Are Partnered Women "Added Workers"?

Evidence from Women's Labour Force Participation in the UK

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Introduction

What is the added worker effect?

- Coping mechanisms for income loss / unemployment / non-employment:

  single individual vs. household

- The additional margin of adjustment: labour supply of household members
- *Added worker effect* is a household insurance mechanism,
  - Participation to labour force if inactive (extensive margin)
  - Increase in hours supplied if already working (intensive margin)

Focus is on inactive women in married or cohabiting couples in the UK

Aim is to

- show whether, and how to what extent, the time a woman spends out-of-labour-force affects her participation decision,
- examine the effect of her partner's labour market activity on a woman's labour supply decision, and
- compare these effects when woman's labour force participation is via job-search and via job-finding

Data: Couples' monthly labour market histories from the British Household Panel Survey 1991-2008 (BHPS)

Methodology: Discrete-time duration model of women's participation

Empirical Evidence on the *Added Worker Effect*

Theoretically, the added worker effect is well established, but there are mixed empirical evidence

- Little but significant added worker effect: Lundberg (US, 1985), Gong (AUS, 2011), Ayhan (TR, 2015)
- No added worker effect: Layard et al. (UK, 1980), Maloney (US, 1991), Spletzer (US, 1997)

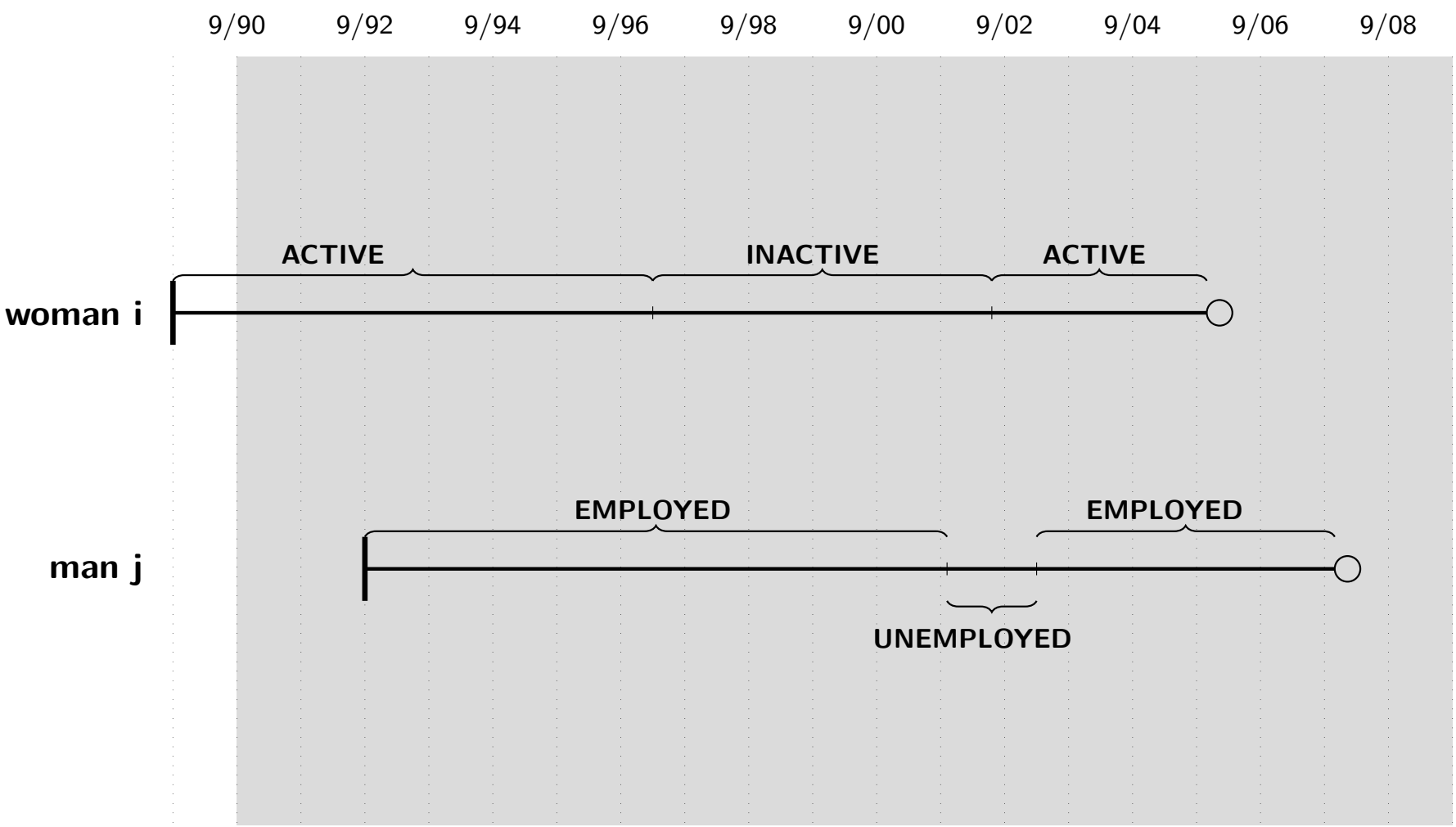
UK: shows *little* or *no* effect, and also a *reverse added worker effect*

- Voluntary quits (McGinnity, 2002; Bryan and Longhi, 2017)
  - complementarity of leisure
- Welfare (benefit) system (Bingley and Walker, 2001; McGinnity, 2002; Bredtmann *et al.*, 2014)

Contribution

1. Modelling how the time a woman spends in inactivity affects her decision to enter the market explicitly
   - and comparing women who become unemployed or employed
2. Extending the scope of the added worker effect
   - not only partner's unemployment but also partner's other labour market activities (inactivity, retirement, and long-term sickness)
3. Evidence from a new dataset (longer and higher frequency panel)
   - couple's monthly labour market histories from the BHPS

Conceptual Framework



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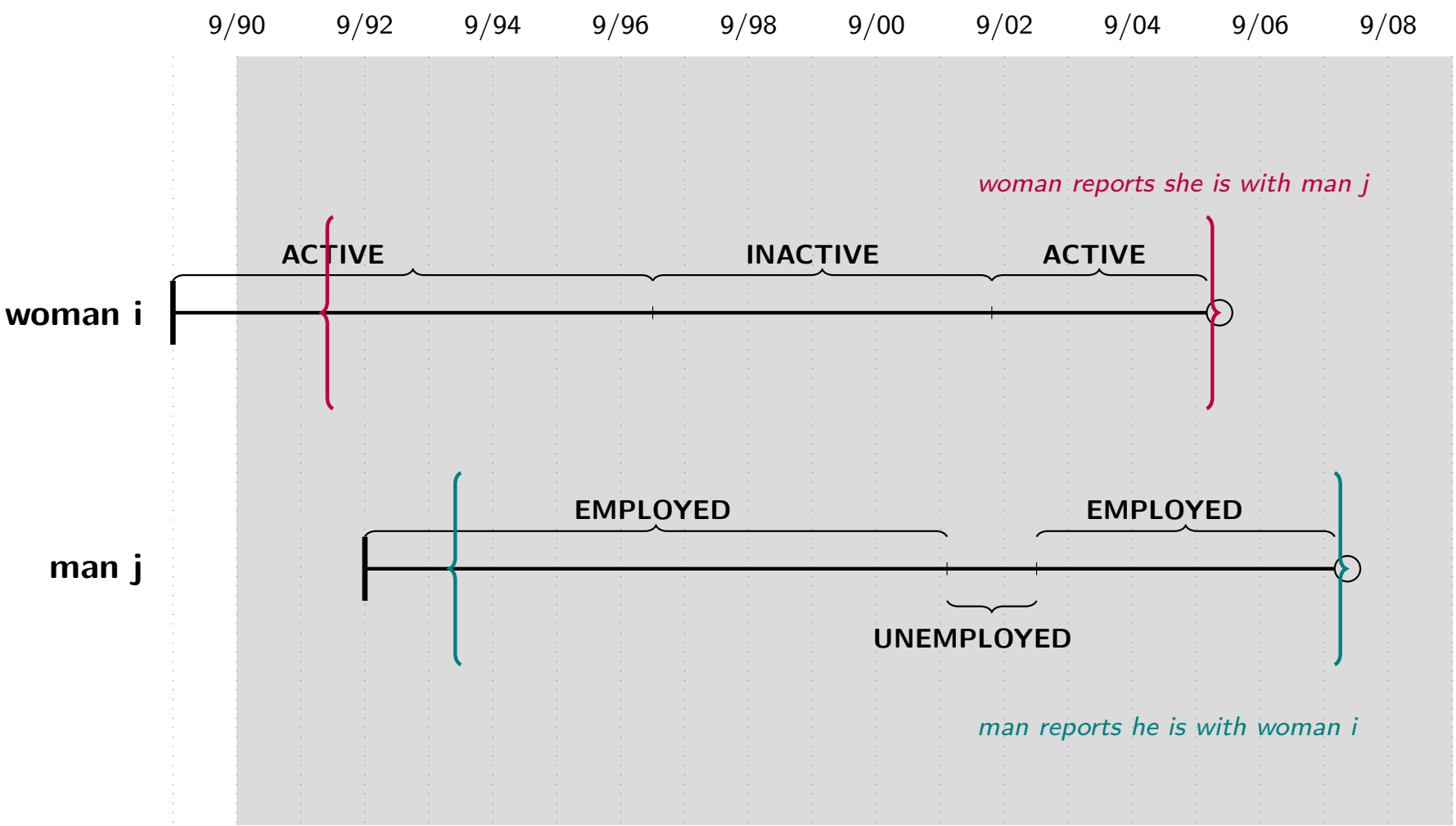

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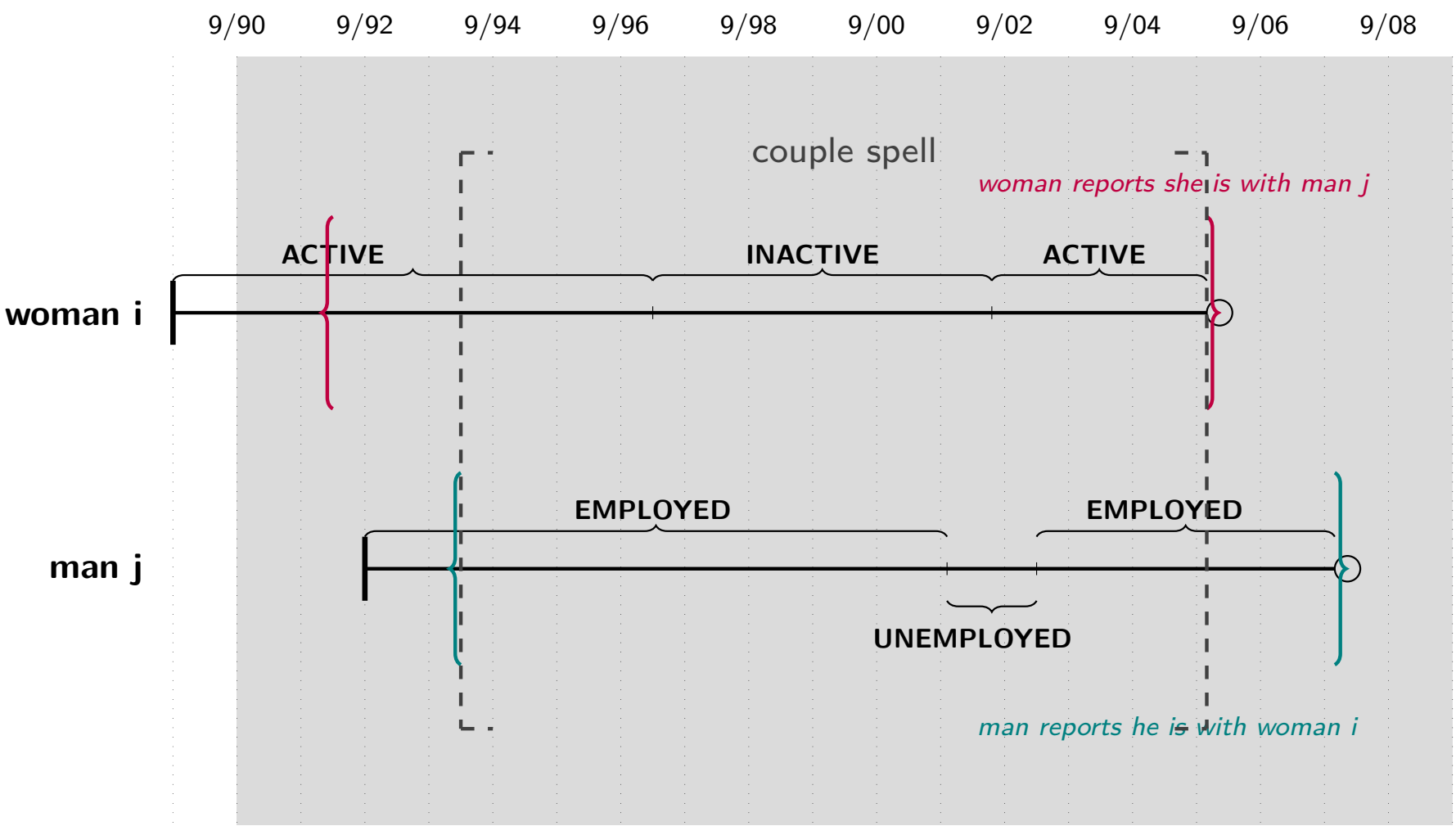
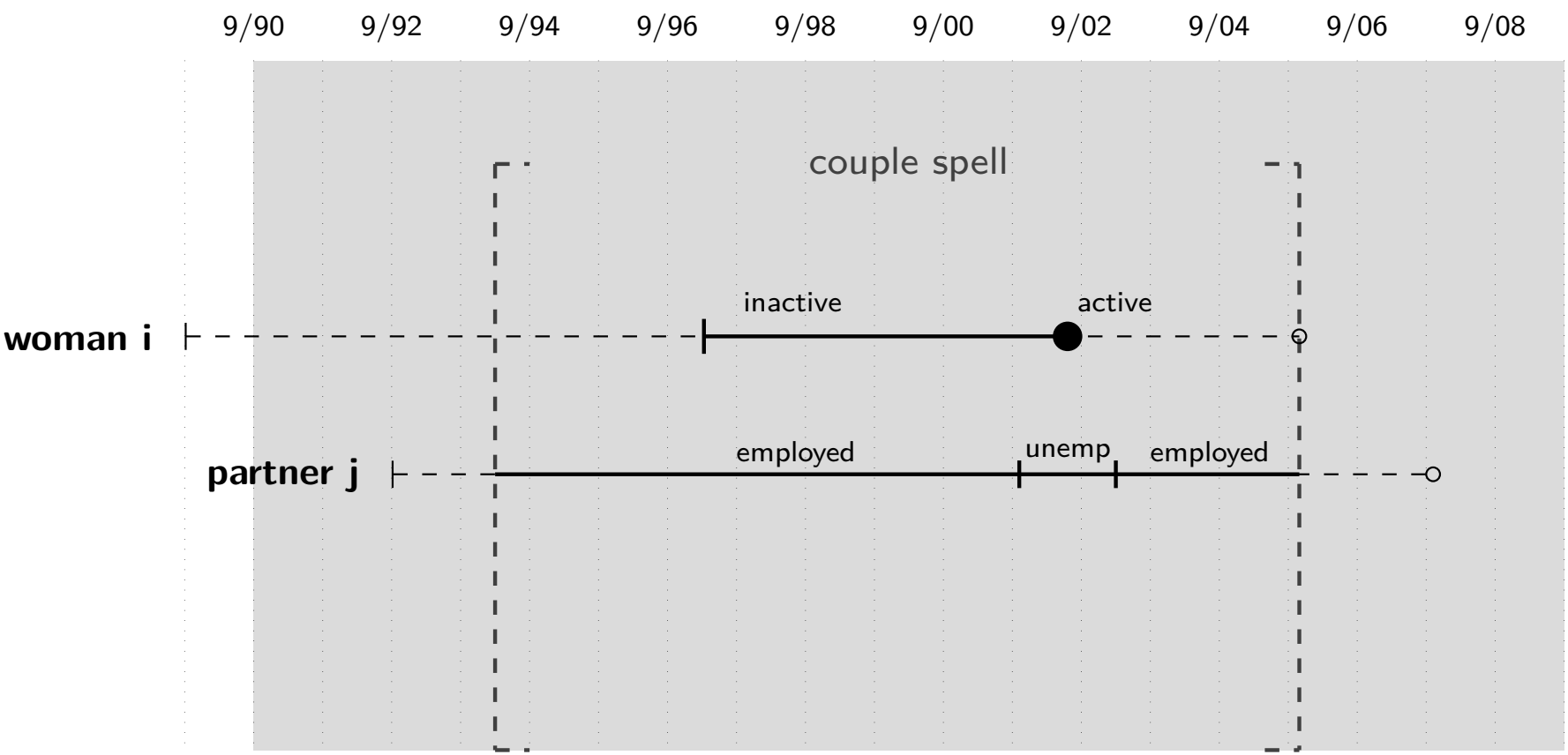


Conceptual Framework

A basic definition of the *added worker effect*



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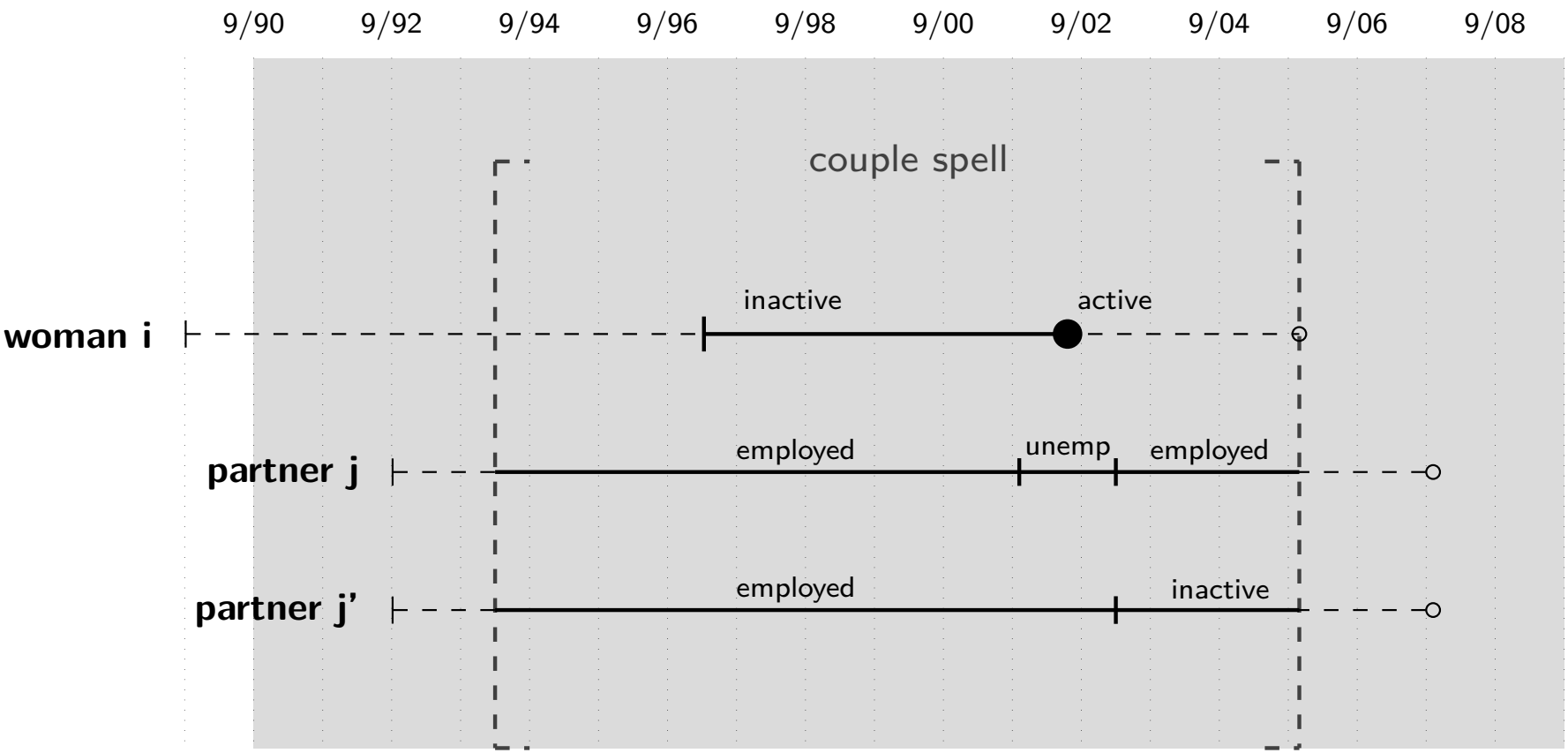

Conceptual Framework

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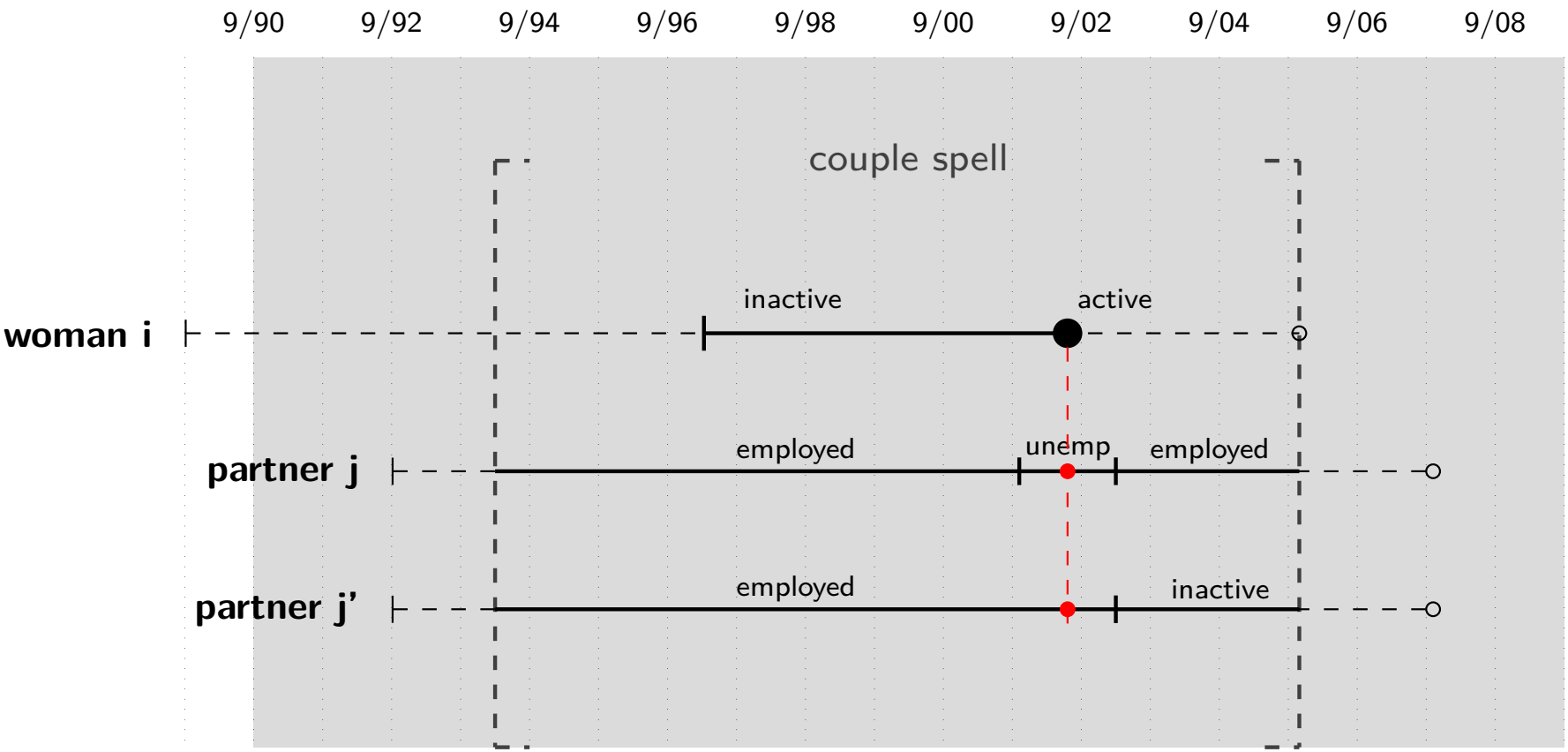


The empirical counterpart of the *added worker effect*

$$= \Pr(\mathbf{i}\text{: inactive} \rightarrow \text{active} \mid \mathbf{j}\text{: unemployed}) - \Pr(\mathbf{i}\text{: inactive} \rightarrow \text{active} \mid \mathbf{j}\text{: employed})$$

Couples' Labour Market History:

- Unbalanced panel of 7025 women in 7261 uninterrupted couple spells observed between September 1990 - April 2009
  Both women and partners are above 16 years old, not in full-time education

Estimation sample Some descriptive statistics

- Consists of couples in which woman has been inactive (even if for one month)
- 2780 women in 2838 couple spells (40% of all couples, 16% of couple-month observations)
- Average number of observations per couple: 103 couple-months (st. dev. 73.38)

Empirical Strategy

Event of interest: woman in couple i's exit from inactivity by participation at elapsed month s ,

$$y_{ks} = \begin{cases} 1 & \text{if woman exits inactivity via participation, and inactive at } s-1 \\ 0 & \text{otherwise} \end{cases}$$

- **Example:** If a woman is inactive for 2 months before she joins the sample, and stays inactive for another 6 months, then she enters labour market

$$\{y_{k3}, y_{k4}, y_{k5}, y_{k6}, y_{k7}, y_{k8}, y_{k9}\} = \{0, 0, 0, 0, 0, 1\}$$

- Mean of y_{ks} is 0.019, i.e. 2% average monthly transition rate
- 4187 inactivity spells, on average 1.5 inactivity spell per couple Summary of inactivity spells

Empirical Strategy

Discrete-time proportional hazards model (with unobserved heterogeneity)

Non-parametric model:

$$h_{ks}(X_{kt}, u_k) = 1 - exp\{-exp(\sum_{a=1}^{\tau} \gamma_a d_{a,ks} + \sum_{k=1}^{4} \delta_p P_{kt}^p + X_{kt}\beta + u_k)\}$$

Discrete-time Weibull model (parametric):

$$h_{ks}(X_{kt}, u_k) = 1 - exp\{-exp[(\alpha - 1)log(s_k) + \sum_{k=1}^{4} \delta_p P_{kt}^p + X_{kt}\beta + u_k]\}$$

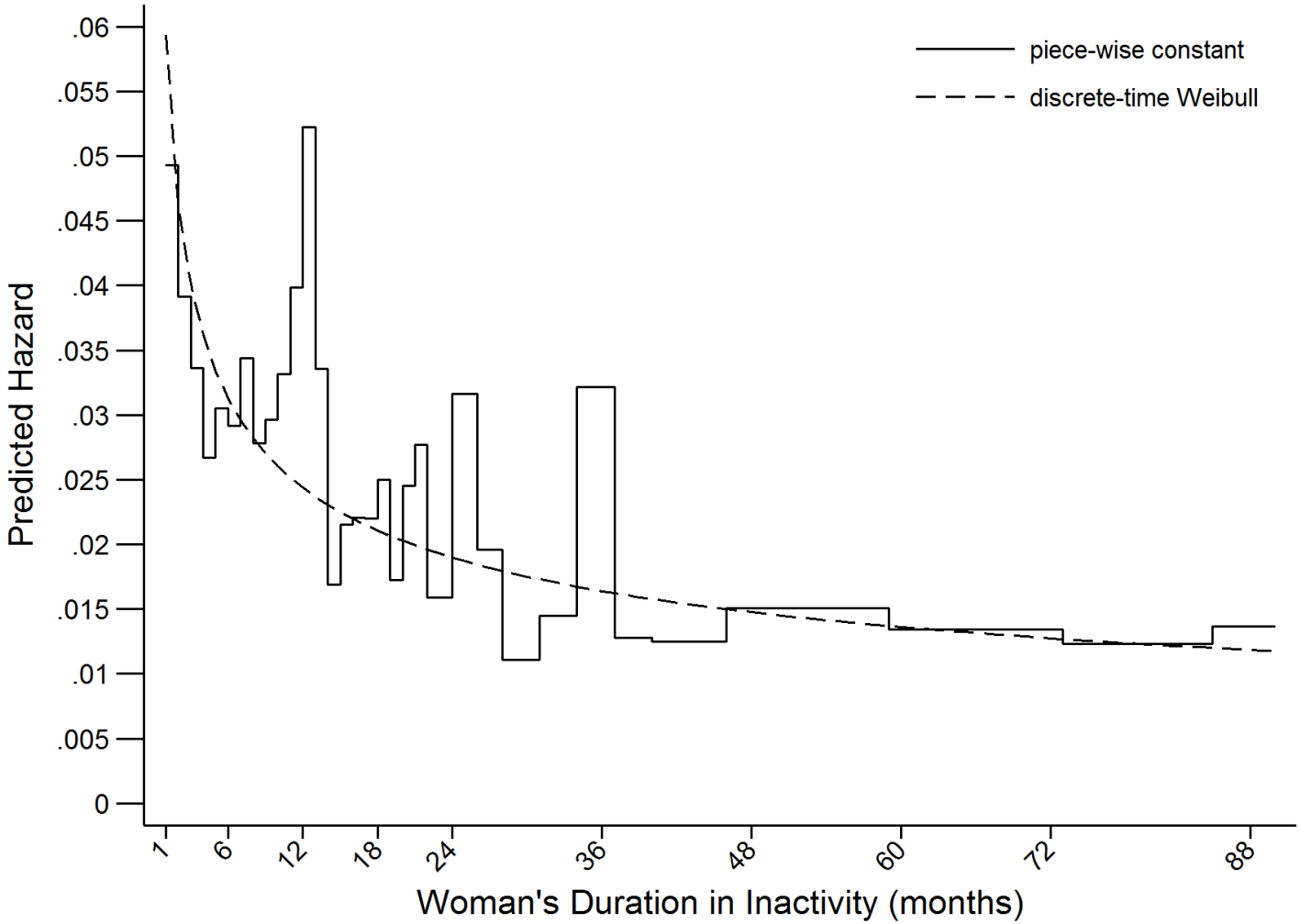
where p refers to different LM states of partner, base category ($p = 1$) is partner's employment, and couple-level unobserved heterogeneity $u_k \sim N(0, \sigma_u^2)$

The added worker effect is

$$\delta^{awe} = log(h_s \mid P^2 = 1, \mathbf{X}, u) - log(h_s \mid P^1 = 1, \mathbf{X}, u)$$

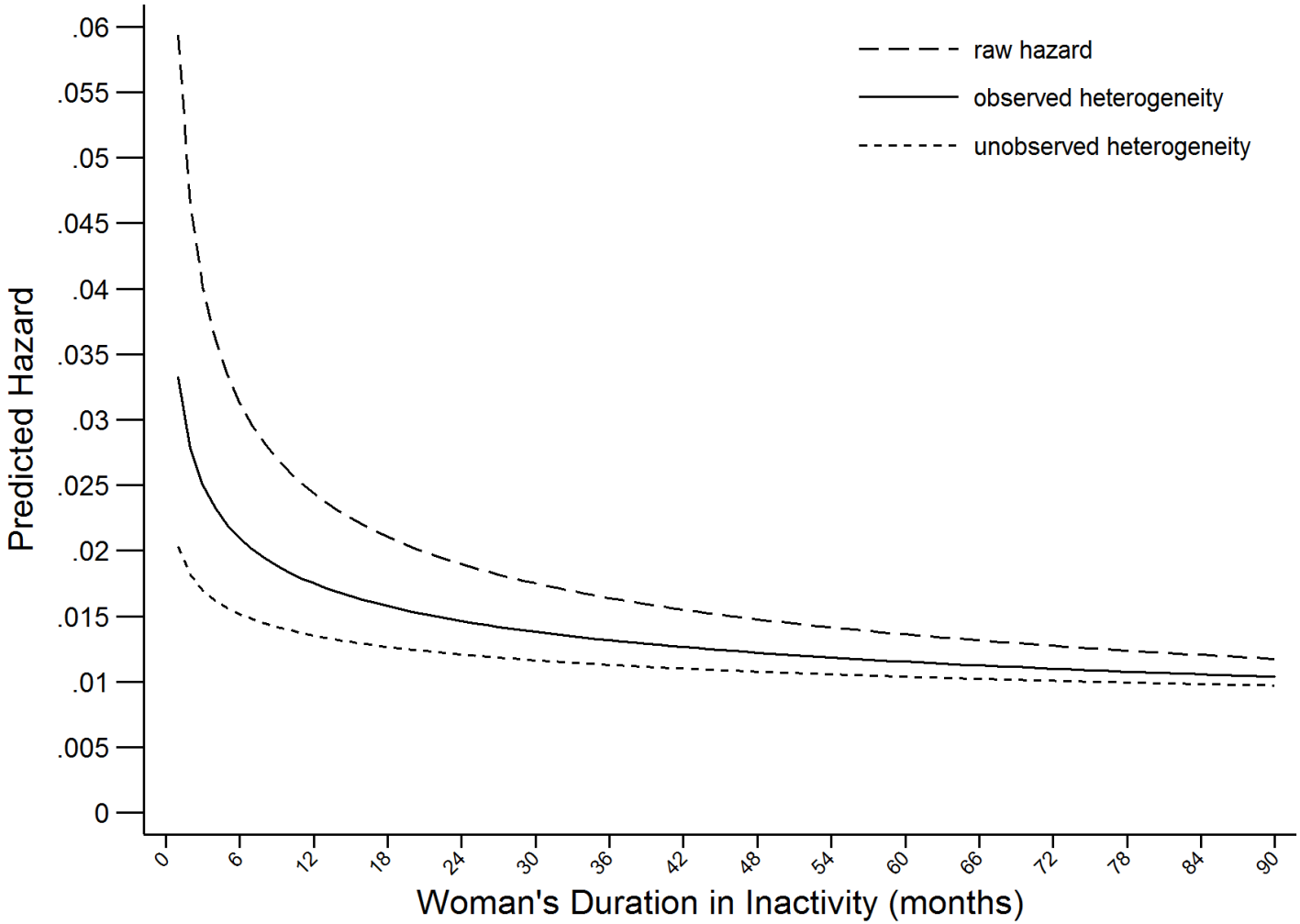
Competing Risks Model

Results: Duration Dependence



A closer look to jumps around 12-month-duration

Results: Duration Dependence & Unobserved Heterogeneity



The reference categories are: woman and partner is between 24 and 35 years old, both has GCSEs, partner is employed, woman has no previous work experience and does not look after an adult. The couple lives in London. There are no children aged below 12 in the household, and the house is owned outright. Woman's inactivity spell starts within her couple spell, she is egalitarian whereas her partner holds traditional attitudes on gender roles. Neither woman nor her partner claim benefits between two interviews. The reference year is 1990, and the month is January. The baseline hazard from the model with Gaussian mixing evaluates the unobserved heterogeneity at its mean value.

Results: Traditional Added Worker Effect

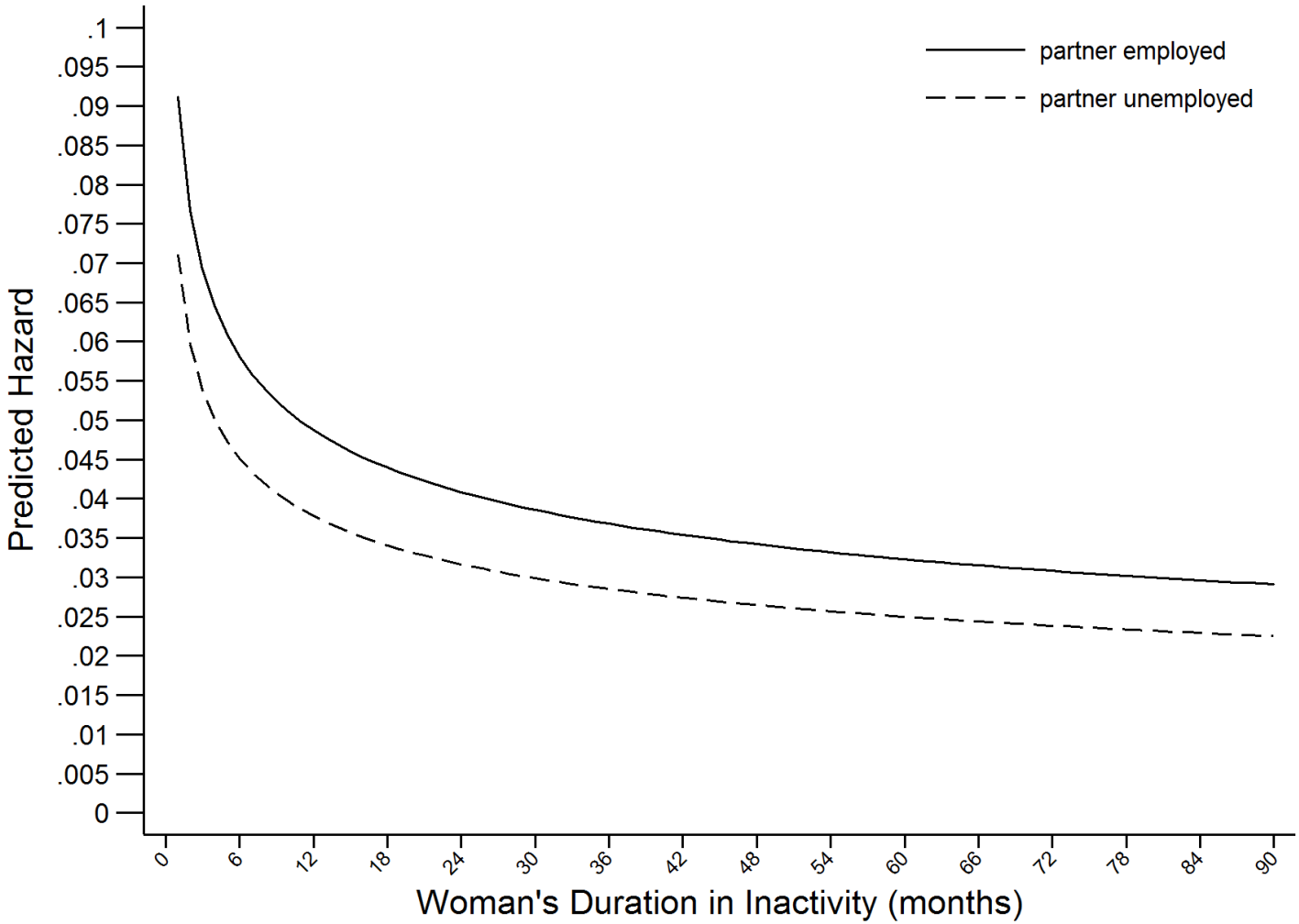


Table: Hazard to Participate, selected estimates

	Model I		Model II	
Weibul α	0.739***	(0.019)	0.835***	(0.025)
Partner's LM				
Unemployed	-0.260**	(0.122)	-0.264**	(0.124)
Inactive	0.187	(0.189)	0.283	(0.178)
Retired	-0.566***	(0.207)	-0.659***	(0.174)
Long-term Sick	-0.365***	(0.139)	-0.410***	(0.142)
Couple benefit	-0.255***	(0.085)	-0.280***	(0.087)
Financial percep.	0.153**	(0.065)	0.154**	(0.069)
σ_u			0.573	(0.056)

Notes: $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$. Standard errors are clustered at couple level and presented in parentheses. For all models the number of couple-month observations is 103,084, and there are 2,042 exits from inactivity, $y_{ks} = 1$. The reference categories are: woman and partner is between 24 and 35 years old, both has GCSEs, partner is employed, woman has no previous work experience and does not look after an adult. The couple lives in London. There are no children aged below 12 in the household, and the house is owned outright. Woman's inactivity spell starts within her couple spell, she is egalitarian whereas her partner holds traditional attitudes on gender roles. Neither woman nor her partner claim benefits between two interviews. The reference year is 1990, and the month is January.

Results: Other controls

- There is a monotonic relationship between woman's **education level** and the probability of her participation
  - a woman whose partner has a first-degree is $1/3$ times less likely enter the labour force than a woman whose partner completed his GCSEs
- A woman who was employed before (either when single or during her partnership) is 1.5 times more likely to participate than a woman with **no experience**
- While having **children** younger than 5 year-old in the household lowers the participation probability, having a child aged between 5-11 makes her more likely to participate by 10%
- A woman whose **house** is rented is 30% more likely to participate than a woman whose house is owned outright
- If woman's **perception of financial situation** is worse than her partner's, woman is 1.2 times more likely to join labour force
- **Gender roles** seem to play a role, participation probability increases when both partner's are egalitarian, or when only partner is egalitarian than a couple where only woman is egalitarian

Results: Competing Risks

Variable	Estimates, exit via unemp		Estimates, exit via employment		Difference in probabilities	
α	0.680	(0.050)	0.751	(0.020)		
P, unemp	-0.452	(0.271)	-0.201	(0.137)	0.005	(0.008)
P, retired	-0.747	(0.427)	-0.543	(0.235)	0.004	(0.012)
A levels	0.239	(0.209)	0.358	(0.076)	0.002	(0.005)
Ever employed	-0.113	(0.191)	0.477	(0.074)	**0.011**	(0.005)
Children aged 3-4	-0.968	(0.233)	-0.178	(0.059)	**0.015**	(0.006)
Benefit= 1	0.694	(0.201)	-0.438	(0.095)	**-0.021**	(0.006)

Standard errors are in parentheses, and clustered at couple level. The hazards are estimated with no Gaussian mixing and are evaluated at $s = 6$ using Model I.

Discussion

- **Why negative duration dependence?**
  - Depreciation in skills, lower motivation to participation, type of inactivity
- **Why no traditional added worker effect?**
  - Complementarity of woman's and partner's non-market time (Bryan and Longhi, 2017)
  - Inflexibility in changing established division of labour in the household (Laure et al., 2015; Gush et al., 2015)
  - Women with employed partners may be more encouraged to (find/look for) work due their partners network
  - Discouraged worker effect may in place, which offsets any added worker effect
  - Partners do not come together randomly; similar tastes and preferences: assortative mating

Discussion

- **Do benefit claims discourage women to participate?**
  - Single risk model: yes
  - Competing risks model: woman more likely to start looking for a job when benefit claimed within the period between interviews
- **Competing Risks**
  - There is a difference between participating by finding a job and start searching for a job,
    - Probability of participation does not change across exit types by partner's LM activities
    - Experience and benefit claims have different effects on two exit types

Conclusion

- A simple definition of the added worker effect
  - Partner's labour market transitions are not taken into account, but other LM states included (sensitivity analyses)
- Novel dataset, couple's labour market histories, and estimates a discrete-time duration model of inactive women's participation behaviour

The results indicate that

- There is duration dependence in woman's inactivity
- The longer woman stays inactive, detached from the labour market, the less likely she is to participate
- Participation probability of a woman whose partner is unemployed is around 23% lower than a woman with same characteristics but with an employed partner
- Benefit claims have a negative impact on the probability of woman's participation, when participation is considered as a single risk (consistent with previous literature on the UK)
  - but competing risks model shows that it actually makes woman more likely to search for a job

Thank you!

Some descriptive statistics - estimation sample

Women	Mean	St.dev	N
Age	44.207	14.738	107131
Education			
No or some quals	0.391	0.488	2838
GCSEs	0.176	0.381	2838
A-levels	0.321	0.467	2838
First-degree or higher	0.102	0.303	2838
Ever participated	0.600	0.491	107131
Caring for an adult	0.115	0.319	103902
Financial perception	0.120	0.325	102539
Good health	0.679	0.467	103902
Spell start when single	0.038	0.191	2838

Male partners	Mean	St.dev	N
Age	46.914	14.990	107131
Education			
No or some quals	0.326	0.469	2838
GCSEs	0.149	0.356	2838
A-levels	0.399	0.490	2838
First-degree or above	0.113	0.317	2838
LM states			
Employed	0.680	0.467	107131
Unemployed	0.069	0.253	107131
Inactive	0.014	0.115	107131
Retired	0.152	0.359	107131
Long-term sick	0.087	0.281	107131

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Some descriptive statistics cont'd

	Mean	St.dev	N
Number of children by age			
[0,2]	0.208	0.437	103999
[3,4]	0.199	0.424	103999
[5,11]	0.522	0.815	103999
House ownership			
Owned outright	0.253	0.434	104260
Owned with mortgage	0.446	0.497	104260
Rented	0.300	0.458	104260
Benefit claimed	0.175	0.380	103436
Attitudes towards gender roles			
Both egalitarian	0.158	0.364	2838
W is , P is not	0.173	0.378	2838
W is not, P is	0.108	0.310	2838
Both not egalitarian	0.520	0.500	2838

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Summary of woman's inactivity to labour force transitions

	Number of spells	**Mean duration in months (st. dev)**
Delayed entry spells	1206	168.25 (162.56)
Flow spells	2981	21.18 (25.77)
Completed spells	2081	34.93 (53.64)
Right-censored spells	2106	91.81 (142.96)
Total	4187	63.54 (11.89)

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Empirical Strategy

Competing Risks Model

Estimate two separate models for each competing risk

$$h_s^r(X_{ks}, u_k) = 1 - exp\{-exp((\alpha - 1)log(s) + \sum_{p=1}^{4} \delta_k P_{kt}^p + X_{kt}\beta)\},$$

where $r = 1$ unemployment, and $r = 2$ employment

Assume that $t_i^{(r)}$ is the time at which woman i participates by risk r

new dependent variable for $r = 1, 2$; $y_{is}^{(r)} = \begin{cases} 0 & s < t_i \\ 0 & s = t_i,\ r_i \neq r \\ 1 & s = t_i,\ r_i = r \end{cases}$

Comparison within h_s^r is with "no event" + "any event other than r"

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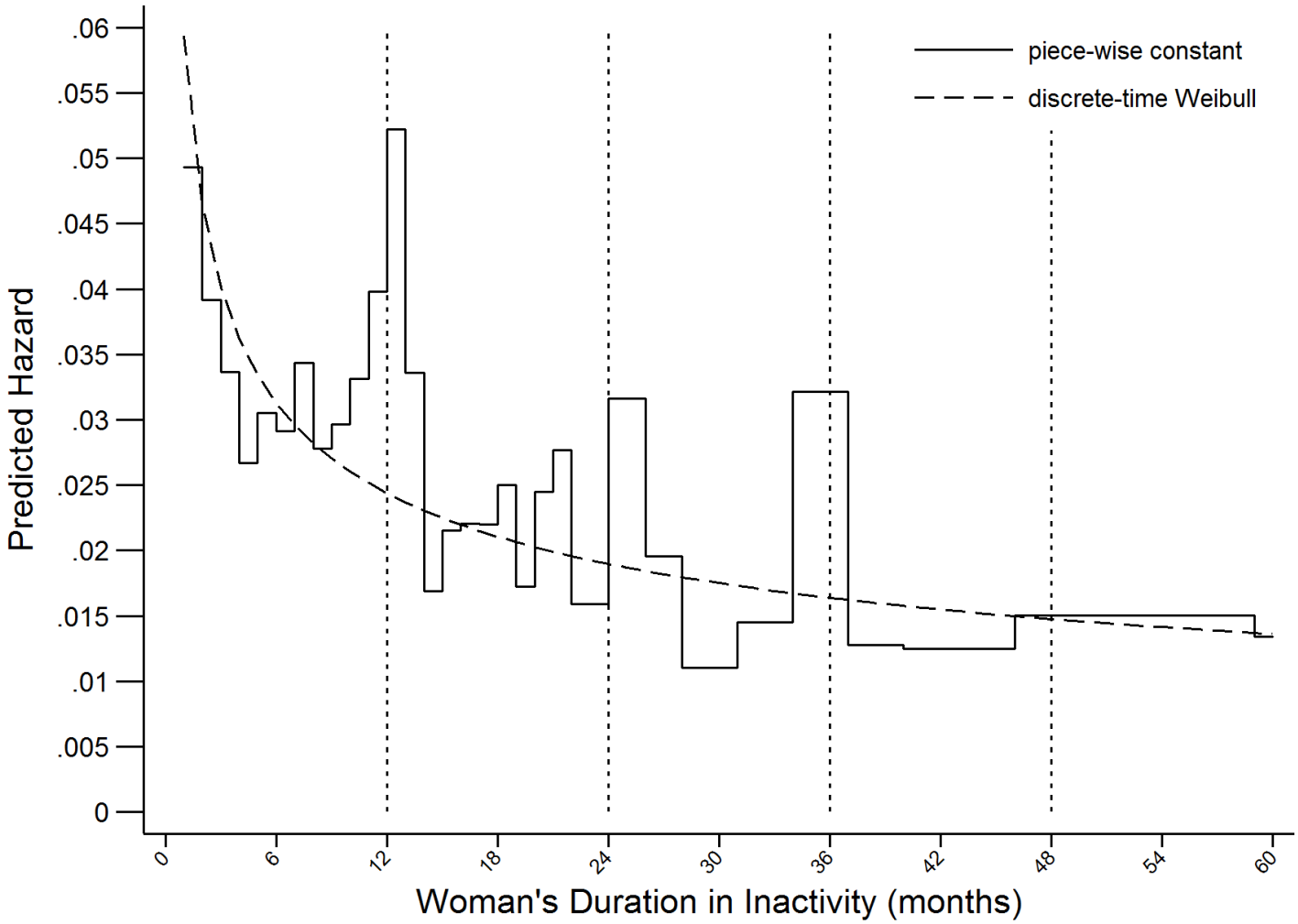
Predicted raw hazards - closer look at jumps around 12-month-durations



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Sensitivity Analysis: Partner's unemployment duration

Estimating Model I, with re-defined partner-unemployment using his unemployment duration.

	Estimate	Std. Error
Weibull, α	0.741^{***}	(0.019)
Partner's LM, ref: Employed		
Short-term Unemployed	0.684^{***}	(0.167)
Mid-term Unemployed	-0.239	(0.222)
Long-term Unemployed	-0.762^{***}	(0.175)
Inactive	0.175	(0.190)
Retired	-0.575^{***}	(0.208)
Long-term Sick	-0.392^{***}	(0.139)
Constant	-3.401^{***}	(0.275)
N	103,084	

Notes: $^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$. Standard errors are clustered at couple level and presented in parentheses.The control variables are the same as in Model I.

Sensitivity Analysis: Partner's transitions

	Estimate	Std. Error
Weibull α	0.745***	(0.019)
Partner's LM at t, ref: Employed (1)		
Non-Employed (2)	-0.123	(0.114)
Out-of-Labour-Force (3)	-0.398***	(0.124)
Partner's Transition from $t-1$ to t, ref: No transition		
(1) $\rightarrow$ (2)	0.174	(0.295)
(1) $\rightarrow$ (3)	-0.516	(0.999)
(2) $\rightarrow$ (1)	0.253	(0.247)
(2) $\rightarrow$ (3)	-0.213	(0.983)
(3) $\rightarrow$ (1)	-0.321	(1.008)
(3) $\rightarrow$ (2)	-0.018	(1.023)
Constant	-3.293***	(0.320)
N	101,844	

Notes: $^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$. Standard errors are clustered at couple level and presented in parentheses.The control variables are the same as in Model I.

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