# Cumulative economic insecurity

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# Conceptualising economic insecurity

## Motivation

- High proportion of households experienced considerable income loss during last two global crises

- Financial instability perceived by households has highlighted the importance of studying economic insecurity as a dimension of well-being

- **Economic insecurity**: stress and anxiety produced by exposure to adverse economic events and the inability to face them when they occur

- Anticipation of future financial difficulties affects mental health, quality of life, and behavioural

# Economic insecurity **dimensions**

## Economic insecurity definition

- *"the anxiety produced by a lack of economic safety – that is, by an inability to obtain protection against subjectively significant potential economic losses" (Osberg, 1998, p. 7).*

## Buffers to offset potential economic loss / unexpected expense

- *Liquid assets*

- Indebtedness capacity

- *Protected employment*

# Measuring economic insecurity

## Motivation

- Economic insecurity is widely recognised as a *multidimensional phenomenon*

- Current debate focuses on how best to measure economic insecurity

- One-dimensional measurement approach vs. composite indices

    1. *A dashboard approach* has the advantage of not dealing with complex methodological choices, **but** has the drawback of not considering **the dependency between other dimensions**

    2. *Composite indices* capture simultaneous incidence of the dimensions of economic insecurity **&** are sensitive to joint distribution of dimensions

- Our research focus on the dependence between economic insecurity dimensions

# Cumulative economic insecurity

## Dependence between economic insecurity dimensions

- **Cumulative economic insecurity**: it occurs when households occupy a low position on all economic insecurity dimensions

- Cumulative vulnerabilities provides an intuitive lens into the dependence between dimensions (e.g. well-being dimensions; Decancq, 2022)

- **Concept of cumulative disadvantages:** disadvantages in one dimension of economic insecurity are reinforced by disadvantages in other dimensions (Wolff and de-Shalit, 2007)

- The stress and anxiety of households without a buffer (*liquid assets, ability to borrow or protection of employment*) to face an economic problem **should be greater than that of households who do have buffers**

**Three societies with three households each**

| | Society A | | | Society B | | | Society C | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Dim. 1 | Dim. 2 | Dim. 3 | Dim. 1 | Dim. 2 | Dim. 3 | Dim. 1 | Dim. 2 | Dim. 3 |
| Household 1 | 70 | 20 | 30 | 70 | 50 | 60 | 60 | 40 | 50 |
| Household 2 | 10 | 50 | 10 | 20 | 30 | 30 | 10 | 20 | 20 |
| Household 3 | 20 | 30 | 60 | 10 | 20 | 10 | 5 | 10 | 5 |

- Dashboard approach **remains blind to the dependence *btw* dimensions** (difference *btw* societies A and B)
- BUT an association measure **remains blind to changes in the means of the dimensions** (difference *btw* societies B and C)

# Our research in a Nutshell

- We propose a **composite index of economic insecurity** which can be summarised and aggregated *at the level of society*

- Our index **combines** the *dashboard of averages* with the concept of *cumulative economic insecurity*

- Three contributions to the literature on economic insecurity

  - **Theoretical contribution:** incorporate the notion of accumulation of disadvantages to multidimensional economic insecurity (MEI) index

  - **Methodological contribution:** MEI index is explicitly sensitive to both
    1. changes in the association between dimensions (relative)
    2. changes in the means of the dimensions (absolute)

  - **Empirical contribution:** We compare our MEI index across four countries using the Luxembourg Wealth Study Database

# Cumulative economic insecurity:
# a rank concordance index

- **A rank concordance index** (R) is used to capture the degree of positive association between the percentiles of all the dimensions.

  - reaching its highest value when the indicators are perfectly positively associated

- Three rank concordance indices are used:

  - Kendall-Dickinson index (1990)

  - Joe index (1990)

  - Spearman's footrule index | cumulative deprivation curves (Decancq, 2022)

# Multidimensional economic insecurity index

- To construct a composite index, we follow the functional form proposed by Yalonetzky (2021)

$$MEI(X_{n3}) = \left(\frac{1+R(X_{n3})}{2}\right)\left(\frac{1}{3}\sum_{j=1}^{3}\overline{x_{.j}}\right)$$

- Where $X_{nd}$ is a matrix with $n$ rows representing households and 3 columns representing the three indicators of economic insecurity

- $\overline{x_{.j}}$ is the social average of indicator/column $x_{.j}$ and $0 \leq R(X_{n3}) \leq 1$ is a rank concordance index

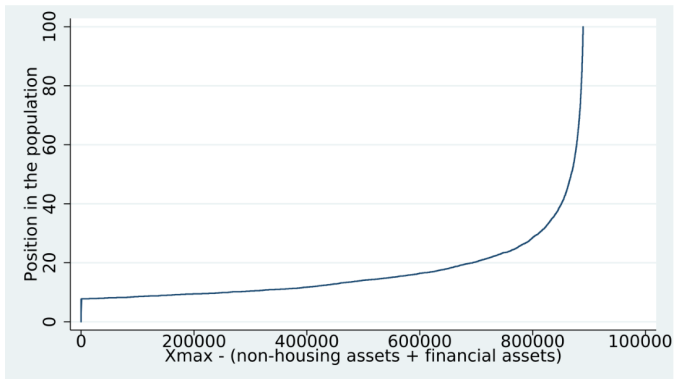- A higher value of $x_{ij}$ would indicate more insecurity for household $i$ in indicator $j$

# Dimensions and measurement of sources of economic insecurity

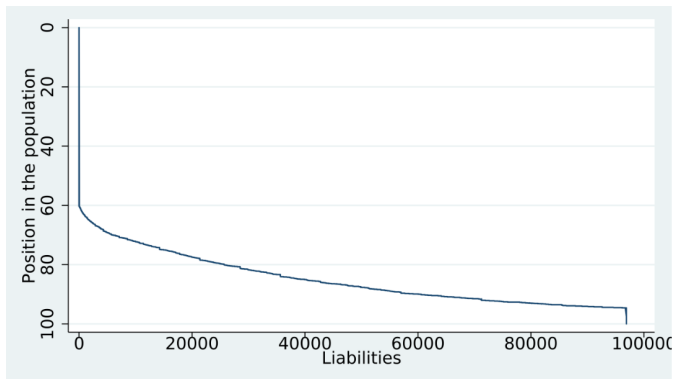| Household dimension | Indicator in US$ per person in 2017 PPPs | Xmax defined | Economic insecurity level | |
| --- | --- | --- | --- | --- |
| | | | Minimum | Maximum |
| Liquid assets | Xmax - (non-housing assets + financial assets (exc. pen.)) | Assets sufficient to stay above poverty line for 100 years | 0 | Xmax |
| Indebtedness capacity | Liabilities | NA | 0 | Xmax from data |
| Protected employment | Xmax - (labour income) | Assets sufficient to stay above poverty line for 20 years | 0 | Xmax |

Note: The global poverty line for high-income countries is used for both Xmax (US$ 24.36 per person per day in 2017 PPPs, Jollife et al. (2022)).
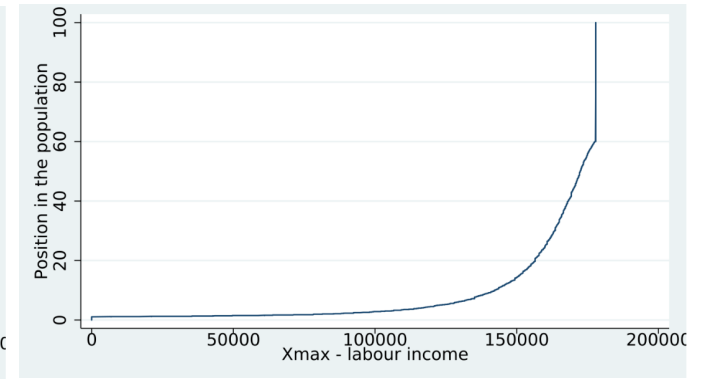
# Cumulative distribution functions from Spain 2014

| Liquid assets dimension | Indebtedness capacity dimension | Protected employment dimension |
|---|---|---|



Source: Authors' calculations from the Luxembourg Wealth Study

# Minimum position method for graphing cumulative economic insecurity curve

Rank concordance index: Multidimensional generalization of Spearman's footrule

| Household position vector | | | Step 1 | Stept 2 |
|---|---|---|---|---|
| Dim. 1 | Dim. 2 | Dim. 3 | Minimal position of a houshold | Percentile ranks for minimal position |
| (100, | 100, | 100) | 100 | HH with the higher minimal position |
| | … | | … | … |
| (90 | 45, | 80) | 45 | 50 |
| | … | | … | … |
| (80 | 50, | 70) | 50 | 45 |
| | … | | … | … |
| (60 | 25, | 50) | 25 | 30 |
| | … | | … | … |
| (50 | 60 | 30) | 30 | 25 |
| | … | | … | … |
| (0, | 0, | 0) | 0 | HH with the lower minimal position |

**The cumulative economic insecurity curve**



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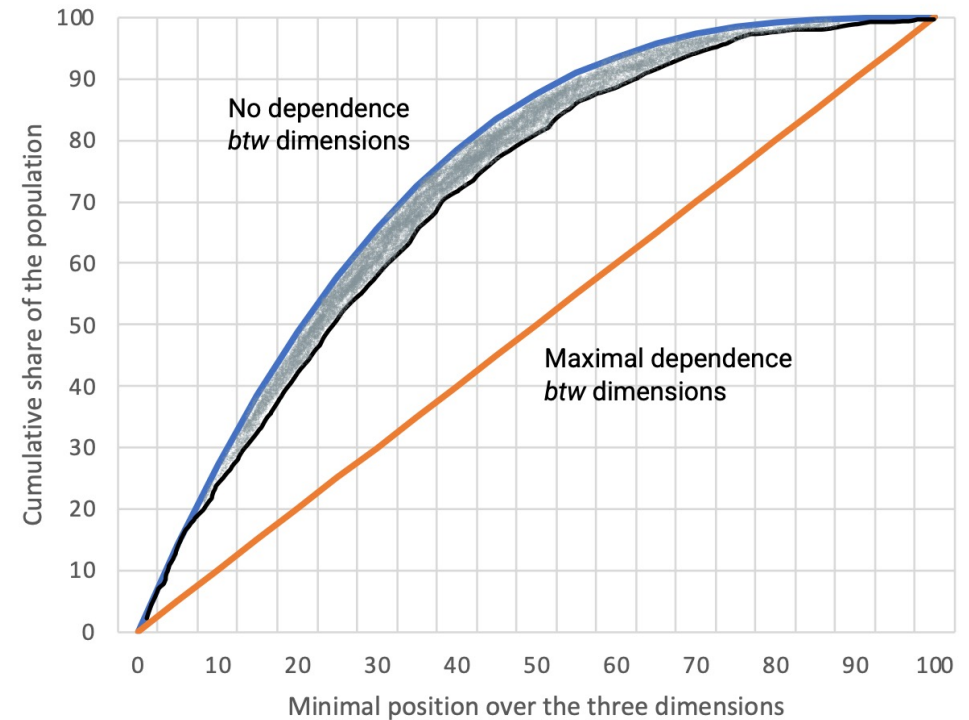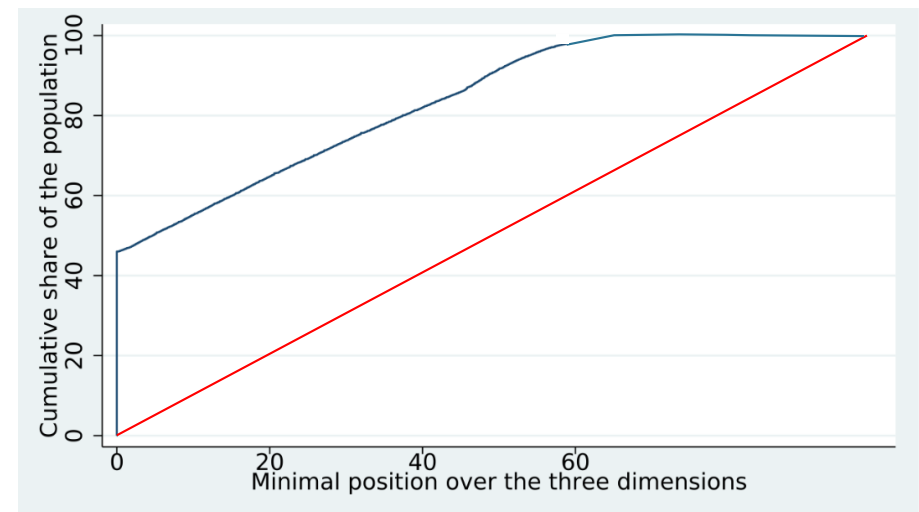
# Cumulative economic insecurity curves

USA 2013
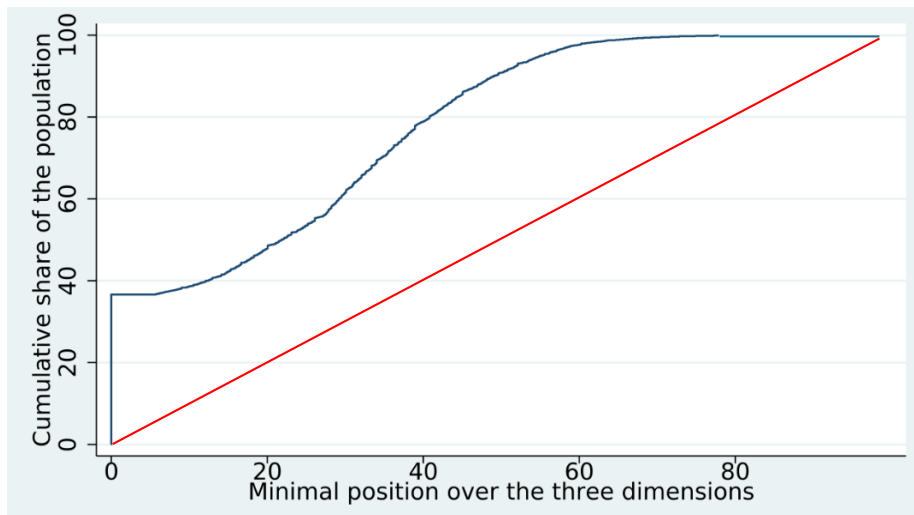


UK 2013



Source: Authors' calculations from the Luxembourg Wealth Study

# Evolution of the MEI index in Italy, Spain, UK and USA, 2007/08 - 2016/17

| País | 2007/08 | 2010/11 | 2013/14 | 2016/17 | Percentage change 2007/08 - 2016/17 |
|---|---|---|---|---|---|
| Italy | 229,773 | 258,237 | 264,830 | 244,691 | 6.5% |
| Spain | 375,200 | 373,704 | 376,102 | 372,077 | -0.8% |
| United Kingdonm | 122,452 | 206,963 | 206,988 | 201,724 | 64.7% |
| United States | 214,014 | 214,181 | 216,325 | 214,595 | 0.3% |

Source: Authors' calculations from the Luxembourg Wealth Study

# Evolution of the composition of MEI index in Italy, Spain, UK and USA, 2007/08 - 2016/17

| Component | Italy | | | | Percentage change 2007/08-2016/17 |
|---|---|---|---|---|---|
| | 2008 | 2010 | 2014 | 2016 | |
| Liquid asset | 845,856 | 843,287 | 850,544 | 849,406 | 0.42% |
| Protected employment | 226,218 | 360,767 | 392,199 | 307,797 | 36.06% |
| Indebtedness capacity | 5,762 | 5,949 | 5,015 | 5,279 | -8.39% |
| Rank concordance index | 0.27908 | 0.28051 | 0.27347 | 0.26294 | -5.78% |

| Component | Spain | | | | Percentage change 2007/08-2016/17 |
|---|---|---|---|---|---|
| | 2008 | 2011 | 2014 | 2017 | |
| Liquid asset | 854,569 | 853,605 | 849,622 | 850,176 | -0.51% |
| Protected employment | 867,433 | 872,341 | 873,760 | 863,859 | -0.41% |
| Indebtedness capacity | 19,115 | 19,923 | 19,984 | 18,680 | -2.28% |
| Rank concordance index | 0.29296 | 0.28430 | 0.29440 | 0.28842 | -1.55% |

| Component | United Kingdom | | | | Percentage change 2007/08 - 2016/17 |
|---|---|---|---|---|---|
| | 2007/08 | 2010/11 | 2013/14 | 2016/17 | |
| Liquid asset | 421,986 | 813,322 | 815,331 | 808,475 | 91.59% |
| Protected employment | 159,819 | 161,519 | 162,971 | 161,589 | 1.11% |
| Indebtedness capacity | 29,474 | 25,651 | 24,425 | 25,403 | -13.81% |
| Rank concordance index | 0.20192 | 0.24117 | 0.23855 | 0.21586 | 6.90% |

| Component | United States | | | | Percentage change 2007/08 - 2016/17 |
|---|---|---|---|---|---|
| | 2007/08 | 2010/11 | 2013/14 | 2016/17 | |
| Liquid asset | 808,715 | 813,099 | 818,157 | 806,876 | -0.23% |
| Protected employment | 150,440 | 151,902 | 153,728 | 151,657 | 0.81% |
| Indebtedness capacity | 50,316 | 49,701 | 42,856 | 43,629 | -13.29% |
| Rank concordance index | 0.27204 | 0.26647 | 0.27910 | 0.28479 | 4.69% |

# Next steps

- Equivalence theorem linking transformations that increase/decrease concordance with the cumulative insecurity curves

- Analysis of the sensitivity of concordance indices and cumulative insecurity curves to different tie-breaking methods

- Apply our MEI index to more countries participating in the Luxembourg Wealth Study database.

- Generalisation of index to account for inequality within each dimension?

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# Rank concordance indices

- Kendall-Dickinson index (1990)

$$KF = \frac{12}{(N^2 - 1)\,N} \sum_{i=1}^{N} \left[ \frac{1}{D} \sum_{d=1}^{D} r_{nd} - \frac{N+1}{2} \right]^2$$

- Joe index (1990)

$$J = \frac{\sum_{n=1}^{N} \left[ \prod_{d=1}^{D} r_{nd}^{1/D} - \frac{N+1}{2} \right]}{\sum_{n=1}^{N} \left[ n - \frac{N+1}{2} \right]}$$

- Spearman's footrule (1904, 1906)

$$R = 1 - \frac{3 \sum_{i=1}^{n} |x_i - y_i|}{n^2 - 1}.$$