Research Statement

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1 Overview

My research examines decisions about acquiring property rights in the presence of substantial information uncertainty. By using and expanding methods developed to study industrial organization, I examine the both the mechanisms behind the decisions to acquire and farm land in the last half of the nineteenth century in the United States, and the causal effects of those decisions. Agricultural production in the nineteenth century is an ideal setting in which to analyze models related to information uncertainty and perfect competition because it is a setting with many small family farms which produced largely homogeneous agricultural goods in unknown terrain and climates.

The Homestead Act of 1862 has long been considered one of the most important policies in increasing the pace of settlement of the American West. It granted individuals small plots of land to farm at a very low cost. To analyze farmer choices at the individual level, I use grants from the National Science Foundation, the Economic History Association, and other sources to build a database from multiple sources that combines information the characteristics of individual farmers with information about the specific plots of land they farm and information on their sales and resales of land. Using this database, I directly examine how individuals chose between different methods of acquiring land, including homesteading, and how these choices influenced their decisions about planting crops and investing investing in

capital equipment. After the initial wave of settlement, some farmers sought to expand their farmers, and I examine how the decision to consolidate was influenced by the operation of land markets.

The value of information and the impact of uncertainty is a major focus of economic research. Because of the nature of western settlement implies moving to a relatively uninhabited place in a time when information moved slowly, a major element of the frontiersman's decision-making process was uncertainty. I am particularly interested in the way in which the Homestead Act not only created value for farmers with cheap land, but also created value by providing cheap information. My research focuses on this underexplored aspect of the Homestead Act: the value it created by decreasing settlers' uncertainty about land quality and farm productivity via cheap information.

My job market paper investigates farmers learning about their agricultural ability related to the demand for land historically in the United States by estimating a dynamic discrete choice model which includes biased Bayesian beliefs. It establishes that without the Homestead Act of 1862, the rate of western expansion by US farmers would have decreased by 38%. In addition to my job market paper, my dissertation includes work on land resale and heterogeneity in agricultural production.

My research informs the literature on resource allocation and misallocation. Additionally, my research in historical land law and agricultural production relates to the development literature on land allocation and agricultural development in emerging economies. It also relates to agricultural economics literature on farmers adopting different farming technologies.

2   Job Market Paper

Dynamic discrete choice models are commonly used to model agents make economic decisions such as choosing between different restaurants. Such models often assume that the agent knows the true value of each option. However, in real life, individuals make decisions based on their beliefs about the outcomes. When those beliefs are unknown to the researcher, this can pose an estimation problem. My job market paper, "The Homestead Act and the Process of Learning about Farming Ability in the Late Nineteenth Century," addresses this modeling difficulty in the setting of farmers learning about their own farming ability in order to refine their decisions over time.[1] Specifically, it expands dynamic discrete choice models to include biased Bayesian beliefs.

I model how learn more about their ability through the process of farming, update their belief based on that new information, and use that updated belief to make a decision about whether to sell the farm, abandon the farm, or continue to farm. Using the model, I create counterfactuals which demonstrate how changing the information set impacts individuals' decisions. These counterfactuals have important historical implications and also demonstrate the impact of beliefs on decision-making. The counterfactuals estimated using the model demonstrate that about 70% of homesteaders would have chosen not to farm if they could only purchase the land instead of homestead it. This result has significant implications for western expansion in the United States: without the Homestead Act, we show that the rate of western expansion would have been slowed by about 38% and the agricultural production from new farms in Kansas would have decreased by about $270,000,000. Further, it addresses a broader development and agricultural economics literature about individuals migrating to a new location and learning about job opportunities in a setting in which they have high uncertainty.

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[1] Joint work with Tiemen Woutersen

This paper also makes a significant methodological contribution to the widely used dynamic discrete choice model by expanding such models to allow for biased Bayesian beliefs. It allows agents to make decisions based on their beliefs about the payoffs, not the true payoffs, and for those beliefs to be wrong on average (i.e., for agents to be optimistic or pessimistic). Allowing beliefs to be biased is motivated by the application to farming, and this demonstrates how capturing the details of the historical setting can drive methodological advancements. The model created in this paper can be applied to various other settings, including insurance markets, consumer behavior, restaurants learning about their local demand for their food, plant replacement, teachers learning about their teaching ability before getting tenure, and investments that are made over a long time period, such as research and development expenses.

3   Historical Working Papers

I expand on the results in my job market paper in two other working papers. These papers provide heterogeneity in outcomes by illustrating different types of farming ability and by exploring the land resale market. One type of farming ability is the production of agricultural consumable goods like crops. Another type of farming ability is to create durable farm improvements like fences. I use an instrumental variable approach to exploit the unique administrative requirements of homesteading. The results show that purchasers and homesteaders use different farming strategies: homesteaders initially invested in crops and livestock, while purchasers initially invested in durable improvements like fences. While homesteaders initially produced more agricultural output, after about eighteen months, purchasers' output surpassed the output of homesteaders. I implement a model of heterogeneous production functions to show that purchasers and homesteaders make significantly different types of investment decisions.

Additionally, my research provides context into the conditions under which farmers made land resale decisions. I find that purchasers resold their land much more quickly than homesteaders, and I provide evidence that individuals purchased land rather than homesteaded it in order to resell their land more quickly. Together, these papers build on each other to develop a more complete understanding of how land acquisition methods, land resale, and farming ability interact.

4 Methodological Working Papers

Information uncertainty plays a crucial role in economic decision-making, but it complicates solving dynamic optimization problems. "Forward Induction and Dynamic Optimization under Uncertainty" is a working paper related to my job market paper which lays out econometric techniques related to solving dynamic optimization problems when agents do not have full information.[2] Specifically, we propose a solution technique using forward induction which allows for both updating of prior beliefs and for future decisions to depend on future information. Then we demonstrate situations in which this technique is less computationally intensive than backward induction. Easing the computational requirements of solving dynamic optimization problems is important because it allows for more complex models to be solved on the margin.

5 Works in Progress

Economists and policy-makers are often concerned with the impact of horizontal mergers. In general, these models only allow for a few players, such as in models of mergers between airlines. The historical context for my research is a setting with many small family farms. Over

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[2]Joint work with Tiemen Woutersen.

time, these farms consolidated into a few larger farms. Modeling this process necessitates a horizontal merger model with many players in which the players are spatially correlated. Including more players in a horizontal merger model increases the difficulty of estimation because it increases the endogeneity problems: each player makes decisions based on the other players decisions. I create a structural model to estimate which farms merged, at what rate, and if they reach an equilibrium farm size, which can be solved using Benkard's oblivious equilibrium method. Preliminary results indicate that the initial decision to purchase has a significant positive causal effect on the rate of farm consolidation. This paper is one of the first to use individual-level data to examine farm consolidation in late nineteenth century America. It also makes a methodological contribution by adding to the growing literature in industrial organization that expands horizontal merger models to study many players in competitive settings.