

Sick leaves: Understanding disparities between French Departments



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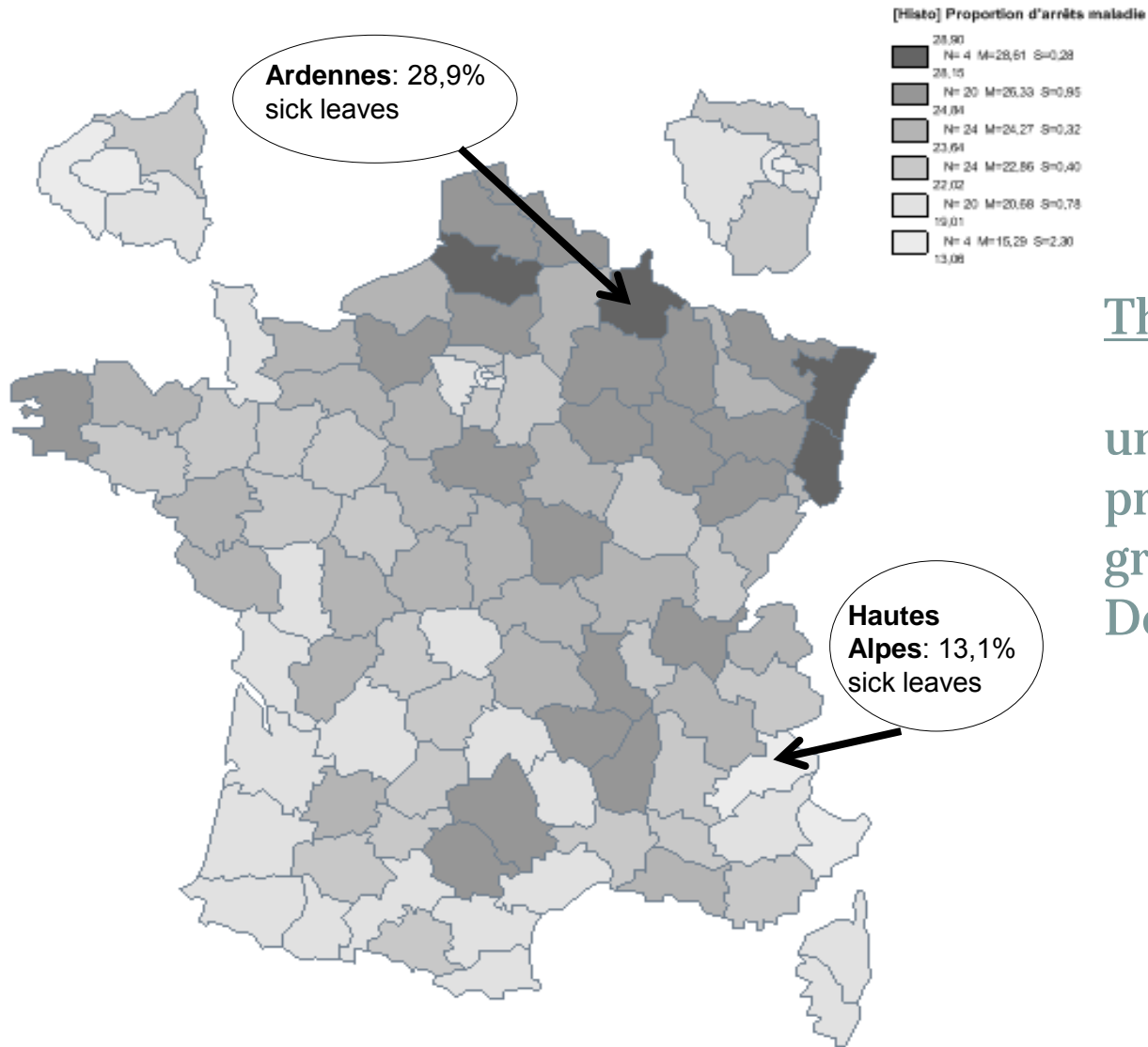
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Motivations



- In 2008, the amount paid out by compulsory National Health Insurance in France for daily sick leave benefits è 11.3 billion €.
 - 54 % illness/disease, 24 % maternity leave and 22 % occupational accidents (AT/MP).
 - More than 5% of total health expenditures.
- This amount of course varies with the economic situation, the regulatory context and outbreaks of epidemics:
 - 1995-2003 è increased by 4.3% / year.
 - 2003-2008 è decreased by 0.5% / year.
- Very large geographic heterogeneity
 - The Financial Courts (2006):« the considerable geographic differences that exist and that still vary by a factor of 3 can hardly be explained by the socio-professional structure of the working population of the Departments»

Data Hygie 2005



The purpose of this study:

understand disparities of proportions of sick leaves granted in French Departments.

Motivations



- Daily sick leave benefits are the insurance expression to the question of absenteeism for health reasons, long been dealt with in labour economics.
- « Choice » of individuals
 - Health reasons
 - Distinguishes the utility of working from the utility of being absent (Shapiro-Stiglitz (1984))
- Costs of these sick leaves: direct or indirect:
 - The worker
 - The firm

Daily sick leave benefits for an illness in France are paid every 14 days by National Health Insurance for each day not worked, including weekends and holidays, but starting on the 4th day of work stoppage after a waiting period of 3 days.

Plan



- **Conceptual framework**
 - Literature review
 - Analysis methodology
- **Database**
 - Description of the HYGIE
 - Descriptive statistics
- **Estimation strategy**
 - Estimation of proportions
 - Construction of indicators
- **Results**
 - The determinants of sick leaves
 - The analysis of determinants of differences between Departments

Literature review



- **Problems of geographic segregations resulting in differences:**
 - Employment (Benadou, 1993 ; Borjas, 1998...)
 - Health (Kawachi and Berkman, 2003 ; Congdon, Shouls and Curtis, 1997...).
- **Many publications have demonstrated the existence of external economic factors (Crane, 1991 ; Cutler and Glaeser, 1997).**
- **Few publications have attempted to understand the relations between geographic differences and the rates of absenteeism or sick leaves.**

Literature review

- **Ichino and Maggi (2000) → 6 potential reasons :**
 - (1) differences in characteristics among populations,
 - (2) differences due to mobility between regions,
 - (3) differences in production sectors and existing amenities,
 - (4) sociological differences on the value of work, sick leaves and levels of needs,
 - (5) differences in discrimination or acceptance of sick leave between Departments
 - (6) differences in supply and demand of local markets that condition entry in the labour market or different types of jobs.
- **Ekblad and Bokenblon (2010) → effects of cultural and geographic contexts on sick leaves.**
- **Barmby and Ercolani (2010), Little (2007) → effects of context can explain the difference in sick leaves.**

Analysis methodology



- To explain differences between Departments, two effects can be considered:
 - **Effect of composition** → result from differences to the characteristics of individual or firms. This effect explain the difference in the demographic, economic and social structure of the population from one Department to another.
 - **Effect of context** → is that there may subsist geographic differences that can be imputed to the characteristics of each Department after adjusting for the characteristics of individuals.

Effect of composition



3 groups of individual variables:

- *Individual* characteristics:
 - Age, Age when entering the labour market, Sex, Wage, Work time
- *Firm* characteristics:
 - Number of worker in the firm, Sector of activity (Industry, Agriculture, Construction, Service)
- *Insurance-related* characteristics:
 - Alace Moselle: *generous system where individuals don't support the loss financial during the first three days of sick leave like individuals from other departments*
 - Recipient of universal health coverage (CMU) , With a chronic disease (ALD)

Effect of context



3 groups of departmental variables:

- *socio-economic variables* :
 - Unemployment rate, Birth-rate
- *firm environment variables*:
 - **Indicator of relative salary**: is calculated by comparing his to that of employees in the same sector and in the same Department
 - **Indicator of severity**: is calculated by comparing the situation of each firm to the situation of firms in the same sector and in the same Department
- *insurance and medical supply variables*:
 - Density of general practitioners, Percentage of chronic disease, Percentage of sick leaves verified

Database: HYGIE



- **Innovative Statistics Project**
 - Examine relations between health, work, professional career and firm characteristics.
 - Partnership: IRDES-CNAM-CNAV-DREES
 - Large Panel:
 - ✦ 550 000 individuals 300 000 firms
 - ✦ 2005-2008 and more
- **Merger of two administrative files : CNAV(National retirement Fund) and CNAM (National Health Insurance)**
- **Database of HYGIE 2005**
 - Private sector employees, living in France (95 Departments), between 25 and 65 years of age.
 - Retirees were excluded from the study.
 - Our database includes 262,998 benefit recipients in 146,495 firms.

Econometric method



- **Tow steps:**

- We estimate results of three probit models that model the probability of being on sick leaves, on sick leaves shorter than three months and on sick leaves longer than three months.
- Measuring the relative and absolute differences between situations of different Departments .
- We used the predictions obtained from the nine different estimations (Ref = age + sex)
 - ✦ 1 : Ref + individual variables
 - ✦ 2 : Ref + insurance-related variables
 - ✦ 3 : Ref + firm variables
 - ✦ 4 : *Effect of composition: Ref + individual + insurance-related + firm*
 - ✦ 5 : Ref + socio-economic variables
 - ✦ 6 : Ref + healthcare supply variables
 - ✦ 7 : Ref + enterprise variables
 - ✦ 8 : *Effect of context: reference+ socio-economic + healthcare supply + enterprise*
 - ✦ **9 : Total effect: effect of composition + effect of context**

Econometric method

$$\begin{cases} p_{.j}^{ref} = \frac{1}{n_i} \sum_{i=1}^{n_i} (P_{i,j}^{ref}) \\ p_{.j}^{estk} = \frac{1}{n_i} \sum_{i=1}^{n_i} (P_{i,j}^{estk}). \end{cases}$$

- **P^{ref}** is the mean proportion estimated on reference variables (age and sex) of individuals (i) having had a sick leave in Department j .
- **P^{est}** is the estimated mean proportion (k) of individuals (i) having had a sick leave in Department j .
- We then calculated the difference between these two mean proportions and the mean weighted by the population of each Department.

$$E_{.j}^k = p_{.j}^{ref} - p_{.j}^{est}$$

$$E_{.}^k = \frac{1}{J} \sum_{j=1}^J \frac{n_i}{N} (E_{.j}^k)$$

Econometric method



- We can now determine the mean square error (MSE) and thus the **relative indicator** of differences between Departments:

$$MSE^k = \frac{1}{J} \sum_{j=1}^J (E_{v_j}^k - E_{v_j}^k)^2 \quad I_{rel}^k = 100 \left(1 - \frac{MSE^k}{MSE^{ref}} \right)$$

- If differences between Departments are due only to differences in the distribution of characteristics different models, then the values of these indicators should be zero.
- If on the other hand, the value of indicators is different from zero and is changed by introducing new variables; this means that the latter are explanatory factors of differences between Departments.

Results



– Determinants of daily sick leave benefits paid

variable	effect
Sex (Men vs Women)	-
Age	+
Age squared	-
Unemployment in 2004	-
Sick leave in 2004	+
Special Alsace-Moselle plan	+
Recipient of universal health coverage (UHC)	-
With chronic disease	+
Part time, at home or other	-
Salary	-
Number of employees in the firm	+
Sector/ Industry	-

Results



- Determinants of daily sick leave benefits paid

variable	effect
Unemployment rate	+
Birth-rate	+
Density of general practitioners	+
Percentage of chronic diseases	-
Indicator of relative salary	-
Indicator of severity of accidents	+

Results



- **Analysis of variance between Departments :**

Effect of composition	Individual	29,4 %
	Insurance-related	7,6 %
	Firm	20,8 %
	The 3	45,4%
Effect of context	Socio-economic	9,7%
	Insurance and supply	42,4%
	Enterprise	1,7%
	The 3	47,5%
Effect of composition + Effect of context		65,3%

Results



– Analysis of variance of key variable between Departments :

Individual effect	Age when entering the labour market	23,0 %
	Work time	2,6 %
	Prior work status	7,6 %
	The 3	29,4%
Insurance and supply effect	Density of general practitioners	28,7%
	Percentage of chronic diseases	0,9%
	Percentage of sick leaves verified	31,6%
	The 3	42,4%

Results



- The effects of composition and effects of context explain the two-thirds of variance of sick leaves between Departments .
- The variables explaining the differences between departments :
 - Density of general practitioners
 - Percentage of sick leaves verified
 - Age when entering the labour market

Conclusion



- Our different models explain a large part of the disparities between Departments.
- The effects of composition and effects of context explain the two-thirds of variance of sick leaves between Departments .
- The most explain variables
 - Percentage of sick leaves verified (moral hazard),
 - Density of general practitioners (physician-induced demand).
- Our research shows that they could be used as public policy instruments aimed at reducing geographic disparities.