

Labour market effects of a parental hospitalisation in the Netherlands

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Channels:

- Informal care giving
- (Mental) health effects

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- (Mental) health effects

Relevance:

- Income uncertainties not possible to insure against
- Unanticipated long-run financial consequences
- Reduction of tax and pension contributions

- Dutch labour market: high participation (60%) and high part-time rate (40%).
- Informal care giving in the Netherlands: wide-spread (20% intensive/prolonged care giving)
- Dutch long-term care system: comprehensive and accessible

Negative

- Parental health shock → Informal care giving ↑ → Employment/earnings ↓
- Parental health shock → Mental health problem ↑ → Employment/earnings ↓

Positive

- Parental hospitalisation → parent goes to nursing home → Employment/earnings ↑

No effect

Related to three strands of literature:

- Employment/earnings effects of informal care giving: e.g. Van Houtven et al. (2013)
- Health effects of parental health shocks: e.g. Bobinac et al. (2010)
- Labour market effects of a spousal cancer diagnosis: Jeon and Pohl (2017)

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- Employment/earnings effects of informal care giving: e.g. Van Houtven et al. (2013)
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Contributions:

- Focus on parents
- Broader health issues
- Administrative data without attrition → estimates for the whole population
- Quarterly data allowing to follow individuals over 18 quarters

CBS data 1990-2005 on

- Labour market outcomes, hospitalisations, and family links
- No informal care/mental health data

Sample selection criteria

- In the municipality register
- At least one parent still alive
- Aged 35-65
- Not more than one parental health shock

- Dependent variable: Employment and earnings
- Variable of interest: Parental unexpected hospitalisations based on main diagnosis (ICD-9CM)
 - Unexpected: based on opinion of a medical doctor
 - Examples: first time cancer, fractures, stroke, infectious disease, injuries
 - Avoids endogeneity problems

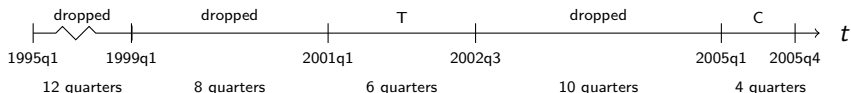
Control variables: Age, living with a partner, number of children below 13, number of jobs, tenure in the main job, gender

- Difference-in-difference model over multiple treatment periods
- Inverse probability weighting

Treatment and control group allocation

Assumption: health shock can have an impact 8 quarters before and 10 afterwards

Timing of the health shock and consequent Treatment (T) and Control (C) group allocation



- No shock in 1999-2005 \rightarrow C
- 6 treated cohorts, one control cohort attached to every treatment cohort

Difference-in-difference for multiple treatment cohorts (Hijzen et al., 2010; Jeon and Pohl, 2017) combined with IPW

$$y_{it} = \alpha_i + \alpha_t + \sum_{k=-7}^{10} \gamma^k q_{it}^k + \sum_{k=-7}^{10} \beta^k D_i q_{it}^k + \delta x_{it} + \varepsilon_{it} \quad (1)$$

Identifying assumption: Common trend assumption.

Illustration DiD with two treatment periods

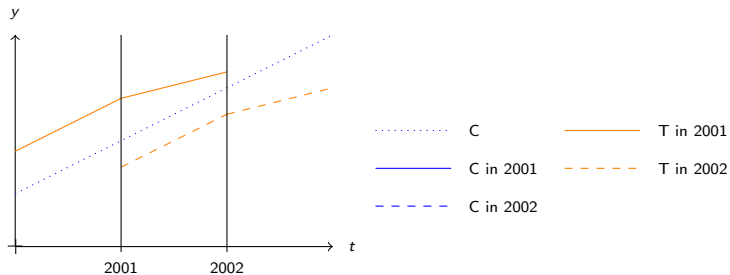


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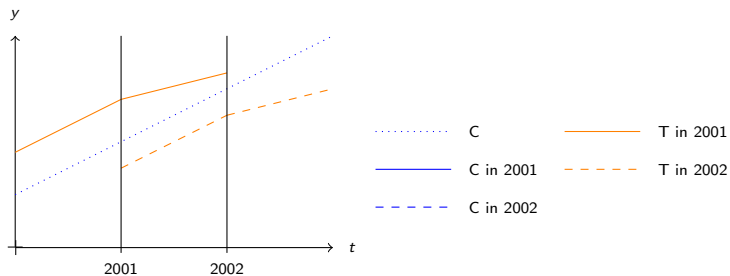


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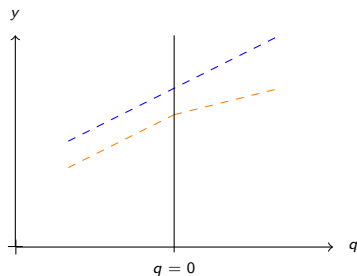
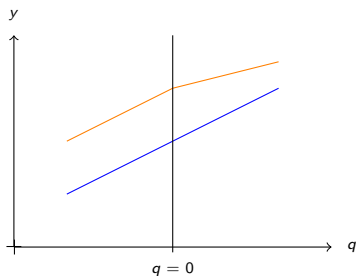
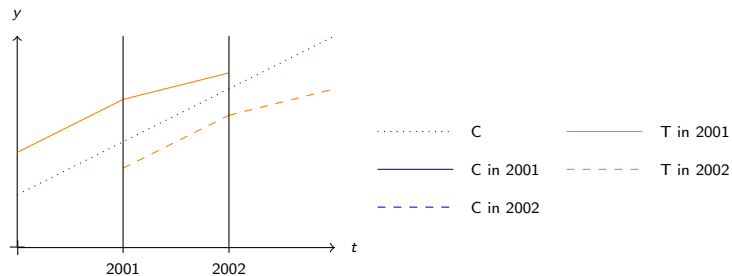


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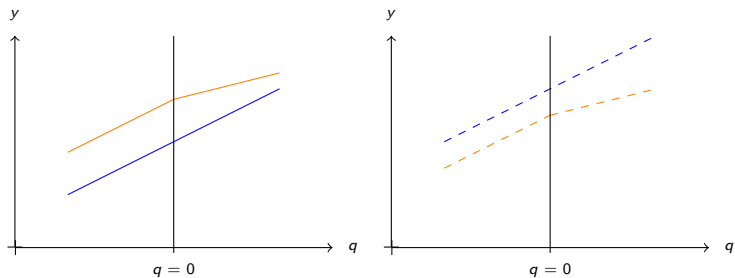
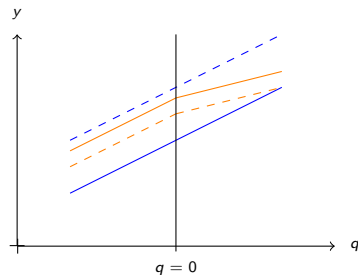
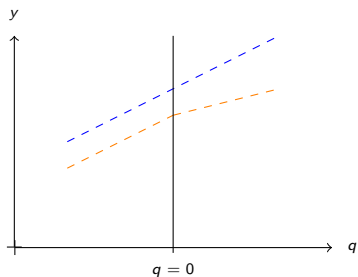
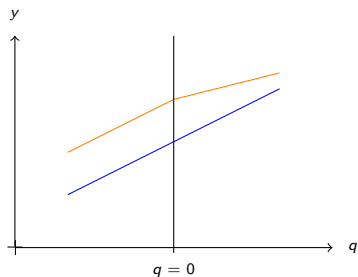
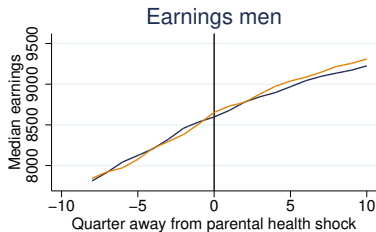
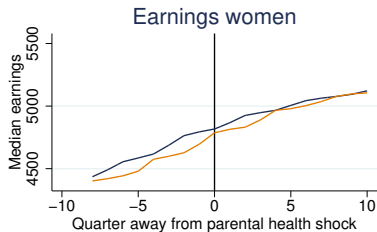
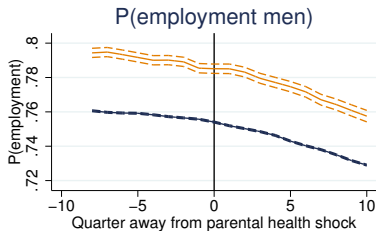
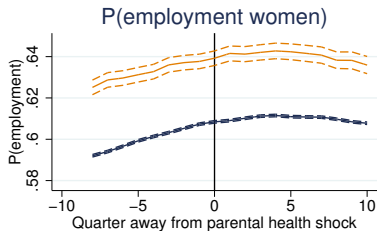


Illustration DiD with two treatment periods



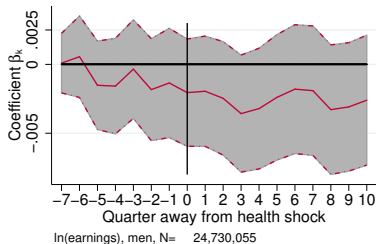
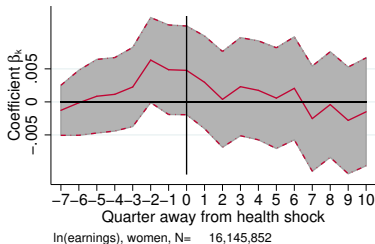
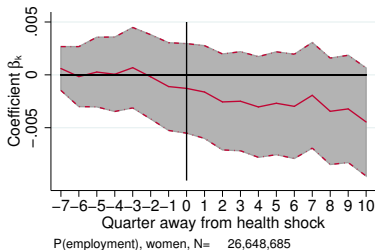
— C in 2001 — T in 2001
- - - C in 2002 - - - T in 2002

Employment and earnings trends



Earnings and employment effects of a parental health shock

Coefficient β_k with corresponding 95% confidence intervals.



Subsamples:

- Alone-living parents
- Employed one year before the shock
- Parents aged 80 and over
- Only children
- Close-living children
- Only children with alone and close living parents

Results:

- Mostly no effect.
- No IPW yet
- Common trend assumption sometimes violated

- Effect of an unexpected parental health shock on the probability of employment and conditional log earnings
- Difference-in-difference model combined with IPW.
- No effect of an unexpected parental health shock on labour market outcomes for men and women in the Netherlands

Finding: no effect

- Parental health shock $\overset{?}{\rightarrow}$ Informal care giving $\overset{?}{\rightarrow}$ Employment/earnings
- Parental health shock $\overset{?}{\rightarrow}$ Mental health problem $\overset{?}{\rightarrow}$ Employment/earnings

Next steps

- Explore these channels
- Follow labour market outcomes over a longer time period
- Coarsened exact matching instead of IPW

Theoretical model

Static time allocation model (extensions of Johnson and Lo Sasso, 2000)

$$\begin{aligned} \max_{c, t_w, t_c, t_l} \quad & U(c, t_w, t_c, t_l; h_o) = u(c) + v(1 - t_w - t_c) + x(h_p(t_c, t_o, s_p)) \\ & + g(h_k(s_p, 1 - t_w - t_c)) \\ \text{s.t.} \quad & wt_w = c \end{aligned}$$

$$w = \frac{\partial v(t_l)}{\partial t_w} \bigg/ \frac{\partial u(\cdot)}{\partial c} - \frac{\partial g(\cdot)}{\partial h_k(\cdot)} \frac{\partial h_k(\cdot)}{\partial t_w} \bigg/ \frac{\partial u(\cdot)}{\partial c} \quad (2)$$

$$\frac{\partial v(t_l)}{\partial t_c} = \frac{\partial x(\cdot)}{\partial h_p(\cdot)} \frac{\partial h_p(\cdot)}{\partial t_c} - \frac{\partial g(\cdot)}{\partial h_k(\cdot)} \frac{\partial h_k(\cdot)}{\partial t_c} \quad (3)$$

Women summary statistics treatment (T) and control (C) group raw and inverse probability weighted

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Raw Mean C	Employment Mean T	Diff	IPW Diff	Raw Diff	Earnings IPW Diff
Employed	0.607	0.638	-0.030***	-0.001	0.000	-0.000***
Earnings	5799.335	5522.185	277.150***	-350.948***	277.150***	-349.771***
Age	45.096	43.740	1.356***	-0.081***	0.777***	-0.076**
Age mother	73.866	72.373	1.493***	-0.059	0.874***	-0.048
Age father	76.513	74.960	1.553***	-0.223***	0.966***	-0.208***
Partnered	0.757	0.777	-0.020***	-0.001	-0.011***	0.000
Dutch	0.896	0.919	-0.023***	-0.001	-0.017***	-0.001
1st gen migrant	0.040	0.024	0.016***	0.000	0.011***	0.000
2nd gen migrant	0.064	0.057	0.007***	0.001	0.006**	0.002
No. of siblings	1.251	1.313	-0.062***	-0.011*	-0.047***	-0.008
No. of kids <13	0.477	0.500	-0.023***	0.001	-0.006	0.002
Father partnered	0.474	0.715	-0.241***	-0.009***	-0.221***	-0.009***
Mother partnered	0.463	0.698	-0.234***	-0.008***	-0.215***	-0.008**
Distance to mother	25.574	25.487	0.087	0.098	0.032	0.016
Distance to father	27.311	26.691	0.620***	0.150	0.673**	0.020
No. of jobs	1.076	1.077	-0.001		-0.001	-0.001
Tenure (main job)	33.781	32.639	1.142***		1.142***	-0.130
Dist. to closest parent				-0.147		-0.162
One parent dead				0.000		0.000
Age oldest parent				-0.215***		-0.199***
Number of obs. T			874,700	866,573	556,905	527,368
Number of obs. C			31,535,422	25,782,112	19,101,857	15,618,484

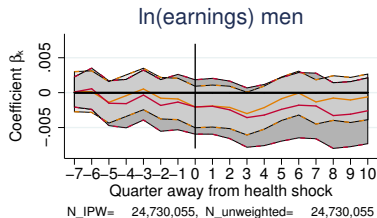
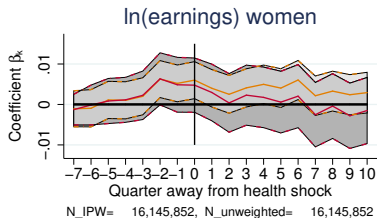
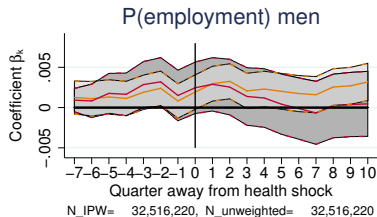
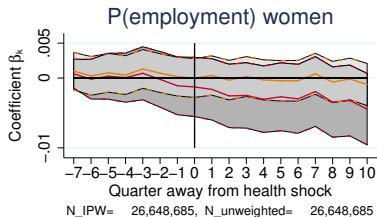
The significance of raw difference in means is tested with a t-test of equality of pre-treatment means with unequal variance in the period before the shock. For the IPW version, significance test from a weighted regression of the treatment indicator on the pre-treatment values of the respective variable is used. The number of jobs and tenure are not tested for the employment IPW version, as these are not included in the propensity score model. The distance to the closest parent, one parent dead, and the age of the oldest parent are not tested in the raw version because they are only used in the propensity score model.

Men summary statistics treatment (T) and control (C) group raw and inverse probability weighted

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Raw Mean Control	Employment Mean Treatment	Diff	IPW Diff	Raw Diff	Earning IPW Diff
Employed	0.756	0.785	-0.030***	-0.002	0.000	0.000
Earnings	10333.928	10339.340	-5.412	-270.234**	-5.412	-277.589**
age	45.135	43.850	1.285***	-0.069***	0.896***	-0.068***
Age mother	73.802	72.401	1.401***	0.002	0.992***	-0.005
Age father	76.489	74.962	1.527***	-0.218***	1.128***	-0.209***
Partnered	0.745	0.764	-0.019***	0.000	-0.014***	0.001
Dutch	0.888	0.917	-0.029***	-0.002	-0.024***	-0.002
1st gen. migrant	0.051	0.026	0.025***	0.001	0.019***	0.002
2nd gen. migrant	0.061	0.057	0.004***	0.001	0.005***	0.001
No. of siblings	1.264	1.308	-0.045***	-0.022***	-0.035***	-0.018***
No. of kids <13	0.640	0.674	-0.033***	0.003	-0.023***	0.007
Father partnered	0.466	0.712	-0.246***	-0.010***	-0.234***	-0.010***
Mother partnered	0.455	0.692	-0.237***	-0.010***	-0.226***	-0.010***
Distance to mother	23.280	23.633	-0.352**	0.263	-0.243	0.182
Distance to father	25.140	24.816	0.324*	0.038	0.447**	-0.052
No. of jobs	1.065	1.064	0.001		0.001	-0.002*
Tenure (main job)	39.977	38.332	1.645***		1.645***	-0.290*
Dist. to closest parent				0.057		-0.001
One parent death				-0.001		0.000
Age oldest parent				-0.179***		-0.180***
Number of obs. T			1,071,257	1,056,404	837,722	812,846
Number of obs. C			38,977,833	31,459,816	29,193,471	23,917,209

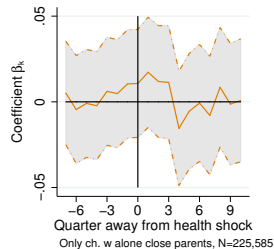
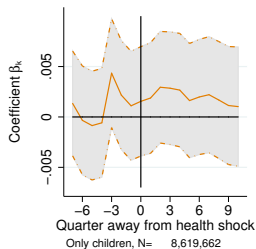
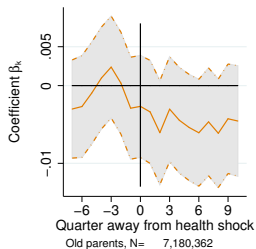
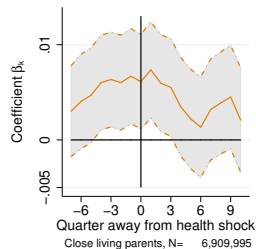
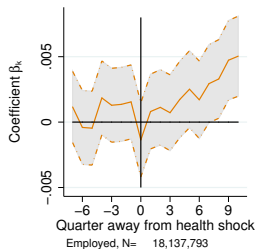
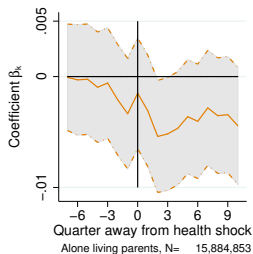
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Comparison results with and without IPW



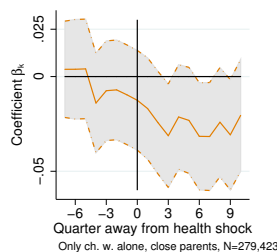
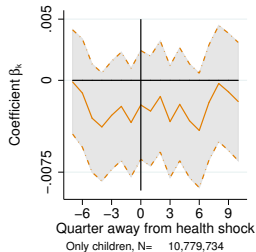
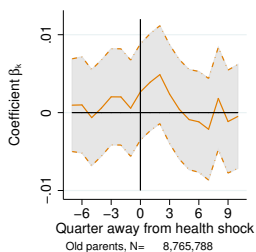
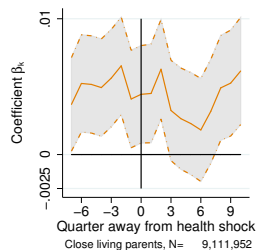
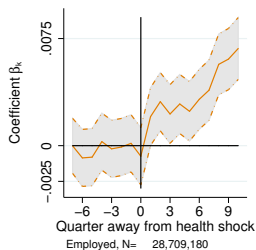
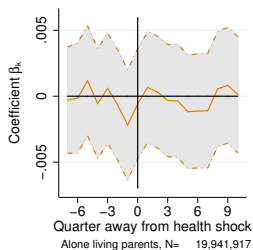
Subsample analysis for female employment probabilities

Coefficient β_k with corresponding 95% confidence intervals.



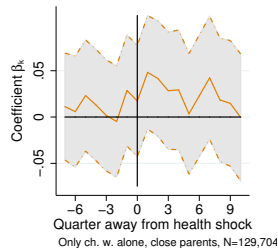
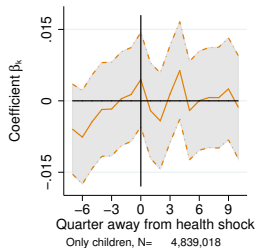
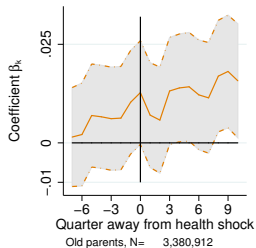
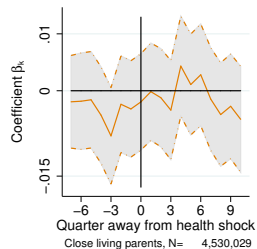
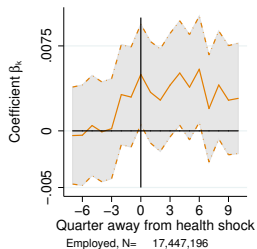
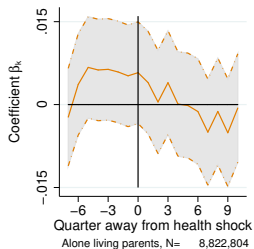
Subsample analysis for male employment probabilities

Coefficient β_k with corresponding 95% confidence intervals.



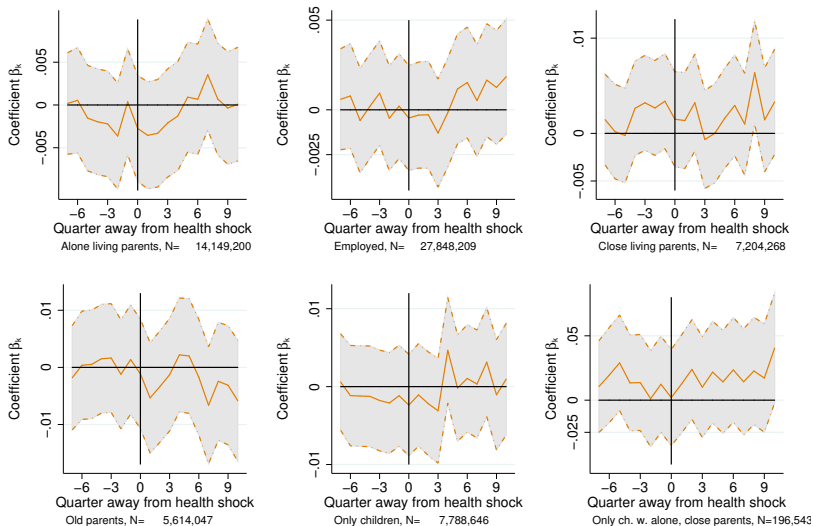
Subsample analysis for female conditional earnings

Coefficient β_k with corresponding 95% confidence intervals.



Subsample for male conditional earnings

Coefficient β_k with corresponding 95% confidence intervals.



Health shocks and the 23 most common diagnoses of Dutch Hospital Patients aged 65+ using LTC after hospitalisation (2004)

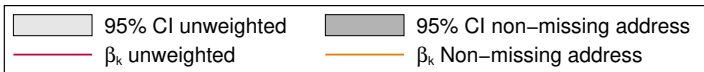
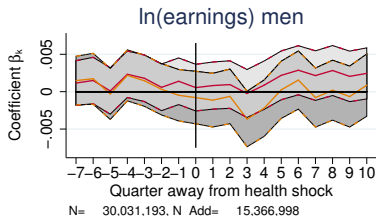
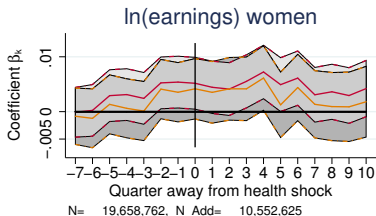
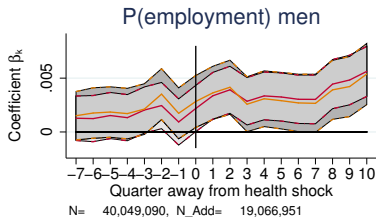
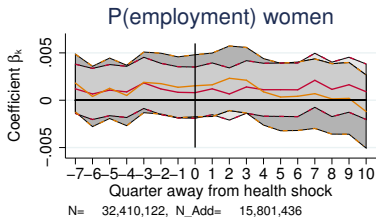
Health shock	Condition	% of sample	Formal care %	Home care %	home for the elderly %	nursing home %
1	Lung cancer	1,1	54,2	50,1	1,3	2,9
1	ovary cancer	0,2	51,9	47,3	1,9	2,7
1	Intestinal, stomach and rectum cancer	2,2	50,2	46,1	1,6	2,6
1	Uterus cancer	0,3	34,9	32	1,7	1,2
1	fracture of femur	1,7	53,8	29,9	5,5	18,4
1	fracture of ankle of lower leg	0,4	42,4	26,7	4,8	10,9
1	fracture of elbow and forearm	0,5	32,1	24,4	2,5	5,1
1	bladder cancer	1	25,8	23,9	0,6	1,3
1	prostate cancer	1,3	22,9	20,2	0,8	2
1	cerebrovascular disease	3,6	38,5	17,9	1,4	19,2
1	intracranial injury	0,6	27,1	17,4	2,2	7,5
0	Alcoholic liver disease	0,1	45,7	34,6	2,6	8,5
0	Coxarthrosis	3,5	37,7	29,6	3,4	4,7
0	Heart failure	3,3	35	29,4	2,3	3,3
0	Glomerular disorders	0,5	31,1	29	1	1,1
0	Infections of skin	0,4	32,8	28,4	1,2	3,2
0	schizophrenia	0,2	47,8	28,1	3,8	15,9
0	chronic obstructive pulmonary disease (COPD)	3,5	31,7	27,6	1,5	2,6
0	dementia	0,4	51,1	26,5	4,6	20
0	diabetes mellitus	4,1	31,9	26,3	1,5	4,1
0	alzheimer's disease	0,1	42,9	23,8	2,9	16,3
0	Gonarthrosis	2,6	29,7	23,1	2,1	4,5
0	Epilepsy	0,4	32,7	22,6	2,2	7,8
0	Other	72,4	13,4	11,8	0,7	0,9

Verification $\ln(\text{earnings})$ approximatively Normally distributed

	Women		Men	
	$\ln(\text{earnings})$	$Y \sim N(8.4, 0.55)$	$\ln(\text{earning})$	$Y \sim N(9.1, 0.32)$
mean	8,394975	8,399731	9,075875	9,096766
variance	0,553095	0,556337	0,318014	0,319397
p25	8,028538	7,897064	8,830327	8,713988
p50	8,484403	8,400166	9,06093	9,098362
p75	8,881151	8,902586	9,347593	9,47784
skewness	-0,81882	0,005172	-0,8134	-0,00014
kurtosis	5,79459	2,999172	12,36652	2,98175
N	19658762	100000	30031193	100000

The seed for the normal simulations is set at 239487.

Comparison unweighted sample with non-missing address sample



Reduction in observations due to IPW by treatment indicator

		Treatment group		Control group	
		No. obs	%	No. obs.	%
Women	Employment	8,127	0.9%	5,753,310	18.2%
	Earnings	29,537	5.3%	3,483,373	18.2%
Men	Employment	14,853	1.4%	7,518,017	19.3%
	Earnings	24,876	3.0%	5,276,262	18.1%

Note that observations means quarter-person observations in for the treatment group, and quarter-person observations multiplied by six in the control group.

- Aim: increase balance in observed covariates
- Propensity score model: regressing the probability of treatment on the 8 quarters pre-treatment means of covariates
 - correlated with post-shock labour market outcomes:
employment, living with a partner, and tenure and number of jobs
 - correlated with post-shock labour market outcomes and the probability of a parental health shock
number of children below 13, age, age of the oldest parent, first and second generation migrant indicators, living situation of both parents, the distance between residence of the individual and her father and mother, and an indicator of parental death
- Formal and informal balance tests

Propensity score estimation (probit coefficients)

VARIABLES	(1)	(2)	(3)	(4)
	Employment	Women Earnings	Employment	Men Earnings
Number of kids below 13	-0.110*** (0.00655)	-0.0991*** (0.00828)	-0.0836*** (0.00518)	-0.0805*** (0.00578)
Living with a partner	0.0252** (0.0118)	0.0175 (0.0147)	0.0555*** (0.0110)	0.0678*** (0.0129)
Age oldest parent	0.0340*** (0.000865)	0.0349*** (0.00108)	0.0338*** (0.000791)	0.0358*** (0.000893)
First Generation Migrant	-0.413*** (0.0304)	-0.266*** (0.0386)	-0.547*** (0.0265)	-0.456*** (0.0309)
Second Generation Migrant	-0.106*** (0.0198)	-0.0918*** (0.0244)	-0.0700*** (0.0179)	-0.0868*** (0.0204)
Age	-0.0190*** (0.00130)	-0.0189*** (0.00181)	-0.0161*** (0.00118)	-0.0173*** (0.00143)
Father partnered	0.719*** (0.0253)	0.716*** (0.0319)	0.759*** (0.0230)	0.745*** (0.0263)
Mother partnered	0.224*** (0.0242)	0.228*** (0.0304)	0.182*** (0.0219)	0.211*** (0.0251)
Dist. closest living parent in km	-0.000517*** (0.000112)	-0.000476*** (0.000139)	-0.000370*** (0.000103)	-0.000406*** (0.000116)
One parent dead	-0.231*** (0.0650)	-0.283*** (0.0889)	-0.312*** (0.0614)	-0.299*** (0.0722)
Employed	-0.0513*** (0.0102)	-0.0944** (0.0372)	-0.0111 (0.0111)	-0.000858 (0.0472)
Tenure in the main job		-0.000148 (0.000206)		-0.000406** (0.000163)
Number of jobs		0.0334 (0.0260)		-0.00142 (0.0207)
Observations	1,413,192	903,959	1,724,645	1,357,613
Number of obs. outside common support	26	126	40	19
P-value imbalance test	0.000	0.000	0.000	0.000

Percentage decrease from raw to weighted data in standardised mean/variance of the difference between treatment and control group

	Employment Women		Men		Earning Women		Men	
	mean	variance	mean	variance	mean	variance	mean	variance
Number of kids below 13	0.0	0.6	0.1	0.4	0.1	0.6	0.2	0.8
Living with a partner	0.4	0.3	0.7	0.4	0.4	0.9	0.3	0.1
Age oldest parent	<i>1.4</i>	0.6	0.8	0.6	0.8	0.6	0.6	0.5
First Generation Migrant	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1
Second Generation Migrant	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2
Age	0.4	<i>1.4</i>	0.4	<i>1.2</i>	0.6	<i>3.8</i>	0.5	<i>26.1</i>
Father partnered	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mother partnered	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Dist. closest living parent in km	0.8	0.1	0.4	<i>1.9</i>	<i>1.4</i>	0.5	0.4	<i>2.3</i>
One parent dead	0.1	0.2	0.0	0.1	0.1	0.1	0.0	0.1
Employed	0.3	0.9	0.1	0.0	0.3	0.3	0.6	0.6
Tenure in the main job					0.6	0.5	0.8	<i>4.1</i>
Number of jobs					1.0	0.8	<i>1.1</i>	0.7
Number of obs.	1413192		1724645		903959		1357613	

Increase in imbalance from raw to weighted is indicated in italics.

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