Discussion paper – economics of occupational safety and health

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Economic incentives as a policy tool to promote safety and health at work

by Eila Kankaanpää, MSc(econ) [1]

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Incentives are regarded as a promising policy tool for the promotion of occupational safety and health (OSH). This article discusses the potential of different kinds of incentives in light of economic theory and evidence from research. When incentives are used as a policy tool, it implies the existance of an institution that has both the interest and power to apply incentives to stakeholders, usually to employers. Governments can subsidize employers' investments in OSH with subsidies and tax structures. These incentives are successful only if the demand for OSH responds to the change in the price of OSH investments and if the suppliers of OSH are able to increase their production smoothly. Otherwise, the subsidy will lead only to higher prices for OSH goods. Both public and private insurance companies can differentiate insurance premiums according to claim behavior in the past (ie, experience rating). There is evidence that this can effectively lower the frequency of claims, but not the severity of cases. This papers concludes that incentives do not directly lead to improvement. When incentives are introduced, their objective(s) should be clear and the end result (ie what the incentive aims to promote) should be known to be effective in achieving healthy and safe workplaces.

Key terms award; economics; experience rating; occupational safety and health; OSH; subsidy.

Statistics on occupational injuries and occupational diseases, sickness absence, and disability pensions show that there is still a need to improve safety and health at work (1). Incentives have recently been included in many countries' policy toolkit to promote occupational safety and health (OSH). Incentives – as an OSH policy instrument – typically have a positive connotation (2). Usually, regulation is considered as the alternative to the incentivizing approach and, in many cases, is often considered ineffective or even viewed as a nuisance by the actors at whom it is targeted.

The core idea of using an incentive as a policy tool is that, by providing a rationale (be it economic or societal) for a certain kind of behavior, persons and organizations (hereafter referred to jointly as "agents") will adapt their behavior in a manner desired by the incentivizing institution. For an incentive to be a policy tool there has to be an institution or organization that wants the agent to behave in a certain manner and, in addition, this institution has to possess the power and the ability to apply the incentive to agents.

The main objective of this discussion paper is to clarify the concept of "incentive" and the arguments for its use from an economic perspective. The paper describes different kinds of incentives and deals with their effectiveness based on economic theory and evaluation studies. The aim is to help readers understand what incentives are and how they work (or do not work) in achieving safer and healthier workplaces.

Why are incentives needed?

For most resource allocation decisions in society, economics relies on the functioning of the market. In theory, producers and sellers provide various "goods" (ie, products and services) in such a way that the resulting mix of different goods supply the highest attainable benefit to consumers. At the same time, competition drives individual firms to produce these goods in the most efficient way. What is produced and consumed, and the way production is organized, is considered as optimal. OSH can be regarded as a "good" too because resources are needed to ensure safety and health at work.

Markets function well only in very specific circumstances. These circumstances are that the prices of goods will reflect all production costs, on the one hand, and that, on the other hand, all relevant information on goods and production processes is available to consum-

[1] University of Eastern Finland, Kuopio Campus, Department of Health and Social Management, Kuopio, Finland.

Correspondence to: Eila Kankaanpää, University of Eastern Finland, Kuopio Campus, Department of Health and Social Management, PO Box 1627, FI-70211 Kuopio, Finland. [E-mail: eila.kankaanpaa@uef.fi]

ers and workers. When these conditions do not exist, the market solution will not be optimal and there is a reason to look for actions to correct the market failure. The introduction of incentives is one possible action to address this market failure by inducing the desired behavior (3).

In the labor market, however, workers usually have insufficient information about risks at work. Also employers lack information about ways and methods to reduce risks at work or improve working conditions. The issues related to the provision of information on risks and effective interventions to deal with risks and working conditions are outside of the scope of this article. Therefore, the assumption is that when agents are incentivized, they will take actions to reduce risks at work and improve the quality of working life based on available information concerning effective actions.

In the OSH context, unsafe or harmful working conditions usually also result in costs (monetary and non-monetary) to third parties, such as families, relatives, and society at large. These costs are called "negative externalities", and they are born by the third parties because employers do not cover these costs.

In the case of these negative externalities, economics recommends two major actions. The first is to require the employer to internalize the true production cost, including the costs of accidents and ill health. This can be achieved, for example, through compulsory insurance for occupational accidents and diseases. Internalizing all production costs would lead to higher prices and therefore to lower demand for goods and services that are produced in risky circumstances [(4) referring to Pigou (1920)]. The second solution for dealing with negative externalities is to rely on private negotiation between the parties involved. For OSH issues, this would mean that employers and employees would negotiate on working conditions and wages at the same time. If risks were involved, employees would demand a higher pay, known as a "compensating wage premium" [(4) referring to Coase (1960)].

When the externalities are transferred to third parties, these third parties might be willing to induce better OSH at workplaces. In developed countries, the third party consists of all citizens because social security and healthcare are usually publicly or collectively funded. In this case, the government has an interest in keeping the costs of social security and healthcare low as this will improve the global competitiveness of the country and keep tax rates down. On the other hand, health and well-being is highly valued on the political agenda, (ie, highly valued by the voters). Therefore, politicians, governments, and trade unions also have an interest to improve OSH at work. Another third party, private insurance companies, can additionally have an interest in using incentives. Lowering the costs of occupational accidents, diseases, and disability is in their interest if it results in an increase of profits. Insurance companies can also apply incentives if their clients, usually employers, are interested in improving OSH issues. In that case, those insurance companies that promote activities for OSH improvement will achieve a greater market share and/or recruit employers with less claims. In conclusion, governmental organizations and private insurance companies are those institutions that will have an interest and the means to apply incentives.

Occupational safety and health economic incentives

Economic incentives for OSH have been classified into three groups: (i) state subsidies, grants, and financing, (ii) tax reductions or structures, and (iii) insurance premium variations (2). However, other incentives are possible, such as awards and financial incentives related to regulations. In this article, state subsidies, grants, financing, and tax reductions are grouped together. They are jointly referred to as "subsidies" because their main effect is to change relative prices for firms and thus affect the firm's choices in favor of OSH. These are incentives that governments can apply. Both state-owned insurance companies and private insurance companies offer insurance premium differentiation to improve the performance of firms in the OSH field. This creates an incentive to improve OSH provided that the premium is not based on the average costs of the industry and that each employer will be charged based on its own record of claims.

Incentives and regulations are not mutually exclusive. Thorén & Sterner (5) state that both approaches are needed depending on the context. Economic incentives can be used to reinforce regulation. Compliance with regulations can be reinforced with fines. If employers do not comply and are at fault for occupational accidents, they must pay a fine.

Although it is not a "real" policy tool, compensating wage premium has been used as an example of an incentive [eg, by Viscusi (6) who is an authority in the field]. Implicitly, compensating wage premiums assume that employers and employees perceive risks correctly and that the latter has bargaining power. The proviso of bargaining power will not always been fulfilled. For example in the case of unemployment, bargaining power is substantially weakened. Viscusi regards compensating wage premiums as a strong incentive for managers to lower the risks at work. He estimated the magnitude of compensating wage premiums to be 7-fold bigger than the costs of workers'

compensation. However, Viscusi was criticized by Jolls (7) who stated that the empirical evidence cannot show whether wages are adjusted by the right amount (given the employee's underlying preferences) in the light of workplace risks. At most, the evidence can show that wages move in a particular direction in relation to risk.

Recent empirical evidence has indeed shown that Vicusi's estimate was too high (8, 9). Jolls points to [(7 referring to Weinstein's (1980)] "optimism bias", which means that employees usually assess their personal probability of facing bad outcomes to be lower than the average.

Another argument against the use of compensating wage premiums is that usually the most dangerous jobs are done by employees without much bargaining power: the unskilled, poorly educated, and minority groups (10). If compensating wage premiums existed, they would provide the rationale for employers to lower the risks, which would be in the self-interest of the managers and firms. When this "risk pay" is part of a collective agreement and the labor market is unionized, the compensating wage premium "self-interest" will be dampened because an employer would not be able to pay lower wages after reducing the risks at a specific workplace.

However, the most important argument against including such premiums in this paper is that they do not fulfill the criteria for an incentive as a policy tool: there is no interest for a third party to act. Employers and employees will find an optimal solution themselves.

Effectiveness of occupational safety and health incentives

People respond in various ways to economic incentives because their actions are also based on other goals and personal motives. Incentives will thus work less, or even not at all, if the desired behavior is not aligned with or is against the individual's own motive.

Neo-classical economic theory describes firms (employers and shareholders) as profit-maximizing entities. The description does not imply that firms do not consider their reputation and employees' well-being as important factors, but rather that the profit-maximizing firm will consider employees' health only if it thinks that this will increase profits.

When the government introduces tax reductions or subsidies, it relies on the profit-maximizing idea of a firm. By changing prices, behavior can be changed. It is not self-evident that providing funding for OSH, or allowing tax reductions and subsidies to lower the price of OSH investments, will indeed increase investment in OSH. This depends on the demand and supply conditions of OSH products and services.

From a theoretical point of view, this paper uses OSH consultancy services as an example to explain how subsidies work (figures 1 and 2). Before the subsidy is introduced, employers buy and consultancies supply an amount (q_0) at a price (p_0). The subsidy increases the demand for an OSH service and thus creates a "jump" in the demand. The line representing demand moves from D_0 to D_1 and the quantity demanded increases from

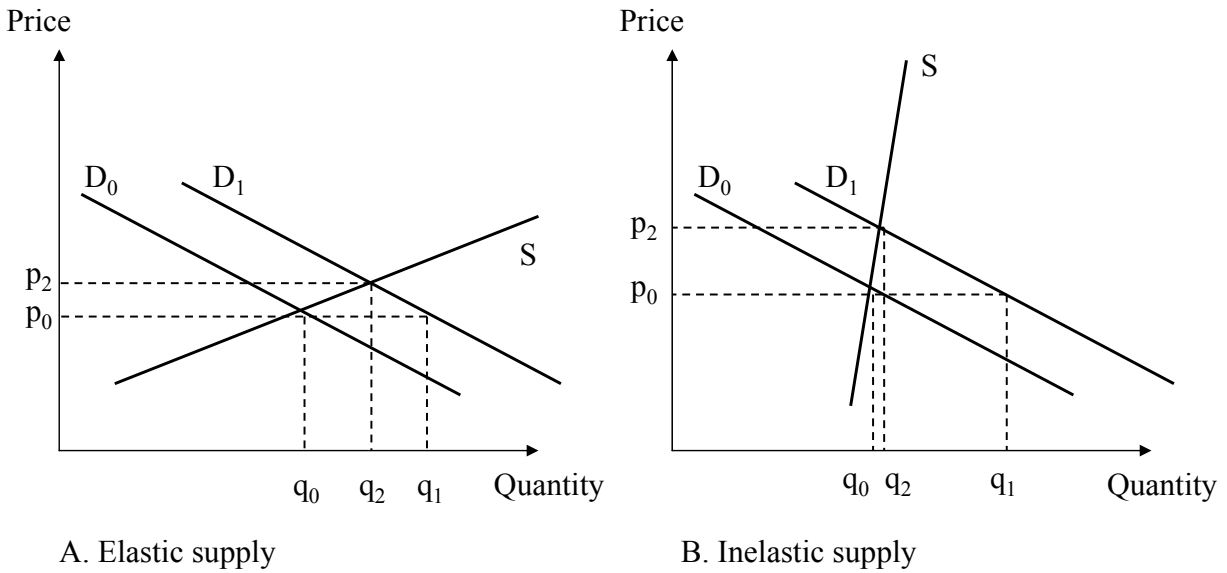

Figure 1. Subsidies for occupational safety and health (OSH): the impact on price and quantity of OSH when demand is price elastic.

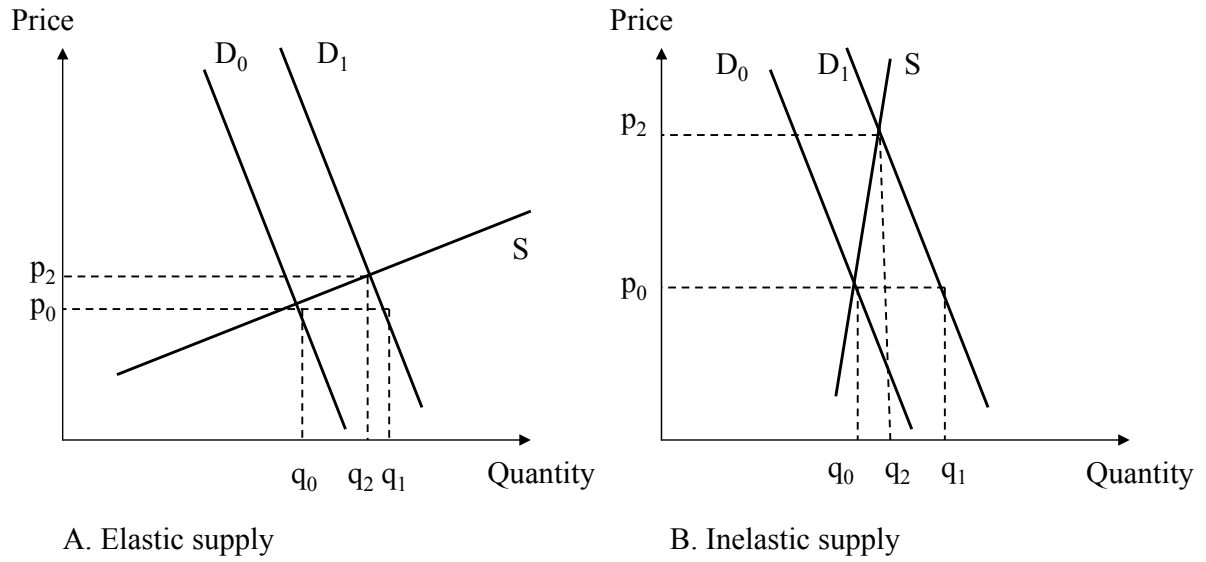

Figure 2. Subsidies for occupational safety and health (OSH): the impact on price and quantity of OSH when demand is price inelastic.

q_0 to q_1. Supply of OSH consultancy services has to adjust to the new higher demand. To be able to provide the higher quantity demanded, the suppliers have to recruit resources from other activities in society and the economy. To be able to recruit the resources, the wages and prices of the inputs in the OSH production have to rise. This will in turn lead to an increase in the price of the OSH consultancy services. At the new higher price (p_2), employers are willing to buy the amount (q_2) of OSH consultancy services.

Figure 1 illustrates the impact of a subsidy for OSH consultancy services when the demand for OSH is "price elastic". Price elasticity of demand is the percentage change in the quantity demanded that results from a 1% change in price. Demand is price elastic when the quantity demanded responds to changes in prices in a proportionally greater magnitude than the change in price. The supply will adjust quite easily meaning that the supply is price elastic (case A, figure 1). This will result in an increase of the quantity of OSH services bought at a moderate rise in prices of OSH consultancy services. If the supply of OSH services is inelastic (case B, figure 1), the subsidy will mainly lead to higher prices for the OSH services and the subsidy spills over to the providers.

Figure 2 presents the case where the demand curve for OSH services is very steep, which means that the quantity demanded does not change much with price changes. Then the subsidy does not increase investments in OSH as much as in figure 1. If the supply is price elastic, the price increase of the OSH services will only be moderate (case A, figure 2). If both demand and supply are inelastic, the quantity of OSH services will not increase much, and only the prices of OSH services will rise (case B, figure 2). I am not aware of any empirical research that has studied these effects of subsidies. This would be certainly worthwhile to investigate.

There is empirical evidence for the effects of differentiation of insurance premiums. A systematic review by Tompa et al (11) shows that there is moderate evidence that the introduction of "experience rating" (ie, pricing premiums for different groups or individuals based on the group or individual's history of claims) reduces the frequency of injuries. The results of the studies included in the review were not unambiguous. Only some types of injuries were reduced and the severity of injuries also increased with the introduction of experience rating. Tompa et al discussed this result and assumed that employers try to diminish the number of claims for example by accommodating injured workers and suppressing some types of claims. In addition, firms might devote more time and effort to the prevention of less severe and more frequent injuries over more severe ones. Both responses can result in a lower frequency but a higher severity of injuries. This was indeed found in a recent study in the United States that used panel data over the years 1999–2006. Experience rating decreased the frequency of claims. In addition, those states that had an above-average share of self-insured firms had below-average incidence rates (12).

Other incentives will target a firm's activities that make it more profitable. These are activities that make a firm more attractive in the eyes of the consumers (higher demand or willingness to pay for their services and products), in the labor market (able to recruit more productive employees, sometimes even at lower wage), or in

the financial market (lower cost to capital). Reputation has been recognized to be one of the key motivational factors in health and safety issues because of its importance for business (13). Reputation is important due to the impact a negative reputation can have on business; when a company loses its reputation, it can be fatal. A positive reputation can have the opposite effect and, therefore, can be used as a basis for an incentive. For example, awards or competitions for OSH issues are used as incentives to improve OSH performance. This only succeeds if customers, employees, and shareholders (or financial organizations) react to the reputational improvement or loss. There is some empirical evidence to support this. Tait & Walker (14) investigated 20 safety award competitions or campaigns in the UK. They found that the motives to participate in a competition were commercially driven, especially for the construction industry that could use the reward in tendering processes. Public relations played only a marginal role. Professional recognition for OSH experts was also among the most important reasons to participate in a competition. However, there are also limitations to this approach. Tait & Walker concluded that awards are not suitable for small firms due to the relatively high fixed costs of participation such as administrative workload and information gathering. Laitinen & Päiväranta (15) also found that only the big construction companies participated in competitions. In general, it has been noted that participation rates for award competitions are low (16).

Working conditions are generally regarded as being the responsibility of the employer. However, from a health behavior perspective, it is known that people make informed choices that can be detrimental to their own health and well-being. Attitudes towards risk also vary. Therefore, it is important to discuss the safety and health motives of employees and whether OSH could be improved by incentivizing workers. This has been studied in safety research. In their review of external awards, Tait & Walker (14) commented also on internal incentives like rewarding "no accident teams" or localities in multi-plant companies based on their safety performance. The conclusion was that the results from studies are ambiguous. Awarding healthier behavior has also been studied in smoking cessation research. In a Cochrane review, Cahill et al (17) found that "quit and win" competitions did not lead to higher quitting rates. In general, the success of rewarding is very much dependent on how well the performance can be observed and verified (18). Therefore, it can be concluded that incentivizing employees is probably not a very promising approach.

For firms, damage caused to consumers has a much bigger impact than damage caused to employees. In both cases, the costs of lawsuits will be moderate and similar, but the damage to a firm's image is much bigger when something happens to a consumer. This also reflects the fact that customers value their own health much higher than the lives and health of those who fabricate the product. Consumers themselves do not have direct possibilities to create incentives for firms. They must use their political influence to gain better information on working conditions, which they then have to take into account when making consumption choices. For example the use of nutritional labels has been studied [eg, (19)] in this way, but the research concentrated on the health effects on consumers. Reporting the conditions in production processes has also been used but mainly for environmental reasons. Examples of successful consumer actions include non-child labor or fair-trade labeling. Labeling could be a promising incentive also to promote OSH issues.

Concluding remarks

In this paper, an incentive is defined by two important characteristics. First, to be considered a policy tool, an incentive must involve a third party (ie, the incentivizing institution), who is interested and able to apply an incentive. Second, an incentive aims to induce a behavior desired by the institution, behavior that would not result from the actor's own motivation and circumstances only.

Governments are the third party with the biggest interest in improving OSH. This is caused by the necessity to lower the cost of social security, which will increase the nation' competitiveness. On the other hand, voters highly appreciate a safe and healthy life, providing justification for governments and trade unions to improve OSH. Incentives are one way of acting. Insurance companies can apply insurance premium differentiation if at least part of the cost savings will remain with the insurance company.

Financial incentives in the form of funding opportunities, subsidies, and tax reductions that aim at lowering the cost of investing in OSH could be successful if the demand responds to the decrease in price. In addition, the providers of OSH equipment and expertise have to be able to adjust their supply of OSH goods and services.

Rewarding companies that improve their OSH can be organized with competitions and awards. Awards are well accepted in industries where the "proof" of good OSH improves competitiveness, like in the construction industry. Other important reward-like incentives are auditing by outsiders and feedback on performance (14, 15). However, such campaigns or competitions usually do not reach small firms.

If the problem with improving safety and health in the workplace is the result of missing information

about risks or their prevention (3, 4) then incentives are not the right remedy. Incentives probably succeed in creating actions, but do not necessarily help in achieving the original objective (less disability, occupational accidents, and diseases as well as improved well-being at work). Therefore, it is important that, when incentives are introduced, the objectives are clear and what is being promoted should be known to be effective in achieving healthy and safe workplaces.

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