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Compensation Mechanisms for Lost Productivity: A Comparison between Four European Countries

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ABSTRACT

Objective: Productivity costs are usually estimated by multiplying the wage with the period absent. This can lead to an overestimation if compensation mechanisms occur. Until now only Dutch data are available on the influence of compensation mechanisms on lost productivity, but between-country differences in frequency and type of compensation mechanisms can be expected. The objective of this study was to understand whether compensation mechanisms for days absent from paid work differ in type and frequency across countries and to explore whether this would result in between-country differences in relevant lost productivity. **Methods:** Data from a cross-sectional survey among respondents with rheumatic disorders from four countries were the basis for this study. Analyses focused on respondents with paid employment who reported absence in the last 3 months. The different compensation mechanisms are described and the resulting lost productivity in terms of days absent was calculated with and without taking compensation mechanisms into account. Logistic regression analyses were performed to examine which variables influence compensation mechanisms leading to relevant lost productivity. **Results:** The results indicate that compensation mechanisms occur and are relevant in all four countries. Between-country differences in the type and frequency of compensation mechanisms and relevant lost productivity were observed. The logistic regression analyses indicate that, correcting for other variables, this is also the case for the use of compensation mechanisms leading to relevant lost productivity. **Conclusions:** Between-country differences in compensation mechanisms in case of absenteeism exist and could vary to such an extent that foreign relevant lost productivity data should be used with caution.

Keywords: between-country comparison, compensation mechanisms, lost productivity, rheumatic disorders.

Introduction

It is well known that between-country differences exist in lost productivity due to health problems, not only with regard to work disability but also with regard to sickness absence [1]. The differences can only partly be explained by patient characteristics such as educational level, sex, age, job type, and severity of disease because system characteristics such as regulations and allowance regarding sickness absence and the rules and amount of the disability insurance play an important additional role [1]. Previous research suggested that in case of short-term absenteeism, compensation mechanisms at the workplace can occur, which would influence the estimates of productivity costs of the individual for the workplace or for society [2,3]. The compensation of long-term absenteeism is taken into account when calculating productivity costs by using the Friction Cost Method, but not when using the Human Capital Approach and explains the large differences in the estimations of the productivity costs based on both approaches [4]. In this study, the focus will be the compensation of short-term absenteeism and explores possible between-country differences in these mechanisms.

When productivity costs are included in economic evaluations, the costs of days absent from paid work are commonly estimated by multiplying the patients' wages with the time absent. It was suggested, however, that these methods might overestimate productivity costs because they do not take into account compensation mechanisms [2]. Taking into account short-term compensation mechanisms could considerably decrease the estimated productivity costs based solely on the time absent of the individual worker. This is because time absent that is compensated for in normal working hours will not result in societal productivity losses, while compensating lost productivity during extra working hours requires extra time and thus additional costs. While it can be expected that the occurrence of

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such compensation mechanisms might also be country specific, this has never been studied. Up to now, only two studies have been performed on the influence of short-term compensation mechanisms on lost productivity and both studies were conducted in The Netherlands. It was shown that productivity costs taking compensation mechanisms into account were ranging from only 23% up till 33% of the costs when not taking compensation mechanisms into account [2,3,5]. In the present study, it is first explored whether compensation mechanisms for days absent from paid work differ in type and frequency across countries and second whether this would result in between-country differences in relevant lost productivity. Patients with rheumatic disorders were considered because it is known that they have a high frequency of sick leave.

Methods

In a cross-sectional study a questionnaire was sent in March 2010 to 200 respondents with a rheumatic disorder in one of four countries: The Netherlands, the United Kingdom, France, and Germany. Data were collected by research organization TNS NIPO by sending members of the patient panel "rheumatic disorders" a link to an online questionnaire. The potential respondents were eligible when they had a rheumatic disorder and were between 20 and 65 years of age. The authors developed the questionnaire and carried out the data analyses. For the analyses of the present study, we focused on respondents with paid employment who reported absence in the last 3 months. More details about the study design and questionnaire can be found in Knies et al. [1].

As part of the Productivity and Disease Questionnaire [6], working respondents who reported absence in the last 3 months were asked how their absence was compensated for. The respondents could choose between six possible compensation mechanisms, being self-compensation in normal hours or in extra hours, compensation by colleagues in normal hours or in extra hours, compensation by extra workers, or work was not compensated. In addition, a "do not know" option was added. Patients could indicate more than one compensation mechanism, but it was not possible to indicate to what extent their absence was compensated for and which mechanism was the most common. In the analyses, it was therefore assumed that the mechanisms in which extra hours or extra workers were needed were dominating, thus being more important than the other compensation mechanisms. In addition, it was assumed that when the first five mechanisms were reported, all lost productivity due to absence was compensated for.

Descriptive statistics were used to compare the demographics, occupational characteristics, disease severity (level of restriction on a three-point scale), and the reported presence of compensation mechanisms across the four countries.

To examine the role compensation mechanisms play in lost productivity, first the mean number of days absent for each country was calculated, without accounting for compensation mechanisms. Since in the questionnaire, the number of days absent in the past 3 months was collected, the lost productivity represents a 3-month period. Next, two approaches were used to calculate the lost productivity taking compensation mechanisms into account. In the first valuation approach, compensation led to *relevant lost productivity* when extra hours (colleagues, themselves, or hiring additional employees) were needed to compensate the absence of a sick respondent. Relevant lost productivity is that portion of the lost productivity that is not compensated for within normal working hours. When using the *alternative valuation approach*, it was assumed that relevant lost productivity also occurred when the subjects indicated that lost productivity was not compensated for [3]. In both valuation methods, relevant lost productivity was calculated as the number of days absent leading to relevant lost productivity.

In logistic regression analyses, the independent contribution of country of residence to compensating mechanisms after adjusting for disease severity and work characteristics was explored. The dependent variable was compensating mechanisms leading to relevant lost productivity versus compensating mechanisms without relevant lost productivity. The independent variables comprised country of residence and personal (sex, age, educational level, and disease severity) and occupational characteristics (occupational level, part-time work, irregular shifts, and management position). Dummy variables were used for country of residence (three dummies), education, and occupation (both two dummies). Except for the dummy variables for country of residence, nonsignificant independent variables were deleted step by step when their P value was higher than 0.10, each time deleting the variable with the highest P value. This process was continued until only significant variables were left. For the final model with only significant variables, the significance of the three dummy variables that represent country of residence was examined.

Results

Out of 800 respondents 539 had a paid job and 167 of them reported absenteeism in the last 3 months. The personal, disease, and occupational characteristics of the respondents being absent are reported in Table 1. In the United Kingdom, significantly more men reported absenteeism than in Germany and France. The British respondents have the highest educational level, and the French respondents are more frequently seriously restricted because of their disease. France and The Netherlands had the most respondents with a part-time job. Respondents are grading the relationships with colleagues similar across the four countries, but the number of colleagues with the same work differs. In The Netherlands, on average, 5.3 colleagues have similar work compared with 103 colleagues in the United Kingdom, which is due to three respondents reporting an extremely large number of colleagues with the same work. German and Dutch respondents work less often in shift work. The average monthly salary is lowest in The Netherlands, likely as a result of a high proportion of respondents who work part-time.

The different compensation mechanisms and their reported frequency are given in Table 2. Because respondents could report multiple mechanisms, the cumulative percentage of compensation mechanisms is above 100%. In all four countries, the lost productivity is most often compensated by colleagues in their normal working hours. In The Netherlands, France, and Germany, the second most reported mechanism is doing the work self during normal working hours after returned to work, but in the United Kingdom this is the fourth most common mechanism. The second most reported mechanism in the United Kingdom is hiring extra workers, while in the other three countries this is the least frequently mentioned mechanism. Absence is not compensated in 9.5% (France) to 19% (United Kingdom) of the cases, and 4.3% (Germany) to 11.9% (France) of the respondents did not know how their lost work was compensated for.

The average number of days of lost productivity without taking compensation mechanisms into account differs largely between the four countries. The average ranges from 11.4 days in The Netherlands, around 20 days in Germany and the United Kingdom to 26.5 days in France. The percentages of respondents for whom compensation mechanisms are used that resulted in relevant lost productivity vary from 21.1% (The Netherlands) to 36.2% (Germany) of respondents and varied from 31.0% (France) to 48.9% (Germany) when also including the frequency of

Table 1 – Personal, disease, and occupational characteristics of those reporting absence from work in the past 3 mo.

	The Netherlands	The United Kingdom	France	Germany
Respondents who reported absenteeism (% of working respondents)	57 of 173 (32.9)	21 of 116 (18.1)	42 of 129 (32.6)	47 of 121 (38.8)
Personal characteristics				
Males, n (%)	21 (36.8)	10 (47.6)*	17 (40.5)*	15 (31.9)†,‡
Mean age (y) (range)	45.5 (28–63)	47.5 (23–63)	44.3 (28–56)	45.7 (23–63)
Educational level, n (%)§				
Lower education	15 (26.3)†	2 (9.5)‖,¶,#	19 (45.2)**	20 (42.6)**
Middle education	28 (49.1)¶,#	11(52.4)¶,#	9 (21.4)**,††	11 (23.4)**,††
Higher education	14 (24.6)*,†,‡	8 (38.1)‖	14 (33.3)‖	16 (34)‡‡
Disease characteristics				
Years of rheumatic disorder (range)	13.7 (2–42)	8.7 (1–24)	12.6 (1–34)	11.0 (1–39)
Restricted by disease (0–2)				
Seriously restricted, n (%)	9 (15.8)*,‡,**	5 (23.8)‡	14 (33.3)†,††	13 (27.7)‖
Somewhat restricted, n (%)	41 (71.9)¶,#	15 (71.4)¶,#	23 (54.8)**,††	29 (61.7)**,††
Occupational characteristics				
Relation with colleagues— scale 0–10 (10 best)	7.7	7.7	7.6	7.8
Colleagues with same work, n (range)	5.3 (0–30) **	103 (0–1000)*,‡,††	35.2 (0–300)†	13.2 (0–100)†
Part-time work (<36 h), n (%)	29 (50.9)*,**	6 (28.6)¶,††	25 (59.5)*,**	17 (36.2)‡,‖
Shift work, n (%)	10 (17.5)¶,**	9 (42.9)‡,#,††	26 (61.9)†,#,††	6 (12.8)†,‡
Management position, n (%)††	10 (17.5)	5 (23.8)	11 (26.2)	11 (23.4)
Occupational level, n (%)§§				
Lower occupation	5 (8.8)	5 (23.8)	6 (14.3)	4 (8.5)
Middle occupation	36 (63.2)	12 (57.1)	27 (64.3)	28 (59.6)
Higher occupation	16 (28.1)	4 (19.1)	9 (21.4)	15 (31.9)

* $P < 0.05$ with Germany.
† $P < 0.05$ with the United Kingdom.
‡ $P < 0.05$ with France.
§ Lower education: preparatory vocational education, preparatory general secondary education; middle education: higher general secondary education, preparatory university education, intermediate vocational education; higher education: higher vocational education, university education.
‖ $P < 0.05$ with The Netherlands.
¶ $P < 0.01$ with France.
\# $P < 0.01$ with Germany.
** $P < 0.01$ with the United Kingdom.
†† $P < 0.01$ with The Netherlands.
‡‡ Respondents are considered to have a management position when they indicated to have an executive function.
§§ Lower occupation: elementary and lower-level employment; middle occupation: intermediate-level employment (executive), intermediate-level employment (nonexecutive), company owner/director (<10 employees), company owner/director (>10 employees), self-employed professional; higher occupation: higher-level employment (executive), higher-level employment (nonexecutive), farmer/market gardener.

uncompensated work in the alternative approach. The available information was used to calculate which part of the lost productivity would remain when taking the compensating mechanisms into account. The lowest percentage of the remaining lost productivity could be found in The Netherlands with only 12% of the initial lost days being relevant, and the highest percentage of the remaining lost productivity could be found in the United Kingdom with 50%. As expected, these differences became even larger (19.8% in The Netherlands vs. 82.2% in the United Kingdom) when using the alternative valuation method, in which the lost days that were not compensated for are also assumed to result in lost productivity at the workplace.

The results of the logistic regression analyses exploring the adjusted contribution of country of residence to the use of compensating mechanisms resulting in relevant lost productivity as defined according to two different approaches can be found in Table 3. The results of the first analyses showed that living in Germany instead of in The Netherlands, being somewhat restricted versus not restricted, and having a middle or high occupation versus having a low occupation increase the chance of having used a compensation mechanism leading to relevant lost productivity. The chance of relevant lost productivity however decreases when being older, when not working part-time, when not working in shift, or when having a management position. The results of the alternative valuation are somewhat similar: the chance of the occurrence of relevant lost productivity increases when living in the United Kingdom or Germany instead of in The Netherlands and when being seriously or somewhat restricted versus somewhat restricted. Being older or not having a management position decreases the chance of having relevant lost productivity when absent from work.

Discussion

The results of our explorative study indicate that compensation mechanisms for short-term absenteeism from paid work are important in the four countries, but differences in the type of

Table 2 – Lost productivity and compensation mechanisms as reported by respondents.

	The Netherlands (n = 57)	The United Kingdom (n = 21)	France (n = 42)	Germany (n = 47)
Mean number of days absent (range)	11.4 (0–65)*	21.9 (1–91)	26.5 (1–92)†	19.8 (0–90)
Compensation mechanisms (%)				
Colleagues during normal hours	56.1	38.1	38.1	29.8
Colleagues during extra hours	7	9.5	7.1	12.8
Extra workers	7	28.6	7.1	4.3
Self during normal hours	22.8	14.3	26.2	27.7
Self during extra hours	8.7	0	7.1	19.1
Work not compensated	10.5	19	9.5	12.8
Compensating mechanisms not known	7	4.8	11.9	4.3
Number of respondents using compensation mechanisms leading to relevant lost productivity (%)‡	12 (21.1)§	6 (28.6)	9 (21.4)§	17 (36.2)*
Number of respondents using compensation mechanisms leading to relevant lost productivity, alternative valuation method (%)¶	19 (33.3)§,#	10 (47.6)*	13 (31.0)§,#	23 (48.9)*
Days out of total number of days absence in the last 3 mo leading to relevant lost productivity when taking into account compensation mechanisms (%)	1.4 (12.5)§,**	10.9 (50.1)†	6.4 (24)	7.4 (37.2)†
Days out of total number of days absence in the last 3 mo leading to relevant lost productivity when taking into account compensation mechanisms under the alternative valuation method (%)	2.3 (19.8)§,**	10.9 (82.2)‖,††	6.4 (27.4)**	7.4 (50.4)†

Note. Total percentages are higher than 100% because respondents could report more than one compensation mechanism.
‡‡ $P < 0.01$ with Germany.
* $P < 0.05$ with France.
† $P < 0.05$ with The Netherlands.
‡ Only when extra hours (by the respondent's colleagues or respondent) or extra workers were needed to compensate the lost productivity, this was considered relevant lost productivity.
§ $P < 0.05$ with Germany.
‖ $P < 0.01$ with France.
¶ Here lost productivity was considered relevant not only when extra hours or extra workers were needed to compensate the productivity loss but also when the productivity loss was not compensated for.
# $P < 0.05$ with the United Kingdom.
** $P < 0.01$ with the United Kingdom.
†† $P < 0.01$ with The Netherlands.

compensation mechanisms and impact on lost productivity can be found. The between-country differences remained in multivariable modes that were adjusted for patients and job characteristics. In The Netherlands, the difference between lost productivity with and without relevant compensating mechanisms is the highest because most work is compensated in normal working hours. Previous research indicated that 23% to 33% of the absences result in relevant lost productivity [2,3]. Our results confirm this figure for France (24%–27.4%), but revealed larger proportions of relevant losses for the United Kingdom (50.1%–82.2%) and smaller proportions for The Netherlands (12.5%–19.8%), indicating between-country differences. All relations with the explanatory variables as found in the logistic regression analyses were as expected.

The present study has a number of limitations. The first and the main limitation is that because of the explorative nature of our study it was not possible to correct for all factors that may influence the use of compensation mechanisms. Job type is one of these factors that could influence the amount of lost productivity and the type of compensation mechanisms. In our study, we had only limited information on the occupation of the respondents. In further research, the influence of job types on compensation mechanisms and possible between-country differences in this relationship should be investigated by using detailed information on job type. More importantly, this study calls for research to better understand which system characteristics contribute to the large between-country differences we observed in the use of compensation mechanisms. Second, it was assumed that lost productivity was *completely* compensated when one of the first five compensation mechanisms was chosen by the respondents. It was not possible for the respondents to indicate the extent of the compensation. Therefore, full compensation was assumed, which is not realistic because it is more likely that only a part of the lost productivity is compensated for. More research is needed to further refine the methods to determine the extent of the compensation mechanisms and their influence on relevant lost productivity. In addition, it is possible that there are between-country differences in the degree that lost productivity is compensated for. Third, in our sample only respondents with rheumatic disorders were included to have a sample with a relatively homogeneous disease state of which it is known that sick leave occurs quite frequently. Although it might well be that in other disease areas similar compensation mechanisms occur, the results cannot be generalized to other disease areas. Finally, some researchers suggest that the costs of lost productivity of the absence of an employee can be higher than the actual days lost because the absence can hamper the

Table 3 – Logistic regression of variables related to compensating mechanisms leading to relevant lost productivity.

	Standard valuation method		Alternative valuation method	
	OR	95% CI lower-upper bound	OR	95% CI lower-upper bound
Country				
UK vs. The Netherlands	1.415	0.791–2.532	0.558*	0.365–0.855
France vs. The Netherlands	1.085	0.679–1.734	1.075	0.751–1.540
Germany vs. The Netherlands	0.517†	0.353–0.758	0.526‡	0.379–0.731
Personal characteristics				
Age (y)	1.046†	1.026–1.067	1.014§	0.999–1.030
Restricted by disease				
Seriously restricted vs. not restricted	1.174	0.606–2.276	0.561*	0.334–0.943
Somewhat restricted vs. not restricted	0.486‖	0.276–0.856	0.658§	0.412–1.052
Occupational characteristics				
Part-time work (1: yes, 2: no)	1.351¶	0.977–1.868	–	–
Shift work (1: yes, 2: no)	2.153†	1.405–3.299	–	–
Management position (1: yes, 2: no)	2.277†	1.445–3.589	1.449*	1.036–2.026
Occupational level				
Middle occupation vs. lower occupation	0.524‖	0.311–0.881	1.012	0.663–1.545
High occupation vs. lower occupation	0.324†	0.179–0.586	0.750	0.467–1.204

* Note $R^2 = 0.056$ (Nagelkerke): $P < .05$.
† Note $R^2 = 0.122$ (Nagelkerke): $P < 0.001$.
‡ Note $R^2 = 0.056$ (Nagelkerke): $P < 0.001$.
§ Note $R^2 = 0.056$ (Nagelkerke): $P < 0.10$.
‖ Note $R^2 = 0.122$ (Nagelkerke): $P < .05$.
¶ Note $R^2 = 0.122$ (Nagelkerke): $P < 0.10$.

productivity of their direct colleagues or workplace. This is especially true in case of teamwork where the work is time dependent and thus cannot be postponed [7,8]. These potential effects were not measured in the present study and thus could not be considered in the lost productivity calculations.

The large changes in lost productivity when accounting for compensation mechanisms suggest that compensation mechanisms should also be considered in the national pharmacoeconomic guidelines. First, more research should be done, however, on the extent to which the different compensation mechanisms at an individual level occur, and which factors can explain the difference in the occurrence of compensation mechanisms across countries. It should also be explored how a sick employee affects the productivity of his or her direct colleagues because their productivity might depend on the work of their absent colleague [7,8]. The ISPOR Task Force on Transferability concluded in its report that there are several important methodological and practical issues when transferring economic data because there is evidence on the variability of economic data between countries [9]. The between-country differences found in reported compensation mechanisms are so large that data on lost productivity solely measured in terms of days absent likely cannot be transferred across countries without adaptation.

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