

## Dissertation Summary

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“In the Shadow of the Mushroom Cloud: Nuclear Testing, Radioactive Fallout and Damage to U.S. Agriculture.”

In the first chapter of my dissertation, I measure the direct effects of radioactive fallout from Nevada Test Site activities on agricultural production in the Great Plains and Midwest. This paper uses a novel dataset measuring county level radioactive fallout deposition for each test conducted from 1951 to 1958 at the NTS. By aggregating these data to the annual level, I can use within county variation in fallout exposure across years to study the agricultural effects of atmospheric nuclear testing at the NTS. I find fallout induced yield reductions, caused land abandonment, and decreased livestock inventories. This paper estimates the magnitude of the effects and suggests that pollution resulting from atomic testing led to billions of dollars of lost output (in 2016 \$) from 1951 to 1970. Wheat losses totaled to approximately 1/3 of the sample's 1945-50 average total yearly output. Corn losses totaled to approximately 2.5 times the sample's 1945-50 average total yearly output.

“Measuring Policy's Role in Mediating Responses to Agricultural Productivity Shocks”

The second chapter of my dissertation uses the unanticipated nature of radioactive fallout to study how farmers respond to productivity shocks. During the period of nuclear testing, the public was generally unaware that they were being exposed to radioactive material created hundreds to thousands of miles away. As such, radioactive fallout depositing on farmers' fields would have been uncorrelated with any adaptive actions or investments agricultural producers made. Using a two stage least squares framework, I measure how farmers adjust their planting decisions in response to adverse productivity shocks in the previous year.

I find that wheat specific “use-it or lose-it” government policies that regulated future production based on past production histories caused farmers to increase wheat cultivation in the years following fallout induced productivity shocks. This behavior was an attempt by farmers to offset the negative effects of a (potentially) tightening policy constraint. From 1952 to 1959, wheat producers planted 2.6 million additional acres of wheat (approximately 17 million acres of wheat were planted on average from 1945-50). Corn producers, who were not subject to a policy constraint, treated fallout induced productivity shocks as transitory. Contemporary agricultural policies, such as crop insurance, are implemented in part based off agricultural producers' past production histories. The climate change and agricultural literature has been relatively agnostic regarding the role policy plays in shaping adaptive responses to temperature shocks. My results suggest that policy incentives can fundamentally shape producer responses to productivity shocks and can alter the estimated social cost of disruptive events.

“Some Unintended Fallout from Defense Policy: Measuring the Effect of Atmospheric Nuclear Testing on American Mortality Patterns.”

My third dissertation chapter studies how nuclear testing at the NTS affected U.S. public health and the geographic and temporal extent of the harm. This chapter combines data from U.S. Vital Statistics with measures of radioactive Iodine-131 exposure. I-131 is an isotope that entered the food supply and that was ingested in large quantities. I find that fallout from nuclear testing led to persistent and substantial increases in overall mortality for large portions of the country. The largest mortality effects appear in areas of the Great Plains and Midwest, which are regions not

studied in the medical and scientific literature. My estimates suggest that nuclear testing at the NTS contributed to approximately as many deaths as the bombings of Hiroshima and Nagasaki. The cumulative death toll attributable to nuclear testing is seven to fourteen times larger than previous estimates by the National Cancer Institute.

### **Chapters in Progress**

“Measuring the Long Run Consequences of In-Utero and Childhood Exposure to Iodine-131.”

The fourth chapter of my dissertation uses state level variation across birth year cohorts in the 2000 Census and the county level variation across birth year cohorts in the NLSY79 to test if in-utero exposure to I-131 adversely affected adult outcomes related to health, income, or education. The data application for the NLSY79 geocodes is in progress.

“The Evolution of Cancer Mortality from 1946 to 1988”

The fifth chapter in my dissertation uses annual county level cause of death records from U.S. Vital Statistics and U.S. death certificates to study the geographic and temporal effects of NTS fallout on cancer mortality rates. A preliminary county year panel has been constructed for the years of 1946 to 1958.