UNIVERSITÄT BONN

Chair of Production Economics

Proposal master thesis

Topic: Induced Innovation in Agriculture

Do exogenous shocks to input cost result in more agricultural innovation? Economic theory predicts that a shock that increases the relative price of an input leads to an increase innovation in the provision of that input. Patents can be used as a proxy that measures such innovation. Innovation generally requires long and expensive research and development efforts, firms or research institutions, that invest in research and development secure their investment by applying for patents. The patent allows the patent holder to control the use of the innovation and therefore confers a quasi-monopoly. The rents from the quasi-monopoly are used to generate returns for the research and development investment.

Innovation in agriculture is distinct due to many reasons, namely the atomistic nature of farm production, spatial specificity of agriculture, and the role biotic and abiotic shocks in agricultural production (Pardey et al., 2010). Biotic shocks that affect agriculture are pest, namely weeds, fungi or insects. The pesticides are used to control these pests, are constantly innovated. Other innovations deal with abiotic shocks, for example irrigation for drought. In addition, innovations may improve the productivity of machines, through saving the input or increasing the output of agricultural production. Some shocks may increase the cost of a given input. For example, more stringent pesticide laws may require a farmer to use a more expensive alternative. Research shows that such cost increases may lead to increases in innovation and input reduction, i.e., that innovation is induced (Hemous et al. 2025).

The thesis will address some or all of the following research questions: How can innovation in agriculture be measured through patents? What are exogenous shocks that could change the provision of innovation? Does the induced innovation hypothesis hold in agriculture?

Proposed methods:

The research questions will be addressed through (1) a literature review on the measurement of agricultural innovation through patent statistics, (2) a classification of patents related to agriculture, and (3) an empirical analysis of the relationship between exogenous price shocks and patents.

Literature:

Hémous, D., Olsen, M., Zanella, C., Dechezleprêtre, A., 2025. Induced Automation Innovation: Evidence from Firm-Level Patent Data. Journal of Political Economy 133, 1975–2028.

Pardey, P.G., Alston, J.M., Ruttan, V.W., 2010. The Economics of Innovation and Technical Change in Agriculture, in: Handbook of the Economics of Innovation. Elsevier, pp. 939–984.

Contact:

The master thesis will be supervised by the chair group of “Production Economics”. For further information please contact Jan-Philip Uhlemann (jpuhlemann@uni-bonn.de) and Prof. Dr. Niklas Möhring (mohring@uni-bonn.de).