

How can the human development index be made more sensitive to the position of the worst off?

Srijit Mishra

(draws from a paper with Hippu Salk Kristle Nathan)

CASE Social Exclusion Seminars, STICERD
London School of Economics and Political Science
19 March 2014

Presentation Format

- Brief history of human development accounting
- The two known measures of HDI
 - Linear average
 - Geometric mean
- The proposed measure: displaced ideal
 - Emphasis on worst off dimensions and populations
 - Greater equity consciousness at higher attainment
 - The MANUSH axioms
- An illustration – regions across England, UK
- Concluding remarks

A Brief History of Human Development Accounting

- *Human Development Report* (HDR) 1990
- Antecedents in basic needs
- Beyond income – reasonable pluralism
- Three dimensions – healthy life, knowledge and decent standard of living
- Increasing popularity of HDR *a la* the Human Development Index (HDI)
- An afterthought – links with Titmuss

HDI – linear average (till 2009)

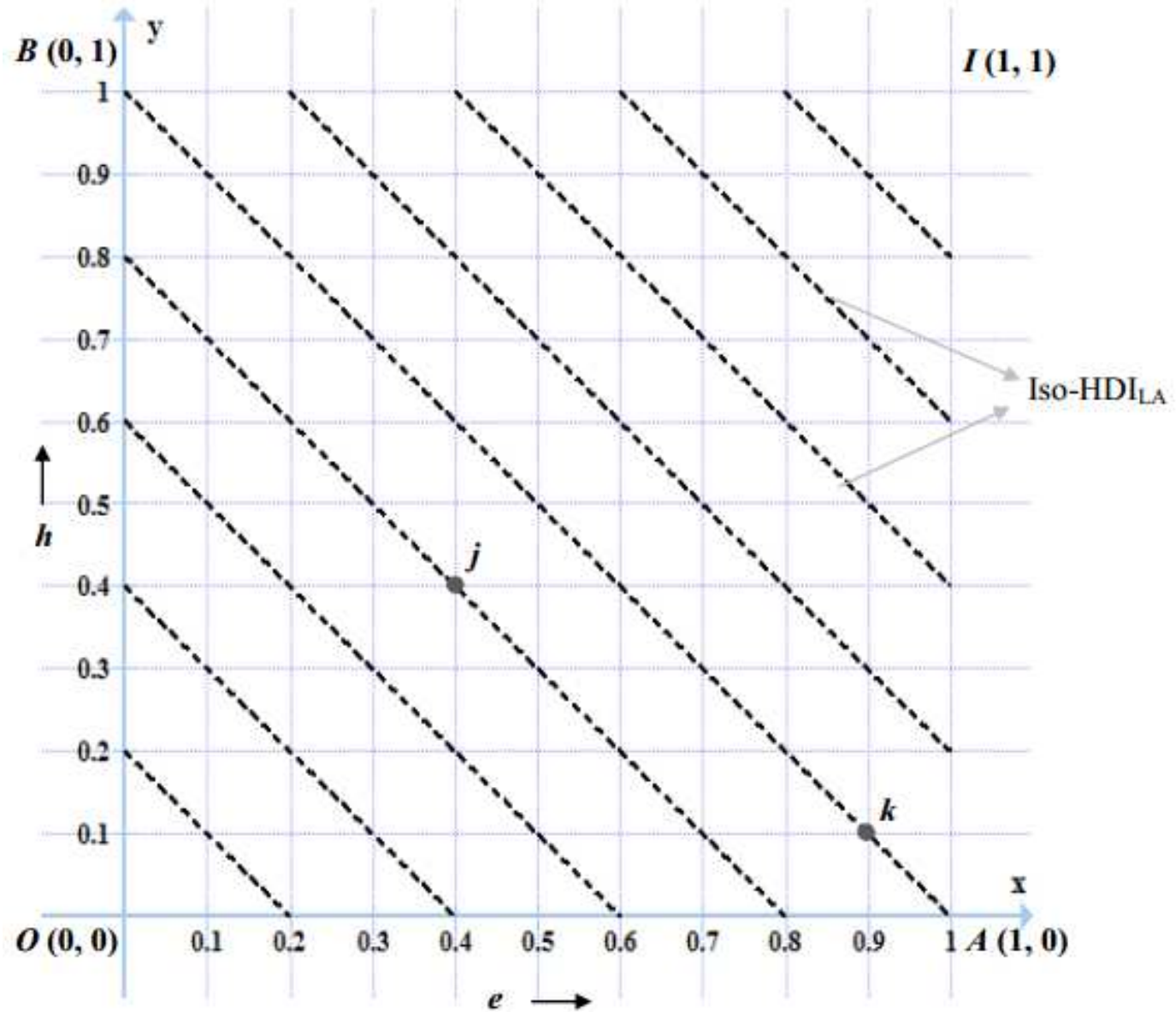
3 dimensions –

1. A long and healthy life } Life Expectancy at birth h
2. Knowledge }
 - Adult literary rate (2/3) }
 - Gross enrolment ratio (1/3) }
 e
3. Ability to achieve decent standard of living } GDP per capita (PPP) y

$$0 \leq h, e, y \leq 1$$

$$\text{HDI}_{\text{LA}} = 1/3(h) + 1/3(e) + 1/3(y)$$

Iso-HDI lines – linear average



HDI – geometric mean (from 2010)

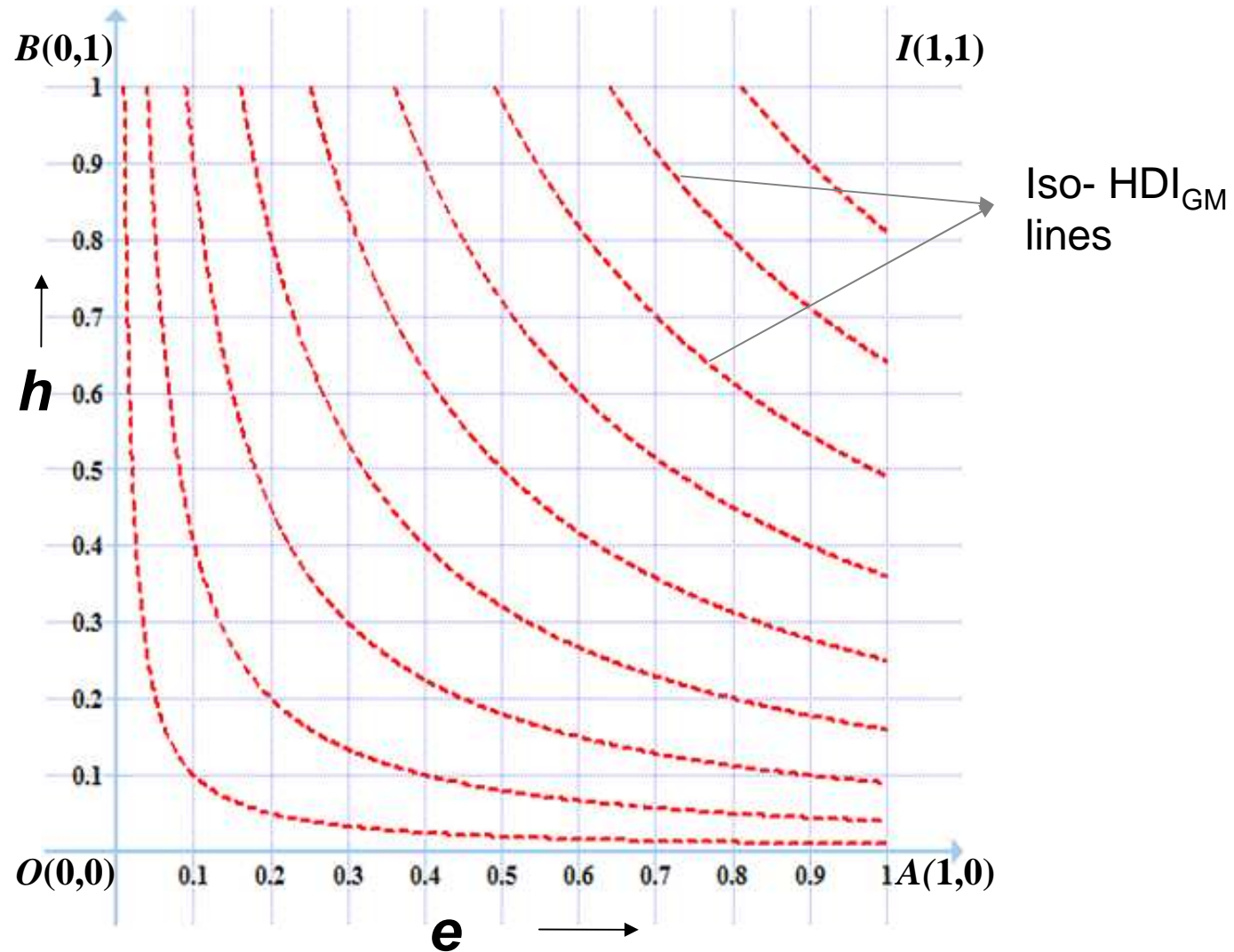
3 dimensions –

1. A long and healthy life } Life Expectancy at birth h
2. Knowledge } Mean years of schooling: adults (1/2) e
 } Expected years of schooling: children (1/2)
3. Ability to achieve decent } GNI per capita y
 standard of living } (PPP)

$$0 \leq h, e, y \leq 1$$

$$\text{HDI}_{\text{GM}} = (h * e * y)^{1/3}$$

Iso-HDI lines – geometric mean



HDI – the proposed (displaced ideal)

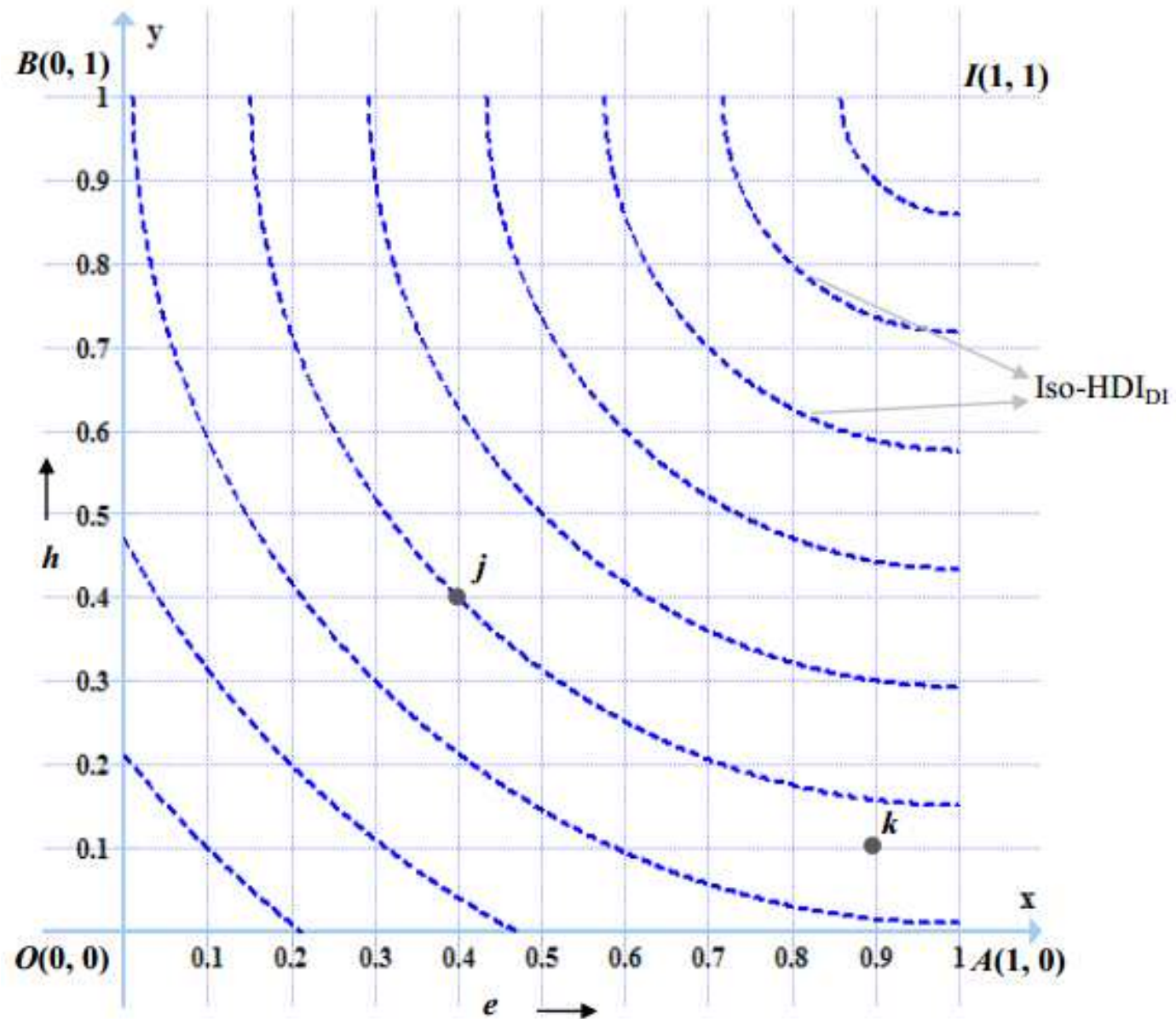
3 dimensions –

1. A long and healthy life } Life Expectancy at birth $\cdots\rightarrow h$
2. Knowledge } Mean years of schooling: adults $\cdots\cdots\cdots\rightarrow e$
 } Expected years of schooling: children
3. Ability to achieve decent } GNI per capita $\cdots\cdots\cdots\rightarrow y$
 standard of living } (PPP)

$$0 \leq h, e, y \leq 1$$

$$\text{HDI}_{DI} = 1 - (\sqrt{((1-h)^2 + (1-e)^2 + (1-y)^2)} / \sqrt{3})$$

Iso-HDI lines – displaced ideal



Inequity conscious

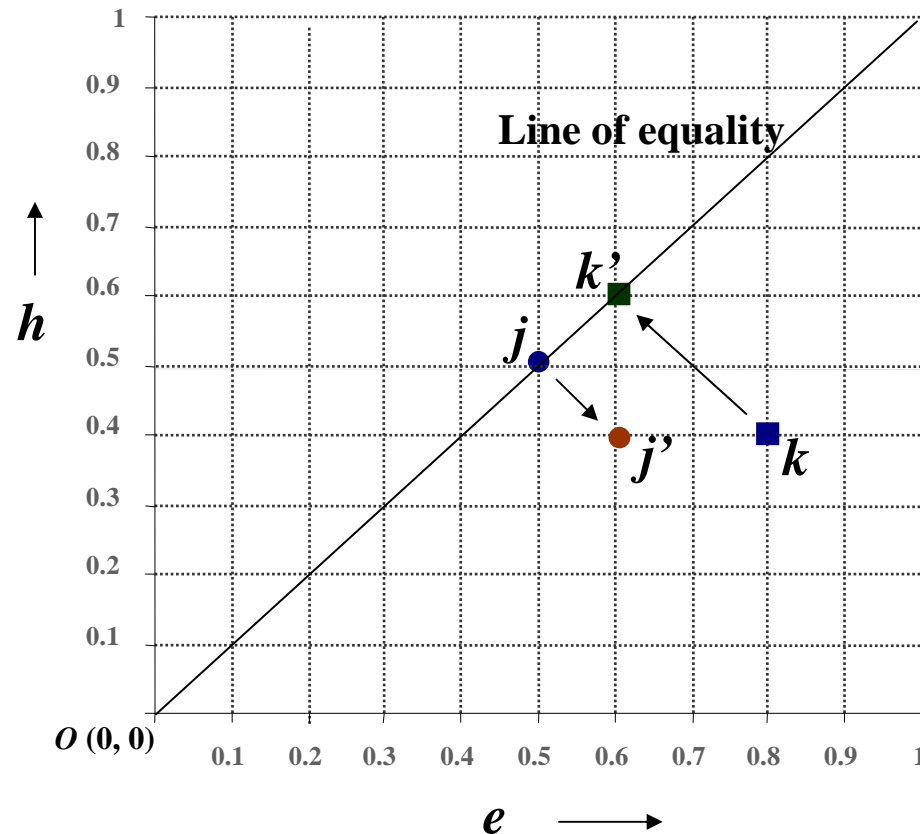


Illustration (1)

Uniform to Non-Uniform

$$j(0.5, 0.5) \quad d_j = \sqrt{(0.50)} \quad GM = \sqrt{(0.25)}$$

$$j'(0.6, 0.4) \quad d_{j'} = \sqrt{(0.52)} \quad GM = \sqrt{(0.24)}$$

Change in HDI:

$$HDI^{LA}_j = HDI^{LA}_{j'}$$

$$HDI^{GM}_j > HDI^{GM}_{j'}$$

$$HDI^{DI}_j > HDI^{DI}_{j'}$$

Illustration (2)

Non-Uniform to Uniform

$$k(0.8, 0.4) \quad d_k = \sqrt{0.80} \quad GM = \sqrt{(0.32)}$$

$$k'(0.6, 0.6) \quad d_{k'} = \sqrt{0.72} \quad GM = \sqrt{(0.36)}$$

Change in HDI:

$$HDI^{LA}_k = HDI^{LA}_{k'}$$

$$HDI^{GM}_k < HDI^{GM}_{k'}$$

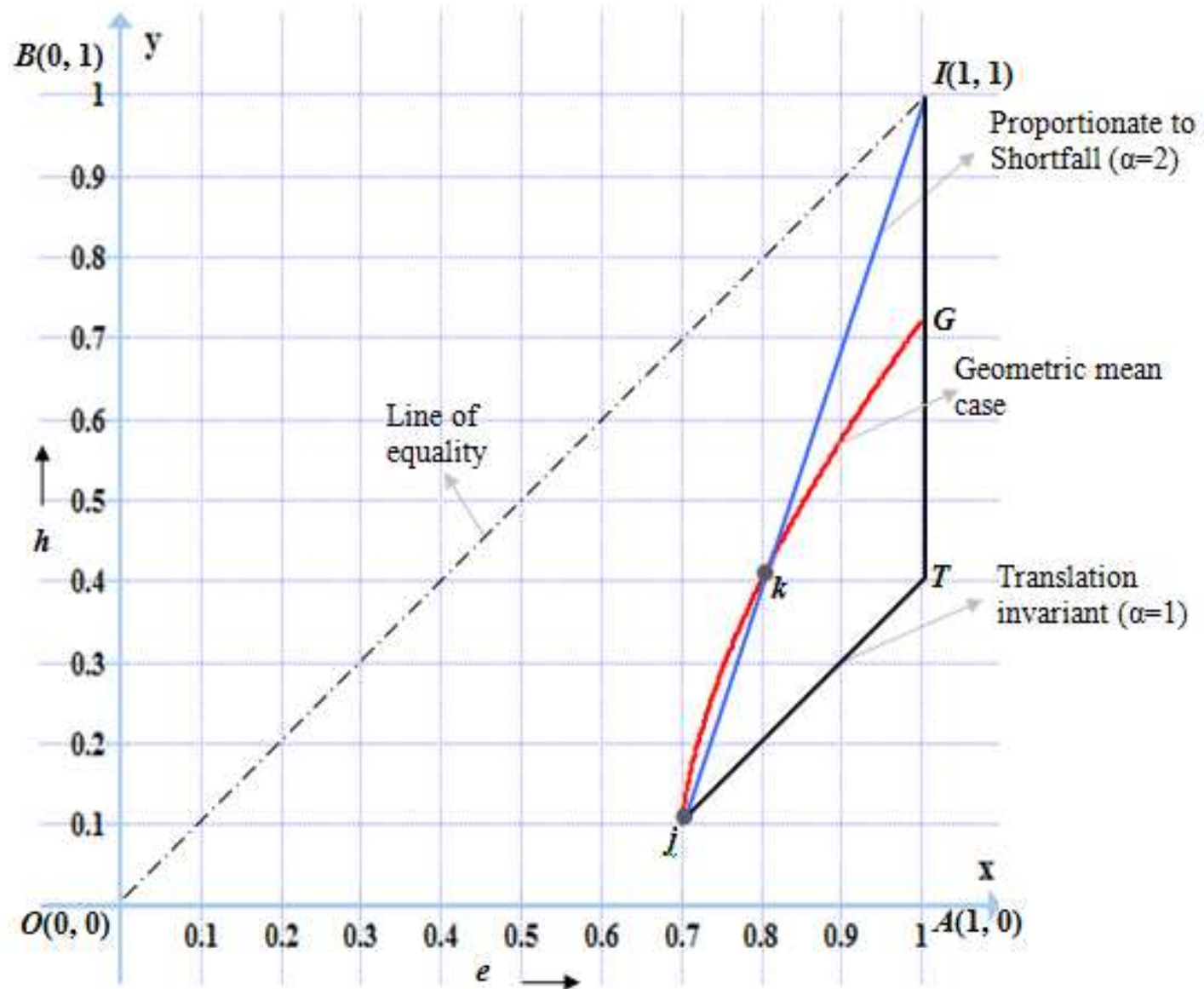
$$HDI^{DI}_k < HDI^{DI}_{k'}$$

LA fails, GM and DI satisfy

Perfect Substitution vs Uniformity

- A measure of HDI cannot satisfy perfect substitutability and be sensitive to inequity across dimension for a given mean (uniformity) simultaneously
- If a measure satisfies perfect substitutability then it will not change for a given mean even if deviation across dimensions change. As against this, uniformity demands that the measure decreases as deviation increases for a given mean.

Shortfall sensitive



Class of Measures

$$H_{\alpha} = 1 - \left(\frac{(1-h)^{\alpha} + (1-e)^{\alpha} + (1-y)^{\alpha}}{3} \right)^{1/\alpha}$$

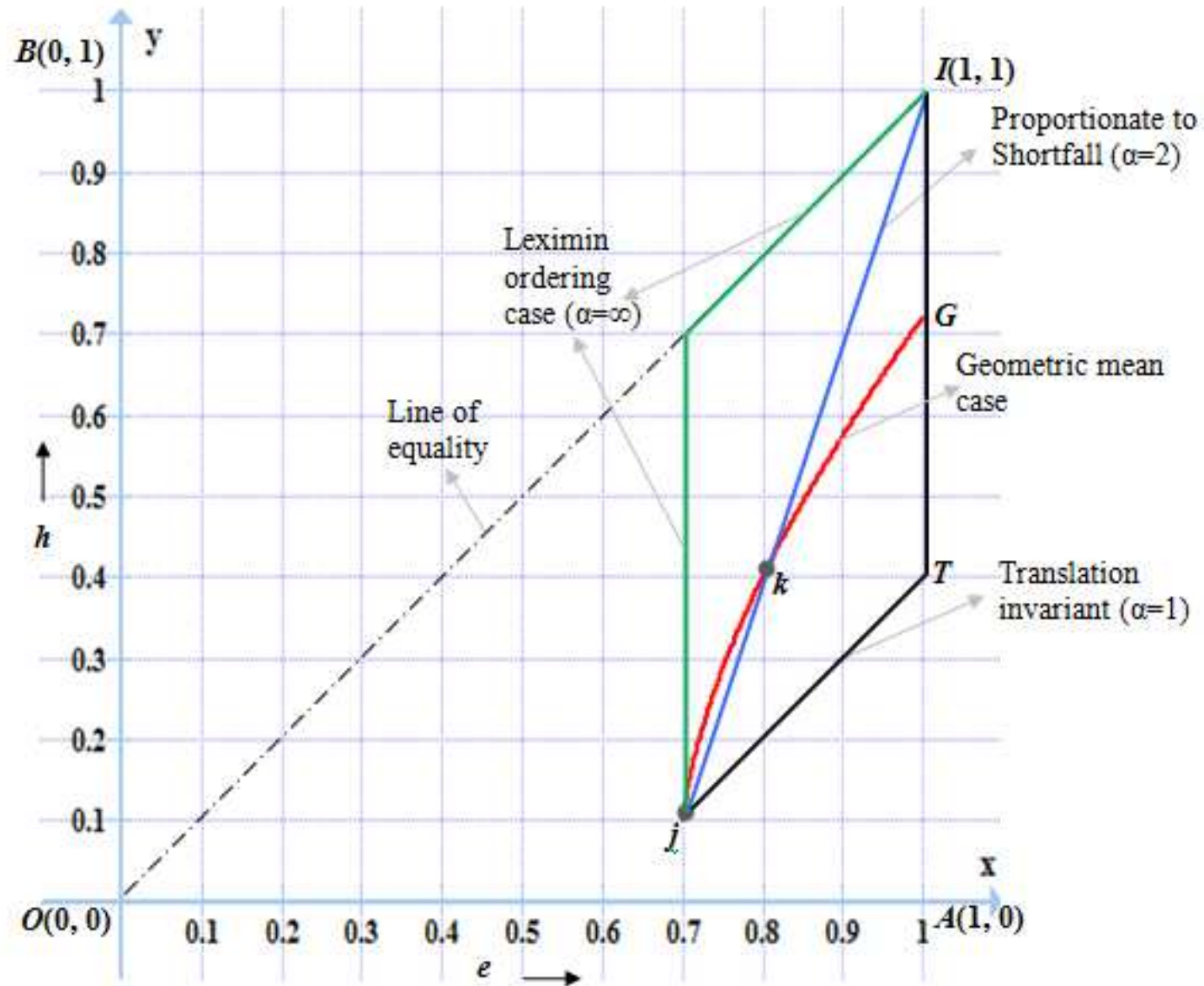
H_{α} special case at

$$\alpha=1, H_{\alpha} = \text{HDI}_{\text{LA}}$$

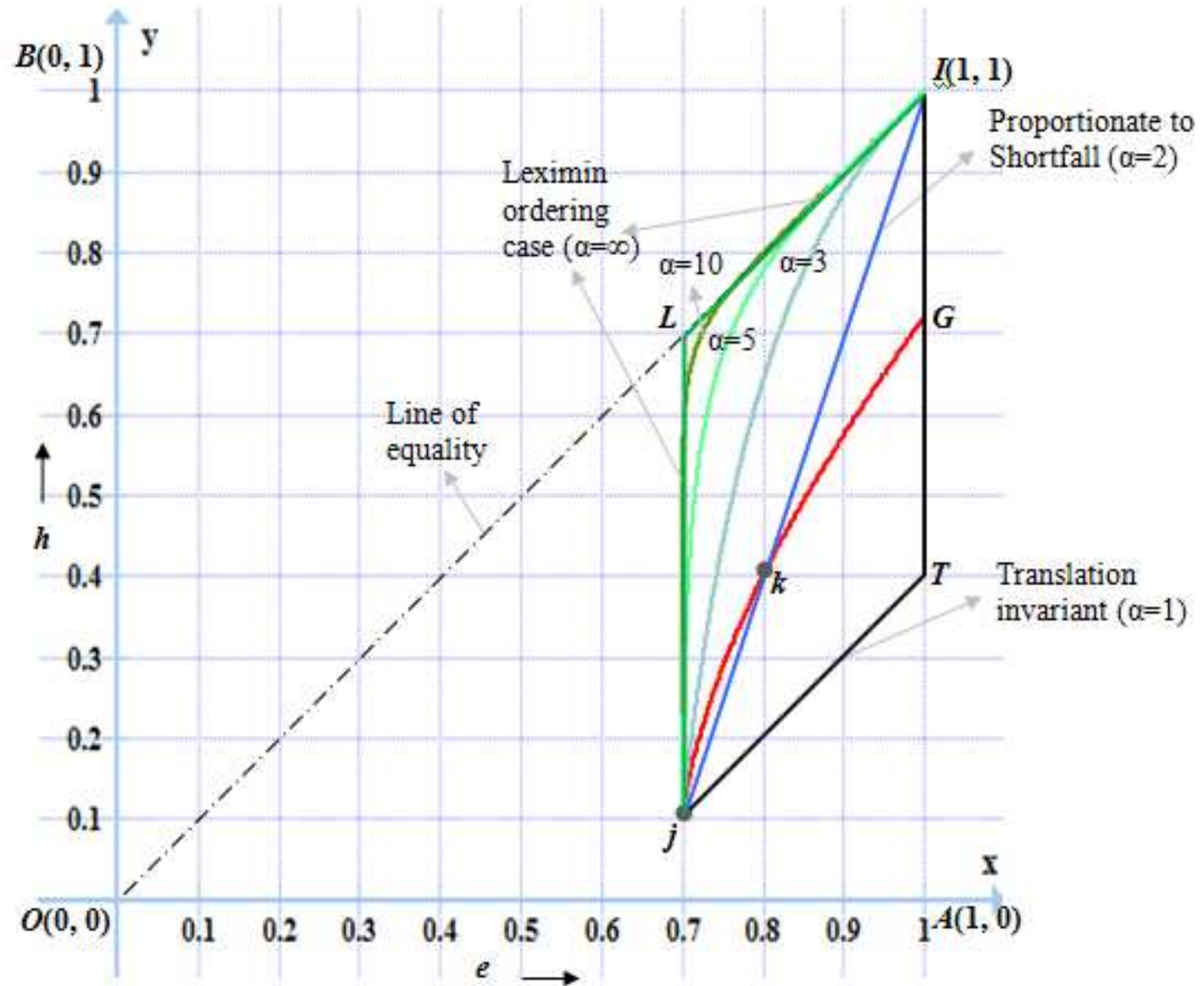
$$\alpha=2, H_{\alpha} = \text{HDI}_{\text{DI}}$$

$\alpha=\infty$, H_{α} is equal to a Rawlsian leximin ordering

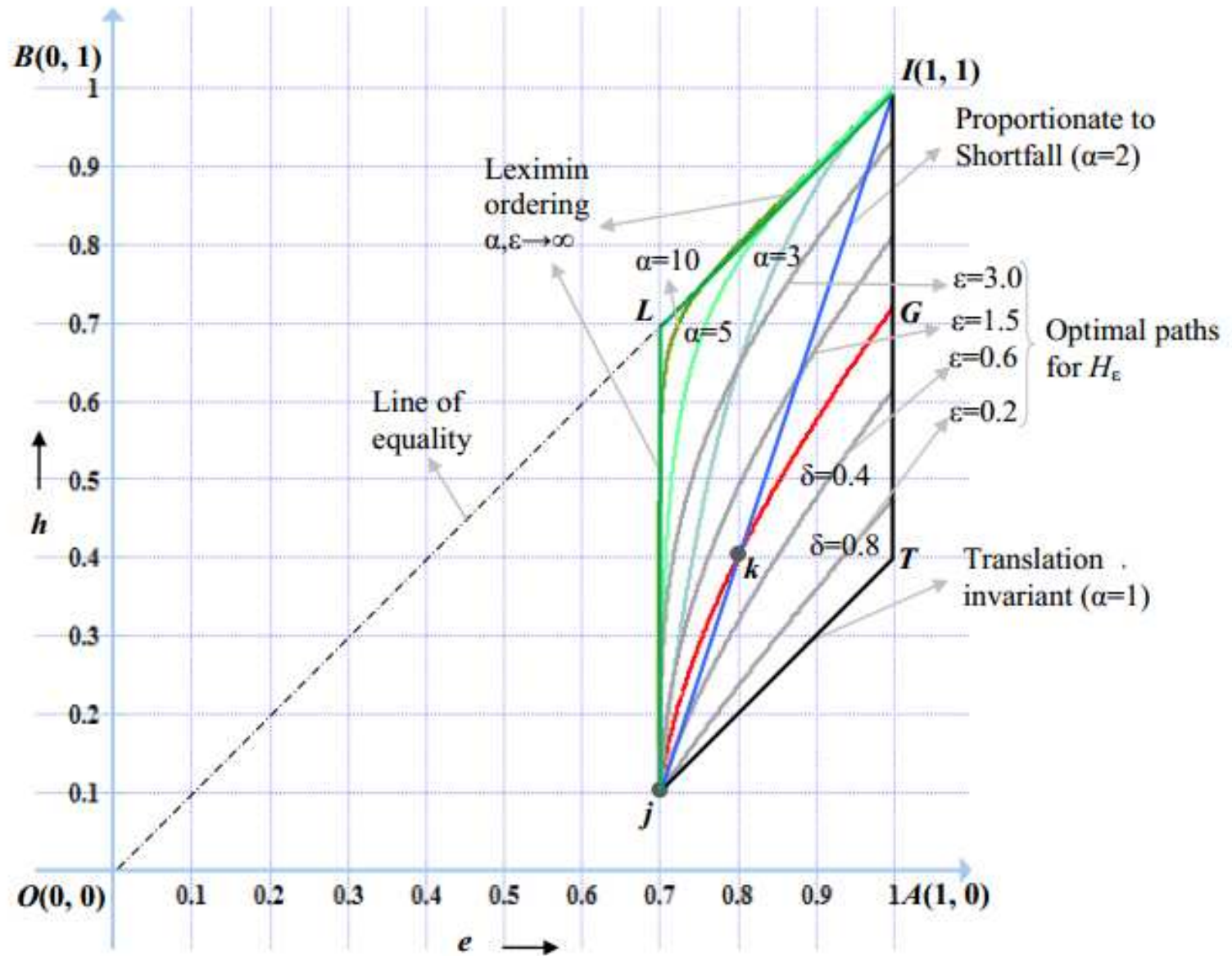
Leximin ordering - Rawlisan



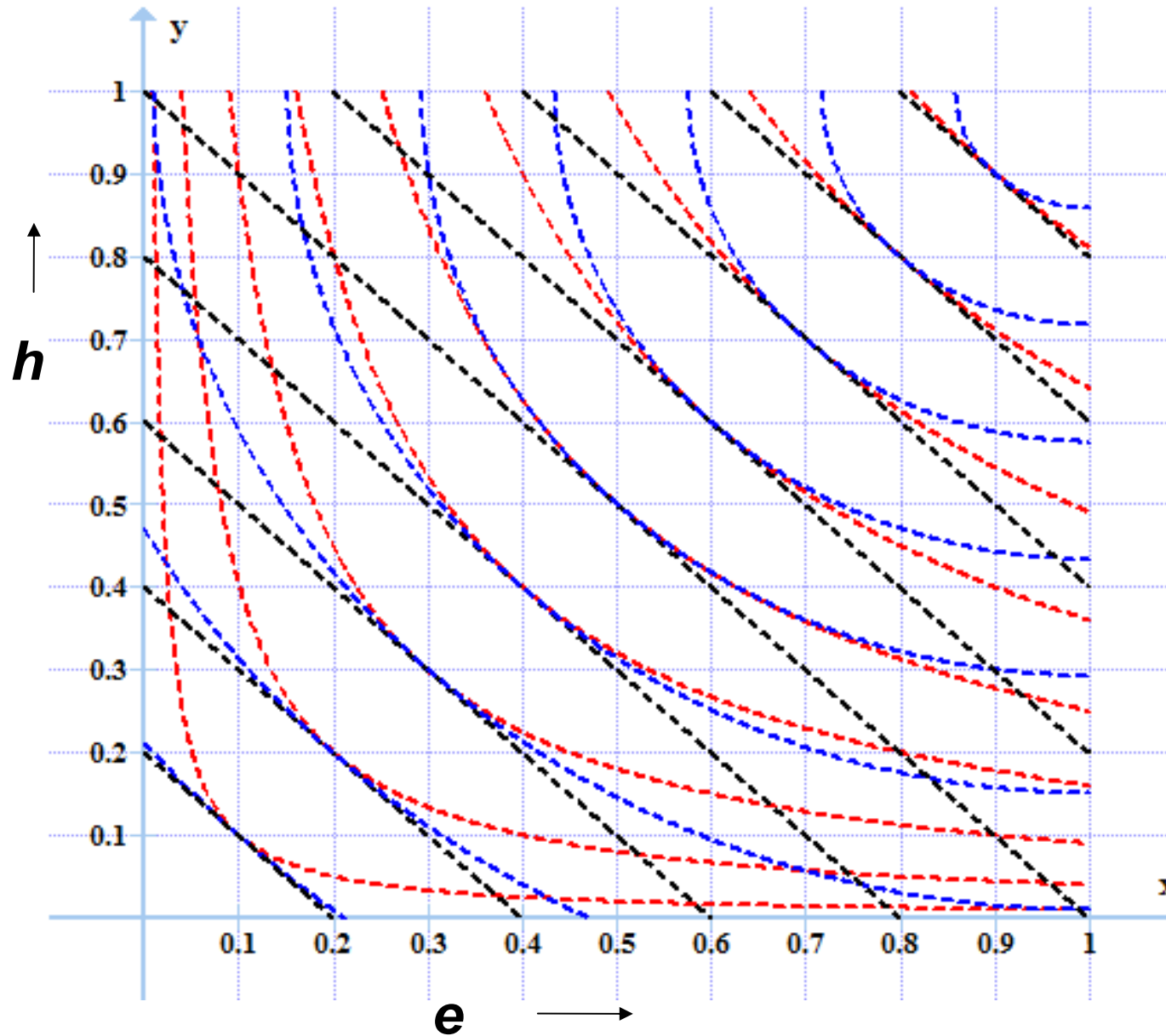
Reasonable pluralism



Fixed ideal – a questionmark



Hiatus sensitive



Equal gap at higher attainment should be considered worse off

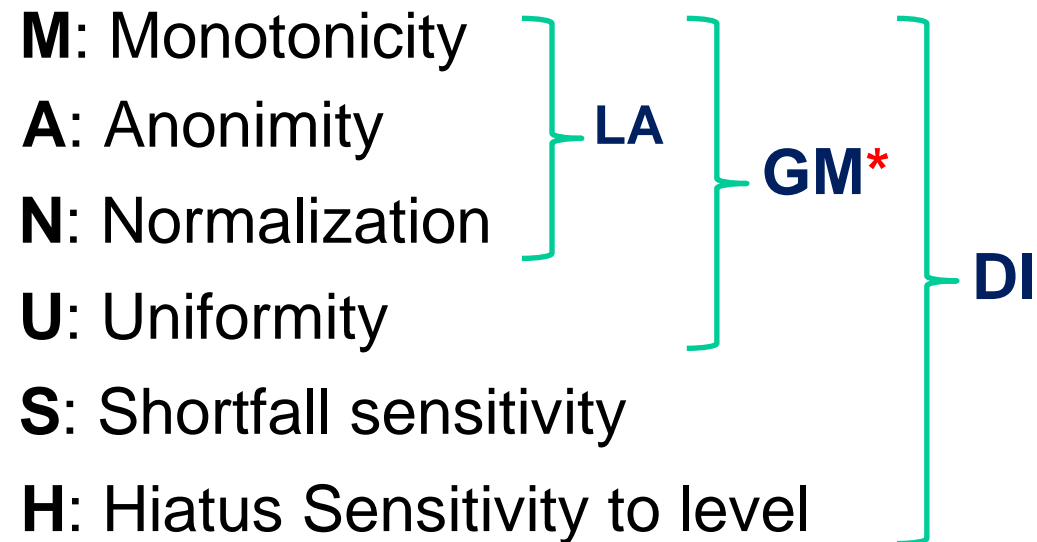
LA and GM fail

DI satisfies

Hiatus sensitivity to level vs Proportionate deviation

- A measure of HDI cannot satisfy hiatus sensitivity to level and also penalize proportionate deviation of a given gap from uniformity simultaneously.
- The former suggests that the same gap at a higher average attainment should be considered worse off. The latter would imply that at a higher attainment the same absolute deviation would be identified with a lower proportionate deviation, and hence, acceptable.

MANUSH Axioms: A Comparison



MANUSH is necessary and sufficient for **H α** ; $\alpha \geq 2$

A caveat on the focus of the study

- NOT rationale behind choosing the indicators
- NOT how the indicators are measured and scaled
- NOT how the indicators are normalized and weighed

INVESTIGATED the appropriateness of
the known two measures of HDI

and proposed an **alternative class of measures**

Female life expectancy at birth and Pupils achieving 5 or more A-C grades

Regions	Lif Exp Fem yr 2005-07	≥5 A-C grd,% 2006-07	Lif Exp Fem yr 2010-12	≥5 A-C grd,% 2011-12
North East	80.4	60.5	81.6	58.5
North West	80.4	60.3	81.7	58.9
Yorkshire n Humber	81.1	57.8	82.2	57.3
East Midlands	81.6	57.9	82.9	57.6
West Midlands	81.4	59.3	82.7	58.8
East	82.5	61.2	83.7	58.2
London	82.3	60.9	83.8	62.3
South East	82.6	62.0	83.8	60.2
South West	82.9	59.5	83.9	57.5

LSE Two-dimensional HDI using the earlier data on female life expectancy and pupils achievement



Regions	2005-07			2010-12		
	LA	GM	DI	LA	GM	DI
N East	5	7	6	8	6	8
N West	7	8	7	7	5	6
Y n Humber	9	9	9	9	9	9
E Midlands	8	6	8	6	8	7
W Midlands	6	5	5	5	3	3
East	2	2	2	3	4	4
London	3	3	3	1	1	1
S East	1	1	1	2	2	2
S West	4	4	4	4	7	5

Concluding Remarks

- The proposed displaced ideal method is sensitive to the worst off across dimensions and populations.
- It imposes greater equity consciousness across dimensions/populations at higher levels of attainment.
- In the α -class of measures, the most stringent form of shortfall sensitivity is like the Rawlsian leximin scenario.
- We suggest the axiom of MANUSH (or HUMANS) for the human development index.
- Illustration from regions across England, UK.
- Fits into the three-leg framework of Titmuss suggested by Glennerster – moral, political/institutional and economic. These are in essence Rawlsian.

References

- This presentation draws from a co-authored working paper available at <http://www.igidr.ac.in/pdf/publication/WP-2013-020.pdf>.

Some selected references are given below.

- Anand, S and Sen, A (1994) Human Development Index: Methodology and Measurement, Human Development Report 1994.
- Glennerster, H (2014) Richard Titmuss: forty years on, CASE paper 180, London School of Economics and Political Science.
- Mishra, Srijit and Nathan, Hippu Salk Kristle (2008) On A Class of Human Development Index Measures, WP-2008-020, Indira Gandhi Institute of Development Research, Mumbai.
- Nathan, Hippu Salk Kristle and Mishra, Srijit (2010), Progress in Human Development: Are we On the Right Path? *International Journal of Economic Policy in Emerging Economies*, Vol.3. No. 3, 199-221.
- Nathan, Hippu Salk Kristle, Mishra, Srijit and Reddy, B. Sudhakara (2008), An Alternative Measure of HDI, WP-2008-001, Indira Gandhi Institute of Development Research, Mumbai
- Nathan, Hippu Salk Kristle and Mishra, Srijit (forthcoming), Group Differential for attainment and failure indicators, *Journal of International Development*.
- UNDP (2010), *Human Development Report 2010: The Real Wealth of Nations; Pathways to Human Development*, Oxford University Press, New Delhi