

# Health and labor market consequences of low-value care: The role of practice style

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# Motivation

- ▶ Mental health problems are a leading cause of disability and suicide worldwide
- ▶ Increasing **awareness** of the social and economic burden of mental illnesses has contributed to growing mental health care costs:
  - ▶ Increasing consumption of **psychotropic drugs**
  - ▶ Treatment practice hardly follows **guidelines** (Currie and McLoad, 2020, Cuddy and Currie 2021)
  - ▶ Concerns about overdiagnosis and **overtreatment** (e.g., Hertzberg et al., 2021)
- ▶ **Physician role** in determining the right treatment
  - ▶ Substantial **variation** in the intensity of health care services driven by differences in **physician practice style** (e.g., Cutler et al. 2019)
  - ▶ **Primary care** is the most frequently utilized health service and often determines the **initial treatment**

# Benzodiazepine: an example of low-value care treatment

- ▶ Benzodiazepines (e.g., Valium, Xanax) are part of the **symptomatic** management of mental health disorders
- ▶ **Choosing Wisely** often lists them among low-value care treatments
  - ▶ **Cheap** drug that provides **short-term** relief from insomnia and anxiety symptoms
  - ▶ Highly **addictive** with important side-effects
  - ▶ Less effective than CBT (e.g., Baranov et al. 2020)
- ▶ Still among the most prescribed drugs in **primary care**
  - ▶ Adult prevalence is high (e.g., US 12%) and increases sharply with age
  - ▶ “Hidden ingredient” in the **opioids epidemics** (Park et al. 2015)

# This paper

- ▶ Evaluate the effects of GPs practice style in prescribing benzodiazepines on long-term **health** and **labour** market outcomes:
  - ▶ **Step 1:** Using administrative data about 1.2 million patients in Dutch general practitioner (GP) practices, we estimate an arguably exogenous GP **propensity** to prescribe benzodiazepines
  - ▶ **Step 2:** **Dynamic DiD** that compares the health and labor market outcomes of patients treated by GPs with different propensities after an **exogenous** mental health shock: the **death** of a close **relative**
- ▶ After the shock, patients enrolled in more “lenient” GP practices:
  - ▶ are more likely to get a benzodiazepine prescription
  - ▶ most prescriptions are against Dutch guidelines
  - ▶ have higher **health care expenditure**
  - ▶ shows **worse** labor market trajectories (income ↓, employment ↓, disability and unemployment benefits ↑)

## Related literature

- ▶ **Variation** in health care and **physicians' practice style** (Skinner, 2011, Finkelstein et al. 2016, Cutler et al., 2019)
  - ▶ **Quasi-random assignment** in ambulance referrals and to doctor in emergency departments (Doyle et al. 2011 and 2015, Eichmeyer and Zhang, 2021)
  - ▶ Doctor's adherence to **guidelines** (Abaluck et al., 2020, Currie and MacLeod, 2020, Finkelstein et al., 2022)
- ▶ **Mental health** related studies:
  - ▶ Antidepressant (AD) for adolescent and children (Cuddy and Currie 2020 and 2021)
  - ▶ AD for **post-partum** depression (Currie and Zwiers 2021)
  - ▶ **Labour market** impacts of ADs (Biasi et al., 2021; Butikofer et al., 2020; Masiero et al., 2020; Shapiro, 2022)
- ▶ **Studies on benzodiazepines** in control settings or observational studies
  - ▶ associated with increasing falls (Luta et al. 2020), emergency visits (Hampton et al., 2014), dementia (De Gage et al., 2014)
  - ▶ Increasing overdose mortality (Bachhuber et al. 2016)

# Background: Dutch Healthcare System

## Primary care

- ▶ Gatekeeper GP system, where GP care is free for the patient
  - ▶ GP work in 'practices'
  - ▶ GP can be freely chosen, but:
    - ▶ Practice must be within 15 minutes driving distance
    - ▶ Practice must be accepting patients
- ⇒ leaves limited space for doctor shopping

## Mental health care

- ▶ The starting point of mental health treatment in the Netherlands is the GP
- ▶ For severe cases need referral from GP
- ▶ Waiting lists: for anxiety, waiting times are around 12-15 weeks in 2019-2021
- ▶ Since 2009, benzodiazepines are no longer reimbursed

# Data

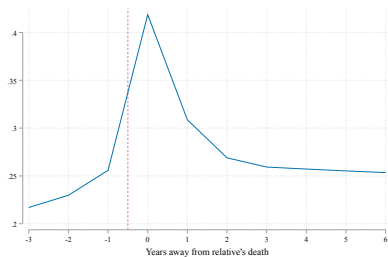
- ▶ GP data
  - ▶ Subsample of around 500 Dutch GP practices covering 1.2 million patients (2009-2019): prescriptions and diagnoses (Nivel data)
  - ▶ Link this via social security number
- ▶ Administrative data (CBS)
  - ▶ Labour market outcomes
  - ▶ Health insurance expenditure
  - ▶ Demographics
  - ▶ Address data
- ▶ From GP data we can identify 5 potentially inappropriate prescriptions (Red-Flags):
  - ▶ long treatment period ( $> 3$  months)
  - ▶ no mental health diagnoses
  - ▶ no therapy after the first diagnosis
  - ▶ treatment for light anxiety
  - ▶ joint prescription with opioids.

# Research Design

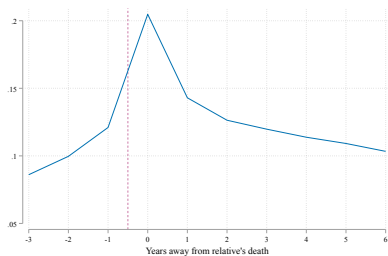
- ▶ **Ideal experiment:** compare outcomes of (otherwise identical) individuals treated for an anxiety or insomnia issues by doctors with different practice style. In practice:
  - ▶ **Selection** of worsts into high prescribers
  - ▶ **Different trajectories** before treatment
  - ▶ **Pre-treatment** effect due to previous interactions
- ▶ How we address these issues:
  - ▶ The Dutch context mitigates the selection concerns (Currie and Zwiers 2023)
  - ▶ We focus on patients with a common (exogenous) mental health trigger: relative's death (child, partner, parents or siblings) between 2010-2019
  - ▶ We focus on patients with no benzo, anxiety, insomnia, depression before shock (3 years)



# Relative's death, mental health and benzodiazepines



(a) Mental health diagnoses



(b) Benzodiazepine prescription

## Step 1: Practice Propensity to Prescribe

On the whole sample of Nivel patients, we estimate our prescribing propensity measure using a leave-out (jackknife) residualized approach:

$$prescribed_{ijt} = \delta_0 + \gamma_t + \gamma_{wc} + \gamma_d + \delta x_{it} + \varepsilon_{ijt}$$

- ▶  $\gamma_t$ : time fixed effects
- ▶  $\gamma_{wc}$ : neighborhood fixed effects
- ▶  $\gamma_d$ : MH diagnoses fixed effect
- ▶  $x_{it}$ : gender, nationality, marital status, 5-years age bins

**Practice propensity to prescribe benzodiazepines:**

$$pp_i^j = \frac{1}{N_{-i}^j} \sum_{i' \neq i} \sum_t \hat{\varepsilon}_{i'jt} \quad (1)$$

- ▶ Rescale:  $\frac{pp_i^j}{p(90) - p(10)}$
- ▶ Interpretation: moving from the 10th (low-prescribing) to the 90th percentile (high-prescribing)

# Step 1: Practice Propensity to Prescribe

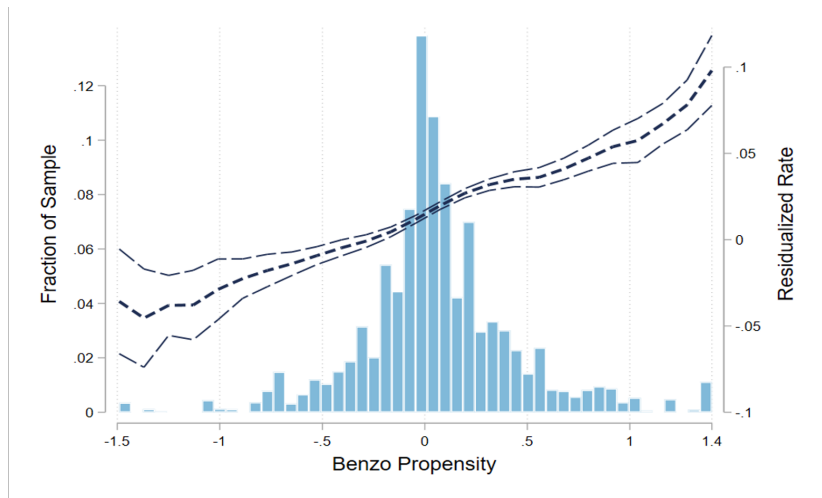
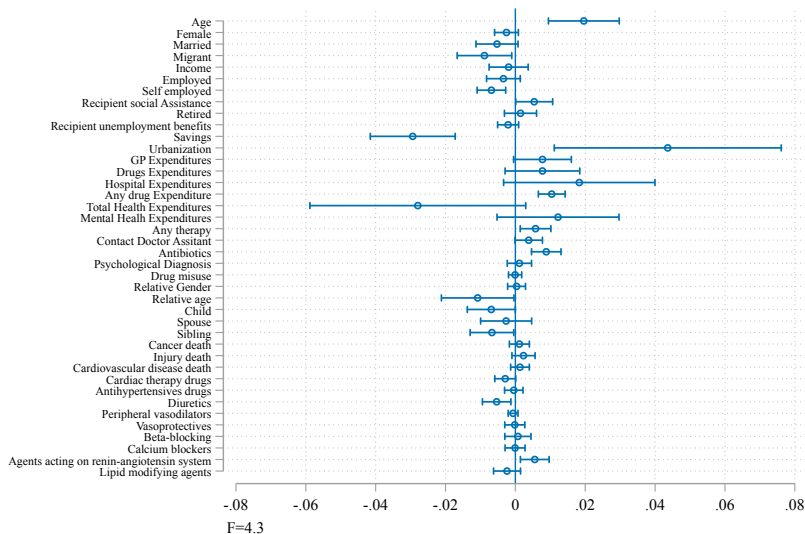
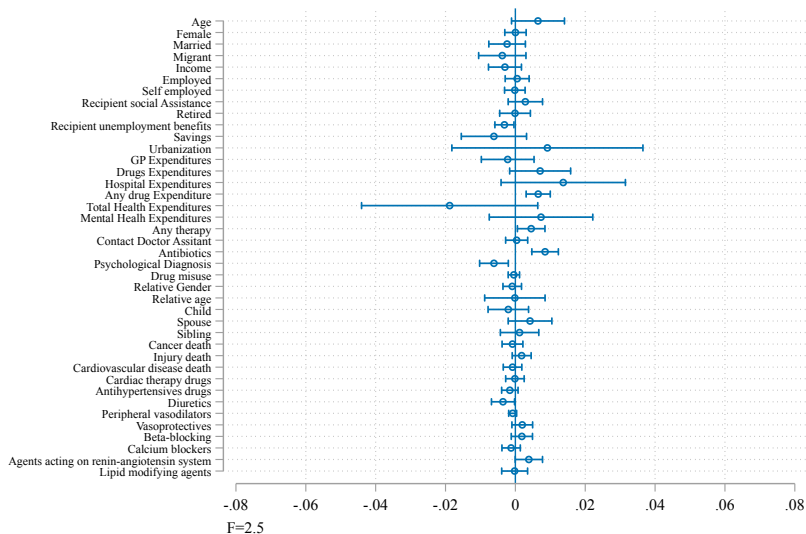


Figure: Propensity distribution

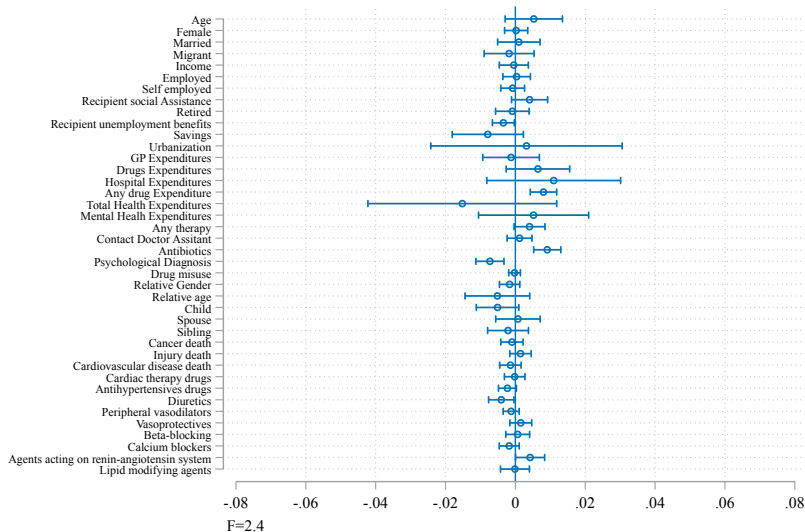
# Balancing test: unconditional



# Balancing test: Conditional on neighborhood FE



# Balancing test: Conditional on neighborhood FE and SES



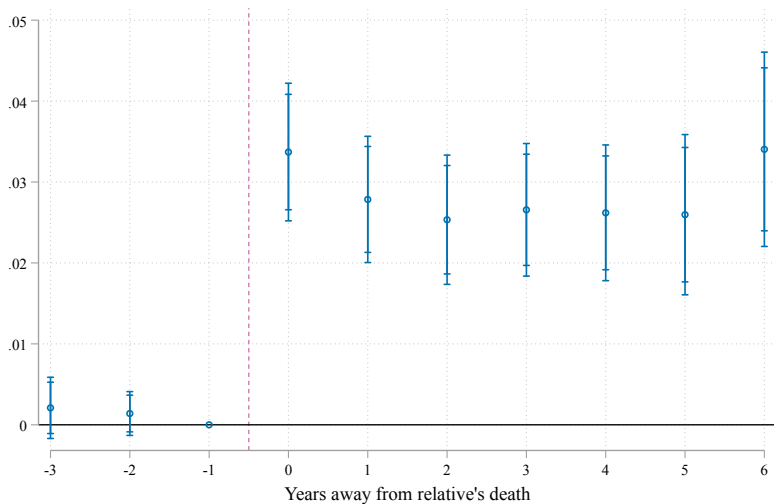
## Step 2: Main Estimating Equation

### Staggered Event Time DiD:

$$Y_{it} = \alpha_i + \alpha_t + \sum_{k=-3}^6 \delta^k \tau_{it}^k + \sum_{k=-3}^6 \gamma^k \tau_{it}^k \cdot pp_i^j + \delta x_{it} + \varepsilon_{ijt}$$

- ▶  $\alpha_i, \alpha_t$ : individual and time fixed effects
- ▶  $x_{it}$ : 5 years age bins
- ▶ Coefficient of interest:  $\gamma^k$
- ▶ Event-time  $\tau$ : time away from the relative loss
- ▶ Main outcomes: Benzodiazepine Prescriptions, Healthcare Expenditures, Income, employment, social assistance

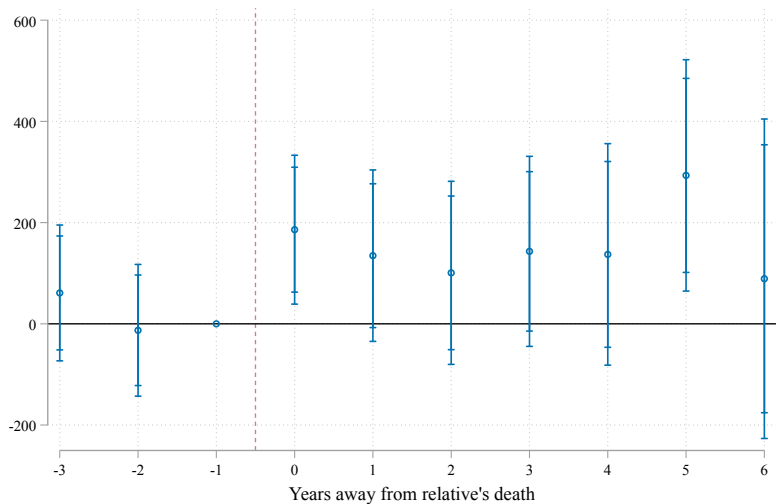
# Benzodiazepine Take Up



▶ Red flags



# Healthcare Costs



▶ breakdown

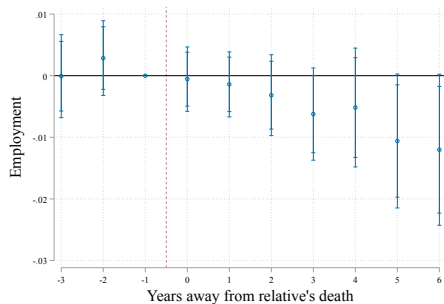
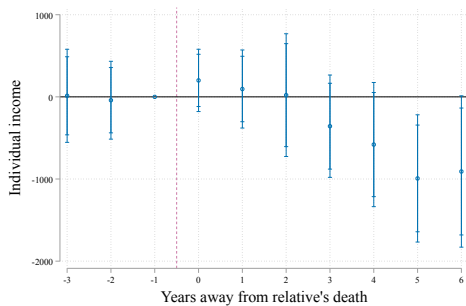
## Main results: benzodiazepine and health expenditure

	Benzo prescription	Any red flag prescription	Health expenditure	Mental health expenditure
Short (0–1 years)	0.0304*** (0.0036)	0.0072*** (0.0011)	144.91** (67.11)	22.68 (30.62)
Medium (2–3 years)	0.0247*** (0.0035)	0.0102*** (0.0016)	139.40* (84.53)	40.91 (37.16)
Long ( $\geq 4$ years)	0.0268*** (0.0040)	0.0075*** (0.0017)	218.21** (103.30)	36.92 (52.69)
N	760'087	760'087	760'087	760'087
Pre Period Mean	0	0	2061.32	184.53

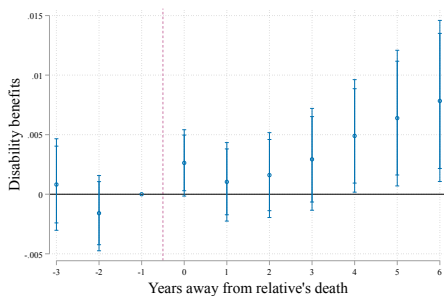
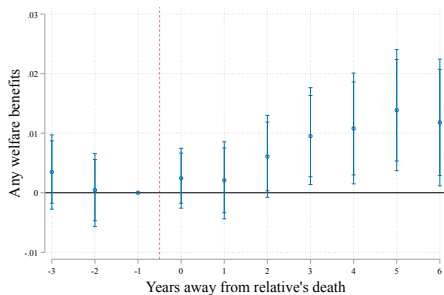
# Summing up I

- ▶ We find a clear increase in benzodiazepine prescription of patients treated by lenient GPs relative to their counterparts treated by strict physicians
  - ▶ The difference in prescription rates is remarkably stable over time
  - ▶ A large share of these prescriptions are against current guidelines
- ▶ People treated by lenient GPs also experience a large increase in health care expenditure that increase over time
- ▶ Such increase is mainly driven by hospital expenditure (both inpatient and outpatient care)

# Individual income and employment



# Probability of social assistance and disability benefits



## Main results: labor market outcomes

	Income	Employment	Social Ass.	Disability
Short (0–1 years)	152.42 (201.51)	-0.0017 (0.0022)	0.0011 (0.0026)	0.0021 (0.0014)
Medium (2–3 years)	-136.31 (312.82)	-0.0052* (0.0029)	0.0064* (0.0033)	0.0024 (0.0017)
Long ( $\geq 4$ years)	-759.01** (366.51)	-0.0091** (0.0043)	0.0107** (0.0042)	0.0061*** (0.0023)
N	533'264	533'264	533'264	533'264
Pre Period Mean	37'552	0.8673	0.1037	0.0402

## Summing up II

- ▶ Individuals treated by lenient GPs also experience a gradual deterioration of their labor market trajectories
  - ▶ Negative effects on income start to materialize after three years from the shock
  - ▶ This is partially driven by a decrease in employment probabilities
  - ▶ Social assistance benefits increase significantly after 2 years
  - ▶ We also find a remarkable increase of people ending up in disability schemes

# Results interpretation

- ▶ Are these “reduced form effects” due to differences in benzodiazepine prescription rates across GPs, or due to other GPs differences correlated with prescribing leniency?
  - ▶ We check whether there are similar increases in other drugs
    - ▶ AD and opioid
  - ▶ We construct a leniency measures based on antibiotics
    - ▶ AB leniency
  - ▶ Placebo exercise using a different shock (tbd)



# Heterogeneity and Robustness checks

- ▶ Heterogeneity by [sex](#) and [age](#)
  - ▶ mostly driven by the older subsample, not clear by gender
- ▶ TWFE bias: Sun and Abraham estimator [link](#)
- ▶ More balanced cohorts [link](#)
- ▶ Excluding cancer deaths [link](#)
- ▶ Excluding one relative at time [link](#)

# Conclusions

- ▶ We find that doctors prescribing style strongly influences individual health and labor trajectories after a common mental health shock
- ▶ This doctors are more like to prescribe benzodiazepine to their patients often for too long, out of current guidelines
- ▶ We cannot exclude that some of the effect is also due to other treatments behaviors associated with their leniency to prescribe benzodiazepines
- ▶ Future research will devoted to:
  - ▶ better pin down the exact mechanisms behind the health and labor market effects
  - ▶ explain the determinants of the variation in prescribing behavior and its correlation with diagnosis skills

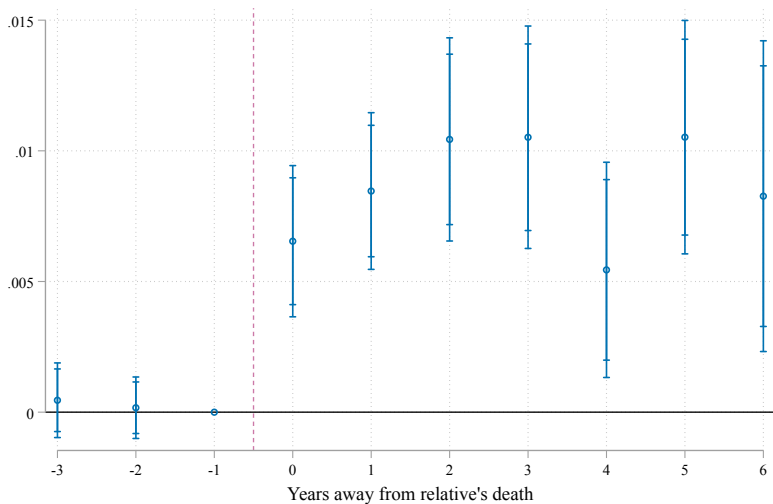
# Appendix

## Red flags (RF) benzodiazepine prescriptions

	Mean	SD	25 <sup>th</sup>	75 <sup>th</sup>
Share of patients with a benzo prescription	0.0815	0.0738	0.0096	0.1426
RF 1: 1 <sup>st</sup> prescription and no justifying diagnosis	0.0576	0.0302	0.0448	0.0683
RF 2: 1 <sup>st</sup> prescription and only light anxiety	0.0304	0.0166	0.0170	0.0416
RF 3: prolonged prescriptions (more than 3 months)	0.0978	0.0335	0.0763	0.1271
RF 4: 1 <sup>st</sup> prescription with anxiety but no therapy	0.0128	0.0101	0.0059	0.0192
RF 5: benzo and opioids in the same month	0.0625	0.0205	0.0506	0.0762
Any RF prescription	0.2204	0.0509	0.1892	0.2596

Notes:  $N = 3,941$  practice  $\times$  years. Red-flag 1-5 are always in relation to the total number of patients with benzodiazepine prescriptions in a year. Source: Nivel and Statistics Netherlands microdata.

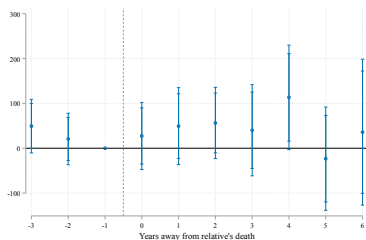
# Red Flag prescriptions



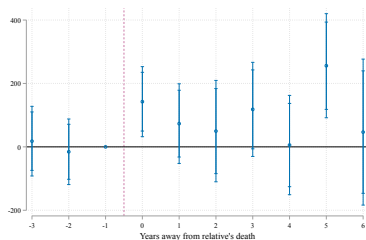
▶ back

# Decomposing health care expenditure

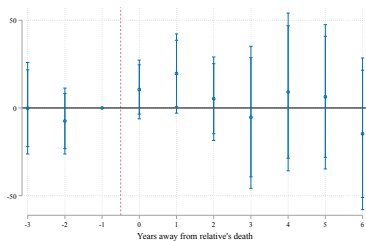
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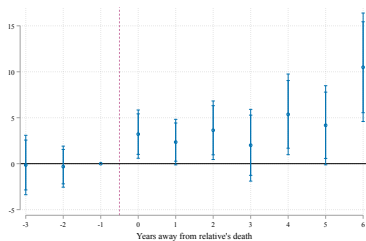
(a) Mental health care



(b) Hospital and specialists



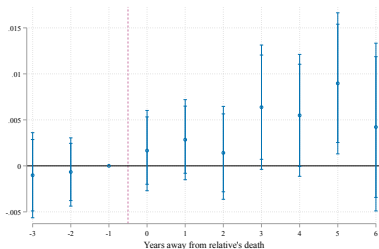
(c) Drugs



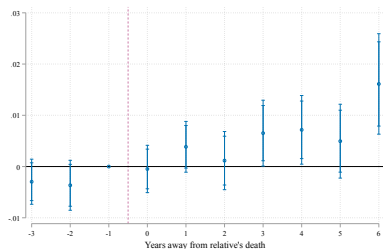
(d) GPs

# Antidepressants and Opioids prescriptions

▶ back

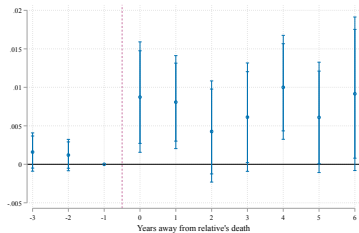


(a) Antidepressants prescriptions

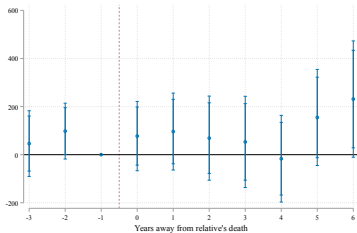


(b) Opioids prescriptions

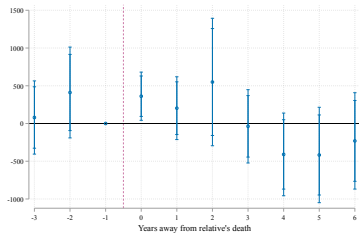
# Antibiotics leniency [▶ back](#)



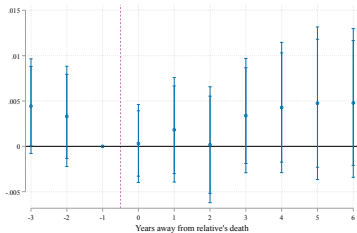
(a) Benzodiazepine prescriptions



(b) Health care expenditure



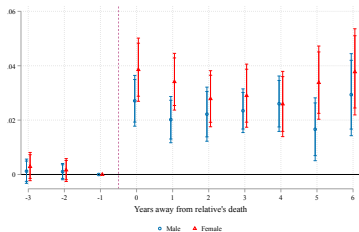
(c) Income



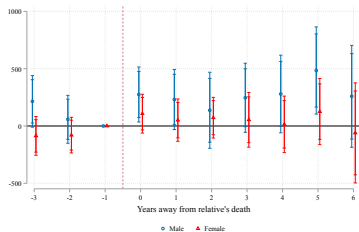
(d) Social assistance



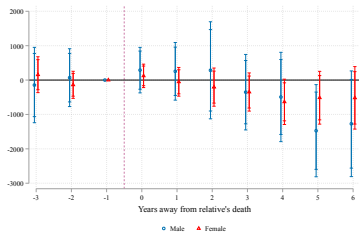
# Gender heterogeneity [▶ Back](#)



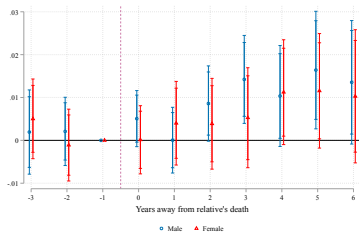
(a) Benzodiazepine prescriptions



(b) Health care expenditure

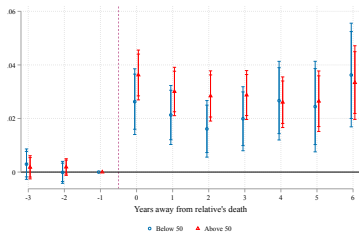


(c) Income

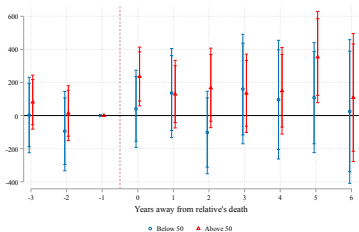


(d) Social assistance

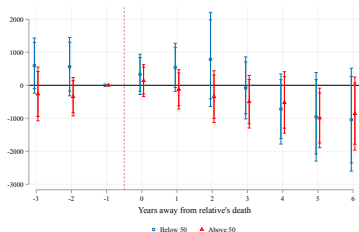
# Age heterogeneity ▶ Back



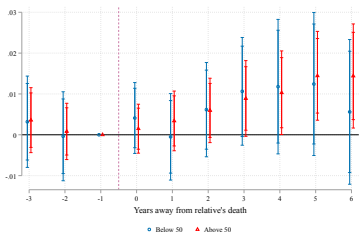
(a) Benzodiazepine prescriptions



(b) Health care expenditure

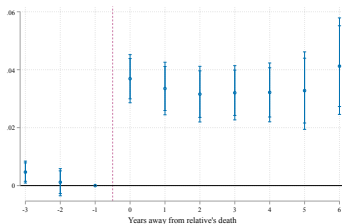


(c) Income

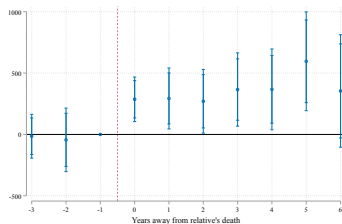


(d) Social assistance

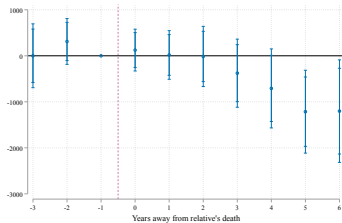
# Sun and Abraham ▶ Back



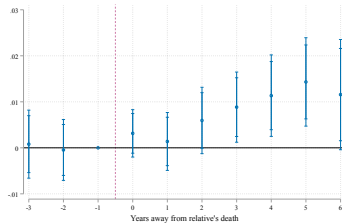
(a) Benzodiazepine prescriptions



(b) Health care expenditure

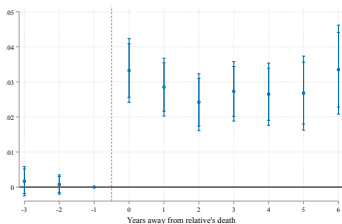


(c) Income

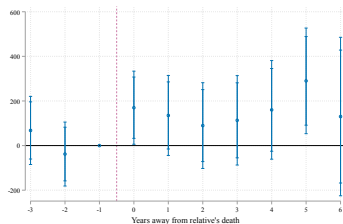


(d) Social assistance

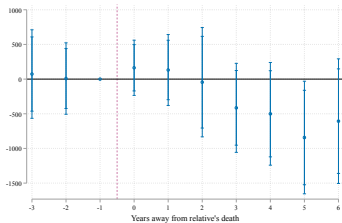
# Balancing cohorts (2011–2018) ▶ Back



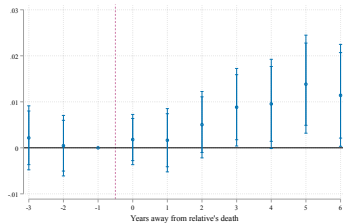
(a) Benzodiazepine prescriptions



(b) Health care expenditure

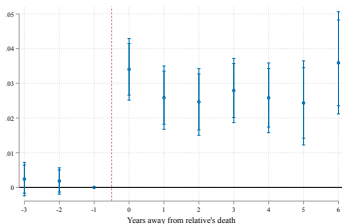


(c) Income

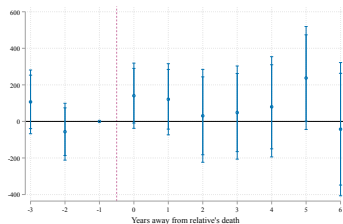


(d) Social assistance

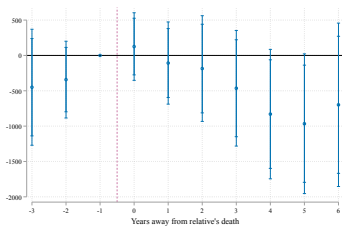
# Excluding cancer ▶ Back



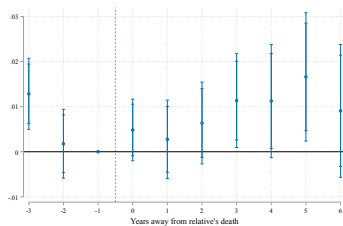
(a) Benzodiazepine prescriptions



(b) Health care expenditure

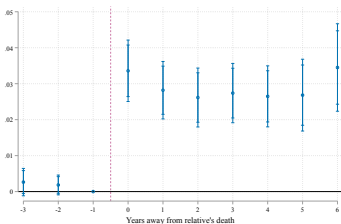


(c) Income

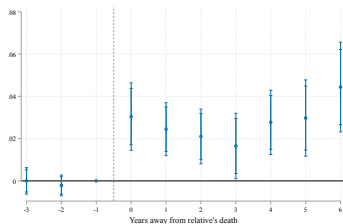


(d) Social assistance

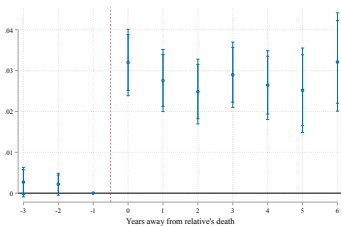
# Relative's death heterogeneity: benzodiazepine ▶ Back



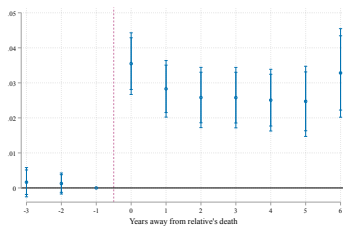
(a) No children



(b) No parents



(c) No spouse



(d) No siblings