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Sick Leave: What Explanation for Disparities between French Departments? First exploitation of the HYGIE database

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In 2008, the amount paid out by statutory National Health Insurance for daily sick leave benefits in France totalled 11.3 billion Euros representing over 5% of total health expenditures. Since 2008, these expenditures have shown an upward trend. Furthermore, the proportion of employees on sick leave varies considerably from one department to the next: from 13% in the Hautes-Alpes to 29% in the Ardennes, for an average of 23%.

This study attempts to shed light on the reasons for inter-departmental differences in sick leave rates using the HYGIE database. Constructed by IRDES from the merger of Health Insurance (CNAMTS) data and Pension Fund (CNAV) data for private sector employees in France in 2005, this database enables cross-referencing data never previously available conjointly on both employees (professional career, medical consumption, sick leave...) and the firms employing them (sector of activity, company size...).

Following a description of employee characteristics and their different motives for taking sick leave, an econometric analysis is carried out to explain the key determinants of inter-departmental disparities in sick leave rates using two types of variable: composition variables made up of employees' individual characteristics, those of the firms employing them and the insurance regime from which they benefit, and context variables providing departmental characteristics (unemployment rate, medical services supply) and the environment in which each firm operates within a same department (relative salary and working conditions).

7 In 2008, the sum of daily sick leave benefits¹ paid out by the French National Insurance fund amounted to 11.3 billion Euros (of which 54% in sickness benefits, 24% maternity leave and 22% occupational accidents), representing over 5% of total health expenditures. Between 1995 and

2003, daily sick leave benefits increased by 4.3% whereas they decreased by an average 0.5% between 2003 and 2008. Since 2008 sick leave expenditures have shown an upward trend. Daily sick leave benefits are one of the issues that have long been dealt with by labour economics. The cost of sick leave² is borne by

¹ Daily sick leave benefits are paid by the National Health Insurance from the fourth day of work stoppage. In this study, all sick leaves are taken into account including those not entitled to statutory daily sick pay.

² A term that will be used in this study to denote work stoppages related to the payment of daily sickness benefits by the statutory Health Insurance regime.

the National Health Insurance but also by companies and employees in the form of direct or indirect costs. One of the theoretical models of reference (Shapiro-Stiglitz, 1984) distinguishes between the utility of working and the utility of being absent for the individual concerned.

The literature reveals a diversity of individual factors explaining absenteeism: gender (Ose, 2005), age, salary (Barmby, Orme and Treble, 1995) or working conditions (Case and Deaton, 2003).

The moral hazard phenomenon could also be one of the key determinants of sick leave. This is expressed by insured workers' adapting their labour supply behaviour according to the generosity of the social security system and the extent to which it compensates for wage loss related to sick leave. A well-insured individual may tend to take more sick leave as related wage losses are lower (Allen, 1981). Few studies to date, however, have broached the issue from the angle of geographic differences in absenteeism or sick leave rates (Ichino and Maggi, 2000).

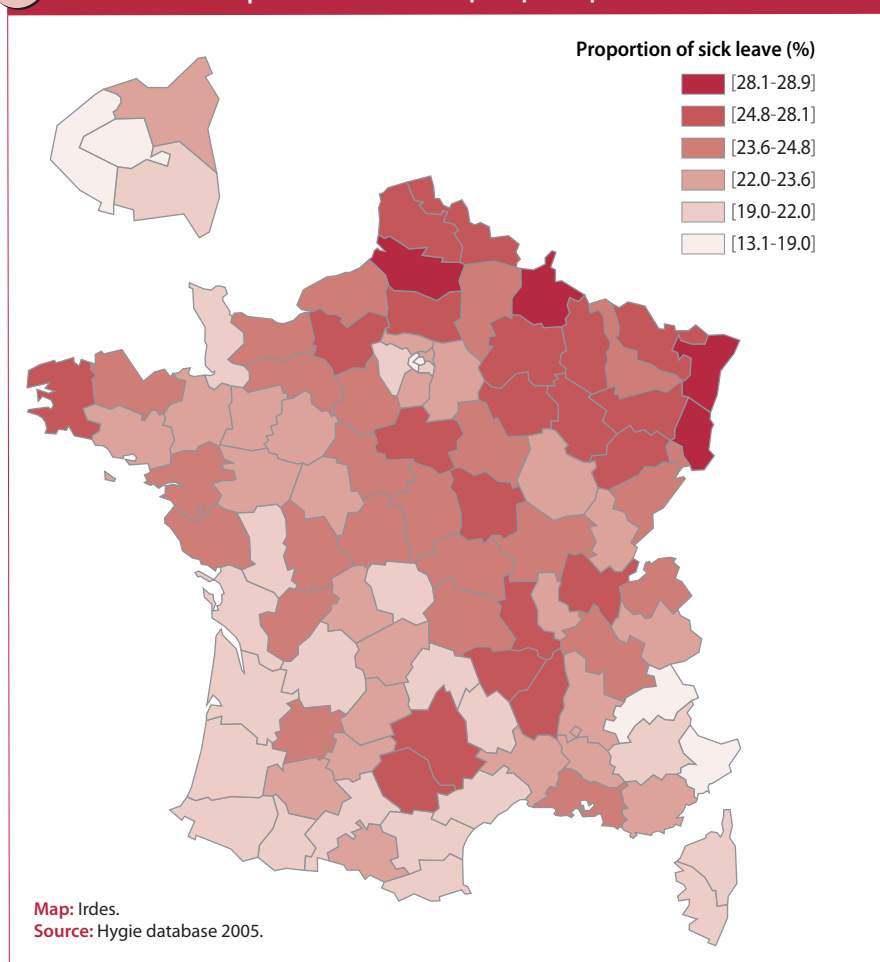
In France, sick leave rates are marked by strong geographical heterogeneity. In its 2006 report on the Social Security, the Court of Auditors stated that 'the considerable geographic differences that exist and still vary by a factor of 3 can hardly be explained by the socio-professional structure of the working populations of the different departments.'

In this study, geographic comparisons are carried out at departmental level. The proportion of employees recording at least one sick leave spell in 2005 reveals an uneven distribution varying from 13% in the Hautes-Alpes department to 28% in the Ardennes (map). What explanation for these inter-departmental differences?

Following a reminder of the different determinants of sick leave identified in the literature, an empirical analysis using these determinants is carried out to explain their variability at departmental level. This analysis is based on data provided by the HYGIE database constructed from the merger of administrative data on private sector employees in France in 2005 (Sources insert).

C1

Proportion of sick leave spells per department



The determinants of sick leave: effects of composition and context

The determinants of sick leave can be divided into two categories: effects of composition and effects of context. The main difference between these two types of effect is that composition variables describe characteristics specific to each individual or firm and context variables define departmental characteristics and company contexts for same sector companies within a same department.

Composition effect: individual, company and insurance characteristics

The variables explaining the composition effect can be divided into three groups. The first group brings together individual characteristics such as age, age of entry into the labour market, gender, salary and

work hours. These are the variables traditionally selected in economic literature studying the determinants of sick leave.

The second group of variables constituting the composition effect groups together company characteristics such as size, sector of activity and salary. The economic fabric is not uniformly distributed over the national territory and differences in salary between companies operating in the same sector may partially explain interdepartmental differences.

The 'insurance-related' variables constitute the third group of variables that make up the composition effect. They allow measuring the risk of moral hazard. The Alsace-Moselle health insurance regime or complementary health insurance coverage offer their beneficiaries greater advantages than the National Health Insurance in terms of sick leave benefit. In these cases, the costs generated by sick leave will be lower. Furthermore, there is a risk of moral

CONTEXT

This study fits within the framework of research on Health Insurance and sick leave carried out at IRDES. It is based on the HYGIE database constructed on IRDES initiative with the aid of data provided by the CNAV and CNAMTS and financing from the Directorate of Research, Studies, Evaluation and Statistics (DREES). For further information concerning the HYGIE database, please consult the web site: <http://www.irdes.fr/Hygie>

hazard for individuals registered under the long-term illness scheme (ALD) even if it primarily serves to indicate health status. In the case of sick leave related to a registered long-term illness, the beneficiary is entitled to receive daily sick leave benefits for up to three years and the waiting period is applied only once during the course of a same spell.

Context effect: economic, company context and health system variables

The variables explaining the context effect can also be divided into three groups: economic variables (unemployment rate, birth rate), health system variables (gene-

ral practitioner density, proportion of long-term chronic disease, percentage of verified sick leave), and variables situating the company in its environment (relative salary indicator, relative gravity index concerning occupational accidents).

The first group includes economic variables. The unemployment rate is one of the key factors explaining variability in the frequency of absence for health reasons. In the research carried out by Barmby and Treble (1991) based on work-leisure preferences in periods of high unemployment, dissatisfied employees tend to keep their jobs whereas they would have certainly resigned if the economic situation had been more favourable and, in exchange, take more sick leave.

The second group of variables explaining the effect of context is specific to the health system and notably medical services supply. It can in effect be considered as generating an effect of context on individual sick-leave behaviour. Based on the theory of induced demand, the density of general practitioners (GP) per department could explain inter-departmental differences in the proportion of employees taking sick leave. There are two explanations for

this (Expert, 2007): a department with a high GP density can be characterised by a higher frequency of sick leave because access to healthcare is easier. In addition, a department with a high medical density reinforces competition between doctors. As they are remunerated according to the number of patients on their active list and the medical procedures performed, this can lead to an increase in prescriptions.

Finally, a comparison between the employee's company and other companies in the same sector of activity within the same department constitutes the third context effect. A sector of activity's arduousness is one of the effects of context explaining sick leave which is more frequent in sectors characterised by high and repetitive physical effort (Case and Deaton, 2003).

In 2005, almost a quarter of employees took sick leave, a rate that varies by a factor of 2 according to department

In 2005, 23% of the sample population (sources insert) took at least one sick leave spell during the course of the year. The proportion of employees taking sick leave per department is unevenly distributed going from 13% in the Hautes-Alpes department to 29% in the Ardennes. The same disparities exist in terms of sick leave duration. 21% of employees in the sample had a spell of sick leave lasting less than three months; that is 11% in the Hautes-Alpes and 27% in the Bas-Rhin departments. The population of employees having taken long-term sick leave (over three months) is very low compared with short-term sick leave; only 1.5% of the sample. The same departmental differences are observed with a minimum rate of 0.5% in the Hautes-Alpes and a maximum rate of 3% in the Alpes-de-Haute-Provence (map).

The sample is made up of 55% men and 45% women [table 1] who take slightly more sick leave than men (23.7% vs. 19.1%). The distribution of employees on sick leave per age group corresponds to the age pyramid of private sector employees

SOURCES

The HYGIE database makes it possible to study the relationships between health, work, private sector employees' professional careers and the companies that employ them

This study is based on data provided by the merger of two administrative files: a National Health Insurance data file (CNAMTS) and the other from the National Pension Fund (CNAV) for the year 2005. The resulting database, named HYGIE, contains information on National Health Insurance beneficiaries, their professional careers, medical consumptions, professional context and the characteristics of the companies employing them. It allows studying the relationships between health, work, professional career and company characteristics. Until the creation of HYGIE, no French database allowed the conjoint study of these different dimensions.

The CNAV data used in the HYGIE database provide a sample of beneficiaries from the National Career Management System (SNGC) that groups together private sector employees in France and the National Statistical Beneficiary System (SNSP) that groups together private sector retirees in France. The SNGC provides data concerning beneficiaries' careers and the SNSP on their retirement. The information is individual (date of birth, gender, etc.). This sample is matched with health data provided by the CNAMTS issued from the National Health Insurance Inter-regime Information System (SNIIR-AM) that provides information on health expenditure reimbursements from the National Health Insurance and employer characteristics. The file is representative of private sector employees in France and thus contains precise information concerning the employees, the company employing them and their medical consumption. The HYGIE database thus provides a broad range of research possibilities; it is situated on a borderline between 'employer/employee' labour market studies, those studying the impact of companies on employee health and studies exploring the relationship between work and health.

For this analysis of inter-departmental disparities concerning sick leave, only private sector employees residing in metropolitan France (95 departments) and aged from 25 to 65 were retained; that is to say 262,998 beneficiaries distributed between 146,495 companies. Retirees were excluded from the study.



T1

Characteristics of employees in the sample

	Study sample (in %)	Minimum According to department (in %)	Maximum (in %)	Population having had (in %)
Variables				
Gender				
Male	55.1	49.5	62.7	20.7
Female	44.9	37.3	50.5	25.9
Age				
25-29 years old	16.3	11.4	22.1	21.5
30-34 years old	16.8	12.7	20.1	23.3
35-39 years old	16.3	12.7	20.0	22.7
40-44 years old	15.2	12.2	18.9	22.1
45-49 years old	13.5	9.7	19.8	23.4
50-54 years old	11.9	8.8	15.6	25.2
55-59 years old	8.8	7.0	12.1	25.4
60-65 years old	1.3	0.4	3.5	18.6
Age of entry into the labour market				
Under 18 years old	24.4	8.2	38.8	27.5
19-22 years old	44.0	28.8	55.4	24.3
23-26 years old	22.6	13.8	40.1	18.3
Over 27 years old	9.1	3.7	22.9	17.2
Occupational status: having experienced a spell of unemployment				
None in 2004	88.8	81.7	9.5	23.9
In 2004	11.2	7.7	18.3	16.7
None in 2003 and 2004	91.9	86.1	94.6	23.6
In 2003 and 2004	8.1	5.4	13.9	17.5
Occupational status: having had a spell of sick leave				
None in 2004	95.0	92.0	97.3	21.7
In 2004	5.0	2.7	8.0	48.9
None in 2003 and 2004	98.8	97.0	99.8	22.6
In 2003 and 2004	1.2	0.2	3.0	60.7
Pension Fund for stay-at-home parents (AVPF)				
Did not benefit from AVPF in 2004	96.1	93.7	98.0	23.1
Benefitted from AVPF in 2004	3.9	2.0	6.3	23.4
Did not benefit from AVPF in 2003 and 2004	96.9	94.5	98.6	23.1
Benefitted from AVPF in 2003 and 2004	3.1	1.4	5.5	22.9
Work time				
Full time	74.6	57.6	81.3	23.7
Part-time, work from home and other	25.4	13.2	38.1	21.4
Insurance regime				
Alsace-Moselle regime beneficiary	4.2	0.0	87.1	28.2
General regime beneficiary (excluding Alsace-Moselle)	95.8	12.9	100	22.9
Complementary CMU beneficiary (CMU-C)	2.3	0.3	5.4	14.9
Does not benefit from CMU	97.7	94.6	99.7	23.3
Has changed CMU-C status during the year	1.9	0.4	3.9	32.9
Has not changed CMU status	98.1	96.1	99.6	22.9
Long-term chronic illness (ALD)	6.5	4.6	10.2	42.7
Does not have long-term chronic illness	93.5	89.8	95.4	21.7
Sector of activity				
Industry	21.2	6.0	39.6	28.1
Agriculture	0.0	0.0	0.6	19.6
Construction	6.1	1.7	11.4	20.2
Services	69.2	49.2	85.4	22.1
Effectif total	262,998	267	11,638	60,675

Data : Hygie database 2005.

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in France. In that respect, considerable differences between departments also exist: Paris is the youngest department with 26% of employees aged less than 30 and the Meuse is the oldest with 27% of employees aged 50 or over. Yet, the sick leave rate, whether short or long-term, increases with age.

Over half the employees having taken at least one spell of sick leave entered the labour market before the age of 22

The Eure-et-Loir and Cantal departments have the highest percentage of early entrants to the labour market (respectively 39% before 18 and 55% between 19 and 22 years old). On the other hand, Paris counts the highest number of employees entering the labour market at over 23 years old³. Early entrants to the labour market take more sick leave than the others: 27.5% of sick leave for entrants before the age of 18, 17% after 27 years old. The proportion of short-term sick leave also decreases with age of entry into the labour market: 24.5% for those aged less than 18 and 16% for those aged over 27.

Successive periods of unemployment do not appear to increase the frequency of sick leave

11% of employees had experienced a period of unemployment in 2004 and 8% both in 2003 and 2004. Here again, inter-departmental differences are considerable with a minimum of 7.7% in the Yvelines department and a maximum of 18% in the Hautes-Pyrenees in 2004. However, successive periods of unemployment have little impact in terms of taking sick leave. The proportion of employees having experienced successive periods of unemployment in 2003 and 2004 and taken short-term sick leave shows little increase when compared with employees having experienced a single period of unemployment in 2004 (16.7% *versus* 17.5%).

³ The population entering the labour market at over 27 years old has its particularities: employees having undertaken long studies or late entrants such as housewives or new entrants from overseas.

T2

Departmental context data

Variables	Average	1 st quartile	3 rd quartile
Beneficiaries' annual salary	20,300.4 €	10,640.5 €	25,274.2 €
Number of employees in the company	268	10.7	188.1
Average annual unemployment rate	9.5	8.3	10.5
Birth rate	11.8	10.5	12.8
Relative salary indicator	1.3	0.9	1.3
Occupational accident gravity index	-0.04	-0.09	0.03
Percentage of chronic long-term disease sufferers	13.3	12.1	14.3
Percentage of verified work absences	13.4	11.2	14.8
Density of general practitioners	158.4	143.5	169.8

Reading: Individuals' average annual salary is 20,300 €. A quarter of the population (1st quartile) earns less than 10,640 € per year; the last quarter (3rd quartile) earns over 25,274 € per year.

Data: Hygie database 2005.

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ment is much lower than in Paris with 117 against 313 GPs per 100,000 inhabitants (Eco-Santé 2005)⁵. The average rate of sick leave verified by the Social Security is 13% but varies considerably from one department to the next: Mayenne registers the lowest rate at 10% and the Nièvre the highest with 17%.

The determinants of sick leave explained by individual variables...

The results of the econometric estimations carried out using a probit model show that men have less time off work for health reasons.

Age: the probability of taking sick leave is higher between the ages of 35 and 55. A non-linear effect of age on the probability of being on sick leave is observed: the two turning points for absenteeism in general are 35 and 55 years old. These results confirm the theory according to which absenteeism for health reasons is more frequent on approaching retirement. At these ages, individuals are in poorer health and sickness benefit schemes provide a means of withdrawing from the labour market.

Periods of unemployment: fewer spells of sick leave among employees having expe-

⁴ The Alsace-Moselle insurance regime is specific to the Bas-Rhin, Haut-Rhin and Moselle departments.

⁵ These data are provided by the ADELI directory that lists health professionals, notably general practitioners whether prescribers or not.

Considerable variation in sick leave rates according to employees' health insurance regime and sector of activity

For the 4% beneficiaries of the Alsace-Moselle⁴ insurance regime, the percentage of employees taking sick leave is higher (28%) than for beneficiaries of the other regimes (23%). Inversely, employees benefiting from the Universal Complementary Health Insurance scheme (CMU-C) [2%], take fewer sick leave spells (15%) than those who do not (23%). Logically, individuals registered on the long-term illness scheme are twice as numerous to take sick leave (43% *versus* 22%).

It is in the agricultural sector, the least represented in the HYGIE database, that we observe the highest rate of long-term sick leave (4.7 %) whereas the sectors of activity most represented are the service

sector (69%) and the industrial sector (21%).

Heterogeneous departmental context data

On average, the unemployment rate per department is 9.5% (table 2). A quarter of the departments (1st quartile) have an unemployment rate of below 8.3% against over 10.5% in another quarter (3rd quartile). The department of Hérault has the highest unemployment rate (15%) whereas Lozère has the lowest (6%). Birth rate is also unevenly distributed across the territory: it fluctuates between 18‰ in Seine-Saint-Denis and 9‰ in the Creuse, with an average of 12‰ per department. The same is true for the density of general practitioners: 158 per 100,000 inhabitants (1st quartile = 143.5; 3rd quartile = 170). The density of GPs in the Eure depart-

MÉTHOD

The econometric method used* is based on two large groups of variables: the first is composed of variables of composition referring to individual data (age, gender, insurance regime, occupational status (sickness, unemployment), age of entry into the labour market, job characteristics (salary, company size), and the second is composed of variables of context describing the situation in each department (unemployment rate, birth rate, density of general practitioners, percentage of long-term chronic illness (ALD), relative salary indicator, occupational accident gravity index, number of absences from work verified by the Social Security).

Following the example of Bolin et al. (2008), to calculate the influence of each group of variables in explaining inter-departmental differences, we use relative deviation indicators (inter-departmental variance) between the departments. To do this, we proceed in two phases. The first phase of the analysis consists in estimating the determinants of sick leave with daily sickness benefits. The second phase consists in measuring the relative deviation between departmental situa-

tions. We use the predictions from the nine different estimations that depend on the explanatory variables presented in the model (see the continuation of the Methods insert, page 7):

We then calculate the difference between these two average proportions and the average weighted by the population of each department and $N = \sum_j n_j$ is the population of one of the departments and the total population of the J departments):

$$E_{.j}^k = P_{.j}^{ref} - P_{.j}^{estk} \text{ et } E_{..}^k = \frac{1}{J} \sum_{j=1}^J \frac{n_j}{N} (E_{.j}^k).$$

From that point, we can determine the average quadratic error (EQM) and thus the relative indicator of inter-departmental differences:

$$EQM^k = \frac{1}{J} \sum_{j=1}^J (E_{.j}^k - E_{..}^k)^2 \text{ et } I_{rel}^k = 100 \left(1 - \frac{EQM^k}{EQM^{ref}} \right).$$

* For further details see Ben Halima, Debrand and Regaert, 2012.

rienced one spell of unemployment. Spells of unemployment have an impact on absenteeism. An individual having experienced a single spell of unemployment in 2003 is less likely to take sick leave and the probability of taking sick leave diminishes by 10 points. This is referred to as the 'worker discipline effect'. On the other hand, employees that were unemployed in 2004 and 2003 have a higher probability of being on sick leave. These are the long-term unemployed or employees with broken career paths and, in all likelihood, very specific health characteristics.

Sick leave spells: a greater number of sick-leave spells among employees that have taken them in previous years. The employee who has taken sick leave the preceding year tends to increase the number of sick leave spells the following year. Thus the probability of taking sick leave increases by 9.1% among employees that have taken sick leave in previous years.

Job characteristics: part-time employees or those working from home have fewer sick leave spells and a lower probability of taking sick leave than full-time employees. The empirical results confirm the theoretical predictions of the efficiency wage model according to which low wages reduce the probability of absenteeism. This effect is stabilised among very high salary earners. These differences can be explained either by an effect related to working conditions: high salary jobs present fewer health risks and therefore fewer sick leave spells, or else generate a 'presence at work obligation' effect among the more qualified employees and those with higher responsibilities.

Company characteristics: employees in SMEs take fewer sick leave spells than those in larger firms. The number of employees is positively correlated to the individual probability of being on sick leave. In larger companies, an employee's absence tends to be less penalising than

in a small company. This can be due to fewer controls, fewer constraints and a lower degree of implication in one's work but also to different production processes. Employees in the agricultural, building and services sectors thus have respectively 9%, 6% and 5% less chance of taking

T3

Determinants of sick leave

		Marginal effect	Significance
INDIVIDUAL VARIABLES	Gender		
	Male	-0.056	***
	Female	ref	
	Beneficiaries age		
	Age	0.240	***
	Age squared	-0.056	***
	Age cubed	0.004	***
	Age of entry into the labour market		
	Under 18 years old	ref	
	19-22 years old	-0.019	***
	23-26 years old	-0.062	***
	Over 27 years old	-0.073	***
	Occupational status: Having experienced a spell of unemployment		
	In 2004	-0.103	***
	In 2003 and 2004	0.045	***
	Occupational status: having had a spell of sick leave		
	In 2004	0,181	***
	In 2003 and 2004	0,091	***
	Pension Fund for stay-at-home parents (AVPF)		
	In 2004	-0.042	***
	In 2003 and 2004	0.022	**
	Insurance regime		
	Alsace-Moselle regime beneficiary	0.040	***
	Complementary CMU beneficiary	-0.148	***
	Having changed status regarding CMU during the year	0.240	***
	Registered long-term chronic disease (ALD)	0.176	***
	Working time		
Full time	ref		
Part-time, home workers and others	-0.050	***	
Salary			
Salary	-0.274	***	
Salaire squared	0.042	***	
Salaire cubed	-0.002	***	
Company characteristics			
Number of employees in the company ($\times 10$)	0.020	***	
Number of employees in the company squared ($\times 10^2$)	-0.001	***	
Sector of activity			
Industry	ref		
Agriculture	-0.088	**	
Construction	-0.061	***	
Services	-0.047	***	
CONTEXT VARIABLES	Economic context		
	Average annual unemployment rate	0.003	***
	Birth rate	0.032	***
	Birth rate squared	-0.001	***
	Health system		
	Density of general practitioners (GP) per 100.000 inhabitants ($\times 10^2$)	0.055	***
	Density of GPs per 100.000 inhabitants squared ($\times 10^4$)	-0.019	***
	Percentage long-term chronic disease ($\times 10^2$)	0.066	***
	Percentage of verified work absences	-0.002	***
	Company context		
	Relative salary indicator	-0.005	***
Occupational accident gravity index ($\times 10^2$)	0.853	***	
Number of observations	262,998		
Number of observations (sick leave = 1)	60,675		
LR chi2 (34)	14,903.68		
Prob > chi2	0		
Pseudo R2	0.05		
Obs. P	0.23		

Reading: the values expressed are the marginal effects. Compared to women, men have a lower probability of taking sick leave by 5.6 points.

Data: Hygie database 2005.

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time off work for health reasons than employees in the industrial sector.

... and context variables

The occupational accident gravity index: the more arduous the working conditions the higher the probability of employees taking sick leave. This indicator can be considered as a proxy for working conditions: the higher the indicator, the higher the health risks for the employee compared with other companies in the same sector and the same department. Our results reveal a positive correlation between the company's gravity index and individual sick leave.

Departmental variables: working in a department with a high medical supply density increases the probability of taking sick leave. The introduction of departmental variables makes it possible to observe eventual saturation effects. For the socio-demographic variables, the results reveal a significant relationship between the unemployment rate and absenteeism for health reasons (Bliksvaer and Helliesen, 1997).

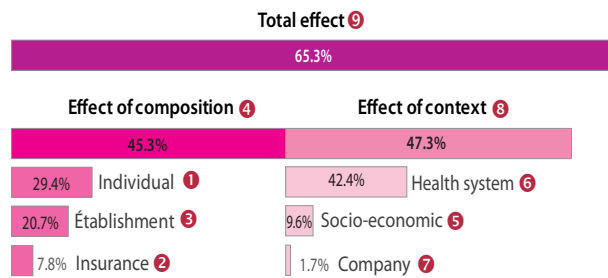
Concerning the medical services supply variables, GP density has a significant concave effect on taking sick leave. Living in a high density department increases the individual probability of being on sick leave. A saturation effect is observed from the rate of 147 GPs per 100,000 inhabitants.

How to explain inter-departmental variance

The relative indicator reveals inter-departmental variance (Methods insert p. 5 and 7). All the retained context and composition variables combined thus explain 65.3% of inter-departmental variance (graph 1). The effects of composition and context both contribute to explaining departmental differences (respectively 45.3% and 47.3%). Individual variables play a greater role in explaining the effect of composition or 29.4% of the relative indicator for the probability of taking

G1

Analysis of inter-departmental variance via the effects of composition and context



① The numbered dots refer to the variables described in the Methods insert below.

The average effects are based on 400 simulations on the initial base. The values belong to the confidence interval at a 95% threshold.

Reading note: All the variables combined (see Methods insert below) explain 65.3% of the relative indicator. The effects of composition and context respectively describe 45.3% and 47.3% of the latter. Variables in the insurance and medical services supply group explain 42.4% of the relative indicator whereas the individual variables group explain 29.4%.

Data: Hygie database 2005.

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sick leave. This confirms the observations made during the analysis of the descriptive statistics. For the effects of context, the 'Health System' variables play a preponderant role in explaining the probability of being on sick leave according to the relative indicator (42.4%).

Thus, among the three most determinant variables in terms of departmental variance concerning sick leaves, the first two are context variables: the rate of verified absences from work (31.4%), the density of GPs (28.7%), and the third is an individual variable: the age of entry into the labour market (23%) [Graph 2]. To a lesser degree,

past occupational status also explains inter-departmental differences (7.6%).

* * *

The models used revealed expected effects from the variables of composition and context on taking sick leave. The analysis of inter-departmental differences and variance allowed measuring the contribution of data from each group of variables (Methods insert p. 5 and 7).

Thus verified sick leave spells, medical density and the age of entry into the labour market are the variables that ontri-

METHOD

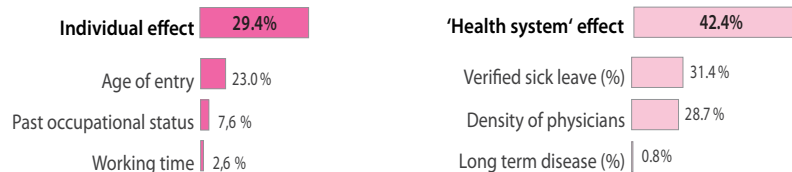
Construction of the variables

For the estimations, the reference variables are age (+ squared and cubed) and gender. The other variables in the econometric model were grouped together as follows:

- ① **Individual:** age of entry into the labour market, beneficiaries' occupational status in 2004 and 2003, past labour market situation, work time.
- ② **Insurance-related:** being a beneficiary of the Alsace-Moselle regime, the CMU, having changed status regarding the CMU, registered long-term illness.
- ③ **Establishment:** salary (squared and cubed), company size, sector of activity.
- ④ **Effect of composition:** individual + insurance + company (① + ② + ③).
- ⑤ **Socio-economic:** unemployment rate, birth rate (and its square).
- ⑥ **Health system:** density of general practitioners, percentage of long-term illness, verification of sick leave.
- ⑦ **Company:** relative salary indicator and occupational accident gravity index per sector of activity and department.
- ⑧ **Effect of context:** socio-economic + health system + company (④ + ⑤ + ⑥).
- ⑨ **Total effect:** effect of composition + effect of context (④ + ⑧).

G2

Analysis of inter-departmental variance: key variables



The average effects are based on 400 simulations using the initial base. The values belong to the confidence interval at a 95% threshold.

Reading note: Two groups of variable (see insert P.7) explain inter-departmental variables: the individual group and the insurance and medical supply groups. These two groups respectively explain 29.4% and 42.4% of the relative indicator. The percentage of absenteeism controlled by the social security and the age on entry into the labour market respectively explain 31.4% and 23% of the relative indicator.

Data: Hygie database 2005.

To download data: www.irdes.fr/Donnees/Qes177_ArretsMaladieDisparitesDepartementales.xls

bute the most to explaining inter-departmental differences in terms of sick leave rates. More specifically, the rate of sick leave spells verified by the social security is a way of controlling moral hazard. The effect of GP density appears to confirm the induced demand hypothesis. Finally, an individual's 'past' situation on the labour market sheds light on labour market differences between departments.

Contrary to other variables of composition or context that have a temporal inertial evolution (such as birth rate, industrial sector) or those for which public health policies have little impact (company wage policy or unemployment rate, for example), the control and reduction of health hazards at work, the control of work absences and the density of GPs could represent areas for action in the departments with the highest expenditures in daily sick leave benefits.

A more in-depth analysis would require eliminating a limitation of this study: if the presence of a chronic long-term disease indicates health status, the HYGIE database does not provide a direct measure of individuals' health status and does not therefore enable establishing a precise relationship between sick leave and real health status. In addition, it would be necessary to refine the definition of disparity and verify whether it covers inequalities or inequities. To what extent and on what criteria should disparities be reduced?

In the near future, and in order to treat these first results in greater depth, the HYGIE database will be exploited further as panel data from 2005 to 2009. An analysis through time will make it possible to identify the causal relationship between the determining variables revealed in this study and sick leave rates. ♦

FURTHER INFORMATION

- Allen S.G. (1981). "An Empirical Model of Work Attendance". *Review of Economics and Statistics*, 63, pp. 77-87.
- Barmby T., Orme C. et Treble J. (1995). "Worker Absence Histories: A Panel Data Study". *Labour Economics*, 2, pp. 53-65.
- Barmby T. et Treble J. (1991). "Absenteeism in a Median-Sized Manufacturing Plant". *Applied Economics*, 23, 161-166.
- Ben Halima M. A., Debrand T. et Regaert C. (2012). « Comprendre les disparités des arrêts maladie selon les départements ». *Revue française d'économie*, vol. 26, n° 4, avril, pp. 121-159.
- Bliksvaer T. et Helliesen A. (1997). "A study of 11 LES Countries". *Luxembourg Employment Study working paper* n°3.
- Bolin K., Lindgren A. et Lundborg P. (2008). "Utilization of Physician Service in the 50+ Population. The Relative Importance of Individual Versus Institutional Factor in Ten European Countries". *NBER Working paper* n°14096.
- Case A. et Deaton A. (2003). "Broken Down by Work and Sex: How our Health Declines". *NBER Working Paper* 982.
- Expert A. (2007). « Les disparités géographiques de consommation d'indemnités journalières maladie ». *Cnamts, Points de Repère* n°11.
- Ichino A. et Maggi G. (2000). "Work environment and individual background: explaining regional shirking differentials in a large Italian firm". *The Quarterly Journal of Economics*, 115 (3), pp. 1057-1090.
- Ose S. (2005). "Working Conditions, Compensation and Absenteeism". *Journal of Health Economics*, 24, pp. 161-188.

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