

# Industry Dynamics with Learning Externalities: Hydraulic Fracturing

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I model the interaction between dynamic decision making and social learning about new technologies in determining industry learning and development. Learning about new technologies is an important factor in economic growth, and, as I demonstrate, its presence as an externality can have significant implications for the development of nascent industries. I consider the empirical setting of hydraulic fracturing in North Dakota, where firms continue to learn about optimal use of the fracturing technology and detailed data published by regulators enables social learning. I model the role of this learning externality on agents' decisions to drill shale oil wells, a real option optimal stopping problem. The learning externality gives rise to a dynamic free-riding problem: the possibility of profitably learning from others' wells incentivizes rational agents to wait longer than if they were myopic. I estimate a structural model of this industry, and consider the effects of alternative policies on the industry's learning path through counterfactual simulations.