Sick Leave Claims and Labor Supply

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Applied Proseminar

Motivation

Social insurance is one of the major functions of governments

- Insurance against adverse shocks: health shocks, work injury, unemployment
- Trade off between protection against risk and minimizing moral hazard

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- Sick leave benefits and sickness absence behavior:
    - labor supply, labor productivity, population health
    - the functioning of social insurance systems

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Research question: what is the optimal paid sick leave system?

- Insured workers adapt their work-absence behavior to the generosity of the system
- Workers do not internalize negative externalities created by contagious diseases
- Expenditure on sick leaves: 0.79% of GDP in OECD countries (Poblete, I. & Rivera, J., 2017)

Sickness Insurance System

Rationale

- Consumption smoothing and risk sharing
- Preserve population health (Bana et al., 2019)
- Prevent the spread of diseases (Pichler et al., 2020)

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Challenges

- Moral Hazard (Einav and Finkelstein, 2018; Johansson and Palme, 2005)
  - responsiveness of work-absence behavior to the generosity of the sickness-insurance system
- Unobserved heterogeneity:
  - workers with preferences against absences tend to be more productive
  - workers with preferences favoring absences tend to request larger leaves
- Hidden information regarding the individual's health status

This paper

Chilean Sickness Insurance System

- Common features with other systems to reduce moral hazard
- Non-payable waiting period and increasing replacement rate
- Funded entirely through employee payroll tax deductions

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- Administrative data on claims 2010 - 2018
- Match individuals to their employment records

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Methodology

- Develop a structural model of work-absence behavior
  - Adverse selection and moral hazard
  - Externalities created by contagious diseases
  - Non-linear budget sets: non-payable waiting periods, non-constant replacement rates
- Counterfactual analysis: welfare implications of changes in the benefits

Contribution to the literature

Design of public insurance programs

Aron-Dine, Einav, and Finkelstein (2013), Einav and Finkelstein (2018), Chetty (2008, 2009), Chetty and Finkelstein (2013),Cutler and Zeckhauser (2000), Gruber (1997), Hendren (2017)

Empirical literature on sickness insurance system

Banaa et al. (2019), Hansen (2016), Johansson and Palme (2005), Maclean et al. (2020), Pichler et al. (2020), Ziebarth and Karlsson (2010), Ziebarth (2013).

→ Optimal design of sickness insurance system

→ What are the consequences of non-linearities present in current systems?

Overview

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Institutional details: Health Insurance System

Eligibility criteria:

- All wage-earners are mandated to get health insurance
- The mandatory contribution amounts to 7% of their labor income

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Public and private providers compete for workers' contributions

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- The mandatory contribution amounts to 7% of their labor income

Public and private providers compete for workers' contributions

Public provider (FONASA)

- One big insurer that provides 4 types of contracts (based on income)
- Insures 80% of population (lower wages)

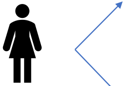
Private providers (12 ISAPRES)

- Offer a variety of contracts and access to private health providers (+ quality)
- Insures 20% of population (higher wages)

Institutional details: the process of filing a claim

HEALTH SYSTEM CHOICE

PUBLIC



PRIVATE

Institutional details: the process of filing a claim

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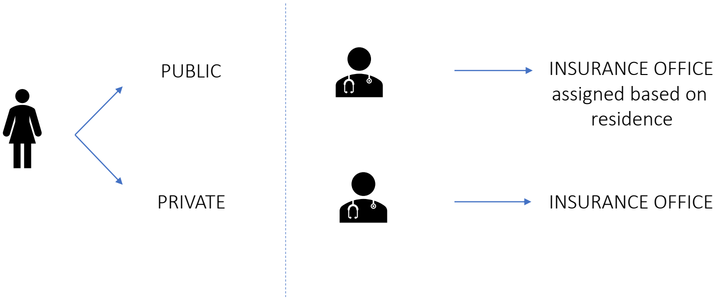
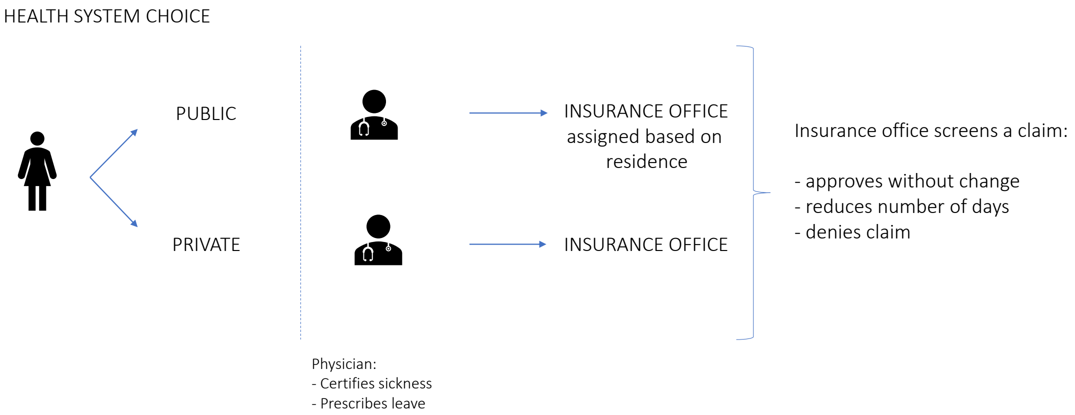


Physician:
- Certifies sickness
- Prescribes leave

Institutional details: the process of filing a claim



Chilean Sickness Insurance System

Non-payable waiting period

- First 3 days of the leave are not paid: $\tau = 0 \times w$
- From day 4 till day 10 the worker receives: $\tau = (\text{Leave days} - 3) \times w$
- Starting at day 11 the replacement rate is 100% : $\tau = \text{Leave days} \times w$

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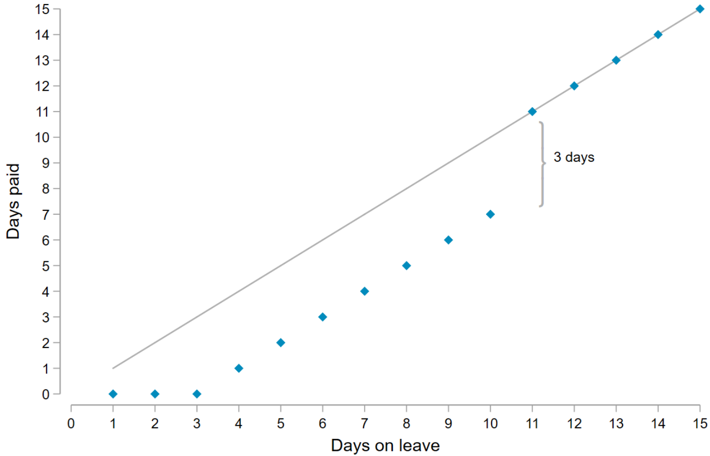
The health insurance agency

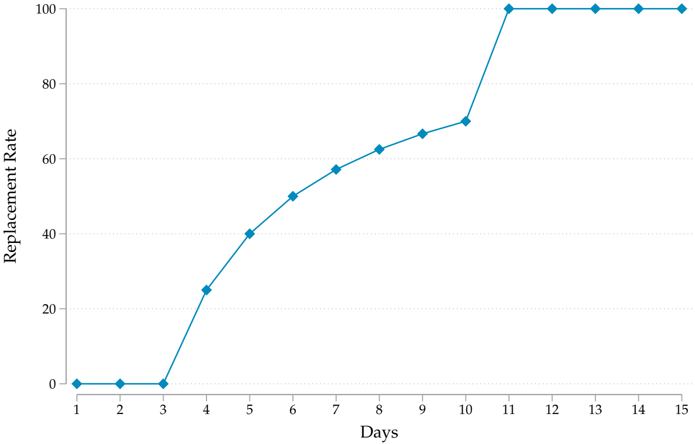
- Authorize leaves, payments, and screening
- Public and private providers follow the same rules ...
- in practice there are differences across systems ▸ Time series

Days paid as a function of days on leave



Notes: This graphs shows the relation between days paid and days on leave. The 3-days-non-payable period only applies to the first 10 days. For leaves 11 or more days long there is no non-payable period. This creates a discontinuity as those 3 days "are recovered" by the worker.

Replacement Rate



Notes: The replacement rate is the proportion of lost wages that the worker is paid. This rate is a function of the total number of days on leave. In the Chilean system, for leaves 11 or more days long there is no non-payable period, this creates a sharp increase in the replacement rate.

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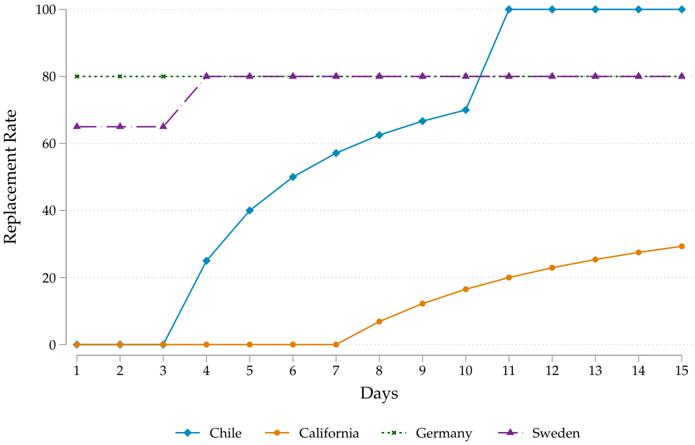

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▸ US legislation

Overview

Data

10% sample of administrative data on claims between 2010 - 2018

- Wage-earner workers in the private sector eligible to file a claim
- Health insurance system enrollment: public / private
- Claims characteristics :
    - physician identifier
    - days prescribed by the physician
    - days approved by the insurer
    - diagnose (20 categories)

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Match employer-employee data

- Unemployment insurance records of the private sector workers (80-90% of the labor force)
- Workers: education, date of birth, marital status, monthly wages, municipality of residence
- Firm: size, location, economic activity

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CASEN: Socieconomic Characterization Survey (similar to the CPS)

- Employment questionnaire: hours worked, type of contract, monthly wages and income
- Health questionnaire: reported health, access to primary care

Workers' characteristics

	All workers	Workers w/ no claims	Workers w/ at least 1 claim
Age	35.22	35.07	35.47
	(11.58)	(11.75)	(10.71)
Female	0.39	0.38	0.47
	(0.49)	(0.48)	(0.50)
Married	0.27	0.26	0.30
	(0.44)	(0.44)	(0.46)
Years of education	11.59	11.49	12.05
	(2.82)	(2.84)	(2.69)
% temp workers	0.48	0.55	0.28
	(0.50)	(0.50)	(0.45)
Observations per year	3,581,813	2,679,613	627,690
Monthly wages (2013 USD)			
Mean	794.31	756.13	1101.12
Median	527.91	506.34	766.29
Sd. Dev	813.99	781.89	1010.60
Conditional difference[a]			177.89***
Observations per year	2,713,371	2,571,421	374,787

Notes: This table presents summary statistics for all workers in the social security system and by claim status: workers who have not filled a claim and those who filled at least 1 claim. Pooled years 2010 to 2016. *a* conditional mean accounting for workers demographic characteristics: gender, age, age squared, marital status and time fixed effects.

▸ p-val ▸ Hours ▸ Education by levels

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p-val Hours Education by levels

Claims' characteristics

	All diagnosis	Mental health	Respiratory system	Musculoskeletal system
Share on all diagnosis		0.14	0.29	0.19
Number of claims per worker				
Raw	1.63	1.31	1.26	1.28
	(1.23)	(0.7)	(0.68)	(0.69)
Net of extensions	1.81	1.54	1.33	1.42
	(1.48)	(1.01)	(0.8)	(0.92)
Share of extended leaves	0.11	0.18	0.07	0.12
	(0.31)	(0.38)	(0.25)	(0.33)
Ave. duration	8.15	12.70	5.70	8.64
	(6.98)	(7.46)	(4.76)	(6.59)
Observations per year	947,204	129,711	272,082	176,292

Notes: This table presents summary statistics of claims for all claims and by diagnose. Standard deviation are reported in parenthesis. Mental health includes: depression, anxiety, panic attacks, among others. Respiratory diseases includes: influenza, pneumonia, bronchiolitis, among others. Musculoskeletal system diseases includes: arthritis, back pain, knee pain, among others.

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Empirical Facts about Sick Leave Claims in Chile

1) Positive relation between wealth and health (Cutler, 2016; Cutler & Lleras-Muney, 2010) but **less wealthy** workers take **shorter leaves** on average

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   - Contagious presenteeism: employees with a contagious disease go to work sick and spread the disease to co-workers (Pichler et al, 2017)

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4) There is geographic variation:
   - in the duration of the sick leaves
   - in the diagnosis prevalence

Overview

Model: Workers' behavior

Workers are ex-ante identical. Random draw from $F(\theta)$ determines worker's type θ

- Assume that θ is distributed over non-negative values with c.d.f. $F(\theta)$
- Workers type θ could be interpret as the disutility of work
- or as workers' sickness level if leisure is more valuable when sick

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Utility over consumption and leisure

- separable and additive on disutility of work (θ)
- utility is state dependent:
  * utility of consumption when healthy $v(c)$
  * utility of consumption when sick $u(c)$
  * both $u(\cdot)$ and $v(\cdot)$ are smooth and strictly concave
  * consumption is less valuable when sick: $\frac{\partial u}{\partial c} < \frac{\partial v}{\partial c}$ (Finkelstein, 2013)

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Workers enter the model with exogenously determined assets A

Workers decide whether to work or not for a given wage w, i.e. $h = \{0, 1\}$

Model: Workers' behavior

Consider the following insurance contract:

- Workers pays an actuarially fair tax $\tau(b)$ when healthy
- The insurance company pays the worker a benefit b if sick
    * utility when healthy and working $v(A + w - \tau(b)) - \theta$
    * utility when sick and not working $u(A + b)$

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Which individuals would work?

$$0 = \underbrace{v(A + wh - \tau(b)) - \theta^*}_{\text{work}} - \underbrace{u(A + b)}_{\text{sick and on leave}}$$

$$\theta^* = v(A + w - \tau(b)) - u(A + b)$$

We can think of θ^* as the sickness reservation level

Threshold rule: $\theta^* = \max[0, v(A + w - \tau(b)) - u(A + b)]$

Model: determination of b

Assume the insurance firm chooses b to maximize ex-ante workers' utility:

$$\max_b W(b) = \int_0^{\theta^*} (v(A + w - \tau(b)) - \theta) dF(\theta) + \int_{\theta^*}^{\infty} u(A + b) dF(\theta)$$
$$\text{s.t.} \quad \theta^* = \max\left[0, v(A + w - \tau(b)) - u(A + b)\right]$$

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Optimal benefit b^* will satisfy:

$$\frac{u_c(A + b^*)}{v_c(A + w - \tau(b^*))} = \frac{F(\theta^*)}{(1 - F(\theta^*))} \frac{\partial \tau(b)}{\partial b}$$

The optimal benefit level (b^*) equates the marginal benefit of an extra unit of consumption in the bad state with the marginal cost taking into account the behavioral response

▸ F.O.C.

What are the effects of an increase in b?

Using the threshold rule: $\theta^* = v(A + w - \tau(b)) - u(A + b)$:

$$\frac{\partial \theta^*}{\partial b} < 0$$

$\Rightarrow$ More sick pay decreases the sickness reservation level, more workers call in sick.

$\Rightarrow$ This behavioral response is what the literature has called moral hazard

$\Rightarrow$ What has the literature estimated?

▸ Details

What is the model missing?

Some workers would like to **hide** their type: *how to incorporate this in the model?*

- Incorporate a firm that produces and provides pay sick leave
- The firm cannot observe employee sickness or type θ
- Assume that workers' productivity ($g(\theta)$) is decreasing on θ: $g'(\theta) < 0$
  - sickness causes employees to be less productive
- The firm is willing to pay w to workers with productivity $g(\theta) > \bar{g}$
  - firm's threshold: $\theta^{firm} = g^{-1}(\bar{g})$
- We are interested in cases where: $\theta^{firm} \neq \theta^*$
  - If $\theta^{firm} > \theta^*$: some workers do not want to work, but the firm wants them to work
  - If $\theta^{firm} < \theta^*$: some workers do want to work, but the firm does not want them to work
- Goal: write a contract such that workers with $\theta : g(\theta) > \bar{g}$ show up to work

Next steps

Work on the model:

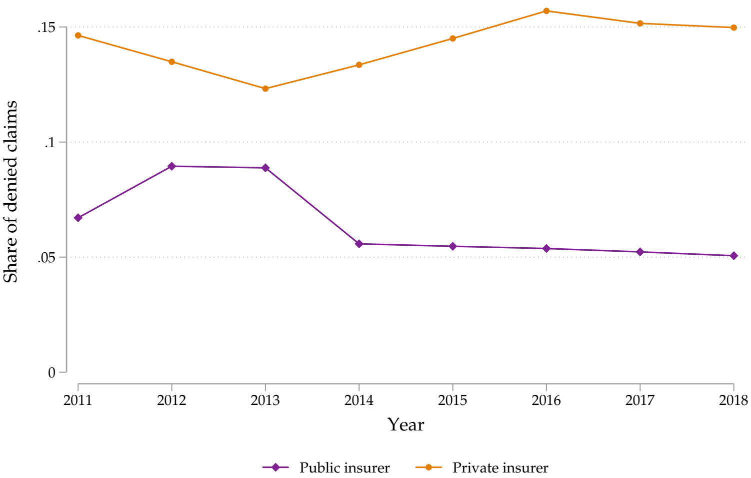
- Incorporate the firm as explained in this presentation
- Incorporate externalities: consider a model with contagious diseases vs noncontagious diseases
  - Should the cost sharing scheme vary by condition?
  - Important point for policy implications

Role of physicians

- There is some evidence of physicians helping workers to "cheat the system"
- In 2012 the punishments to physicians suspected of "selling" leaves were increased
  - How to exploit this variation?

Appendix

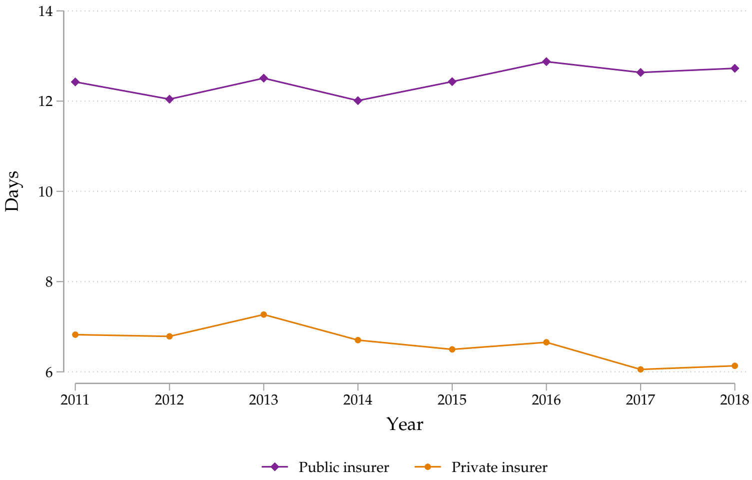
Private insurer denies claims at a higher rate (10 points)



Notes: The share of denied claims is computed as the ratio of denied claims to the total number of claims by insurance agency. FONASA refers to the National Health Fund of public system and ISAPRES refers to the private insurance agencies.

Back

Approved claims by the public insurer are 5 days longer



Notes: The average days approved is computed as the ratio of days approved (even if not paid) to approved claims. FONASA refers to the National Health Fund of public system and ISAPRES refers to the private insurance agencies.

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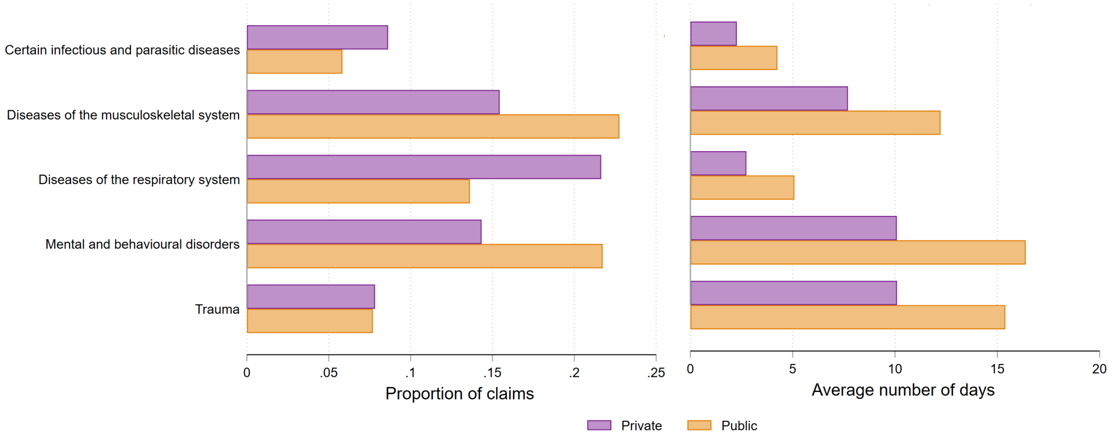
Higher share of claims that required longer recoveries



Notes: Left panel: Share of claims by diagnosis, only the main diagnosis are displayed. *Right panel*: Average number of days by diagnosis, only the main diagnosis are displayed. The average days approved is computed as the ratio of days approved (even if not paid) to approved claims.

▸ Back

Workers' characteristics: workers w/ no claims & workers w/ at least 1 claim

	Workers w/ at least 1 claim	Difference
Age	35.47	0.8***
	(10.71)	
Female	0.47	0.1***
	(0.5)	
Married	0.30	0.04***
	(0.46)	
Years of education	12.05	0.57***
	(2.69)	
% temp workers	0.28	-0.26***
	(0.45)	
Observations per year	627,690	3,581,813
Montly wages (2013 USD)		
Mean	1101.12	196.64***
Median	766.29	
Sd. Dev	1010.60	
Observations per year	374,787	2,713,371

Notes: This table presents samples statistics for workers with at least 1 claim and the coefficient on a dummy that takes the value of 1 if the individual has filed a claim. We consider the regression: $y_i = \alpha + \beta * claim_i + \alpha_t + \varepsilon_i$. The coefficient β captures the difference among workers with claims and workers without claims. Pooled years 2010 to 2016.

Back

Distribution of hours worked by type of contract

	Mean	Median	10th percentile	25th percentile	SD
Permanent (%70)	45.29	45.00	40.00	45.00	10.69
Temporary (%30)	41.87	45.00	20.00	40.00	13.68
Difference	-3.42***				

Notes: This table presents samples statistics to illustrate the distribution of hours worked by type of contract. Permanent contracts means that the work relation between employer and employee has not a date of termination. Temporary workers are those with a termination date in their contract. Source is CASEN survey for 2015.

Back

Workers' educational attainment

Education level	All workers	Workers w/no claims	Workers w/ at least 1 claim	Difference
Primary school	0.15	0.16	0.10	-0.06***
	(0.36)	(0.37)	(0.30)	
High school	0.69	0.69	0.70	0.01***
	(0.46)	(0.46)	(0.46)	
College or more	0.15	0.14	0.20	0.05***
	(0.36)	(0.35)	(0.40)	

Notes: This table presents samples statistics to illustrate the distribution of educational attainment, considering the three most important levels. The last column presents the coefficient on a dummy that takes the value of 1 if the individual has filed a claim. We consider the regression: $y_i = \alpha + \beta * claim_i + \alpha_t + \varepsilon_i$. The coefficient β captures the difference among workers with claims and workers without claims. Pooled years 2010 to 2016.

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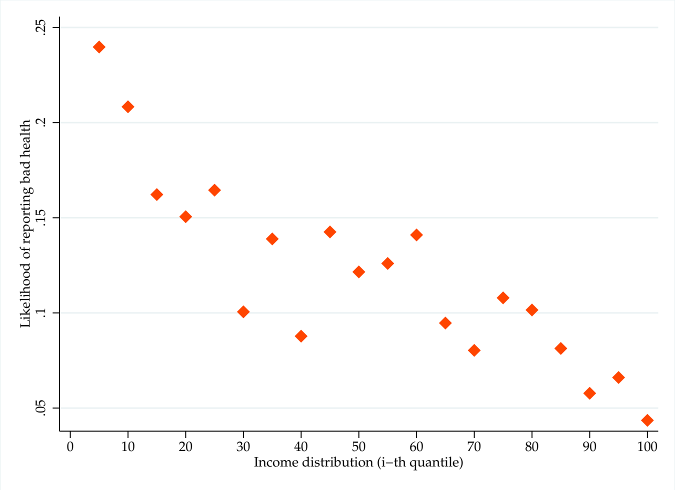
Claims' characteristics

	All diagnosis	Mental health	Respiratory system	Musculoskeletal system
Share of claims filled by..				
Women	0.51	0.62	0.52	0.45
	(0.5)	(0.49)	(0.5)	(0.5)
Age				
18-25	0.15	0.13	0.17	0.14
	(0.36)	(0.34)	(0.38)	(0.35)
25-40	0.53	0.57	0.55	0.49
	(0.5)	(0.49)	(0.5)	(0.5)
40-55	0.26	0.26	0.24	0.3
	(0.44)	(0.44)	(0.43)	(0.46)
55 - 65	0.05	0.04	0.05	0.07
	(0.23)	(0.2)	(0.21)	(0.25)
Observations per year	947,204	129,711	272,082	176,292

Notes: This table presents summary statistics of claims for all claims and by diagnose. Standard deviation are reported in parenthesis. Mental health includes: depression, anxiety, panic attacks, among others. Respiratory diseases includes: influenza, pneumonia, bronchiolitis, among others. Musculoskeletal system diseases includes: arthritis, back pain, knee pain, among others.

▸ Back

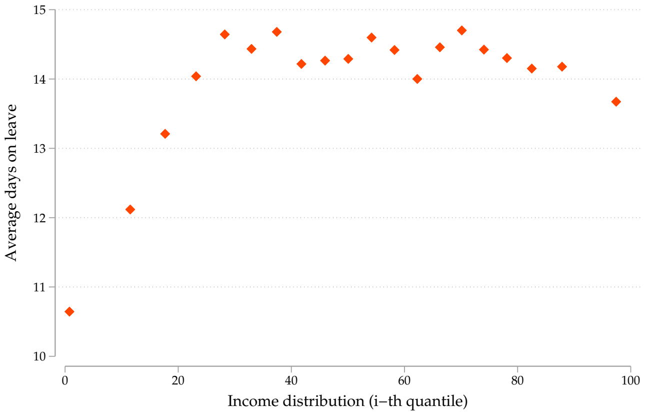
Likelihood of reporting bad health decreases with income (cross-section relationship)



Notes: We use the likelihood of reporting bad health as a measure of health. *Higher values on the vertical axis imply worse reported health.* This figure shows a binned scatter plot of the relation between health and wealth. We consider the residualized version of: 1 bad healt$_{id}$ $= \beta$ Income percentile$_i + \Gamma' X + \alpha_d + \varepsilon_i$. We use reported health from the CASEN 2015 survey data over a sample of workers between 25 to 65 years old. Bad health is a dummy that takes the value 1 if a worker reports health between 1 and 4 in scale of 1 to 7.

▸ Facts

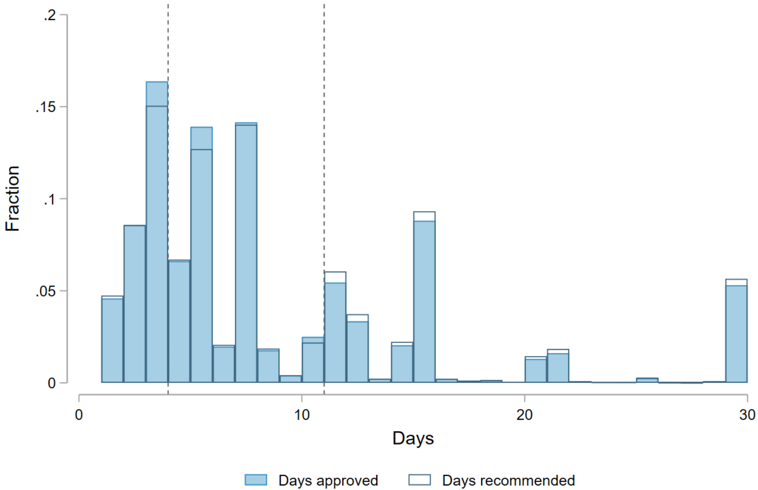
Less wealthy workers take **shorter leaves** on average



Notes: This figure shows a binned scatter plot of the relation between days on leave and income quantile controlling for age, gender, years of education and district fixed effects. We consider the residualized version of: Days on leave$_{id}$ $= \beta$ Income percentile$_i$ $+ \Gamma' X + \alpha_d + \varepsilon_i$. Source is administrative data on sick leave claims, year 2015.

▸ Facts ▸ Mental Health ▸ Respiratory diseases ▸ Musculoskeletal system

Recommended days (physician) vs approved days (insurer)



Notes: This figure shows the distribution of days recommended by the physician (hollow distribution) and the distribution of days approved by the insurer (filled distribution) for leaves less than 30 days long.

Contagious effects at the firm-level

Consider the following regression at the firm-week level for disease type d:

$$y_{ijk} = \alpha + \sum_{k=1}^{\bar{K}} \beta_k [Treat_i \times (\text{Weeks After Treat} = k)] + \alpha_j + \alpha_k + \varepsilon_{ijk}$$

y_{ijk}: probability that worker i in firm j files a claim during week k

$Treat_i = 1$ if a co-worker files a claim in week $= 0$

(Weeks After Treat) $= k$ captures time relative to the week a co-worker files a claim

α_k: week fixed effects

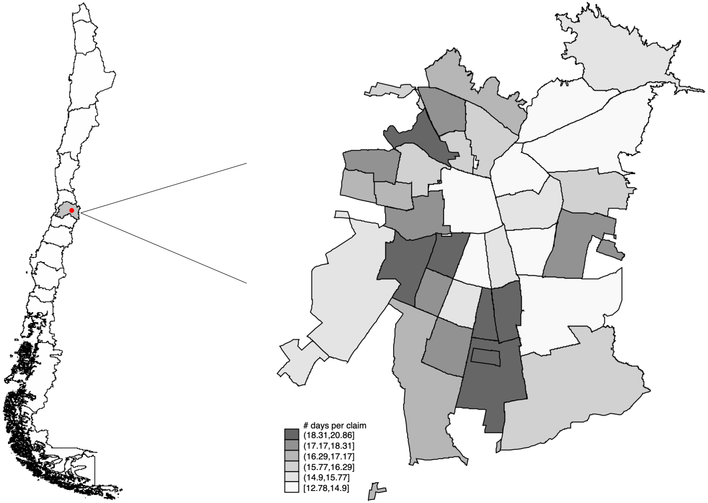
α_j: firm fixed effects

ε_{ijk}: error term

β_k measures the change in the probability of claiming a leave k weeks after a co-worker files a claim (normalize to 0). Identification is **within** firm and disease type.

▸ Facts

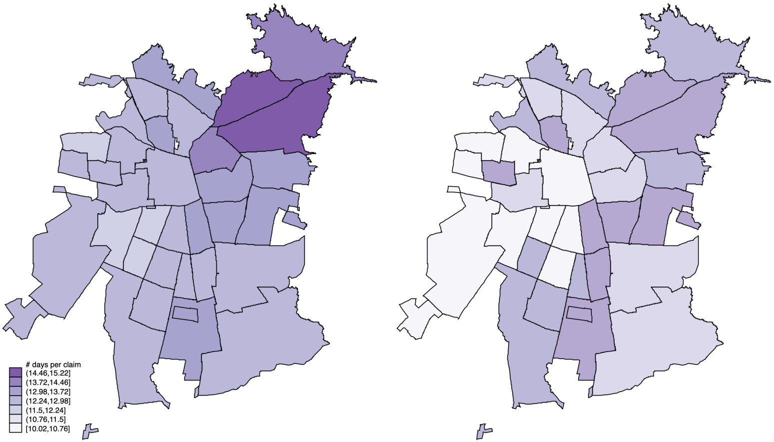
Longer days on leave in poorer districts.. is worse health the explanation?



Notes: This figure shows Chile on the left and zooms on Santiago on the right. Santiago is colored by districts (comunas), darker shades indicate longer leaves.

Facts

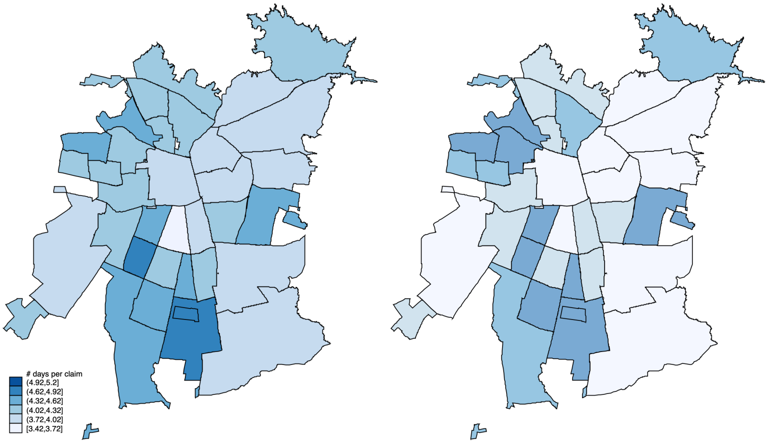
Claims by diagnose: Mental Health



Notes: This figure shows Santiago colored by districts (comunas), darker shades indicate longer leaves. The panel on the left shows the number of days recommended by the physician, the panel on the right shows the number of days approved by the regulator agency.

▸ Facts

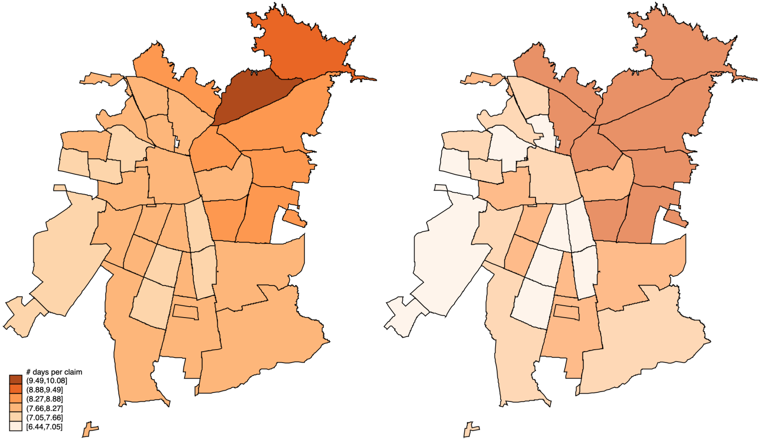
Claims by diagnose: Respiratory diseases



Notes: This figure shows Santiago colored by districts (comunas), darker shades indicate longer leaves. The panel on the left shows the number of days recommended by the physician, the panel on the right shows the number of days approved by the regulator agency.

▸ Facts

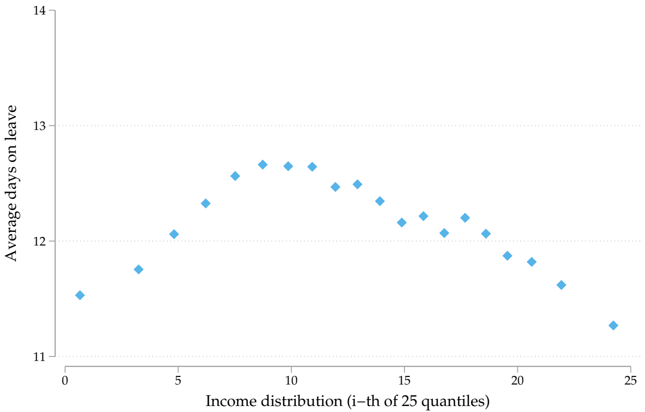
Claims by diagnose: Musculoskeletal system



Notes: This figure shows Santiago colored by districts (comunas), darker shades indicate longer leaves. The panel on the left shows the number of days recommended by the physician, the panel on the right shows the number of days approved by the regulator agency.

▸ Facts

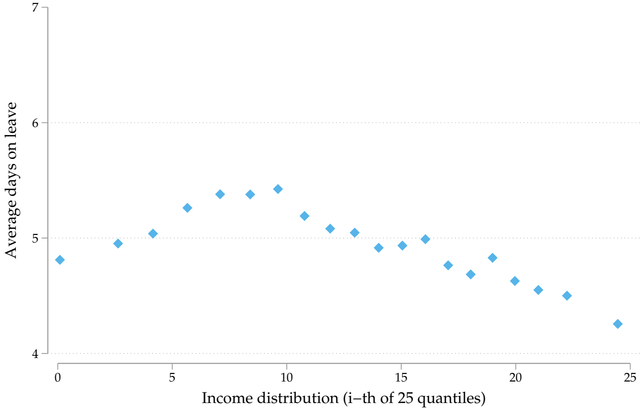
Mental and behavioral disorders



Notes: This figure shows a binned scatter plot of the relation between days on leave and income quantile controlling for age, gender, years of education and district fixed effects. We consider the residualized version of: $\text{Days on leave}_{id} = \beta \text{ Income percentile}_i + \Gamma' X + \alpha_d + \varepsilon_i$

▸ Back

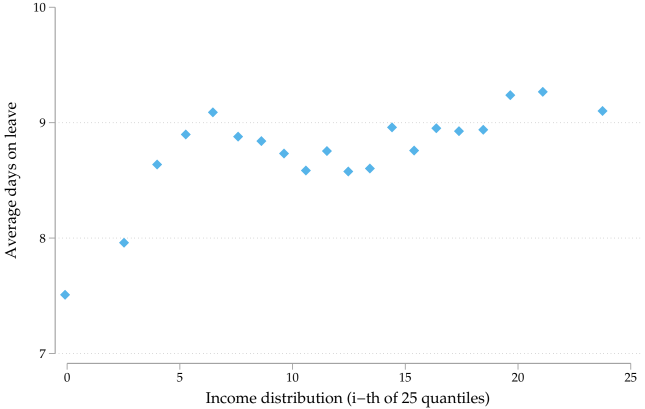
Diseases of the respiratory system



Notes: This figure shows a binned scatter plot of the relation between days on leave and income quantile controlling for age, gender, years of education and district fixed effects. We consider the residualized version of: Days on leave$_{id} = \beta$ Income percentile$_i + \Gamma' X + \alpha_d + \varepsilon_i$

▸ Back

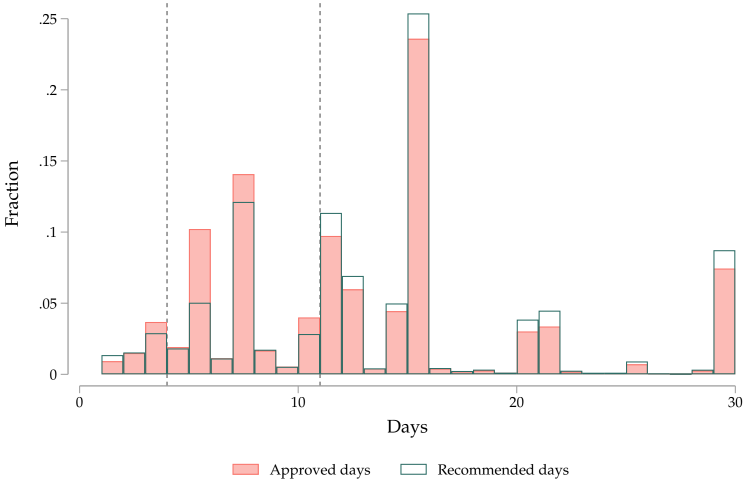
Diseases of the musculoskeletal system



Notes: This figure shows a binned scatter plot of the relation between days on leave and income quantile controlling for age, gender, years of education and district fixed effects. We consider the residualized version of: Days on leave$_{id}$ $= \beta$ Income percentile$_i + \Gamma' X + \alpha_d + \varepsilon_i$

Back

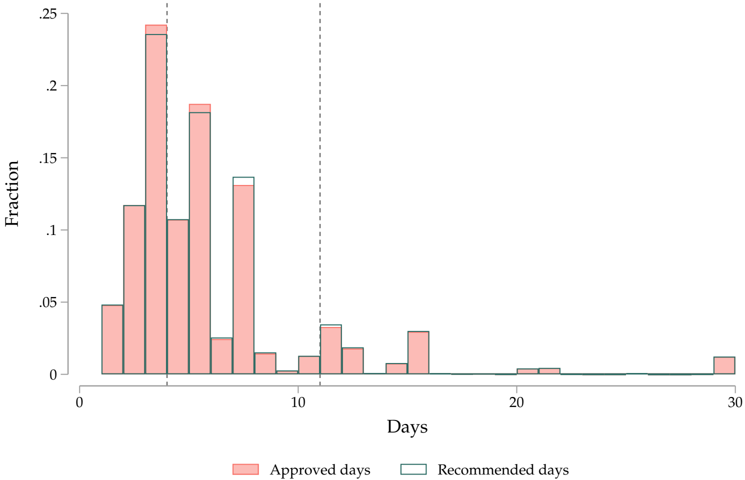
Mental and behavioral disorders



Notes: This figure shows the distribution of days recommended by the physician (hollow distribution) and the distribution of days approved by the regulator (filled distribution) for leaves less than 30 days long.

▸ Back

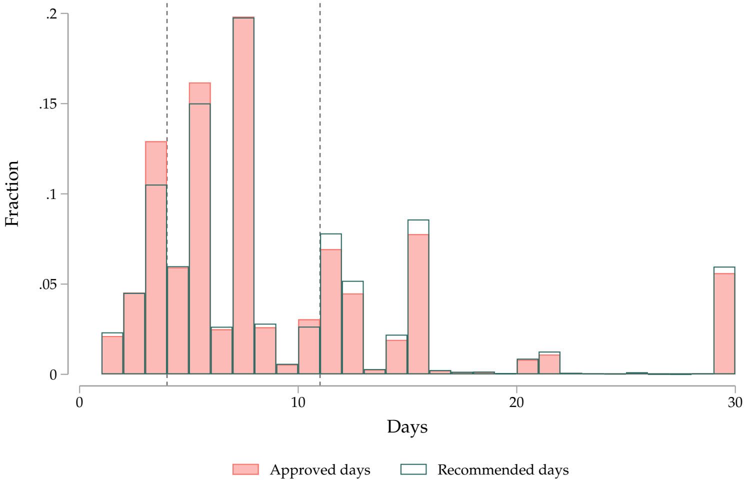
Diseases of the respiratory system



Notes: This figure shows the distribution of days recommended by the physician (hollow distribution) and the distribution of days approved by the regulator (filled distribution) for leaves less than 30 days long.

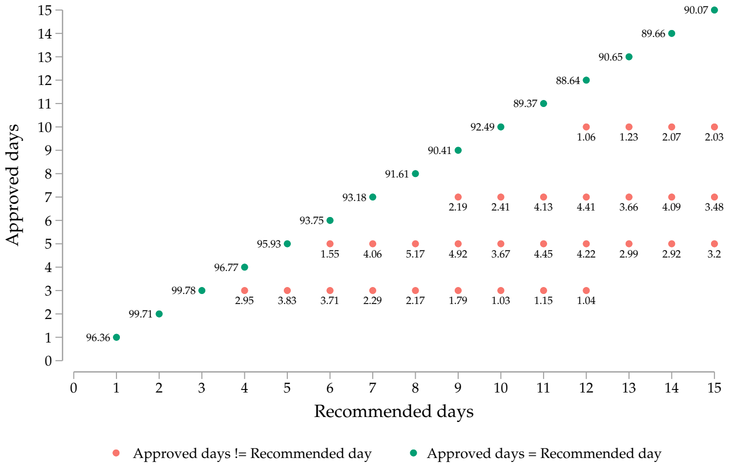
▸ Back

Diseases of the musculoskeletal system



Notes: This figure shows the distribution of days recommended by the physician (hollow distribution) and the distribution of days approved by the regulator (filled distribution) for leaves less than 30 days long.

“Transition” scatter plot



Notes: This graph shows the number of days approved as a function of the days recommended by the physician. Red dots indicate that the number of days approved are smaller than those recommended. Green dots indicate that the number of days approved are equal to those recommended. Only dots with more than 1% mass are included.

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Legislation in the US - States with Mandated Paid Sick Leave

Region	Law Passed	Law Effective	Content
Washington, DC	May 13, 2008	Nov 13, 2008	1 hour of paid sick leave for every 43 hours, 90 days accrual period; up to 3 to 9 days depend. on firm size; own sickness or family; no health care or restaurant workers
	Dec 18, 2013	Feb 22, 2014	extension to 20,000 temporary workers and tipped employees
Connecticut	July 1, 2011	Jan 1, 2012	full-time service sector employees in firms>49 employees (20% of workforce); 1 hour for every 40 hours up to 5 days; own sickness or family member, 680 hrs accrual period
California	September 19, 2014	July 1, 2015	all employees; 1 hour per 30 hours; minimum 24 hours; 90 days accrual own sickness or family member
Massachusetts	Nov 4, 2014	July 1, 2015	firms >10 employees; 1 hour per 40 hours up to 40 hours; 90 days accrual own sickness or family member
Oregon	June 22, 2015	Jan 1, 2016	firms >9 employees; 1 hour of paid sick leave for every 30 hours up to 40 hours; 90 days accrual; own sickness or family member
Vermont	March 9, 2016	Jan 1, 2017	employees w/ 18 hours/week & >20 weeks/year in firms > 5 employees; 1 hour every 52 hours; up to 24 hours in 2017, 40 hours thereafter; own sickness or family member some state employees & per diem employees in health care or long-term care facilities exempt
Arizona	November 8, 2016	July 1, 2017	all employees; 1 hour for every 30 hours; up to 40 hours in firms >14 workers, up to 24 hours <15 workers; own sickness or family member; 90 day accrual for new employees
Washington	Nov 8, 2016	Jan 1, 2018	all employees except those exempt from minimum wage; 1 hour per 40 hours; no cap but no more than 40 hours carry over; own sickness or family member; 90 day accrual for new employees
Maryland	Jan 12, 2018	Feb 11, 2018	all employees working at least 12 hours per week in firms > 14 employees; 1 hour for every 30 hours; 106 days accrual period; own sickness or family member
Rhode Island	Sept 28, 2017	July 1, 2018	all employees; 1 hour of paid sick leave for every 35 hours; 90 day accrual period; own sickness or family member

Source: Pichler et al., 2020. "Positive Health Externalities of Mandating Paid Sick Leave"

Back

Derivation of FOC from the insurer problem

The insurance firm chooses b to maximize ex-ante workers' utility:

$$\max_b W(b) = \int_0^{\theta^*} (v(A+w-\tau(b)) - \theta)dF(\theta) + \int_{\theta^*}^{\infty} u(A+b)dF(\theta)$$
$$\text{s.t. } \theta^* = \max\left[0, v(A+w-\tau(b)) - u(A+b)\right]$$

$$0 = \int_0^{\theta^*} -v_c(A+w-\tau(b))\frac{\partial \tau(b)}{\partial b}dF(\theta) + \left[v(A+w-\tau(b)) - \theta^*\right]\frac{\partial \theta^*}{\partial b} +$$
$$\int_{\theta^*}^{\infty} u_c(A+b)dF(\theta) - u(A+b)\frac{\partial \theta^*}{\partial b}$$
$$0 = \int_0^{\theta^*} -v_c(A+w-\tau(b))\frac{\partial \tau(b)}{\partial b}dF(\theta) + \int_{\theta^*}^{\infty} u_c(A+b)dF(\theta)$$
$$0 = -P[\theta \leq \theta^*]v_c(A+w-\tau(b))\frac{\partial \tau(b)}{\partial b} + P[\theta > \theta^*]u_c(A+b)$$

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What are the effects of an increase in b?

Lower threshold level

Using the threshold rule: $\theta^* = v(A + w - \tau(b)) - u(A + b)$:

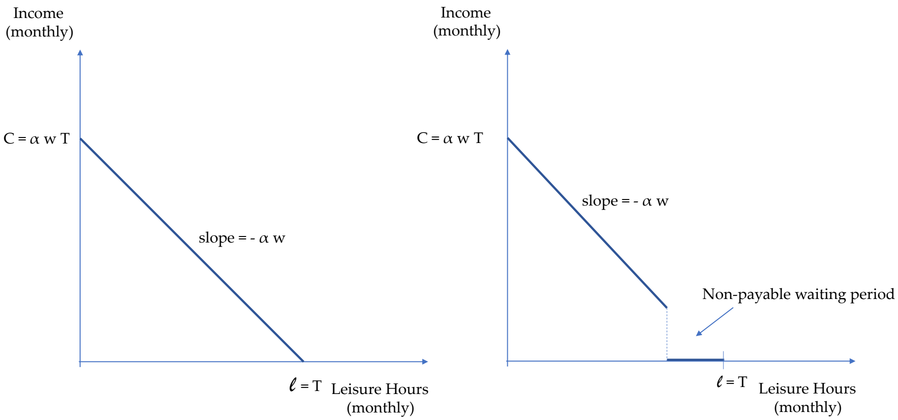
$$\frac{\partial \theta^*}{\partial b} = -v_c(A + w - \tau(b)) \frac{\partial \tau(b)}{\partial b} - u_c(A + b)$$

▸ Back

What has the literature estimated?

- More sick pay decreases the sickness reservation level, more workers call in sick: $\frac{\partial \theta^*}{\partial b} < 0$
- Benefits of the sickness insurance are $b = \alpha w$ where α is the replacement rate
- But, has not consider the nonlinearities arising from non-payable waiting periods
- **How will these results change with non-linear systems?**
  - Same model as before, assume $A = 0$ and $b = \alpha w$

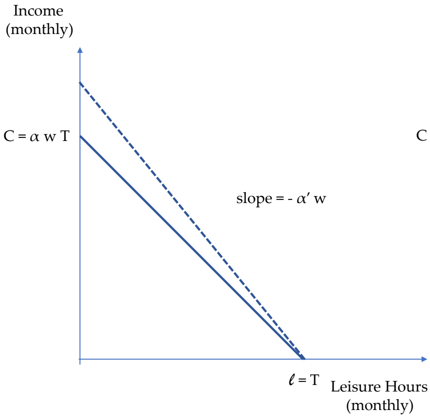
Implications of non-payable waiting periods



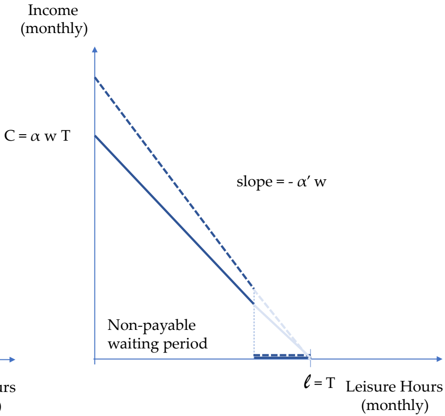
(a) (b)

Notes: Panel (a) shows the budget set for agent *i* when she is sick and phases a constant replacement rate. Panel (b) shows the budget set of agent *i* when she is sick and phases a scheme with a non-payable waiting period and a constant replacement rate. The replacement rate is the same in both panels for simplicity.

What are the effects of an increase in α?



(a)



(b)

Notes: Panel (a) shows the budget set for agent *i* when she is sick and phases a constant replacement rate. Panel (b) shows the budget set of agen *i* when she is sick and phases a scheme with a non-payable waiting period and a constant replacement rate. The replacement rate is the same in both panel to keep things comparable.

What are the effects of an increase in α?

Intuition: when the budget set is non-linear (relative to the linear case)

- Some agents react as before (those who are in an interior solution)
- Some agents do not change their leisure decision (those who are at the kink)

$\Rightarrow$ Omitting the non-linearity of the budget set will lead us to overestimate the respond to changes in the replacement rate

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