Introduction

- Most countries regulate the growth of cities [5, 2, 1, 4].
- Many land-use regulations aim to protect farmland from urban land expansion [6, 7, 9].
- Little is known about how these regulations affect economic development.
  - Land-use regulations are endogenous.
  - Therefore, it is challenging to establish a causal impact of land-use regulation on economic development or to quantify its distortionary effects.
- This Paper
  - Exploits China’s Farmland Red Line Policy (1999) as a natural experiment in China to identify the causal impact of land-use regulation on local GDP and population growth.
  - Since 1999, the policy forbids the conversion of farmland into urban land unless an equal amount of unused land in the nearby rural area is converted into farmland.
  - The policy creates an additional cost of urban land development that depends on exogenous local geographical features.
  - In locations less affected by the policy, there is more urban land, higher GDP, and larger population after the policy was adopted.
- This Paper estimates the aggregate effects of land-use regulation on the welfare of workers and rural-to-urban migration using a quantitative spatial equilibrium model with endogenous land-use decisions.
- The policy costs 6% of workers’ aggregate welfare.
- A cap-and-trade platform that achieves the same policy goal can save 60% of workers’ welfare costs.

Policy Background

- Within a city jurisdiction, land is divided into urban, farm, and unused land.
  - The administrative boundaries do not change in almost all city jurisdictions.
- Before 1999, there was no restriction on converting farmland into urban land.
- Since 1999, conversion of farmland into urban land is forbidden unless an equal amount of unused land (within the city jurisdiction) is converted into farmland.
- The policy creates an additional cost of urban land development that varies across city jurisdictions.

Identification Strategy

- The additional cost is endogenously affected by local economic conditions, such as labor costs and price levels.
- Isolate exogenous variation in the additional cost of urban land development.
  - The ruggedness of unused land [8]
  - Unused land concentrates near the administrative boundary.
  - Land conversion barrier as the cross-sectional variation: the ruggedness of land near the administrative boundary of a city jurisdiction.
- Regression Specification: Difference-in-Difference
  \[ \ln y_{it} = \beta_0 + \beta_1 \text{Post99}_i + \beta_2 \text{InC}_i + \gamma_1 \text{Post99}_i \times \text{InC}_i + \sum_{\text{Firm} j} X_{ij} \beta_j + \varepsilon_{it} \]
  - \( \beta_0 \): outcome variable of interest, including urban land supply, GDP, and population.
  - \( \beta_1 \): land conversion barrier.
  - \( \beta_2 \): city jurisdiction fixed effects.
  - \( \gamma_1 \): year fixed effects.
  - \( X \): region dummies and economic characteristics in 1990.
- Economic characteristics include (log) population, employment rate, % employment from non-agriculture, % employment in the construction sector, % in-migrants, literacy rate and % college graduates.

Regression Results

- City jurisdictions with a lower land conversion barrier have more urban land, higher GDP, and larger population after policy implementation.
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Quantitative Spatial Equilibrium Model

- Summary of the Model
  - Multiple locations, each with two sectors: an urban sector and a rural sector.
  - Two types of agents: workers and landlords.
    - Workers solve a location and sector choice model.
      - Immobile landlords supply farmland and urban land subject to the constraint of the policy.
    - The Farmland Red Line Policy is modeled as a minimum farmland quantity constraint to each location. If the constraint is binding:
      - Cross-sector land misallocation: an excess supply of farmland and an under-supply of urban land.
      - Cross-location variation: more severe under-supply of urban land in locations with more inelastic supply of developed land.
  - General equilibrium forces amplify the distortionary effects of the policy:
    - The allocation of labor across sectors and locations responds to land mis-allocation.
    - Spillover of inefficiencies via trade across locations
  - Quantify the model to estimate the aggregate costs of the policy.

Counterfactual Outcomes

- Without the Farmland Red Line Policy, workers’ welfare would have been 6% higher.
- Introduce a cap-and-trade platform on which one local government can pay another local government to develop new farmland within the administrative area of the latter.
- 60% of the welfare cost could be saved if a cap-and-trade platform is used.

Conclusions

- The paper uses China’s Farmland Red Line Policy to quantify the distortionary effects of land-use regulations on the local and the national economy.
  - At the local level, city jurisdictions with a lower land conversion barrier due to the policy have significantly more urban land supply, higher GDP, and larger population.
  - At the aggregate level, the policy reduces workers’ welfare by 6%.
  - A cap-and-trade platform that achieves the same policy goal can save 60% of workers’ welfare costs from the Farmland Red Line Policy.

References