Methodological challenges when studying precarious employment II

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Challenges…

- Defining and operationalizing (measuring) PE
- Collecting the appropriate data

→ Studying the appropriate population

→ The issues of study design

The study population

- If we want to study precariously employed workers, who do we need to include in our study population?

  → *Reference group?*

  → *Salaried workers? Self-employed workers?*

  → *Are unemployed (short or long term) part of our “working” population?*

CARMEN (43 years old)

administrative assistant being employed through a **temp-agency**

directly employed by a company with a fixed-term contract

unemployed for 6 months

self-employed working as a **gig worker** (delivering food).

Self-employed individuals in studies of PE

- Mixed group of low and high quality employment
  - → Business owners (medium-big employers)
  - → Farmers, dependent freelancers, own account workers (solo self-employed)

- Exclusion: EPRES was created for salaried workers
- Separate analyses for salaried and self-employed workers
- Measurement of precarious employment that includes self-employed and salaried individuals

Unemployed individuals in studies of PE

- Cross-sectional studies: exclusion

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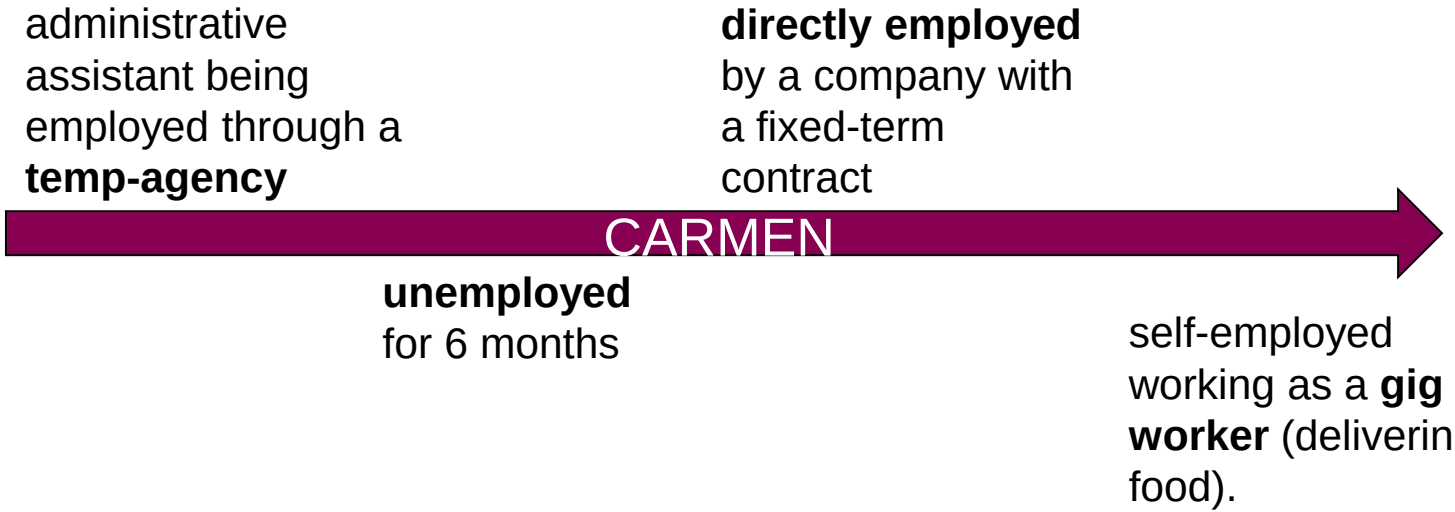


Cross-sectional vs longitudinal evidence

- Research on PE has been based on data with assessment of precarious employment at **one time point only.**

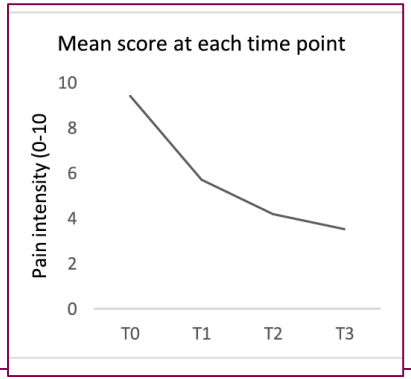
- Dynamic nature of the labor market → we need to consider changes of employment relationships over time, across the **individual's working life course**.

How to study mobility patterns? TRAJECTORIES

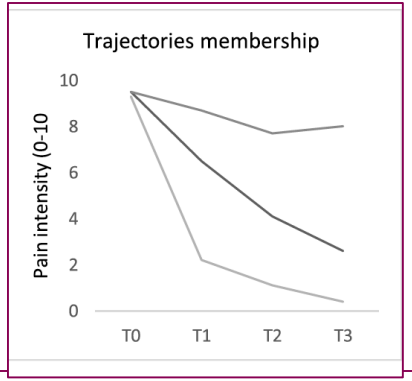
When we are interested to study **how groups of individuals share a similar evolution over time**.

Or with other words, to understand intra- and inter-individual variability in a specific variable patterns over time.

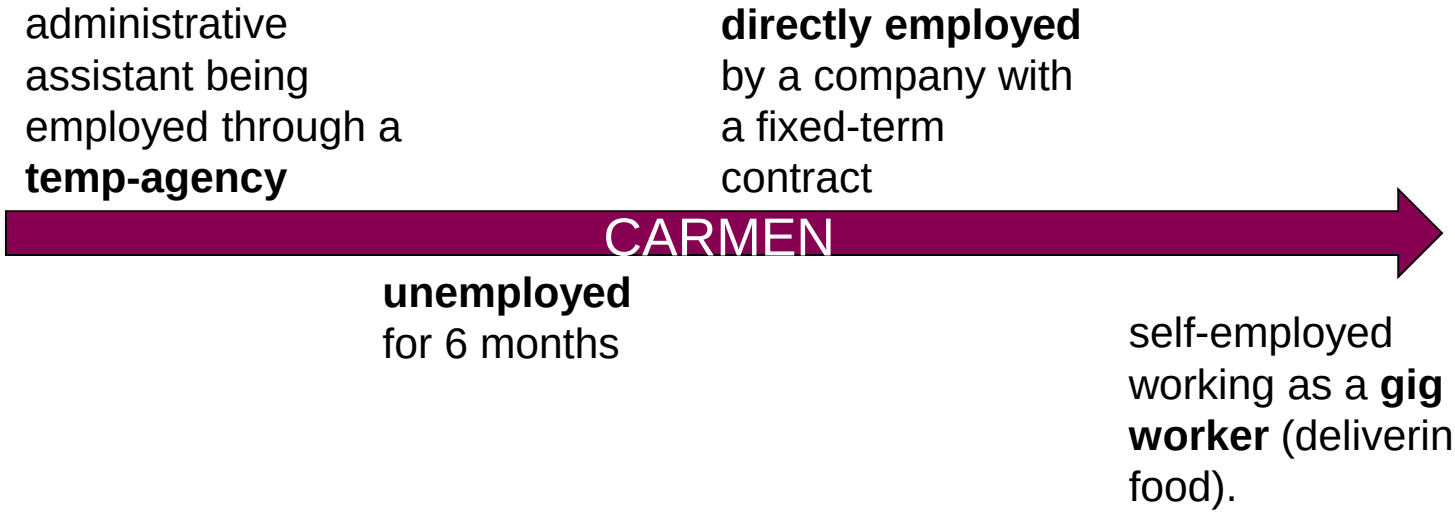
TRENDS



TRAJECTORIES



Trajectories of precarious employment



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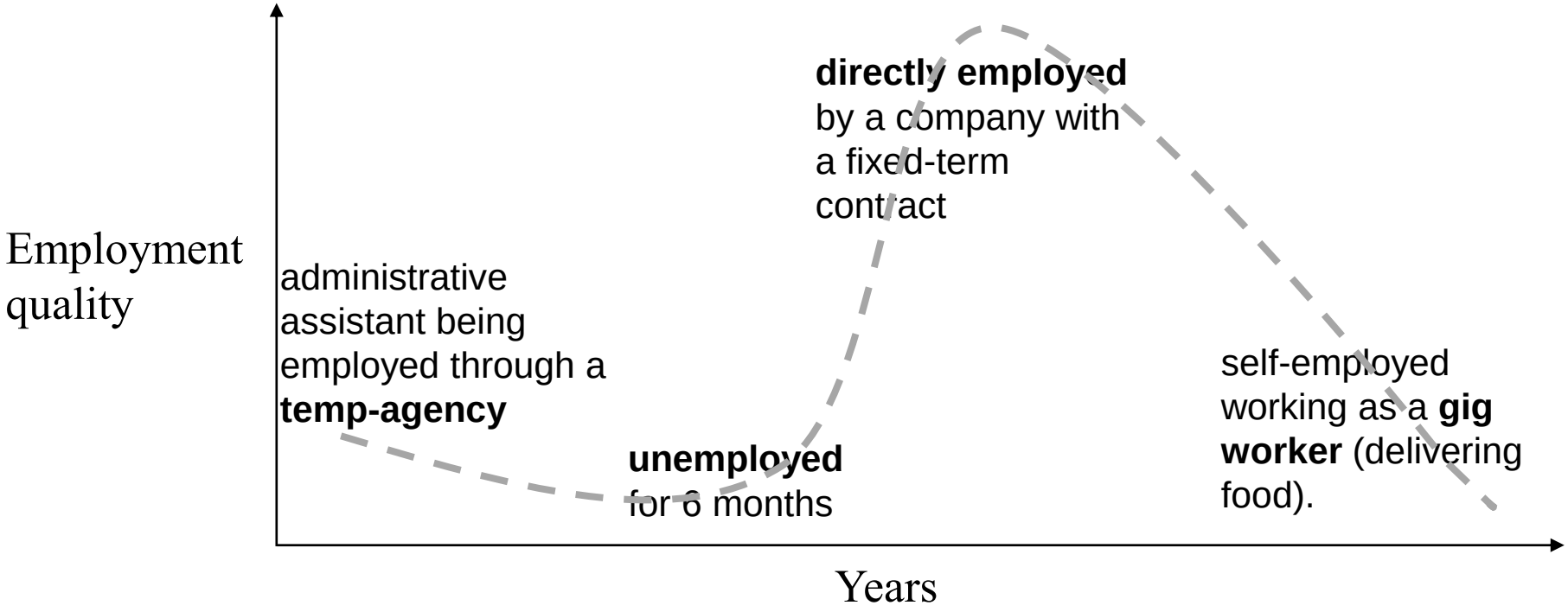
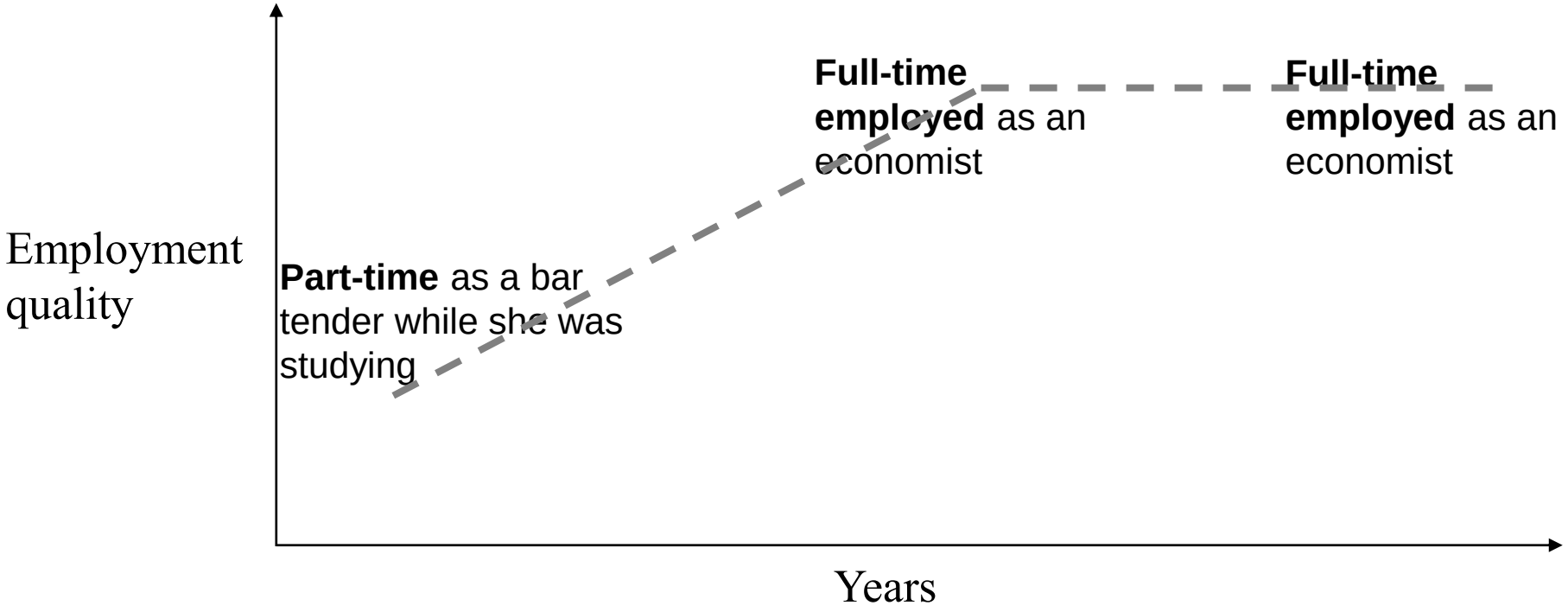


MARIA (43 years old)

Part-time as a bar tender while she was studying

Full-time employed as an economist

Trajectories of precarious employment



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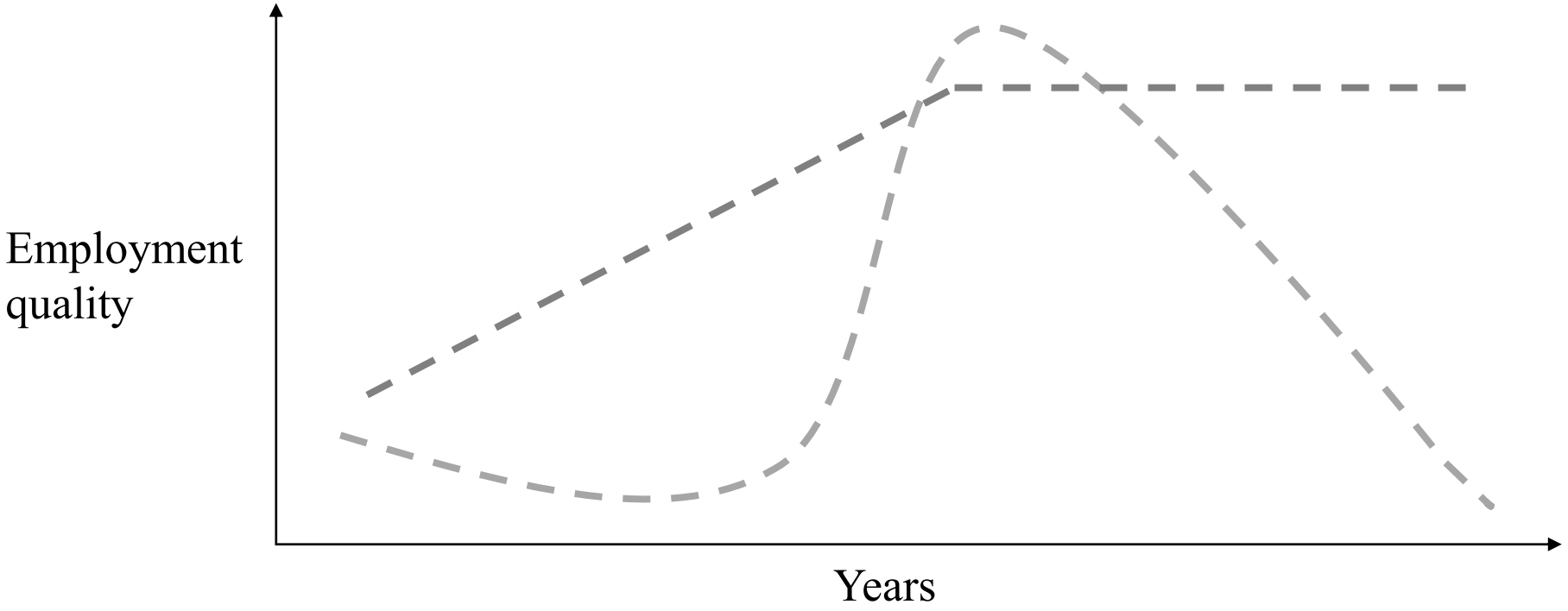

How to create trajectories?

Manually

- We establish the patterns we want to study a priori (pre-specified groups are analyzed).

Data-driven approaches (latent class-modeling)

- Sometimes, unknown or unexpected subgroups of individuals share similar patterns –> If we follow manual approaches, then we are probably oversimplifying the variabilities.
- Modelling classifies individuals within a given subgroup that share greater similarities than individuals from separate subgroups.

Example 1: Manually created trajectories

> Scand J Work Environ Health. 2021 Oct 1;47(7):509-520. doi: 10.5271/sjweh.3978.
Epub 2021 Aug 16.

Low-quality employment trajectories and risk of common mental disorders, substance use disorders and suicide attempt: a longitudinal study of the Swedish workforce

Johanna Jonsson [1], Carles Muntaner, Theo Bodin, Magnus Alderling, Rebeka Rebeka, Bo Burström, Letitia Davis, Virginia Gunn, Tomas Hemmingsson, Mireia Julià, Katarina Kjellberg, Bertina Kreshpaj, Cecilia Orellana, Eva Padrosa, David H Wegman, Nuria Matilla-Santander

Affiliations + expand

PMID: 34397098 PMCID: PMC8504160 DOI: 10.5271/sjweh.3978

Free PMC article

We wanted to study **constant, mobility** and **fluctuation** patterns of low and high quality employment states over 5 years

Exposure assessment: Employment trajectories (2005-2009)

SWE-ROPE 2005-09

Contractual relationship insecurity (Directly employed, agency employed, direct and self-employed, self-employed, solo self-employed)

Contractual temporariness (Stable, unstable)

Multiple job holding (1 job, Multiple jobs, Multiple jobs and sectors)

Income level (>200%, 120-199%, 80-119%, 60-79% of the median)

Lack of unionization (>90%, 70-90%, <70%)

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RLCA

EMPLOYMENT TYPOLOGIES 2005-09

Low quality:
-Precarious employment relationship
-Solo self-employment
+ Unemployment <180 days per year

High quality:
-Business ownership
-Standard employment relationship
-Standard employment relationship high income

Not classified:
- Hybrid multiple job-holding

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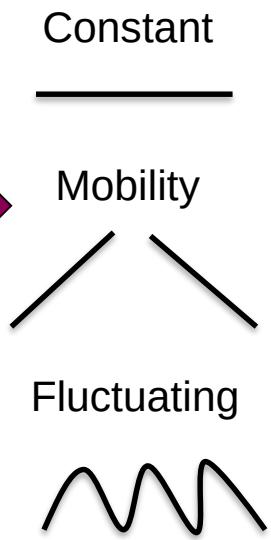
Manually

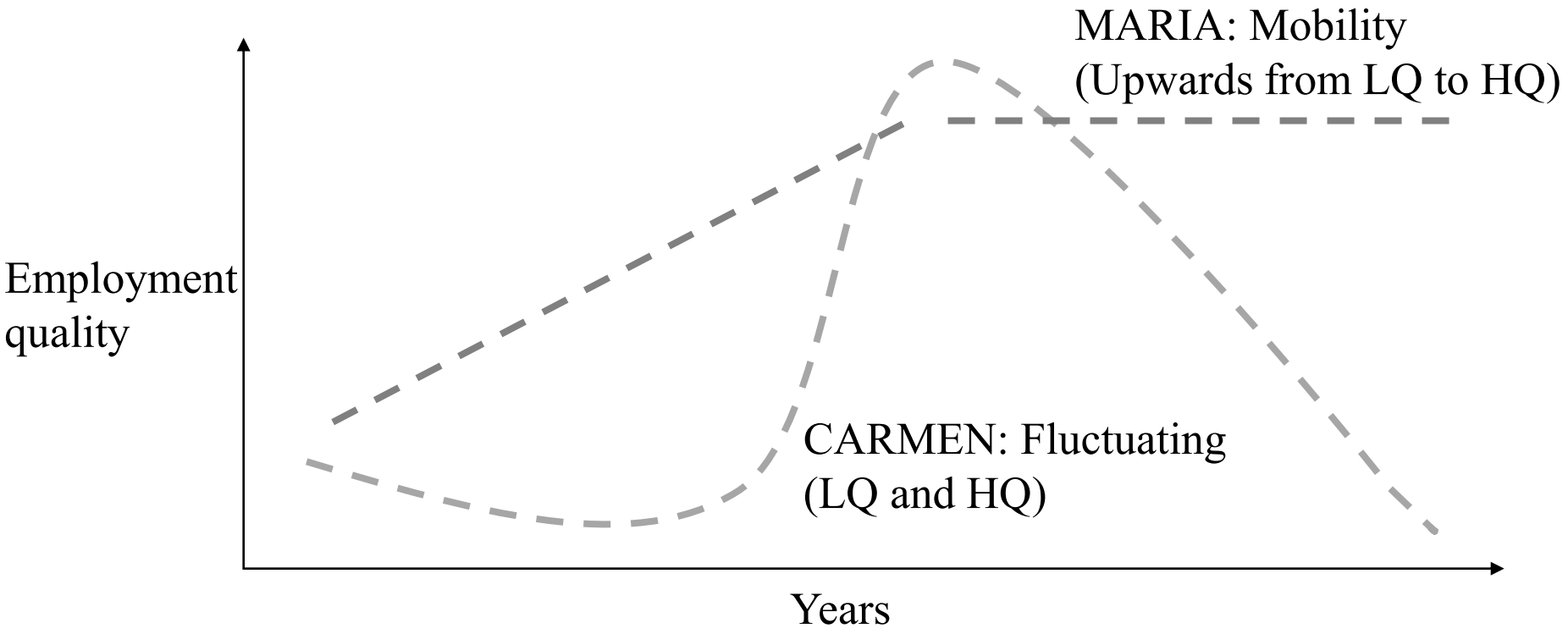
TRAJECTORIES BY QUALITY AND PATTERN



Trajectories	Total	
	N	%
Total	2 743 764	100
Constant		
SER	1 049 775	38.3
SER/HI	597 315	21.8
BO	45 587	1.7
HMJH	43 437	1.6
SSE [b]	80 786	2.9
PER [b]	103 578	3.8
UE [b]	1459	0.05
HQ	133 239	4.9
LQ [b]	16 954	0.6
Fluctuating		
HQ	64 817	2.4
LQ [b]	1990	0.07
HQ and HMJH	30 086	1.10
LQ and HMJH [b]	13 815	0.5
LQ and HQ [b]	217 745	7.9
Mobility		
Within HQ	5620	0.2
Between HMJH and HQ	37 998	1.4
Between HMJH and LQ [b]	15 650	0.6
Within LQ [b]	575	0.02
Upwards LQ to HQ	126 716	4.6
Downwards HQ to LQ [b]	116 575	4.2
Other	40 047	1.5

- 10 out of 21 employment trajectories are of low quality (20.6% population)
- Most women were in SER and the majority of men in SER/HI
- Individuals in low-quality trajectories: less often highly educated, born in Sweden, they more often had a history of mental disorders, as compared with individuals in high-quality trajectories.
- Young individuals were over-represented in constant PER.

Trajectories of precarious employment



Example 2: Data-driven approach

Table 1 Overview of the Trajectory Modelling Techniques

	Latent Class modelling approaches				Cluster Analysis	Sequence Analysis
	GMM	**GBTM**	**LTA**	**LCA**		
Statistical technique	Parametric finite mixture model; Allows heterogeneity within subgroups	Semi-parametric finite mixture model; Do not allow heterogeneity within subgroups	Semi-parametric finite mixture model	Semi-parametric finite mixture model	Nonparametric approach	Nonparametric approach
Rationale of use	Statistical modelling of repeated measures of a given variable			Modelling of a variable at one point in time	Modelling of a variable at one point in time	Modelling of sequences of states or events that unfold over a period of time
Possibility to include covariates	yes	yes	Yes	yes	yes	yes
Study design	Longitudinal	Longitudinal	Longitudinal	Cross-sectional	Cross-sectional	Longitudinal

Example 2: Group based model trajectories

› Lancet Reg Health Eur. 2022 Feb 3;15:100314. doi: 10.1016/j.lanepe.2022.100314. eCollection 2022 Apr.

Trajectories of precarious employment and the risk of myocardial infarction and stroke among middle-aged workers in Sweden: A register-based cohort study

Nuria Matilla-Santander [1], Carles Muntaner [2], Bertina Kreshpaj [1], Virginia Gunn [1 3], Johanna Jonsson [1], Lauri Kokkinen [4], Jenny Selander [1], Sherry L Baron [5], Cecilia Orellana [1], Per-Olof Östergren [6], Tomas Hemmingsson [1 7], David H Wegman [8], Theo Bodin [1 9]

Affiliations + expand

PMID: 35169764 PMCID: PMC8829810 DOI: 10.1016/j.lanepe.2022.100314

We wanted to **identify trajectories of PE as a multidimensional construct + single PE components** (contractual employment relationship, temporariness, income levels, multiple job holding, probability of coverage by collective agreements) 2003-2007

Example 2: Group based model trajectories

Contractual employment insecurity (-1/0)

Temporariness score (-2/0)

Multiple job holding score (-2 to 0)

Income level score (-2 to 2)

Probability of unionisation score (-2 to 0)

Score of PE (-9 to +2)

Individuals are assigned to a subgroup based on their highest posterior group probability.

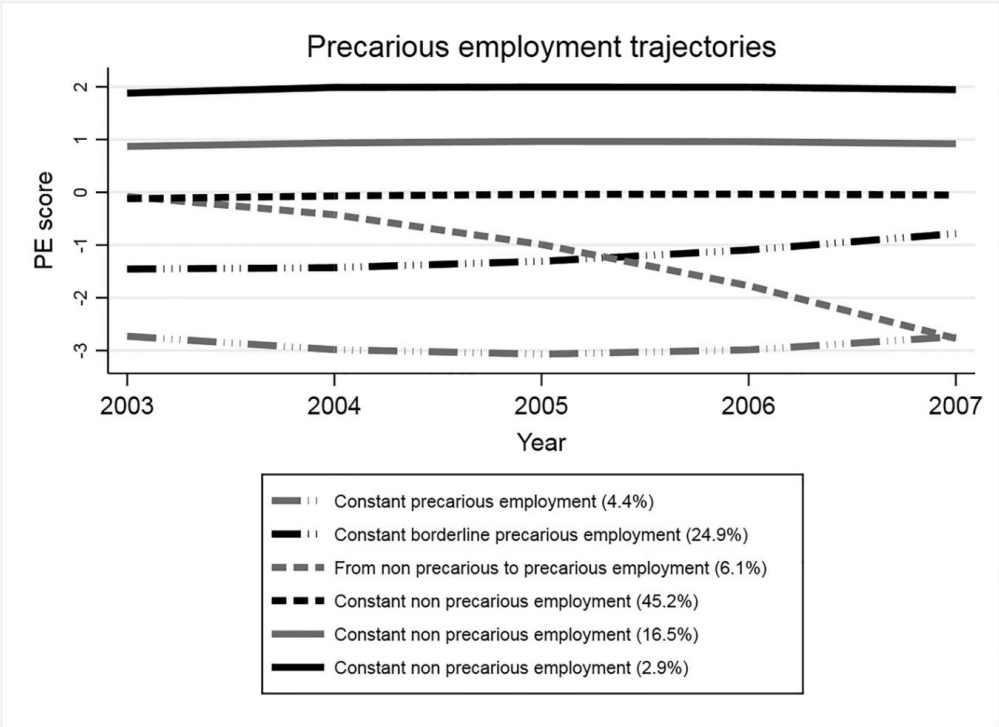
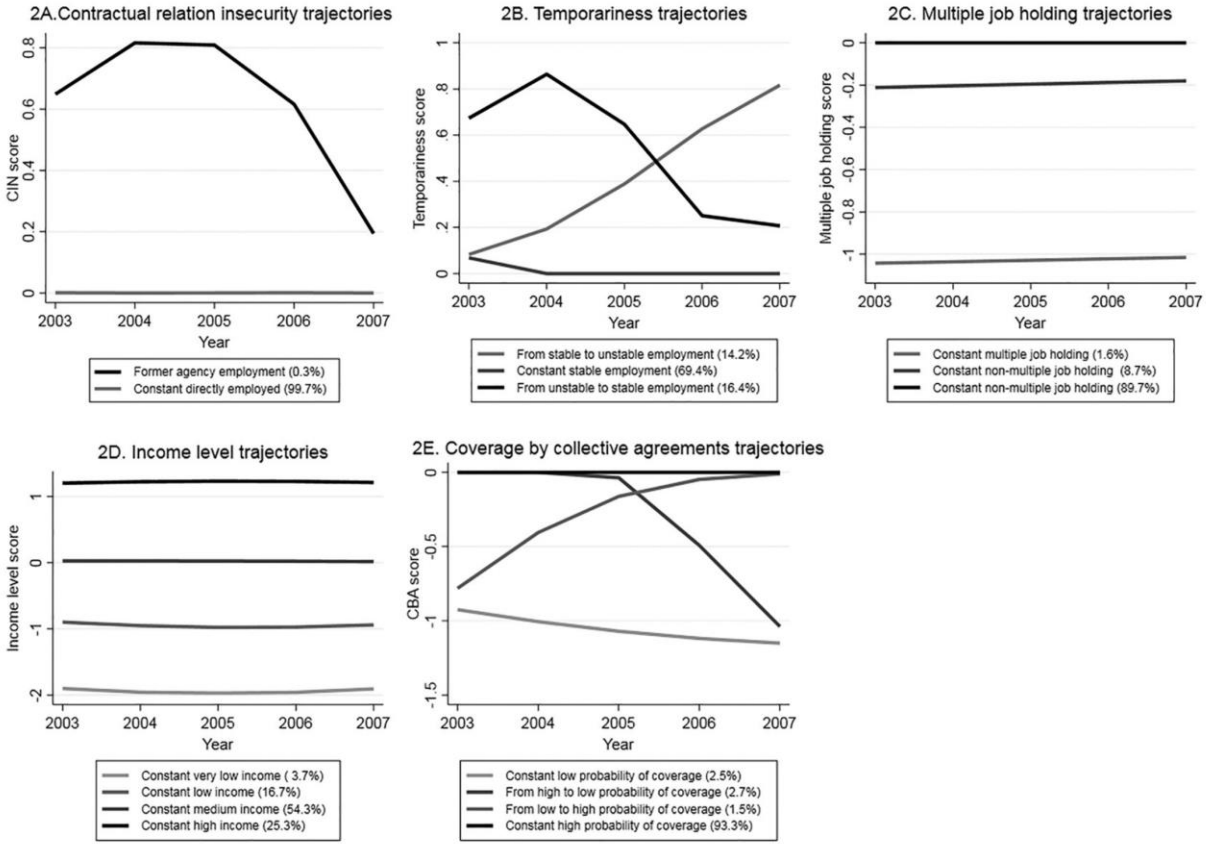


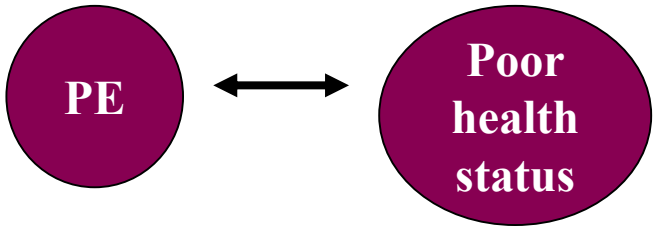
Figure 1. Trajectories of precarious and non-precarious employment (2003-2007) in middle aged workers in Sweden (n= 1,583,957).

Note: PE (PE score). An individual is in precarious employment when the total score is < -3. The three trajectories corresponding to non-precarious employment are merged for the analysis into one trajectory "constant non precarious employment".


2A.Contractual relation insecurity trajectories
CIN score
0
0.2
0.4
0.6
0.8
2003
2004
2005
2006
2007
Year
Former agency employment (0.3%)
Constant directly employed (99.7%)
2B. Temporariness trajectories
Temporariness score
0
.2
.4
.6
.8
1
2003
2004
2005
2006
2007
Year
From stable to unstable employment (14.2%)
Constant stable employment (69.4%)
From unstable to stable employment (16.4%)
2C. Multiple job holding trajectories
Multiple job holding score
0
-0.2
-0.4
-0.6
-0.8
-1
2003
2004
2005
2006
2007
Year
Constant multiple job holding (1.6%)
Constant non-multiple job holding (8.7%)
Constant non-multiple job holding (89.7%)
2D. Income level trajectories
Income level score
1
0
-1
-2
2003
2004
2005
2006
2007
Year
Constant very low income (3.7%)
Constant low income (16.7%)
Constant medium income (54.3%)
Constant high income (25.3%)
2E. Coverage by collective agreements trajectories
CBA score
0
-0.5
-1
-1.5
2003
2004
2005
2006
2007
Year
Constant low probability of coverage (2.5%)
From high to low probability of coverage (2.7%)
From low to high probability of coverage (1.5%)
Constant high probability of coverage (93.3%)

More challenges for the study design…

- Reverse causation



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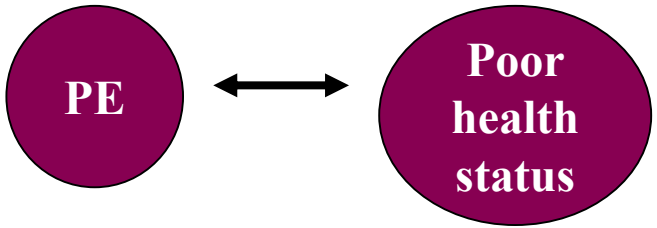

- Longitudinal approach
- Exclude individual with baseline/previous poor health

More challenges for the study design…

- Immortal time bias (survivorship bias)

To have information available for measuring the exposure for 5 years, individuals must be alive

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To have information available for measuring the exposure for 5 years, individuals must be alive

- Include spells of unemployment
- Consider the latency/effect of the exposure on the outcome

More challenges for the study design…

- Prevalent user bias

→ “Incident” exposures vs. “accumulated” exposures

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- Prevalent user bias

→ “Incident” exposures vs. “accumulated” exposures

- Start at entry in the labour market
- Adjust for previous exposure
- Design an observational study usign the framework of a target trial

ELIGIBILITY CRITERIA (2005)	TREATMENT ASSIGNMENT (2005)	TREATMENT STRATEGIES (2005)	Follow-up (2006-2016)
(At least 1 year in PE (PE is defined by a PE score of <-3)	 Emulation of randomization by adjustment for baseline confounders	**Initiation to non-precarious employment and continuation** **Continuation on precarious employment**	Starts at baseline and ends at the **day of death**, end of follow-up (December 2016), whichever happens first.

Table 1. Specification and emulation of the target trial of precariously employed work that switch to standard employment and mortality risk using Swedish register data.

Protocol component	Target trial specification (Randomized pragmatic trial)	Target trial emulation (Using observational data)
Eligibility criteria	(i)At least 1 year in PE (PE is defined by a PE score of <-3), (ii) age 20-55, (iii) not studying (for avoiding miss-classification of students into PE), (iv) having a yearly income >100SEK, (v) being unemployed <3 months in a year, (vi) not being self-employed (solo or non-solo) Baseline is defined as the first year in which all eligibility criteria are met. (2005-2016)	Same as for the target trial specification.
Treatment strategies	1) Initiation to standard employment (PE score >-1) at baseline and continuation over follow-up 2) No initiation to standard employment (PE score<-3) over follow-up	Same as for the target trial. *allow 3 months in unemployment while we assume they are still in PE
Treatment assignment	Individuals are randomly assigned to a strategy at baseline, and individuals will be aware of the assigned treatment strategy.	We classified individuals according to the strategy that their data were compatible with at baseline and attempted to emulate randomization by adjusting for baseline confounders (we assume that groups are exchangeable at baseline conditional on baseline covariates).
Outcomes	All-cause mortality	Same as for the target trial specification.

Take home message

- We need to consider changes of employment relationships over time when studying precarious employment.
- Longitudinal evidence of the effects of PE on health is needed.
- The design of our study can help to reduce the risk of bias.

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