Can Technology Transfers Save Innovation? Evidence from China

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Motivations

- Effectiveness of foreign aid in promoting economic growth is far from clear.
  - Africa V.S. Western Europe (e.g., the Marshall Plan)
- Most of the aid puts more emphasis on financing investments, structural adjustments, and improving the quality of governance.
- Insufficient discussion of the consequences of foreign aid in the form of technology transfers persists.

Research Questions

This article examines the impact of technology transfers on innovation inputs based on China's adoption of Soviet-aided industrial projects:
- Has China's adoption of the 156 Projects affected local industrial firms' long-term innovation inputs after nearly half a century?
- And if so, what is the likely underlying mechanism for its effect?

Soviet-aided 156 Projects

- On February 14, 1950, China and the Soviet Union signed the Sino-Soviet Treaty of Friendship, Alliance and Mutual Assistance, followed by the large-scale economic and military cooperation between the two nations.
- Between 1950 and 1957, China and the Soviet Union reached various agreements in support of large-scale, capital-intensive industrial development (i.e., 156 Projects), 150 projects were actually constructed.
- These 156 Projects were unevenly distributed across cities (Figure 1) for reasons such as (1) proximity to resources, (2) ability to change economically underdeveloped areas, and (3) military considerations.

Model Specification

To examine the impact of adopting the 156 Projects on firms' innovation inputs, I use a two-stage least squares model:

\[ Y_{ic} = \beta_0 + \beta_1 Y_{ic-1} + \beta_2 Z_{ic} + \beta_3 K_{ic} + \epsilon_{ic} \]  \hspace{1cm} (1)

\[ T_{ic} = \beta_0 + \beta_1 T_{ic-1} + \beta_2 Z_{ic} + \beta_3 K_{ic} + \eta_{ic} \]  \hspace{1cm} (2)

\( Y_{ic} \) is a dummy variable indicating positive R&D for each firm \( i \) in city \( c \).
\( T_{ic} \) is a dummy variable indicating adoption of a project in city \( c \).
\( Z_{ic} \) is the instrument, defined as the geographical distance between the centroid of each mainland Chinese city \( c \) and the centroid of Jinmen.
\( \beta_1 \) and \( \beta_2 \) are parameters of interest.

Table 1. Impact of the 156 Projects on Firms’ Innovation Inputs.

<table>
<thead>
<tr>
<th>Variables</th>
<th>OLS</th>
<th>IV</th>
<th>First Stage</th>
<th>Reduced</th>
</tr>
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<td>( \beta_1 )</td>
<td>-0.0636***</td>
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China’s Adoption of the 156 Projects

Figure 1. The adoption of the 156 Projects across Chinese cities. Note: This map may not fully capture the entire Chinese administration.

Results

- China’s adoption of the Soviet-aided 156 Projects reduced long-run innovation inputs.
- IV estimate shows that the average probability of investing in R&D decreases by 0.36 in adopting localities (Table 1).
- The decline in innovation inputs is further supported by firms’ lower probability of patenting in adopting localities.
- Low adoption of performance-based reward systems, rather than a lack of capital and skilled workers, is likely an underlying mechanism for the decline.

Table 2. Impact of the 156 Projects on the use of performance-based reward systems.

<table>
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Discussions

- Various reasons may explain the decline in innovation inputs in adopting localities. One could be that Soviet-aided industrialization helped to sustain the centrally planned economy that emphasized collectivism, which hindered the adoption of performance-based reward systems.
- Using the same approach, we show that adopting the 156 Projects led to a 32-unit decrease in the intensity of pay for performance on average (Table 2).
- We also rule out alternative channels such as over-specialization, use of capital, and use of skilled workers.

References


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