The effect of allocation method and volatility of emission permits on abatement investments

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Based on interviews with plant managers of almost all the Belgian ceramics, lime and cement producers (16 companies), the study describes how emission trading was accounted for in investment decisions (54 projects). We develop orthodox economic insights, especially on the effect of the volatility of carbon prices on investment decisions. We confront perception of managers with the orthodox theory and add insights from behavioural economics, which explain deviations from what orthodox economic theory would predict.

For companies with gas as their sole heat source (bricks sector), the gain in carbon allowances induced by energy efficiency investments, was never included in payback times or IRR calculations. However, at a price of 15 euro (mean price covering the period), the carbon market increases the incomes of efficiency investments by 10%.The major argument for not including the carbon gains is the fact that they are over-allocated. Three out of five companies with more carbon intensive fuels also perceived under-allocation as a greater incentive to invest.

Classical economics predicts that over-allocation or under-allocation, for a given carbon price, creates the same incentive for investments. Possibly, if under-allocation may increase the probability of plant closure, the resulting option value creates a lower incentive to invest. The former classical economic view was only expressed by one company and the latter was perceived by only one other company. (Even if the argument of a plant closure was mentioned by two other companies, while thinking that an under-allocation is a greater incentive to invest). By contrast, nine companies argued that under-allocation was perceived to be a greater incentive to invest. They argued this choice by reference-dependent preferences, well described by behavioural economics. There were three references 1) endowment of free allocations, 2) the situation before or without investment and 3) competitors. All worked in the sense of a lower than rational perceived effect of over-allocation.

There is an upcoming strand of literature arguing that policy design is more effective when it takes into account the way people and companies perceive incentives. Insights from behavioural economics allow to understand and anticipate in a more accurate way these perceptions. Behavioural barriers to investment induce a loss of efficiency because it creates a distortion from the efficient outcome of equal marginal abatement costs. The findings in this paper are an extra argument, besides other classical market distortions from free allocation, to auction at least a small part of allocations to companies. The new allocation rules from 2013 are likely to change the impact on energy efficiency because even if the carbon incentive of an allocation above or below emissions is the same according to orthodox economic theory, an allocation below emissions, where the ETS entails a real cash flow, is perceived as a much stronger incentive compared to the situation of allocation above emissions.

The classical theory of the effect of carbon price volatility on the incentive to invest hasn't been studied before in detail. We show that for costs positively correlated to the market return, volatility of carbon prices increases the risk-adjusted discount rate or equivalently decrease the certainty equivalent. Pro-cyclical costs are less risky than counter-cyclical or constant costs. This counter-intuitive insight from classical economics was not perceived as such by any of the managers. This perception can be understood by narrow framing, a widely observed heuristic by behavioural economics.

Classical economics predicts that the riskiness of costs avoided by a project increases the incentive to invest. This was only perceived so by a minority of managers. Most managers saw the avoidance of more risky cost as a disincentive to invest. This again can be understood by a narrow framing where the avoided risky costs are framed as risky gains in an IRR or payback time calculation. But both errors neutralise each other, yielding the right conclusion for the majority of the managers: price volatility decreases the incentive to invest. The wrong conclusion –price volatility increases the incentive to invest- was the perception of the more rational managers.

When investments are not decided on a now-or-never basis, but can be postponed, an option value is lost by an investment decision. This option value is higher for volatile carbon prices. The option value induced by very low carbon prices is likely to be of small importance because the effect of the carbon price is in most cases too low to create a gain in waiting that exceeds the advantage of doing the investment immediately. The option value of not investing when there is a plant closure, induced by very high carbon prices, is a reason why a more volatile price creates a lower incentive to invest. This argument, in accordance with classical theory, was cited by 3 companies. However, if the narrow framing in the interpretation of the effect of volatility on risk is applied in this context, this induces an over-estimation of the effect of volatility on the option value.

The policy implication is that a more foreseeable price, yielded by a price floor and a price cap, creates a higher incentive to invest and would moreover reduce behavioural biases in investment decisions.