Work in a man's shoes: Determinants of Female Mismatch in the UK

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Motivation

- Active role of women:
  - Participate more in HE and the Labour Market (LM)

    ▸ HE ▸ LM
- But, *where* are they employed?
  - Typically in lower-skilled occupations ⇒ LM does *not* utilise fully their skills

    ▸ Employment
  - More likely to be mismatched;
    - Margin case: If a woman is in the margin of working in a higher-skilled or a lower-skilled occupation, her probability of human capital mismatch increases.
    - if not, they work in a high-skilled occupation.
- Result:
  - genuine greater potential of female mismatch
  - mismatched women hold more skills than their male counterparts

Contributions

Questions:

1. How many women in lower-skilled occupations have similar skills to those (of men) in higher-skilled ones?
2. Why? What drives their mismatch?
3. Can a more detailed definition of HC explain further the mismatch?

Literature: Educational & skills mismatch in the Labour Market

▸ Literature

Data: BHPS & UKHLS (Understanding Society)

Methodology: Multi-component measure of HC mismatch

Preview of Results

1. Mixed effects of single motherhood on the probability of mismatch
2. Number of children: probability increases with the number of children
3. In the public sector, women are more likely to be mismatched
4. Stronger effect of female flexibility when they are in the male LM; smaller, otherwise
5. New entrants: higher likelihood of mismatch initially

6. A richer definition of HC does *not* generate important differences in the incidence of the mismatch

Outline

1. Methodology
   - Identification Strategy
   - Data
2. Results
3. Conclusions

ID Strategy

- How many women in low-skilled occupations hold similar human capital to those in middle-skilled ones?
- Wage Equation:

$$\ln[\text{wage}]_{i,t} = \alpha + \boldsymbol{\beta}_1 \boldsymbol{x}_i + \sum_{k=2}^{7} \beta_k S_{k,i,t} + \vartheta_t + u_{i,t}$$

▸ Wage Distribution

- Selection equation:

$$\text{employed}_{i,t} = \alpha + \boldsymbol{\delta}_1 \boldsymbol{z}_{i,t} + \delta_2 FS_{i,t} + \delta_3 \text{ region}_{i,t} + \delta_4 \text{HHmembers}_{i,t} + \vartheta_t + v_{i,t}$$

▸ Illustration ▸ Incidence

3 cases - indices

I. Restricted (female) subsample

▸ Illustration (I)

Women in low-skilled occupation relative to women in middle-skilled one

$$\text{mismatched}_i \Big| (\text{sex=female})_I = \widehat{\text{HC}}_{\text{female}} \Big| occ_j > p(50) \Big| occ_{j-1}$$

II. Counterfactual female:

▸ Illustration (II)

Women in low-skilled occupation relative to *men* in middle-skilled one

$$\text{mismatched}_i \Big| (\text{sex=female})_{II} = \widehat{\text{HC}}_{\text{men}} \Big| occ_j > p(50)_{\text{men}} \Big| occ_{j-1}$$

III. Relative to overall:

▸ Illustration (III)

Women in low-skilled occupation relative to *median employee* in middle-skilled one

$$\text{mismatched}_i \Big| (\text{sex=female})_{III} = \widehat{\text{HC}}_{\text{overall}} \Big| occ_j > p(50)_{\text{overall}} \Big| occ_{j-1}$$

Why 3 indices?

The importance of the comparative group

- If you have a group that is more mismatched, estimating its probability of the mismatch depends on the comparative group.
- For example, if all women are mismatched, we could get zero estimates of mismatch using the female wage equation and the female job allocation.

Probability of HC Mismatch

$$\Pr\left(\text{mismatched}_i \middle| (\text{sex=female})_{\text{index}} = 1\right) = f(x_{i,t}, \text{family}_{i,t})$$
$$, \forall \text{ index} = \{I, II, III\}$$

x: entrance in LM, (regional) UR

family: lone parenthood HH, number of children

Selection Equation

$$\text{employed}_{i,t} = \alpha + \boldsymbol{\delta}_1 \boldsymbol{z}_{i,t} + \delta_2 FS_{i,t} + \delta_3 \text{ region}_{i,t} + \delta_4 \text{HHmembers}_{i,t} + \vartheta_t + v_{i,t}$$

Data

Unbalanced Panel:

1. British Household Panel Survey (BHPS)
   - waves 1-18;
   - 1991-2009
2. UK Household Longitudinal Study (Understanding Society)
   - waves 2-7;
   - 2010-2016

Contribution: No study employs both of these datasets to explore the mismatch effect dynamically

Sample:

- Employees; $23 \leq$ age ≤ 59; 65,346 women
- Exclude: self-employed; farmers; army sector; income outliers on top and bottom 1% of distribution

▸ Descriptive Stats (I) ▸ Descriptive Stats (II)

Determinants of female mismatch (I)

Individual and HH determinants

	Relative to overall		Counterfactual Female	Restricted sample
	Probit	HP	HP	HP
single parent HH	-0.011**	0.0069**	-0.036	0.0172***
	(0.0046)	(0.0032)	(0.0273)	(0.0045)
Number of children				
1	-0.0022	-0.0044***	-0.0016	-0.0114***
	(0.0028)	(0.0015)	(0.0054)	(0.0027)
2	0.0055*	-0.0032**	0.0007	-0.0198***
	(0.003)	(0.0016)	(0.0054)	(0.0027)
3	0.015***	0.0066**	0.0153*	-0.0023
	(0.0058)	(0.0035)	(0.0086)	(0.0051)
4	-0.0342***	-0.0212***	0.0223	-0.0392***
	(0.0092)	(0.0053)	(0.0179)	(0.0109)

(Conditional) Marginal effects; Robust standard errors in parentheses; clustered at household level.

Note: HP stands for Heckman-Probit. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Determinants of female mismatch (II)

Recent entrance in LM

	Relative to overall		Counterfactual Female	Restricted sample
	Probit	HP	HP	HP
single parent HH	-0.0111**	0.00669**	-0.0369	0.0169***
	(0.00466)	(0.00322)	(0.0273)	(0.00444)
Number of children				
1	-0.00339	-0.00483***	-0.00135	-0.0125***
	(0.00278)	(0.00150)	(0.00540)	(0.00270)
2	0.00379	-0.00411**	0.000806	-0.0213***
	(0.00301)	(0.00161)	(0.00542)	(0.00265)
3	0.0118**	0.00462	0.0151*	-0.00516
	(0.00565)	(0.00337)	(0.00863)	(0.00509)
4	-0.0365***	-0.0218***	0.0224	-0.0424***
	(0.00881)	(0.00522)	(0.0179)	(0.0105)
Entered LM?	0.0211***	0.0118***	0.0449***	0.0226***
	(0.00384)	(0.00185)	(0.00955)	(0.00374)

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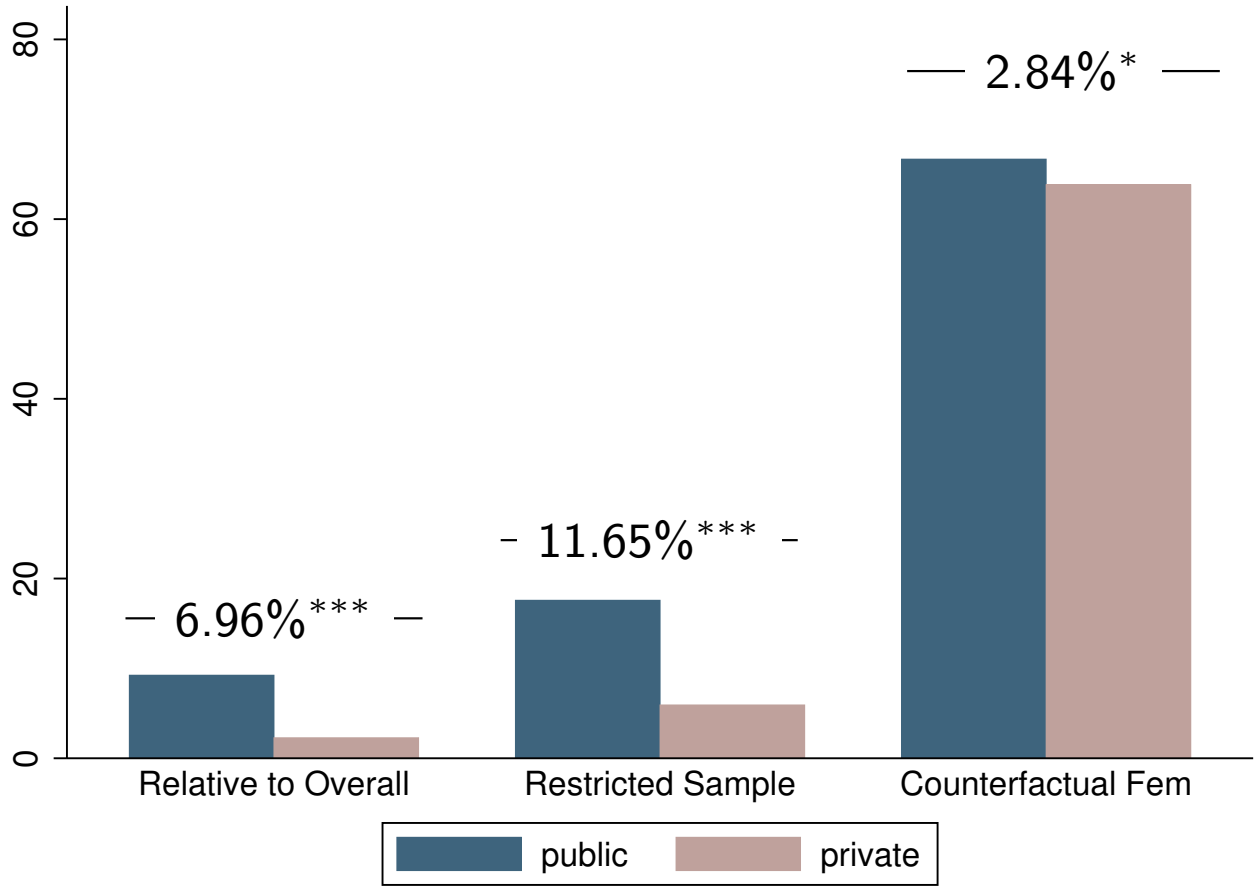
Public vs. Private Sector

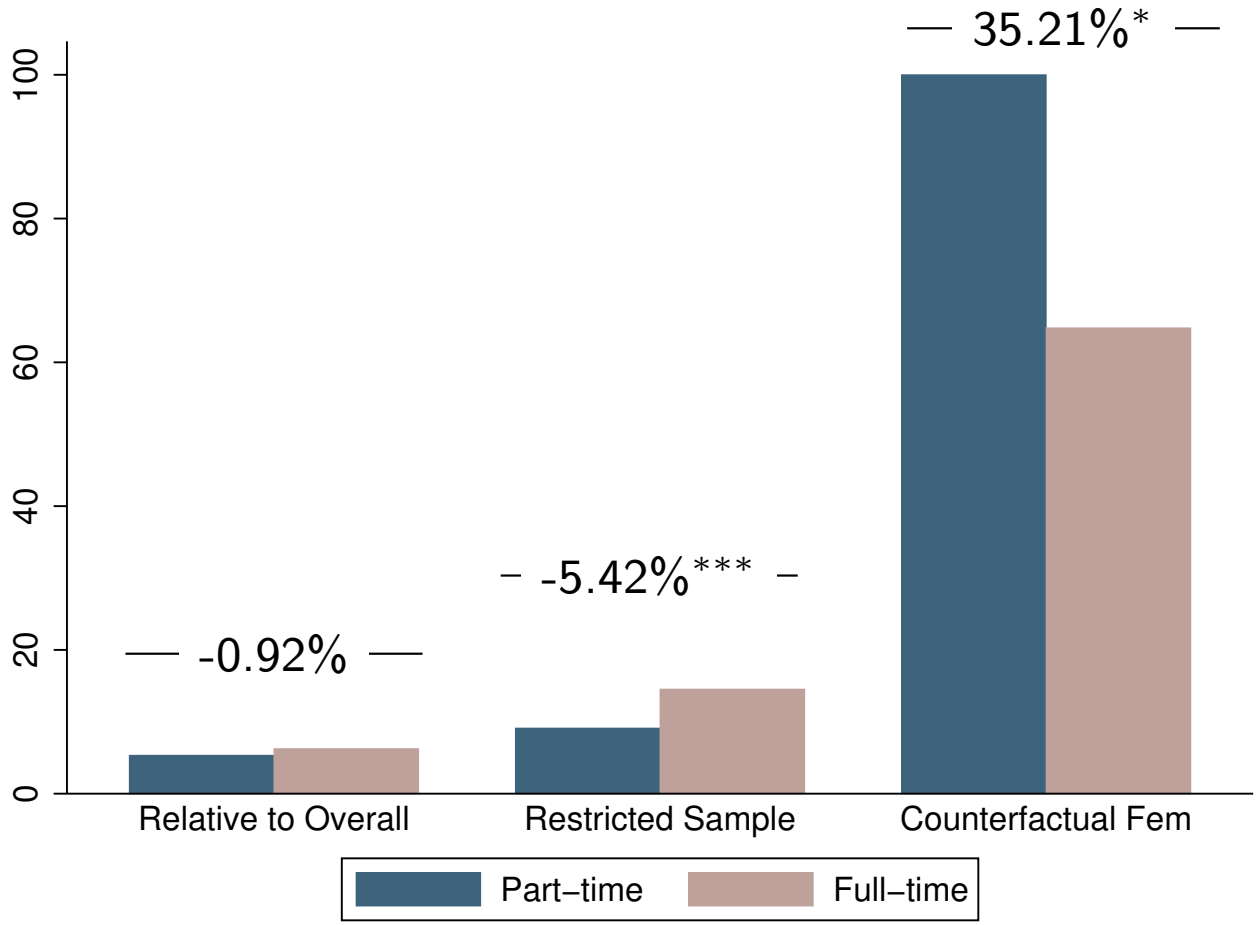
Example: Single mothers with at least 2 children in mismatch (in percentages)



$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Part-time vs. Full-time employement

Example: Single mothers with at least 2 children in mismatch (in percentages)



$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Weaknesses

1. Individual heterogeneous background affects distribution of skills
   - BCS70: cognitive and non-cognitive skills ▸ BCS70
2. Identification of mismatch may be biased
   - Structural model built up on Albrecht & Vroman (2002)

Conclusions

1. Lone-motherhood: mixed effects
2. Number of children: probability increases with the number of children
3. Public sector: women are more likely to be mismatched
   - high concentration in administrative/clerical support and limited presence in high-skilled occupations
4. Flexibility: Stronger effect when assigned to the male LM; smaller, otherwise
5. Higher probability of initial mismatch in the market - not necessarily an issue
   - Structure of each market; potential matching frictions
6. A more detailed definition of HC does *not* generate important differences in the incidence of the mismatch

Thank you!

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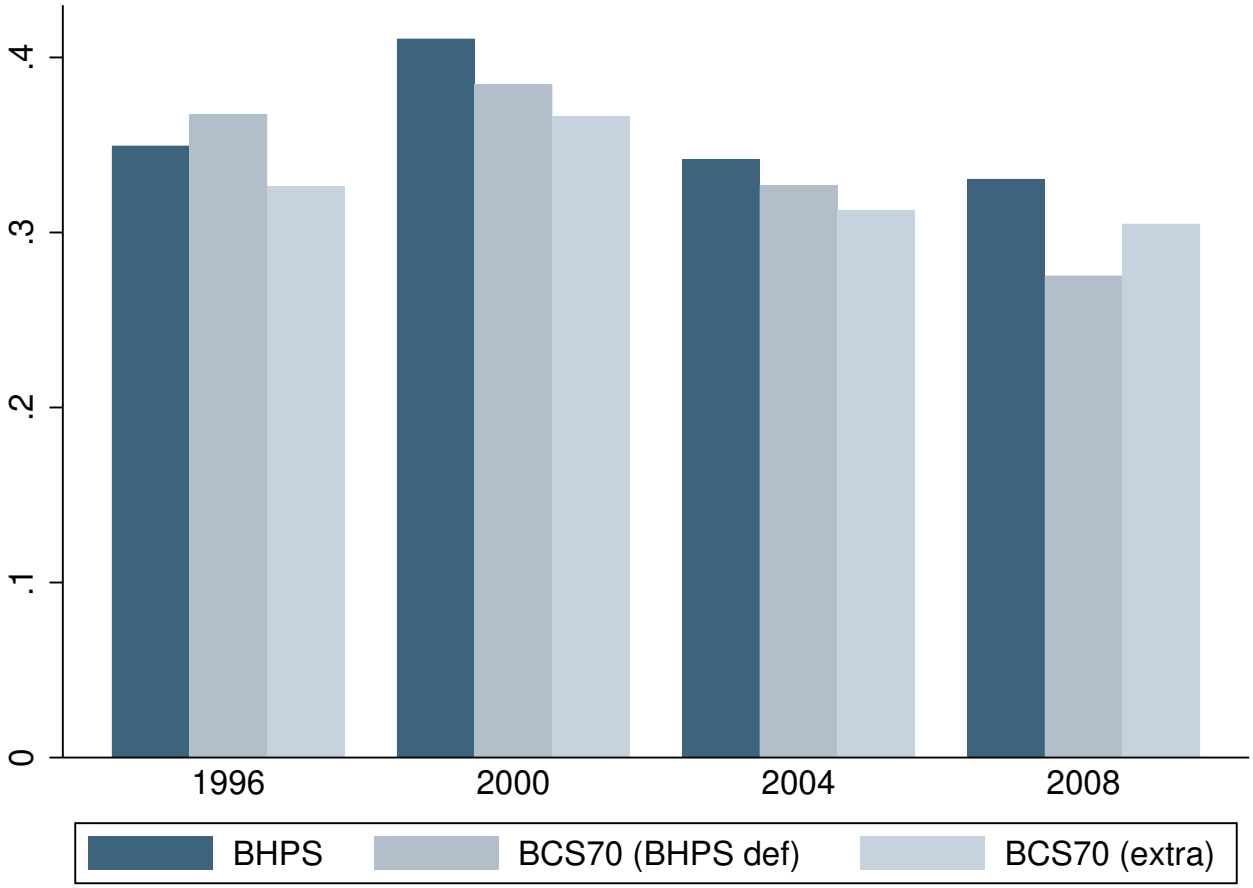
BCS70
A richer definition of Human Capital

Human Capital: (Non-)Cognitive skills

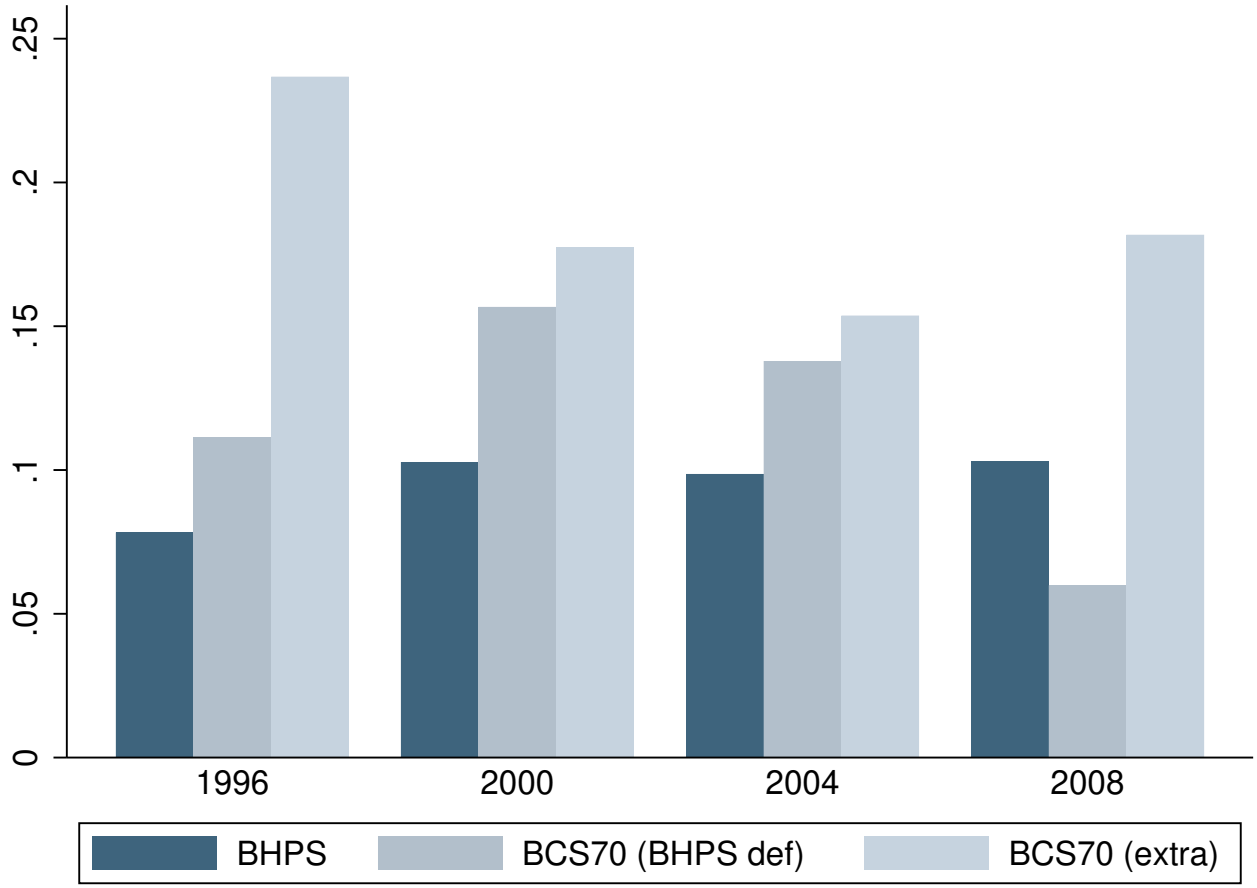
▸ Cognitive ▸ Non-cognitive

Incidence (I): Relative to overall



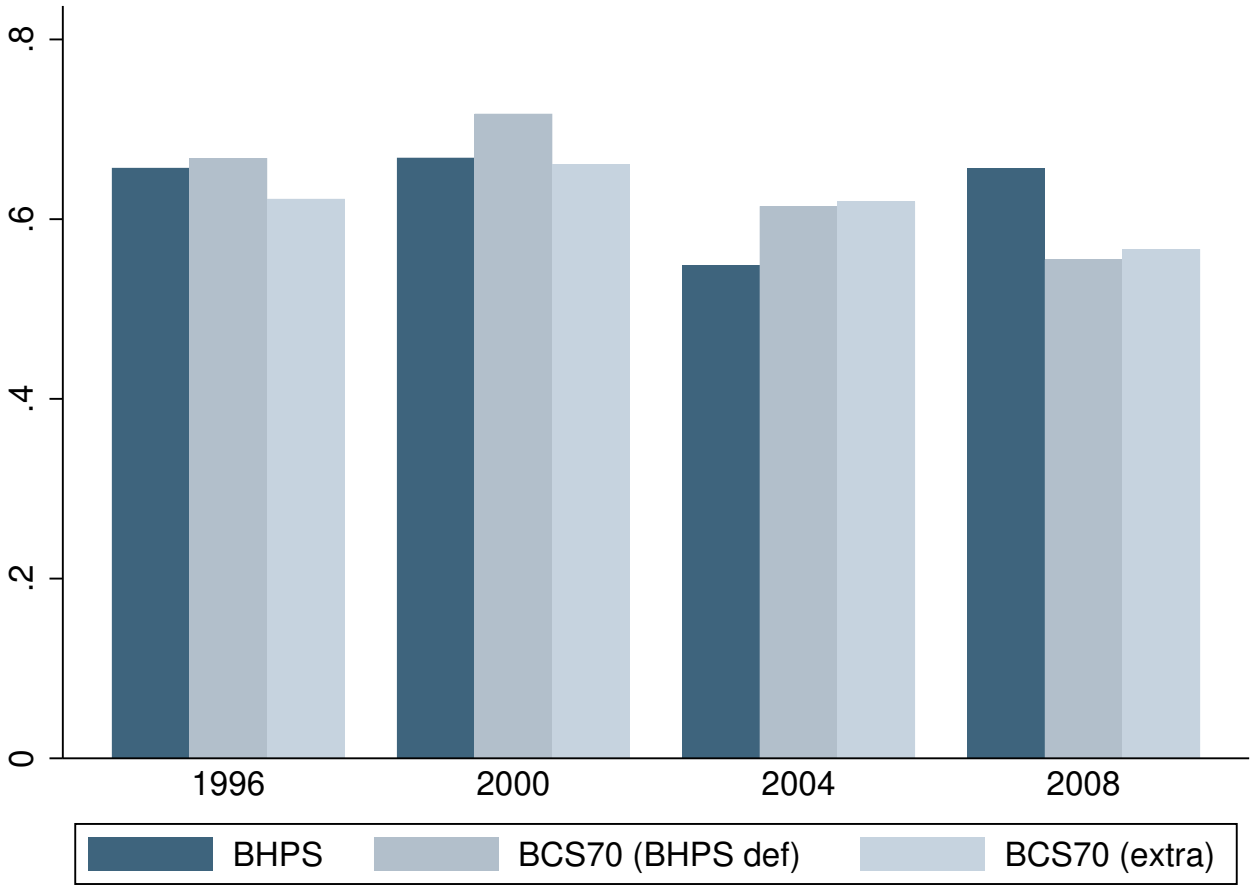
Human Capital: (Non-)Cognitive skills

Incidence (II): Restricted sample



Human Capital: (Non-)Cognitive skills

Incidence (III): Counterfactual Female



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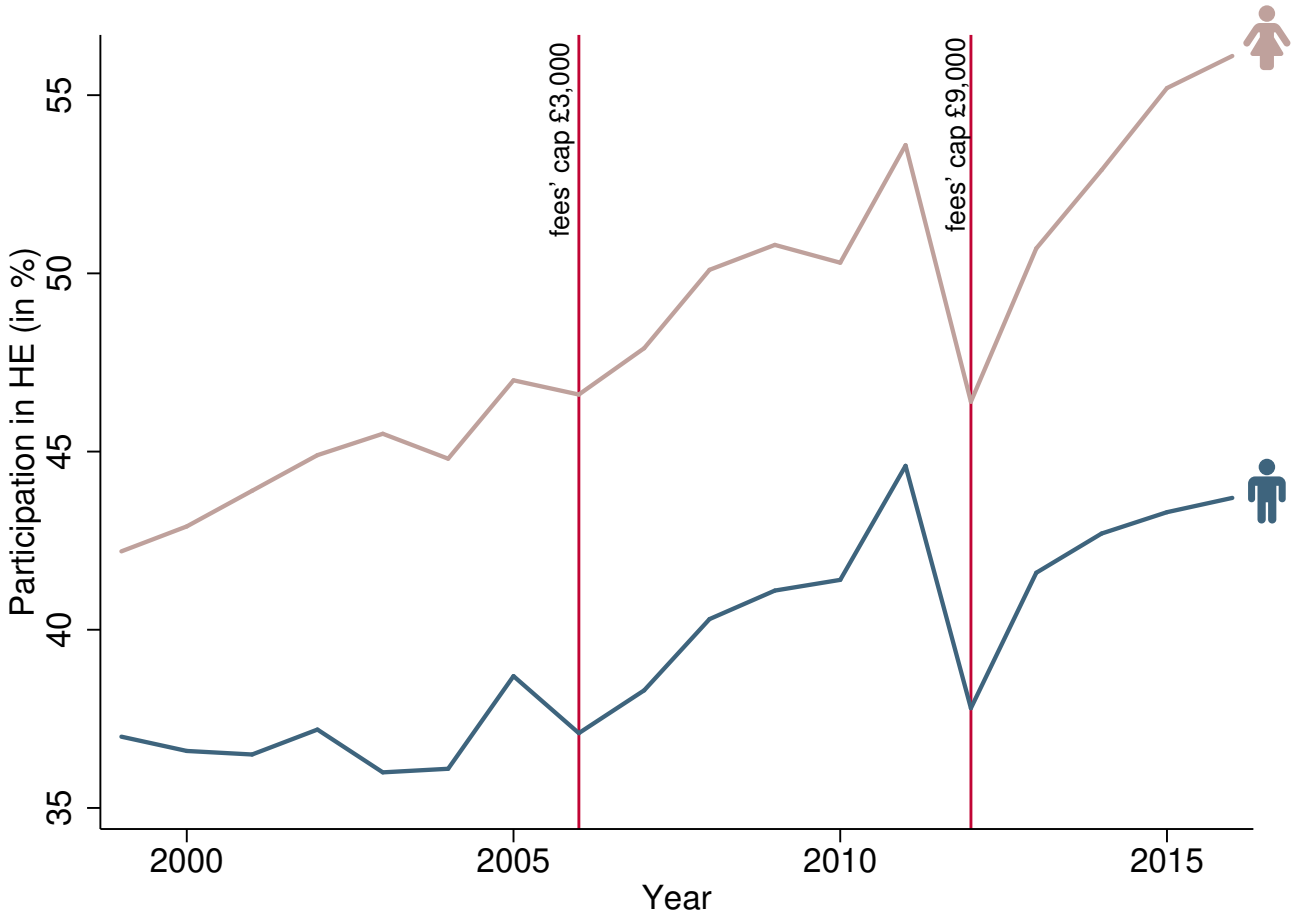
Expansion of Higher Education



Source: DfE and HESA

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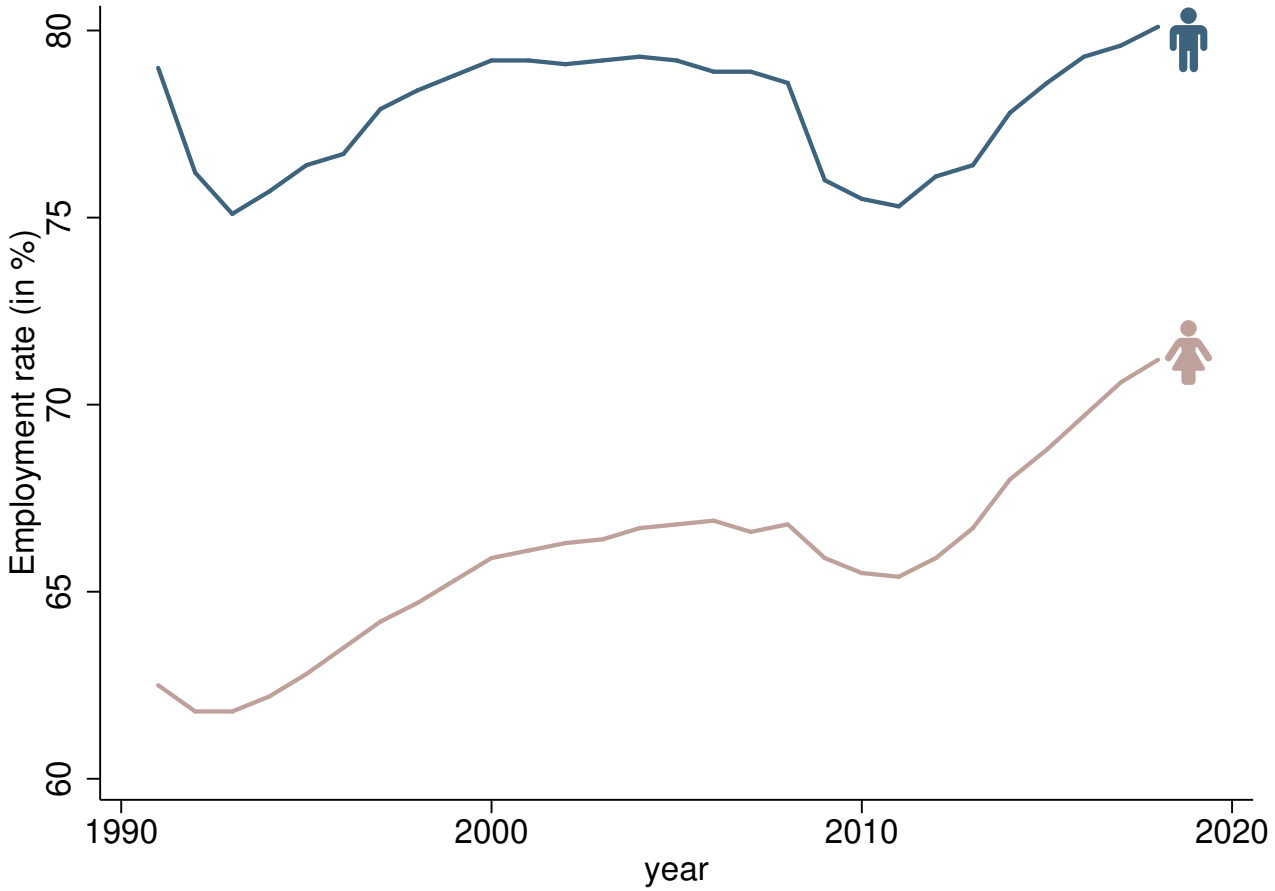
Participation in Labour Market (1991-2016)



Source: ONS UK Labour Market bulletin

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Employment by occupation: all employees (1991-2016)

▸ Back ▸ by children

▸ Timeline (Animated)

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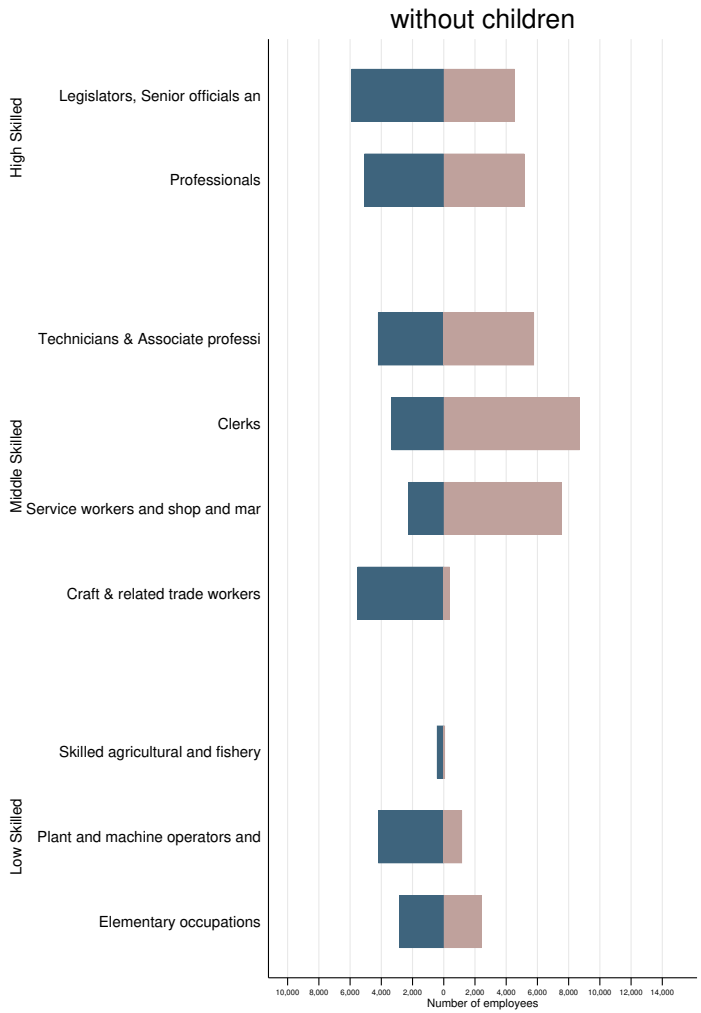
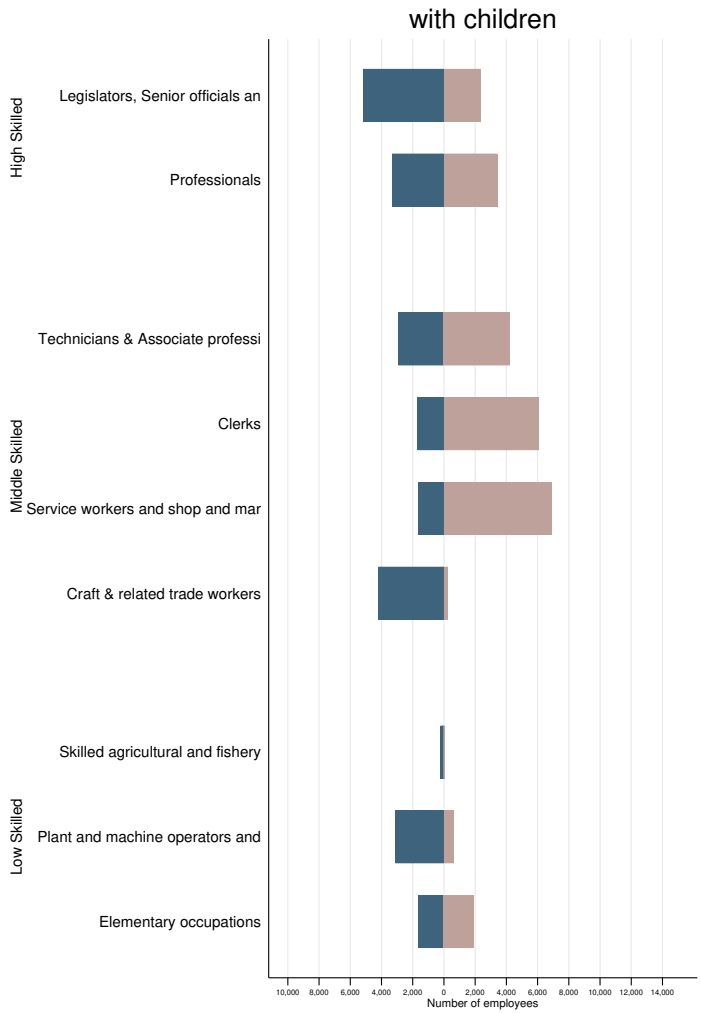
Employment by Occupation: all employees by children





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Source: Own elaboration; based on BHPS & UKHLS

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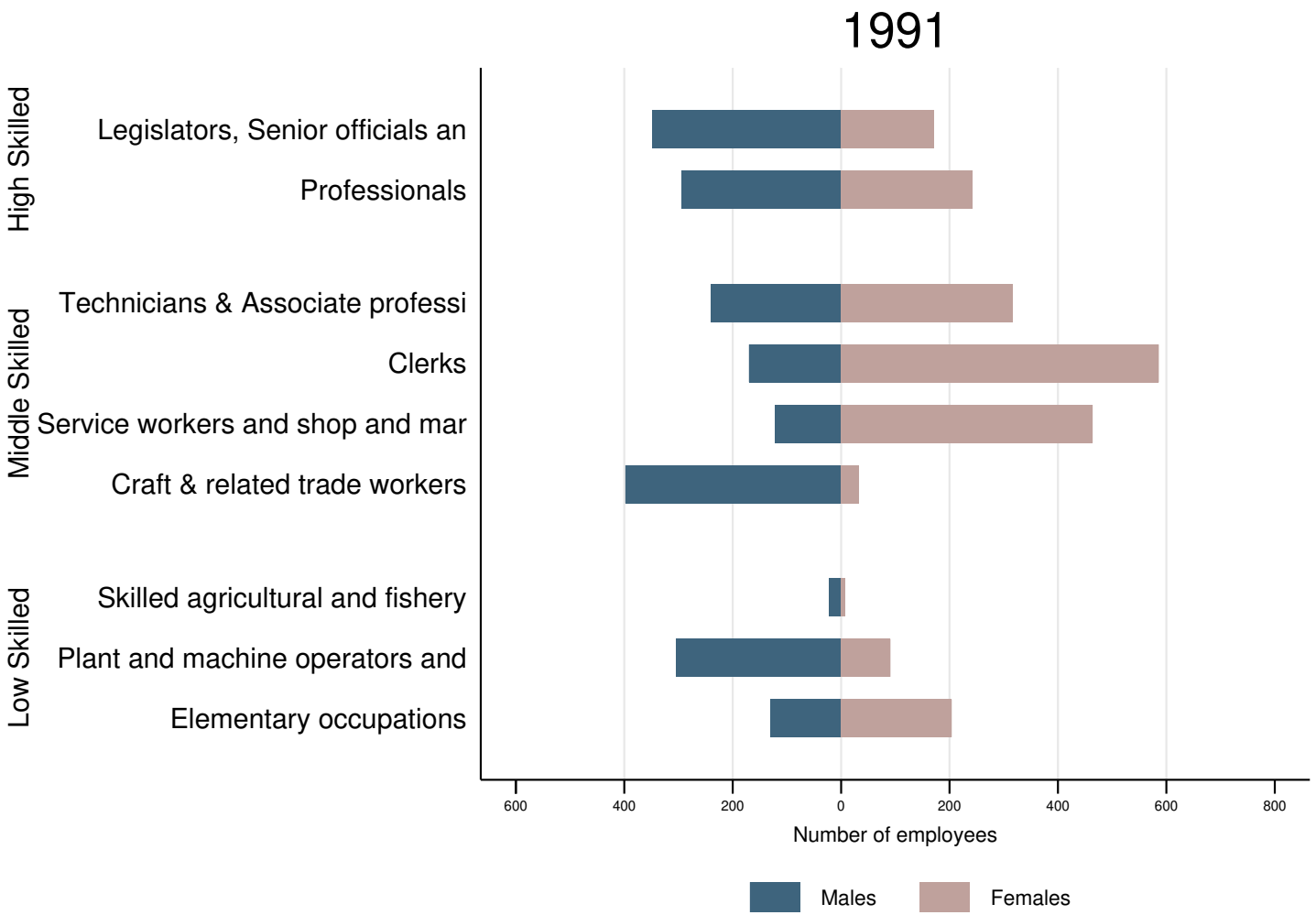
Animated Employment Pyramid



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Women in British labour market: At a glance

Lone motherhood: Career discontinuities contribute to lower levels of specialisation: gendering of occupations

Occupational segregation: Choice of occupations which empower the female role

Flexibility: PT employment increases with (a) the number of children or (b) the lower position a woman has in the occupation distribution.

Sector:
- more women concentrated in public sector
- higher-quality jobs attract highly-educated women
- the private-public pay gap is narrower the higher one stands in the wage distribution

Overeducation:
- traditional measures do not agree on the gender allocation of the mismatch

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Descriptive Statistics (I)

Variables	Men	Women	Total
Age	40.52	40.47	40.49
	(10.24)	(10.22)	(10.23)
Real (Hourly) wage (£)	14.6424	11.3769	12.9024
	(7.1409)	(6.0604)	(6.7857)
Married	0.5396	0.5439	0.5419
	(0.4984)	(0.4981)	(0.4982)
Part-time	0.0452	0.3557	0.1989
	(0.2078)	(0.4787)	(0.3992)
Public sector	0.2263	0.4494	0.3417
	(0.4184)	(0.4974)	(0.4743)
High-skilled Occ	0.3437	0.2626	0.3038
	(0.4749)	(0.44)	(.4599)
Middle-skilled Occ	0.4424	0.6349	0.5373
	(0.4967)	(0.4815)	(0.4986)
Low-skilled Occ	0.2139	0.1025	0.159
	(0.41)	(0.3033)	(0.3656)

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Descriptive Statistics (II)

Variables	Men	Women	Total
EDUCATION			
Higher Degree	0.0444	0.0357	0.0397
	(0.2060)	(0.1857)	(0.1952)
1st degree or equiv	0.1356	0.135	0.1347
	(0.3424)	(0.3418)	(0.3414)
Other Degree	0.1052	0.1321	0.1196
	(0.3068)	(0.3386)	(0.3244)
A-level etc	0.3139	0.2254	0.2675
	(0.4641)	(0.4178)	(0.4426)
GSCE etc	0.3939	0.3336	0.3127
	(0.4533)	(0.4715)	(0.4636)
Other qualification	0.2889	0.1381	0.126
	(0.3154)	(0.345)	(0.3318)

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Distribution of wages

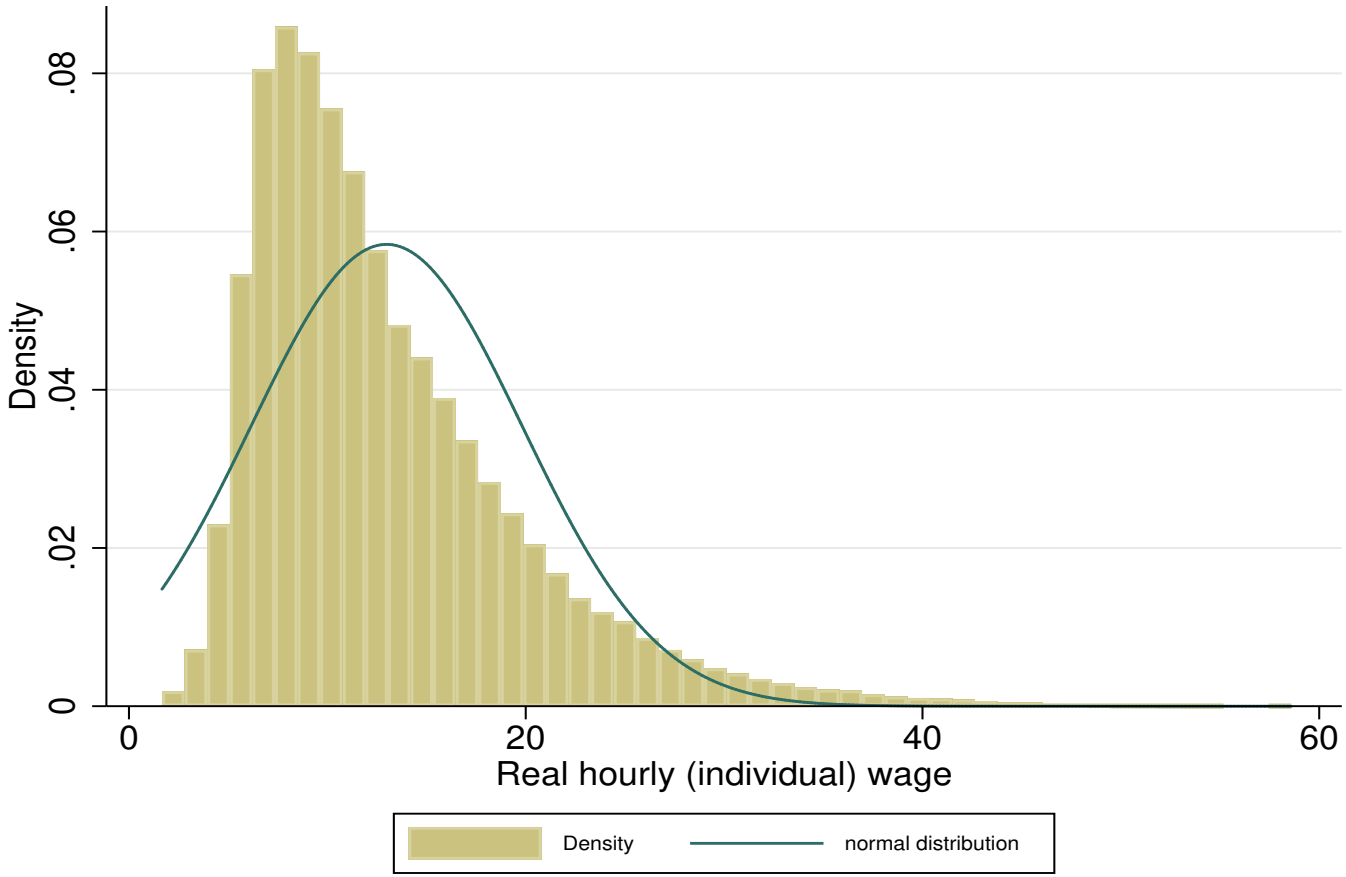

Figure: Wage Distribution

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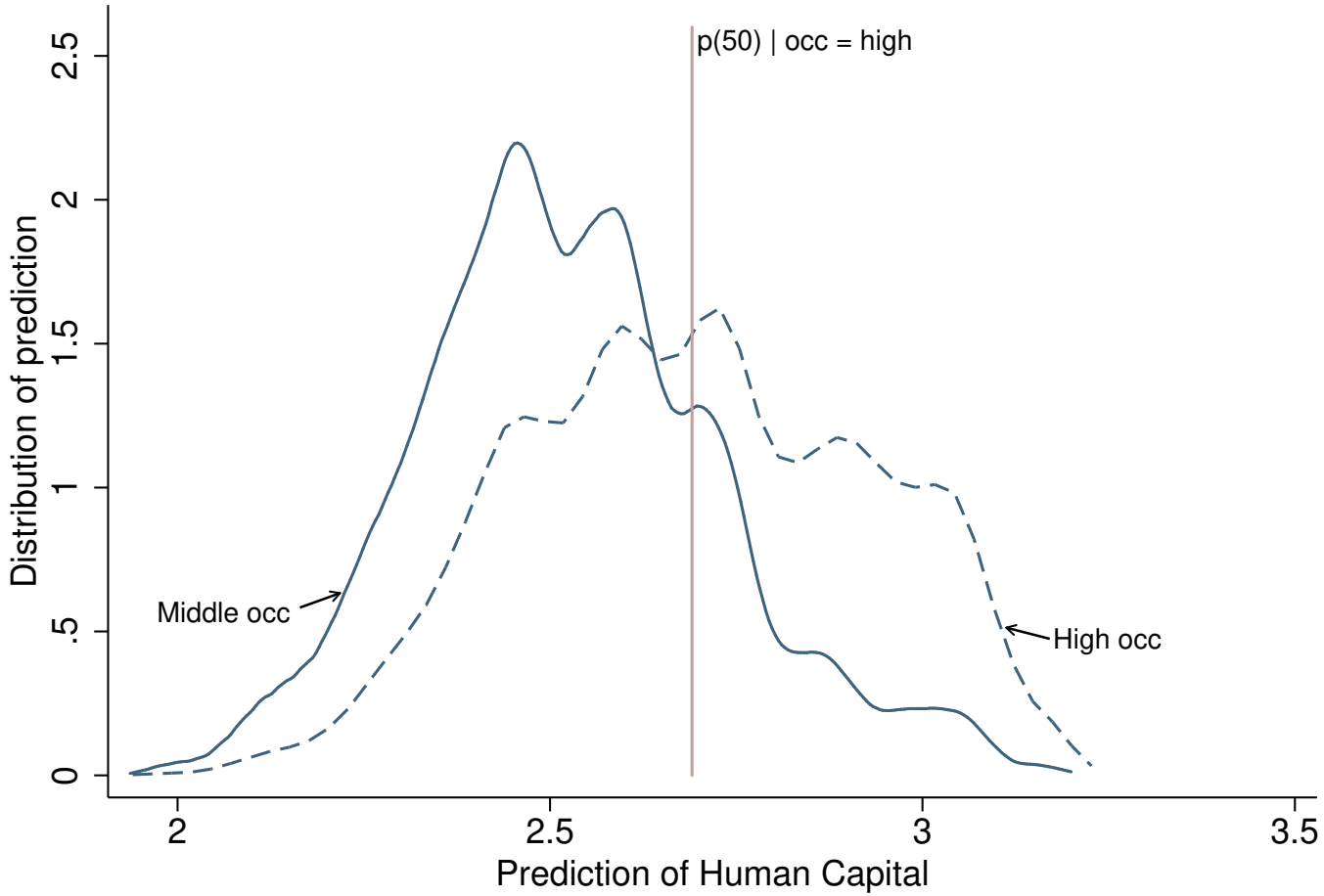
Illustration

Example: High-/middle-skilled employees (overall population)



kernel = epanechnikov, bandwidth = 0.0269

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Illustration (I)

Example: High-/middle-skilled employees (restricted female subsample)

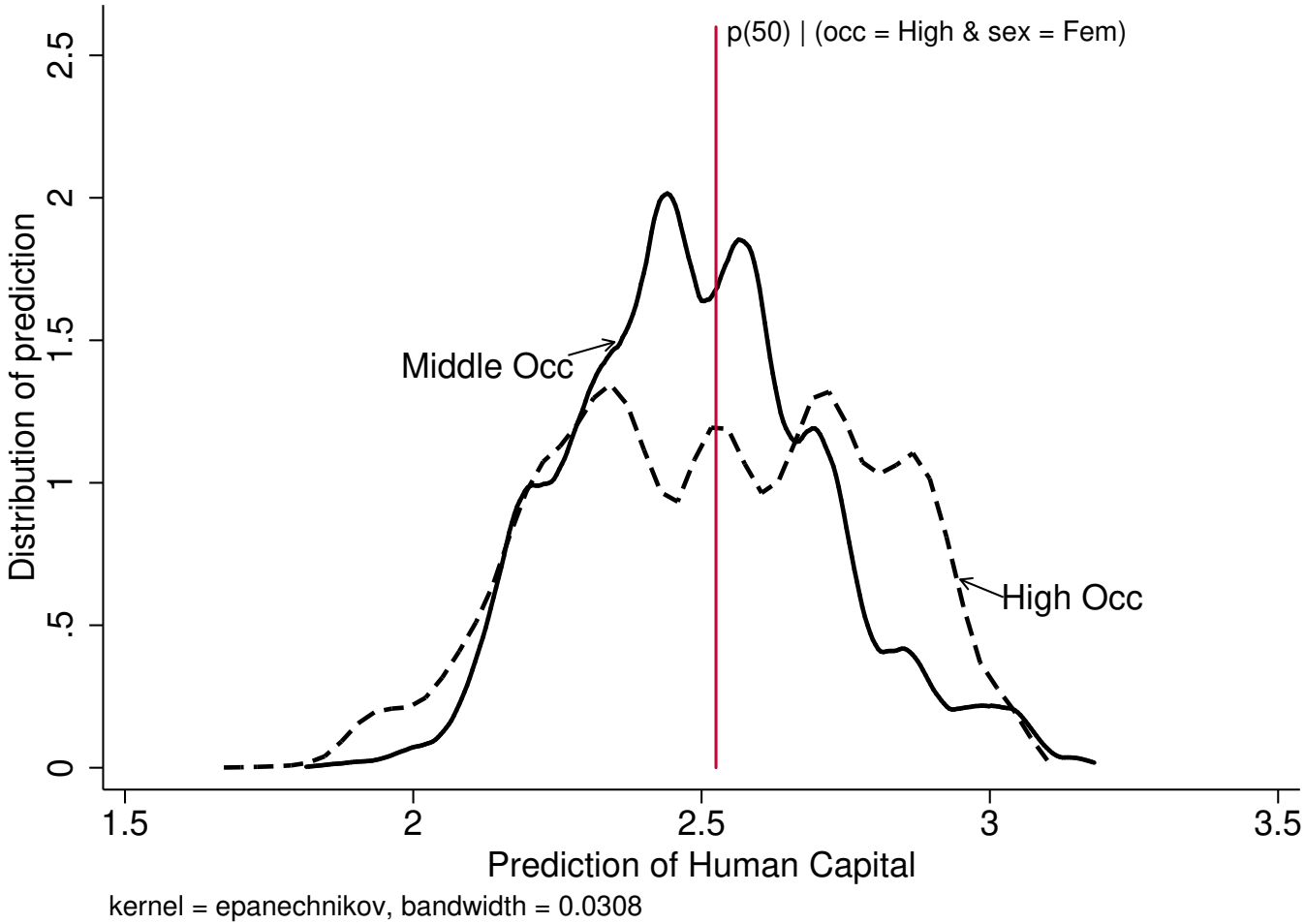

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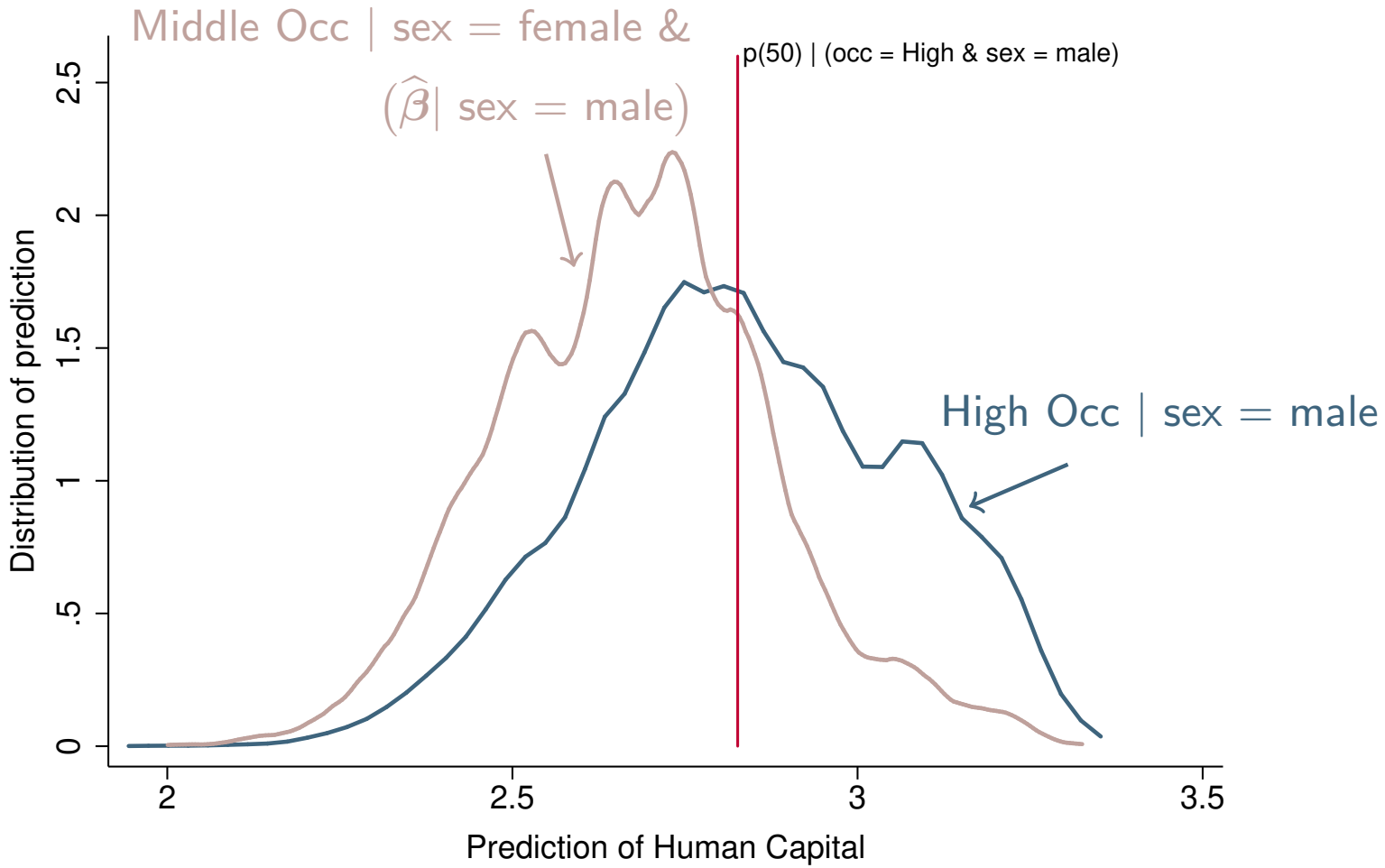
Illustration (II)

Example: High-/middle-skilled employees (counterfactual women)



kernel = epanechnikov, bandwidth = 0.0258

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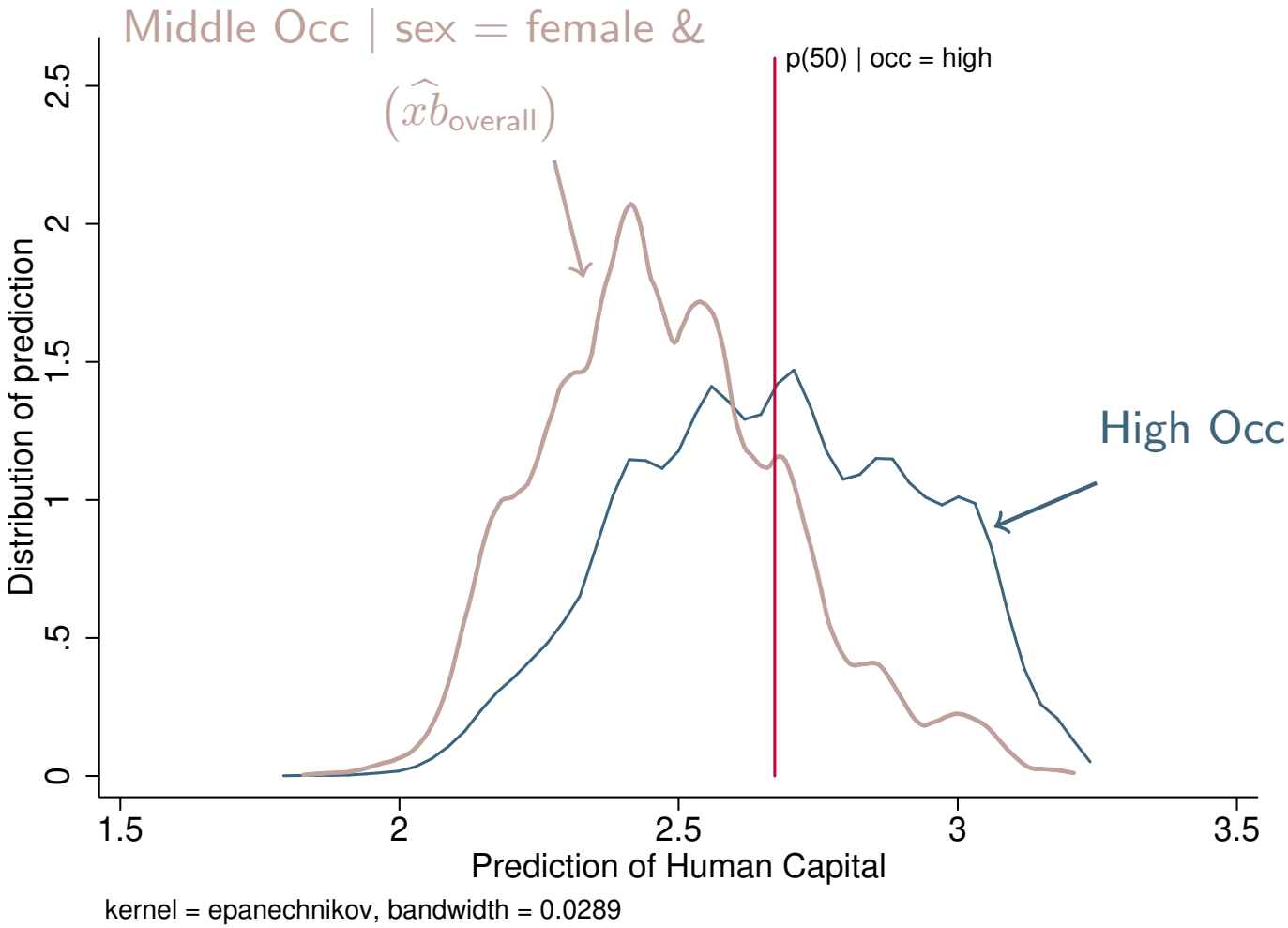
Illustration (III)

Example: High-/middle-skilled employees (women relative to median employee)



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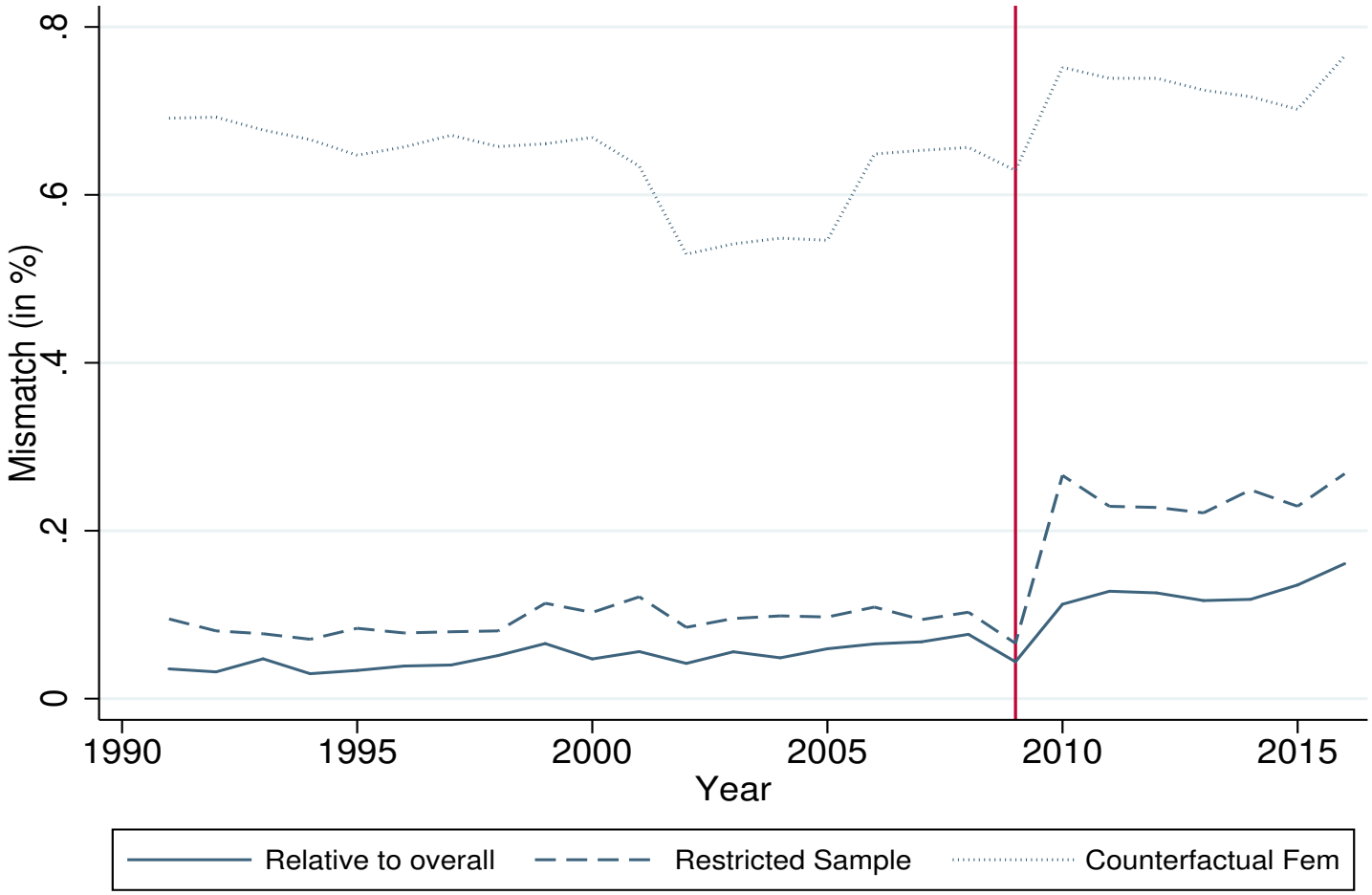
Incidence of Mismatch



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BCS70: Cognitive Tests

Table: Cognitive skills tests used in BCS70

Age	Test
5	HFDT: Human Figure Drawing Test CDT: Copying Designs Test EPVT: English Picture Vocabulary Test PT: Profile Test
10	PLCT: Pictorial Language Comprehension Test FMT: Friendly Math Test SERT: Shortened Edinburgh Reading Test BAS: British Ability Scales (Recall of Digits; Matrices; Word Definitions; Similarities)
16	AT: Arithmetic Test VT: Vocabulary Test ST: Spelling Test
30	Numeracy MC and OR assessment

Note: Tests have been normalised using the min/max method.

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BCS70: Non-Cognitive Tests

Table: Non-cognitive skills tests used in BCS70 (summary)

Age	Test
Birth	Mother Malaise
5	Mother Malaise Child Behavioural Measures (on Rutter Scale)
10	Child Behavioural Measures (on Rutter Scale)
26	Malaise score

Note: For details, see Attanasio et al. (2018; table A1)

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