SICK HAPPENS: THE EFFECT OF WORKER HEALTH SHOCKS ON COWORKERS' EMPLOYMENT AND HEALTH BEHAVIOR

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Motivation

- Severe health shocks (e.g., cancer, cardiovascular disease) affect life of individuals significantly
  - → shocks often happen already during working life
  - → may reduce worker productivity significantly
- Prior work focuses on effects for the individual (see Prinz et al., 2018 for a review)
- Recent increasing literature considers spillover effects mainly to family members (Fadlon & Nielsen, 2019, Frimmel et al, 2023,...)
- **However:** Adults spend a significant amount of their time at work

This Paper

- We investigates **spillovers effects of severe health shocks to coworkers** — a largely unexplored channel.

- We consider cardiovascular (heart attack, strokes...) and cancer diagnosis as (possibly unanticipated) health shocks $\rightarrow$ have a significant impact on affected workers

$\rightarrow$ How does a coworker's severe health shock affect others' labor supply and health behavior?

- A health shock may affect coworkers in an ambiguous way:
  - **Information channel**: increased salience of personal health risks (Fadlon and Nielsen, 2019)
  - **Labor channel**: need to replace productivity of the shocked worker (Jäger and Heining, 2022)

This paper

- We link comprehensive admin data on labor market histories and health records from (Upper) Austria to identify coworker networks and severe health shocks
- To construct an appropriate control group, we follow Jäger and Heining (2022) and use a combination of exact and propensity score matching
- Using a **difference-in-difference framework**, we compare coworkers who experience a severe health shock of a colleague to similar coworkers without such an experience, before and after the (placebo) health shock

Our contribution

- we extend existing evidence by considering **coworkers' labor market outcomes and health behavior**
- Jäger and Heining (2022) focus on worker deaths and the labor market responses of coworkers $\rightarrow$ full loss of productivity
- We consider events mainly leading to **partial loss of productivity** and human capital
  - $\Rightarrow$ a more realistic and frequent scenario
  - $\Rightarrow$ Firms and coworkers may react differently to a partial/temporary substitution than to a full/permanent substitution
- we synthesize two strands of the literature that consider the spillover effects of health shocks on **health behavior** and **labor market responses**

Institutional Background (Austria)

- **Labor market:**
  - Austrian economy is characterized by rather small firms
  - Weak employment protection and high turnover (Böheim, 2017)
  - Most workers covered by collective bargaining (98%)
  - Low actual retirement age due to disability and early retirement
  - Employers influence their workers' decision to retire by offering special severance payments (Frimmel et al., 2018)
- **Healthcare system:**
  - Universal Bismarckian healthcare and public pension system
  - Health insurance provides access to a wide range of healthcare services (outpatient visits, inpatient care, prescription drugs) and health and cancer screening programs

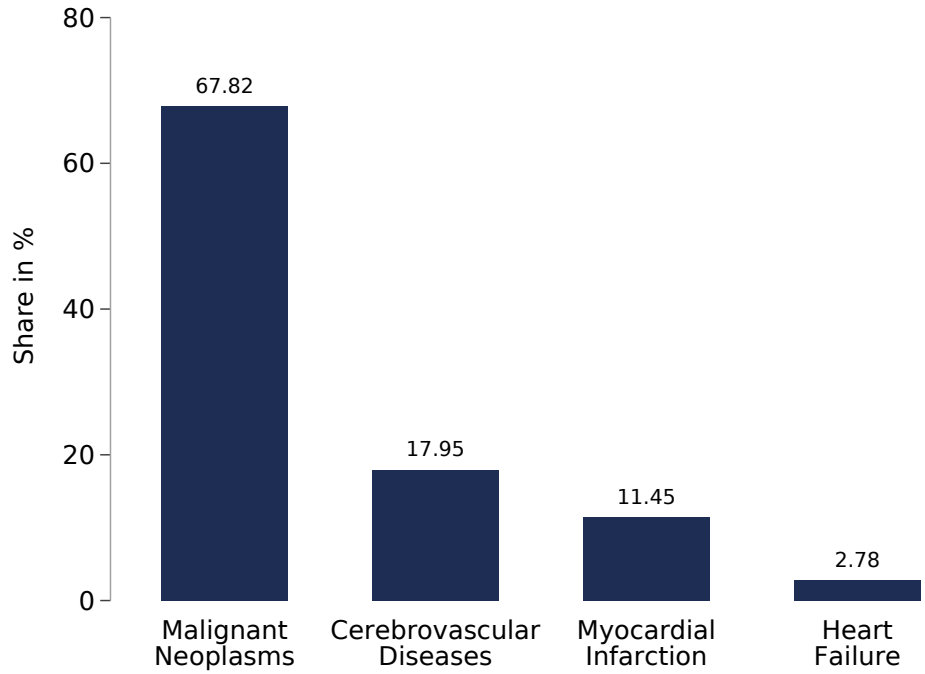
Data

- Austrian Social Security Database (ASSD)
  - workers' employment and earnings histories
  - basic socio-economic characteristics
  - firm information and coworker networks
- Health care utilization data (Upper Austrian Health Insurance Fund)
  - outpatient sector: expenditure for medical attendance (GPs, medical specialists) and medical drugs (ATC), participation in (cancer) screening exams
  - inpatient sector: hospital expenditure and hospital days (ICD-10)
  - sick leave days (incl. diagnosis)
- Payslip data for measuring golden handshakes (Frimmel et al., 2018)

Sample

- Severe health shocks of workers $\rightarrow$ first recorded hospitalisation for cancer or severe cardiovascular diseases
- individuals are employed and aged between 15 and 65 at the time of the shock
- only firms that
  1. do not have multiple first shocks in the same quarter
  2. employ more than three workers in all quarters that a firm is observed
  3. are observed without any gaps
  4. are observed for at least four consecutive quarters
  5. where all workers are insured in Upper Austria
- Focus on small firms (< 50 employees) and older coworkers ($\geq$50 years)

Distribution of Health Shock Types



Note — The figure shows the distribution of the different types of severe health shocks in the main estimation sample. The health shocks are identified based on the admission diagnoses recorded in the hospital data.

Identification of Health Shocks

- Similar to approach of Jäger and Heining (2022)
- **Treatment group:** all worker-firm pairs that experience a worker's first severe health shock between 2006 and 2018.
- **Control group:** from pool of all worker-firm pairs of firms without health shock experience until 2018
- Using a combination of exact and propensity score matching $\Rightarrow$construct for each worker-firm pair treated in quarter s a control group of similar worker-firm pairs from firms without a severe health shock
- we use firm and worker characteristics measured in $s-4$

Matching

- **Treated:** coworkers of workers who actually experience a health shock
- **Controls:** coworkers who have a colleague without a health shock but
  - colleague is similar to an actual shock worker
  - coworker is employed in a firm without a health shock with similar characteristics to a shocked firm
- **Firm characteristics:**
  number of workers, *industry*, the median wage, age composition of workforce, age of firm, share of women, share of white-collar workers, share of non-Austrian citizens in the workforce
- **Worker characteristics:**
  age in five-year categories, daily earnings, *collar status*, *gender*, *citizenship*, and whether a worker is *insured in Upper Austria*

Final sample

- we construct a panel at the coworker-quarter level up to 12 quarters before and 12 quarters after the (placebo) health shock
- restrict the sample to firms that employ no more than 50 workers four quarters before the health shock
- include only shock workers and coworker who have been employed at the shock firm for at least four quarters prior to the health shock
- we only include observations up to the quarter of of a potential second shock at the firm and/or coworker level (about 18 percent)

Descriptive Statistics

	Ø Full	Ø Treatment	Ø Control	Diff.	Stand. Diff. in %	N
	(1)	(2)	(3)	(4)	(5)	(6)
Shock Firm Characteristics						
Firm Size	16.721	16.886	16.548	0.337	3.11	49,600
% Blue Collar	38.761	38.232	39.318	−1.086	−3.39	49,600
% Women	50.276	48.759	51.869	−3.110	−9.08	49,600
Avgerage Age	43.133	43.262	42.996	0.266	5.06	49,600
% Non-Austrian Citizens	7.513	7.110	7.936	−0.826	−6.52	49,600
Average Daily Wage	77.156	77.715	76.569	1.147	3.72	49,600
Coworker Characteristics						
Treated	0.512	1.000	0.000	1.000***	0.00	49,600
Demographic Characteristics						
Female	0.516	0.504	0.528	−0.024	−4.77	49,600
Age in Years	52.992	52.943	53.045	−0.102	−2.85	49,600
Age at Shock in Years	54.572	54.523	54.624	−0.101	−2.91	49,600
Non-Austrian Citizen	0.063	0.061	0.065	−0.004	−1.71	49,600
Labor Market Outcomes						
Employment Days	88.736	88.765	88.705	0.060	0.44	49,600
Employed at Shock Firm	0.921	0.920	0.922	−0.002	−0.83	49,600
Blue Collar	0.433	0.424	0.443	−0.019	−3.82	48,807
Daily Wage	72.088	72.405	71.754	0.651	1.82	48,173
Tenure in Quarters	36.205	36.120	36.294	−0.173	−0.53	48,807
Health Outcomes						
Sick Leave Days (All Causes)	2.357	2.277	2.442	−0.164	−2.00	48,950
Easy-to-Fake Sick Leave Days	0.114	0.109	0.118	−0.009	−0.62	48,934
Inpatient Exp.	95.907	93.676	98.255	−4.579	−0.59	48,321
Outpatient Exp.	94.230	92.933	95.596	−2.663	−1.57	48,321
Medication Exp.	30.099	25.547	34.893	−9.346***	−6.94	48,321
Exp. Preventative Health Check-Up	2.910	2.858	2.965	−0.107	−0.73	48,935
Exp. PSA Screening	0.486	0.476	0.498	−0.022	−1.10	23,561
Exp. Mammography	4.079	4.021	4.136	−0.116	−0.72	25,381
Dermatology Exp.	1.668	1.585	1.756	−0.171	−1.57	48,321
Radiology Exp.	5.183	5.025	5.350	−0.326	−1.61	48,321

Empirical Strategy

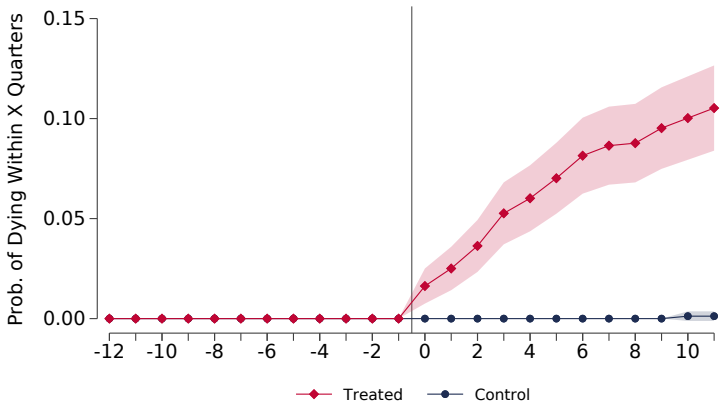
- we estimate the following two-way fixed effects (TWFE) model:

$$y_{iq} = \alpha_i + \beta \cdot \mathbb{1}\left(q \geq 0\right)_q + \delta \cdot \left[\mathbb{1}\left(q \geq 0\right)_q \times HS_i\right] + \boldsymbol{\gamma} \boldsymbol{X}_{iq} + \varepsilon_{iq}$$

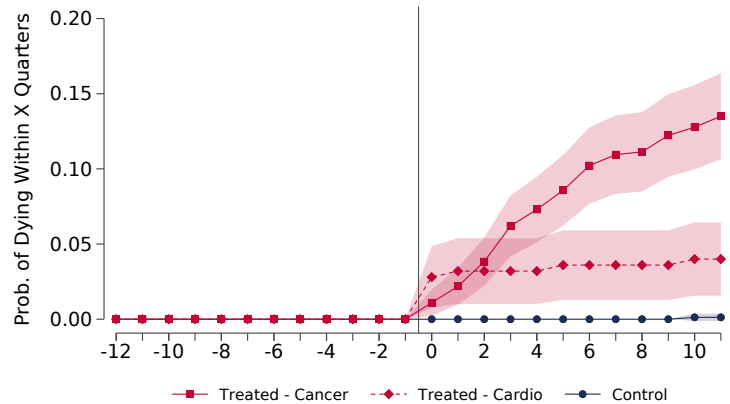
- $\mathbb{1}\left(q \geq 0\right)_q$ is a binary indicator that is equal to one for the post-treatment period
- HS_i is a binary indicator equal to one for those coworkers who actually experience the health shock
- $\boldsymbol{X}_{iq}$ are calendar year $\times$ birth year fixed effects to flexibly control for age and general trends in the outcome variable.
- Dynamic TWFE and Sun & Abraham (2021) approach as robustness

Mortality of shocked workers

(a) Overall

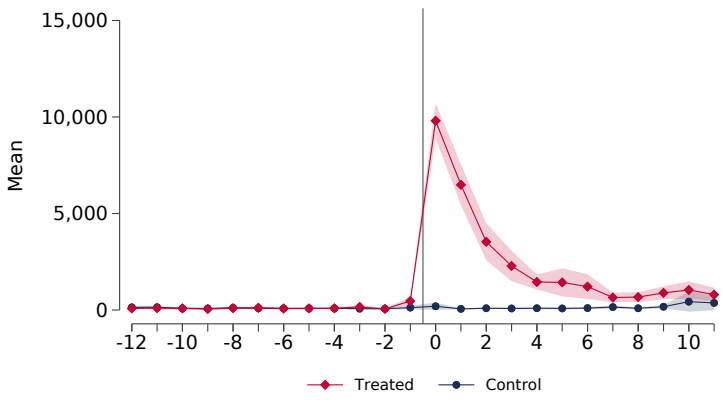


(b) By Type of Health Shock

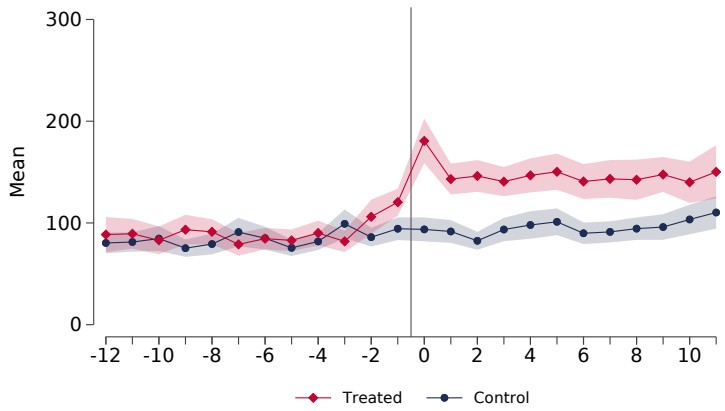


Health Effects of shocked workers

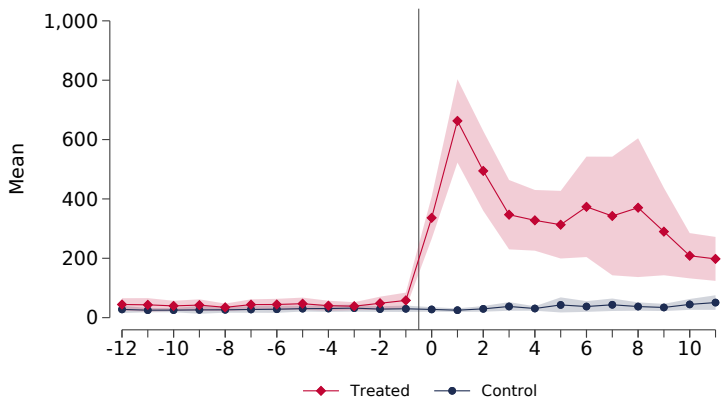
(c) Inpatient Expenditures



(d) Outpatient Expenditures

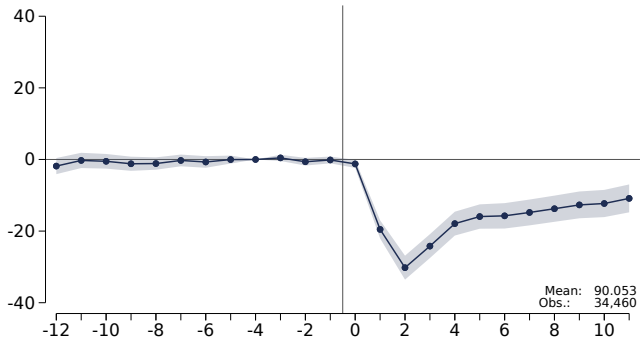


(e) Medication Expenditures

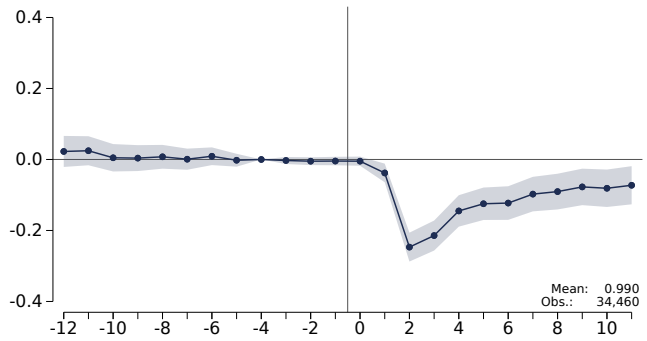


Labor Market Effects of shocked workers

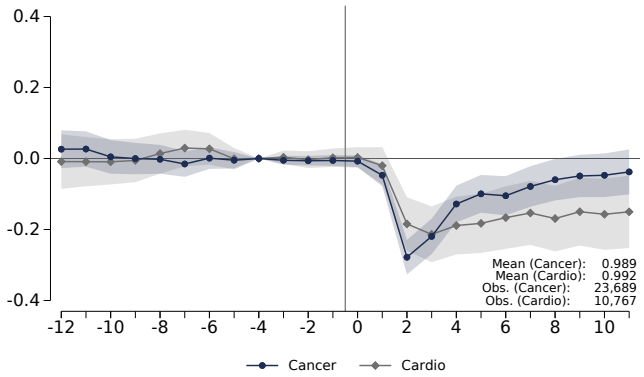
(f) Employment Days



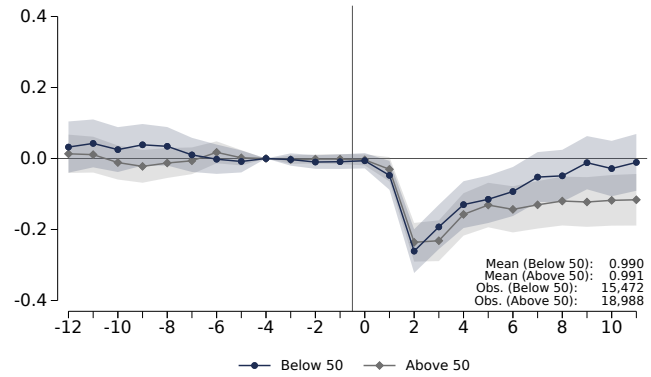
(g) **P**(Employed at Shock Firm)



(h) **P**(Employed at Shock Firm) By Shock Type



(i) **P**(Employed at Shock Firm) By Age of Shock Worker



Labor Market outcomes of coworkers

	Employment		Retirement	Wages	
	Days	**P**(Employed at Shock Firm)	Days	Log Daily Wage	Wage Growth
	(1)	(2)	(3)	(4)	(5)
Health Shock × Post	1.0676*	0.0232*	-1.0506**	0.0022	-0.0002
	(0.6159)	(0.0139)	(0.4612)	(0.0059)	(0.0015)
Individual FE	✓	✓	✓	✓	✓
Year × Birth Year FE	✓	✓	✓	✓	✓
N	93,058	93,058	93,058	84,129	79,482
# Clusters	1,605	1,605	1,605	1,604	1,604
p-Value of Pre-Coefficients	0.218	0.541	0.246	0.687	0.579
Outcome Mean	88.705	0.922	7.829	4.130	0.006
Effect in % of Mean	1.204	2.520	-13.419	0.053	-3.746

Note — Standard errors are clustered at the shock firm level. $^{*}\ p < 0.1, {}^{**}\ p < 0.05, {}^{***}\ p < 0.001.$

Health outcomes of coworkers

	Sick Leave Days		**P**(Expenditures $>$ 0)		
	All Causes	Easy-to-Fake Diagnoses	General Health Check-Up	PSA Screening	Mammography
	(1)	(2)	(3)	(4)	(5)
Health Shock $\times$ Post	-0.1002	0.0043	0.0009	0.0044	0.0064*
	(0.1912)	(0.0283)	(0.0022)	(0.0044)	(0.0034)
Individual FE	✓	✓	✓	✓	✓
Year $\times$ Birth Year FE	✓	✓	✓	✓	✓
N	91,862	91,830	91,829	43,788	48,050
# Clusters	1,605	1,605	1,605	958	1,128
p-Value of Pre-Coefficients	0.009	0.442	0.293	0.061	0.645
Outcome Mean	2.442	0.118	0.040	0.060	0.065
Effect in % of Mean	-4.103	3.593	2.186	7.300	9.726

Note — Standard errors are clustered at the shock firm level. $^{*}\ p < 0.1, {}^{**}\ p < 0.05, {}^{***}\ p < 0.001.$

Health behavior effects stronger when:

- Coworker and shocked worker are similar (gender, age)
- Shock due to cancer

Shock Worker heterogeneity

	Employment				Retirement		**P**(Expenditures > 0)	
	Days		**P**(Employed at Shock Firm)		Days		Mammography	
Wage Percentile of	$\leq 75^{th}$	$> 75^{th}$	$\leq 75^{th}$	$> 75^{th}$	$\leq 75^{th}$	$> 75^{th}$	$\leq 75^{th}$	$> 75^{th}$
Shock Worker	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Health Shock $\times$ Post	0.4024	2.5464**	0.0080	0.0586**	-0.4244	-2.2705***	0.0076*	0.0048
	(0.7581)	(1.0516)	(0.0161)	(0.0267)	(0.5487)	(0.7921)	(0.0042)	(0.0059)
Individual FE	✓	✓	✓	✓	✓	✓	✓	✓
Year $\times$ Birth Year FE	✓	✓	✓	✓	✓	✓	✓	✓
N	61,342	31,715	61,342	31,715	61,342	31,715	30,729	17,321
# Clusters	1,039	570	1,039	570	1,039	570	734	397
p-Value of Pre-Coefficients	0.232	0.471	0.203	0.498	0.102	0.488	0.181	0.945
Outcome Mean	88.419	89.179	0.921	0.925	7.310	8.590	0.066	0.064
Effect in % of Mean	0.455	2.855	0.869	6.337	-5.805	-26.432	11.515	7.526

Note — Standard errors are clustered at the shock firm level. $^{*}\ p < 0.1, {}^{**}\ p < 0.05, {}^{***}\ p < 0.001.$

Productivity of Shock Worker

	Employment				Retirement		**P**(Expenditures $>$ 0)	
	Days		**P**(Employed at Shock Firm)		Days		Mammography	
Productivity of Shock Worker	Low	High	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Health Shock $\times$ Post	0.2493	2.4080***	0.0132	0.0371*	-0.3556	-2.1753***	0.0062	0.0058
	(0.8641)	(0.8401)	(0.0178)	(0.0213)	(0.6328)	(0.6143)	(0.0044)	(0.0054)
Individual FE	✓	✓	✓	✓	✓	✓	✓	✓
Year $\times$ Birth Year FE	✓	✓	✓	✓	✓	✓	✓	✓
N	49,322	43,472	49,322	43,472	49,322	43,472	29,195	18,714
# Clusters	865	736	865	736	865	736	650	474
p-Value of Pre-Coefficients	0.033	0.403	0.564	0.843	0.213	0.949	0.646	0.837
Outcome Mean	88.136	89.292	0.921	0.923	7.891	7.726	0.062	0.069
Effect in % of Mean	0.283	2.697	1.430	4.022	-4.506	-28.155	9.955	8.340

Note — Standard errors are clustered at the shock firm level. $^{*}\ p < 0.1, {}^{**}\ p < 0.05, {}^{***}\ p < 0.001.$

Heterogeneity by leaving of Shock Worker

	Employment				Retirement		Wages			
	Days		**P**(Employed at Shock Firm)		Days		Log Daily Wage		Wage Growth	
Shock Worker Leaves Firm	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Health Shock × Post	2.0715**	0.0172	0.0441*	-0.0014	-1.4503**	-0.5479	-0.0040	0.0066	-0.0015	0.0005
	(0.9329)	(0.7916)	(0.0231)	(0.0153)	(0.6566)	(0.6267)	(0.0105)	(0.0055)	(0.0029)	(0.0010)
Individual FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year × Birth Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
N	45,785	47,273	45,785	47,273	45,785	47,273	41,362	42,766	39,037	40,444
# Clusters	827	782	827	782	827	782	826	782	826	782
p-Value of Pre-Coefficients	0.440	0.497	0.816	0.433	0.073	0.797	0.932	0.199	0.779	0.685
Outcome Mean	88.025	89.379	0.911	0.933	8.275	7.371	4.115	4.145	0.005	0.007
Effect in % of Mean	2.353	0.019	4.837	-0.148	-17.528	-7.433	-0.096	0.160	-27.676	7.478

Note — Standard errors are clustered at the shock firm level. $^{*}\ p < 0.1, {}^{**}\ p < 0.05, {}^{***}\ p < 0.001.$

Golden Handshakes

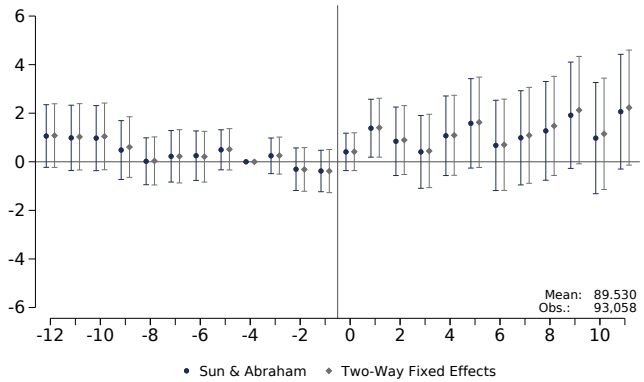
	All Observations		Coworkers Leaving the Labor Market	
	(1)	(2)	(3)	(4)
Health Shock	0.0101**	0.0105**	0.0349**	0.0300*
	(0.0047)	(0.0046)	(0.0162)	(0.0173)
Coworker Characteristics	✓		✓	
Shock Worker Characteristics	✓		✓	
Shock Year FE		✓		✓
Coworker Age at Shock FE		✓		✓
Shock Worker Age at Shock FE		✓		✓
N	1,564	1,564	435	435
# Clusters	632	632	299	299
Outcome Mean	0.0026	0.0026	0.0095	0.0095

Note — The results are based on a cross-section of all coworkers. Sample only includes health shocks before 2010. Standard errors are clustered at the shock firm level. $^{*}\ p < 0.1, {}^{**}\ p < 0.05, {}^{***}\ p < 0.001.$

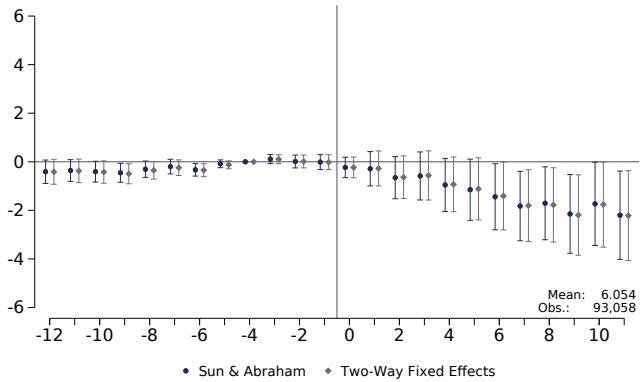
Robustness Checks

- Dynamic DiD and Sun & Abraham correction confirm parallel trends

(j) Employment Days



(k) Retirement Days



- Results robust to:
  - Weighting by firm size
  - Relaxing pre-treatment employment restrictions

Conclusion

- We find evidence for spillover effects of health shocks at the workplace $\rightarrow$ coworkers about 2.3 percentage points more likely to be employed in the shock firm and significantly delay retirement
- no evidence for changes in daily earnings or wage profiles, but firms compensate their loyal employees with special severance payments
- effects on employment and retirement are larger when the health shock affects a high-skilled worker and when shock workers leave the firm
- female coworkers are about 9.73 percent more likely to have a mammography after a cancer-related health shock
- no significant effects on male screening participation or coworker absenteeism.

$\Rightarrow$ older coworkers step in to compensate for the (partial) loss of labor supply to the firm associated with the severe health shock

Comparing Matched and Non-Matched Worker-Firm Pairs

	Ø All Obs.	Ø Matched	Ø Non-Matched	Diff.	Stand. Diff. in %	N
	(1)	(2)	(3)	(4)	(5)	(6)
Firm Characteristics						
Firm Size	16.996	11.897	21.153	−9.256***	−92.45	2,302
% Women	46.470	52.265	41.744	10.521***	32.53	2,302
% Blue Collar	40.473	36.112	44.028	−7.916***	−24.74	2,302
% Non-Austrian Citizens	8.460	6.243	10.269	−4.026***	−30.39	2,302
Average Worker Age	40.681	40.793	40.590	0.203	3.61	2,302
Avgerage Daily Wage	79.277	75.148	82.645	−7.496***	−28.21	2,302
Firm Age	17.534	18.343	16.874	1.470***	11.08	2,302
Worker Characteristics						
Matched	0.449	1.000	0.000	1.000***	0.00	2,302
Demographic Characteristics						
Age	48.017	47.648	48.317	−0.669*	−7.36	2,302
Female	0.438	0.512	0.378	0.134***	27.17	2,302
Non-Austrian Citizen	0.079	0.025	0.124	−0.099***	−38.25	2,302
Labor Market Outcomes						
Employed at Shock Firm	0.878	0.952	0.818	0.134***	42.84	2,302
Employment Days	89.819	90.044	89.608	0.435	5.14	2,137
Blue Collar	0.453	0.416	0.488	−0.072***	−14.48	2,137
Daily Wage	73.556	69.136	77.703	−8.566***	−24.95	2,136
Unemployment Days	1.405	1.145	1.648	−0.503	−5.67	2,137
Retirement Days	0.556	0.355	0.745	−0.390	−5.52	2,137
Health Outcomes						
Sick Leave Days (All Causes)	2.053	2.049	2.056	−0.007	−0.11	2,114
Hospital Days	0.156	0.173	0.141	0.032	3.13	1,977
Outpatient Expenditures	90.827	87.797	93.665	−5.868	−3.22	1,977
Medication Expenditures	44.490	38.514	50.086	−11.572	−4.80	1,977
GP Expenditures	23.147	23.271	23.030	0.241	0.68	1,977