

專題討論：經濟史與應用個體

## Growing without Divergence: The Impact of Innovation on Low-and High-skilled Migration in China

講者：Su-Qin Ge

導讀：D12323002 蘇家歡

December 11, 2025

### 1. What is the question of the paper?

究竟中國大陸顯著的技術成長是否將導致人口空間分布的改變？同時間技術進步是否會有利於高技術勞工？具體而言，技術進步是否會使高技術勞工搬遷至大城市追逐更高的薪水，同時間都市地區的地租是否因需求上升而上升，最後使得低技術勞工搬離原本的住處，甚至搬離該城市？

### 2. Why should we care about it?

以議題而言，學術界已不斷的討論經濟成長跟地理分布改變的關係已經超過十年，在這之中，不少學者關心是否經濟成長因技術的差異造成地理分布的改變且惡化分配不均的現象。中國大陸自從改革開放以降，經歷了巨幅的經濟成長，其中沿海各省與內陸地區相較，因具有更好與其他經濟體的連結，獲得更好的內部競爭優勢也加速了地方的創新能力。意即自西元 1978 年的改革開放以來，中國大陸享受了技術差異的技術進步，也使其適合作為研究。

### 3. What is the author's answer?

For the last decade, the innovation (patent citation growth) in China did not have a strong skill-biased pattern. On the one hand, cities have both increasing pattern citation and increasing in wage for both high-skilled and low-skilled workers. On the other hand, patent citation growth significantly increase migration for both skill group. However, the high-skill/low-skill workers ratio still increase since the migration flow is stronger for the high-skill workers than the low-skill ones. Moreover, authors find that while the citation increase is associated with rising housing prices,

the amenities does not significantly increase as well.

#### 4. How did the author get there?

Authors first construct a spatial equilibrium model to find the equilibrium high-skill wage, low-skill wage, housing rent. After modelling, they estimate the model by using all granted patent from China National Intellectual Property during 2005 to 2015 and population census data. In addition, authors conduct several counterfactual analysis to show the casual effect for the technology growth.

#### 5. Model Summary

Authors follow Dimond (2016) to consider the model which have  $K$  cites in China. Each city has two sectors: agriculture and non-agriculture. Cites differ in wages, skill mix, housing rent, amenities and technology. Workers may be low-skill worker or high-skill workers. Workers can move across cites and sectors within China.

For the agricultural sector (denoted in subscript  $ag$ ) in city  $k$  in year  $t$ , each firm face the following problem:

$$\max_{L_{ag,kt}, H_{ag,kt}} z_{ag,kt} (L_{ag,kt} + H_{ag,kt})^\eta - W_{ag,kt}^L L_{ag,kt} - W_{ag,kt}^H H_{ag,kt},$$

where  $z_{ag,kt}$  is the labor productivity,  $L_{ag,kt}$  and  $H_{ag,kt}$  are the number of low skilled and high-skilled workers in the agricultural sector,  $W_{ag,kt}^e$  is the wage level for the skill  $e = L, H$ .

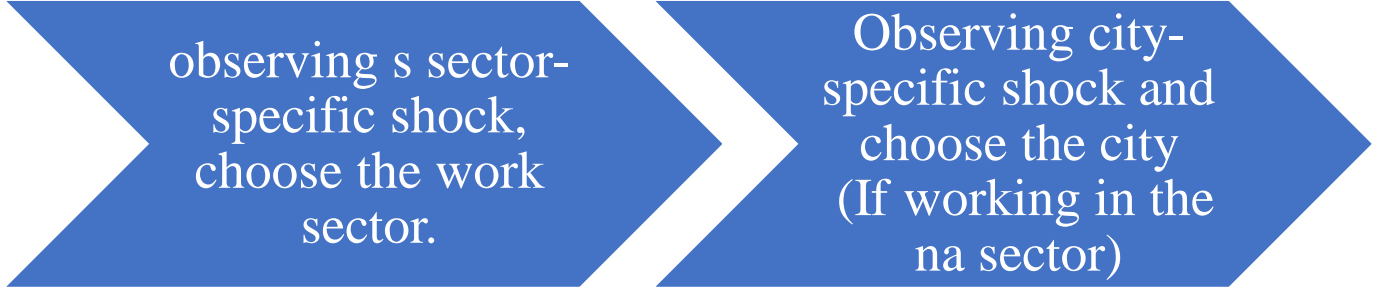
For the non-agricultural sector (denoted in subscript  $na$ ) in city  $k$  in year  $t$ , each firm face the following problem:

$$\max_{L_{na,kt}, H_{na,kt}} z_{na,kt} (N_{na,kt})^\alpha (\theta_{na,kt}^K K_{kt})^{1-\alpha} - W_{na,kt}^L L_{na,kt} - W_{na,kt}^H H_{na,kt} - \kappa_{kt} K_{kt}$$

- $N_{na,kt} = (\theta_{kt}^L (L_{na,kt} + \omega C_{kt})^\rho + \theta_{kt}^H H_{na,kt}^\rho)^{\frac{1}{\rho}}$  is the efficient labor level.
- $C_{kt}$  is the machine.  $C_{kt} = f_C(A_{kt})$ , where  $A_{kt}$  is the labor demand shock.
- $L_{na,kt}$  and  $H_{na,kt}$  are the number of low skilled and high-skilled workers in the non-agricultural sector.
- $\theta_{kt}^L = f_L(A_{kt}, H_{na,kt}, L_{na,kt})$  is the labor augmenting technology.

- $\theta_{kt}^H = f_H(A_{kt}, H_{na,kt}, L_{na,kt})$  is the capital augmenting technology.
- $W_{na,kt}^e$  is the wage level for the skill  $e = L, H$ .  $\kappa_{kt}$  is the capital rent.

For each individual  $i$  with the skill  $e = L, H$ , choose the work and the city sequentially as follows.



choosing to work in the non-agriculture sector (denoted in subscript  $na$ ) in city  $k$ , and year  $t$ , her utility function is

$$V_{ikt} = \beta_1^e \log W_{na,kt}^e + \beta_2^e \log R_{kt} + \beta_3^e a_{kt} + \text{MigrationCost}_{ikt} + v_{kt}^e + \epsilon_{ikt}$$

- $\beta_j^e, j = 1, 2, 3$ , is the coefficient for variable  $j$ .
- $R_{kt}$  is the housing expenditure.
- $a_{kt}$  and  $v_{kt}^e$  are the endogenous and exogenous amenities respectively.
- $\text{MigrationCost}_{ikt} = \sum_r \beta_{4rt}^e \text{WithinHometown}_{ikt} 1_{k \in r} + \sum_\tau \beta_{5rt}^e \text{WithinProvince}_{ikt} 1_{k \in \tau} + \beta_{6t}^e \text{hukou}_{ikt} + \beta_{7t}^e \text{hukou}_{ikt}^2$ .
- hukou 是户口。hukou is the city individual registered.

For the home supply, firms with perfective competitive will follow

$$\log R_{kt} = \log l_t + \log CC_{kt} + [\gamma_1^{hd} + \gamma_2^{hd} geo_k] \log(HD_{kt}).$$

- $CC_{kt}$  is the local construction costs.
- $HD_{kt} = L_{na,kt} W_{na,kt}^L + H_{na,kt} W_{na,kt}^H$

The endogenous amenity supply is constructed by using the PCA approach

$$a_{kt} = \gamma_1^a A_{kt} + \gamma_2^a (\log H_{na,kt} - \log L_{na,kt}) + \epsilon_{kt}^a.$$