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DYNAMIC INVESTMENT DECISIONS AND IMPLEMENTATION OF CLIMATE POLICIES

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Investment decisions are simple to make given that the right information is available. Right information is however in short supply shedding doubt on the financial outcome of investments. For instance, no-one can with certainty predict if the price of oil is about to increase or decrease, let alone pin-point its price level in, say, 20 years. As a consequence, investments based on current or on inaccurate oil price projections might become worthless if the oil price changes.

The more uncertainties the investment decision is facing the more likely it is to fall through. The energy sector is facing a number of uncertainties of which the European Emission Trading System (EU ETS) is amongst the more recent. Faced with an increasing number of uncertainties the energy sector might reduce its investment levels in existing and new capacity with has repercussions on the price formation.

The literature on investment decisions in general and on the energy sector in particular is extensive. Studies on both European and country levels have been conducted indicating, to no surprise, that climate policies do affect investment decisions in the energy sector (e.g., Laurikka, 2005; Pettersson, 2005; 2007). However, assessments of how investments in the Swedish power sector are affected by climate policies still remain unclear. Sweden is an interesting case for many reasons: it has implemented more ambitious climate policies compared to most other countries; it has few, dominant firms active on the power market and; has together with Norway and Denmark established a Nordic power market.

The purpose is to evaluate how various implemented climate policies affects the dynamics of investment decisions in terms of timing and technology choice in the Swedish power sector. For instance, the Swedish power sector is affected from different types of climate policies; e.g., the EU ETS and the Swedish green certificate scheme which increases the uncertainties of investments in existing or new capacity. The main hypothesis tested is that climate policies will increase the level of uncertainty of investments in the power sector thus affecting realisation or timing of the investment.

The issue is approached by considering a prospective investor who is considering an investment in new or existing generation capacity. Figure 1 illustrates the conceptual framework of the investment model. The investor faces three options: (1) invest in existing capacity (brown-field investment); (2) build an entirely new facility (green-field investment) or; (3) choose to delay the investment and thus have the option invest in the future. The first two options also involve deciding optimal technology. In Sweden, investing in existing capacity generally means hydro- or nuclear power while green-field investments are restricted to wind power, gas-fired power (e.g., CCGT), or biomass or gas-powered combined heat and power (CHP). Due to the complexity in investment decisions, especially to incorporate policy changes and other qualitative variables, the investment choices are modelled as real options.

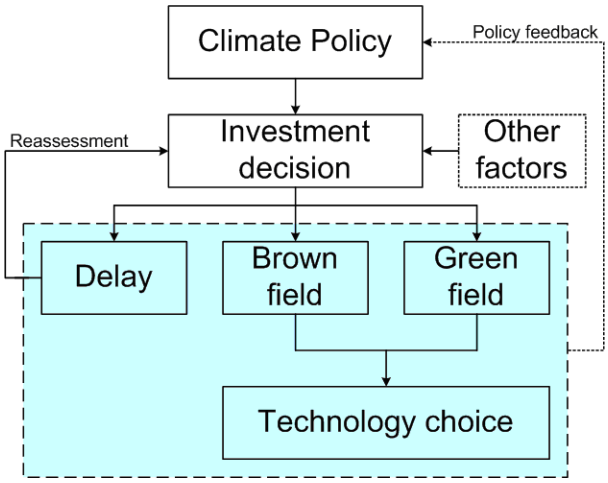

Figure 1: Conceptual framework of the investment decision model

The results will indicate the monetary value of lost or delayed investments in the Swedish power sector. Depending on the climate policy assessed the investments are affected differently, foremost on the carbon cost resulting from the policies. As a consequence, climate policies might indirectly put an upward pressure on the electricity price through the absence of investments in the power sector.

References

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