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OVERLAPPING ENVIRONMENTAL POLICIES

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Summary

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Abstract
OVERLAPPING ENVIRONMENTAL POLICIES

For regulators concerned with achieving a low-carbon economy the merits of using a single or a mix of environmental policy instruments is important. On the one hand, if an efficient instrument to implement an environmental target exists, it makes little sense to introduce an additional one. In the words of Johnstone (2003) the use of a mix of policies in this case "will be at best redundant and at worst counterproductive." On the other, differentiated or multiple instruments can be justified where there is an inter-play of several policy objectives, such as those guided by social or technology-related criteria that may conflict with narrowly defined efficiency considerations (Tinbergen, 1952). Second-best regimes reflecting market power, transaction costs, uncertainty, etc. provide another general argument for differentiated regulation. In the recent past, overlapping, potentially less-efficient, regulations (e.g. renewable obligations, energy efficiency, etc) have been invoked in the face of new information and (political) impossibility to adjust existing policy.

In fact, numerous countries and regions that have embraced environmental targets seem to rely on several – rather than single – policy instruments, some of which cover the same emission sources. For example, in the European Union, CO2 emissions from the power sector are regulated (directly or indirectly) by the EU Emission Trading System, energy-efficiency standards, CO2 or energy taxes, energy-efficiency obligations, and by renewable energy power subsidies in the form of feed-in-tariffs or renewable energy portfolio obligations. The multiplicity of these policy instruments has been justified on several grounds, including market failures, regulatory failures and behavioural failures.

This research considers the problem of expanding electricity supply through only energy markets and questions whether these markets will be able to send clear signals for investments in new, flexible power plants. The study is premised on the fact that an expanded electricity supply is achieved through the remodelling of the existing energy system into one that is largely based on renewable energy sources. At the same time, given the intermittent generation of these sources, the research also assumes that, for the foreseeable future, flexible conventional generation capacities will still be required for safety and backup purposes.

We consider a representative energy producer and two alternative means of electricity generation: conventional (polluting) generation and non-conventional (carbon-free) generation. We test three possible policy scenarios: a carbon tax on conventional generation, a subsidy for non-conventional generation and a combination of the two. The optimal policy mix is found by maximising total welfare as measured by the sum of consumer and producer surpluses minus the environmental damage from the resulting level of conventional energy generation.

Reflecting merit order principles, electricity demand is satisfied using the production plants with the lowest marginal costs, i.e. non-conventional generation. When demand exceeds the non-conventional capacity, the entire non-conventional capacity is sold at (higher) conventional generation prices. Hence, we show that it is in the best interest of the electricity generator to bound the capacity of non-conventional generation to a level where the resulting electricity price equals the price that is set by the polluting and more expensive conventional plants most of the times.

References

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