function F_X

Fig. 1.3.

$$X$$

$\mathcal{I} \quad \mathcal{D}$

characteristic
function ϕ_X

$\mathcal{F}^{-1} \rightarrow$

$\leftarrow \mathcal{F}$

probability density
function f_X

$$\phi_X(\omega) \equiv \mathrm{E}\{e^{i\omega X}\} \quad (1.12)$$

$$\mathbb{P}\{X \in [\underline{x}, \overline{x}]\} \equiv \int_{\underline{x}}^{\overline{x}} f_X(x)\, dx. \quad (1.3)$$

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$$Q_X(p) \equiv F_X^{-1}(p) \quad \text{(1.17)} \quad \Longleftrightarrow \quad F_X(x) \equiv \mathbb{P}\{X \leq x\} = \int_{-\infty}^{x} f_X(u)\, du. \quad \text{(1.7)}$$
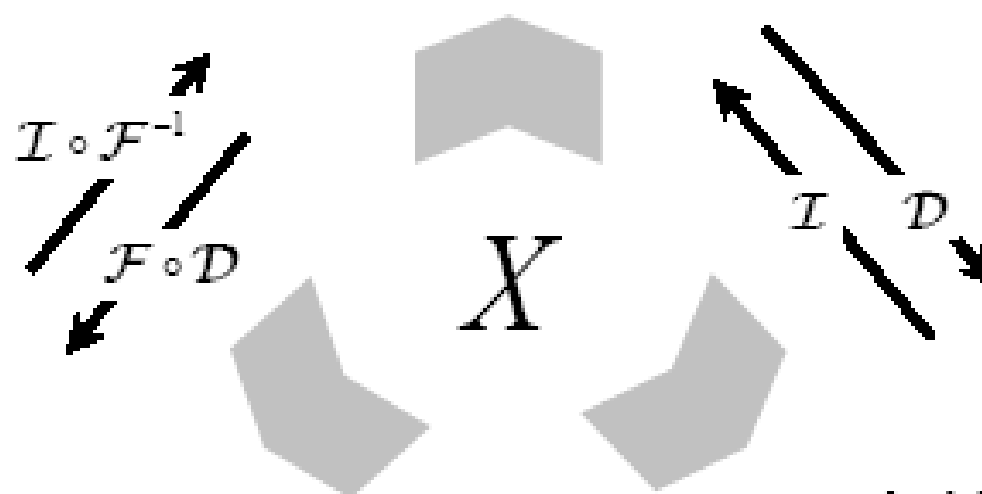
quantile

cumulative distribution function F_X

$\mathcal{I} \circ \mathcal{F}^{-1}$

$\mathcal{F} \circ \mathcal{D}$

$\mathcal{I} \quad \mathcal{D}$

X

Fig. 1.3.

characteristic function ϕ_X

$\mathcal{F}^{-1}$

$\mathcal{F}$

probability density function f_X

$$\phi_X(\omega) \equiv \mathrm{E}\left\{e^{i\omega X}\right\} \quad \text{(1.12)}$$

$$\mathbb{P}\{X \in [\underline{x}, \overline{x}]\} \equiv \int_{\underline{x}}^{\overline{x}} f_X(x)\, dx. \quad \text{(1.3)}$$