

Title: Three Essays on the Agri-Food Systems

Abstract: This dissertation consists of three essays on agri-food systems with regards to consumer behavior, agricultural land use outcomes and market equilibrium prices utilizing scanner data and micro-level geo-referenced spatial data. Across three essays, I examine how consumers and agricultural producers perceive and respond to changes in urbanization and environmental quality over time and space in the context of evolving food demand, climate change and changing food retail environments. This dissertation seeks to inform policymakers and food supply chain actors and to provide insights that help improve the sustainability of the agri-food system.

In the first chapter, I model household averting expenditure in response to public water supply contamination by Harmful Algal Blooms (HABs) in Lake Erie, which is primarily induced by excessive nutrient runoff from agricultural land into shallow water bodies. I employ a post-matched Difference-in-Difference method following the Toledo Water Crisis using household scanner data. I find that household averting behavior in response to a 3-day water advisory persists beyond the transitory event period with a declining magnitude over time. This study provides the first revealed preference estimates of willingness to pay to avoid HABs in public drinking water supplies. A version of this work is published in *Environmental and Resource Economics*.

The second chapter examines the producer end of the agri-food system to model farmers' choices of high-value specialty crops in response to rising local food demand in a rapidly urbanizing area of the city Columbus, Ohio. I develop a novel approach to using the Cropland Data Layer by overlapping the satellite data with spatial parcel data to construct a continuous map of agricultural production change at a fine level over 10 years. This study shows that urbanization has a significant impact on farmers' crop choices leading to increasing allocations of cropland into specialty crops.

The third chapter applies a quasi-experimental framework to investigate the impacts of extreme weather events on retail level equilibrium prices as transmitted through the food supply chain. Using store scanner data and USDA Agricultural Marketing Service data, I study California fresh cherry market to measure the impacts of temporary weather shocks in local production region and how organic cherry prices respond differently from conventional prices. I find that local weather shocks lead to elevated cherry prices by 25% but are associated with diminishing organic premiums by 27% at the retailer level. These findings suggest that a natural hedge to supply side disruptions may not fully apply in the case of organic produce production. This study shows heterogeneous impacts on quality differentiated products in the modern produce market, suggesting that organic growers are at a heightened risk from external shocks

to the local food system. An extension of this work is published in the USDA's Fruit and Tree Nut Outlook.