Lezione 3.9
Valutare la performance (NPV)

Major RI projects in the context of EU regional policy between 2008 and 2013

Country	No. of projects	Investment Cost (a)	ENPV (a)	ERR (b)	SDR (b)
Czech Republic	1	104,200	3,998	13.09	5.5
France	2	88,440	81,192	12.16	4.0
Hungary	2	229,350	192,600	16.20	5.5
Italy	1	83,000	50,236	22.39	3.5
Lithuania	2	76,818	21,878	9.64	5.5
Poland	8	79,018	93,129	24.31	5.4
Slovenia	1	111,100	71,561	15.26	7.0
Spain	2	225,864	21,281	7.35	5.5
United Kingdom	5	65,608	296,344	25.85	4.0
Total	24	104,143	124,435	19.38	5.0

Data do not include R&D investment in firms. (a) average thousand EUR, (b) average %.

Distributive Issues

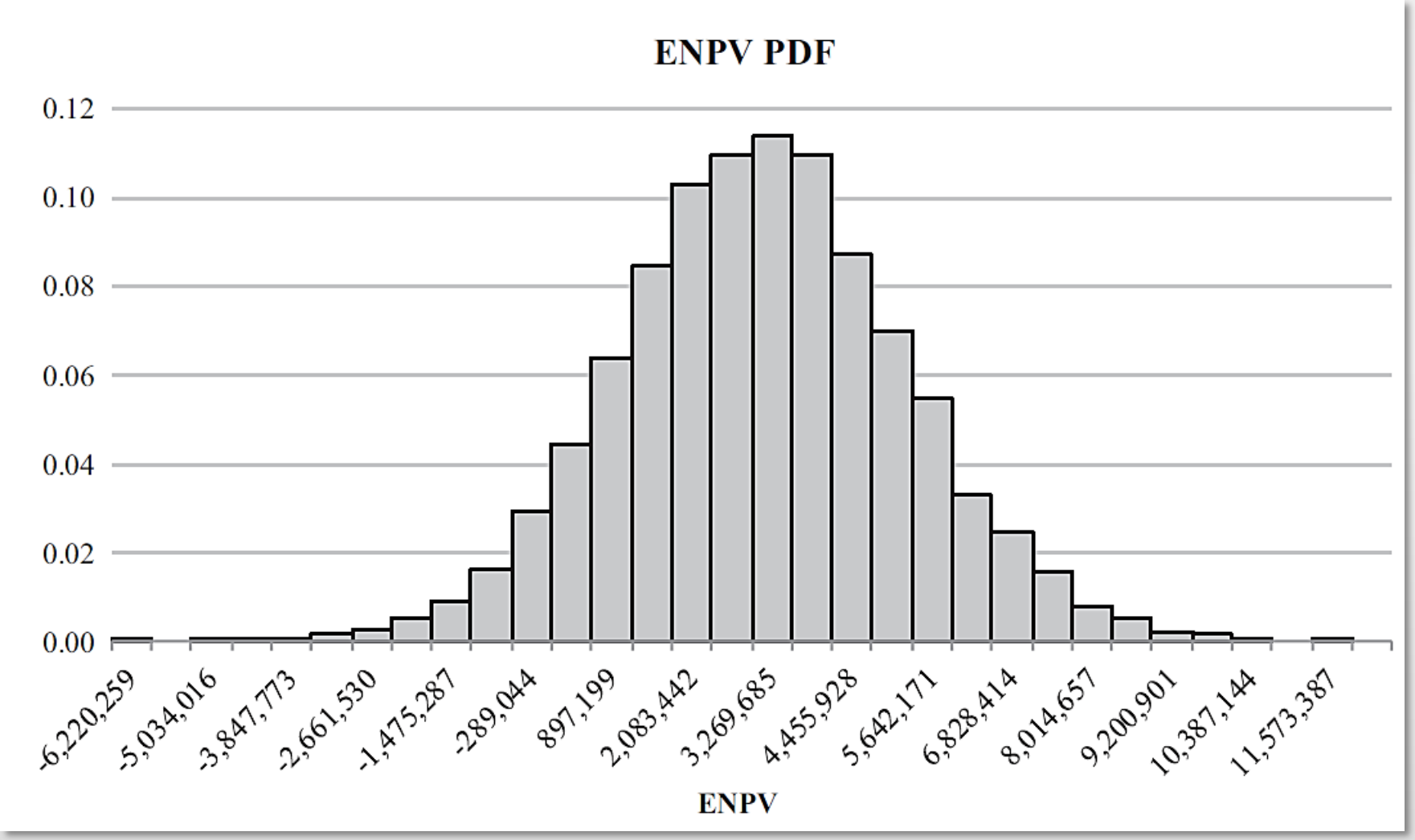
$$NPV_{RI} = [a_1 SC + a_2 HC + a_3 TE + a_4 AR + a_5 CU] + B_n - mcpf\,[K + L_s + L_o + OP + EXT],$$

- $a_1, \ldots a_5$: welfare weights *inversely* correlated to the welfare of each group, such as scientists to whom the RI benefits accrue: scientists (*SC*), students (*HC*), investors of supplier firms (*TE*), investors in other firms and consumers of innovative products *(AR*), and consumers of cultural goods (*CU*)
- The welfare weight of the general public of nonusers (B_n) is assumed to be unity, meaning that EUR 1 to the median taxpayer is valued at EUR 1, while, for instance, the welfare weight of the poor benefiting from health research (included in *AR*) is > 1, and that of the shareholders of firms enjoying increased profits (included in *TE*) < 1
- Moreover, in some cases, it would be worth considering a marginal cost of public funds (*mcpf*) > 1 because of the excess burden of distortionary taxation
- In this context, the welfare-weighted NPV changes, and qualitatively, there may be winners and losers

The Net Present Value of the Large Hadron Collider and of Its Upgrade (HL LHC)

Costs	13.5 ± 0.4
Use Benefits	
Scientific publications	0.3 ± 0.1
Human capital formation	5.5 ± 0.3
Technological spillovers	5.3 ± 1.7
Cultural effects	2.1 ± 0.5
Nonuse Benefits	
Public good value	3.2 ± 1.0

NPV probability density function and cumulative distribution function of the LHC



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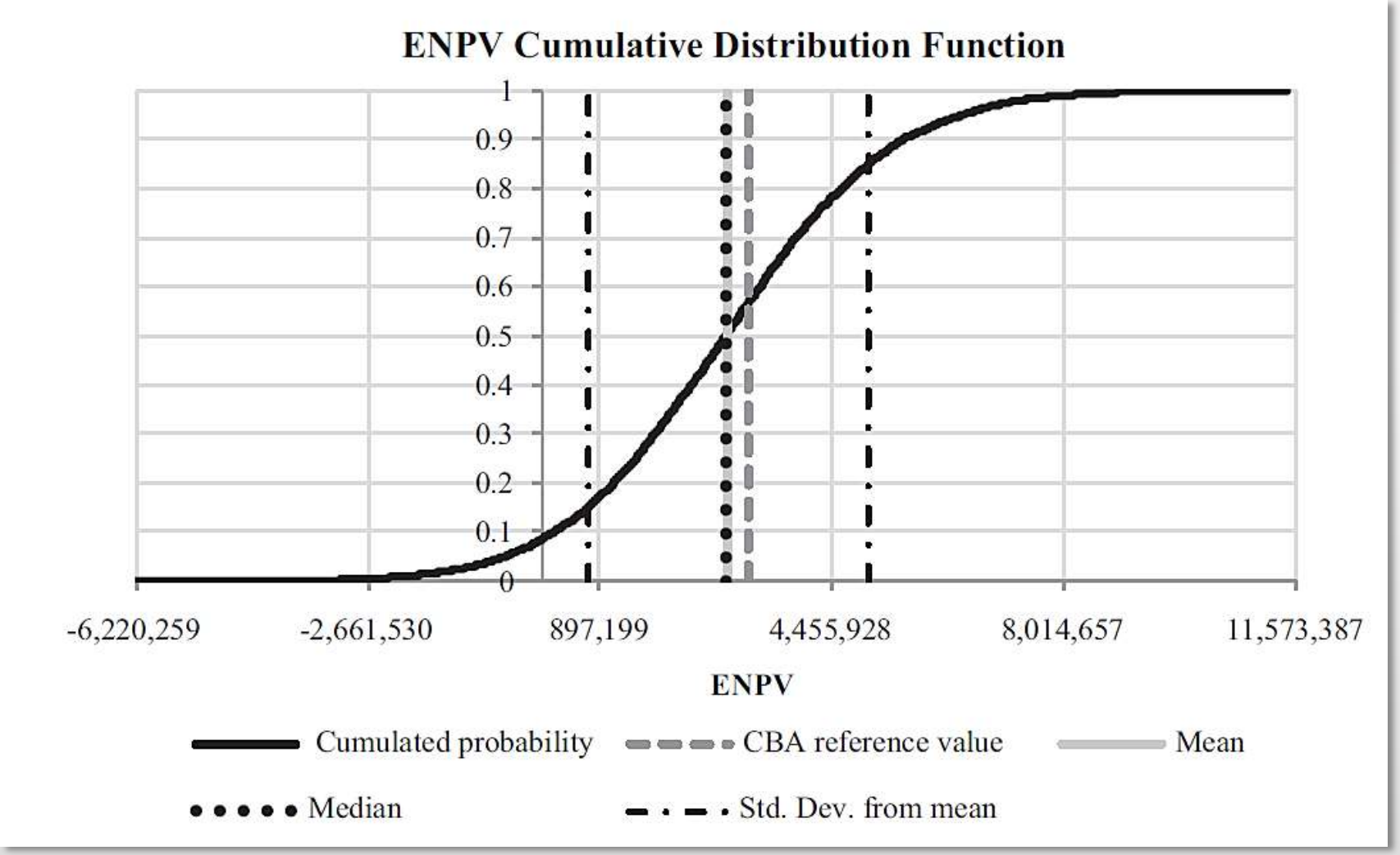
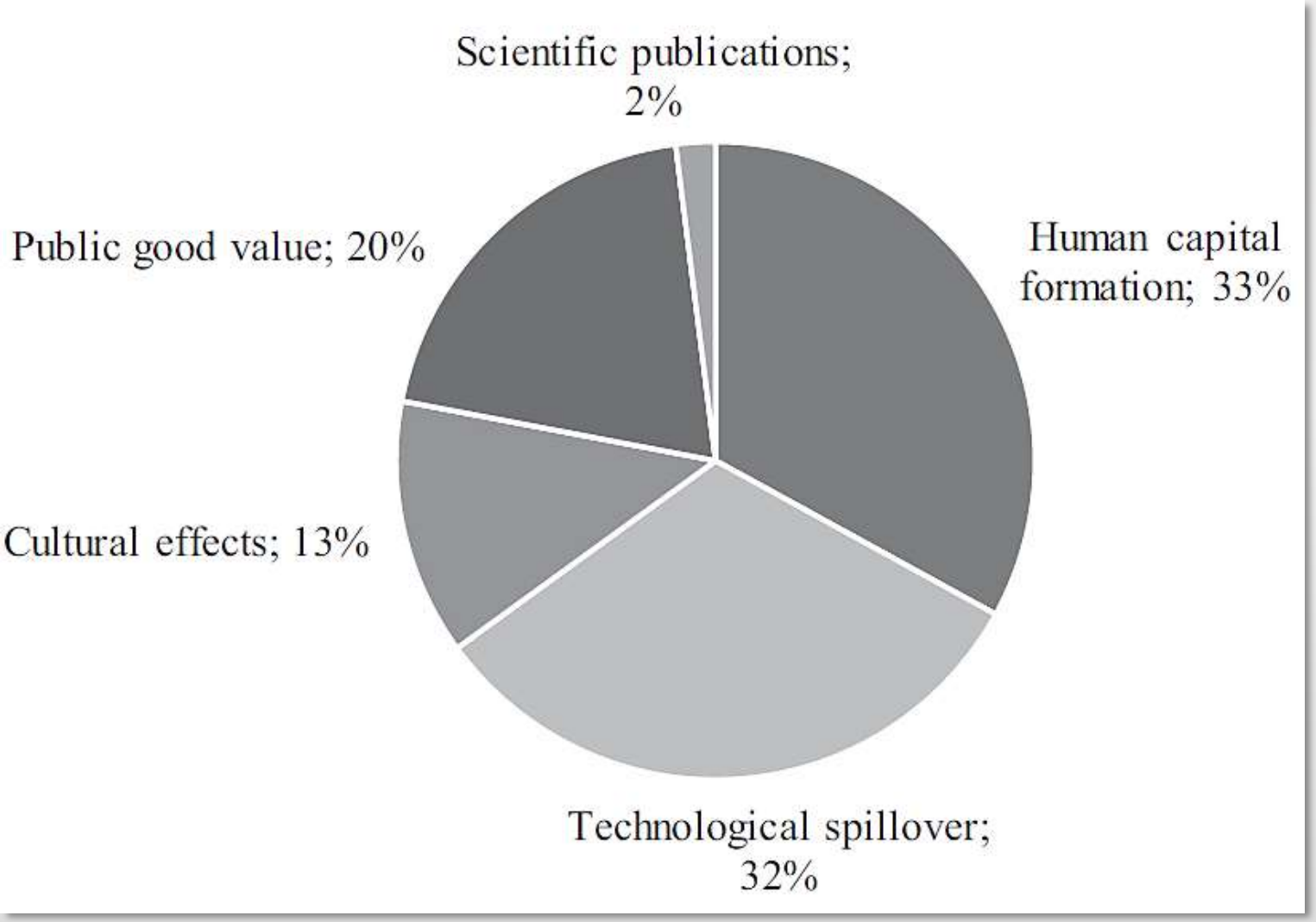


LHC: Share of total benefits by category



The Net Present Value of CNAO

$$AR = \sum_{t=0}^{T} \frac{\sum_{cp=1}^{CP} \sum_{i=1}^{I} (N_{cp,i} * E_{cp}) * (YEAR_{cp,i} * VOLY_i) * QUAL_{cp}}{(1 + \mathrm{SDR})^t}$$

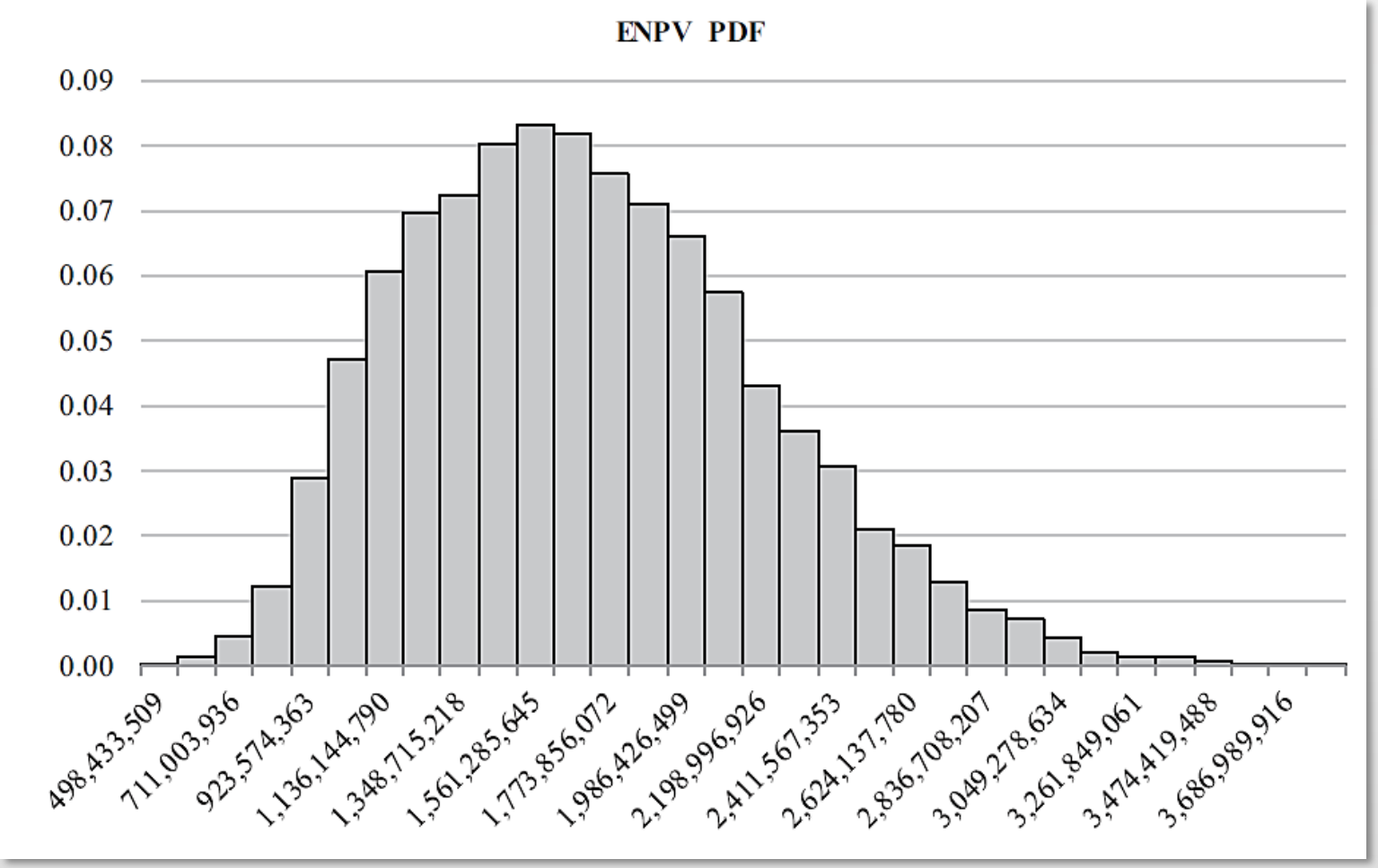
- *N:* the number of patients
- *E:* the share of patients who gain additional years of life compared to the identified counterfactual
- *YEAR:* the number of life-years gained
- *VOLY:* the value of a life-year
- *QUAL:* the coefficient capturing the increased quality of life
- *cp* = (1, 2..23) is the clinical protocol;
- *i* (1, ..6) is age class
- *t* (1, … 30) years in the time horizon
- SDR: the social discount rate

Value of statistical life and the value of a life-year

$$VOSL = \sum_{t=0}^{T-a} VOLY * (1 + SDR)^{-t},$$

- *a:* is the age of the individual or group considered
- *T:* is the life expectancy at birth
- *SDR:* is an appropriate discount rate
- VOLY is often estimated from VOSL as the average value of a life year, adjusted by the survival probabilities

NPV probability density function and cumulative distribution function of CNAO



NPV probability density function and cumulative distribution function of CNAO