

Kelly P. Nelson | Research Statement

My research considers the impact of policy and market forces on firms' innovation decisions. I employ econometric techniques to answer questions on the allocation of research and development (R&D) resources within economies. My case studies draw on the energy and agricultural biotechnology industries.

My dissertation studies innovation using the European Patent Office PATSTAT data. I proxy research inputs by raw patent counts and outputs by quality-weighted patent counts, which adheres to the best practices in the innovation studies literature. The first chapter is on the effects of biofuels policies on plant and biofuel research. Demand-side policies to stimulate the use of biofuels present firms with opportunities to grow profits through productivity-enhancing research. Depending on the complementarity between biofuels research and plant biotechnology research, the choice of R&D resource allocation can result in either increased or reduced innovation in non-biofuels biotechnology. I use Bayesian model averaging as the primary statistical technique. The effect of the policies is a decrease in biotechnology research effort allocation, though little change in research output. This suggests that the substitution effect diminishes the complementarity effect.

The other chapters of the dissertation also apply the PATSTAT data to firm and research institution decisions. My second chapter is on the impact of nuclear power plant accidents on research into nuclear energy technology. Using a time series analysis of historical data on nuclear accidents, I investigate whether accidents stimulate or deter research effort toward nuclear power technologies, including those meant to improve nuclear plant safety. The third chapter evaluates the impact of state-level renewable portfolio standards in the United States on the amount of research done in renewable energy technologies.

I am developing additional projects. I am analyzing the welfare impacts of the Tennessee Valley Authority's (TVA) power program. I consider if TVA pricing policy approximates the surplus impact of a two-part tariff pricing structure. A two-part tariff structure transfers consumer surplus to the producer, which would have undermined the TVA's mandate to promote consumer well-being. A small grant supported the initial data collection and I am developing funding applications to continue the archival research. I am also developing a research project on the impact of market concentration within the agricultural biotechnology sector. Using a two-stage least squares approach that models a policy shock that increased mergers and acquisitions as an instrument for market concentration, I evaluate the impact of mergers on the variety of R&D activity

within the sector. I have also developed funding proposals for this project.

Innovation studies are important to informing science policy. R&D is critical to the development of alternative energy capacity and improving the use of current fossil and renewable energy sources. It is important to understand how policies and market forces impact innovation. My research agenda will produce works with academic merit that can also inform policy decisions through analysis of the impact of policy and market phenomena on R&D in the energy, biotechnology, and related sectors.