

# 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  $\Rightarrow$  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?

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



# Outline

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



# ID Strategy

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

$$\ln[\text{wage}]_{i,t} = \alpha + \beta_1 \mathbf{x}_i + \sum_{k=2}^7 \beta_k S_{k,i,t} + \vartheta_t + u_{i,t}$$

▶ Wage Distribution

- Selection equation:

$$\begin{aligned} \text{employed}_{i,t} = & \alpha + \delta_1 \mathbf{z}_{i,t} + \delta_2 F S_{i,t} + \delta_3 \text{region}_{i,t} + \delta_4 \text{HHmembers}_{i,t} \\ & + \vartheta_t + v_{i,t} \end{aligned}$$

▶ Illustration

▶ Incidence



## 3 cases - indices

### I. Restricted (female) subsample ▶ Illustration (I)

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

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

### II. Counterfactual female: ▶ Illustration (II)

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

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

### III. Relative to overall: ▶ Illustration (III)

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

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



# 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

$$\Pr(\text{mismatched}_i | (\text{sex=female})_{\text{index}} = 1) = f(x_{i,t}, \text{family}_{i,t})$$

$$, \forall \text{index} = \{I, II, III\}$$

$x$ : entrance in LM, (regional) UR

family: lone parenthood HH, number of children

## Selection Equation

$$\text{employed}_{i,t} = \alpha + \delta_1 z_{i,t} + \delta_2 F S_{i,t} + \delta_3 \text{region}_{i,t} + \delta_4 \text{HHmembers}_{i,t}$$

$$+ \vartheta_t + v_{i,t}$$



# Data

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

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

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



# Determinants of female mismatch (I)

## Individual and HH determinants

	Relative to overall		Counterfactual Female	Restricted sample
	Probit	HP	HP	HP
single parent HH	-0.0906** (0.0384)	0.0418** (0.0195)	-0.0705 (0.0533)	0.0553*** (0.0145)
Number of children				
1	-0.0184 (0.0237)	-0.0271*** (0.00932)	-0.00312 (0.0105)	-0.0362*** (0.00880)
2	0.0441* (0.0239)	-0.0196** (0.00993)	0.00128 (0.0106)	-0.0652*** (0.00906)
3	0.115*** (0.0412)	0.0363** (0.0181)	0.0303* (0.0171)	-0.00701 (0.0159)
4	-0.383*** (0.144)	-0.162*** (0.0524)	0.0443 (0.0360)	-0.142*** (0.0480)

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	-0.0920** (0.0385)	0.0409** (0.0196)	-0.0720 (0.0533)	0.0546*** (0.0144)
Number of children				
1	-0.0287 (0.0238)	-0.0299*** (0.00945)	-0.00264 (0.0105)	-0.0399*** (0.00883)
2	0.0306 (0.0241)	-0.0253** (0.0100)	0.00158 (0.0106)	-0.0707*** (0.00915)
3	0.0911** (0.0415)	0.0259 (0.0181)	0.0298* (0.0171)	-0.0160 (0.0161)
4	-0.415*** (0.145)	-0.168*** (0.0528)	0.0445 (0.0360)	-0.157*** (0.0481)
Entered LM?	0.174*** (0.0317)	0.0724*** (0.0114)	0.0877*** (0.0187)	0.0733*** (0.0122)

Robust standard errors in parentheses; clustered at household level. Note: HP stands for Heckman Probit

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# Public vs. Private Sector

**Table:** Sector of Employment: Single mother with at least 2 children (in percentages)

	Participation	Mismatch		
		Relative to overall	Restricted Subsample	Counterfactual
Public	51.14	9.24	17.58	66.67
Private	28.17	2.28	5.93	63.83
Difference	0.2297*** (0.0605)	0.0696*** (0.0082)	0.1165*** (0.0175)	0.0284* (0.1346)

Note: Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



# Part-time vs. Full-time employment

**Table:** Type of Employment: Single mother with at least 2 children (in percentages)

	Participation	Mismatch		
		Relative to overall	Restricted Subsample	Counterfactual
Part-time	56.34	5.33	9.11	100
Full-time	11.36	6.25	14.53	64.79
Difference	0.4498*** (0.0534)	-0.0092 (0.0122)	-0.0542*** (0.0166)	0.3521* (0.2165)

Note: Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



# 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



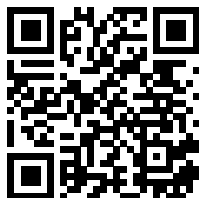


# Weaknesses

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



# Thank you!

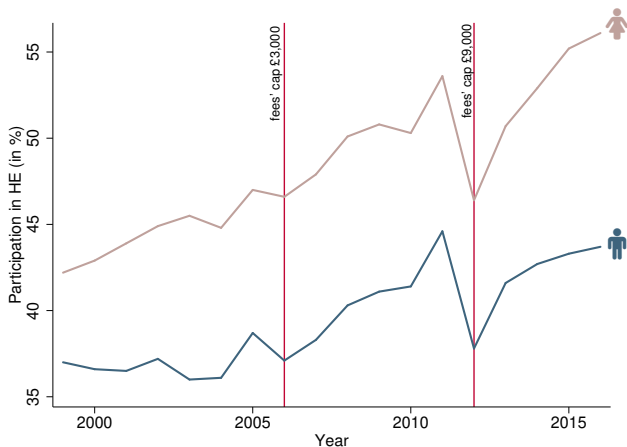


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# Expansion of Higher Education

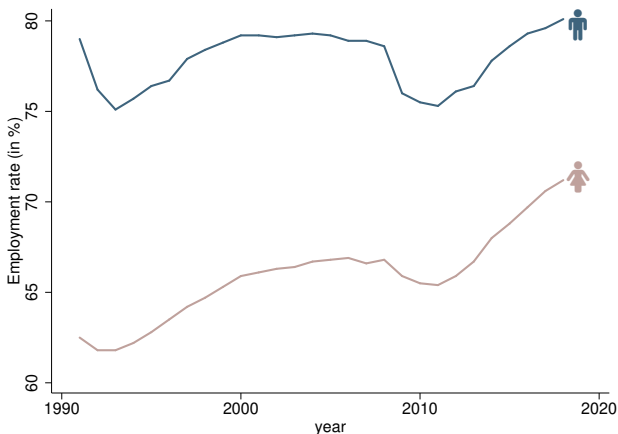


Source: DfE and HESA

▶ Back



# Participation in Labour Market (1991-2016)



Source: ONS UK Labour Market bulletin

▶ Back



# Employment by occupation: all employees (1991-2016)

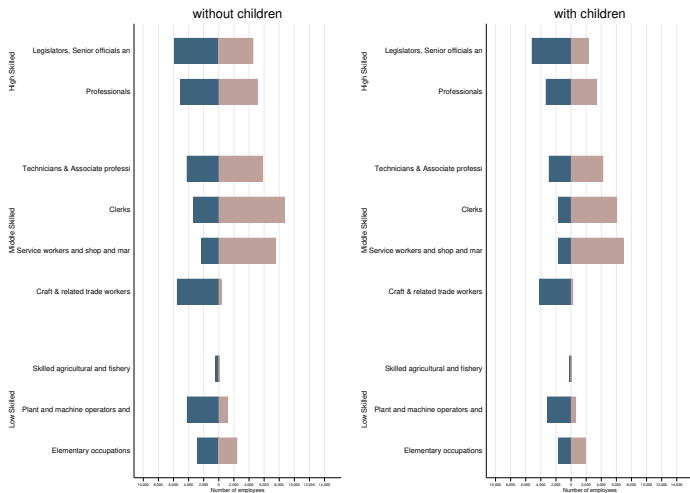


▶ Back ▶ by children

▶ Timeline (Animated)



# Employment by Occupation: all employees by children



▶ Back

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





# Descriptive Statistics (I)

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

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## Descriptive Statistics (II)

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

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# Distribution of wages

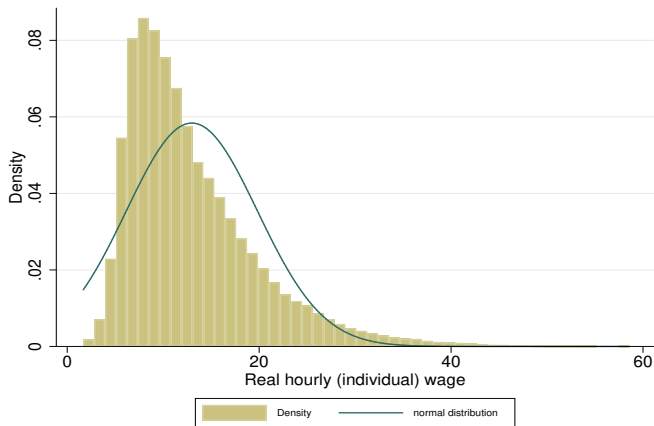


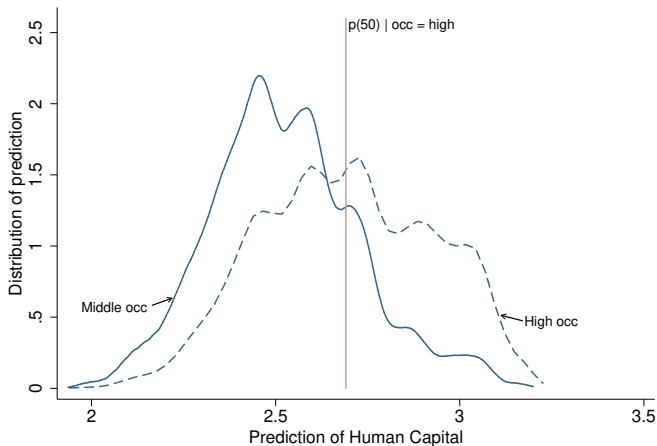
Figure: Wage Distribution

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# Illustration

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

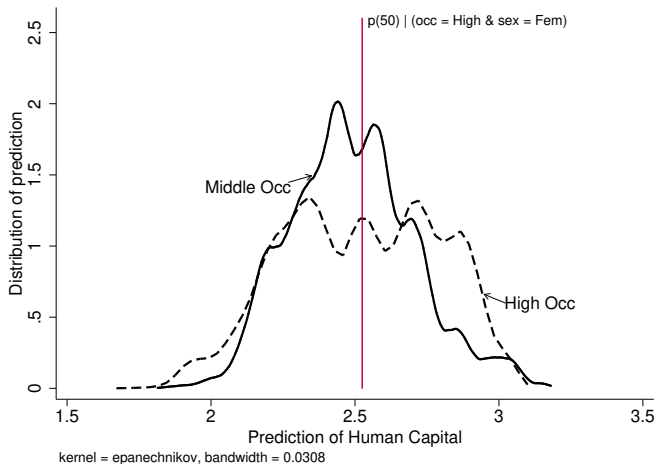


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# Illustration (I)

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

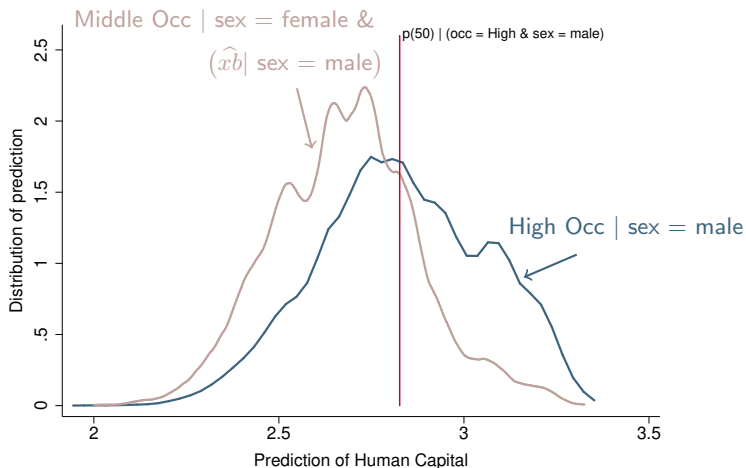


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# Illustration (II)

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



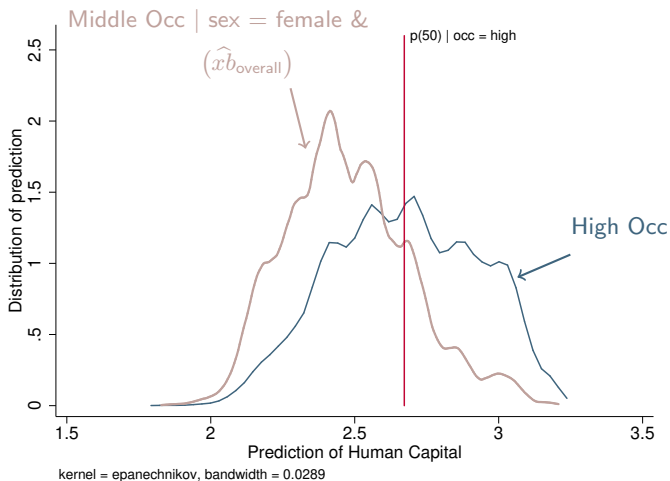
▶ Back

kernel = epanechnikov, bandwidth = 0.0258



# Illustration (III)

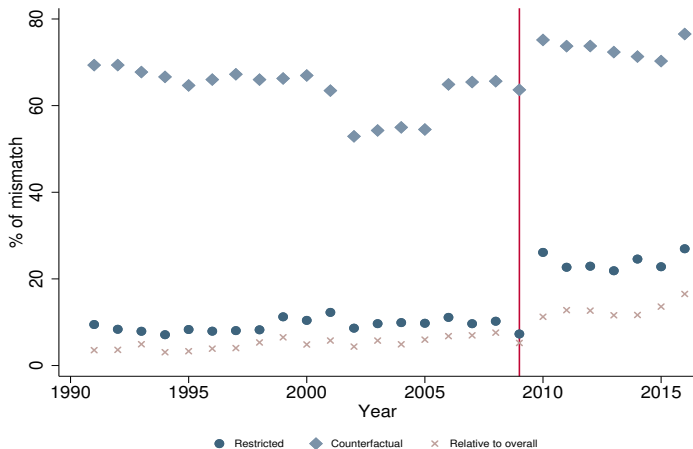
Example: High-/middle-skilled employees (women relative to median employee)



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# Incidence of Mismatch



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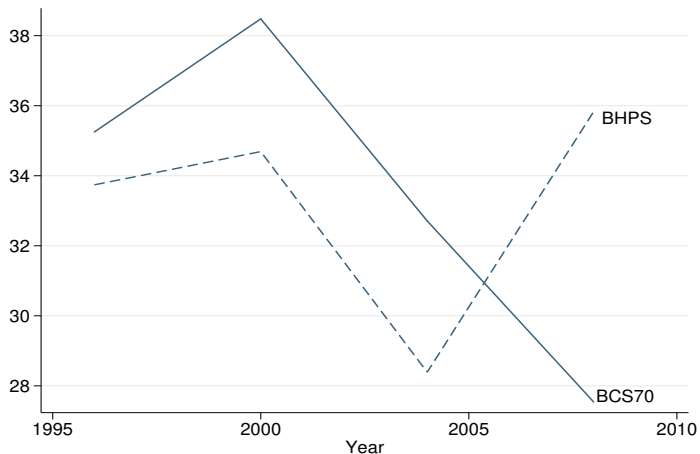
Note: Year 2009 includes 761 obs., while year 2016 only 746.





# Incidence of Mismatch (I)

Women relative to overall population

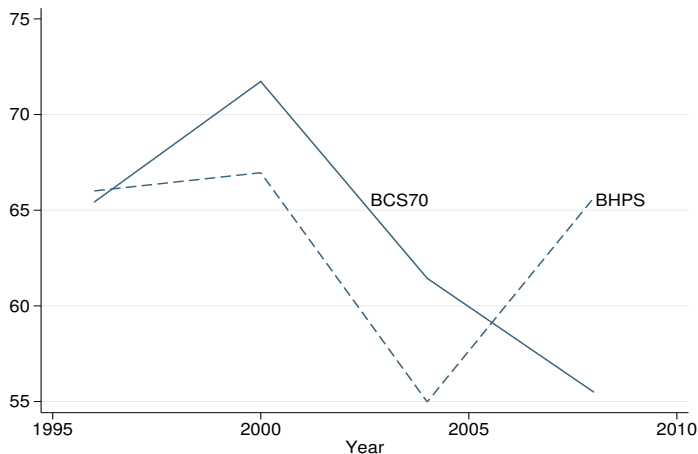


Note: BHPS given the age of BCS70



# Incidence of Mismatch (II)

## Counterfactual Women

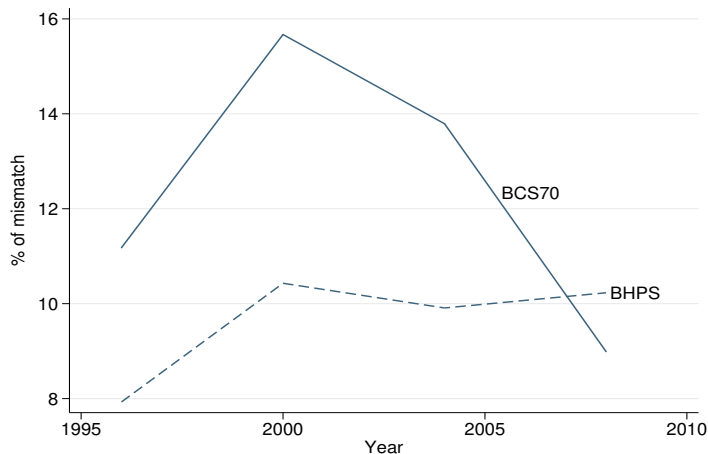


Note: BHPS given the age of BCS70



# Incidence of Mismatch (III)

Restricted female subsample



Note: BHPS given the age of BCS70

