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Some determinants of reporting workplace accidents in France: The role of labour contract.

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Février 2006

Docweb n°0603

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Some determinants of reporting workplace accidents in France: The role of labour contract.

Abstract: This article uses a unique French survey that makes it possible to explore various individual determinants of workplace accident reporting. This survey covers a representative sample of 13,000 private-sector employees. Some 10% of workers suffer at least one workplace injury each year and that only 80% report it to the social security. A multivariate analysis with sample selection shows that severity and types of injury are clear determinants of reporting. Low-educated, but with a first degree, workers and workers in large firms seem to more likely report their injuries, and managers less. In addition, workers recently hired or on probation for a permanent job and previously unemployed or on a precarious position are significantly less likely to file a claim. This result suggests that labour market conditions can influence reporting.

JEL Classification: J28, D82, H55
Keywords: France, occupational injury, reporting.

Déterminants de la sous-déclaration des accidents du travail en France.

Le rôle du type de contrat de travail

Résumé : Le gouvernement français a lancé en 2005 un ambitieux plan Santé au Travail. Un des indicateurs de performance retenu est le taux d'accident du travail. Ce dernier est sujet à des biais déclaratifs potentiels. En particulier, l'évolution de la nature des contrats de travail, notamment avec le CNE/CPE, si elle s'avère comme le dénonce certains syndicats, synonyme d'affaiblissement de la position du travailleur dans l'entreprise, pourrait brouiller la lecture d'un indicateur nominal.

Cette note exploite l'enquête « conditions de travail » française 1998 pour explorer certains déterminants de la sous-déclaration des accidents du travail en France, en particulier le type de contrat de travail. Alors que 10% des salariés du secteur concurrentiel sont victimes d'accidents du travail, seuls 80% de ces accidents seraient déclarés à la sécurité sociale. Ce taux de sous-déclaration est proche de celui constaté dans d'autres pays comme les Etats-Unis.

L'enquête complémentaire à l'enquête emploi offre un échantillon représentatif de travailleurs français pour lequel on dispose de riches informations individuelles et sur l'organisation de leur travail. En contrôlant par nombreux facteurs comme l'âge, le sexe, la région, la CSP ou le secteur d'activité, il apparaît 3 facteurs clairement associés à une moindre ou une plus grande déclaration. En cohérence avec l'importante littérature anglo-saxonne sur la question, la gravité de l'accident est fortement corrélée à une meilleure déclaration.

Il apparaît également que les salariés sans diplôme, à poste et nationalité donnés, déclarent moins leurs accidents. La procédure écrite et relativement complexe pourrait être un obstacle à la déclaration.

Un deuxième groupe se distingue : les salariés nouvellement embauchés en CDI sortant d'une période de chômage ou d'un emploi non CDI. Ils déclarent environ 2 fois moins leur accident à emploi, gravité ou secteur donnés. Ce constat peut s'expliquer par le fait que ces salariés pour une part encore en période d'essai sont les plus perdants en cas de licenciement. De fait, ils sont les plus sensibles à une éventuelle pression à la non déclaration de la part de leur hiérarchie, surtout dans les entreprises sont les cotisations accidents du travail dépendent de leur sinistralité, ou encore sont les plus enclins à cacher un accident qui constitue un signal négatif auprès de leur employeur sur les capacités à occuper l'emploi. En revanche, les salariés en CDD ne semblent pas moins déclarer leurs accidents. Cette observation peut découler d'une hétérogénéité inobservable des personnes en CDD. Pour ceux qui n'ont pas d'espoir de renouvellement du CDD ou d'un accès en CDI, le fait que le contrat est prolongé d'autant que la durée d'arrêt suite à l'accident peut impliquer un comportement de déclaration systématique alors que les salariés en CDD avec perspective de CDI par exemple se comporteraient comme les nouveaux bénéficiaires de CDI.

Au total, on peut présumer qu'un succès des contrats du type CNE/CPE avec l'équivalent d'une période d'essai de 2 ans aurait un impact significatif sur le niveau de déclaration des accidents du travail en France. Pour obtenir une image la moins biaisée possible de l'évolution dans les années futures de la sinistralité au travail en France, il faudrait décomposer les taux d'accidents en distinguant les travailleurs en CDI de plus de 2 ans.

Insurance for workplace accidents and occupational illnesses is affected by a number of moral hazards involving both employers and employees (Moore and Viscusi, 1990). In particular, there is an extensive theoretical literature[1] that highlights the importance of reporting hazard on the part of employees, who may over-report or, conversely, underreport any accidents they may have. The more the compensation paid for workplace accidents is relative to that paid for accidents outside work, the more workers might, in theory, be tempted to report an accident in the home as having occurred in the workplace. Conversely, an employee might be tempted not to report a workplace accident, either in order not to send a negative signal to her employer or to stop her employer having to bear the cost of the accident if the insurance system includes experience rating. This reporting hazard poses a significant problem when it comes to interpreting data taken from accident reports. Ideally, in addition to this nominal rate, what is needed is a real accident rate. Fluctuations in the reporting rate may have a massive impact on the insurance system and company accounts, even when the actual rate remains unchanged. Conversely, a rise in underreporting may mean that the nominal data conceal deterioration in health and safety at work. A recent article by (Boone and Van Ours, 2002) suggests that the pro-cyclicality of the workplace accident rate observed in most OECD countries is linked to fluctuations in worker reporting rates, which rise during an economic upturn, when workers are less concerned about the risk of dismissal if they report an accident. Some works have attempted artificially to recreate real and nominal trends by comparing, for example, accident data with data on treatment received[2] or by separating injuries or illnesses according to their severity (e.g. Moore et al. 1990, Lanoie 1992). These articles highlight the considerable potential discrepancies between the evolutions of these sets of data.

Nevertheless, despite the theoretical and practical importance of reporting bias, there have been few empirical studies of its magnitude and determinants, especially using direct evidences. According to Conway and Svensson (1998), for example, the underreporting rate for accidents leading to time off work could be greater than 10% in the USA. Using a survey including 450 firms, Thomasson and Pozzebon (2002) show that Québec firms are engaged in aggressive claims management that lead to a reduction of the workers' declaration rate. Using evidences in the state of Oregon, Biddle (2001) also finds that higher claim-denial rates are associated with lower rates of claim filing. Biddle and Roberts (2003) use administrative data in Michigan combined with data collected from a sample of workers identified by as having work-related pain. They show that a substantial number of workers

[1] E.g. Rea (1981), Dionne et al. (1991), Bruce et al. (1993), Butler et al. (1996)
[2] Butler et al. (1991), Aiuppa et al. (1998), Kniesner et al. (1989)

do not file compensation claims; severity of the worker's condition and the worker's general health are the main determinants of the decision to file. Some studies have also highlighted the existence of under and over-reporting, with the hazard being all the greater since the causality of the injury is difficult to identify (e.g. Ruser, 1998)

Conversely, some in-depth studies[3] of the 'Monday effect' (i.e. of the higher nominal accident rate on Mondays than on other days of the week) do not support any significant reporting problem, even though many theoretical papers point to this effect as an illustration of over-reporting bias. Furthermore, surveys carried out by researchers in occupational health or safety science have identified the fear of unemployment and a desire not to lose one's job as the main reasons given by victims for not reporting an accident, together with the belief that injuries are a normal part of life in the workplace (for a review, Pransky et al., 1999). However, the samples in such surveys are often small and unrepresentative.

The aim of this article is to use a unique French survey that makes it possible systematically to explore certain individual determinants of workplace accident reporting, especially their situation in the labour market. Carried out in 1998, the working conditions survey covers a representative sample of 13,000 private-sector employees in France. It is a supplement to the French labour force survey. In addition to a number of variables describing individual characteristics, employees are asked whether they have had an accident in the past year and whether they reported it. Besides its representative nature, this database has the advantage of correcting the sample's potential selection bias caused by the fact of having had an accident.

The survey shows that some 10% of private-sector workers suffer at least one workplace injury each year and that only 80% report it to the French social security. Consistent with the previous literature, the severity and the type of injury are significant determinants of reporting. A multivariate data analysis also suggests that workers in large firms are more likely to report their injuries while managers less report their accidents. Two results are more original. First, among low-educated workers, only those with a first diploma seem to report more their injuries, suggesting that literacy could be a determinant of reporting. Second workers recently hired for a permanent job from unemployment or precarious position are, all other things being equal, significantly less likely to report their workplace injuries.

[3] Card et al. (1996), Derrig (2001)

The paper is structured as follows. In the first part, the French workplace accident insurance and compensation system is described. In the second part, the data and econometric strategy are outlined. The main findings are discussed in the third and final section.

1. Insurance and compensation of occupational injuries in France

France has a complex system of insurance for occupational injuries and illnesses. Basically, the system is mandatory and public for private firms. Paradoxically, however, central and local government organisations can be self-insured or covered by a private insurer. We focus here on the private sector only.

The insurance of occupational injuries and illnesses in France is administered within the social security system (*Caisse Nationale d'Assurance Maladie/National Sickness Insurance Fund* - CNAM*)*. However, this insurance fund is managed separately from the general social security system (ordinary illnesses). It covers all workers in the private sector and is jointly managed by trade unions and employers' organisations. The chairman of this public insurance fund is usually an employer. One particular characteristic of the French system is that accidents occurring during journeys between an employee's home and place of work are regarded for insurance purposes as workplace accidents. This type of accident is not considered in this article, which focuses solely on accidents that occur in the course of normal workplace activities. Accident statistics broken down by industry, type of injuries and type of events are published each year by the CNAM.

Reports on workplace accidents are drawn up jointly by the employee concerned and the employer and sent to the CNAM. The accident is described and the details of any possible witnesses noted down. If an employee wishes to report an accident, his or her employer cannot prevent them from doing so but can express remarks, which may trigger an enquiry by social security officials. Such enquiries are conducted as a matter of course in the case of severe injuries giving rise either to an absence from work of more than 30 days or a permanent disability. For less severe accidents, the compensation paid to victims is usually similar (at least 60% of the last wage) to that paid in the event of ordinary illness. However, the procedure for ordinary illnesses requires only a certificate from a doctor chosen by the employee, with no possible intervention by the employer. In fact, except in the case of collusion with the employer, the over-reporting of workplace injuries is rare in France. Consequently, the French system provides a basis for examining the determinants of underreporting without any noise from significant over-reporting.

The insurance charge paid by firms is set annually by the relevant *Caisse Régionale d'Assurance Maladie (*Regional Sickness Insurance Fund). Firms with fewer than 10 employees pay a mutualised charge levied on the basis of their risk assessment number, that is the accident rate in all firms in their industry. For firms with more than 200 workers, the charge is based solely on experience rating. It depends on the accidents that have occurred in the previous three years. For firms with between 10 and 200, the system is mixed, with the share of experience rating rising with size of firm. Thus for firms with more than 100 workers, more than half of the charge is calculated on the basis of the company's own accident rate. In fact, it might reasonably be supposed that underreporting increases with size of firm, since employees are likely to be aware of the cost implications for their firms. Nevertheless, trade unions, which play an important role in providing information and support for employees who have had an accident, wield all the more influence the greater the size of firm. Moreover, firms with more than 50 employees are obliged to have a health and safety committee. Large establishments have to employ a nurse. The probability of inspection by the labour administration is also greater in large firms. Overall, the theoretical impact of size of firm on the reporting rate is ambiguous.

2. Data and econometric strategy

A remarkable survey is available in France, carried out among individual workers by the Ministry of Labour as a supplement to the INSEE labour force survey (Enquête Emploi). It is the "working conditions" survey, and its last available wave dates from 1998. In 1998, the Enquête Emploi was an annual survey consisting of a three year rotating panel of a 1/300 sample of the active population. The questions on working conditions, occupational injuries and workplace organisation were asked only to individuals with a job in the outgoing third of the sample. Our dataset thus provides information for a representative sample of the working population, with about 22,000 individuals in it. We will confine ourselves here to the field of private-sector employees. The sample includes some 13,000 individual observations.

In addition to data on the technologies used, working conditions and work organisation, the survey also provides occupational or personal information, such as age, sex, educational level, marital status, geographical location, etc. Bué and Guignon (2004) provide a detailed description of the survey and of the methodology employed, as well as examples of uses to which the survey has been put.

2.1 Key variables

The 1998 working conditions survey makes it possible to separate reported accidents from unreported accidents. In March 1998, employed individuals in employment were asked:

- In the last twelve months, have you had an accident in the course of your work, even a minor one, that caused you to seek treatment?… even if there was no severe injury.
- Approximate date (month) of the accident (report the most recent accident)?
- Was the accident reported to the social security?

These questions refer only to the most recent workplace accident, whereas up to one worker in five is said to have several injuries at work in a year. Somewhat fewer than 10% of private-sector workers report having had at least one accident at work in the previous 12 months. Only 80% of these workplace accidents are reported. According to the survey data, the percentage of people who reported at least one accident in the year (from March 1997 to March 1998) was 8%, which is close to that observed by the CNAM for the year 1997. One advantage of the working conditions survey is that it allows to correct the potential bias linked to the fact that reporting may be not independent from the probability of being injured (Van de Ven et al., 1981). For example, men could less file claims not because they are not female but because men have a higher probability of being injured and thus they file only in case of significant injuries.

For groups of factors determining an accident report can be constructed on the basis of these surveys: determinants linked to the worker's position in the labour market (A), other 'individual' determinants (B), those linked to the firm (C), and the nature or severity of the injury (D).

A. The years 1997 and 1998 are particularly relevant to any attempt to assess the impact of the labour market. The unemployment rate (ILO definition) was at its historical peak of 12.2% at the beginning of the period but declined significantly by 0.5 of a percentage point over one year, while GDP grew at an annual rate of 3.7%, compared with only 0.6% one year previously.

The employment survey makes it possible to construct proxies for an employee's fear of dismissal. This fear is likely to be all the greater the more the employee's socio-geographic group is affected by unemployment (whether in terms of stocks or growth) and the more

precarious his or her employment status is. Unfortunately, there are no data on non-personal factors, such as those linked to the firm (planned redundancy programme or, conversely, expansion of workforce), which also influence an employee's fear. The only indicators available to us are 'objective' ones; there is no information on the 'subjective' level of fear of dismissal or redundancy. Three preliminary indicators can be constructed from the French Labour Force Survey.

- unemployment rate in March 1997 according to the employment survey in the cell[4] defined by age group (under-25, 25-55, over-55), sex, qualification (7 levels) and region (24);
- evolution in percentage points of this unemployment rate from March 1997 to March 1998;
- precarious employment status during the month in which the accident occurred (i.e. fixed-term contract, on a training course etc.).

Finally, there are data on the type of contract the worker was on when the accident occurred and his or her employment situation in the year prior to the survey.

B. The individual determinants in March 1998 were as follows:

- Gender.
- Type of household (single, couple with no children, couple with child(ren), single-parent).
- Nationality (French, Portuguese[5], other EU, rest of the world). It can reasonably be assumed that foreigners are less well informed about the French accident reporting system or less able to file a claim.
- Qualification (7 levels). Presumptively, the least well qualified, even within the same occupation, are allocated to the most hazardous jobs. Consequently, their level of reporting should be higher. Conversely, filing a claim requires a minimal literacy level.
- Occupation (15-item classification).

C. The characteristics of the firm employing the worker in March 1998

- Size (6 categories, see appendix)
- Industry (16-item classification).

[4] Despite the size of the Labour Force Survey sample, these cells are sometimes small. We therefore tried to construct more highly aggregated units of analysis (excluding qualifications, for example, or the regional dimension). The results were qualitatively similar to those presented here.

[5] The Portuguese constitute the largest community of foreign workers in France and are concentrated in the construction industry.

D. Nature and severity of the injury

Existing literature shows that the nature of the injury, especially the difficulty to identify the causality (see Ruser, 1998), and the severity of the injury are major determinants of filing compensation claims.

This information is thus a key to correct potential selection bias. For example, if employees on precarious contracts have more severe accidents, they should report them more. Two supplemental questions in the French working conditions survey are available on the nature and the severity of the injury.

1. *Do you have stopped working? If yes, how many days?*

Workers respond to this question even if they have not declared their injury. We can expect that the response depends on the claiming behaviour. But for non-benign injuries, workers have to see a physician for care. Now, In France, the number of "ITT" (days, weeks or months, away from work) decided by the physicians is based on the nature of the injury and not on its source, according to the official standards of the social security.

Consequently, severe occupational injuries should lead to similar absence days for reported and non-reported cases. Therefore, we can identify the severity of an injury or more exactly have a scale of severity. The problem is to fix the cut-offs. The distribution of the number of days away from work is characterized by a rapid tiny queue plus Diracs corresponding to absence weeks or months: 8 days, 15, 21, 30, 45, 60, 90 and 120. For example, only 3% of injured workers claim that they stopped working between 11 and 14 days plus between 16 and 20 days, compared to 15% at 15 absence days and 8% at 21 days. We have thus chosen 3 levels: benign (less than 5 days away from work, 53% of cases), serious (5 to 14 days, 16%) and severe (15 or more days, 31%). We have also tried alternative cut-offs (less than 3 etc.) and scales (up to 5 levels); Our findings are not significantly affected.

2. *Can you describe in clear the nature of your injury?*

This question is open. Workers give a simple description (e.g. "I cut my arm with a knife", or just "Cuts") that does not refer to a formal classification. We have thus systematically coded the 1200 injuries[6] in quite homogenous groups based on a simplified version of French official classification:

- sprains, other muscular disorders and (back) pains (26%),
- cuts and bites (25%),
- contusions (22%),

[6] Some injured workers (about 2%) report multiple injuries. In this case, we keep only the first injury signalled by the worker.

- eyes disorders (8%),
- fractures (7%),
- burns (5%),
- allergies (2%),
- stings (2%),
- others (commotion, hearing disorders etc, 3%).

Among workers that have declared their injuries, the proportion of each type of injury is globally similar to the logs of the French social security (Caisse Nationale d'Assurance Maladie, 2000). This proofs again the representativity of the sample.

2.2 The econometric model

The econometric model is, *a priori*, the probit equation:

$$Report_i = \alpha + \beta.labour_i + \gamma X_i + \varepsilon_{1i} \qquad (1)$$

in which

- the dependent variable is *Report*, a binary variable that has the value 1 when an accident is reported to the social security and the value 0 when it is not reported;
- *labour* is one or more proxies for the fear of unemployment, and
- *X* is a vector of the other determinants of reporting or control variables.

Nevertheless, the act of reporting (or not reporting) an injury necessarily means that an accident occurred. A simple probit equation would therefore be affected by selection bias because the risk of being injured is heterogenous. This makes it necessary to extend the econometric model with a selection equation:

$$Accident_j = \mu + \delta Z_j + \varepsilon_{2j} \qquad (2)$$

in which

- *Accident* is the binary variable (occurrence or otherwise of an accident), and
- *Z* is a vector of the characteristics of the individual or of his/her job.

Estimation of such a bivariate probit model with selection, similar to Heckman's model, typically follows Van de Ven and Van Pragg (1981). Let ρ be the correlation between the residuals ε_1 and ε_2 and let ϕ and ϕ_2 be the distribution functions respectively of the lognormal and the bivariate lognormal. The total log-probability to be maximised is thus

$$L = 1_{,0} \ln [\Pr(Accident =0)] + 1_{1,0} \ln [\Pr(Accident =1 ; Report =0)] + 1_{1,1} \ln [\Pr(Accident = 1 ; Report =1)],$$

with $\Pr(Accident = 0) = \phi(-\delta Z)$, $\Pr(Accident = 1, Report = 0) = \phi_2(\delta Z, -\beta\, labour - \gamma X, -\rho)$ *et* $Pr(Accident = 1, Report = 1) = \phi_2(\delta Z, -\beta\, labour + \gamma X, -\rho)$.

For the selection equation, we adopt the initial specification (A). It includes a series of standard determinants of the accident rate (gender, household structure, employment status, night work, seniority, age group, qualifications, industry, socio-occupational category, technology, work organisation). The technological and organisational variables allow identification, on the assumption that they influence the accident risk, but have little effect on employees' reporting behaviour. On the other hand, the variables do not include size of firm (or size categories), which is non-statistically significant and reduces the size of our sample (see Appendix). The results obtained are consistent with the literature (e.g. Askenazy et al., 2002; Brenner et al., 2004): the probability of an accident is statistically greater for men, young people, workers with less than 10 years' seniority and for those in jobs in which the pace of work is imposed or the job tasks are repetitive. However, the technological variables account for certain characteristics of the job held at the time of the survey and not necessarily at the time of the accident. As a consequence, our estimations may well be biased. One way of eliminating these potential biases would be to exclude these control variables; however, this would deprive us of any means of establishing identification between the 2 stages. We decided rather to limit the bias by also considering only recent accidents. It should be noted that the probit estimation for recent accidents and for those that occurred in the previous year produced very similar results, which confirms the robustness of the estimations. Overall, however, the R^2 of the selection equation are low, which suggests the existence of non-observed factors and important heterogeneity.

3. Results

Table 1 shows the estimations from the second stage of a probit with selection model or from a simple probit. All statistically significant variables are given. There are generally no significant differences between the accidents that happened from December 1997 onwards and those that happened in the previous year, supporting a certain robustness of the results. The Wald tests of independence of equations (1) and (2) range between 0.3 and 1.8 i.e. one can not systematically reject that the equations are dependant. Actually, some results differ from the standard probit: for instance, if we compare column 2 versus column 2b, men declare more their injury and managers less. But for most variables, the differences are cosmetic.

Consistent with works based on US data (see above), we find that our discrete measure of the severity of the accident is a powerful determinant of reporting. In addition, compared to pains and sprains that should be harder to diagnose or to directly link to the workplace activity, workers tend to report more often some types of injury: eyes troubles, fractures or contusions. Such injuries are often due to specific and clear events on the workplace: falls, spattering or splashing in the eyes, etc. Allergies (mostly to chemical products) that could appear after the accidental exposition are significantly less report to the social security.

Employees of large firms seem more likely to report their accidents. This result may suggest that the presence of trade unions or the existence of health and safety committees improve reporting behaviour. It is also rather intuitive that managers tend to less declare their injuries; However, this result is not robust if we consider only recent accidents (column 5).

In addition, contrary to workers with no diploma, workers with a first degree seem to more declare their injuries. One potential explanation is that these low-educated workers face similar risk than workers with no complete education, but they are more able to file the accident claim and to understand the quite complex administrative procedure that requires a real literacy level. According to the INSEE, about 10% of the French population is illiterate. Note that the diploma variable kills the nationality variables that are not significant in our estimations. Also, the household type or the age do not seem to statically influence reporting

Table 1 about here

In addition, none of the three indicators of the fear of unemployment is statistically significant, even at high thresholds. The results are qualitatively similar when they are taken separately and if the other explanatory variables are modified. The unemployment rate (or its trend) does not seem to have any influence on reporting behaviour. This result can be

Table 1: Determinants of reporting a workplace accident

Probit or Probit with selection model

Dependant variable: to report or not his/her accident

	1	2	2b	3	4	5	5b	6
Selection model	A	A	No	A	A	A	no	B
Accident in the 'x' last months	12	12	12	12	12	4	4	12
Severity of the accident (Ref. = benign) :								
Serious	1,33***	1,27***	1,33***	1,31***	1,26***	1,39***	1,44***	1,26***
	(0.17)	(0.19)	(0.16)	(0.17)	(0.20)	(0.28)	(0.23)	(0.20)
Severe	1,86***	1,67***	1,75***	1,82***	1,63***	2,63***	2,72***	1,64***
	(0.21)	(0.24)	(0.16)	(0.20)	(0.26)	(0.59)	(0.44)	(0.25)
Type of injury (Ref.= MSD, sprains, strains):								
Contusions	0.30*	0.30**	0.31**	0.29*	0.29*	0.49**	0.50**	0.28*
	(0.16)	(0.15)	(0.15)	(0.16)	(0.15)	(0.24)	(0.24)	(0.15)
Eyes disorders	0.56***	0.52***	0.55***	0.52**	0.48**	0.47	0.48	0.48**
	(0.22)	(0.20)	(0.20)	(0.21)	(0.20)	(0.33)	(0.34)	(0.20)
Fractures	0.54*	0.55*	0.59*	0.53*	0.53*	0.17	0.18	0.53*
	(0.29)	(0.29)	(0.30)	(0.29)	(0.28)	(0.51)	(0.53)	(0.29)
Allergies	-1.05***	-0.83***	-0.90***	-1.07***	-0.83***	-1.10*	-1.15**	-0.83***
	(0.33)	(0.31)	(0.29)	(0.33)	(0.31)	(0.60)	(0.57)	(0.31)
Cuts, bites, burns, stings, others	Yes	Yes	Yes	Yes	Yes	yes	Yes	Yes
Fear of unemployment or dismissal :								
Unemployment rate in March 1997	0,64	-0.11	-0,12	0,77	0.05	0.20	0.21	0,05
in the worker's cell	(0,88)	(0,80)	(0,84)	(0,89)	(0.80)	(1.35)	(1.41)	(0,80)
Evolution of unemployment rate	0,62	0,41	0,50	0,73	0.39	1.15	1.24	0,40
between March 1997 and March 1998	(1.05)	(1.00)	(1.05)	(1,05)	(0.99)	(1.76)	(1.81)	(1.00)
Precarious status during the accident	0,08	0,09	0,12	0,01	0,02	-0,02	-0,01	0,03
	(0,17)	(0,15)	(0,16)	(0,17)	(0,15)	(0,25)	(0,26)	(0,15)
Permanent contract during the accident but previously on precarious position or				**-0,90*** **	**-0,92*** **	**-0,75*** **	**-0,78*** **	**-0,90*** **
Unemployed in March 1997				**(0,25)**	**(0,23)**	**(0,34)**	**(0,33)**	**(0,24)**
Male	0,22	0,24*	0,19	0,25	0,26*	0,54**	0,52**	0,26*
	(0,17)	(0,14)	(0,15)	(0,15)	(0,14)	(0,24)	(0,25)	(0,14)
Household type (see appendix)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nationality (see appendix)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age (4 slices, see appendix)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Diploma (7 levels, see appendix) Ref.= technical high school	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No diploma	0.22	0.20	0.22	0.22	0.21	0.41*	0.44*	0.21
	(0.15)	(0.14)	(0.14)	(0.15)	(0.14)	(0.22)	(0.22)	(0.14)
First diploma	0,49**	0,54***	0,54***	0,53**	0,59***	0,98***	1.00***	0,59***
	(0,21)	(0,20)	(0,20)	(0,21)	(0,20)	(0,33)	(0,33)	(0,19)
Social category (15 categories)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Manager	-0.61	-0.65**	-0.47	-0.75**	-0.79**	-0.18	0.06	-0.78**
	(0.41)	(0.33)	(0.32)	(0.36)	(0.32)	(0.76)	(0.61)	(0.32)
Firm size (5 slices, ref. = 1 to 50 workers)	Yes	No	No	Yes	No	No	No	

100 to 500	0,30**			0,29**				
	(0,15)			(0,14)				
500 to 1000	0,54**			0,51**				
	(0,22)			(0,23)				
> 1000	0,63***			0,58***				
	(0,17)			(0,16)				
Industries (NAF 16 ; ref = construction)	Yes	Yes	Yes	Yes	Yes	yes	Yes	Yes
Automobile	0,56	0,66**	0.66*	0,54	0,62*	0,54	0,54	0,62*
	(0,37)	(0,33)	(0,34)	(0,36)	(0,32)	(0,53)	(0,53)	(0,32)
$Chi^2(x)$	(62) = 263	(57) = 245	(57) = 246	(63) = 256	(58) = 234	(58) = 128	(58) = 148	(58) = 235
Total observations	12156	13306	1193	12156	13306	13306	496	13306
Number of injured workers	1114	1193	1193	1114	1193	496	496	1193

Lecture: Robust standard deviation Huber-White-Sandwich in parenthesis; * significant at 10%, ** 5%, *** 1%.
Field: private workers.

explained by the segmentation of employment, with the threat of dismissal or redundancy being of little concern to workers on permanent contracts. After all, the cost of dismissing such employees, together with the regulatory obstacles, can be prohibitive. Consequently, it should be workers on precarious contracts who are at greatest risk of being made unemployed. Now our estimations produce a coefficient that is certainly negative but non-significant. Should it be concluded from this that the fear of unemployment or of dismissal does not influence employees' reporting behaviour?

Firstly, we are not observing employees' fear of redundancy sparked by a poor economic situation in their firms, or their employers' own policies; these variables might have a greater impact on their behaviour. Secondly, the fact of being off work means that the countdown of the number of days worked is temporarily suspended and postpones the ending of the contract. The fear of unemployment for precarious workers is also potentially assuaged by the knowledge that the likelihood of such workers being offered permanent contracts when their temporary contracts come to an end is very low or non-existent in firms that draw mainly on a 'floating reserve' of labour. Thus precarious employees may, on the contrary, be particularly inclined to protest or take direct action, since they have nothing to gain and hence nothing to lose. Presumptively, therefore, under-reporting by employees on precarious contracts is underestimated.

Consequently, because of this last effect and the non-observable biases, we are unable, solely on the basis of individual data, to draw any firm conclusions as to the impact of the fear of redundancy. It is advisable, therefore, to focus on an observable test group of workers not affected by all these various biases but who are particularly vulnerable. Employees recently hired on permanent contracts who were previously either in precarious employment or unemployed fulfil these conditions. Firstly, they are going through a period of probation (which is not observed here). During this period (legally between 1 and 6 months), employers can dismiss employees on permanent contracts without cost or justification. Once this period is over, employees are fully covered by an employment protection legislation that is particularly rigorous in France (see OECD, 2004). In addition, losing her permanent job some months after being hired is an adverse signal for future employers. A worker recently recruited on a permanent contract has every incentive not to give any "negative" signals to his or her employer during this initial period of employment and to comply with the employer's instructions.

Columns 3 to 5 show the results for model (1) under the terms of the selection equation (2). The individual explanatory variables are still the fact of being in precarious employment, as well as being on a permanent contract in the month of the accident but being in a precarious

situation (but not a student) or unemployed in March 1997, that is one year before the survey. The control group is made up of employees on permanent contracts who were not previously in precarious situations. The Chi² obtained are significantly better than those obtained from the previous estimations. The coefficients associated with the other determinants and control variables are not affected. The main result is that workers newly hired on a permanent contract are significantly less likely to report their workplace accidents, all observable things being equal; the estimated coefficient is high and statistically very significant. The probability of underreporting in this group is of the order of twice that of other permanent employees. In purely mechanical terms, precarious employment statuses emerge more negatively but without becoming significant.

These estimations may be susceptible to residual endogeneity biases. Firstly, the causality may be in the opposite direction: an employer may decide to offer new permanent contracts to individuals who are inclined not to report their accidents. However, such behaviour is difficult for employers to observe ex ante. Secondly, all observable things being equal, individuals who have accepted a permanent contract following a voluntarily period of precarious employment or unemployment may be less risk-averse. In this case, the estimation of the impact of a new permanent contract on reporting behaviour would be biased, with the residue of equation (2) being positively correlated with the residue of an explanatory model of the transition from precarious status to permanent employment. The same difficulty would arise if it was thought that workers newly recruited on permanent contracts had less experience in their workplaces and were therefore more exposed to the risk of injuries. In these three cases, a higher probability of accidents should be observed among individuals who moved from a precarious situation to permanent employment in the previous year. We have therefore added to the explanatory probit equation (Appendix, column 4, model B) a 'newly recruited on a permanent contract' variable; the associated coefficient is indeed positive but it is non-significant, which tends to put the preceding arguments into context. Nevertheless, we have used this model B in a two-stage estimation of accident reporting in order to eliminate these possible biases; the coefficients thus estimated are more or less the same as those obtained with model A (column 6, Table 1).

Conclusion

Overall, even though our econometric estimations suffer from some limitations (absence of data on the evolution of a firm's workforce or economic situation), in those categories in which the fear of job loss can be at least partially isolated, this fear does seem to be a significant determinant of failure to report an accident. Thus the cyclical or structural state of

the labour market, especially the nature of the labour contract, may significantly influence the reporting rate of occupational injuries.

In addition, a minimal level of education and probably of literacy would also be a requirement for filing a claim. Finally, this study confirms on the French case that the type of injury and its severity are important determinants of reporting.

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Appendix

Probit model. Dependant variable: having a workplace accident between March 1997 and March 1998

	1	2	3	4
Models		A	A'	B
			Injuries occurring after Dec 1997	
Male	0,21***	0,21***	0,28***	0,21***
	(0,05)	(0,05)	(0,05)	(0,05)
Hired before March 1998 on a permanent status				0.10
but initially (March 1997) on a precarious status				(0.09)
Age (ref = 25-40 years)				
15-25	0,14**	0,17**	0,22***	0,17**
	(0,07)	(0,07)	(0,08)	(0,07)
40-55	-0,06	-0,05	-0,02	-0,05
	(0,04)	(0,04)	(0,05)	(0,04)
>55	-0,13	-0,07	-0,12	-0,08
	(0,08)	(0,08)	(0,09)	(0,08)
Diploma (7 levels, ref = CAP-BEP, technical high school)				
Nothing	0,00	0,02	0,03	0,02
	(0,04)	(0,04)	(0,05)	(0,04)
First diploma	0,11	0,13**	0,12	0,13**
	(0,07)	(0,07)	(0,08)	(0,07)
Complete high school	-0,07	-0,09	-0,08*	-0,09
	(0,06)	(0,06)	(0,07)	(0,06)
Complete high school +2 undergraduate	-0,12	-0,16**	-0,20**	-0,16**
	(0,08)	(0,08)	(0,09)	(0,08)
More than 2 undergraduate years	-0,03	-0,10	-0,27**	-0,10
	(0,11)	(0,10)	(0,12)	(0,10)
student	0,20*	0,16	0,04	0,16
	(0,12)	(0,12)	(0,14)	(0,12)
Ref. Couple with child(ren) (married or not)				
Alone	0,02	0,01	0,07	0,01
	(0,05)	(0,05)	(0,06)	(0,05)
Couple without child	0,08*	0,05	0,09*	0,06
	(0,05)	(0,04)	(0,05)	(0,04)
Sole parent with child(ren)	-0,05	-0,06	-0,15*	-0,06
	(0,07)	(0,07)	(0,08)	(0,07)
Nationality (Fr, Portuguese, others EU, North-Africa, others)	yes	yes	yes	Yes

Firm size (5 slices, ref = 1 to 50 workers)				
0 worker[8]	-0,05			
	(0,07)			
50 to 100 workers	-0,00			
	(0,07)			
100 to 500 workers	0,02			
	(0,05)			
500 to 1000 workers	0,08			
	(0,08)			
> 1000 workers	0,03			
	(0,05)			
Industries NAF 16	yes	yes	yes	Yes
Social category (15 levels)	yes	yes	yes	Yes
Geographic zones (Ile de France, NW, NE, SE, SW)	yes	yes	yes	Yes
Characteristic of the job in March 1998				
Part-time	-0,13**	-0,15***	-0,10	-0,15***
	(0,06)	(0,05)	(0,06)	(0,05)
Precarious status	-0,10	-0,11*	-0,06	-0,11*
	(0,07)	(0,06)	(0,07)	(0,06)
Number of nights worked (All jobs between March 1997 and March 1998)	-,08**	-,07*	-0,05	-,07*
	(0,04)	(0,04)	(0,05)	(0,04)
Equipment with numerical commands	0,14**	0,14**	0,11*	0,14**
	(0,06)	(0,06)	(0,07)	(0,06)
Computer	-0,12***	-0,09**	-0,03	-0,09**
	(0,04)	(0,04)	(0,05)	(0,04)
Pace of worked fixed by the colleagues or the machines	0,05***	0,06***	0,07***	0,06***
	(0,01)	(0,01)	(0,01)	(0,01)
Repetitive work	0,07*	0,09**	0,06	0,09**
	(0,04)	(0,04)	(0,04)	(0,04)
Quality norms	0,10**	0,10**	0,03	0,10**
	(0,04)	(0,04)	(0,05)	(0,04)
Job rotation	0,10***	0,11***	0,06	0,11***
	(0,04)	(0,04)	(0,04)	(0,04)
Pseudo R^2 %	9,6	9,6	8,1	9,7
N	12156	13306	13306	13306

Supprimé : 3

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Lecture: standard deviation in parenthesis; * significant at 10%, ** 5%, *** 1%.
Field: private-sector workers March 1998.

[8] Temporary workers can be used by firms without own worker.