Social Cohesion and Development
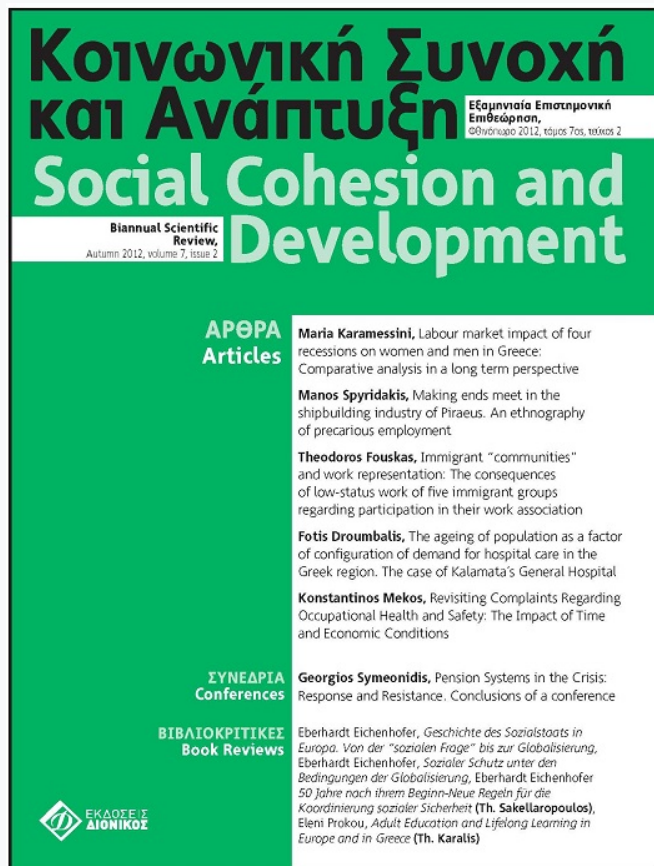
Revisiting Complaints Regarding Occupational Health and Safety: The Impact of Time and Economic Conditions

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Revisiting Complaints Regarding Occupational Health and Safety: The Impact of Time and Economic Conditions

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Ξαναβλέποντας τις καταγγελίες σχετικά με την υγεία και την ασφάλεια των εργαζομένων: Η επίδραση του χρόνου και των οικονομικών συνθηκών

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ABSTRACT

This paper re-examines the matter of complaints regarding occupational health and safety in the area of Thessaloniki, originally dealt with in a 2009 paper. In this paper we examine (a) the validity of the conclusions derived in the 2009 paper as well as the effect of time on them and (b) the effect of the economic conditions on the complaints received and the penalties imposed by the office in charge. The main conclusions of the 2009 paper are still valid: complaints do not lead to the detection of the most dangerous workplaces and no priority should be given to their investigation. Furthermore, as the income per head declines or as the number of unemployed people rises, the complaints are more likely to be characterised as "irrelevant". On the other hand, the economic conditions do not seem to have any effect on the decision of the office in charge to impose sanctions.

KEY WORDS: Health and safety, labour inspectorate, complaints, logit model

ΠΕΡΙΛΗΨΗ

Το άρθρο αυτό επανεξετάζει το ζήτημα των καταγγελιών σχετικά με την υγεία και την ασφάλεια των εργαζομένων στην περιοχή της Θεσσαλονίκης, ζήτημα που είχε αρχικά εξεταστεί σε ένα άρθρο το 2009. Ο στόχος του παρόντος είναι να εξετάσει (α) την εγκυρότητα των συμπερασμάτων του παλαιότερου άρθρου, καθώς και την επίδραση του χρόνου σε αυτά και (β) την επίδραση των οικονομικών συνθηκών στις καταγγελίες που γίνονται και τις κυρώσεις που επιβάλλονται από την αρμόδια υπηρεσία. Το κύριο συμπέρασμα του άρθρου του 2009 εξακολουθεί να ισχύει: οι καταγγελίες δεν οδηγούν στην ανίχνευση των πιο επικίνδυνων εργασιακών χώρων και καμμία προτεραιότητα δεν πρέπει να δίνεται στη διερεύνησή τους. Επιπλέον, όσο το κατά κεφαλήν εισόδημα μειώνεται ή όσο ο αριθμός των ανέργων αυξάνεται, τόσο αυξάνεται η πιθανότητα οι καταγγελίες να χαρακτηρίζονται ως «άσχετες» με την υγεία και την ασφάλεια των εργαζομένων. Από την άλλη, οι οικονομικές συνθήκες δεν φαίνεται να έχουν κάποια επίδραση στην απόφαση της αρμόδιας υπηρεσίας για την επιβολή κυρώσεων.

ΛΕΞΕΙΣ-ΚΛΕΙΔΙΑ: Υγεία και ασφάλεια, επιθεώρηση εργασίας, καταγγελίες, μοντέλο logit

1. Introduction

Mekos (2009) deals with the complaints regarding occupational health and safety in the area of Thessaloniki. It was an attempt to answer three questions: First, who are the complainers and which companies or activities do they complain about? Second, to what extent are complaints relevant to occupational health and safety? And third, do the complaints result to penalties imposed on companies? The answer given to the first question was that complaints do not relate to all economic sectors equally, nor do they originate equally from all kinds of sources. There is lack of complaints concerning agriculture or fishing, but there are a large number of complaints regarding manufacturing and an even bigger one regarding construction. This fact appeared related to the annoyance provoked by each activity: the agricultural activities take place in the country, while fishing is done in the sea, thus not upsetting anyone. On the contrary, buildings are usually constructed in residential areas; therefore, the neighbours are likely to be irritated. The complainer usually prefers to remain anonymous, while competitors seldom make complaints.

The answer given to the second question was that complaints ''irrelevant'' to occupational health and safety are twice as many as the ''relevant'' ones. The complainers appeared unfamiliar to the competence of the Occupational Risk Prevention Centre (which is the office in charge) or they had a hidden agenda. If, for example, the complaint derives from an occupational union (union of people having the same occupation like stokers, drivers or forklift operators) or is aimed at a construction site, the probability for the complaint to have a direct relationship to health and safety matters is decreased: in the former case, the aim of the union is usually the employment of the union's members and in the latter the complainer is usually a neighbour disturbed by the by-products of construction.

Regarding the third question, it was found that in three quarters of the cases, the complaint does not lead to any kind of penalty and in one fifth of the cases in particular, the complaint is not followed by any action by the office in charge: this appears to be the rule in the occurrence of an ''irrelevant'' complaint. On the contrary, if the complaint is directly related to occupational health and safety, if it originates from a competitor or if it pertains to a construction site, the probability of imposing a penalty increases. The stronger effect in this model was derived from the variable *construction.* This may be justified by (a) the great number of fatal accidents occurring in the construction sector (European Social Statistics, 2002), (b) the existence in this sector of companies with different size and time horizon, that frequently change their place of activity, which does not facilitate the regular observation of their compliance and directs labour inspectors to use sanctions more often (Baldwin, 1995, and Hood et al, 2001) and (c) the use of the sanction of stoppage only in this sector (Mekos, 2006).

All things considered, it seemed clear that complaints do not lead to the detection of the most dangerous workplaces and their investigation should not be given greater significance than to the other inspection activities. Three years later, the importance assigned by the government to the complaints has not lessened at all. On the contrary, a special call centre was devoted to the subject. The first question that arises concerns the validity of the conclusions derived in Mekos (2009) and the effect of time on them. The second question this paper seeks answers to, concerns the effect of the economic conditions on the complaints received and the penalties imposed by the office in charge.

2. Materials and methods
2.1 Data

This paper deals with the complaints regarding occupational health and safety in the area of Thessaloniki, that were received in a period of six years, from 2004 to 2009 (included): totally 403 complaints were received and recorded by the Occupational Risk Prevention Centre – which is the office in charge – in that period. In the 2009 paper there were 148 complaints received during 2004 and 2005. The investigation of the complaints was usually given priority over most of the other inspection activities during all those years.

The information recorded includes data relevant to the identity of the complainer (if available), to the company against which the complaint is made and to the content of the complaint, i.e. a brief description of the occupational hazards. It also includes the actions that followed it, if any. These actions could vary from an inspection followed by simple suggestions but without any sanctions, to a combination of fines and penal sanctions. Most of this information is expressed in a descriptive way and has to be transformed in dummy variables in order to be suitable for econometric modelling.

The data regarding the economic conditions (predictors *regional GDP per head* and *unemployed*) is taken from the Bank of Greece / Thessaloniki Branch "Bulletin of Regional Conjunctural Indicators for Macedonia-Thrace".

2.2 Methods

Some sets of variables are cross-tabulated, in an attempt to detect possible relationships between them. STATA version 9.1 was used to carry out the analysis. Since all the possible dependent variables are categorical and in most of the cases they can only have two values, linear regression analysis cannot be used. A suitable probability distribution is the logistic and the appropriate model is logit. The probit model will also be estimated and compared to logit.

A model having *core* as the dependent variable will be examined first, using as predictors all the variables that could explain when a complaint has an "irrelevant" or a "relevant" subject-matter. The predictors in this model belong to three groups: the dummy variables relevant to the identity of the complainer (*worker*, *local union*, *occupational union*, *neighbour* and *competitor)* constitute the first group; the dummy variables relevant to the sector of the company against which the complaint is made (*manufacturing*, *construction*, *commerce*, *services* and *government*) form the second; the new variables regarding the economic conditions (*regional GDP per head* and *unemployed*) and *age* that shows the years that elapsed since year 2000, when most of the labour inspectors were appointed, belong to the third.

However, even "irrelevant" complaints can lead to the detection of companies having hazardous working circumstances and, possibly, to penalties (Mekos, 2009). The effect of the predictors to sanctions will be examined employing another dependent variable, called *penalty*, which gets the value of one if any penalty was imposed on the company. The variable *core* becomes now a predictor.

3. Results
3.1 Cross-tabulations

The first table presents the cross-tabulation of *year* by *sector of activity*, in an attempt to detect potential relationships between them. Pearson x2 tests the hypothesis that row and column variables are independent (Hamilton, 2003). In the case of this table (Table 1), the independence hypothesis (H_0) cannot be rejected: the association between *year* and *sector of activity* is not statistically significant.

Table 1: Cross-tabulation of year by sector of activity

Year	Construction	Manufacturing	Commerce	Services	Government	Totals
2004	33	19	11	9	2	74
2005	27	25	4	17	1	74
2006	25	18	11	13	6	73
2007	22	28	10	11	5	76
2008	18	14	8	15	6	61
2009	12	13	6	7	7	45
Totals	**137**	**117**	**50**	**72**	**27**	**403**

Pearson $x^2(20)$ = 27.6693 Pr = 0.117

Three interesting facts emerge from Table 1: (a) the total number of complaints seems stable during the first four years and is declining during the last two, (b) most of the complaints concern construction sites or manufacturing companies, and (c) the number of complaints against government organizations, although small, is trending upwards over the years: such government organizations include social security agencies, the post office, the local airport and local authorities. The cross-tabulation (not shown) of *year* by *government* (a dummy variable) has a Pearson $x^2(5)$ = 12.1548 (Pr = 0.033), which means that the association between *year* and *government* is statistically significant.

In addition to the other variables - which can be seen as objective - a subjective one (called *core*) was constructed. The aim of *core* is to transform the content of the complaint (which is expressed in a descriptive way) to a value suitable for econometric modelling. The variable *core* assumes the value of ''irrelevant" if the subject-matter of the complaint is not so much related to occupational health and safety, but rather to issues such as the employment of members of an occupational union or the nuisance of a neighbour near a construction site. The variable assumes the value of ''relevant" if the subject-matter is directly related to occupational health and safety (Mekos, 2009).

Table 2: Cross-tabulation of outcome by core ("relevant" or "irrelevant" complaint)

Outcome	Irrelevant	Relevant	Totals
No actions	64	7	71
Suggestions	101	88	189
Second inspection	44	32	76
Lodge complaint	3	0	3
Stoppage	16	6	22
Prosecution	7	8	15
Fines	13	11	24
Prosecution & fines	0	3	3
Totals	**248**	**155**	**403**

Pearson $x2(7)$ = 39.9967 Pr = 0.000

Most of the complaints are classified as "irrelevant": only 155 out of 403 complaints (or 38.46%) are classified as "relevant". Of course, even ''irrelevant" complaints can lead to the detection of companies with dangerous working conditions and to the imposition of sanctions. It is obvious, however, from the relevant table (Table 2), that the case of no action is related to the ''irrelevant" complaints (Mekos, 2009). Pearson x2 tests the hypothesis that row and column variables are independent (Hamilton, 2003). In the case of this table (Table 2), the independence hypothesis (H_0) has to be rejected: the association between *outcome* and *core* is statistically significant.

3.2 Logit models

The results for the logit model having *core* as the dependent variable (2009 version) are displayed on Table 3. The overall x^2 test evaluates the null hypothesis that all coefficients in the model (except the constant term) equal zero (Hamilton, 2003). Since $x^2(9) = 89.76$, the probability of a greater x^2 with nine degrees of freedom is extremely low: the null hypothesis has to be rejected and, consequently, the model under investigation is statistically significant.

Table 3:Logit model with core as the dependent variable (2009 version)

Predictor variable	Coefficient	Standard Error	z	P>|z|	Marginal Effects	Standard Error	z	P>|z|
Worker	-.2707619	.3842596	-0.70	0.481	-.0579802	.07874	-0.74	0.462
Local union	-.4495631	.3149534	-1.43	0.153	-.0944571	.06197	-1.52	0.127
Occupational union	-3.105781	.7513776	-4.13	0.000	-.3741064	.03604	-10.38	0.000
Neighbour	-1.612471	.5670094	-2.84	0.004	-.2713642	.06208	-4.37	0.000
Competitor	-.032944	.7614028	-0.04	0.965	-.0073054	.16794	-0.04	0.965
Manufacturing	-1.035298	.3813864	-2.71	0.007	-.2104646	.07005	-3.00	0.003
Construction	-1.971286	.4029148	-4.89	0.000	-.3758077	.06418	-5.86	0.000
Services	-.6771578	.4093949	-1.65	0.098	-.1384615	.07587	-1.83	0.068
Government	-.1747665	.526998	-0.33	0.740	-.0379378	.11118	-0.34	0.733
Constant term	1.001587	.3385292	2.96	0.003	---	---	---	---

Number of obs. = 403, LR $x^2(9)$ = 89.76, Prob > x^2 = 0.0000, pseudo-R^2 = 0.1671
Correctly classified complaints are 282 out of 403, or 69.98%

Four of the predictors (*occupational union*, *neighbour*, *manufacturing* and *construction*) have coefficients that are statistically significant, all having a negative sign. For example, if the complainer is an occupational union (union of people having the same occupation like stokers, drivers or forklift operators) or a neighbour, the probability of the complaint being "relevant" decreases. In other words, occupational unions and neighbours tend to make "irrelevant" complaints. The overall ''correctly classified" complaints are 282 out of 403 (69.98%). In the same logit model but with fewer observations (totally 148 complaints, received during 2004 and 2005), only two of the predictors (*occupational union* and *construction*) had coefficients that were statistically significant, and another one (*manufacturing*) was marginal (Mekos, 2009).

The next model (Table 4) uses two new predictors (*regional GDP per head*, expressed in euros, as well as *unemployed*), in an attempt to examine the effect the economic conditions have on the behaviour of the complainers. The second of these predictors (*unemployed*) is the number (in thousands) of unemployed people in the region. The model uses also a new predictor (*age*) that

shows the years that elapsed since year 2000, when most of the labour inspectors were appointed. The coefficient of *age* has a negative sign, which means that as the office in charge becomes "older", the probability of a complaint being "irrelevant" rises. The coefficient of *regional GDP per head* has a positive sign, which means that as the personal income rises, the probability of a complaint being "relevant" rises too or, in other words, people with higher income don't usually make "irrelevant" complaints. As expected, unemployment acts in the opposite way: the coefficient of *unemployed* has a negative sign, which means that as the number of unemployed people rises, so does the probability of a complaint being "irrelevant".

Table 4: Logit model with core as the dependent variable (new version)

Predictor variable	Coefficient	Standard Error	z	P>|z|	Marginal Effects	Standard Error	z	P>|z|
Age	-.9797907	.3672941	-2.67	0.008	-.2173235	.08127	-2.67	0.007
Reg. GDP per head	.0011685	.0004134	2.83	0.005	.0002592	.00009	2.84	0.005
Unemployed	-.0417275	.022561	-1.85	0.064	-.0092554	.005	-1.85	0.064
Worker	-.2327013	.3912157	-0.59	0.552	-.0498522	.08073	-0.62	0.537
Local union	-.3756413	.3245751	-1.16	0.247	-.0793108	.06496	-1.22	0.222
Occupational union	-3.12952	.754545	-4.15	0.000	-.3720507	.03596	-10.35	0.000
Neighbour	-1.673453	.570592	-2.93	0.003	-.2760571	.06007	-4.60	0.000
Competitor	.335916	.8348103	0.40	0.687	.0780323	.20136	0.39	0.698
Manufacturing	-.7393408	.4682581	-1.58	0.114	-.1539527	.09091	-1.69	0.090
Construction	-1.713817	.502493	-3.41	0.001	-.3327545	.08324	-4.00	0.000
Commerce	.1755457	.5342227	0.33	0.742	.0397526	.12331	0.32	0.747
Services	-.3789176	.4917543	-0.77	0.441	-.0802862	.0991	-0.81	0.418
Constant term	-8.221236	4.008052	-2.05	0.040	---	---	---	---

Number of obs.   = 403, LR $x^2(12)$ = 98.55, Prob > x^2 = 0.0000, pseudo-R^2 = 0.1835
Correctly classified complaints are 291 out of 403, or 72.21%

Two of the three new predictors (*age* and *regional GDP per head*) have coefficients that are statistically significant and the third (*unemployed*) comes close. The two models, the older (reduced or "nested") and the newer ("full" model) can be compared using the likelihood-ratio x^2 (Greene, 2003 and Hamilton, 2003). Since $x^2(3)$ = 8.79, the probability of a greater x^2 with three degrees of freedom is low enough (0.0322). Therefore, the null hypothesis that the 2009 model (reduced or "nested") is sufficient should be rejected: the three new predictors should be used.

The results for the logit model having *penalty* as the dependent variable (2009 version), are displayed on Table 5. The overall x^2 test for this model leads to the rejection of the null hypothesis that all coefficients in the model (except the constant term) equal zero: $x^2(9)$ = 66.80 and the probability of a greater x^2 with nine degrees of freedom is extremely low. Three of the predictors (*core*, *competitor* and *construction*) have coefficients that are statistically significant, all having a positive sign: if the complaint is ''relevant'', if the complainer is a competitor or if the company against which the complaint is made is in the construction sector, the probability of imposing sanctions increases.

Table 5: Logit model with penalty as the dependent variable (2009 version)

Predictor variable	Coefficient	Standard Error	z	P>|z|	Marginal Effects	Standard Error	z	P>|z|
Core	1.424049	.3778269	3.77	0.000	.1683541	.05091	3.31	0.001
Worker	-1.302003	1.081158	-1.20	0.228	-.0866621	.04291	-2.02	0.043
Local union	.2400332	.5719528	0.42	0.675	.0256791	.06528	0.39	0.694
Occupational union	.9751023	.6104595	1.60	0.110	.1308971	.10363	1.26	0.207
Neighbour	.2119398	.413804	0.51	0.609	.0225354	.04657	0.48	0.628
Competitor	2.043441	.9273253	2.20	0.028	.375005	.22793	1.65	0.100
Manufacturing	1.056307	.6758587	1.56	0.118	.1244965	.08947	1.39	0.164
Construction	2.934711	.6808409	4.31	0.000	.4090513	.10456	3.91	0.000
Commerce	-.0041915	.8667297	-0.00	0.996	-.0004189	.08653	-0.00	0.996
Constant term	-4.085128	.6956838	-5.87	0.000	---	---	---	---

Number of obs. = 376, LR $x^2(9)$ = 66.80, Prob > x^2 = 0.0000, pseudo-R^2 = 0.1947
Correctly classified complaints are 318 out of 376, or 84.57%

The results for using the probit regression instead of the logit (again having *penalty* as the dependent variable) are displayed on Table 6.

Table 6: Probit model with penalty as the dependent variable

Predictor variable	Coefficient	Standard Error	z	P>|z|	Marginal Effects	Standard Error	z	P>|z|
Core	.7868559	.2095479	3.76	0.000	.1765086	.0509	3.47	0.001
Worker	-.7735869	.5728004	-1.35	0.177	-.1023182	.04265	-2.40	0.016
Local union	.1826039	.2936772	0.62	0.534	.039118	.06739	0.58	0.562
Occupational union	.5313897	.3332571	1.59	0.111	.1326328	.09922	1.34	0.181
Neighbour	.1034229	.2426432	0.43	0.670	.021478	.05256	0.41	0.683
Competitor	1.185995	.5241752	2.26	0.024	.3774047	.20651	1.83	0.068
Manufacturing	.5368575	.325107	1.65	0.099	.1198019	.0788	1.52	0.128
Construction	1.591886	.3373648	4.72	0.000	.3937176	.08829	4.46	0.000
Commerce	-.0613909	.4211019	-0.15	0.884	-.0118711	.07929	-0.15	0.881
Constant term	-2.266912	.3401401	-6.66	0.000	---	---	---	---

Number of obs. = 376, LR $x^2(9)$ = 66.82, Prob > x^2 = 0.0000, pseudo-R^2 = 0.1948
Correctly classified complaints are 318 out of 376, or 84.57%

Should someone look only at the coefficient estimates, the natural conclusion would then be that the logit and probit models produced different estimates. The comparison of the columns of marginal effects, however, reveals that the two models are very similar (Greene, 2003). Therefore, there seems to be no reason to substitute probit for the logit regression.

The three new predictors (*age*, *regional GDP per head* and *unemployed*) are used in the next model having *penalty* as the dependent variable (Table 7).

Table 7: Logit model with penalty as the dependent variable (new version)

Predictor variable	Coefficient	Standard Error	z	P>|z|	Marginal Effects	Standard Error	z	P>|z|
Age	.3245795	.4434475	0.73	0.464	.0322845	.04409	0.73	0.464
Reg. GDP per head	-.0001657	.0004899	-0.34	0.735	-.0000165	.00005	-0.34	0.735
Unemployed	.0407311	.0301265	1.35	0.176	.0040513	.00301	1.35	0.178
Core	1.408638	.3828351	3.68	0.000	.1653269	.05149	3.21	0.001
Worker	-1.438832	1.111037	-1.30	0.195	-.091478	.03983	-2.30	0.022
Local union	.1582557	.5748989	0.28	0.783	.0164517	.06238	0.26	0.792
Occupational union	.9270449	.6205463	1.49	0.135	.1221351	.10254	1.19	0.234
Neighbour	.1854394	.4208763	0.44	0.660	.0194536	.04642	0.42	0.675
Competitor	1.934011	.9451422	2.05	0.041	.3469789	.23081	1.50	0.133
Manufacturing	1.021973	.6766369	1.51	0.131	.1191398	.08841	1.35	0.178
Construction	2.872859	.6857835	4.19	0.000	.3968323	.10545	3.76	0.000
Commerce	-.0182846	.8744168	-0.02	0.983	-.0018092	.08609	-0.02	0.983
Constant term	-6.801578	4.831264	-1.41	0.159	---	---	---	---

Number of obs. = 376, LR $x^2(12)$ = 68.82, Prob > x^2 = 0.0000, pseudo-R^2 = 0.2006
Correctly classified complaints are 318 out of 376, or 84.57%

The three new predictors (*age*, *regional GDP per head* and *unemployed*) have coefficients that are not statistically significant. The two models having *penalty* as the dependent variable can be compared using the likelihood-ratio x^2. Since $x^2(3)$ = 2.02, the probability of a greater x^2 with three degrees of freedom is high enough (0.5689). Therefore, the null hypothesis that the 2009 model (reduced or "nested") is sufficient cannot be rejected: the three new predictors should not be used.

A new variable (*election year*) obtaining the value of 1 on the years (2004, 2007 and 2009), when general elections were held in Greece, was also tried (relevant table not shown). The purpose was to check whether elections distort the functioning of the office in charge. The answer is negative: the coefficient of *election year* is not statistically significant.

4. Discussion

By enlarging the time span of the dataset from two to six years and the related enlargement of the complaint population from 148 to 403, the conclusions derived in Mekos (2009) are still valid. There is still lack of complaints concerning agriculture or fishing. On the other hand, there is a large number of complaints regarding manufacturing and an even larger one regarding construction (Table 1). Complaints ''irrelevant'' to occupational health and safety are no longer twice as many as the ''relevant'' ones, but yet 61.54% of the total (Table 2). If the complaint derives from an occupational union or is aimed at a construction site or a manufacturing company, the complaint is less likely to have a direct relationship to health and safety matters (Table 3). In 83.37% of the cases (336 in 403 complaints) the complaint does not lead to any kind of penalty (Table 2). On the subject of sanctions imposed, if the complaint is directly related to occupational health and safety, if it derives from a competitor or if it regards a construction site, the probability of imposing a penalty increases (Tables 5 and 6).

However, as time goes by there seems to be an impact on the content of the complaints (Table 4). The coefficient of *age* (shows the years that elapsed since year 2000, when most of the labour inspectors were appointed), has a negative sign, which means that as the office in charge becomes "older", the probability of a complaint being "irrelevant" rises. Perhaps, over the years more people are informed about the existence of an office that receives complaints (even anonymous ones) and therefore more people do submit complaints. In regard to services provided by the state or social organizations, supply and demand are not independent. On the contrary, supply and demand for such services increase or decrease concurrently. An increase in supply leads to an increase in demand, since some people appreciate that they can use a service that satisfies their needs or wishes (Spicker, 2004).

Regarding the effect of the economic conditions on the complaints received and the penalties imposed by the office in charge, a response is given by the results on Tables 4 and 7. As the income per head declines or as the number of unemployed people rises, complaints are more likely to be "irrelevant". Poorer or unemployed people may want to get even with their ex-employer or the "society" or "the system" in general. Regarding penalties imposed, predictors *regional GDP per head* and *unemployed* have coefficients that are not statistically significant and, as explained above, the model including them should not be used: the economic conditions do not seem to have an impact on the decision of the office in charge to impose sanctions.

All things considered, the main conclusion of the 2009 paper is valid still. Complaints do not lead to the detection of the most dangerous workplaces and no priority should be given to their investigation. Unfortunately, politicians in charge of the Ministry of Labour seem to think otherwise or may have their own agenda.

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