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Learning by Doing with Constrained Growth Rates and Application to Energy Technology Policy

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Countries implement strategic deployment programs to subsidize investment in renewable technologies. They do not aim only for the direct carbon and energy benefits of the projects, but also expect that increased experience will reduce technology costs and allow for large scale application in the future.

To inform the decision whether the provision of public support is warranted, the paper suggests an approach to quantify the marginal social benefit of additional investment in new technologies. It points to the importance of growth constraints for new technologies. If these growth constraints are not considered, then evaluations of technology policy can provide misleading results that underestimate the value of the new technology support.

The growth rate at which a new technology is deployed is an important policy variable. Typically, social benefits increase with a higher growth rate of deployment. This suggests that the optimal   technology policy will deploy the technology at maximum growth rate.

This paper assumes a fixed maximum growth rate for a technology of 30%. Implementing public policy that is close to the optimal growth rate for a technology is important to maximize social benefits. Therefore it will be important to further investigate the optimal growth rates for different technologies, sectors and levels of experience gathered with a technology.

Some countries are reluctant to invest in strategic deployment programs, and discuss the option to free ride on the investment of other countries. The large marginal value of additional investment in

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strategic deployment programs that was identified in this paper has a promising implication. Even if only a fraction of the benefit is captured domestically, it is worthwhile pursing the program. Obviously this is subject to the assumption that the growth rate for the technology does not exceed the rate at which additional growth contributes to additional learning.

A numerical example was used to illustrate the benefit to society of implementing a technology policy to internalize the learning benefit, in addition to implementing an environmental policy to internalize the negative environmental externalities of CO_2 emissions. In particular, if emissions constraints are binding, early development of emissions free technologies can avoid high scarcity prices.

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