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Issues in Climate Change Economics: Uncertainty Renewable Energy Innovation and Fossil Fuel Scarcity

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English Abstract

Due to its enormous scale, the problem of regulating climate change contains many complications that cannot be addressed by simple models of an environmental externality. This Thesis dissertation seeks to address this complexity and shed light as to how these facets of the climate change problem reflect on optimal policy.

First and foremost, our knowledge of the natural processes behind climate change and its impacts on the global economy is rather incomplete, introducing a large amount of uncertainty that should be accounted for when picking the optimal climate policy. The first chapter of the dissertation addresses the issue of uncertainty by examining the concept of climate change skepticism - a belief that climate change may not be emission driven. The study presents optimal policies for various levels of climate change skepticism, showing that as long as the perceived consequences of climate change are severe, even a fairly skeptical policymaker should implement stringent environmental policies. The second chapter focuses on uncertainty in the economic domain by examining the investment into renewable energy innovation and how it is affected by uncertain fossil fuel prices. The main finding is that investing into making renewables cheaper can serve as a hedge against volatile fossil fuel prices, concluding that higher oil price volatility can serve as an incentive for private renewable investment (absent any active environmental concerns).

Another complication in modelling optimal climate change policy is the fact that significant amount of emissions that lead to climate change come from largely irreplaceable yet sometimes scarce fossil fuels. The remainder of the thesis is thus focused on the impact of fossil fuel scarcity on climate change policy. The third chapter examines the optimal renewable subsidy when both oil and coal are also present in the market. The main conclusion is that a renewable subsidy can be quite ineffective and should only be introduced after all the cheap oil is extracted and coal is the main energy source. The last chapter, studies the effect of a monopolist power of oil exporters on the developed world's climate policies. eneral The results indicate ttha the nature of oil demand in the importing country determines whether the monopolist exporter has a positive or a negative impact on the environment