The air pollution emission permits market in the EU and moral hazard

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Abstract. The efficient control of air pollution emissions is one of the most challenging issues that the environmental policy makers face nowadays. Above all, the air pollution is a textbook example of externality. As it is well known, the theory suggests a number of alternative potentially efficiency-improving mechanisms, but it is also well known that some of those mechanisms might also have a perverse side. This paper explores from a theoretical perspective this perverse side for the CO_2 emission permits market, currently running in the EU zone.

Let us start with a straightforward reason for the existence of this market. The EU member states have targets on CO_2 emission ceilings to be met by 2008 to 2012. These ceilings were signed in the Kyoto's protocol and further ratified -in fact strengthened- in EU directives. Roughly 60% of these emissions are currently coming from energy supply sectors, which are obviously key economic sectors and in which a change to a cleaner technology takes time. In fact, as recently reported by the European Environmental Agency (EEA), a number of EU countries will not meet the target unless they resort to market-mechanisms. One of these market-mechanisms is the emission permit market. The EEA shares initially emission permits among the polluting firms and then the market opens. The market improves the overall efficiency if the initial sharing settled by the EEA is -whatever the reason- not efficient and if the permit market has some desirable properties (say it is competitive).

However, a terribly natural argument starts making things more involved: whenever two polluting firms meet at the market, they trade if they both improve by doing so, but both firms improvement does not imply social improvement. Based on this, should we just remove the market and rest on the assumption than the EEA assigns permits aiming for the social welfare? Even if we accept the good intentions of the EEA, we might cast doubts on whether the EEA has all the relevant information at the time of making the assignments (each firm's current investment in clean technologies,...). In summary, the EEA pursues the social welfare, but lacks information, while each firm is better informed than the EEA -at least so long as the firm herself concerns- but acts on her own welfare.

This paper balances off this conflict writing it as a moral hazard problem. The EEA plays as principal, each polluting firm is an agent, and a contract is an environmental policy. The firm has an informational advantage: observes - decides- privately her emission abatement effort, whereas the EEA only observes the firm's actual emissions. Each firm's emission depends on the firm's abatement effort and on a firm-specific unobservable random shock. The abatement effort is costly for the firm because it makes use of resources that alternatively would be used for profitable activities. Additionally, in the simplest setting we consider, there is no emission permit market and the environmental policy of the EEA is the emission permit assignment together with a firm-specific fine for the over-polluters. Events unfold as follows: (1) EEA assignment, (2) firms decisions on abatement effort, (3) shocks are realized, hence emissions and payoffs. The EEA uses her policy to induce each firm to choose some socially optimal level of abatement effort and the known theory predicts the economy attains a second best.

To our knowledge, introducing the emission permit market in the previous setting constitutes a novelty in the moral hazard literature. Essentially, this market means that the agents (polluting firms) might trade part of their contracts (emission permits) among themselves once they initially accept some initial assignment of contracts. Specifically, the market takes place between the point (1) and (2) in the previous sequence of events. We consider only bilateral trading in this market, and we just assume that a trade takes place if it Pareto improves both participating firms. Apart from this, we analyze two alternative scenarios: (a) when firms go to the market they have the same information about their idiosyncratic shocks than the EEA has when making the initial assignment; (b) the shock is privately and partially revealed to each firm at the time of going to the market. This latter scenario captures the fact that market transactions are much more frequent than EEA assignments.

The analysis of scenario (a) is carried out analytically. Our results under this scenario essentially point that the market of permits reduces the room for getting to a second best, though this second best is still attainable. In terms of the moral hazard theory, the market of contracts restricts further the usual incentive compatible constraint, but this further restriction is in a sense superfluous: so long as the EEA can anticipate correctly the market functioning (the bargaining power of each participating firm), the EEA can still induce the socially optimal abatement effort. The analysis of scenario (b) is performed numerically and it is still in progress. Our preliminary results here bring bad news for the EEA: we identify a number of examples in which the EEA fails to induce an abatement effort that in the absence of market, everything else unchanged, would do.