Mining waste: study recommends stringent bonds to cover clean-up costs

Abandoned mines can leave a toxic legacy that must be decontaminated. Firms may be legally obliged to cover the cost, but can escape this obligation by declaring bankruptcy. Governments must then take responsibility and fund the clean-up. ‘Environmental bonds’ – deposits paid to government – can encourage firms to meet their obligation and to minimise waste during operation, a new study shows. Carried out by researchers in Canada, the study focuses on the North American context, but the findings are also relevant for the EU.

Mining produces hazardous waste known as tailings – rocks, water, trace metals and processing chemicals left over once the target mineral has been extracted. The UN Global Industry Standard on Tailings Management and EU Directive on the management of waste from extractive industries Directive (EWD) address the management of tailings. They are conventionally held in a ‘pond’, later drained and planted for remediation.

Researchers behind this new study highlight that firms liable for clean-up may maintain inactive mines to delay these costs. If they go bankrupt, meanwhile, the responsibility falls to government, and taxpayers have to meet restoration costs. Financial tools can ensure funds are available for clean-ups and incentivise firms to minimise waste. For example, a firm may pay a cash deposit to government which is released once the firm has met its obligation. The researchers call these ‘environmental bonds’.

The researchers model the lifecycle of a hypothetical copper mine to compare the effects of environmental bonds on mine value, firm actions and expected clean-up costs for government. The researchers compare the effects of two policies: the firm is liable for clean-up in both cases – but in one example it has to deposit a bond and in the other it does not. The value of the bond is sufficient to clean up the existing waste stock and is updated periodically; when the mine is closed the bond is returned to the firm to pay for the decontamination.
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The model incorporates resource price uncertainty, which can affect the firm's optimal decisions on production, waste accumulation, mothballing (ceasing operations but not closing the mine), abandonment (closure) and clean-up. The researchers explore three scenarios: a 'solvent' benchmark (no option to declare bankruptcy), exogenous bankruptcy (caused by forces outside the firm's control), and endogenous bankruptcy (chosen by the firm as a strategy to minimise costs).

Modelling shows that firms act identically in the case of the benchmark/bond, benchmark/no bond, and endogenous/bond scenarios, minimising waste during resource extraction. The value of the mine is also similar under these scenarios.

Where bankruptcy is an option, however, the absence of a bond can be an incentive to generate additional waste, the study shows. This effect is strongest in the endogenous bankruptcy case. Where there is a bond however, this ensures that the firm reduces waste and no financial burden is left to government. The researchers conclude that an appropriately-structured environmental bond not only shields a government from clean-up liability but also ensures efficient waste abatement.

In the study, there are no charges for setting up the bond and the government pays interest on the bond to the firm. This may not be the case in real life, the researchers note. A lack of interest payments or any additional costs linked to the bond would incentivise a firm to diminish more waste and clean up the site sooner, they suggest.

The researchers assume there is no environmental damage caused by waste creation, and no accidents associated with waste storage. They also assume that government can clean up the site at the same cost as the firm, although this is not generally the case: clean-up costs are usually higher for government. The researchers acknowledge that bankruptcy can damage a firm's reputation and may, therefore, be an unattractive option.

The 'stringent bond' proposed covers the full cost of clean-up. In practice, the size of bonds is often not updated according to waste generated, so they may not fully cover costs, and, without independent verification, firms may underestimate future clean-up costs, the researchers say.
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Acting as a disincentive, stringent bonds may reduce the number of mining projects initiated, note the researchers, posing a trade-off between promoting economic activity and an efficient environmental policy. However, given the number of waste sites currently abandoned and requiring clean-up, in North America and elsewhere, they argue that such bonds seem necessary.

Further information

- In the EU, the Environmental Liability Directive (ELD) encourages the use of financial instruments to cover operators’ responsibilities. Some Member States require environmental insurances to cover the costs of unexpected events, for example. Bank guarantees are the most usual tool used with holders of environmental permits under the Industrial Emissions Directive.