TOWARDS MORE LIFE-COURSE-SENSITIVE DECOMPOSITIONS OF GROUP-INEQUALITIES:

TWO APPROACHES APPLIED TO THE GENDER PENSION GAP

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CONTENT

1. Illustration Gender Pension Gap
2. Sequence Analysis & Kitagawa-Oaxaca-Blinder decomposition: SA-KOB
3. Life-course feature selection & Ñopo decomposition
4. Comparison and conclusion

I. ILLUSTRATION: GENDER PENSION GAPS

- High levels of Gender Pension Gaps (GPG) across Europe (e.g., Tinios et al. 2015; Hammerschmid & Rowold 2019) & higher risk of old-age poverty for women (Haitz 2015)
  - Need for further research (e.g. Kuitto et al. 2021)
- Pension income linked to individual life courses (e.g. Kuitto et al. 2021) & Gender Pension Gaps highly determined by life courses (Foster & Ginn, 2018; Madero-Cabib & Fasang, 2016)
- Life courses as
  - Whole entities
  - Consisting of different aspects: duration, timing and ordering of specific states (Studer & Ritschard, 2016)

I. ILLUSTRATION: GENDER PENSION GAPS

	1. Decomposition of GPG	2. Sequence Analyses + Regression
Outcome	Gender Pension Gap	(Women's) pension income
Covariates of interest	Life course summary measures	Life course typologies (clusters)
Method	Decomposition analyses, usually KOB (based on OLS)	Sequence Analysis (SA) + OLS
Examples	Bardasi & Jenkins, 2010; Bonnet et al., 2020; Cordova et al., 2022; Even & Macpherson, 2004; König et al., 2019; Nolan et al.,	Madero-Cabib & Fasang, 2016; Möhring & Weiland, 2021; Tophoven & Tisch 2016
Main limitations		
Concealing life course complexities	x	
Risk of multicollinearity	x	
Focus on selective set of life course states	x	
Not considering work-family interdependences	x	(x)
Focus on employment life course categories (primarily (full-time) employment)	x	(x)
Risk concealing importance of single life course aspects	x	x
No counterfactual analysis, i.e., no quantification of shares of GPG due to different mechanisms (e.g., compositional and returns effects)		x

I. ILLUSTRATION: GENDER PENSION GAPS

Contributions:

1) How are life courses or life course experiences related to the Gender Pension Gaps?
   a) Through gender-specific segregation in life course patterns or experiences?
   b) Or through gender differences in returns to the same life course types?
2) Which specific elements of life courses are the most relevant pension predictors?

PART I

LIFE-COURSE-SENSITIVE ANALYSIS OF GROUP INEQUALITIES: COMBINING SEQUENCE ANALYSIS WITH THE KITAGAWA–OAXACA–BLINDER DECOMPOSITION

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CONTENT

I. CONTRIBUTION

Implementation of life-course- and gender-sensitive SA-KOB

→ Two-step procedure:

1. **Sequence Analysis (SA)** (Abbott 1995; Liao et al. 2022; MacIndoe and Abbott 2004)
   - Categorises complex and multidimensional life course patterns (family & work)
2. **Kitagawa–Oaxaca–Blinder (KOB)** (Blinder 1973; Kitagawa 1955; Oaxaca 1973) **decomposition of GPG**
   - Using work-family life course clusters as explanatory variables

Contributions:

a) Introducing steps and specifics of SA-KOB

b) Evaluating contribution of SA-KOB

c) New empirical evidence on GPGs in Italy and West Germany

   ➢ Italy & West Germany as proxies for different welfare state/pension systems

II. DATA

Determinant of interest:
Work-family life course, ranging from:

Outcome:
Pension income & Gender Pension Gap

age 18 65

SHARELIFE (w 3, 7), JEP

- Retrospective survey data
- Working & family life for each year

- Education or training
- Care work and other
- (Any) part-time employed
- Full-time employed
- Civil servant
- Self-employed
- Unemployed
- Retired

- Single, no child
- Single, 1+ children
- Married o. cohabiting, no children
- Married o. cohabiting, 1 child
- Married o. cohabiting, 2+ children
- Divorced w/o children

Sample (SHARE)

- Waves 2, 4, 5, 6 (2006-2015)
- Age 65+ (at year of interview)
- Birth cohorts 1911-1950
- n Italy = 2866, n West Germany = 1619

Annual, individual *total* pension income

- Public + occupational + private pension
- Based on own achievement (no survivor pension)
- Including 0€ pension income (gender coverage gaps)

III. REPLICATION OF STANDARD APPROACH: KOB DECOMPOSITION WITH LIFE COURSE SUMMARY MEASURES

Kitagawa-Oaxaca-Blinder decomposition (KOB) (Kitagawa 1955; Oaxaca 1973; Blinder 1973)

- Decomposes *mean* differences in annual pension income between men and women (regression-based):

$$\bar{y}_M - \bar{y}_W = \underbrace{\underbrace{\alpha_M - \alpha_W}_{\text{Intercept}} + \underbrace{\bar{X}'_M(\hat{\beta}_M - \hat{\beta}^*) + \bar{X}'_W(\hat{\beta}^* - \hat{\beta}_W)}_{\text{Returns}}}_{\text{Unexplained}} + \underbrace{(\bar{X}_M - \bar{X}_W)'\hat{\beta}^*}_{\text{Explained}}$$

- Share of the gap
  a) due to mean differences in characteristics, e.g.,: years full-time employed (*explained or compositional component*)
  b) due to differences in returns for the same characteristic (*returns component*)

- Covariates of interest (standard approach & multicollinearity):
  - Years in
    - Full-time empl.
    - Part-time empl.
    - Civil service
    - Unemployment
    - Education
  - Years in
    - Married, 2 ch.
    - Married, no children
    - Single, no children
    - Divorced
  - Controls
    - Birth cohort
    - Survey wave

Packages & software : *oaxaca* from Jann (2008) in Stata 17

III. REPLICATION: STANDARD KOB DECOMPOSITION WITH SUMMARY LIFE COURSE MEASURES

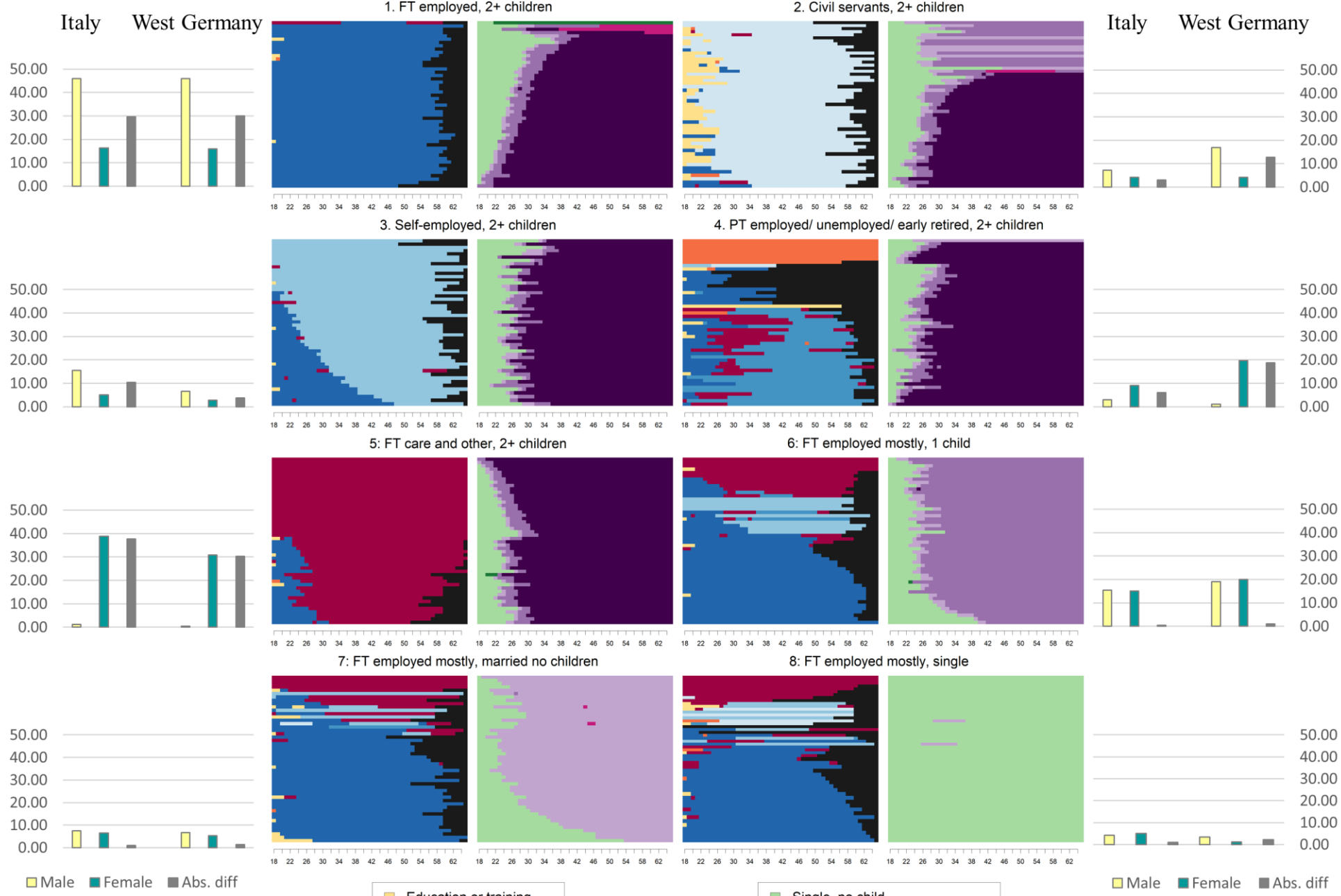
	Italy				West Germany			
Absolute GPG	6,651**				13,089**			
	(21.27)				-26.33			
Explained, total	1,682**				4,499**			
	(6.781)				-6.457			
Unexplained, total	4,970**				8,590**			
	(12.09)				-12.55			
	explained	*shares*	**returns**	*shares*	**explained**	*shares*	**returns**	*shares*
Years FT employment	1,368**	20.56%	-706.7**	-10.63%	3,136**	23.96%	206.7	1.58%
	(6.491)		(-3.644)		-5.452		-0.431	
Years PT employment	-68.74**	-1.03%	-116.2**	-1.75%	-1,282**	-9.79%	-34.23	-0.26%
	(-2.964)		(-3.268)		(-6.136)		(-0.973)	
Years civil service	79.66*	1.20%	-311.1**	-4.68%	1,939**	14.82%	-134.9	-1.03%
	(2.224)		(-4.926)		-8.523		(-1.340)	
Years education	109.7	1.65%	629.9**	9.47%	940.9**	7.19%	916.5**	7.00%
	(1.141)		(3.931)		-3.169		-2.879	
Years unemployment	322.6**	4.85%	-362.1*	-5.44%	156.3	1.19%	-280.2	-2.14%
	(2.798)		(-2.450)		-0.843		(-1.066)	
Years divorced	3.471	0.05%	30.66	0.46%	27.32	0.21%	-514.3**	-3.93%
	(0.299)		(1.078)		-0.621		(-3.764)	
Years married, 2+ch.	145.3**	2.19%	-776.8	-11.68%	55.69	0.43%	517.6	3.95%
	(2.782)		(-1.324)		-0.51		-0.541	
Years married, no children	-1.068	-0.02%	-60.36	-0.91%	44.46	0.34%	87.09	0.67%
	(-0.0634)		(-0.423)		-1.226		-0.386	
Years single, no children	-254.3**	-3.82%	-856.5**	-12.88%	-558.2**	-4.26%	-829.2**	-6.33%
	(-3.080)		(-3.685)		(-3.278)		(-2.840)	
n male	1357		1357		804		804	
n female	1509		1509		815		815	

- Main reasons for GPG
  - Women's lower duration in full-time employment and civil service
  - Women's lower pension returns for the same years in education
- GPG is mitigated by
  - Women's more years in part-time employment
  - Higher returns for women for the same years being divorced

IV. SA-KOB: STEP I – SEQUENCE ANALYSIS

- Identification and categorization of similar life course patterns (for an overview: Raab and Struffolino 2022)
  - Outcome: typology of life courses as clusters
- Researchers‘ choice: single-channel vs. multichannel sequence analysis (MSA)
  - Choice based on empirical and theoretical considerations
  - Single-channel: seperate life course dimensions, e.g., only work life courses
    - If life-course domains not strongly linked ->separate single channel SA more efficient
    - Stepwise models
  - MSA (Gauthier et al. 2010; Pollock 2007; Ritschard, Liao, and Struffolino 2023): account for parallel processes in different domains, e.g. work & family
    - Relationship between domains might differ by group of interests
      - Associated with outcome?
    - Here: work-family life course interdependences likely stronger for women
- For SA-KOB specifically
  - Pooled over KOB groups (here: gender)
    - Here: also pooled over countries
  - Visualizing the life-course clusters jointly with the group-specific distribution

Packages & software: *TraMineR* from Gabadinho et al. (2011) and *WeightedCluster* from Studer (2013), R


Italy
West Germany
1. FT employed, 2+ children
2. Civil servants, 2+ children
3. Self-employed, 2+ children
4. PT employed/ unemployed/ early retired, 2+ children
5: FT care and other, 2+ children
6: FT employed mostly, 1 child
7: FT employed mostly, married no children
8: FT employed mostly, single
50.00
40.00
30.00
20.00
10.00
0.00
18 22 26 30 34 38 42 46 50 54 58 62
Male
Female
Abs. diff
Education or training
Care work and other
(Any) part-time employed
Full-time employed
Civil servant
Self-employed
Unemployed
Retired
Single, no child
Single, 1+ children
Married o. cohabiting, no children
Married o. cohabiting, 1 child
Married o. cohabiting, 2+ children
Divorced w/o children

IV. SA-KOB: STEP II – KOB DECOMPOSITION

- Decomposes *mean* differences in annual pension income between men and women (regression-based):

$$\bar{y}_M - \bar{y}_W = \underbrace{\underbrace{\alpha_M - \alpha_W}_{\text{Intercept}} + \underbrace{\bar{X}'_M(\hat{\beta}_M - \hat{\beta}^*) + \bar{X}'_W(\hat{\beta}^* - \hat{\beta}_W)}_{\text{Returns}}}_{\text{Unexplained}} + \underbrace{(\bar{X}_M - \bar{X}_W)'\hat{\beta}^*}_{\text{Explained}}$$

Here: $\hat{\beta}^* = \begin{matrix} \hat{\beta}_M \\ \hat{\beta}_M \\ \hat{\beta}_M \\ \hat{\beta}_F \\ \hat{\beta}_F \\ \hat{\beta}_M \\ \hat{\beta}_M \\ \hat{\beta}_M \end{matrix}$

- Covariates of interest: life course types
- Share of the gap
  a) due to mean differences in characteristics, **here: gender-specific distribution on life-courses** (*explained or compositional component*)
  b) due to differences in returns for the same characteristic, **here: same life-course pattern** (*returns component*)
- Specifics
  1) Choice of reference coefficient per cluster: cluster majority group
     - If high level of group-specific segregation on cluster (theoretical, empirical and statistical considerations)
     - E.g., female reference coefficients better represents 'real' returns for female-dominated clusters
  2) Normalization of categorical variables including life course clusters (e.g., Yun 2005; Jann 2008; Fortin et al. 2011)

Packages & software : *oaxaca* from Jann (2008) in Stata 17

IV. SA-KOB: STEP II - KOB - EXPLAINED SHARES

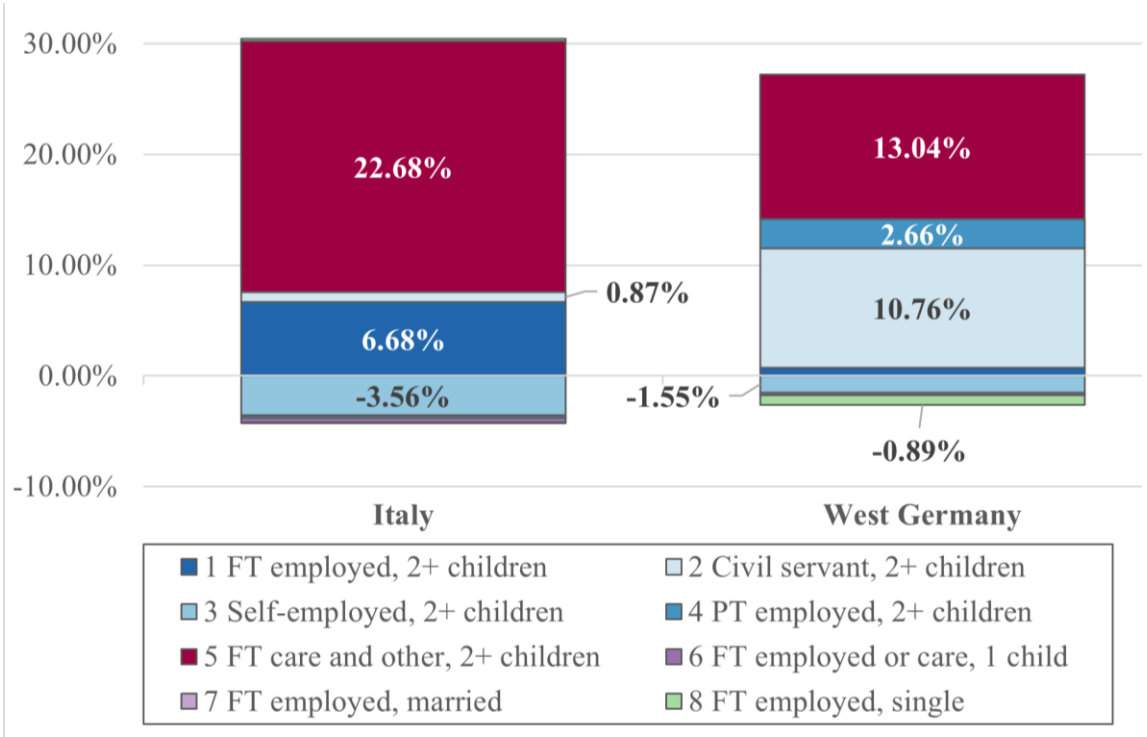
$$(\bar{X}_M - \bar{X}_F)'\hat{\beta}^* + \bar{X}'_M(\hat{\beta}_M - \hat{\beta}^*) + \bar{X}'_F(\hat{\beta}^* - \hat{\beta}_F)$$

- Interpretation example
  - 6,7% due to underrepresentation of women in male-typical life course 1 ($\bar{X}_i^M - \bar{X}_i^F$) that is highly rewarded by the pension system (high return; β_i^M)
- Gendered life courses drive GPGs
  - Pension system reward life-course patterns differently
    - High -> male dominated life courses (exception: self-employment)
    - Low -> female dominated life courses
      - Care-work dominated life courses as main driver

Size of Gender Pension Gaps

	Italy	West Germany
Total GPG	6627€ (53%)	13021€ (62%)
Explained by life course	*1699€ (26%)*	*3240€ (25%)*

Compositional component GPG by gendered work-family life courses



Controlled for cohort & wave. Bold = significant on 10% level min.

IV. SA-KOB: STEP II - KOB - RETURNS COMPONENT

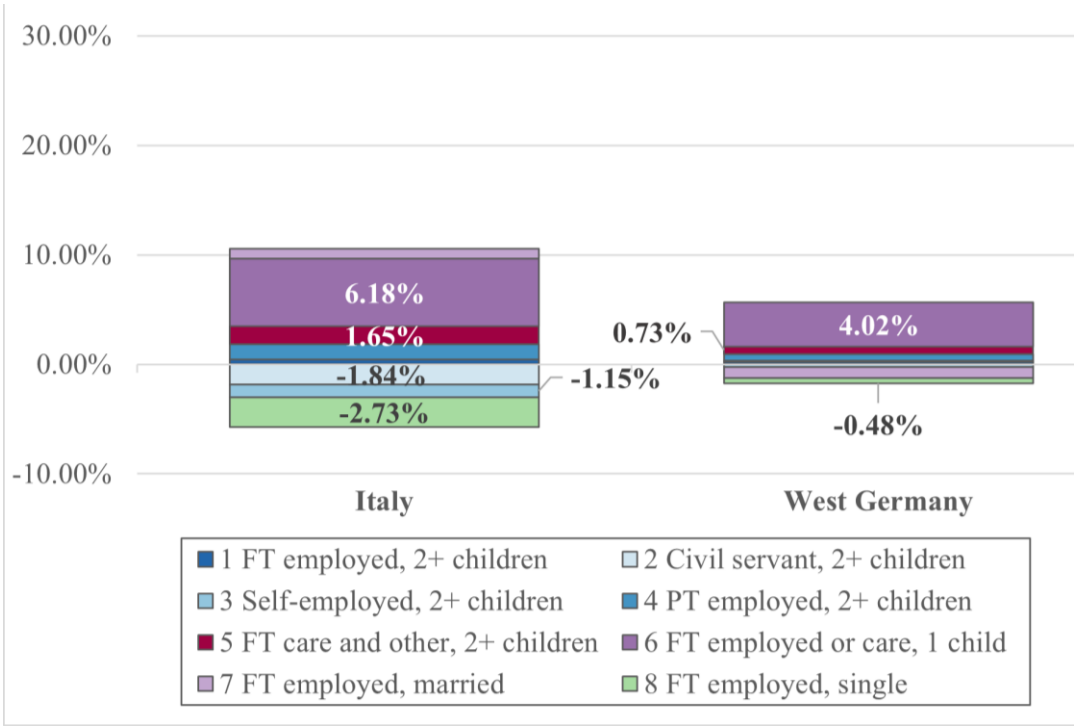
$$(\bar{X}_M - \bar{X}_F)'\hat{\beta}^* + \bar{X}'_M(\hat{\beta}_M - \hat{\beta}^*) + \bar{X}'_F(\hat{\beta}^* - \hat{\beta}_F)$$

	Italy	West Germany
Total GPG	6627€ (53%)	13021€ (62%)
Sum returns component (life course)	*331€ (5%)*	*526€ (4%)*

- Interpretation example
  - 6% due to lower pension returns for women compared to men in life course pattern 6
  - !Difference to standard KOB: SA-KOB does *not* quantify different returns to the *same endowment* but to a *similar trajectory* or the *same life-course cluster*
    - ➢ Within-cluster heterogeneity

➢ Gender-specific returns for same life course patterns less associated with GPG

Returns component by gendered work-family life courses



Controlled for cohort & wave. Bold = significant on 10% level min.

V. COMPARISON STANDARD KOB TO SA-KOB - RESULTS

Standard KOB

1) Differences in full-time employment as main driver

2) More years in part-time employment benefit women's pension incomes

3) Reveals the association of a limited number of specific, preselected life-course aspects
   - Education
   - Divorce

SA-KOB

1) Unpaid care work as main driver
   - SA–KOB more accurately highlights the dynamics behind women's fewer years in full-time employment

2) SA–KOB demonstrates that PT, considered in combination with family-related employment interruptions, is counterproductive for women's pension income

3) Association with less prevalent life course states or distributed across clusters concealed

4) Reveals importance of gendered interaction of work and family life courses
   - Mostly life course differences of parents drive GPG

V. COMPARISON STANDARD KOB TO SA-KOB

	Standard decomposition	**SA-KOB decomposition**
Benefits	▪ Reveals associations for specific aspects of life-courses ▪ Considers more heterogeneity (continuous variables)	▪ Prevents multicollinearity & considers more life-course states simultaneously ▪ Captures association of life-course complexities with gap (e.g., synergy of care work and part-time) ▪ Can model interactions between different life courses domains (e.g., family & work)

Limitations	▪ High risk of multicollinearity
	  ▪ Cannot consider all relevant life-course states
	  ▪ Risks concealing important associations (e.g., unpaid care work)
	▪ Risks concealing interdependences between different life-course states
	▪ Hardly captures interdependences between life-course domains (e.g., work & family)
	▪ Selective sets of life course aspects (mostly duration)
	  ▪ Concealing associations with other life-course complexities (e.g., timing & ordering)
		▪ Holistic categorization reduces variation to explore
		▪ Risks concealing role of specific & less dominant life-course aspects (within-cluster heterogeneity)

VI. RECOMMENDED SENSITIVITY TESTS

1) **Sensitivity to SA**
   a) Informed sensitivity analysis regarding main parameters (e.g., Studer 2013)
   b) Informed decision single-channel vs. multichannel SA
2) **KOB-inherent sensitivities**
   - Reference coefficients
3) **Impact of poorly assigned individuals (classification error): within-cluster heterogeneity**
   - Within-cluster heterogeneity ‚bias' likely, but also visible in SA-KOB
     - Within-category differences also applicable to standard KOB
   - Impact of cluster coherence can be checked for in SA-KOB
   - Compositional component: reference coefficients ($\boldsymbol{\beta}_i^*(\bar{X}_i^M - \bar{X}_i^F)$) skewed by non-coherent individuals?
     - ➢ Here: underestimated
   - Returns component: endowment with '*same*' characteristic differs systematically between men & women (gender-specific within-cluster heterogeneity)?
     - ➢ Differences in returns by gender slightly driven by gender-specific within-cluster heterogeneity

VII. CONCLUSION & CONTRIBUTIONS

1) **Substantial**
   - Visibility of complex & multidimensional gendered life courses that are unequally rewarded
     - Fathers can reconcile parenthood with continuous employment
     - Mothers: volatile employment life courses dominated by part-time jobs or fully dedicate their lives to lifelong unpaid care
   - Gendered mismatch of interrelation of welfare state policies (shaping gender-specific life courses) & pension systems (reward these)
     - Retirement systems have to be sensitive to previous welfare state contexts
     - SA-KOB informs intertemporal linkages between policy fields

2) **Methodological:** Decomposition of gaps in a share due to
   a) Unequal rewards for group-specific life courses (*explained/ compositional component*)
   b) Unequal outcomes of groups even within same life course patterns (*returns component*)
      - Calling attention to group-specific inequalities in outcomes despite having similar trajectories

➢ Bypassing multicollinearity while still considering multiple life courses' characteristics

QUESTIONS?

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Sociological Methods & Research, 0(0).
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PART II

FULL-TIME EMPLOYMENT IS ALL THAT MATTERS?

DECOMPOSING GENDER PENSION GAPS BASED ON RELEVANT LIFE COURSE FEATURES IN GERMANY & THE NETHERLANDS

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2: MAX PLANCK INSTITUTE FOR DEMOGRAPHIC RESEARCH

I. CONTRIBUTION

2 main empirical approaches

1. Summary measures (focus on duration)

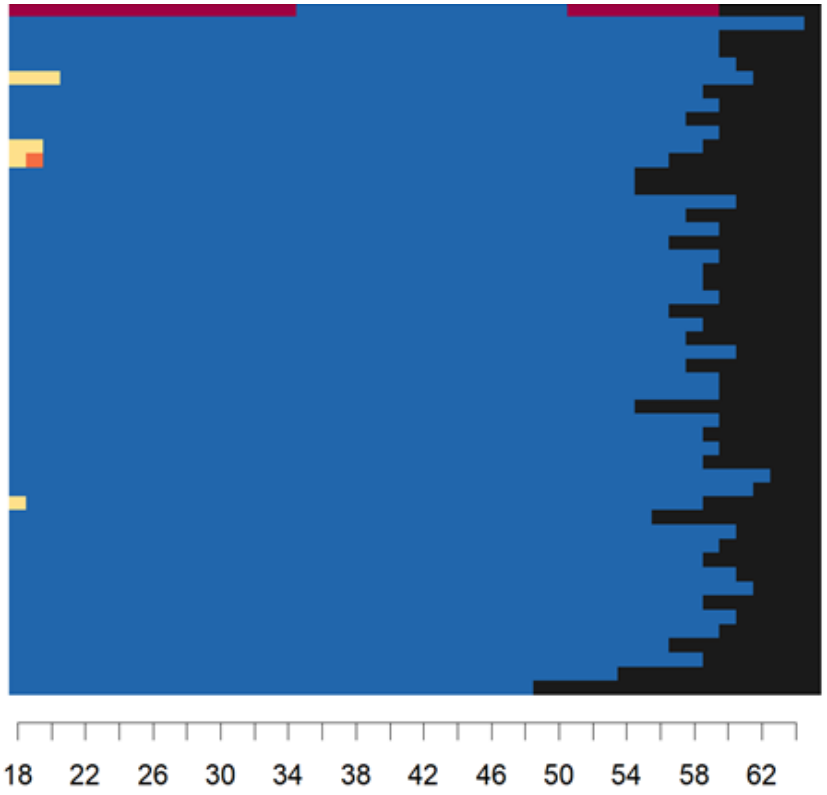
- Most often the years in (full-time) employment
- ➢ Gender differences in duration of full-time employment as main factor (e.g., Bonnet et al., 2020; Even & Macpherson, 2004; Frommert and Strauß 2013; Hänisch and Klos 2014, König et al., 2019; Nolan et al., 2019; Zhao & Zhao, 2018)
- ➢ BUT: Life courses more complex than the duration in specific states?

2. Holistic approach

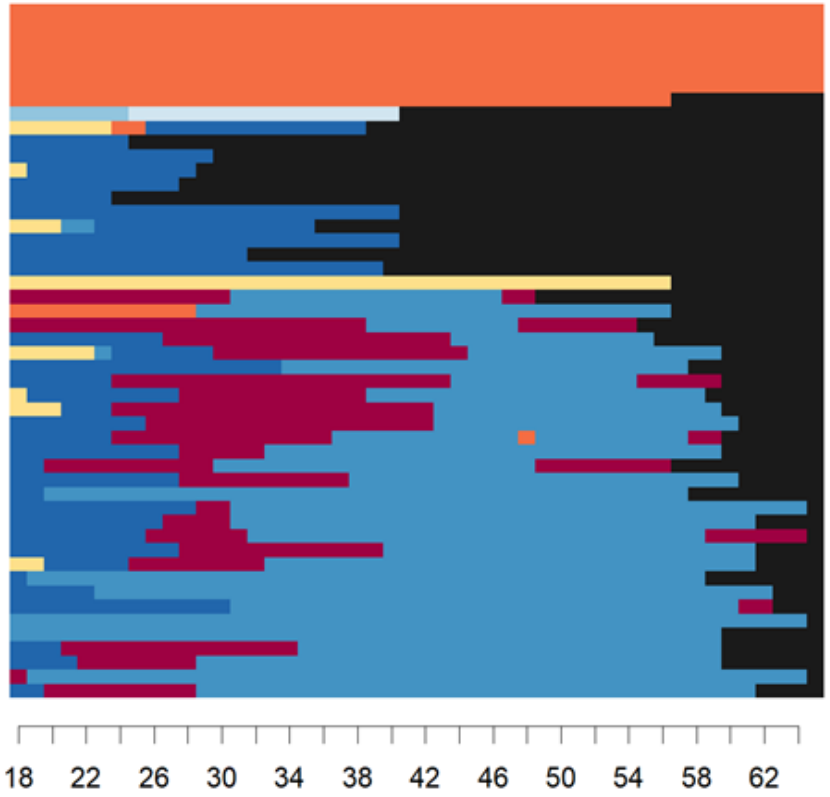
- Using Sequence Analysis to categorization of similar life course patterns (e.g., Madero-Cabib & Fasang, 2016; Möhring & Weiland, 2021; Rowold et al., 2023)
- Life course patterns embed several life course aspects
- ➢ BUT: Risk concealing which specific aspects of life courses play a role

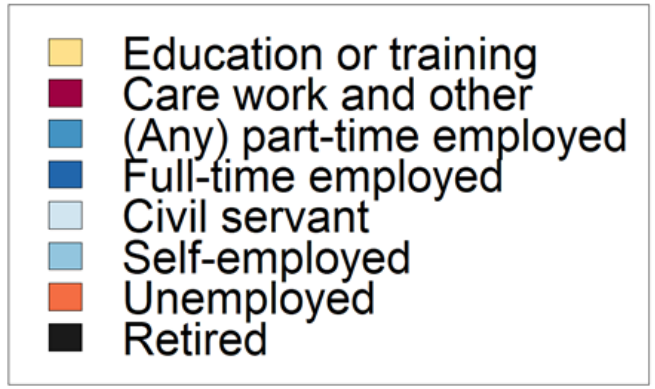
WITHIN-CLUSTER HETEROGENEITY

1)



2)





- Within-cluster heterogeneity regarding some life course aspects, e.g.,
  - Type and number of employment interruption (*ordering*)
  - Time of employment interruption (*timing*)
  - *Duration* of employment interruption

I. MOTIVATION & CONTRIBUTION

2 main empirical approaches

1. Summary measures (focus on duration)
   - Most often the years in (full-time) employment
   - ➢ Gender differences in duration of full-time employment as main factor (e.g., Bonnet et al., 2020; Even & Macpherson, 2004; Frommert and Strauß 2013; Hänisch and Klos 2014, König et al., 2019; Nolan et al., 2019; Zhao & Zhao, 2018)
   - ➢ BUT: Life courses more complex than the duration in specific states?

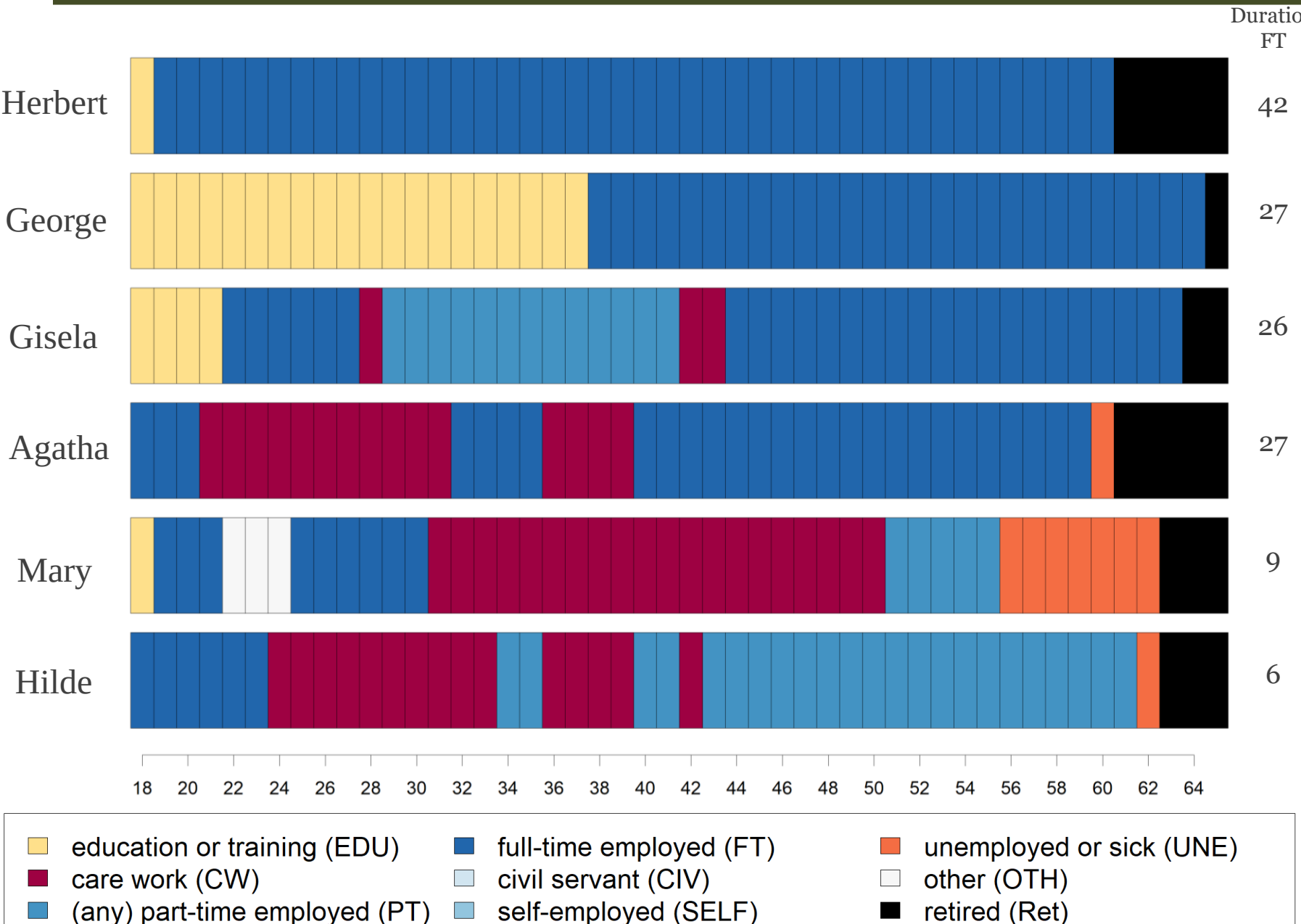
2. Holistic approach
   - Using Sequence Analysis to categorization of similar life course patterns (e.g., Madero-Cabib & Fasang, 2016; Möhring & Weiland, 2021; Rowold et al., 2023)
   - Life course patterns embed several life course aspects
   - ➢ BUT: Risk concealing which specific aspects of life courses play a role

Contribution

I. Detect which life course aspects are relevant predictors of pension income

II. Decompose GPG based on these

I. LIFE COURSE ASPECTS AND PENSIONS



1. Duration

- Years FT good proxy for Herbert & George
- But simplifies complex life course

2. Order

- Appearance
- Order: e.g., Gisela: FT->CW->PT
- Number of periods

3. Timing

- Turning points shaping opportunities (Bernardi et al. 2019)
- E.g., Agathe first CW at age 21, Mary at 31

4. Complexity

- Overall stability/ unpredictability

→ Huge set of variables

I. RESEARCH QUESTIONS & APPROACH

I. Which work and family life course aspects are relevant predictors of pension income inequality?

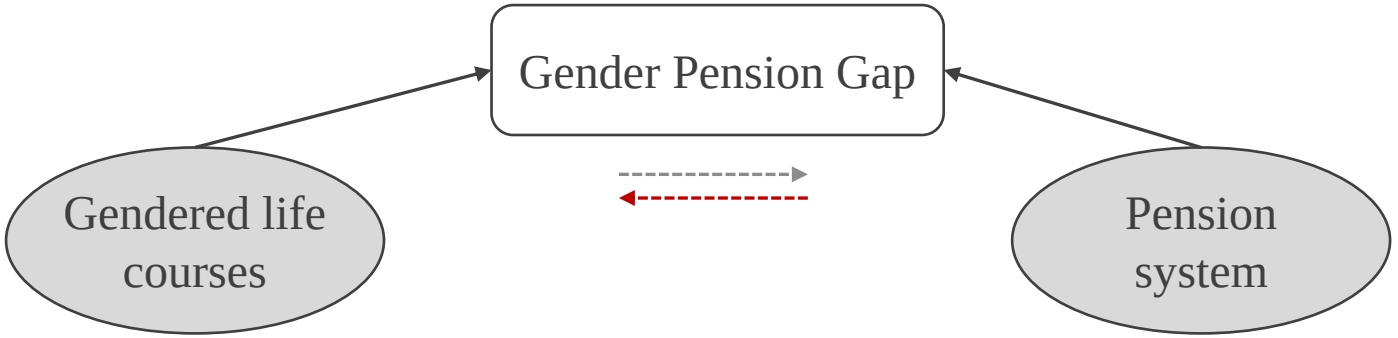
   a) Duration in full-time employment most important predictor of pension income inequalities.

   b) Other life course aspects of other work and family states over the life course matter as well.

II. How these life course variables associated with the gender gap in pension income?

- Two-step approach:
  I. Feature selection
  II. Ñopo decomposition

II. COUNTRY CONTEXTS: GERMANY & THE NETHERLANDS



West Germany & Netherlands

Conservative welfare states

- Similar gendered division of labour

West Germany

Bismarckian pension system

- Public pension: strong link to previous employment
- Private pension: lower coverage

Netherlands

Beveridgean pension system

- Public Pension: Flat-rate basic
- Private pension: high coverage, quasi-mandatory occupational pensions

Similar association of similarly gendered life course aspects with GPGs across pension regimes?

III. DATA

Determinant of interest:
Work & family life course aspects, ranging from:

Outcome:
Pension income & Gender Pension Gap

age 18 65

SHARELIFE (w 3, 7)

- Retrospective survey data
- Working & family life for each year

education or training (EDU)
care work (CW)
unemployed or sick (UNE)
other (OTH)
(any) part-time employed (PT)
full-time employed (FT)
retired (Ret)
civil servant (CIV)
self-employed (SELF)

single no child
single 1+ children
married no children
married 1 child
married 2 children
married 3+ children
divorced w/o child

Sample (SHARE)

- Waves 2, 4, 5, 6 (2006-2015)
- Age 65+ (at year of interview)
- Cohorts 1911-1950
- n Netherlands = 1089, n West Germany = 1623

Annual, individual *total* pension income

- Public + occupational + private pension
- Based on own achievement (no survivor pension)
- Including 0€ pension income (gender coverage gaps)

IV. ANALYTICAL APPROACH

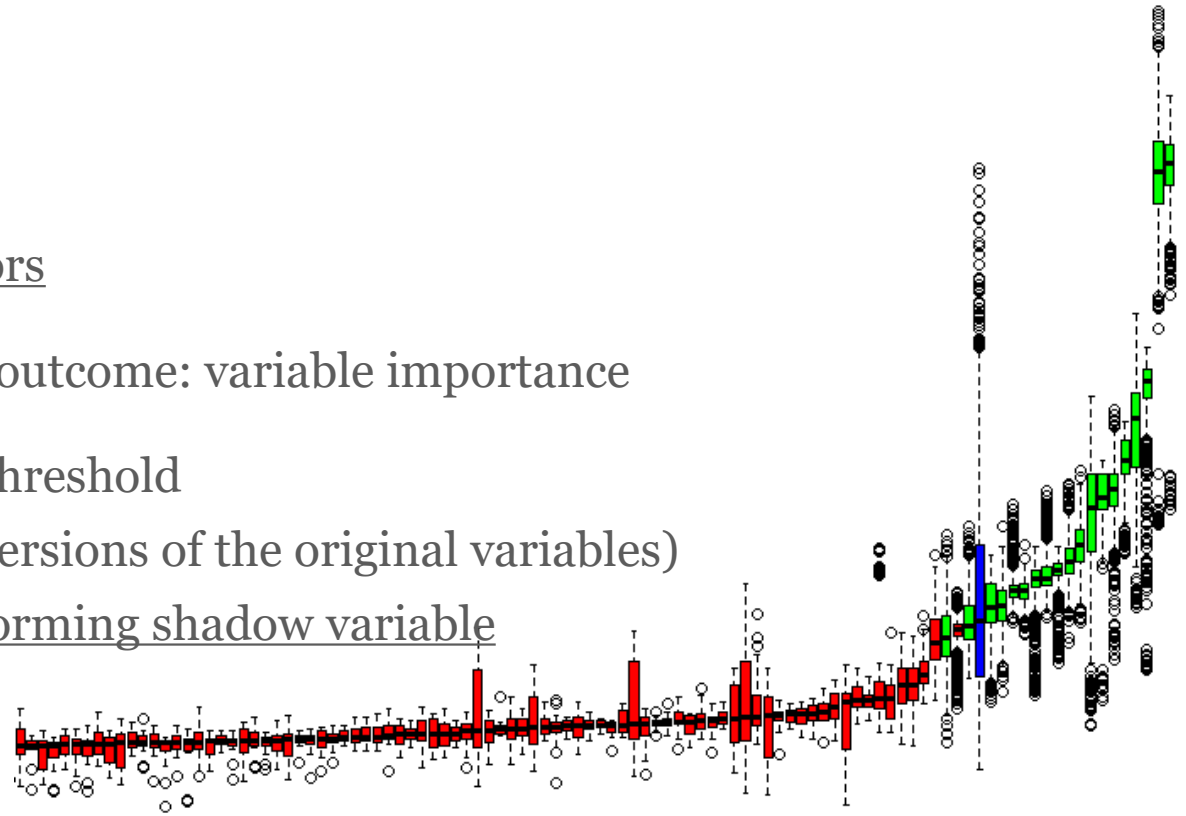
1. Step: Life Course Feature Selection (Bolano & Studer, 2020)

   I. Feature extraction

   - Aim: Extracting work & family life course aspects as variables (Studer, 2018)
     - Covering duration, ordering, timing and complexity
   - ➢ Outcome: Hundreds of variables

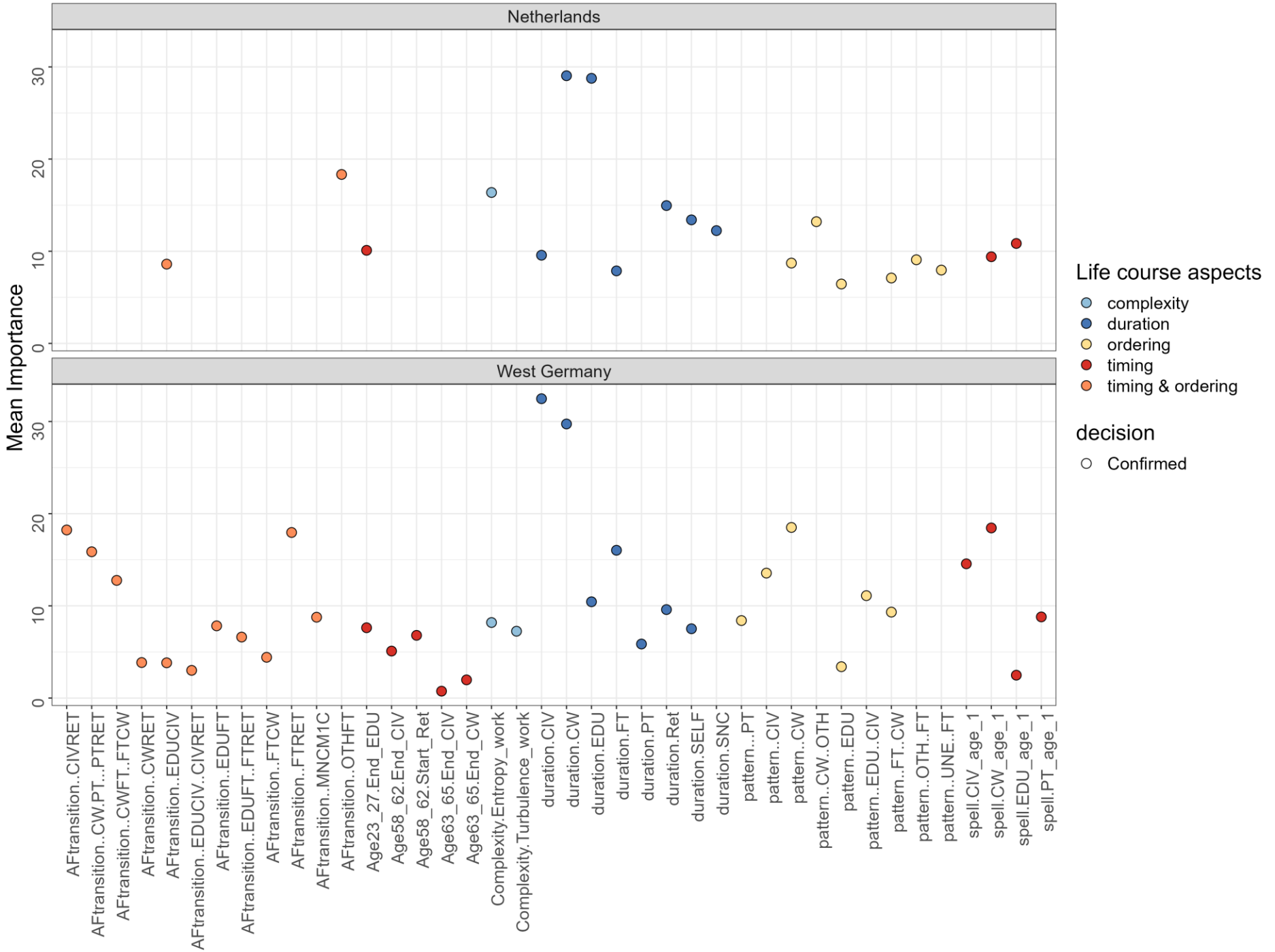
   II. Feature selection, Boruta (Kursa & Rudnicki 2010)

   - Aim: Selecting the most important pension predictors
   - Based on random forest (i.e., many decision trees), outcome: variable importance
   - Selects which variables are relevant by including a threshold
     - Real variable vs. shadow variables (randomized versions of the original variables)
     - Variable selected if perform better than best performing shadow variable



V. RESULTS STEP I: FEATURE SELECTION

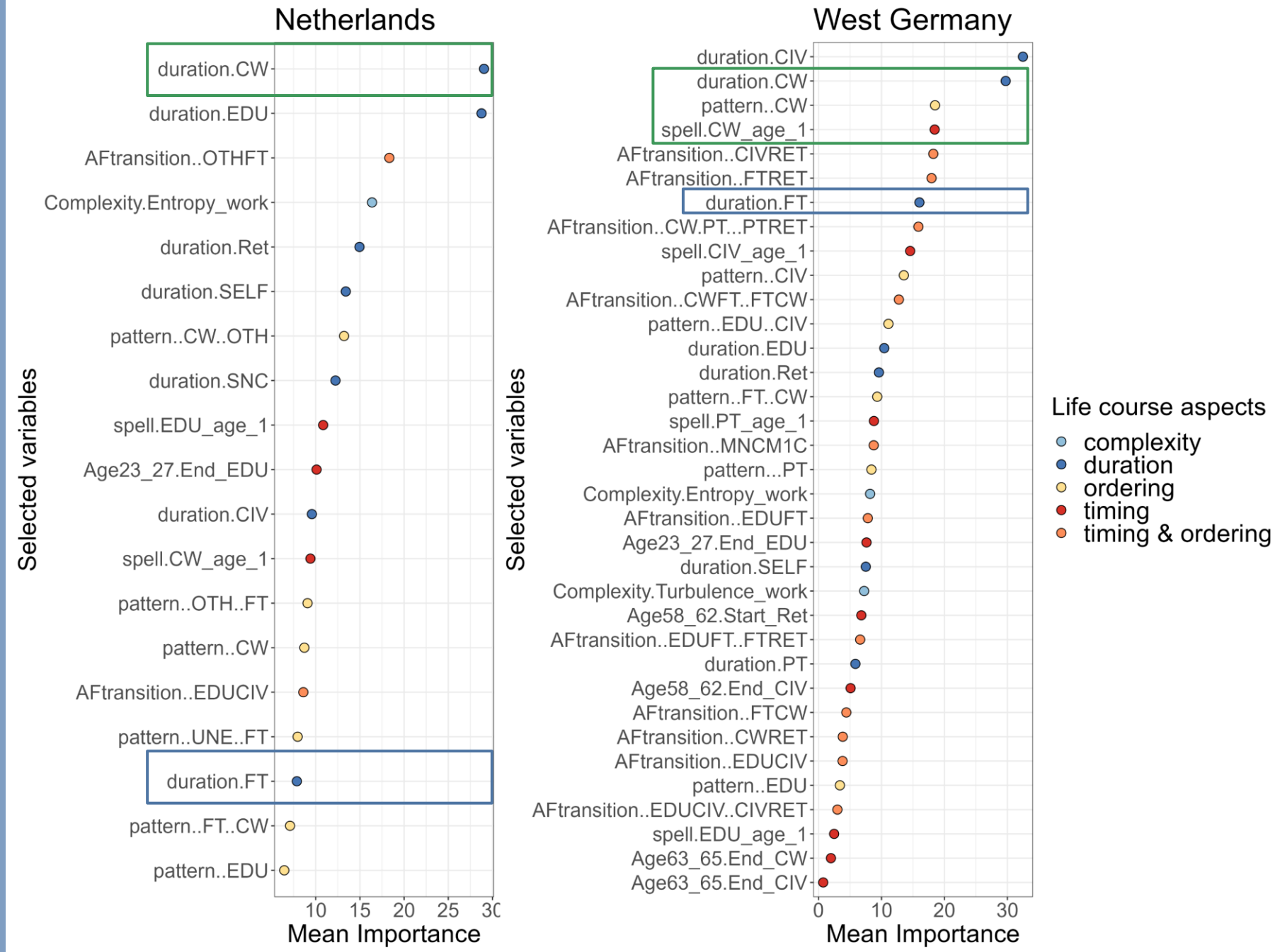
→ Variables from all different life course aspects matter!



V. RESULTS STEP I: FULL-TIME EMPLOYMENT VS. CARE WORK

Life course aspects related to **care work** among the most important variables

… while **duration in full-time employment** less important!



IV. STEP II: DECOMPOSITION

Most common: Kitagawa-Oaxaca-Blinder decomposition (KOB) (Kitagawa 1955; Oaxaca 1973; Blinder 1973)

- Regression-based decomposition into
  - a) explained part (compositional, due to differences in characteristics)
  - b) unexplained part
- Limitation: Not considering lack of common support across gender
  - Particularly relevant for life course aspects
    - E.g., many women with FT employment & 2 CW interruptions, but no men

Ñopo decomposition (Ñopo 2008)

- Uses one-to-many exact matching for a non-parametric decomposition of gaps into four parts:

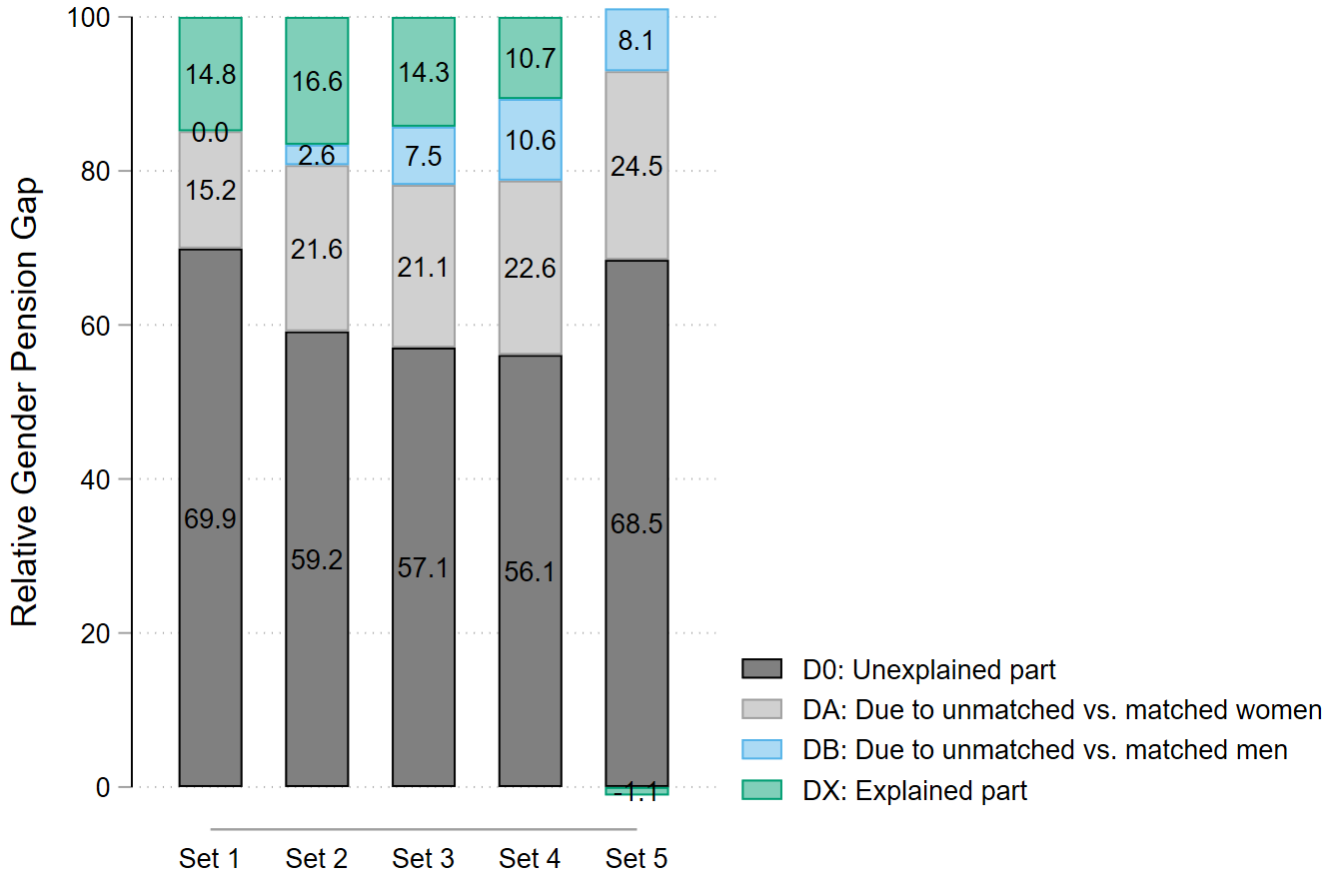
$$\bar{Y}_M - \bar{Y}_W = Dx + D0 + DA + DB$$

- $Dx + D0$: Explained & unexplained shares (like KOB), but over matched sample of groups (over common support)
- $DA + DB$: Shares arising from differences in pension income between, DA, unmatched women and matched women and, DB, unmatched men and matched men

- Quantifies new inequality dimensions: part stemming from gender-specific (life course) segregation (Sprengholz and Hamjediers 2022)
  - I.e., combination of life course aspects that only occur for one group

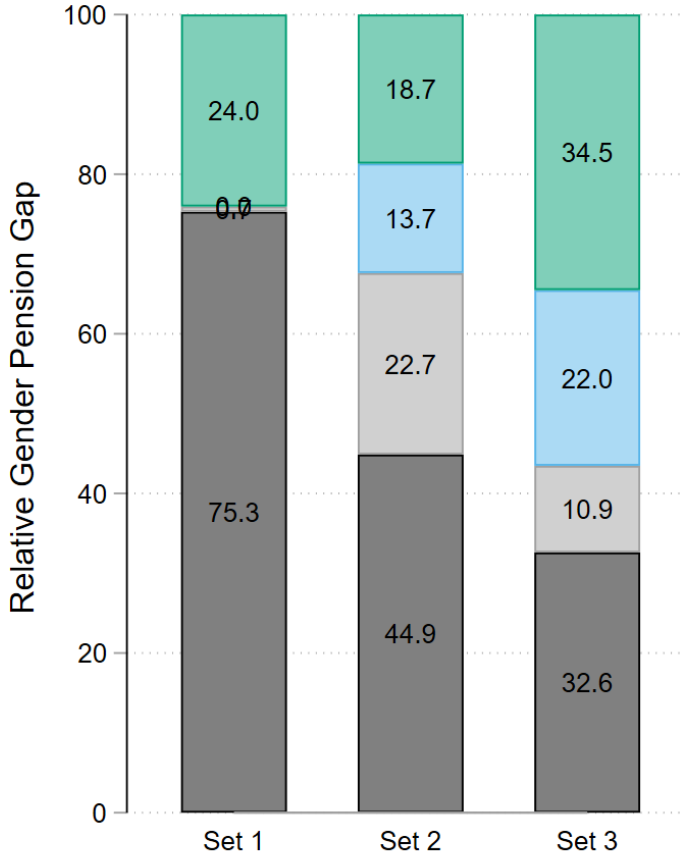
V. STEP II: ÑOPO DECOMPOSITION OF GENDER PENSION GAP

West Germany, 13,449 Euros (60.81%)



	Top 2	Top 5	Top 9	Top 11	Top 15
% matched women	64	41	35	30	11
% matched men	100	95	86	72	23
	durationCIV, durationCW	set 1+ timing CW, age start of CIV->Ret & FT->Ret	set 2 + duration FT, age start CW>PT_PT->RET &	set 3 + duration education, pattern FT->CW	SET 4+ age at 1st PT spell, complexity work, etc

Netherlands, 12,489 Euros (46.37%)



	Top 2	Top 3	Top 4
% matched women	72	25	20
% matched men	100	89	75
matchset	Duration care work and education	Set 1 + unpredict-ability working	Set 2 + Duration self-employment

V. RESULTS, STEP II: NOPO DECOMPOSITION AND MECHANISMS DA & DB

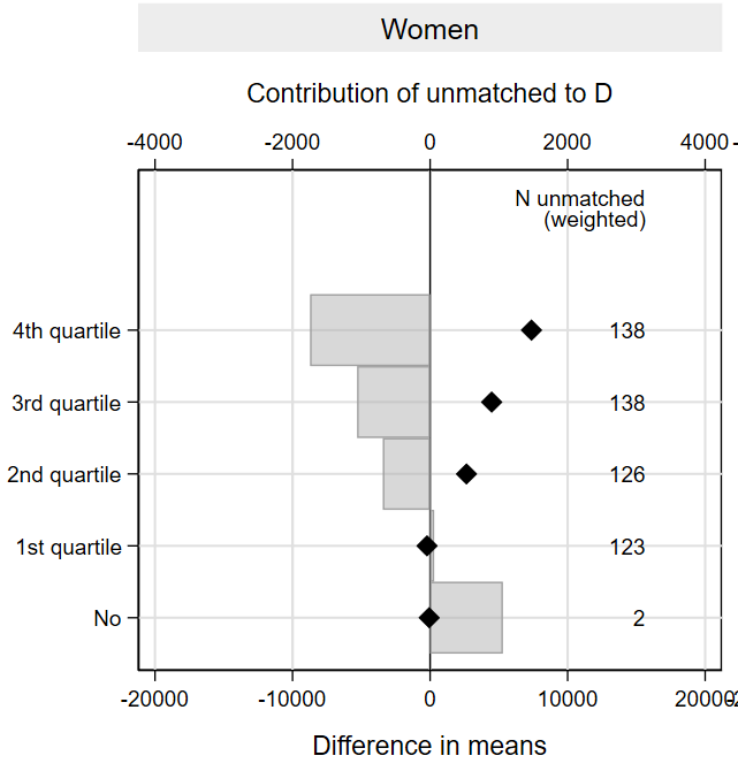
DA: Unmatched women with lower pensions &

- Much longer and earlier care work spells,
  - Unmatched women with earliest and longest care work have largest pension penalties

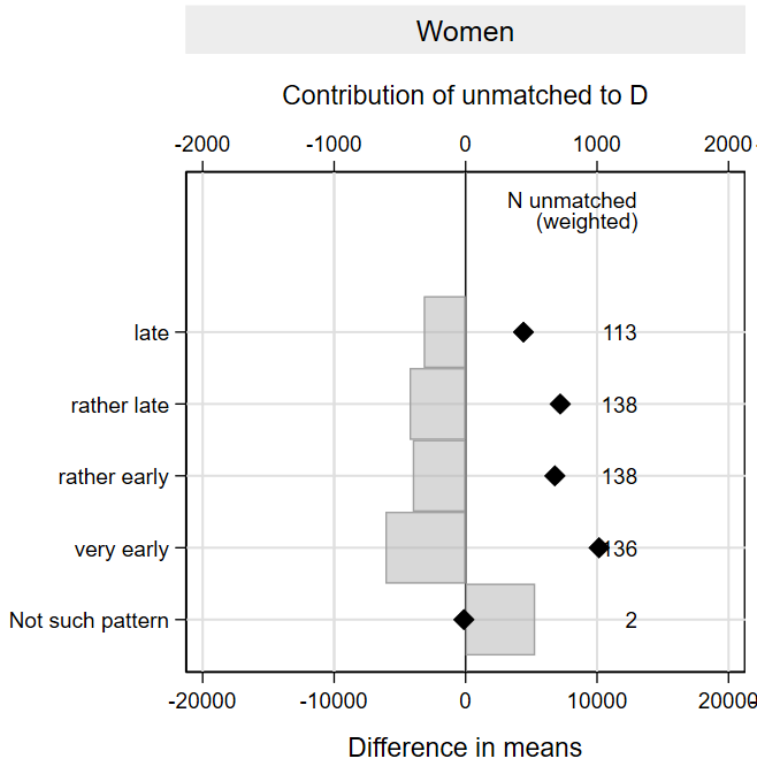
V. MECHANISMS DA: CARE WORK

West Germany, set 3

Duration care work

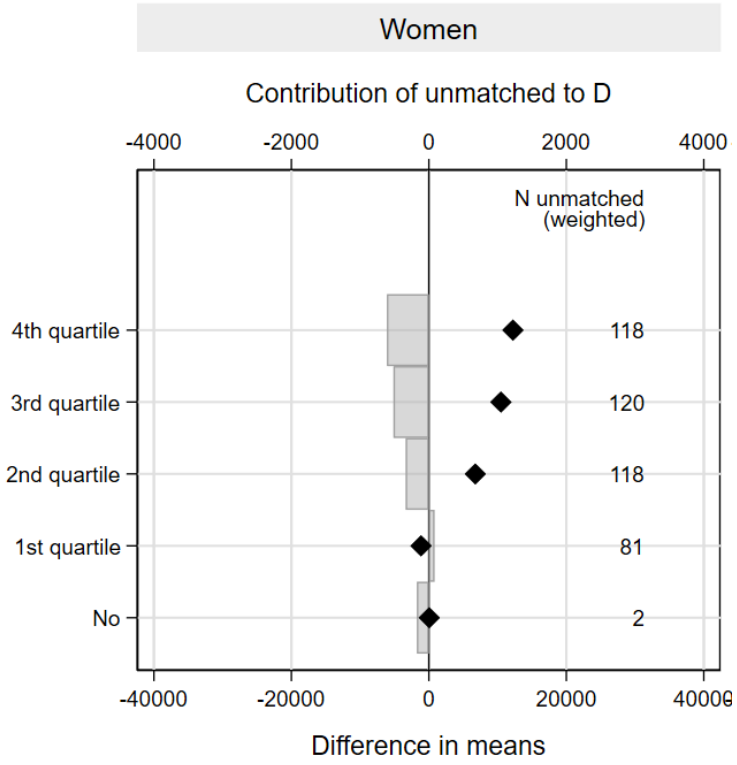


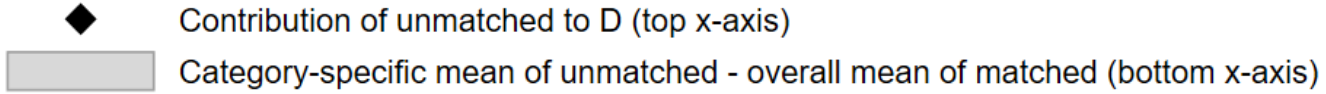
Age 1st care work



Netherlands, set 2

Duration care work





Plot from Hamjediers, M., & Sprengholz, M. (2023). Nopo decomp. Stata package: https://github.com/mhamjediers/nopo_decomposition/blob/main/nopo.ado

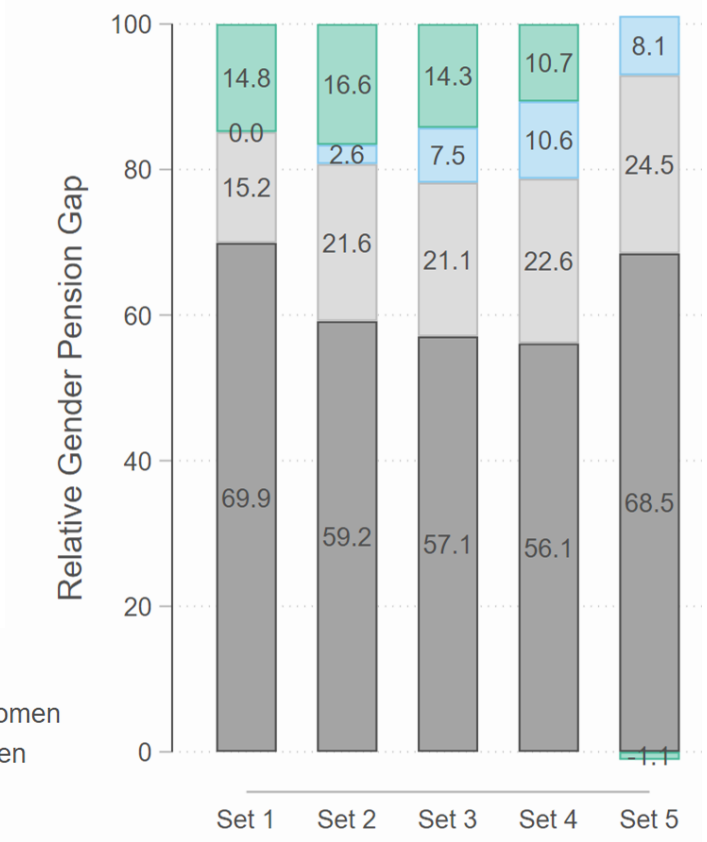
V. RESULTS, STEP II: NOPO DECOMPOSITION AND MECHANISMS DA & DB

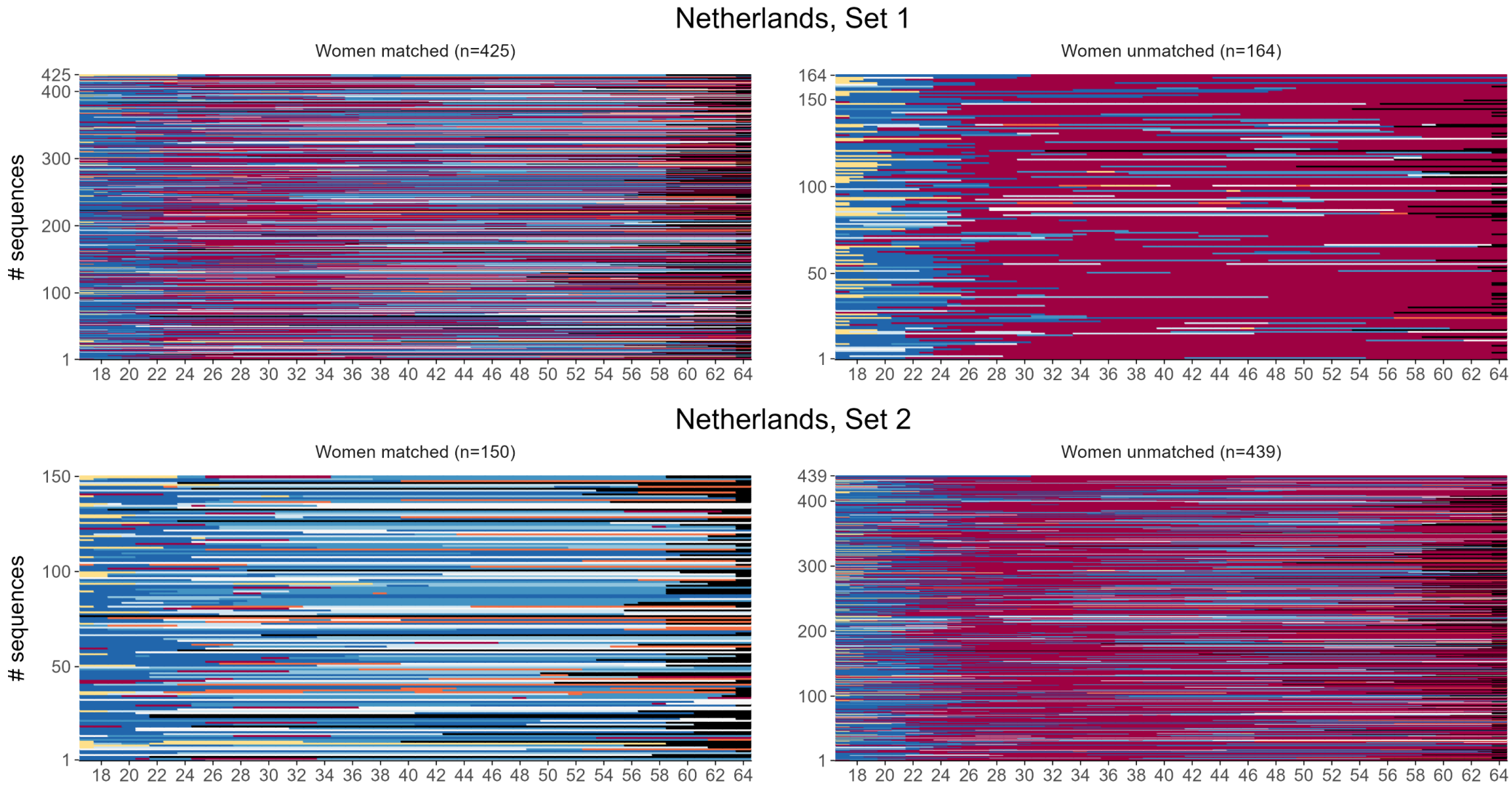
DA: Unmatched women with lower pensions &

- Much longer and earlier care work spells,
  - Unmatched women with earliest and longest care work have largest pension penalties
- WG:
  - Less years civil service & biggest pension penalty if no civil service,
  - No direct or later transition FT->Ret or CIV->Ret,
  - Less years in FT employment (Set 3)

DB: Unmatched men with higher pensions &

- More years in education (after age 17)





Set 1: top 2 Duration care work and education

Set 2: top 4, adds complexity working

VI. SENSITIVITY & LIMITATIONS

Sensitivity analysis

Feature selection:

- Attempts to identify predictors of *gendered* pension inequality
- Alternative algorithms
- Including survivor pensions & excluding 0 pensions

Ñopo:

- Propensity Score instead of exact matching
- Reference group

Limitations

Feature selection:

- Important predictors of overall pension inequality, not gendered pension inequality

Ñopo:

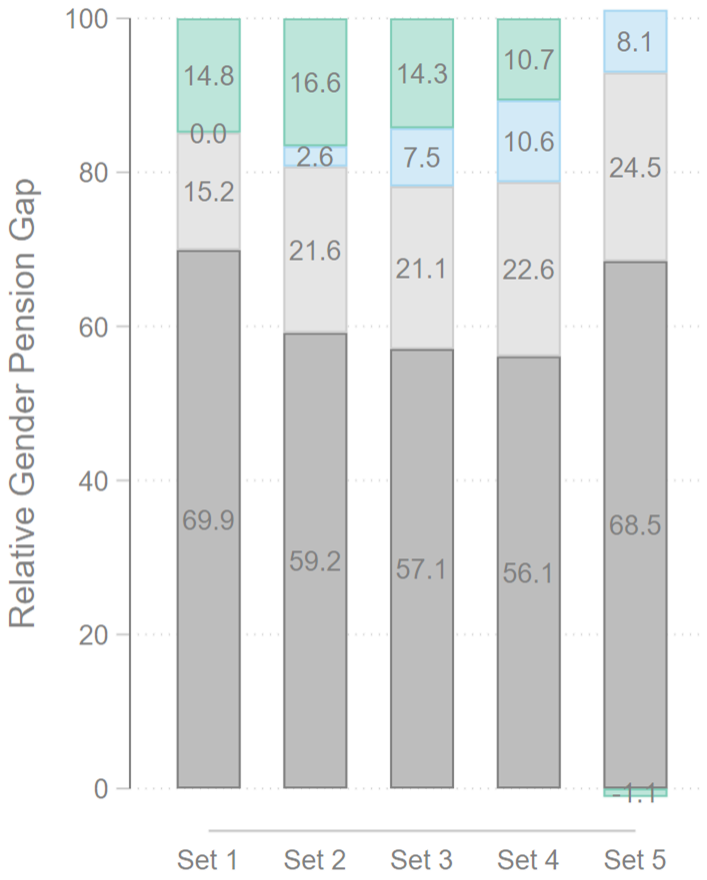
- No 'detailed' decomposition
- 'Curse of dimensionality': only limited number of characteristics meaningful

CONCLUSION

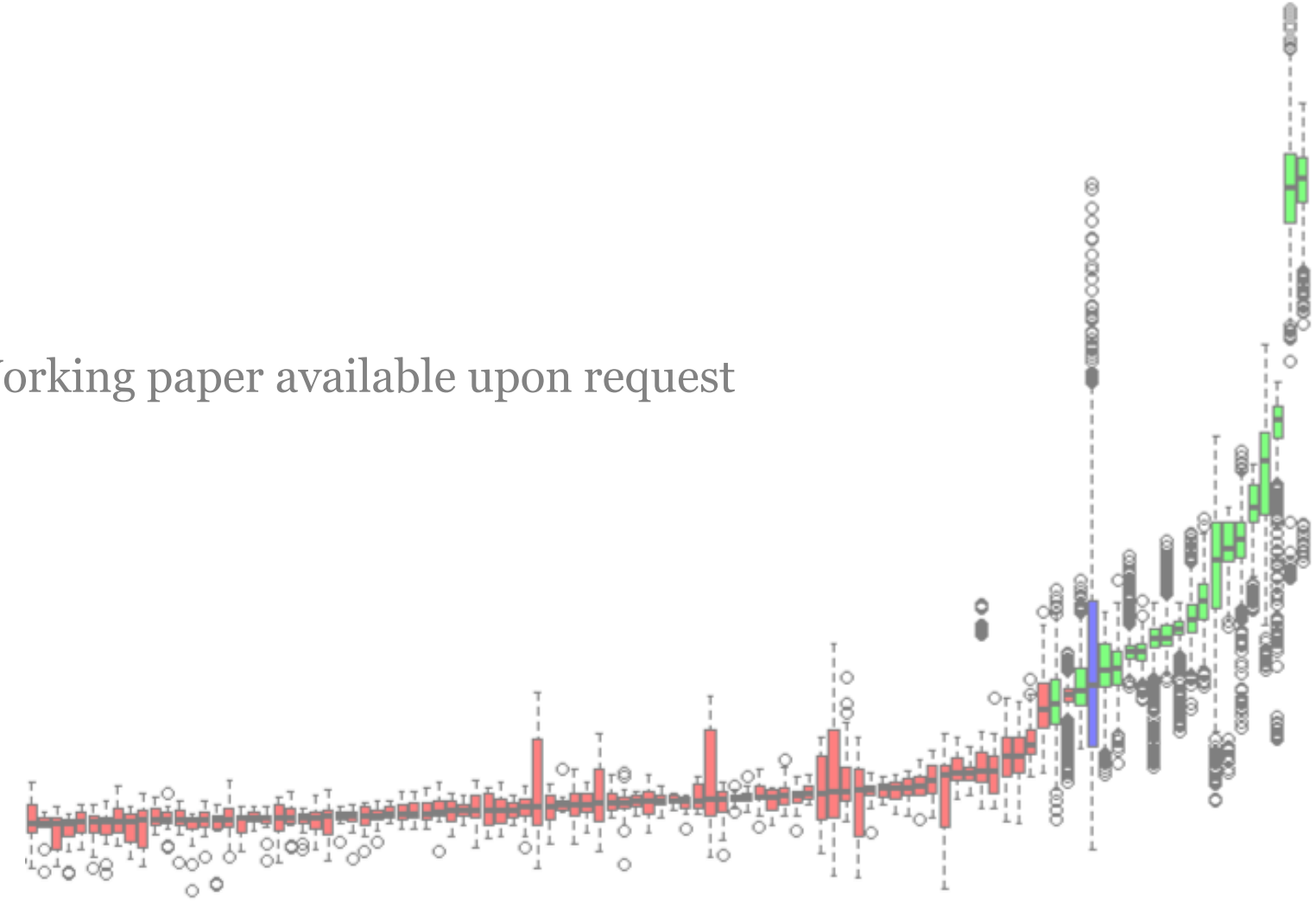
1. Pension life course predictors beyond the employment duration matter
   a) Timing, ordering & complexity
   b) Life course aspects related to unpaid care work
   - ➢ Need to systematically consider more complex & less easily extractable life course proxies
2. Gender pension gap
   - Overestimation of the share due to differences in characteristics
   - Larger parts due to *gender-exclusive* combinations of life course experiences (up to 1/3 of GPGs) – which are differently rewarded by pension system
   - ➢ No male counterparts for care work engagement

→ This holds across both pension systems!

QUESTIONS?



Working paper available upon request



PART III

COMPARING BOTH METHODS

PROS AND CONS

	SA-KOB decomposition	Life course feature selection & Ñopo
Benefits	▪ Prevents multicollinearity & considers more life-course states simultaneously ▪ Captures association of life-course complexities with gap (e.g., synergy of care work and part-time) ▪ Can model interactions between different life courses domains (e.g., family & work) ▪ Quantifies 'impact' of single life course clusters	▪ Identifies most important life course features tailored to outcome ▪ Quantifies part of gap due to group-exclusive combinations of life course experiences ▪ Identifies and overcomes common support problem

Limitations	▪ Holistic categorization reduces variation to explore
	▪ Risks concealing role of specific & less dominant life-course aspects (within-cluster heterogeneity)
	▪ Common support problem can apply
	  ▪ But should also become visible easily
		▪ Risks concealing interdependences between different life-course states and between life-course domains (e.g., work & family)
		▪ Curse of dimensionalty
		  ▪ Limited sets of life course aspects
		▪ Does not clearly visiualize life course complexities
		  ▪ Unless visulaisation of samples by group and matching status is used

CONCLUSION

- More life-course- and gender-sensitive decompositions of group inequalities
  - SA-KOB: for holistic perspective
  - Life Course Feature Selection & Ñopo: single life course elements

➢ Understanding inequality-generating mechanisms in greater complexity

  ➢ More important with increasing complexity & interdependences of life-course domains

➢ New insights to how group-specific inequalities in life-course sensitive outcomes are associated with previous trajectories

➢ Applicable to any other group inequalities in (life-course-sensitive) outcomes

CONCLUSION

The lack of full-time employment is the main reason for my low pension, they said…

But it turns out it's actually the unrewarded & unpaid care work I did for our family, Herbert!

→ Holds across methods

→ Interrelation between welfare contexts shaping gendered life courses decades ago & pension systems rewarding them unequally nowadays

To reduce Gender Pension Gaps:

I. Higher rewards for unpaid care-work

II. Equalize gendered work-family life course opportunities

→ More life-course-sensitive pension system, e.g., with cohort-specific care-work rewards

THANKS!

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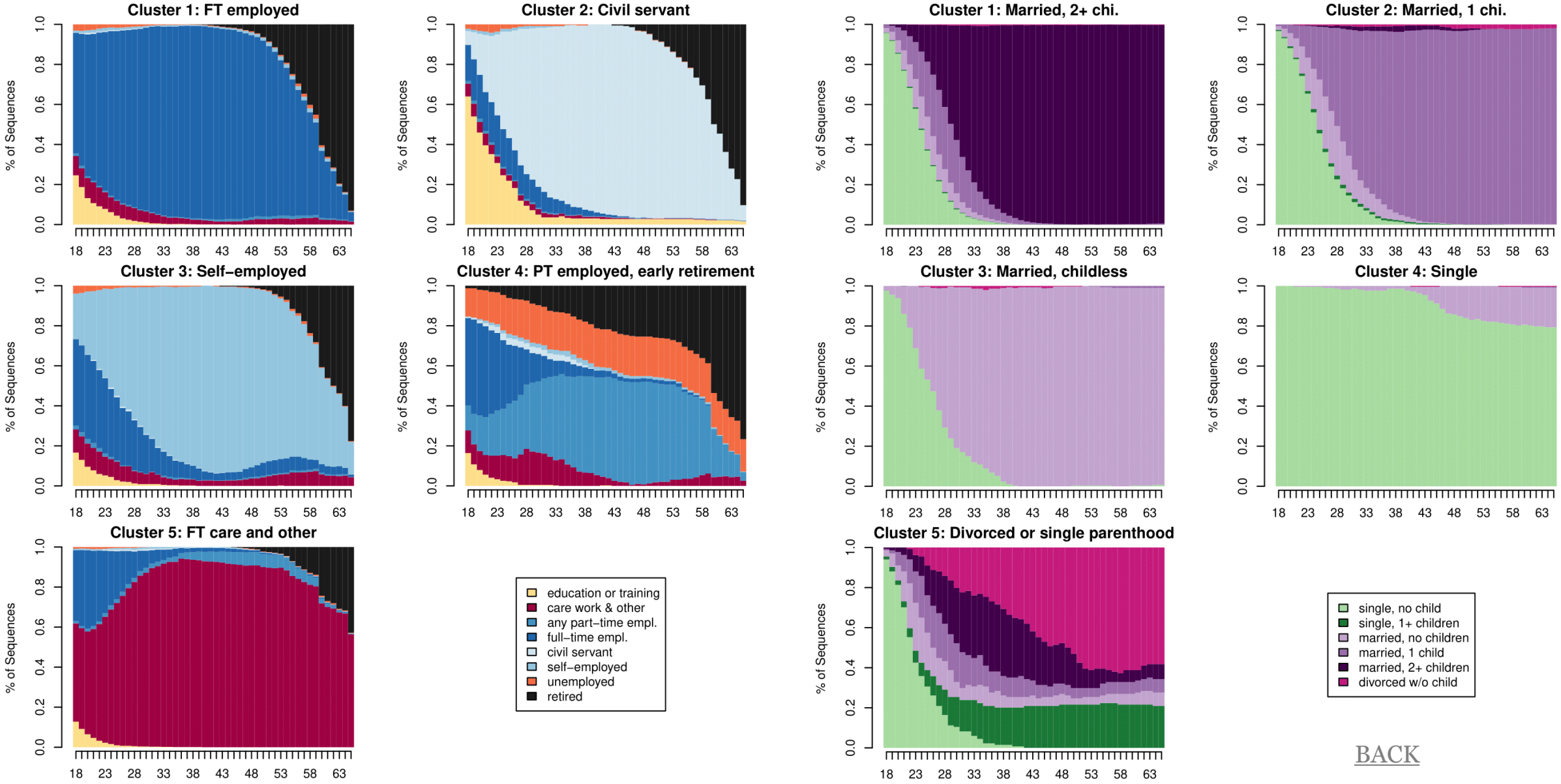
ROBUSTNESS PART I

IV. SA-KOB: SINGLE-CHANNEL SEQUENCE ANALYSIS



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IV. SA-KOB: SINGLE-CHANNEL SEQUENCE ANALYSIS

Table S5.2. Single-channel SA.

	Italy				West Germany			
	Work SA		Work & family SA		Work SA		Work & family SA	
Absolute GPG	6,651**		6,651**		13,089**		13,089**	
	(24.40)		(21.79)		(26.15)		(40.69)	
Explained, total	4,035**		4,152**		9,294**		9,900**	
	(8.434)		(10.30)		(11.40)		(11.36)	
Unexplained, total	2,616**		2,500**		3,795**		3,189**	
	(7.562)		(8.688)		(5.283)		(3.991)	
	explained	returns	explained	returns	explained	returns	explained	returns
Work: Cluster 1: FT employed	895.0**	45.46	843.8**	38.80	19.97	44.00	-153.2	105.9
	(3.925)	(0.251)	(4.069)	(0.231)	(0.0406)	(0.140)	(-0.331)	(0.330)
Work: Cluster 2: Civil service	74.72+	-98.47	70.35+	-102.1+	1,394**	16.76	1,317**	-22.11
	(1.871)	(-1.364)	(1.823)	(-1.784)	(6.832)	(0.185)	(5.462)	(-0.233)
Work: Cluster 3: Self-employed	-207.3*	-36.77	-220.8**	-41.06	-358.2**	-131.2+	-364.4**	-127.4+
	(-2.250)	(-0.561)	(-3.060)	(-0.599)	(-3.287)	(-1.724)	(-3.472)	(-1.848)
Work: Cluster 4: PT employed, early retired	143.3**	-4.124	132.8**	-6.384	398.0**	-4.365	362.6**	-4.541
	(5.344)	(-0.0803)	(4.162)	(-0.153)	(3.045)	(-0.177)	(2.742)	(-0.212)
Work: Cluster 5: FT care or other	1,759**	30.62	1,701**	33.39	2,322**	47.86	2,144**	55.85+
	(14.98)	(0.931)	(13.24)	(1.385)	(11.19)	(1.207)	(9.602)	(1.670)
Family: Cluster 1: Married, 2+ chi.			0.912	55.45			-79.99	2,693**
			(0.104)	(0.158)			(-1.417)	(4.002)
Family: Cluster 2: Married, 1 chi.			4.623	90.25			22.66	682.8**
			(0.348)	(1.065)			(0.452)	(2.941)
Family: Cluster 3: Married, childless			-2.574	0.217			20.96	51.29
			(-0.219)	(0.00339)			(0.685)	(0.539)
Family: Cluster 4: Single			15.60	-189.6**			-98.22*	-38.73
			(0.905)	(-3.202)			(-2.155)	(-1.118)
Family: Cluster 5: Divorced or single parent			1.082	43.28			20.50	-326.6**
			(0.0822)	(1.514)			(0.701)	(-3.969)
Constant		4,205**		4,381**		9,195**		6,703**
		(6.154)		(6.574)		(7.339)		(4.720)
n male	1357	1357	1357	1357	804	804	804	804
n female	1509	1509	1509	1509	815	815	815	815

Notes: All models based on normalized linear regression models with absolute independent pension income as the dependent variable and controlled for birth cohort and wave. z-statistics in parentheses. ** p<0.01, * p<0.05, + p<0.10. Own calculation based on the analysis sample and SHARE waves 2–6, v7.1.0. Not weighted.

- Step-wise models, starting with work domain
- Work: higher explained shares
  - Higher gender difference in clusters (different family life courses merged)
  - Robust when controlling for family life courses
- Family
  - Mothers of 2+ children receive €2693 lower pensions than fathers (returns component, family cluster 1; €683 pension income difference for parents with one child, cluster 2)
  - Divorce benefit of women becomes evident

➢ Only MSA reveals interdependences between work and family life courses that appear almost exclusively for women and are related to GPG

BACK

VI. REFERENCE COEFFICIENT

Reference coefficient option	I.a) Group 1 (here: men)	I.b) Group 2 (here: women)	II) Pooled	III) Cluster-specific majority group
Concept	Regression coefficients from group 1: $\hat{\beta}_M$	Regression coefficients from group 2: $\hat{\beta}_W$	Regression coefficients from pooled model over both groups: $\hat{\beta}^*$	For group-specific clusters: coefficients of the majority group. For group-neutral clusters: coefficients of the theoretically nondiscriminatory group.
Explained part	$(\bar{X}_M - \bar{X}_W)'\hat{\beta}_M$	$(\bar{X}_M - \bar{X}_W)'\hat{\beta}_W$	$(\bar{X}_M - \bar{X}_W)'\hat{\beta}^*$	$(\bar{X}_M - \bar{X}_W)'\hat{\beta}_M$ or $(\bar{X}_M - \bar{X}_W)'\hat{\beta}_W$
Returns component	$\bar{X}'_W(\hat{\beta}_M - \hat{\beta}_W)$	$\bar{X}'_M(\hat{\beta}_M - \hat{\beta}_W)$	$\bar{X}'_M(\hat{\beta}_M - \hat{\beta}^*) + \bar{X}'_W(\hat{\beta}^* - \hat{\beta}_W)$	$\bar{X}'_W(\hat{\beta}_M - \hat{\beta}_W)$ or $\bar{X}'_M(\hat{\beta}_M - \hat{\beta}_W)$
Benefits	- Straightforward interpretation - Reflects assumption that one group is not discriminated against		- Sensitive to the group composition of the covariates and implications for the rewarding structure	- Straightforward interpretation - Sensitive to the group composition of the covariates and implications for the rewarding structure
Limitations	- Nondiscrimination assumption unlikely to hold (esp. for all categories of all covariates of interests) - Disregards group composition of the cluster		- Artificial rewarding structure - Unclear which group drives coefficient - No straightforward interpretation	- Necessary to define thresholds for group-specific and neutral clusters & choice of majority group; application-specific
Specifics for SA+-KOB	- Concept theoretically and empirically challenged in case of high level of group-specific life-course clusters		- In case of highly group-specific life-course cluster, the less typical group might skew the nondiscriminatory coefficients in the pooled regression model	- Addresses group-specific life-course clusters and its theoretical and empirical implications - Addresses some issues of group-specific within-cluster heterogeneity as majority group more likely to be coherent with overall cluster characteristics

BACK

VI. REFERENCE COEFFICIENT – IDENTIFICATION OF MAJORITY GROUP

(a) Theoretical

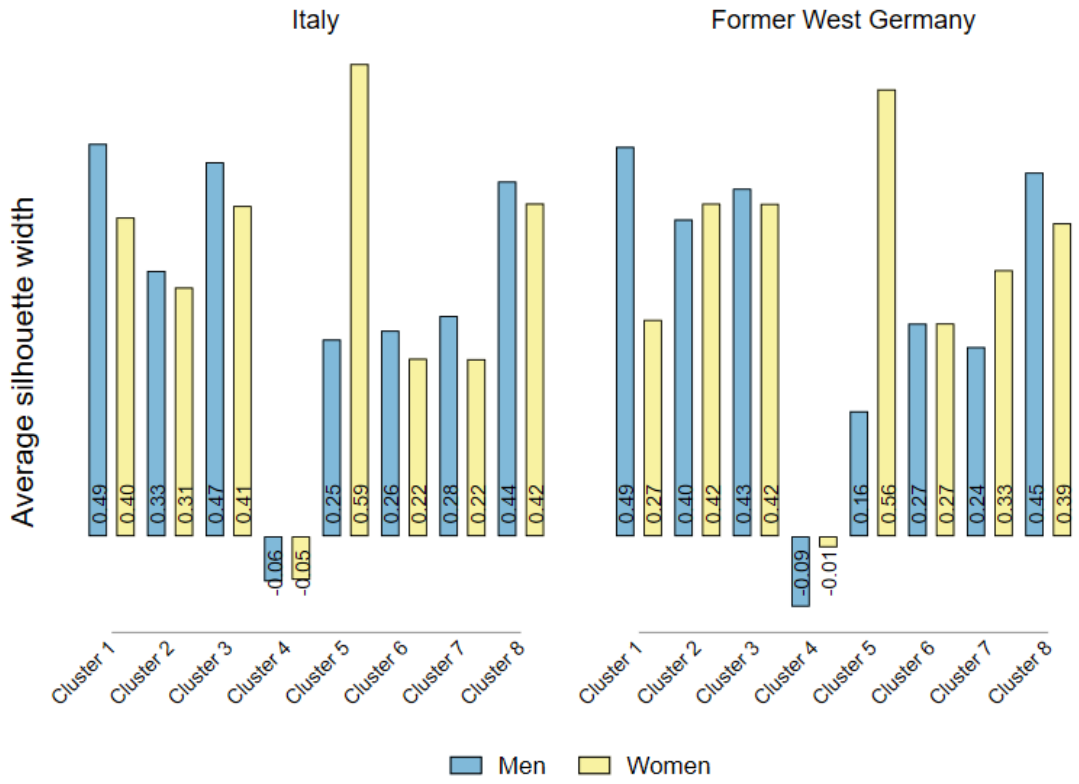
- Reward structure of cluster contains group-specific benefits expected to be exclusive to a particular group's reward structure (e.g., pension benefits for care work)

(b) Empirical

- Gender gap in the distribution over the clusters (in the row percentages) which are equivalent to the $\bar{X}'_A$ and $\bar{X}'_B$ used in the decomposition
- Life-course clusters as group-specific if the relative gender gap in the distribution greater than 50%
  - $50 < 100 * ((\bar{X}'_A - \bar{X}'_B) / \bar{X}'_A)$, with $\bar{X}'_A > \bar{X}'_B$

(c) Statistical

- Statistically validated by comparing the ASW by group for each cluster
  - The higher, the more coherent the group -> better representative



BACK

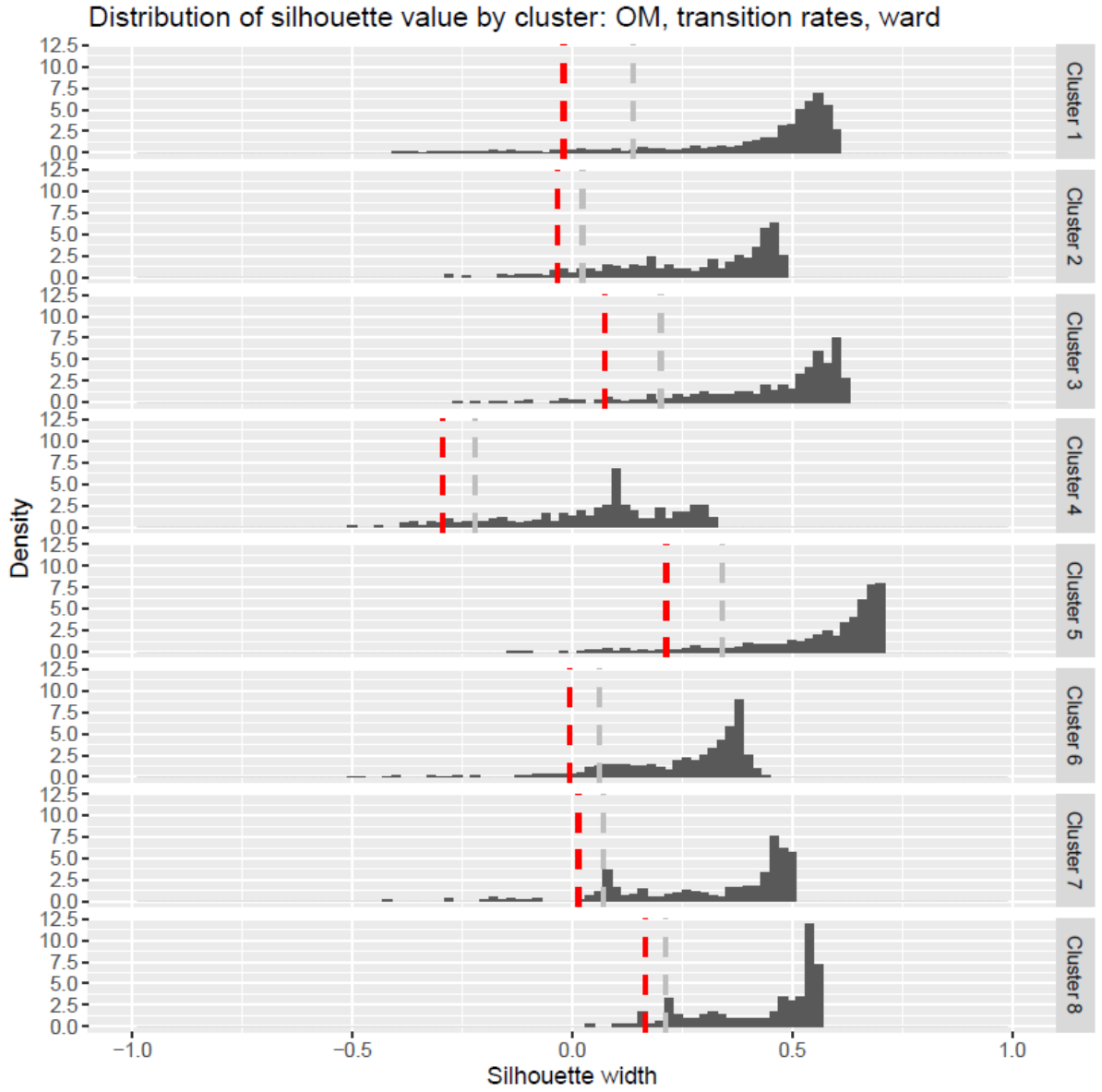
VI. ROBUSTNESS CHECK – REFERENCE COEFFICIENT

Table S4.1. Robustness checks, set I: different reference coefficients used for KOB.

	Italy								West Germany							
	Main: MAJORITY group ref. (M1)		MEN's ref. (M2)		WOMEN's ref. (M3)		POOLED ref. (M4)		Main: MIXED ref. (M1)		MEN's ref. (M2)		WOMEN's ref. (M3)		POOLED ref. (M4)	
Mean pension inc. men	12,660**		12,660**		12,660**		12,660**		21,119**		21,119**		21,119**		21,119**	
	-57.31		-57.31		-57.31		-57.56		-53.62		-53.62		-53.62		-53.95	
Mean pension inc. women	6,009**		6,009**		6,009**		6,009**		8,030**		8,030**		8,030**		8,030**	
	-37.13		-37.13		-37.13		-37.26		-28.52		-28.52		-28.52		-28.68	
Absolute GPG	6,651**		6,651**		6,651**		6,651**		13,089**		13,089**		13,089**		13,089**	
	-24.29		-24.29		-24.29		-24.39		-27.03		-27.03		-27.03		-27.2	
Explained, total	2,054**		1,288**		2,112**		1,875**		3,514**		2,830**		3,418**		3,261**	
	-10.07		-2.686		-11.33		-11.25		-8.725		-3.802		-9.076		-9.675	
Unexplained, total	4,597**		5,364**		4,540**		4,777**		9,575**		10,260**		9,671**		9,828**	
	-14.52		-9.925		-14.61		-15.52		-17.65		-12.29		-18.37		-18.8	
	explained	returns	explained	returns	explained	returns	explained	returns	explained	returns	explained	returns	explained	returns	explained	returns
1 FT employed, 2+ chi.	621.2**	92.16	621.2**	92.16	419.7**	293.7	568.4**	145	214.9	99.19	214.9	99.19	-3.073	317.2	202.3	111.8
	-4.88	-1.178	-4.88	-1.178	-3.487	-1.181	-6.072	-0.93	-1.04	-0.741	-1.04	-0.741	(-0.0147)	-0.742	-1.439	-0.51
2 Civil servant, 2+ chi.	79.72*	-84.40*	79.72*	-84.40*	154.3**	-159.0*	109.9**	-114.6*	1,401**	2.913	1,401**	2.913	1,392**	11.26	1,417**	-13.21
	-2.49	(-2.258)	-2.49	(-2.258)	-3.238	(-2.308)	-3.168	(-2.278)	-6.738	-0.0499	-6.738	-0.0499	-6.323	-0.0499	-7.029	(-0.106)
3 Self-employed, 2+ chi.	-245.2**	-69.06+	-245.2**	-69.06+	-107.4+	-206.8+	-209.4**	-104.9+	-181.2*	-33.92	-181.2*	-33.92	-145.0*	-70.15	-162.7**	-52.41
	(-3.929)	(-1.655)	(-3.929)	(-1.655)	(-1.766)	(-1.675)	(-5.084)	(-1.771)	(-2.499)	(-0.598)	(-2.499)	(-0.598)	(-2.321)	(-0.600)	(-2.624)	(-0.643)
4 PT employed, 2+ chi.	92.08**	-15.25	105.4*	-28.53	92.08**	-15.25	78.94**	-2.114	479.3**	-58.72	748.8*	-328.2	479.3**	-58.72	395.8**	24.78
	-3.069	(-0.247)	-2.061	(-0.247)	-3.069	(-0.247)	-2.82	(-0.0256)	-3.784	(-0.791)	-2.327	(-0.796)	-3.784	(-0.791)	-3.383	-0.164
5 FT care/other, 2+ chi.	1,568**	58.67+	788.1+	838.2+	1,568**	58.67+	1,370**	256.4**	1,646**	88.07	686.7	1,047+	1,646**	88.07	1,426**	307.7*
	-13.68	-1.778	-1.931	-1.858	-13.68	-1.778	-12.81	-2.91	-9.03	-1.625	-1.295	-1.74	-9.03	-1.625	-9.86	-2.468
6 FT empl./care, 1 child	-19.3	477.6**	-19.3	477.6**	7.817	450.5**	-6.16	464.4**	-19.99	518.0*	-19.99	518.0*	25.77	472.3*	-0.599	498.6*
	(-0.633)	-4.48	(-0.633)	-4.48	-0.62	-4.447	(-0.615)	-4.426	(-0.735)	-2.394	(-0.735)	-2.394	-0.833	-2.389	(-0.0591)	-2.18
7 FT employed, married	-4.059	87.04	-4.059	87.04	1.748	81.24	-1.965	84.95	41.67	-2.24	41.67	-2.24	42.34	-2.912	45.51	-6.083
	(-0.463)	-1.275	(-0.463)	-1.275	-0.414	-1.273	(-0.442)	-1.247	-1.134	(-0.0251)	-1.134	(-0.0251)	-1.217	(-0.0251)	-1.264	(-0.0562)
8 FT employed, single	13.84	-160.1**	13.84	-160.1**	-14.47	-131.8**	-4.483	-141.8**	-105.6*	-58.09	-105.6*	-58.09	-4.669	-159.0+	-75.96*	-87.70+
	-0.936	(-2.677)	-0.936	(-2.677)	(-1.056)	(-2.635)	(-0.761)	(-3.023)	(-2.020)	(-1.574)	(-2.020)	(-1.574)	(-0.112)	(-1.713)	(-2.049)	(-1.745)

BACK

VI. ROBUSTNESS CHECK – SILHOUETTE VALUES



- Excludes the poorly assigned individuals from each cluster (silhouettes as a measure for cluster coherence, (Kaufman and Rousseeuw 1990))
  - We suggest using cluster-specific, *relative* cutoffs (**5th (red)** and **10th (grey)** percentiles)
    - ➢ silhouette distribution differs severely by clusters

1. Overall robustness re within-cluster heterogeneity
   - ➢ Main results are overall robust
2. Decomposition components skewed?
   a) Explained: 'more representative' reference coefficient weighting mean differences
      - ➢ Over- or underestimation likely (skewed & not representative reference coefficients)
      - ➢ Tend to be underestimated
   b) Returns: differences in returns driven by gender-specific differences within the cluster
      - ➢ Assumption of endowment with 'same' characteristic violated
      - ➢ Gender-specific within-cluster heterogeneity drives parts of the returns component (e.g., cluster 6 in IT)

➢ Cluster coherence has to be checked for!

BACK

VI. ROBUSTNESS CHECK – SILHOUETTE VALUES

Table S4.2. Robustness checks, set II: excluding individuals poorly assigned to cluster based on low silhouette widths.

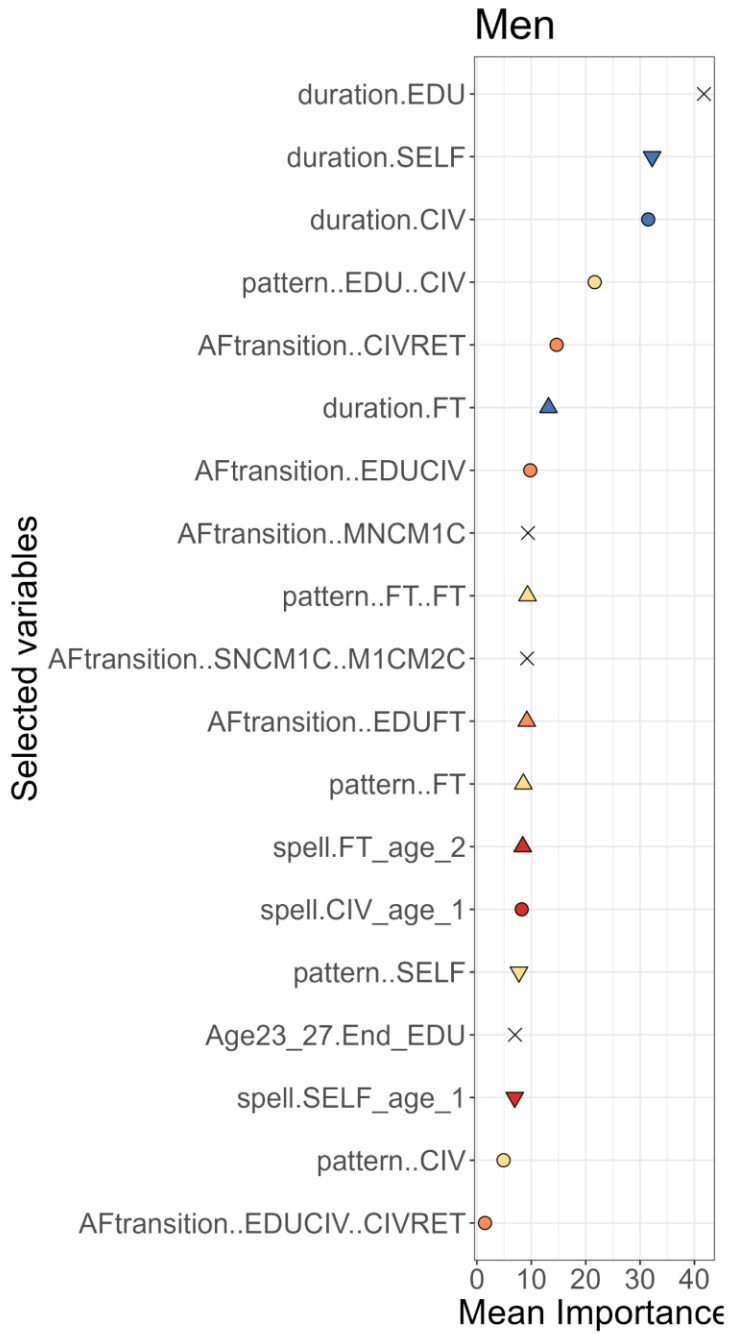
	Italy						West Germany					
	Main model (M1)		Excluded < silhouette p5 (M5)		Excluded < silhouette p10 (M6)		Main model (M1)		Excluded < silhouette p5 (M5)		Excluded < silhouette p10 (M6)	
Mean pension inc. men	12,660**		12,681**		12,635**		21,119**		21,402**		21,501**	
	-57.31		(57.95)		(62.17)		-53.62		(57.64)		(50.46)	
Mean pension inc. women	6,009**		5,884**		5,868**		8,030**		7,992**		7,854**	
	-37.13		(43.24)		(32.17)		-28.52		(28.07)		(22.39)	
Absolute GPG	6,651**		6,797**		6,766**		13,089**		13,410**		13,648**	
	-24.29		(30.45)		(25.37)		-27.03		(29.07)		(23.77)	
Explained, total	2,054**		2,060**		2,254**		3,514**		3,418**		3,362**	
	-10.07		(10.24)		(9.008)		-8.725		(8.804)		(8.579)	
Unexplained, total	4,597**		4,737**		4,513**		9,575**		9,992**		10,286**	
	-14.52		(16.93)		(11.76)		-17.65		(16.54)		(15.97)	
	explained	returns	explained	returns	explained	returns	explained	returns	explained	returns	explained	returns
1 FT employed, 2+ chi.	621.2**	92.16	624.0**	44.37	673.4**	58.94	214.9	99.19	282.4	74.41	307.4	101.5
	-4.88	-1.178	(4.351)	(0.599)	(4.835)	(0.666)	-1.04	-0.741	(1.440)	(0.696)	(1.383)	(1.068)
2 Civil servant, 2+ chi.	79.72*	-84.40*	77.61*	-80.15+	84.57*	-88.02*	1,401**	2.913	1,456**	-24.84	1,440**	-28.29
	-2.49	(-2.258)	(2.160)	(-1.935)	(2.455)	(-2.517)	-6.738	-0.0499	(6.978)	(-0.345)	(7.287)	(-0.363)
3 Self-employed, 2+ chi.	-245.2**	-69.06+	-256.4**	-70.23*	-280.5**	-77.02*	-181.2*	-33.92	-176.1*	-66.04	-152.8*	-41.65
	(-3.929)	(-1.655)	(-4.340)	(-2.171)	(-4.211)	(-2.079)	(-2.499)	(-0.598)	(-2.308)	(-0.979)	(-2.252)	(-0.612)
4 PT employed, 2+ chi.	92.08**	-15.25	112.0**	5.765	115.3**	22.47	479.3**	-58.72	362.1*	-94.71	316.1*	-115.6
	-3.069	(-0.247)	(3.412)	(0.113)	(3.535)	(0.371)	-3.784	(-0.791)	(2.534)	(-1.192)	(2.398)	(-1.608)
5 FT care/other, 2+ chi.	1,568**	58.67+	1,599**	60.53	1,744**	71.38	1,646**	88.07	1,606**	82.86+	1,594**	83.06+
	-13.68	-1.778	(12.49)	(1.390)	(18.44)	(1.603)	-9.03	-1.625	(9.782)	(1.948)	(9.161)	(1.843)
6 FT empl./care, 1 child	-19.3	477.6**	-36.19	486.9**	-19.94	414.6**	-19.99	518.0*	-54.12	601.9**	-60.88	524.9*
	(-0.633)	-4.48	(-0.965)	(4.241)	(-0.625)	(4.088)	(-0.735)	-2.394	(-0.992)	(2.579)	(-1.569)	(2.317)
7 FT employed, married	-4.059	87.04	-6.535	94.98	-5.658	102.4	41.67	-2.24	22.88	-41.25	10.44	-29.07
	(-0.463)	-1.275	(-0.380)	(1.337)	(-0.451)	(1.400)	-1.134	(-0.0251)	(0.875)	(-0.412)	(0.352)	(-0.291)
8 FT employed, single	13.84	-160.1**	12.56	-164.1**	15.69	-162.6*	-105.6*	-58.09	-109.4*	-16.48	-111.4*	-21.28
	-0.936	(-2.677)	(0.765)	(-2.758)	(1.050)	(-2.412)	(-2.020)	(-1.574)	(-2.173)	(-1.006)	(-2.412)	(-0.824)

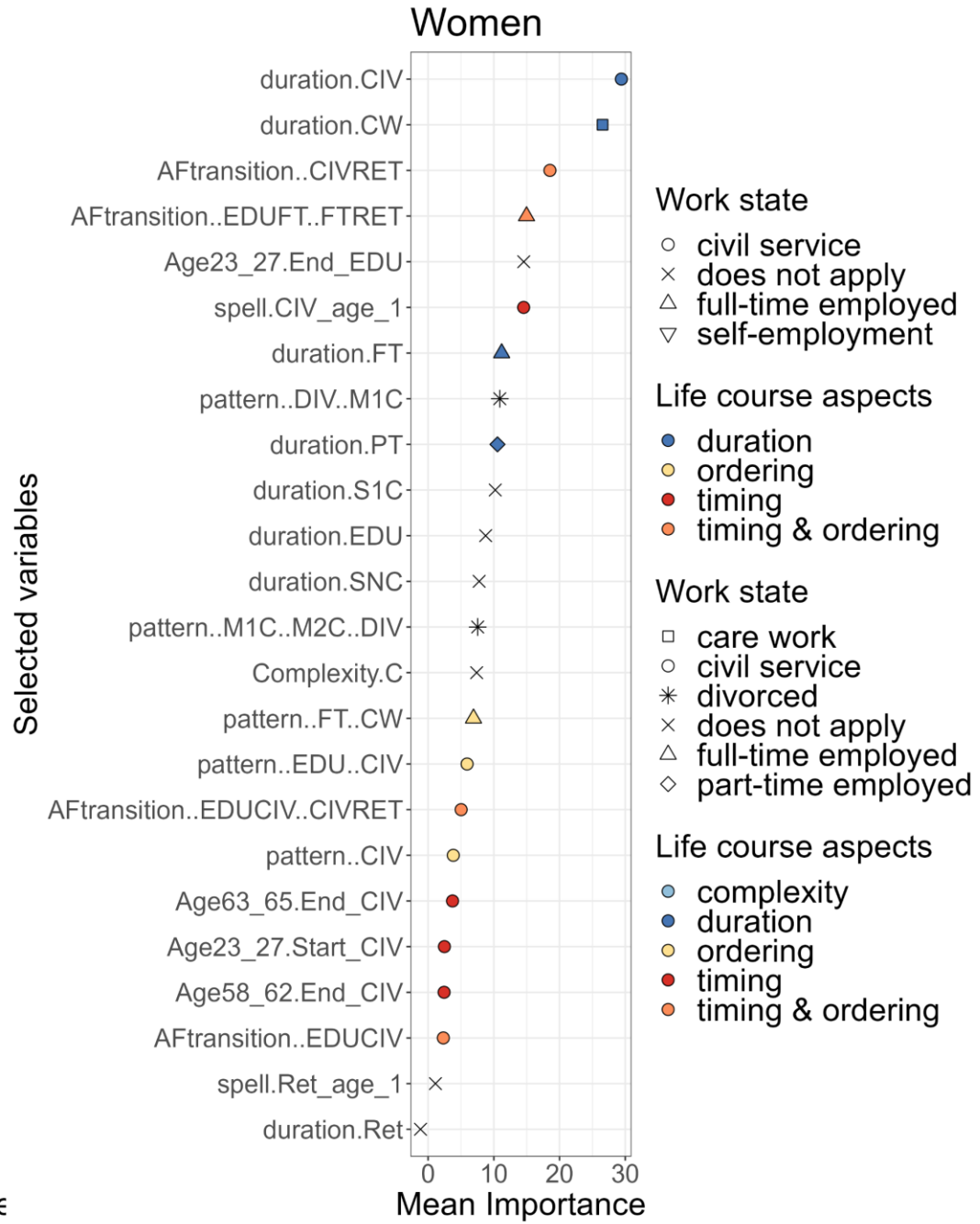
BACK

ROBUSTNESS PART II

ROBUSTNESS

BORUTA WEST GERMANY – GENDER-SPECIFIC

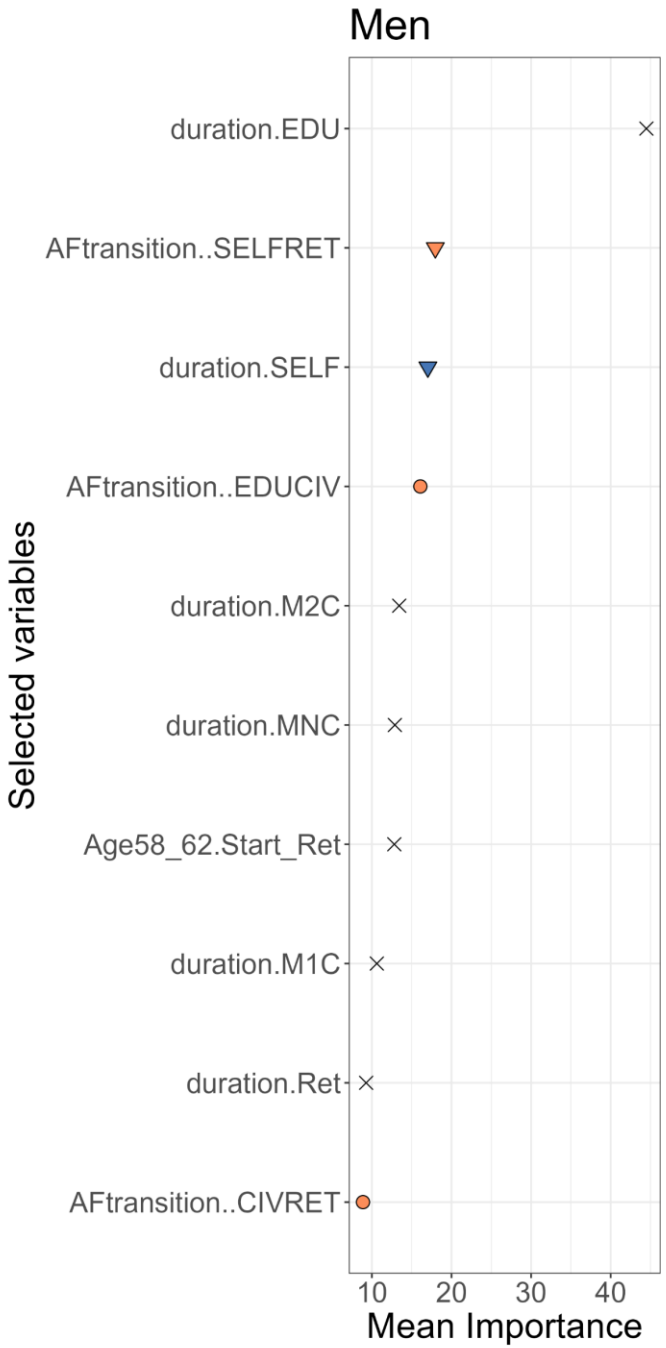


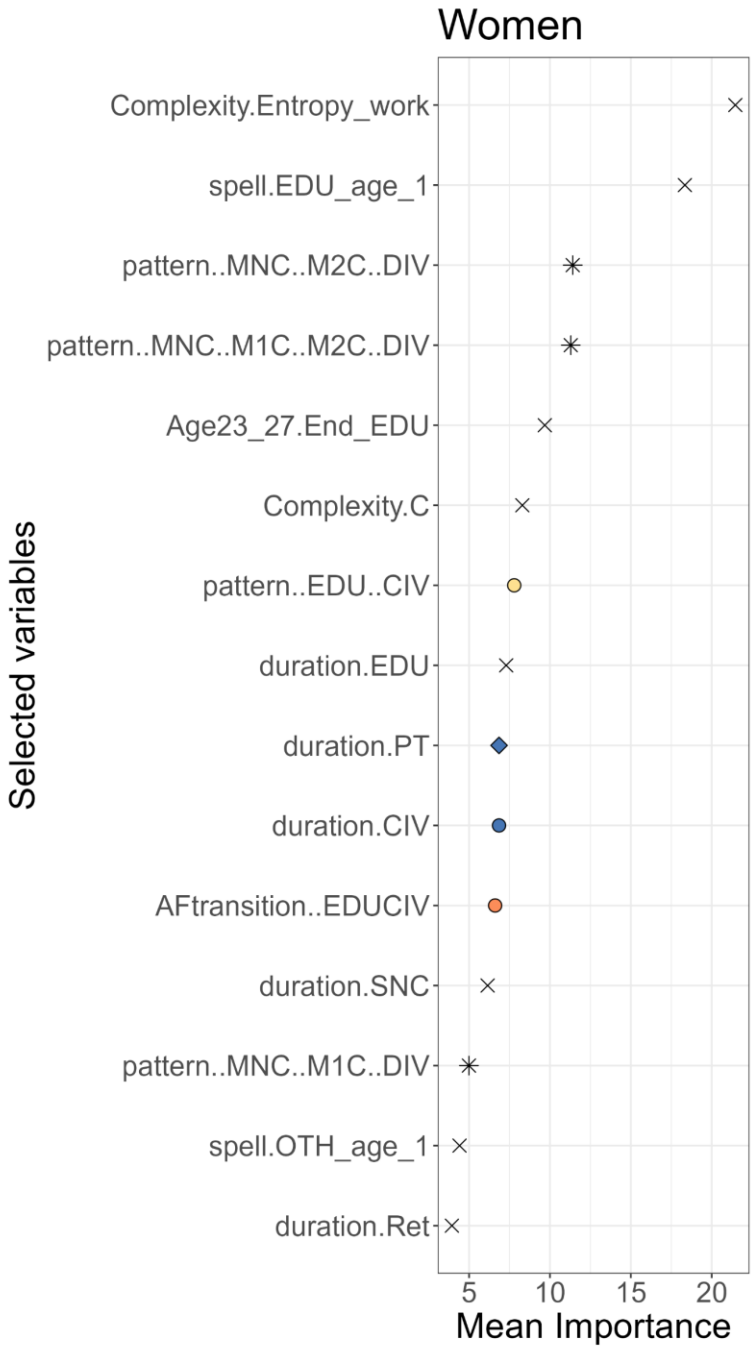


BACK

V. STEP I:

BORUTA NETHERLANDS – GENDER-SPECIFIC





BACK

V. RESULTS STEP I: GENDER-SPECIFIC FEATURE SELECTION

→ Top predictors vary across gender

Care work life courses aspects more important for **women's pensions** and **gendered pensions**
-> Important to consider for gender pension gap

West Germany

features	Rank Main	Rank Men	Rank Women
duration.CIV	1	3	1
duration.CW	2	36	2
pattern..CW	3	33	23
spell.CW_age_1	4	40	25
AFtransition..CIVRET	5	5	3
AFtransition..FTRET	6	21	38
duration.FT	7	6	7
AFtransition..CW.PT...PTRET	8	36	33
spell.CIV_age_1	9	14	6
pattern..CIV	10	19	21
AFtransition..CWFT..FTCW	11	36	37
pattern..EDU..CIV	12	4	16
duration.EDU	13	1	11
duration.Ret	14	30	48
pattern..FT..CW	15	38	15
spell.PT_age_1	16	42	30
AFtransition..MNCM1C	17	8	43
pattern...PT	18	41	46
Complexity.Entropy work	19	29	19
AFtransition..EDUFT	20	11	45
Age23_27.End_EDU	21	17	5
duration.SELF	22	2	40
Complexity.Turbul. work	23	32	20
Age58_62.Start_Ret	24	35	17
AFtransition..EDUFT..FTRET	25	15	4
duration.PT	26	34	9
AFtransition..EDUCIV	32	7	28
pattern..FT	39	12	29
pattern..FT..FT	40	9	35
AFtransition..SNCM1C..M1CM2C	45	10	47
duration.S1C	46	43	10
Age63_65.End_CIV	47	25	22

Netherlands

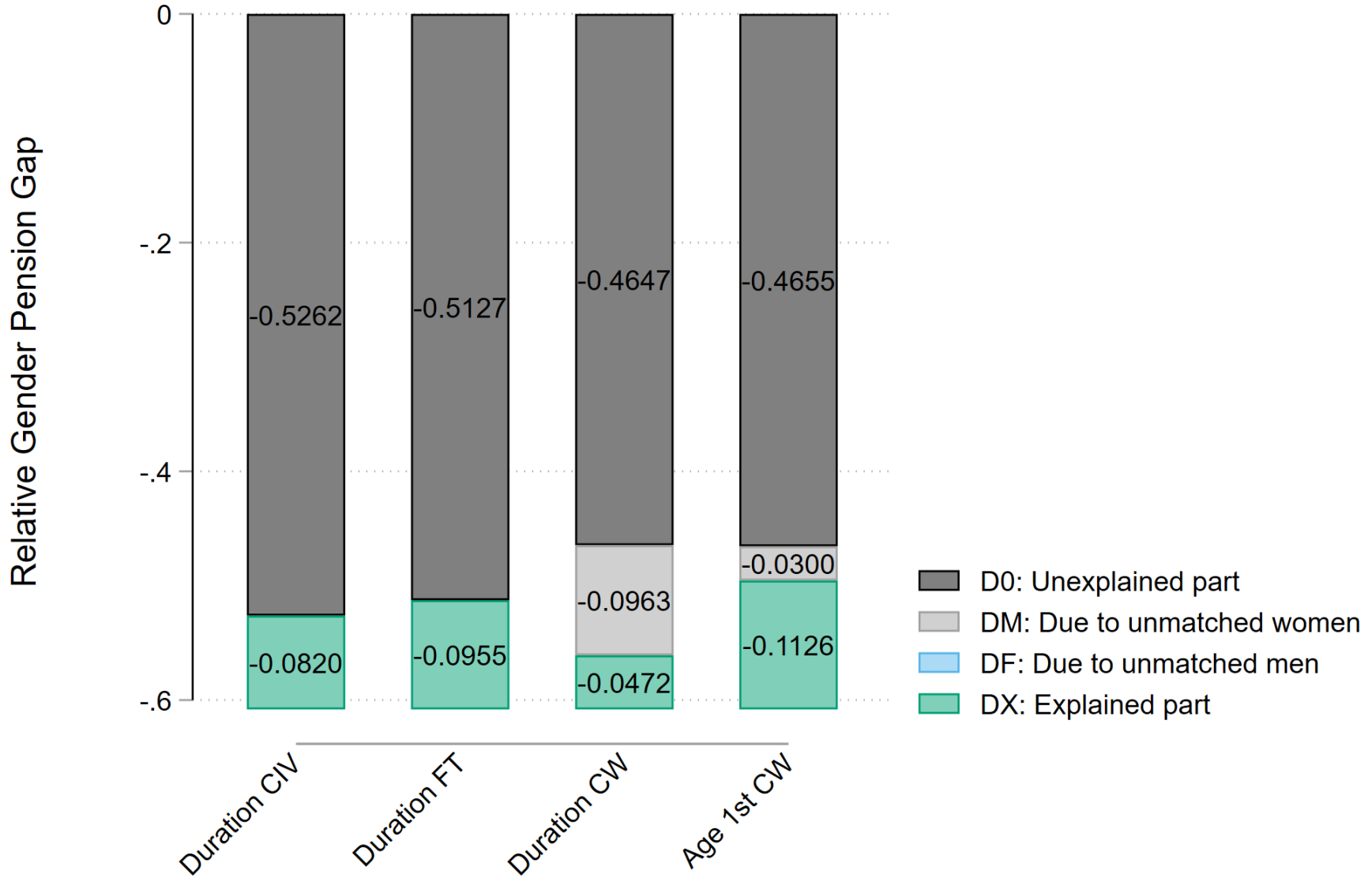
features	Rank Main	Rank Men	Rank Women
duration.CW	1	31	17
duration.EDU	2	1	8
AFtransition..OTHFT	3	30	21
Complexity.Entropy_work	4	14	1
duration.Ret	5	9	15
duration.SELF	6	3	32
pattern..CW..OTH	7	25	22
duration.SNC	8	19	12
spell.EDU_age_1	9	12	2
Age23_27.End_EDU	10	11	5
duration.CIV	11	17	10
spell.CW_age_1	12	27	19
pattern..OTH..FT	13	23	20
pattern..CW	14	32	28
AFtransition..EDUCIV	15	4	11
pattern..UNE..FT	16	26	30
duration.FT	17	16	27
pattern..FT..CW	18	24	18
pattern..EDU	19	13	16
Complexity.C	20	18	6
pattern..EDU..CIV	21	15	7
AFtransition..SELFRET	22	2	25
Age58_62.Start_Ret	23	7	26
pattern..MNC..M1C..M2C..DIV	24	20	4
spell.OTH_age_1	25	22	14
pattern..MNC..M1C..DIV	26	28	13
AFtransition..CIVRET	27	10	29
pattern..MNC..M2C..DIV	28	21	3
duration.MNC	29	6	24
duration.PT	30	29	9
duration.M2C	31	5	23
duration.M1C	32	8	31

BACK

ROBUSTNESS

ÑOPO
WEST
GERMANY–

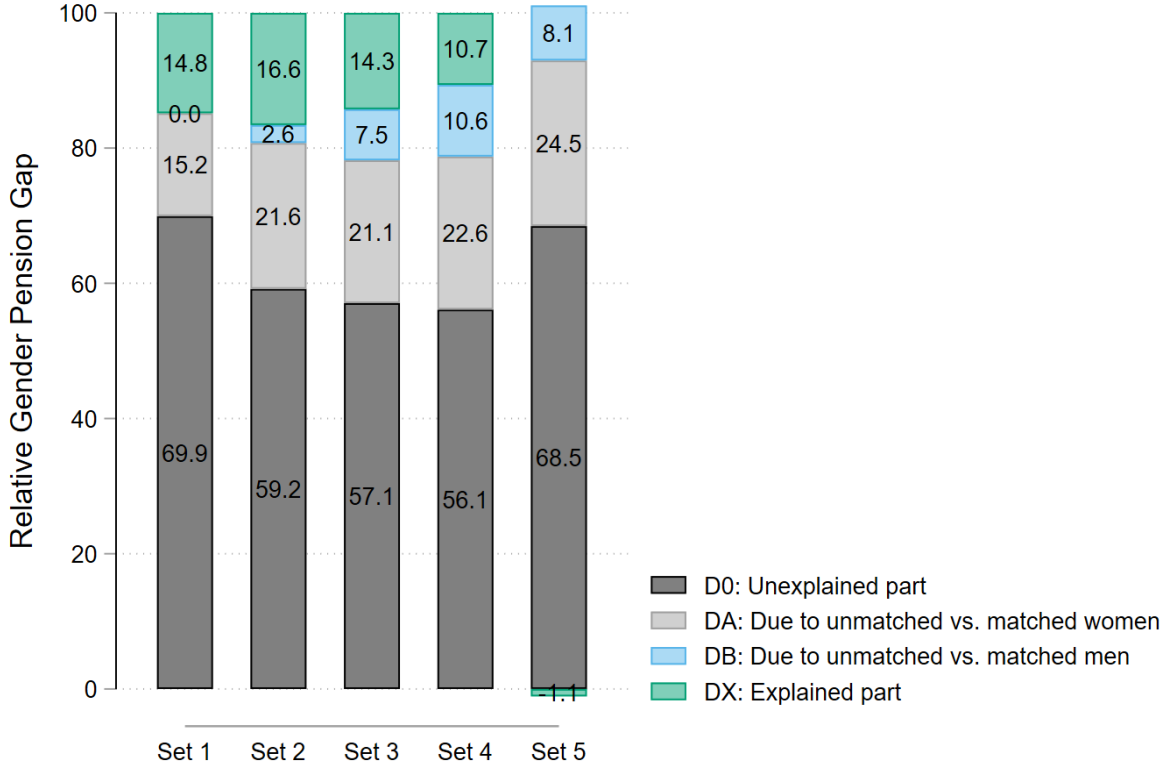
SINGLE
VARIABLES



BACK

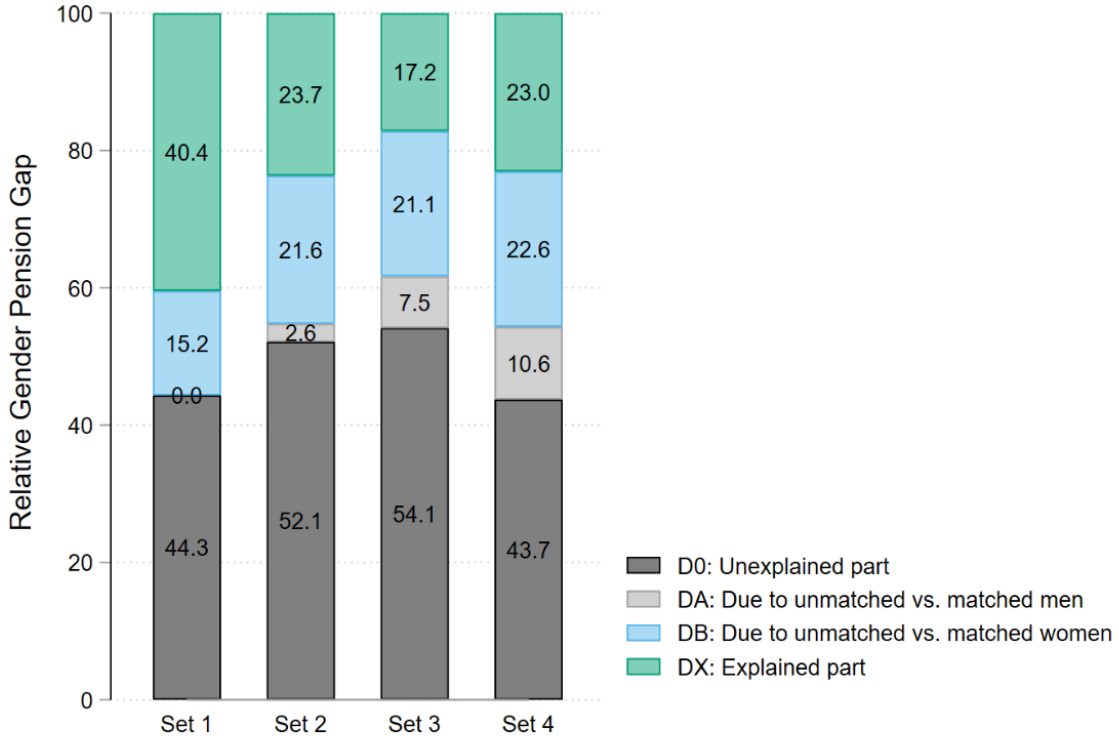
ROBUSTNESS I: REF GROUP WEST GERMANY

Women as group A (main model)



DX = part due to differences in characteristics when <u>the returns of women</u> to these characteristics applied (women as reference in terms *of* returns to characteristics)
D0 = part of the gap due to differences in returns if both, men and women, had the <u>characteristics of men</u> (men reference for characteristics)

Men as group A

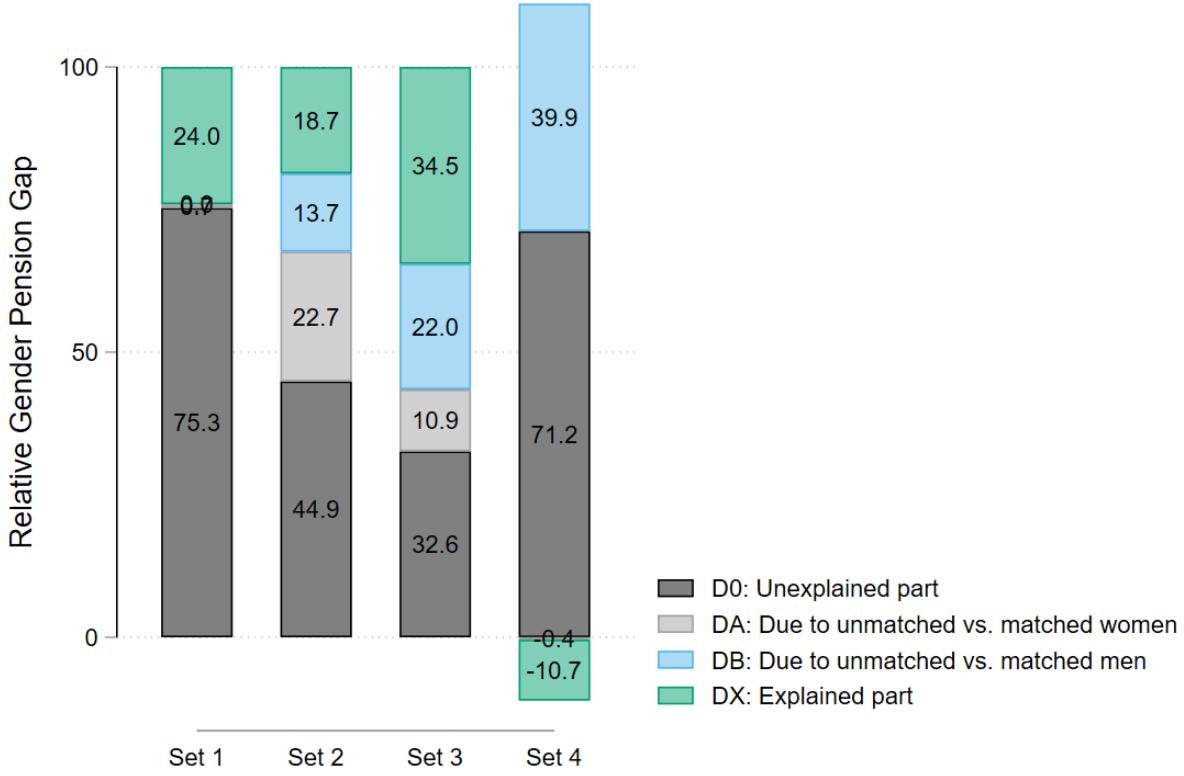


DX = part due to differences in characteristics when <u>the returns of men</u> to these characteristics applied (men as reference in terms *of* returns to characteristics)
D0 = part of the gap due to differences in returns if both, men and women, had the <u>characteristics of women</u> (women reference for characteristics)

BACK

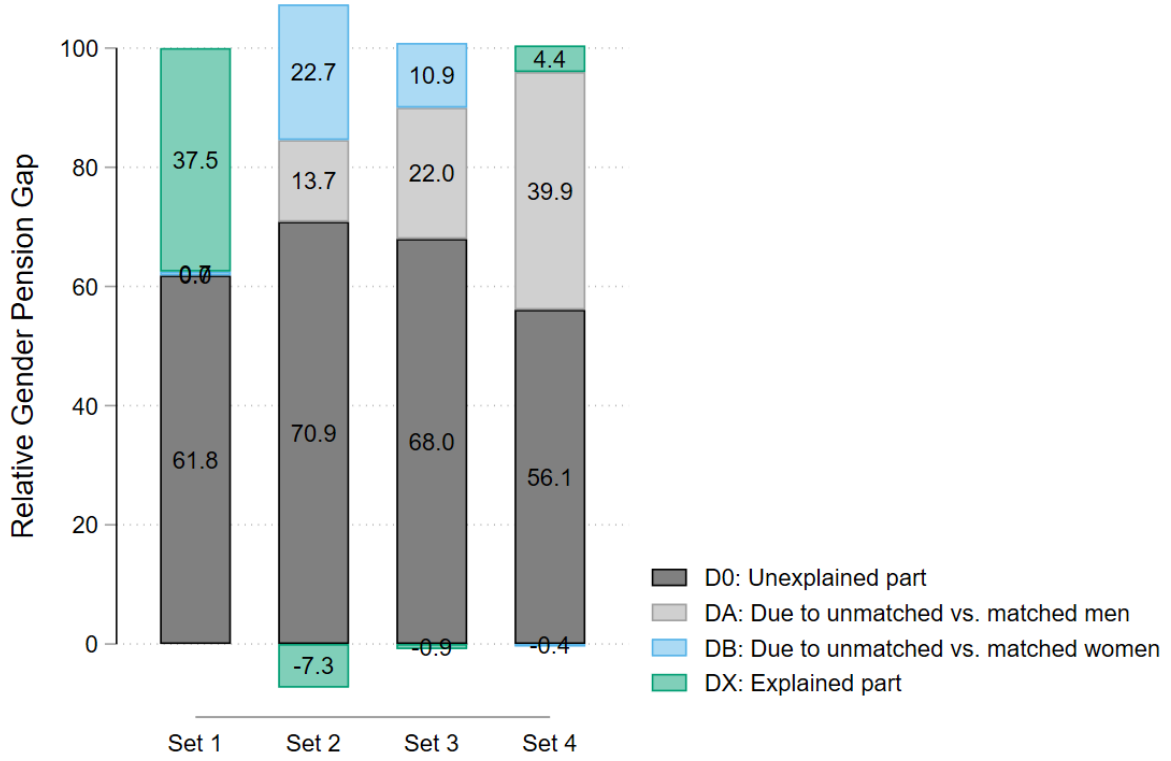
ROBUSTNESS I: REF GROUP NETHERLANDS

Women as group A (main model)



DX = part due to differences in characteristics when <u>the returns of women</u> to these characteristics applied (women as reference in terms *of* returns to characteristics)
D0 = part of the gap due to differences in returns if both, men and women, had the <u>characteristics of men</u> (men reference for characteristics)

Men as group A



DX = part due to differences in characteristics when <u>the returns of men</u> to these characteristics applied (men as reference in terms *of* returns to characteristics)
D0 = part of the gap due to differences in returns if both, men and women, had the <u>characteristics of women</u> (women reference for characteristics)

APPENDIX PART I

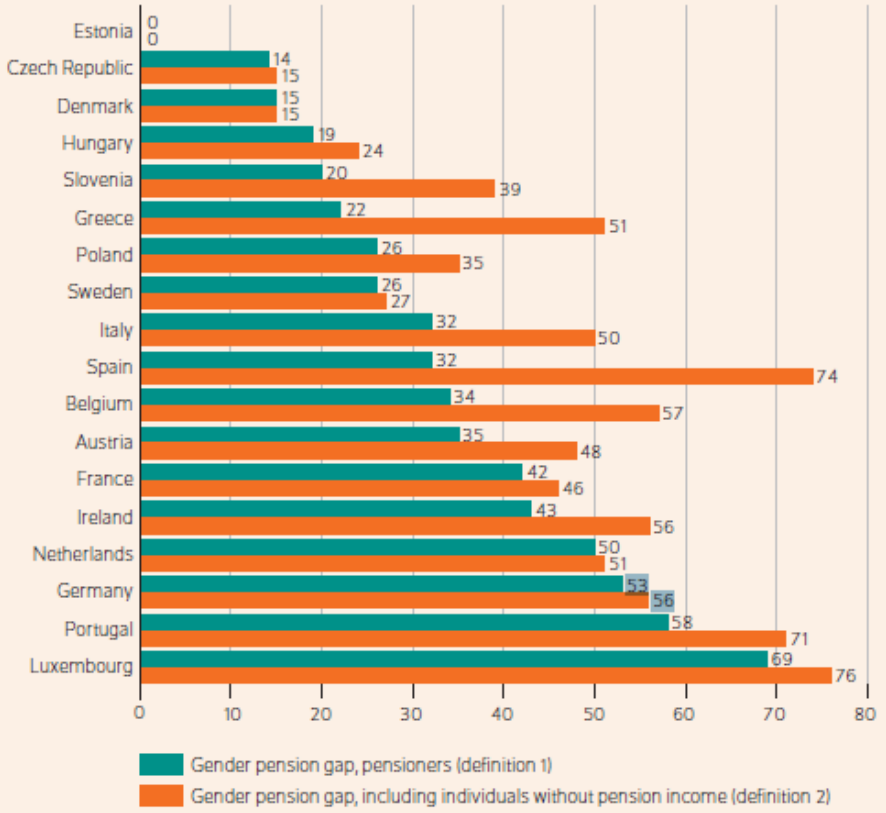
2. DATA – PENSION INCOME

Table A3. Pension types included in the analysis

Public pension	Occupational pension	Private Pension
1. Old age pension 2. Old age supplementary pension or public old age second pension 3. Early retirement or pre-retirement pension 4. Main or secondary disability insurance pension, or sickness benefits	1. Old age pension from the last, a second or a third job 2. Early retirement pension 3. Disability or invalidity insurance *(For wave 6: sum of all occupational pensions)*	1. Average payments of regular life insurance 2. Regular private annuity or private personal pension

The average gender pension gap[1] in several European countries

Individuals aged 65 and over, in percent



1 Weighted (cross sectional weights), controlled for age, and adjusted for purchasing power. Pension income includes all three pillars of old age provision, excluding survivor's pension.

Sources: SHARE wave 5, wave 4 (Hungary, Poland, Portugal), wave 2 (Ireland, Greece), authors' own calculations.

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BACK

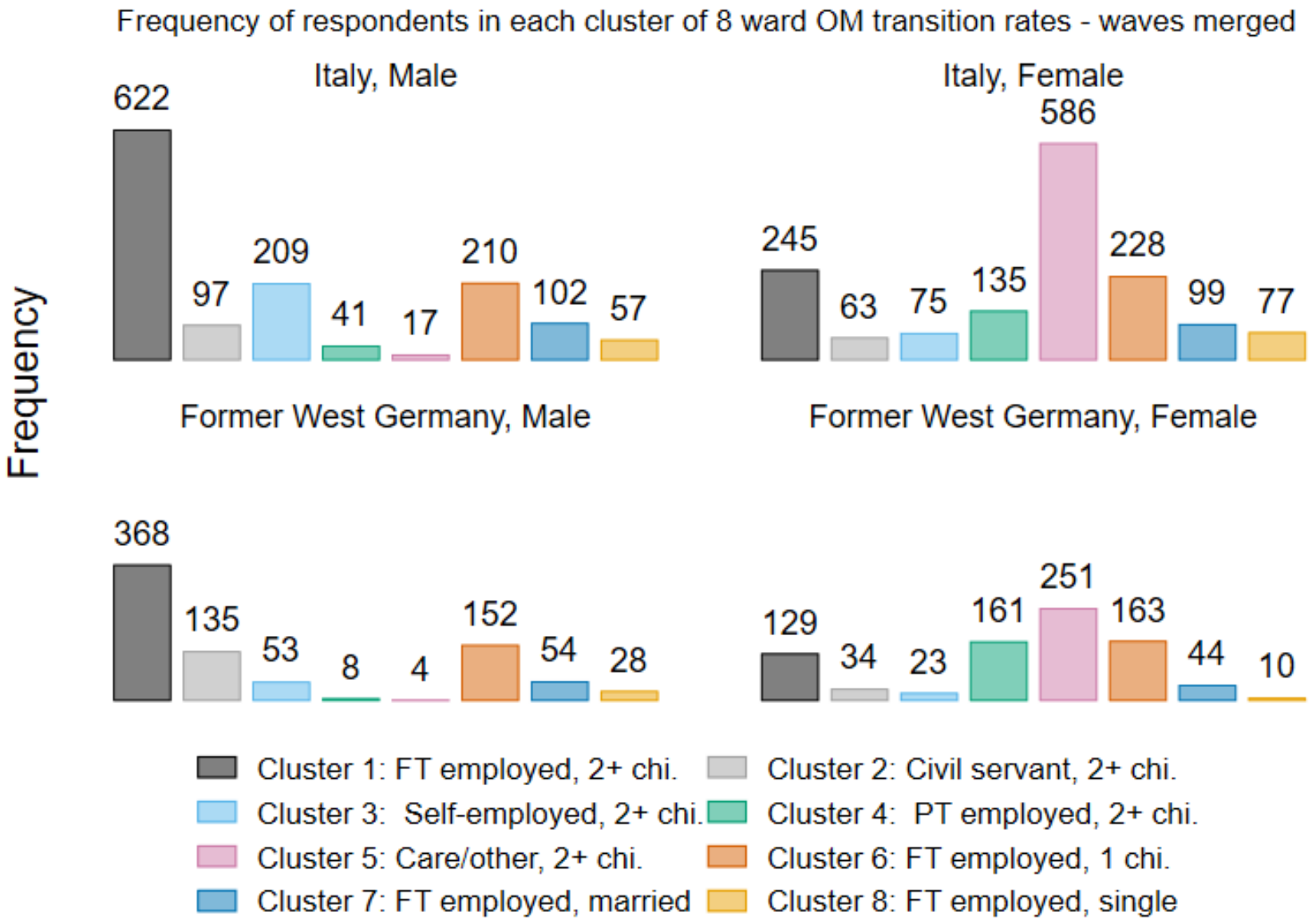
SAMPLE

Table S3. Overview of sample selection and dropouts.

		Men	Women	Total
Base sample merged waves	Italy	2141	2308	4449
	West Germany	1475	1475	2950
Nonresponse pension	Italy	1966	2169	4135
	West Germany	1274	1302	2576
Employment	Italy	1845	2083	3928
	West Germany	1182	1241	2423
Missing pension income	Italy	1844	2080	3924
	West Germany	1182	1241	2423
Final sample incl. retro data	Italy	1357	1509	2866
	West Germany	804	815	1619

Notes: Own calculation based on the analysis sample and SHARE waves 2–6, v7.1.0. Not weighted.

BACK


Frequency of respondents in each cluster of 8 ward OM transition rates - waves merged
Italy, Male
Italy, Female
Former West Germany, Male
Former West Germany, Female
Frequency
622
97
209
41
17
210
102
57
245
63
75
135
586
228
99
77
368
135
53
8
4
152
54
28
129
34
23
161
251
163
44
10
Cluster 1: FT employed, 2+ chi.
Cluster 2: Civil servant, 2+ chi.
Cluster 3: Self-employed, 2+ chi.
Cluster 4: PT employed, 2+ chi.
Cluster 5: Care/other, 2+ chi.
Cluster 6: FT employed, 1 chi.
Cluster 7: FT employed, married
Cluster 8: FT employed, single

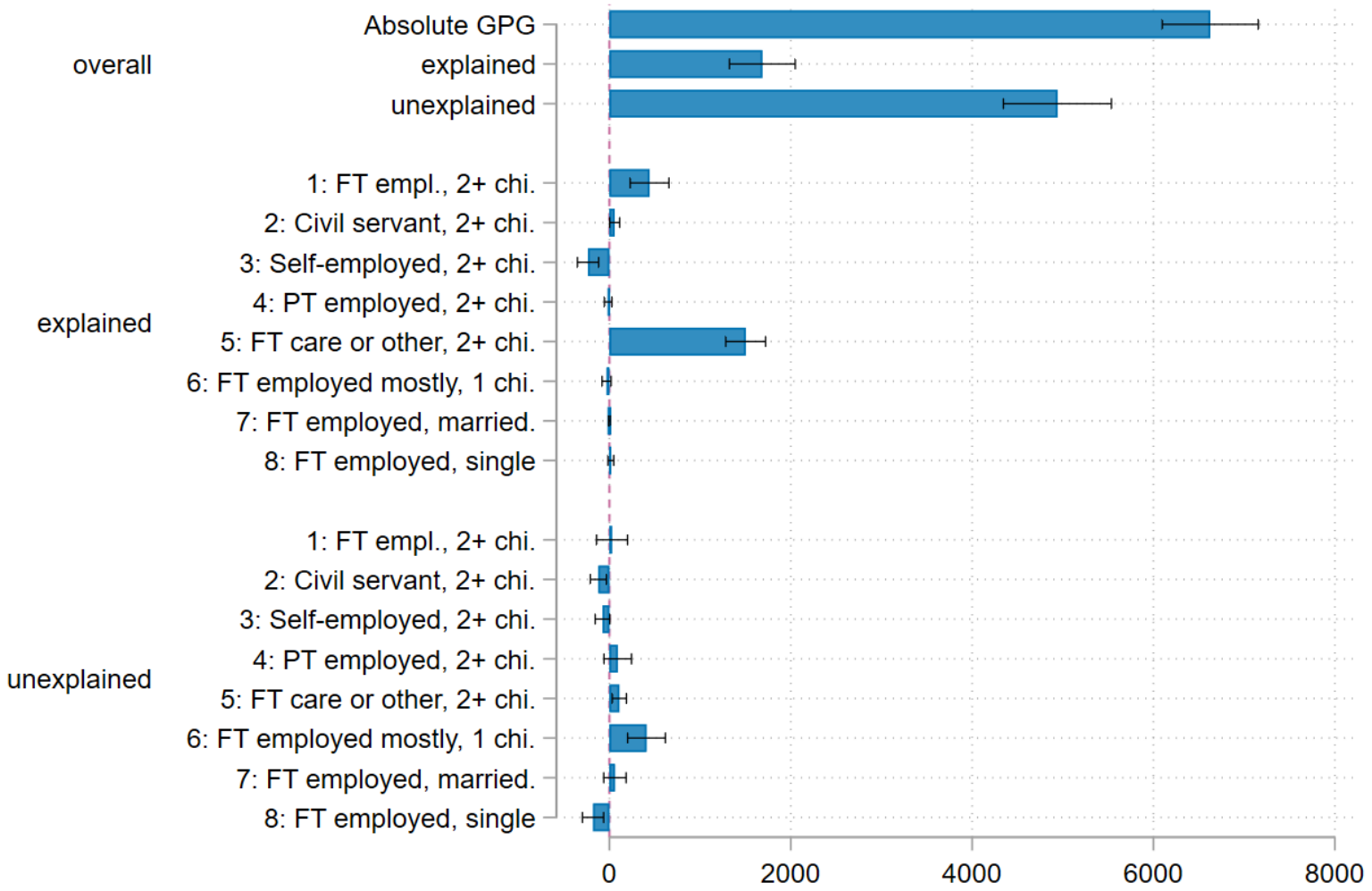
BACK

4. KOB DECOMPOSITION – RESULTS

	Italy				West Germany			
		shares		*shares*		*shares*		*shares*
Men	12,607**				21,051**			
	(57.81)				(53.72)			
Women	5,981**				8,029**			
	(37.50)				(28.52)			
Abs GPG	6,627**				13,021**			
	(24.53)				(26.99)			
	explained		**unexplained**		**explained**		**unexplained**	
Sum life courses	1737.551	*26.22%*	321.76	*4.86%*	3197.37	*24.56%*	511.083	*3.93%*
1 FT employed, 2+ chi.	442.7**	*6.68%*	29.11	*0.44%*	97.02	*0.75%*	34.05	*0.26%*
	(4.056)		(0.334)		(0.517)		(0.222)	
2 Civil servant, 2+ chi.	57.52*	*0.87%*	-121.8**	*-1.84%*	1,401**	*10.76%*	7.713	*0.06%*
	(2.032)		(-2.707)		(6.754)		(0.127)	
3 Self-employed, 2+ chi.	-236.1**	*-3.56%*	-76.12+	*-1.15%*	-201.5**	*-1.55%*	-34.58	*-0.27%*
	(-3.958)		(-1.846)		(-2.675)		(-0.649)	
4 PT employed, 2+ chi.	-13.69	*-0.21%*	91.79	*1.39%*	345.9**	*2.66%*	76.93	*0.59%*
	(-0.649)		(1.187)		(3.529)		(0.904)	
5 FT care and other, 2+ chi.	1,503**	*22.68%*	109.5**	*1.65%*	1,698**	*13.04%*	95.53+	*0.73%*
	(13.40)		(2.759)		(8.894)		(1.783)	
6 FT emp. or care, 1 child	-31.46	*-0.47%*	409.3**	*6.18%*	-26.74	*-0.21%*	522.8*	*4.02%*
	(-1.237)		(3.853)		(-0.879)		(2.360)	
7 FT employed, married	-0.169	*0.00%*	60.88	*0.92%*	-0.810	*-0.01%*	-129.4	*-0.99%*
	(-0.0359)		(0.968)		(-0.0730)		(-1.415)	
8 FT employed, single	15.75	*0.24%*	-180.9**	*-2.73%*	-115.5*	*-0.89%*	-61.96+	*-0.48%*
	(0.975)		(-3.028)		(-2.120)		(-1.659)	

Back

4. KOB DECOMPOSITION – ITALY



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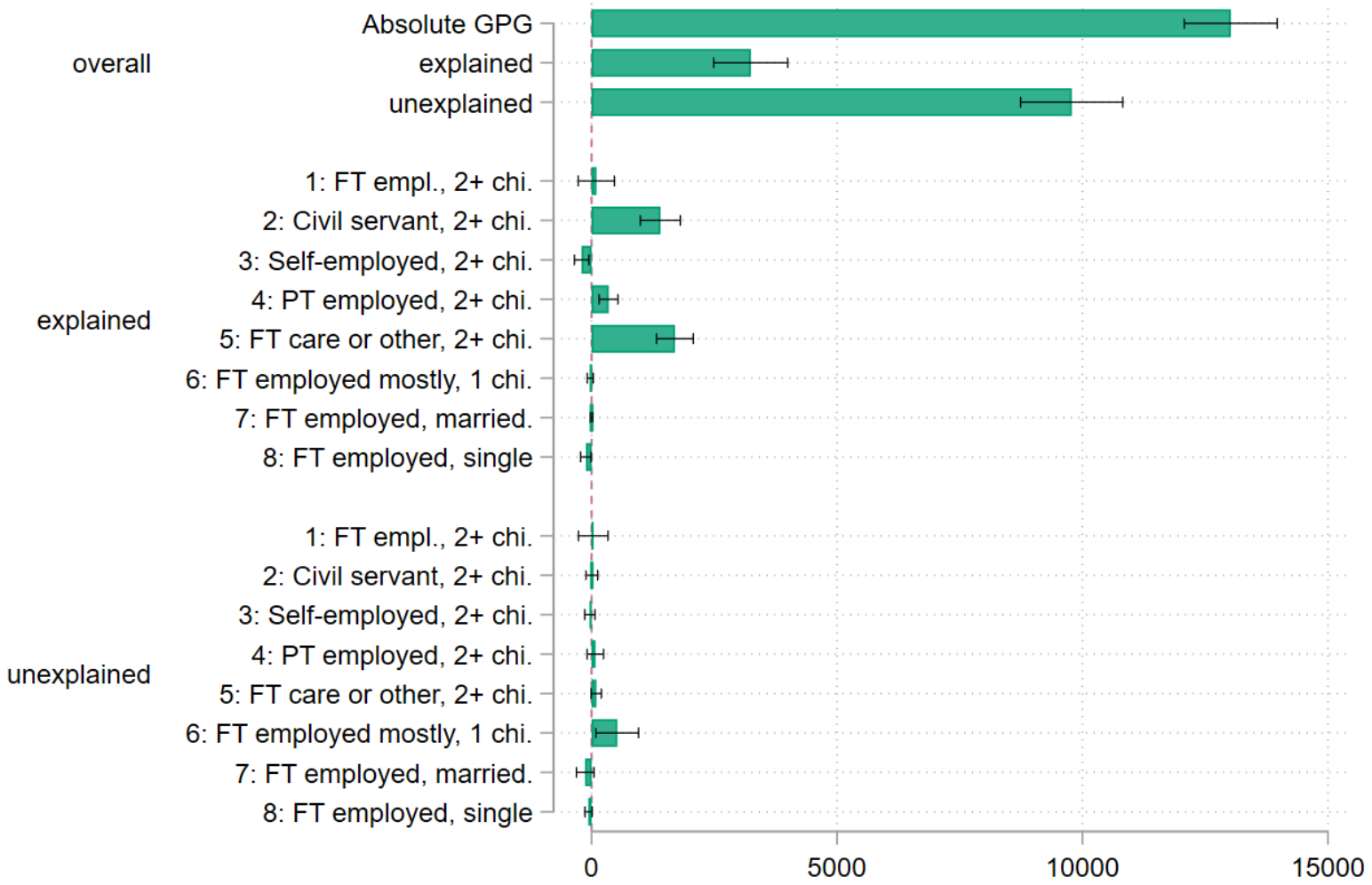
4. KOB DECOMPOSITION – WEST GERMANY



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4. KOB DECOMPOSITION – RESULTS: – BASELINE COEFFICIENTS

	IT		WG	
	Men	**Women**	**Men**	**Wom**
1 FT employed, 2+ children	1671.7	1492.5	358.5	143.
2 Civil servant, 2+ children	2745.3	5661.5	12142.2	1195
3 Self-employed, 2+ children	-2506.5	-976.0	-5698.2	-447
4 PT employed, 2+ children	-963.5	-1912.9	-1021.7	-242
5 FT care and other, 2+ children	-1011.2	-4237.3	-1689.1	-594
6 FT employed or care, 1 child	1786.3	-920.5	1105.6	-150
7 Ft employed, married, no children	28.76	-898.6	-96.93	2300
8 Ft employed, single	-1750.8	1791.4	-5100.3	-50.6

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