

2nd Cambridge Regulation Conference

*The end of zero risk regulation:
risk toleration in regulatory practice*

***Regulating health and safety risks - the
implications for enforcement***

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Health and safety risks

- **Health risks** are either cumulative (e.g. noise exposure) or stochastic (e.g. carcinogens)
- They are managed by determining safe exposure levels, applying a safety margin, and controlling workplace exposures or the placement of products on the market.
- **Safety risks** are episodic—the harm either happens or not. They are rare events and are characterised by their likelihood and their scale (consequences).
- There is a non-zero chance that a susceptible individual, or one who has absorbed a large dose of the agent, or suffered an accident, will suffer some harm.
- Mathematically, these risks can be expressed as frequencies of injury or disease, per person per year.

Quantification of H&S risks

- Small-scale risks, such as slips or falls, are sufficiently common that reliable statistics may be available.
- Many important risks (such as a nuclear accident) are so rare that their frequency must be estimated by detailed risk modeling
- The quantitative nature of these risks lends itself to disciplined numerical methods of assessment.
- Qualitative differences exist, e.g. risks to children, risks of non-fatal injuries, etc.... (Must compare like with like.)

Risk analysts are human

- The social science community has rightly pointed out that risk analysts are capable of errors, e.g. wishful thinking or lack of hard evidence
- Risk assessment is a practice that needs robust governance.
- However, in many fields of human activity, there is no alternative but to manage the related risks by means of risk assessment and control.
- This is accepted, for example, in passenger transport.

Risk trade-offs

- In practice, the less harmful risks occur most frequently and the larger-scale ones infrequently.
- Nature presents us with many large-scale risks of low probability (asteroids, tsunamis).
- For technological risks, it should be permissible to trade off large potential consequences against sufficiently low probability. This will encourage the search for preventive measures.
- The current argument about the role of nuclear power in combating climate change will pose precisely this type of problem.

Major hazards with low probability

- Example: large cross-country fuel pipelines. Failures can be broken down into causes thus:
 - Material defects
 - Construction defects
 - Third party interference
 - Corrosion (internal)
 - Corrosion (external)
- Statistics are available for these failure modes separately.

“Complex” safety risks

- An explosion of LPG vapour in a factory in Glasgow in 2004 caused 9 fatalities and many more injuries. The following types of cause could be distinguished:
 - essential causes: (e.g. failure to seal a hole in a basement wall)
 - contributory causes: (e.g. use of a metallic pipe, failure to protect it against corrosion)
 - missed opportunities to prevent the accident: (e.g. failure to apply recent codes of practice retrospectively)
 - exacerbating factors: (e.g. people in the building on the day).

“Simple” safety risks

- Occupational safety risks may look simple, e.g. a fall.
- However, the underlying causes may include:
 - lack of barriers, warning signs or fall arrest equipment,
 - rule breaking,
 - poor training,
 - inappropriate work procedures,
 - time pressure,
 - poor safety culture,
 - inadequate supervision.

UK approach to non-zero health and safety risks

- The UK Health and Safety regime was one of the first to recognise that risks cannot be eliminated and that the optimum level of regulation should allow some residual risk.
- The principal legal duties (over which the UK has recently fought—and won—a battle with the European Commission) are to “...*ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees*”—the “SFAIRP” or “ALARP” principle.

ALARP interpretation

- In 1949, the Court of Appeal held that -
- *“ ‘Reasonably practicable’ is a narrower term than ‘physically possible’ and seems to me to imply that a computation must be made by the owner in which the quantum of risk is placed on one scale and the sacrifice involved in the measures necessary for averting the risk (whether in money, time or trouble) is placed in the other, and that, if it be shown that there is a gross disproportion between them - the risk being insignificant in relation to the sacrifice - the defendants discharge the onus on them.”*

Health and safety management

- Since 1974, risk practitioners in industry and government have taken these legal principles and turned them into management processes.
- These follow classical management models with inputs and outputs, and processes of planning, organisation and monitoring.
- The regulatory regime thus contains both incentives and penalties. For most of the period between 1974 and 2000, this approach seems to have been successful.

Fatal accident trends

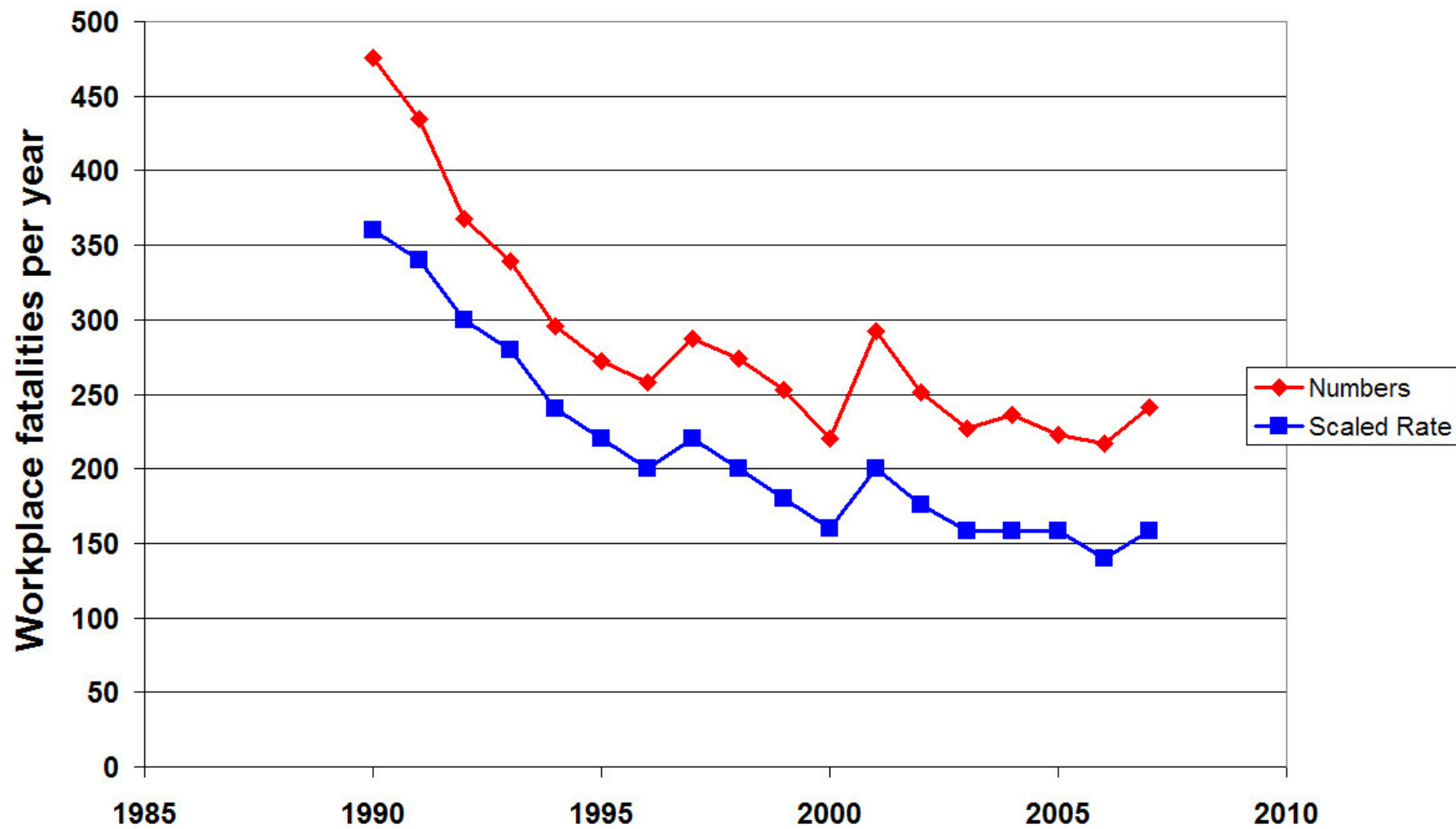
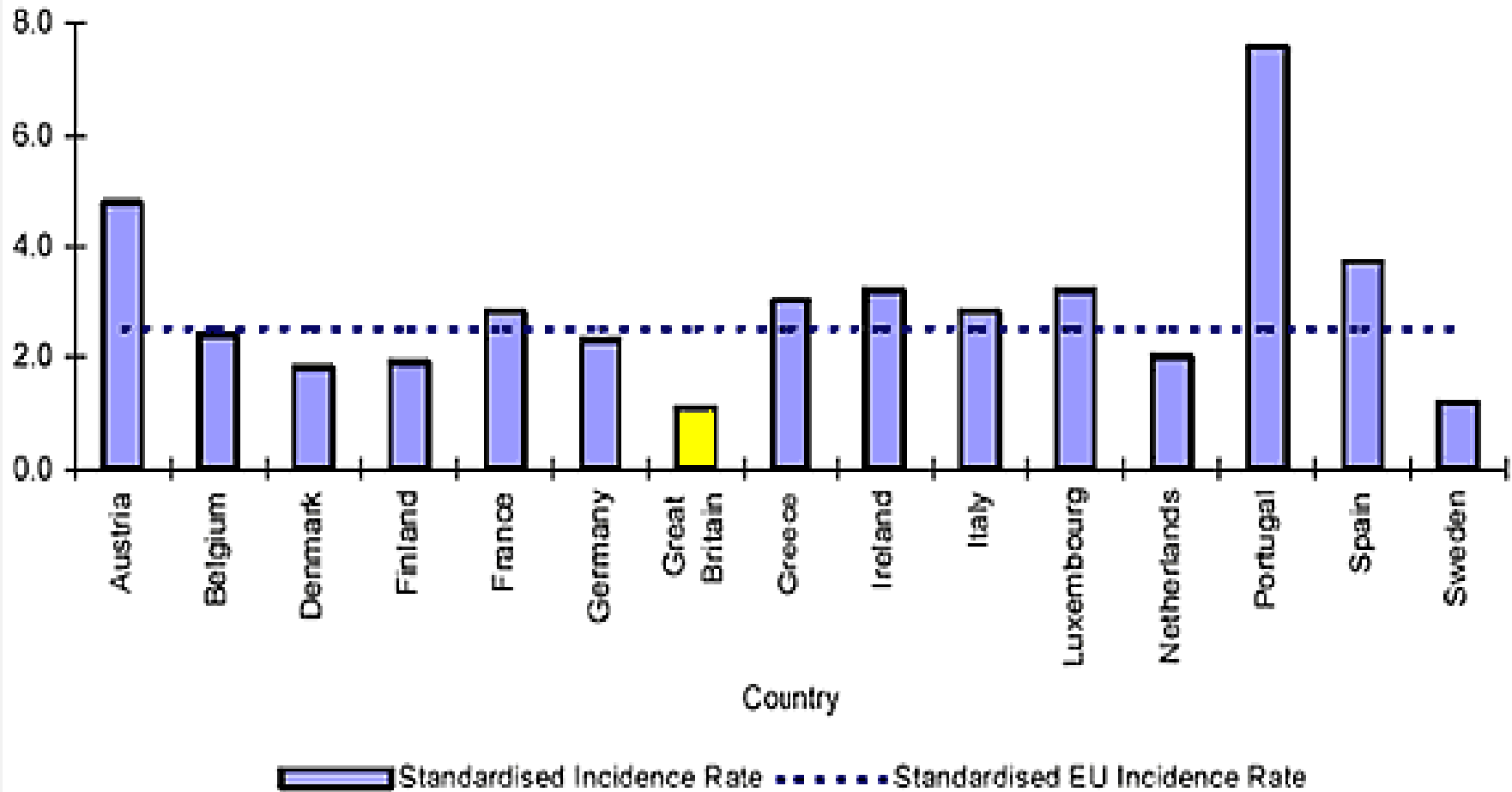


Figure 22: Standardised Incidence Rate* of Fatal Injuries at Work in 2003 for Great Britain and EU Member States

Rate of Fatal Injury



Future aims

- Improvements and higher efficiencies should be expected.
- In 2000, the Health and Safety Commission set up targets for 2010:
 - to reduce the number of working days lost per 100,000 workers from work-related injury and ill health by 30%;
 - to reduce the incidence rate of cases of work-related ill health by 20%;
 - to reduce the incidence rate of fatalities and major injuries by 10%;

How to get there?

- In my view, if the desired reductions in safety risks are to be achieved, this must be done by direct enforcement of the preventive duties, not primarily by punishment after accidents, and deterrence.
- The preventive duties arise when no accidents are occurring or even appear likely. This calls for a regime that emphasises education and incentives.
- However, the recent trend in H&S enforcement has been characterised by “naming and shaming”, stiffer financial penalties and, in the case of fatal accidents, by prosecutions of individuals.

What is the crime? To run the risk, or to have the accident?

- HSE's prosecution work has focused on cases where a serious accident has actually occurred. These absorb large resources.
- In fatal accidents, the police and public prosecutors are engaged. They tend (like the Courts) to have a "blame" mentality.
- The Courts will only hand down severe penalties when there are "aggravating circumstances", i.e. an actual accident.
- The effect has been that the crime is not so much to run the risk, but to have the accident.

An instructive example

- In the gas distribution industry, where gas mains occasionally fail in residential areas and cause explosions in buildings, there is an asset replacement programme regulated by HSE and agreed by the economic regulator OFGEM.
- In the event that there is an explosion caused by a failure in a gas main that is part of an agreed programme of future replacement work, which is being pursued properly, the gas transporter is afforded a statutory defence.
- This provision recognises that the crime is to fail to manage the risk.

Justice issues

- Prosecutors and the Courts (and, one supposes, juries) interpret the law with hindsight, and not in terms of the apparent risk on the day before the accident. This is natural but wrong; it does not suit a risk-based regulatory regime.
- The defendants are effectively selected by chance. The majority who have experienced accidents in their business are “about average” safety managers. It is difficult to equate this with the criminal standard of gross negligence.
- Many other dutyholders, whose operations may be no less unsafe, escape the sanctions.

Does deterrence work?

- In crimes of negligence, will dutyholders at large be deterred by knowing that one of their peers has been convicted of gross negligence?
- If they are not themselves knowingly negligent, this does not seem likely.
- It is all too easy for them to conclude that *“it could not have happened here”*.
- The effectiveness of deterrence in crimes of negligence urgently needs research.

Conclusions – Health & Safety

- The current enforcement strategy undermines the original concept of risk-based H&S regulation.
- It runs counter to principles of good safety management, in particular the blame-free culture and the need to motivate management positively.
- We have to motivate the vast majority of “average” managers who have not had their first accident.
- This would happen if penalties were redirected to failures in the preventive duties.

Conclusions – wider than H&S

- In the wider field of risk-based regulation, the enforcement philosophy must be thought out at the same time that the regulatory regime is being designed.
- If legal duties are to manage risks to a non-zero level, then the regime must prescribe appropriate principles by which the Courts should decide cases when such risks have crystallised as real losses.

