

Compensation for industrial accidents and incentives for prevention: a theoretical and empirical perspective

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Abstract This paper examines the compensation systems for industrial accidents in Belgium, Germany and Great Britain, thereby taking into account some recent empirical data on industrial accident rates and (although hardly available) amounts of compensation paid out to employee victims. The key question of this paper, derived from past research in law and economics, is whether these particular compensation systems include elements that may contribute to the prevention of industrial accidents. While the three countries examined here all have at least some incentive-based elements, notably in the way those systems are financed, there appears to be room for improvement both in Belgium and Great Britain. The German case study leads to the proposition that giving an organisation the responsibility for both compensation and prevention may have a beneficial effect on the accident rate.

Keywords Industrial accidents · Prevention · Compensation · Performance

JEL Classification J28 · K13 · K32

1 Introduction

With respect to compensation for personal injury caused by industrial accidents, several “compensation systems” exist. These range from, on the one hand, private systems based mainly on tort law and (first or third party) insurance, to, on the other hand, public systems such as social security and no-fault compensation funds. In practice, sometimes a combination of private and public elements is chosen; e.g.,

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employee victims receive some basic compensation via social security, and have to resort to tort law for additional compensation. Moreover, the differences between public and private systems are sometimes smaller than they seem at first sight, e.g. when a public fund is to a large extent financed by employers who have to take out direct (third party) insurance on behalf of their employees in the private insurance market.

This paper considers in more detail the different compensation systems used in three European countries: Belgium, Germany and Great Britain. The key question that will be addressed is to what extent these particular compensation systems include elements that may contribute to the prevention of industrial accidents. After all, the extensive law-and-economics literature that discusses the various compensation systems (tort law, insurance, workers' compensation, etc.) generally argues that these systems should give incentives to prevent accidents, both to employers and employees.¹ One may however, wonder whether the compensation systems found in practice really are "incentive-based".

In the existing law and economics literature, empirical data on the effects of compensation systems on prevention are to a large extent lacking. The explanations for this are rather straightforward: (1) it appears to be difficult to find data that can be used to measure prevention of industrial accidents, and (2) there are many other factors (in addition to the compensation system itself) that influence the accident risk, and these are often equally difficult to measure. Although the goal of this paper is not to solve these problems, some modest data will be presented showing (to the extent possible²) industrial accident rates and amounts of compensation paid out to employee victims in the three countries under review. On the one hand, this short empirical exercise will point out some of the difficulties in the data-collecting process. On the other hand, to some extent the (modest) data presented below may show whether the different compensation systems used in each of these countries could have had an effect on prevention. However, as mentioned earlier these data may also suggest us to look for other factors that could have influenced the number of industrial accidents, such as safety regulation, changes in the economic structure and demographic trends.

This paper is set up as follows. In the next Sect. (2) I will present a law-and-economics framework, mainly by recapitulating the well-known economic literature on the different compensation systems. Although prevention and compensation can be considered as different policy objectives, systems designed mainly for compensating accident victims may have preventive effects as well. After having presented the theoretical law-and-economics framework, the three case studies will be presented: Belgium (Sect. 3), Germany (Sect. 4) and Great Britain (Sect. 5). Each of these sections starts with a short explanation and analysis of the compensation system for industrial accidents in that particular country, and then moves to a short empirical part. Section 6, finally, will provide some concluding remarks in the light of the law-and-economics framework presented earlier, as well as suggestions for

¹ See, for example, Danzon (1987), Kötz and Schäfer (1993), Dewees et al. (1996) and Shapiro (2000).

² I will point out below that sometimes empirical data, especially on tort claims and settlements, are hardly available.

further research. An in-depth comparative analysis of the three countries under review is, however, not possible, for the simple reason that the collected empirical data cannot be compared directly. Different definitions of what exactly constitutes an industrial accident are used in each country. Moreover, we have to keep in mind that registration of industrial accidents is never perfect. Nevertheless, there appear to be some common trends as regards the incidence and compensation of industrial accidents.

2 A summary of the law and economics literature³

If employers and employees were able to perfectly assess the risks of industrial accidents *ex ante*, they could allocate these risks in an efficient way by incorporating risk premiums in wages.⁴ In that case the employer's incentive to prevent industrial accidents, by investing in safety and health precautions, would be embodied in the wage premium. However, such an optimal allocation of resources would follow only if transaction costs are zero or negligible. In reality transaction costs in the labour market are of course not negligible. Dewees et al. (1996) argue that risk premiums will not be set at the efficient level because of market failures in the labour market. They refer in particular to information problems regarding the risks,⁵ unequal bargaining power between employers and employees, and externalities caused by fatal injuries.⁶ These are situations where indeed transaction costs in the labour market are high.

Therefore, some kind of intervention in the labour market is required, in order to create optimal incentives for employers and employees to reduce the accident risk, and in order to compensate the victims of such accidents when they do occur; e.g. in the form of tort liability, (mandatory) insurance, safety regulation, a compensation fund, or social security. In practice, each country uses its own combination of these and other instruments, as will be shown in the following sections for Belgium, Germany and the United Kingdom. Here I will first, albeit very briefly, discuss these instruments from an economic point of view. Section 2.1 focuses on tort law and insurance, and Sect. 2.2 on no-fault compensation funds and social security.⁷

2.1 Tort law and insurance

Economists generally argue that a main objective of tort law is deterrence of wrongful and dangerous behaviour, while lawyers tend to stress compensation as its

³ This section draws heavily on Philipsen (2007b).

⁴ This of course follows from the Coase theorem, which states that in the absence of transaction costs, an optimal allocation of resources will always follow, irrespective of the the prevailing liability rule. Moore and Viscusi (1990) discuss wages as a compensation mechanism for job risks.

⁵ On the modelling of underestimation of risks by workers, see Rea (1981).

⁶ Dewees et al. (1996), pp. 347–348. The authors also discuss some empirical literature on risk premiums here.

⁷ The discussion here will be short in order to prevent too much repetition. Interested readers may turn to Shapiro (2000), Shavell (2004), pp. 175–287, and Faure and Van Boom (2007).

main goal. The deterrence argument is straightforward: if there is a (credible) threat of a liability suit, potential injurers will behave more carefully, which will, *ceteris paribus*, result in a lower accident probability or lower amount of damage.⁸ This argument would apply in the labour market as well, as the threat of a liability suit would give incentives to employers to take safety measures in order to prevent accidents at the workplace. For example, Danzon (1987) argues that, with respect to occupational risks, the design of liability rules should always consider their prospective impact on incentives for prevention, in addition to two other factors that have to be taken into account: exposure to uninsured risk and implementation costs.⁹ Social security and no-fault compensation funds do not have such a deterrent effect, unless they are backed by safety regulation or unless financial contributions to the social security system or fund are made dependent on factors relating to the accident risk.¹⁰ Whether, in practice, tort law is indeed an efficient instrument to deter wrongdoing is still highly debated in the literature. Some US scholars have suggested that the (American) tort system may lead to a claims culture and to overdeterrence of risky activities, while others have claimed that tort law does not deter unduly dangerous conduct at all. The former view is sometimes referred to as the “jaundiced view” of tort law, while the latter has been labelled the “reassuring view”.¹¹

Moving from prevention to compensation for a moment, a related question presents itself: to what extent is tort law able to take care of the compensation of industrial accident victims? Naturally, the answer to this question depends on factors such as the determination of the causal link between the accident and the losses (if proving causality is difficult, the chance of receiving compensation is small), the amount and composition of compensation paid out via the tort system in a particular country (e.g., does it also include moral damage?), and whether or not there is a problem of insolvency (which can be related to the availability of insurance). Making generalisations about the performance of the tort system with regard to compensation is therefore difficult. Nevertheless, some scholars, among them again Dewees et al. (1996), have suggested that tort law should only play a *residual* role in compensating employee victims, for example, in addition to no-fault insurance schemes.¹²

Tort law is often combined with some form of liability insurance. On the one hand liability insurance may facilitate the compensation of successful

⁸ Here I implicitly assume that only the potential injurer can influence the accident risk (unilateral accident setting). In a bilateral accident setting, both the level of care taken by the injurer and the potential victim must be taken into account. See e.g. the classic papers by Shavell (1980, 1984) and the literature mentioned in footnote 7.

⁹ Danzon (1987), p. 280. This paper deals more specifically with occupational disease.

¹⁰ On the criteria that determine the choice between safety regulation and tort law, see Shavell (1984).

¹¹ See in that respect the long “meta-review papers” by Saks (1992) and Galanter (1996, 1998), and a reaction to those papers by Schwartz (2002). For a summary of this debate in the United States, see Philipsen (2007b); Dewees et al. (1996), p. 414, argued that the deterrent effect of tort law is limited and uneven, or cannot be established by existing empirical studies.

¹² Dewees et al. (1996), p. 412. The authors refer to “cases of egregious behaviour causing serious harm.”.

plaintiffs.¹³ Moreover, it protects employee victims against the insolvency of the employer, whereas it also protects employers against the exposure to liability. On the other hand, the availability of liability insurance may result in the well-known problem of moral hazard. That is, the very fact that employers are insured may undermine their incentives to prevent accidents in the workplace. Insurers can tackle this problem by making the premium risk-related or experience-rated, or by introducing deductibles or upper limits in order to partially expose employers to risk.¹⁴

Various authors have studied the deterrent effects of experience rating in the workers' compensation system, especially in the United States. Results are contrasting, although the majority of studies seems to reach conclusions in line with economic predictions. I will only mention three examples here.¹⁵ Chelius and Smith (1983) found that experience rating, as used in the workers' compensation insurance arrangements, has no measurable effect on employer safety. However, the authors indicate that they had to use a rather crude measure of marginal premium cost. Moore and Viscusi (1990) reached a different conclusion. Based on an analysis of fatal accidents, they conclude that the workers' compensation system has been a driving force in reducing fatalities in the workplace. Without workers' compensation and without tort, industrial fatality risks could have risen by more than 40%, so they state. In that respect workers' compensation would have had more deterrent effects than safety regulation. Kötz and Schäfer (1993) studied the sugar industry in Germany. Their conclusion, which is in line with economic predictions, is that there were far fewer accidents after the introduction of experience-rated premiums (in the form of a system of rebates and surcharges) in the German workplace compensation scheme than before. The authors attribute this to the economic incentives generated by the the experience rating, which induced employers (in this case, the managers of firms in the sugar industry) to take preventive measures.

2.2 No-fault compensation systems and social security

Other compensation systems, such as no-fault compensation funds and social security, have also been discussed extensively in the law and economics literature.¹⁶ As stated above, no-fault systems and social security generally do not have any deterrent effects unless the financial contributions to these systems are made dependent on factors relating to the accident risk or unless they are combined with safety regulation. This non-deterrence argument applies in particular to social

¹³ Abraham (2004), p. 1. Note, however, that still an employee victim will only receive compensation when the employer is actually held liable.

¹⁴ On experience rating in workers' compensation systems, see also Klein and Krohm (2006), pp. 17–20. The authors present a table (p. 6) containing an overview of workers' compensation systems and their funding mechanisms in the "20 most populous countries in 2004".

¹⁵ Further references can be found in Dewees et al. (1996), p. 381, and Philipsen (2007b), p. 210.

¹⁶ For recent contributions to this literature see Faure and Van Boom (2007) and Faure (2007). As the latter article makes clear, the dividing line between systems based on tort law supplemented by liability insurance and social security systems is not always clear. If, for example, a direct insurance is concluded by the employer to the benefit of its employees, this may be qualified as 'social insurance'.

security, which is generally considered as a “Existenzsicherung”: i.e. providing a basic (limited) compensation, whereas equal access to the system is usually considered essential (which implies that there is no risk differentiation). No-fault systems are somewhat similar, in the sense that accident victims do not need to prove fault to receive compensation. However, in a no-fault system the link between the accident and the particular fund must still be proven, which may be difficult in some cases. Also, no-fault schemes generally favour particular kinds of accident victims over others who may be similarly hurt by other kinds of accidents,¹⁷ which cannot always easily be justified. Compare, e.g., falling from a ladder at home and falling from a ladder at the workplace. There are, however, many different types of no-fault compensation schemes with varying degrees of residual tort liability and various types of compensation, so generalising is hardly possible.¹⁸

Compensation funds may be financed partly or primarily by means of employer contributions. Obviously the line of reasoning applied above in relation to insurance, applies again here: the more risk-related or experience-rated the contributions are, the higher is the expected preventive effect on the industrial accident rate.

3 Belgium

Industrial accident risks in Belgium are considered as a *risque professionnel*. There is a no-fault insurance system, which is an integral part of the social security system and which is paid for by employers collectively. The relevant legal provisions can be found in the *Arbeidsongevallenwet* of 1971 (Industrial Accidents Insurance Act). Employers have to take out private (third party) insurance to cover the risk of industrial accidents on behalf of their employees.¹⁹ In case an employer is not insured, the *Fonds voor Arbeidsongevallen* (Industrial Accidents Fund, *FAO*), established by Royal Decree no 66 in 1967, steps in. Employee victims receive a standardised compensation of lost income, as well as compensation for healthcare costs. Non-pecuniary losses and property damage are not compensated via this scheme. While payment is relatively swift and certain, the amounts paid out are lower than they would be in tort law. Moreover, civil liability of employers is generally excluded, except for intentional wrongs, property damage, and accidents on the road to/from work.

In theory, the Belgian compensation scheme provides some incentives for the prevention of industrial accidents. Namely, insurers may require additional safety measures from their insured, i.e. the employers, and/or adapt the premium to the

¹⁷ McEwin (2000), p. 738.

¹⁸ A no-fault compensation system can be combined with private insurance. Social security is itself considered a social insurance. For a brief discussion of the basic principles of private insurance and social insurance, see Faure (1998), pp. 267–268. McEwin (2000) gives an overview of law-and-economics literature on no-fault compensation systems.

¹⁹ Before 1971 the Belgian system was based on civil liability of the employer, the risk of which was also born by employers collectively by means of private insurance. However, at the time such insurance was not mandatory.

individual accident risk. In 2006, however, the Belgian Minister of Employment and Work proposed to make premiums more risk-related (see below), which implies that at the time there was a feeling that there was still room for ‘improvements’ in this area. For the purpose of prevention of occupational accidents and diseases in Belgium, there is also a special multi-disciplinary institute called Prevent. Its main goals are to promote the quality of working conditions and to improve the labour organisation by providing support, advice and information to all actors involved.²⁰

3.1 Number of accidents

According to the Industrial Accidents Insurance Act, employers are obliged to report to their insurer all accidents leading to personal injury. The FAO keeps a register of all such accidents in the private sector, based on information provided by insurers.²¹ In 2004, the FAO registered 198,861 industrial accidents, including 21,370 on the road to and from work, 195 fatal accidents and 13,760 accidents leading to permanent disability. The number of private, still active, insurers, has decreased to 17 over the years. Collectively these insurers manage about 450,000 insurance policies and collect about € 918 million worth of premiums.²²

In its General Report 2005, the FAO presents data on the total number of industrial accidents in the private sector in the period 1985–2004. Four categories of accidents are distinguished: without consequence (*zonder gevolg*),²³ temporary disability (*tijdelijke ongeschiktheid*), permanent disability (*blijvende ongeschiktheid*) en fatal (*dodelijk*). Table 1 shows a selection of these data.²⁴ The numbers suggest a decrease in all accident categories except permanent disability since the early 1990s.

A better indication of industrial accident trends would be obtained by looking at accident *rates* instead of absolute numbers. Table 2 shows the *frequency* of industrial accidents in Belgium (excluding accidents without consequence), defined as “the number of accidents per million of hours exposed”.²⁵ Obviously, the accident rate has been decreasing in recent years.

²⁰ <http://www.prevent.be>, 13 February 2007.

²¹ As of 2000 the FAO also registers public sector accidents. Detailed figures on public sector accidents could until recently also be found on the website of the Federal Public Service of Employment, Labour and Social Dialogue: <http://werk.belgie.be/moduledefault.aspx?id=236>. This is no longer the case.

²² FAO website: <http://www.fao.fgov.be>, 13 February 2007.

²³ This category refers to minor accidents resulting in an absence from work less than one working day. In many other countries, such accidents are not even recorded. Also, they are not included in the statistics published by Eurostat (the threshold employed by Eurostat is “three working days lost”).

²⁴ Compiled from FAO, *Algemeen Verslag: Dienstjaar 2005* (2006), 109.

²⁵ Source: Prevent, *Statistieken Arbeidsongevallen en Beroepsziekten '03'04* (2006), 8. The figures from the FAO are provided by insurance companies and are available 6 months after the recording. The FAO introduced a new computation method in 2000, which makes it impossible to compare the new estimations with the pre-2000 data. The figures from the Federal Public Service of Employment, Work and Social Concertation are provided through the annual reports of companies. It should be noted that the representativity of the figures depends on the sector and that there is a time interval of 2 years until publication of these data.

Table 1 Number of industrial accidents in the private sector (1985–2004)

Year	Number of industrial accidents accepted by insurers (excl. road to and from work)			
	Temporary disability	Permanent disability	Fatal	Total (including accidents without consequence)
1985	158,994	10,814	206	243,805
1986	154,756	11,944	178	239,412
1987	153,027	11,347	182	237,869
1988	163,595	10,647	169	249,247
1989	182,621	12,064	200	265,930
1990	190,318	12,195	184	276,281
1991	185,538	12,182	184	267,271
1992	173,981	12,133	156	250,959
1993	145,845	12,023	158	213,865
1994	138,913	12,518	152	206,518
1995	109,065	11,586	139	207,869
1996	101,216	11,177	119	196,637
1997	97,574	12,712	130	197,520
1998	103,262	12,258	138	202,274
1999	102,345	12,479	118	199,715
2000	108,409	13,128	139	209,508
2001	110,294	13,742	127	203,171
2002	96,385	11,710	121	184,252
2003	85,823	12,629	100	170,853
2004	82,559	11,751	122	165,472

Table 2 Frequency of industrial accidents in the private sector (1997–2004)

	1997	1998	1999	2000	2001	2002	2003	2004
Source: FAO	31.79	33.50	27.77	35.50	35.02	31.23	28.45	26.98
Source: FPS ELS		35.99	35.82	35.61	32.66	30.15	27.98	27.31

According to the (then) Minister of Employment and Work, this decrease was mainly due to the efforts of companies to create a safer working environment.²⁶ Moreover, in 2006 the Minister announced the introduction of financial penalties for companies with high accident figures. Such penalties could take the form of “prevention contributions”: a fixed amount between € 3,000 and € 15,000, depending on firm size. As regards the risk assessment, companies having more accidents than the average of their sector during a period of 2 or 3 successive years, will be considered “aggravated risks”. Another proposal in order to increase work safety was to make (more) use of experience-related premiums, i.e. relate the

²⁶ It would be interesting to find out what caused the companies to invest in safety at the workplace.

Table 3 Industrial accidents: average costs 1989–1999 (€)

1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
2,618	2,640	2,739	2,995	3,418	3,694	3,924	4,130	4,279	4,321	3,912

premium to some extent to the accident figures. However, both proposals were still in a draft stage at the time of writing this paper.²⁷

3.2 Compensation

The amounts of compensation paid out to employee victims in Belgium are calculated on the basis of formulas. The compensation paid by insurers consists of the basic wage (in case of temporary disability: 90% of the basic wage) multiplied by a disability percentage. The FAO can be considered as a kind of safety net. It will step in when employers are not insured, despite the legal obligation to take out insurance on behalf of their employees. In such cases the FAO will usually try to take recourse against the employer (which is difficult, as it often concerns employers who have already left the market). In cases of permanent disability, a standardised minimum compensation (*minimumvergoeding*) applies, which is calculated as follows: basic amount \times disability percentage \times reassessment coefficients \times adjustment coefficients. A similar formula exists for benefits in cases of decease. In addition, there are various kinds of supplementary payment (*bijslagen*). The role of tort law in compensating employee victims is still rather limited, as civil liability of employers is generally excluded.²⁸

It turned out to be very difficult to gather information on the exact amounts of compensation paid out by insurers. However, the institute Prevent provides an estimation of the average costs of industrial accidents, based on amounts of compensation paid out by insurers. For the year 2002 the average costs are estimated at € 3,399 per accident and at € 5,878 if only accidents causing temporary and permanent disability are considered.²⁹ According to Prevent these numbers are incomplete, because the “monetary reserves of insurers could not be taken into account in the computations”. Complete data are only available for the period 1989–1999 and are provided in Table 3.³⁰ This table shows an increase in the average costs of industrial accidents for almost the entire period, which can largely be explained by the increasing costs of serious accidents. In 1999, for the first time, the costs per accident decreased.

²⁷ Sources: contact person at Prevent and press statement Minister of Employment and Work: <http://www.petervanvelthoven.be/article.php?id=425>, 13 February 2007.

²⁸ There are, however, some legal procedures concerning questions such as the work-related nature of an accident. See, e.g., Rauws (2001). Moreover, an anonymous referee argued that the situation in Belgium is slowly changing, i.e. the role of tort law in compensating employee victims has increased somewhat in recent years.

²⁹ Prevent, *Statistieken Arbeidsongevallen en Beroepsziekten '03'04* (2006), 26.

³⁰ Source: additional information provided by Prevent (conversion from Belgian francs to euros by author).

4 Germany

The German *Unfallversicherungsgesetz* (Industrial Accidents Insurance Act) dates from 1884. The compensation system is based on public insurance, paid for by employers and managed by the *Gewerbliche Berufsgenossenschaften* (BGs). It applies to all employees and their financial dependants, but does not apply to public officials. The amounts of compensation paid out to employee victims depend on the degree of incapacity for work and are limited in size. Both income losses (limited to a maximum of two-thirds of lost wages) and medical costs (including rehabilitation costs) are covered. However, there are almost no possibilities to take civil action against employer or colleagues, with the exception of cases involving intent and gross negligence. General risks of illness and personal injury, i.e. not being work-related, are compensated via the *Krankenversicherung* (Health Insurance Act) and the *Rentenversicherung* (Pension Insurance Act). The risks of commuting accidents and occupational diseases have been included in the Industrial Accidents Insurance Act since 1925.³¹ As from 1997, the Insurance Act has been incorporated in the *Sozialgesetzbuch Buch VII* (Social Code).³²

The BGs play a central role in the German system. In 2007 there were 26 BGs, organised along industry sector lines, each having its own autonomous administration. Being the statutory accident insurance institutions, the BGs are responsible for the provision of all rehabilitation services, controlling and co-ordinating medical treatment, and reintegration into professional life and the social environment.³³ Moreover, they have a legal duty to look after the prevention of occupational accidents.³⁴ If the rehabilitation measures provided by the BGs do not lead to the re-establishment of unrestricted participation in working life, employee victims receive a “pension”. The amount of such a pension depends on the reduction of earning capacity, as will be explained below.

The *Hauptverband der Gewerblichen Berufsgenossenschaften* (Central Federation of BGs, HVBG) represents the common interests of all its members. The HVBG also decides on the contribution rates to be paid and preventive measures to be taken by companies. The contributions (premiums) paid by employers are related to an industry risk factor and to the total wages and salaries paid, and since the 1960s and 1970s these contributions have been made dependent also on the number of accidents in the individual company. As discussed in Sect. 2, risk-related and (especially) experience rated premiums would according to economic theory create strong incentives to invest in safety at the workplace. In the following subsections it will therefore be investigated whether the German system, with its emphasis on prevention, indeed functions well in practice (although, of course, the data in itself are not necessarily related to the ability of the compensation system to lead to adequate prevention).

³¹ See also Van Dongen (1995), pp. 103–108.

³² Before 1997 it was included in the *Reichsversicherungsordnung* (State Insurance Code, 1911).

³³ From HVBG website: <http://www.hvbg.de>, 13 February 2007. See currently <http://www.dguv.de>.

³⁴ The prevention work carried out by the BGs includes inspections, trainings and information provision, etc.

Table 4 Industrial accidents (1994–2005)

Year	Reportable accidents at work	Fatal accidents at work	Accidents at work: new pensions
1994	1,489,360	1,250	34,659
1995	1,415,381	1,196	34,464
1996	1,266,458	1,120	33,966
1997	1,221,530	1,004	28,135
1998	1,198,608	948	25,549
1999	1,185,382	977	24,338
2000	1,144,262	825	22,678
2001	1,060,625	811	21,354
2002	937,540	773	20,603
2003	871,145	735	19,646
2004	841,447	645	18,138
2005	801,834	589	17,414

4.1 Number of accidents

Registration of industrial accidents is, like in Belgium, inherent to the compensation system. The yearly published statistics on industrial accidents are based on the recording and reporting procedures for the accident insurance. The HVBG has collected data on work-related accidents and diseases on a regular basis from 1978 to the present, and it also publishes various overviews and special studies. However, accessibility to the database itself is restricted to HVBG personnel.³⁵

Table 4 presents the number of reportable accidents at work (*meldepflichtige Arbeitsunfälle*) and the number of fatal accidents at work in the period 1994–2005, as well as the number of new pensions resulting from a reduction in earning capacity or fatal accident.³⁶ Pre-1994 data are also available, but these cannot directly be compared with the recent figures because of a change in the “statistical basis used in accident insurance” in 1986 and the “inclusion of the new federal states in Eastern Germany” in 1991.³⁷ The data in Table 4, which do not include commuting accidents, clearly indicate a decrease in the number of accidents and the number of new pensions.

Statistics on the accident *rate* show a decreasing trend as well. Table 5 presents the number of industrial accidents per 1,000 full workers and per 1 million hours at work.³⁸ Pre-1994 data, available from the HVBG website as from 1965, show a similar trend. In 1965 the accident rate per 1,000 full workers was 118.62, which is

³⁵ European Health and Safety Database (HASTE): <http://www.ttl.fi/internet/haste>, 13 February 2007. See also Jacinto and Aspinwall (2004), p. 943.

³⁶ Source: Hauptverband der gewerblichen Berufsgenossenschaften (HVBG).

³⁷ HVBG, *BG Statistics: Figures and Long-Term Trends 2003* (2004), 5. Nonetheless, the HVBG has computed that since 1970, the number of “reportable accidents” has decreased by 56% and the number of “fatal accidents” by 75%: <http://www.hvbg.de/d/pages/praev/index.html>, 13 February 2007.

³⁸ Source: Hauptverband der gewerblichen Berufsgenossenschaften (HVBG).

Table 5 Reportable accidents at work: accident rates (1994–2005)

Year	Accidents at work per 1,000 full workers	Accidents at work per 1 million hours at work
1994	50.13	31.93
1995	46.68	29.73
1996	40.49	26.64
1997	39.57	25.86
1998	39.38	25.41
1999	38.72	24.82
2000	37.10	24.09
2001	34.51	22.56
2002	32.45	21.21
2003	29.37	19.19
2004	27.85	17.63
2005	27.23	17.34

four times as high as the accident rate in 2005. The decline of heavy industry and the closing of coal mines in Germany might be some of the explanatory factors for this. In addition, it is likely that the decrease in the accident rate can be credited to successful prevention efforts by the BGs, as is also claimed by the HVBG on its website.³⁹

Furthermore, and most interesting within the context of this paper, the German compensation system may have had some additional preventive effects, in particular the risk-rated and experience-rated contributions by employers. In Sect. 2 I referred to a German study by Kötz and Schäfer (1993). The authors conclude that “there is a highly significant statistical relation between the introduction of the system of rebates and surcharges, and the reduction in the number of accidents”.⁴⁰ While their study only considered the sugar industry (before and after the introduction and refinement of the contribution adjustment system in the 1960s and 1970s), there is no reason to assume that their results would not apply to some extent to other sectors.

Interestingly, the average contributions paid to the BGs by employers have remained stable or even declined slightly over recent decades. While in 1960 the average contribution rate still amounted to 1.51% of wages and salaries, in 2003 this figure had dropped to only 1.35%.⁴¹ Although it would be impossible to determine whether this figure is close to the “textbook” economic optimum (i.e. where the marginal costs of investing in safety equal the marginal benefits of a reduction in accidents), it seems safe to conclude at least that the market forces inherent in the German public insurance system are working fairly well.

³⁹ <http://www.hvbg.de/d/pages/praeuv/index.html>, 13 February 2007.

⁴⁰ Kötz and Schäfer (1993), p. 33.

⁴¹ From HVBG website: <http://www.hvbg.de>, 13 February 2007. It should be noted that the development of the contribution rate differs with regard to the different branches. For example, the construction industry faces a less favorable development of contributions.

Table 6 Expenditure by BGs
(× € billion)

	2003	2004	2005
Prevention	0.728	0.734	0.733
Compensation	7.610	7.561	7.473
Rehabilitation	2.585	2.552	2.507
Pensions etc.	5.025	5.009	4.966
Administration and procedures	1.122	1.086	1.087

4.2 Compensation

All compensation for income losses to insured persons and surviving dependents is paid out by the BGs. In other words, there is basically just one “compensation source” in Germany, in contrast to countries such as the Netherlands and the United Kingdom where private insurance, tort law and public systems exist much more side by side. The calculation of the “pensions” is standardised and is based on the gross annual earnings (*Jahresarbeitsverdienst*) and the so-called MdE, which stands for reduction of earning capacity (*Minderung der Erwerbsfähigkeit*). For example, if MdE is 100%, the insured person will receive a “full pension”, which amounts to two thirds of his/her (former) gross annual earnings. Although tort law is not totally excluded, it does not play an important role in the German compensation system, with the possible exception of cases involving intent and gross negligence from the side of the employer.

While information on the amounts paid out to individual employee victims is not available, it is possible to list the total expenses by the BGs. In 2005 a total of € 7.5 billion was spent on compensation, of which € 2.5 billion on rehabilitation and € 5 billion on pensions and other cash benefits. Furthermore, € 0.7 billion was spent on prevention. The figures presented in Table 6⁴² show a decrease in compensation expenditures and a small increase in prevention expenditures in recent years.

5 Great Britain⁴³

When it comes to seeking compensation for income losses caused by industrial accidents in Great Britain, both tort law and social security are important.⁴⁴ According to the *Employers' Liability Act* of 1969, employers⁴⁵ have to take out liability insurance against the costs of compensation for employees who are injured or made ill at work through the fault⁴⁶ of the employer. The costs of compensation may include loss of earnings, health care costs and pain and suffering. Prior to 1972, i.e. the year the *Employers' Liability Act* became effective, claims against

⁴² From HVBG website: <http://www.hvbg.de/e/pages/statist/stat/aufw/index.html>, 15 February 2007.

⁴³ The data presented in this section refer to England, Scotland and Wales.

⁴⁴ Klein and Krohm (2006), p. 11 argue that private employer liability insurance and public social insurance “pay roughly equal shares of the indemnity for the workers’ compensation benefits” in Great Britain.

⁴⁵ Except for nationalised industries, the police and local authorities.

⁴⁶ In Great Britain the employer’s civil liability must be shown by the claimant.

employers often failed if the employer was not insured, because insufficient funds existed. Now failure to insure is regarded as a criminal offence. The UK Government believes that employer's liability compulsory insurance (ELCI) provides greater security both to firms (against costs which could otherwise result in financial difficulty) and to employees (because compensation will be available even when firms have become insolvent). ELCI would also support the right of victim-employees to be fairly compensated and the responsibility of employers to fund the costs of their negligence. Moreover, the Government believes that making employers fund the cost of their negligence may have preventive effects. In that respect, an additional preventive effect is expected from the monitoring and interference by insurers.⁴⁷

In 2003 the Government started a review of the Employers' Liability Act, because insurance premiums had risen significantly in the period between 2000 and 2003. Smaller businesses complained that the premiums did not reflect their good health and safety standards and claims record; and that rather the premiums were set on the basis of some standard book rate. The Government review pointed out that the recent premium increases had been driven by a cyclical change in the insurance market, increases in legal costs and (possibly) uncertainty over long-term risks. However, one of the conclusions that followed from the review was the suggestion to make premiums better reflect individual risk.⁴⁸

Let us now turn to social security. The well-known National Health Service (NHS) covers general health care losses and is financed mainly by public funds. However, it is the *National Insurance* that covers the financial risk of injury arising in and out of the course of employment.⁴⁹ This National Insurance is financed by contributions of employers and employees. Benefits consist of flat-rated payments for income loss and medical treatment. In cases of disablement caused by industrial accidents the *Industrial Injury Disablement Benefit* (IIDB) applies. Contrary to the employers' liability system, IIDB does not involve fault being established. However, compensation of income losses does not depend on the actual income loss but on the degree of incapacity, and it is not payable for the first 90 days after an accident. Obviously then, IIDB does not provide full compensation for loss of earnings.

IIDB and employers' liability are separate systems. IIDB provides a safety net for those victim-employees who choose not to pursue a claim against their employer and for cases where liability cannot (easily) be established. In particular cases IIDB may also be the means of support for employees while they pursue the more lengthy process of employers' liability claims.⁵⁰

⁴⁷ Department for Work and Pensions, *Review of Employers' Liability Insurance: First Stage Report* (2003), 14, and Department for Work and Pensions, *Review of Employers' Liability Insurance: Second Stage Report* (2003), 5.

⁴⁸ See the Government reports mentioned above: *supra*, note 47. Compare also to the recent proposals in Belgium, discussed in §3.1.

⁴⁹ More generally: the National Insurance offers benefits such as the Incapacity Benefit, Retirement Pension, Jobseeker's Allowance, Maternity Allowance and Bereavement Benefit. See, e.g., <http://www.adviceguide.org.uk/index/life/benefits>, 23 February 2007.

⁵⁰ Department for Work and Pensions, *Review of Employers' Liability Insurance: First Stage Report* (2003), 18.

5.1 Number of accidents

Industrial accident statistics have been collected by the *Health and Safety Executive* (HSE) since 1986. The HSE is the enforcement authority working in support of the *Health and Safety Commission* (HSC), which has been responsible for the regulation of work-related health and safety risks in Great Britain since its establishment following the *1974 Health and Safety at Work etc. Act*. The activities of the HSC are sponsored by the Department of Work and Pensions. The HSE accident statistics are based on notifications by employers and the self-employed. There are three categories of injuries (accidents): fatal injuries, major injuries⁵¹ and those resulting in an absence from work for more than 3 days. Like in Germany, access to the database for people outside the HSE is limited.⁵² Also, like the HVBG in Germany (and Prevent in Belgium), the HSE regularly publishes sector/industry studies.

Table 7 presents historical injury figures for the private sector. The figures indicate a (non-linear) downward trend in the number of reported *fatal injuries*. With respect to *major injuries*, we note a big change around 1996 that has been caused by a change in the reporting regulations.⁵³ In recent years the number of reported major injuries has increased almost every year, according to the HSE mainly in service industries. The number of *over-3-day injuries* has remained fairly constant as far as employees are concerned (except for the 2004/2005 number), while concerning self-employed the drop in 1996/1997 probably resulted again from the changes in reporting regulations.

The private sector injury *rates* in Table 8 show a similar picture. Here it concerns the number of reported accidents per 100,000 members of the workforce. There was a general downward trend in the rate of *fatal injuries* in the 1990s, but it has risen twice since then. The fact that the fatal injury rate is higher for the self-employed than for employees, according to the HSE reflects the fact that proportionally more self-employed people than employees work in the higher risk industries of agriculture and construction. In addition it should be noted that the rate of fatal injuries of the self-employed is more susceptible to change because there are much less self-employed people than employees.⁵⁴ The rise in the rate of *major injuries* of employees between 2001 and 2003 was, as mentioned earlier, mainly caused in service industries. Before that (and again in 2004) this rate fell steadily, also for the self-employed. The rate of *over-3-day injuries* of employees has gradually decreased from the mid 1990s, with an exception in 2003/2004, but with respect to the self-employed it has been rising again since 2001/2002.

On its website the HSC argues that the activities of the HSC and local agencies have been important in cutting the accident rate since the 1970s, but it also

⁵¹ Major injuries include amputations and fractures and other injuries leading to resuscitation or 24-h admittance to hospital. See Health and Safety Commission, *Health and Safety Statistics 2005/06* (2006), 26.

⁵² European Health and Safety Database (HASTE): <http://www.ttl.fi/internet/haste>, 23 February 2007.

⁵³ More particularly, a change from RIDDOR 85 to RIDDOR 95. RIDDOR stands for Reporting of Injuries, Diseases and Dangerous Occurrences Regulations.

⁵⁴ HSE, *Health and Safety Statistics Highlights 2003/04* (2004), p. 4.

Table 7 Reported occupational injuries in the private sector 1986/1987–2005/2006

Year ^a	Employees			Self-employed		
	Fatal	Major	Over 3 days	Fatal	Major	Over 3 days
1986/1987	355	20,695	159,011	52	690	1,029
1987/1988	361	20,057	159,852	84	867	1,169
1988/1989	529	19,944	163,119	80	1,152	1,503
1989/1990	370	20,396	165,244	105	1,310	1,865
1990/1991	346	19,896	160,811	87	1,326	2,077
1991/1992	297	17,597	152,506	71	1,101	1,832
1992/1993	276	16,938	141,147	63	1,115	2,136
1993/1994	245	16,705	134,928	51	1,274	2,531
1994/1995	191	17,041	139,349	81	1,313	2,869
1995/1996	209	16,568	130,582	49	1,166	2,394
1996/1997	207	27,964	127,286	80	1,356	2,282
1997/1998	212	29,187	134,789	62	815	984
1998/1999	188	28,368	132,295	65	685	849
1999/2000	162	28,652	135,381	58	663	732
2000/2001	213	27,524	134,105	79	630	715
2001/2002	206	28,011	129,655	45	929	917
2002/2003	183	28,113	128,184	44	1,079	951
2003/2004	168	30,689	131,017	68	1,283	1,114
2004/2005	172	30,451	121,779	51	1,251	1,143
2005/2006p	160	28,605	117,471	52	1,251	1,174

Sources: HSE, *Historical Injury Figures* (2005) and Health and Safety Commission, *Health and Safety Statistics 2005/2006* (2006). Numbers for 2005/2006 are provisional (after correction they are usually higher)

^a Figures are based on a planning year 1 April–31 March

acknowledges other factors, such as the occupational composition of employment (such as the balance between manual and non-manual occupations) and changes in public attitude towards risk. A recent study commissioned by the HSE found that the rates of major injury follow a pro-cyclical pattern over the course of the business cycle, related to the incidence of new hires over the business cycle (i.e. during an economic boom).⁵⁵ Another conclusion of this study was that the dominant influence that contributes to a worker's risk of injury is his or her occupation. Injury rates are expected to decline further, but many challenges remain according to the HSC, such as the increasing number of part-time workers, developments in the private services sector, and occupational diseases.⁵⁶ To what extent the Employers' Liability System has contributed to the prevention of accidents is unclear. However, I already noted above that there have recently been some discussions regarding the functioning (insurability) of this system.

⁵⁵ Davies and Jones (2005).

⁵⁶ <http://www.hse.gov.uk>, 23 February 2007.

Table 8 Reported occupational accidents in the private sector: incidence rates (per 100,000)^a

Year ^b	Employees			Self-employed		
	Fatal	Major	Over 3 days	Fatal	Major	Over 3 days
1986/1987	1.7	99.1	761.1	2.0	26.9	40.1
1987/1988	1.7	94.0	748.9	3.0	31.0	41.4
1988/1989	2.4	91.4	747.7	2.7	39.4	51.4
1989/1990	1.7	91.8	743.4	3.3	41.2	58.6
1990/1991	1.6	89.9	726.5	2.7	41.2	64.5
1991/1992	1.4	81.7	708.5	2.3	35.9	64.5
1992/1993	1.3	80.3	669.0	2.0	35.8	68.5
1993/1994	1.2	79.3	640.2	1.6	40.6	80.7
1994/1995	0.9	80.4	657.2	2.5	40.4	88.4
1995/1996	1.0	77.1	607.4	1.5	36.0	73.8
1996/1997	0.9	127.5	580.1	2.3	38.4	64.6
1997/1998	0.9	127.6	589.2	1.8	23.3	28.1
1998/1999	0.8	121.7	567.3	1.9	20.3	25.2
1999/2000	0.7	116.6	550.9	1.7	19.7	21.8
2000/2001	0.9	110.2	536.9	2.4	19.2	21.8
2001/2002	0.8	110.9	513.5	1.3	27.8	27.5
2002/2003	0.7	111.1	506.5	1.3	32.3	28.4
2003/2004	0.7	120.4	514.2	1.8	33.9	29.5
2004/2005	0.7	117.9	471.7	1.3	33.0	30.2
2005/2006p	0.6	110.1	452.2	1.4	32.9	30.8

^a Supra, fn. 54^b Supra, fn. 56

5.2 Compensation

As explained above, income losses resulting from industrial accidents can be compensated either via the Employers' Liability Act (if a tort claim is successful) or via the Industrial Injury Disablement Benefit (IIDB) in social security. Compensation via social security is limited and standardised, but it does not involve fault being established. It needs to be established that the injury is work related and that the degree of disability, judged by a medical examination, is at least 14%. An IIDB benefit provides for the following: a disablement benefit, which is linked to the degree of disablement; a constant attendance allowance (CAA) to distinguish between full-time and part-time workers; an unemployability supplement; and an allowance that is only paid out in exceptionally severe cases where moreover disablement is likely to be permanent.⁵⁷ Some examples of the standardised amounts paid out in 2006/2007 are as follows. Disablement benefits (pensions) are set at fixed weekly amounts: for example £101.68 for 80% disablement, £63.55 for

⁵⁷ Department for Work and Pensions (supra fn. 50), 16–17, and <http://www.dwp.gov.uk>, 23 February 2007. There is also an industrial death benefit, which I will not discuss here.

Table 9 Costs of workplace incidents 2001/2002 (\times bln. £)

	Injury	Ill Health
Costs to individuals	3.3–6.3	5.9–9.4
Costs to employers	1.0–1.1	1.5
Costs to society	5.9–10.7	11.3–17.3
Costs to the economy	3.2–6.2	7.6–11.6

50% disablement, and £38.13 for 30% disablement. Similarly, CAA is set at fixed amounts such as £101.80 for exceptional rate versus £25.45 for part-time rate. The unemployment supplement is £78.50 per week with additions for early incapacity, and the exceptionally severe disablement allowance is £50.90.⁵⁸

Damages following a successful tort claim include compensation for loss of earnings, health care costs, and pain and suffering. Contributory negligence on the part of the employee would reduce the damages. Unfortunately, there appears to be little information on the amounts of compensation paid out and the number of tort claims and settlements in Great Britain,⁵⁹ although the Association of British Insurers has argued that the average size of employers' liability claims has doubled between 1998 and 2003, mainly due to "legal changes and general award inflation".⁶⁰

In 2004 the HSE's Economic Advisers Unit published an interim report on the "Costs to Britain of Workplace Accidents and Work-Related Ill Health", which includes estimations of employers' liability costs. The report provides some broad indications of the costs to individuals, employers and society of work-related incidents in Great Britain, based on 2001/2002 data. Cost categories to individuals include lost earnings, extra expenditure when absent and "pain, grief and suffering". Costs to employers include compensation (via employers' liability), sick pay (excluding statutory sick pay) and others such as administration, insurance and recruitment costs. Costs to society consist of costs of medical treatment (NHS), loss of output, HSE investigation costs, "pain, grief and suffering" and others.⁶¹ The estimations presented in the report are as follows⁶²: (Table 9).

6 Concluding remarks

Focusing on private sector data, the figures presented in this paper indicate that in Belgium, Germany and Great Britain the reported accident rates have shown a

⁵⁸ Department for Work and Pensions, *Social Security Benefit Rates*, 2006, 18–19. The rates given here applied as of 10 April 2006.

⁵⁹ Some older and rather crude estimations of the number of tort claims can be found in Cane (1999), 179.

⁶⁰ Department for Work and Pensions (supra fn. 50), 52.

⁶¹ A figure representing the different cost categories can be found in the Economic Advisers Unit report, which is available at <http://www.hse.gov.uk>, 23 February 2007.

⁶² Source: HSE. The original tables also include non-injury accident costs, representing the cost of damage to materials, machinery and property.

downward trend in recent years, both for fatal accidents and for serious accidents. There is only one exception, the rate of serious accidents (major and over-3-day injuries) in Great Britain, which has risen recently due to more reported accidents in the service industry. Naturally, to an important extent the decrease in accidents can be explained by changes in the economic structure (e.g. the decline of heavy industry) and changes in the general attitude towards risk. In Belgium the decreasing trend has been ascribed also to investments in health and safety by employers (see Sect. 3). However, it is unfortunately unclear to what extent these investments resulted from preventive efforts by the government or liability insurers. As regards the latter it is important to note that the government has proposed to make insurance premiums more experience-related, which suggests there is some need to improve on the current financing system. Also in Great Britain it has been proposed recently to make premiums in employers' liability insurance better reflect individual risk (see Sect. 5). The decrease in the fatality rate in Great Britain has rather been ascribed to preventive efforts by the HSC and local agencies, in addition to the more general factors mentioned above. In Germany, where the decrease in all categories of accidents seems to be most apparent, the preventive efforts of the BGs have been mentioned as a main factor, in addition to again changes in the economic structure (see Sect. 4). The BGs are responsible for both prevention and compensation, which may have contributed to the fact that in Germany employers' contributions already are relatively risk-related and experience-related. This leads to an interesting proposition for further research, namely that giving an organisation the responsibility for both compensation and prevention may have a beneficial effect on the accident rate.

Unfortunately it is impossible to state to what extent the different compensation systems have had an influence on the prevention of accidents.⁶³ One could even argue that this influence is limited, as these countries with their different compensation systems all show the same trend. More detailed empirical data are needed to substantiate any claims about the causality between the number of accidents, the compensation system and other variables, but such data are simply not available. One of the aims of this paper has been to show some of the problems in collecting such data. Nevertheless, we have seen that Belgium, Germany and Great Britain all have systems that include at least some preventive elements, notably in the way those systems are financed. However, we have seen also that in insurance-based systems it is important to relate premiums to the individual accident risk or accident history, in order to utilize the preventive effects in the system. In that respect there appears to be room for 'improvement' in both the Belgian no-fault insurance and the British liability insurance systems. Moreover, in case of insurability problems, as observed to some extent in Great Britain, the danger of underdeterrence looms ahead. After all, liability rules can only work if employers are capable of paying for the full magnitude of harm done to an employee victim and not in cases of insolvency.⁶⁴ As regards compensation, it should be noted that in all countries the amounts paid out are standardised, and

⁶³ See on the problem of measuring this relationship also Kötz and Schäfer (1993), 20–21.

⁶⁴ See in that respect also Shavell (1984), p. 360.

hence limited.⁶⁵ This applies to the FAO in Belgium, the BGs in Germany, and the IIDB in Great Britain. Of course, it does not apply (necessarily) to successful tort claims in Great Britain following the Employers' Liability Act. There, however, fault of the employer needs to be proven. In Belgium and Germany access to tort law is almost, but not completely, excluded.

Industrial accident statistics cannot easily be compared between countries, because there are no uniform definitions. For example, countries may or may not include road traffic accidents and commuting accidents in their statistics, and some countries only have limited information on public sector accidents and on the self-employed. Furthermore, in some countries the definition of "serious" accidents is based on at least one working day lost (e.g. Belgium and the Netherlands) while in other countries this threshold is three working days (e.g. Germany and Great Britain).⁶⁶ We also have to keep in mind that even the seemingly simple-to-interpret statistics on accident rates in one country should always be handled with care, because of possible changes over time in reporting regulations and presentation of data (see Great Britain and Germany). For all of these reasons (and more) I did not attempt to conduct a more elaborate comparative study. However, I hope that the data presented in this paper and my focus on the different compensation systems and their preventive effects will encourage further empirical research in this important domain. Many challenges lay ahead, especially on the sectoral level (e.g. the construction industry or wood industry), where the problem of uniformity of definitions is less severe and comparable empirical data can more easily be obtained.

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⁶⁵ It would be interesting in that respect to compare the actual amounts of compensation received by victim employees in similar firms/industries across the three countries.

⁶⁶ For more information I refer to Jacinto and Aspinwall (2004), HASTE (supra, note 35), and Philipsen (2007a).

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