TRANSPORTATION NETWORKS AND RURAL ECONOMIC DEVELOPMENT

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Background & Motivation

- Interstate Highway System (IHS) is the nation's largest public works project to date
  - Proposed as a National Defense project
  - Started in 1956, took 35 years to complete and cost $329 billion (1996 dollars)
  - Majority of the IHS runs through rural areas
- Results in a network of over 41,000 miles of highway connecting rural and urban areas.
  - Changes transportation costs and how goods are transported
  - Alters firm and individual location decisions
- Understand how transportation infrastructure affected U.S. development in rural areas
- Applicable to public infrastructure in developing countries
How might highways influence the economy

- Transportation Costs
  - Time Costs

- Market Access
  - Broaden geographic range and promote inter-regional trade

- Safety
  - Reduce accidents

- Provide jobs
  - Building and maintenance

- Leisure

- National Defense
Highway History

- Prior to WWI, most travel is local and regional

- War Dept. was commissioned to create a plan for the first national highway network
  - 78,000 miles of strategically important routes

- Never built but influenced future highway networks
Highway History – Pershing Map
Highway History

- As part of the New Deal, Roosevelt organizes National Interregional Highway Committee
  - Goals was to “serve the economic and social needs of the nation”
  - Create a new highway plan
  - Influenced future highway locations
Highway History

• Due to WW II, highway funding lags behind demand
  • Vehicle registrations increase by 60% between 1945-1950
  • Elevated road congestion
    • Food spoilage
    • Increased probability of an accident
• Result is the Federal-Aid Highway Act of 1956
Interstate Highway System
Highways and Cities

- Suburbanization (Baum-Snow, 2007)
  - Urban transportation networks after WWII were critical for promoting suburbanization.
  - The introduction of highways lead to central city population falling by 18%
Highways and Cities

- Commuting Behavior (Baum-Snow, 2010)
  - Employment decentralized apace with population decentralization
  - Commuting patterns changed so that instead of commuting to the central city commuting now happens within the suburbs

- Political Sorting (Nail, 2012)
  - Highways lead to geographic polarization
  - Suburban counties with more interstates end up with more Republicans
What happened in rural areas?

- Changes in Earnings (Chandra and Thompson, 2000)
  - Increased earnings in retail sales, services, and the financial sector
  - Tend to draw economic activity away from adjacent counties
    - Is there a net increase or is it all spatial redistribution?

- Increases in trade related activities (Michaels, 2008)
  - Increase in trucking
  - Also find that manufacturing concentrates in areas with higher levels of education before highway construction
So what exactly do I do?

- **Agriculture**
  - Were highways beneficial for farming?
    - Changes to property values?
  - Examine changes to extensive and intensive margins
    - Changes to amount of farmland?
    - Changes to agricultural production?

- **Migration and Spatial Distribution of Skilled Workers**
  - Did migration behavior change in rural areas in response to highways?
    - Who moves and where do they go?
  - Is the migration behavior different by education level?
    - Positive or negative selection
  - What does that mean for the distribution of income?
A little problem

- Comparing highway and non-highway areas may be problematic
  - Historical accounts indicate that the placement and timing of highway construction was an intensely political process
  - Industry lobbyists were active in the planning process
  - Omitted Variable Bias

- How might politics and lobbyists bias my results?
  - Picking winners or propping up losers
    - If picking winners, a standard comparison of highway and non-highway counties may overstate the effects of interstate highway
    - If picking losers, it may understate the effects
How do I get around the problem

• Instrumental variables
  • Need a way to predict highway locations and construction timing

• Any limitations on instrumental variables?
  • Two key assumptions I need to satisfy (Exogeneity)
    • Instrument isn’t an omitted variable
    • Instrument is as good as randomly assigned
How do I get around the problem

• Predicting Highway location
  • Pershing Map
    • Military purpose
      • What happened to Florida?
How do I get around the problem – Pershing Map
How do I get around the problem

- Predicting Highway location
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- Predicting Highway Timing
  - Route Priority and Graph Theory
    - Convert highway map into a mathematical graph of nodes and edges
    - Find which routes are most important for connecting network and build those first
What kind of data do I use?

- U.S. Agricultural Census 1950 - 1974
  - County level aggregates

- U.S. Decennial Census 1950 - 2000
  - County level aggregates

- Map Data
  - US Department of Transportation
  - Historical map from Bureau of Public Roads
What do I find?

• Preliminary Agriculture Results
  • Were highways beneficial for farming?
    • Changes to property values?
      • Property values increase between 5 – 8%
  
• Examine changes to extensive and intensive margins
  • Changes to amount of farmland?
    • Less land in farms in highway counties
    • More big farms and part-time farming, i.e. hollowing out of the middle
  • Changes to agricultural production?
    • Specialization
      • Farms produce less variety
    • Specialize in perishable stuff?
    • Farm more in areas with the best farmland?
What do I find?

- Migration and Spatial Distribution of Skilled Workers
  - Did migration behavior change in rural areas in response to highways?
    - Yes, more out migration in rural counties without highways
  - Is the migration behavior different by education level?
    - Preliminary results suggest that young, educated people relocate to highway counties
      - Positive or negative selection
  - What does that mean for the distribution of income?
    - Higher median incomes in highway counties
  - What about long-run consequences of “brain drain”?