

Land Rights Security and the Persistent Misallocation of Talent

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Why persistent productivity gap between rich and poor countries

- **Misallocation:** inputs (capital, labor) (Hsieh and Klenow, 2009) and human talent (Hsieh et al., 2019)
- **Mobility barriers:** informational, cultural, institutional, and economic constraints prevent workers from reaching most productive roles (Munshi and Rosenzweig, 2016; Ngai et al., 2019; Adamopoulos et al., 2022)
- **Persistent:** slow speed of workers switching sectors (hence the pace of structural transformation); time effect vs. cohort effects (Porzio et al., 2022)

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 - **Persistent:** slow speed of workers switching sectors (hence the pace of structural transformation); time effect vs. cohort effects (Porzio et al., 2022)
1. How are distortions in occupational choice manifested through educational decisions?
 2. How to identify, characterize, and quantify persistent (long-run) misallocation of talent?

Land Reform in China as an Experiment

- Land institution until reform: collective ownership; gender-biased allocation; “use-it-or-leave-it”
- Staggered rollout of **Rural Land Contracting Law (RLCL)** across provinces, 2003-2014:
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 - Identification - look at households before and after reform
 - Data - National Fixed Point Panel

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- Long-run (or cohort) effects:
 - **Identification** - compare younger cohorts to older (aged 15 as the cutoff)
 - Data - Population Census 2015
 - **Interpretation** - Roy model with OLG (similar to [Nakamura et al. \(2022\)](#))

Preview of Findings

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 - +1% labor income

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 - 2 p.p. low-skill employment and +1 p.p. high-skill employment
 - +1% labor income
- **Importance of the comparative advantage** (Roy, 1951):
 - Long-run effects concentrated among younger males with low agricultural productivity
 - The reform induces younger cohorts to re-optimize education and occupation based on talent
 - Misallocation persists among older cohorts with fixed human capital

Roadmap

Policy Background and Data

A Model of Occupational Choice

The Impact of the Land Reform

Land Institutions in China Before Reform

- Collective village ownership with equal distribution
- Rural families received 30-year land-use contracts
- Gender-biased allocation (Sargeson, 2012)
- Land rights insecurity (Giles and Mu, 2018; Adamopoulos et al., 2024):
 - Land reallocation is often related to the village elections
 - Presence in the village and active work on the land is important
 - Reduced migration in the year before an expected land reallocation

Rural Land Contracting Law (RLCL)

- The reform **strengthened** land rights through:
 - Prohibited arbitrary village-wide land reallocations
 - Granted legal rights for agricultural land leasing
 - Land reclaim only when *entire household* obtains urban *hukou*
 - But gender-biased allocation remains
- **Implementation:**
 - Central guidelines with local experimentation (Xu, 2011; Chari et al., 2021)
 - Staggered provincial rollout (2003-2014): Roll-out
 - 12 treated before 2005
 - 8 never treated by 2014 (control group)

Data

- Population Census 2015 (Mini-Census):
 - Cross-sectional, detailed birth information, education, and employment
 - *Education*: High school and college attendance
 - *Employment*: Currently employed, rural low-skill (farming/construction), high-skill (professional/technical) Occupation Characteristics
 - *Income*: Predicted based on education, occupation, location, etc.
- National Fixed Point Survey (NFP):
 - High-quality panel with detailed information on agricultural activities
 - Household survey (income, family background)
 - Individual survey (demographics and economic characteristics)

Roadmap

Policy Background and Data

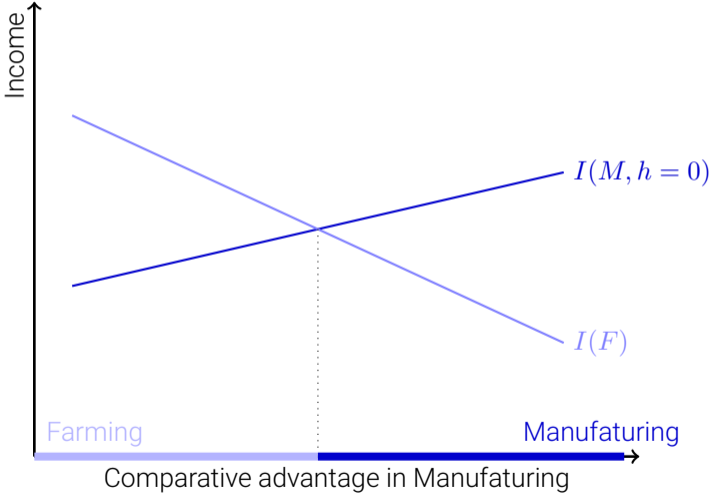
A Model of Occupational Choice

The Impact of the Land Reform

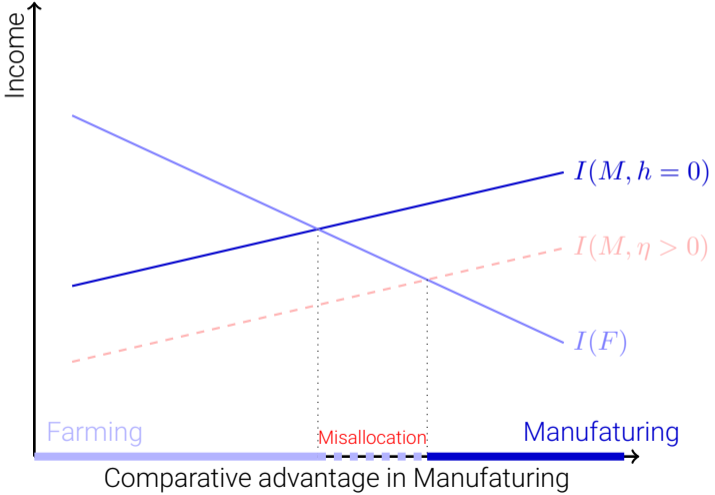
A Roy Model

- Individuals have heterogeneous abilities in *Farming* and *Manufacturing*
- Individuals face the probability of losing rented-out land if choosing *Manufacturing*
- Two periods: education choice $h \in \{0, 1\}$ (first period, young) \rightarrow supply one unit of labor in chosen occupation (second period, adult)
- Two generations in a given period: the young generation born as children to the old generation.
- Education complementary to *Manufacturing* (implication: $h = 0$ if choosing *Farming*)
- Closely related to [Nakamura et al. \(2022\)](#)

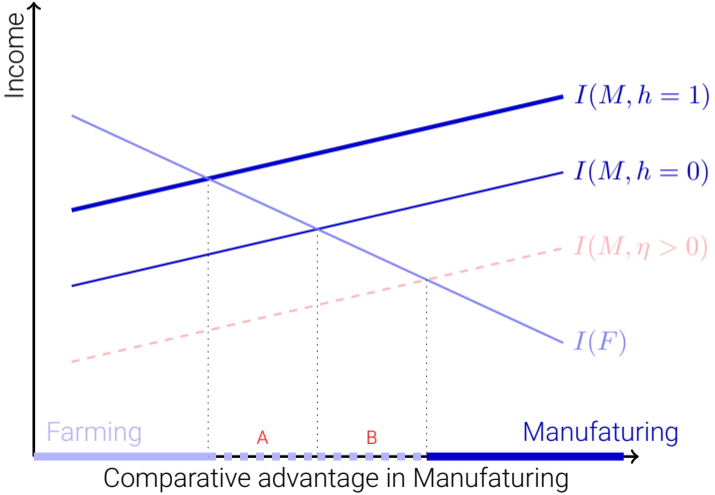
Comparative Advantage without Education Opportunity



Comparative Advantage without Education Opportunity



Comparative Advantage with Education Opportunity



Implications for Identification

Generational contrast:

- Younger generation (still in school) can switch both education and occupation
- Older generation (already in the labor force) can only switch occupation

Two types of switchers:

- *Security-only* (B): both generations switch occupation; young generation also obtain education
- *Education-enabled* (A): only young generation switch both education and occupation; old generation stays in farming

Characteristics of switchers: low comparative advantage in farming

Roadmap

Policy Background and Data

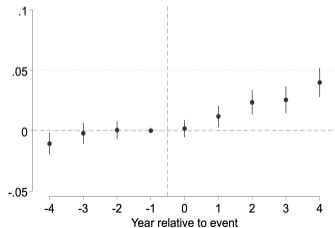
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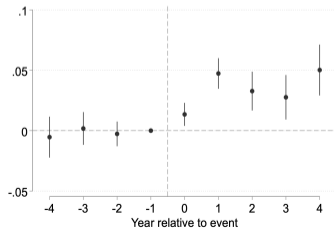
Contemporaneous Effects

- **Approach:** Staggered difference-in-differences exploiting RLCL rollout across provinces
 - Extended two-way fixed effects (ETWFE) estimator (Wooldridge, 2021)
 - Estimates separate ATTs for each treatment group-year combination
- **Sample:** NFP household and village panel between 2000-2013
- **Results:** rental, income, occupation

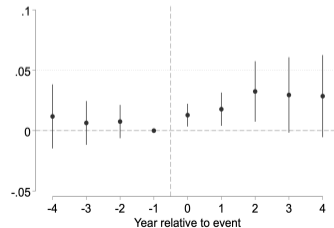
(a) Any land rental activity



(b) Household income (log)



(c) Village-level non-farming share



Main Results: Long-run Effects

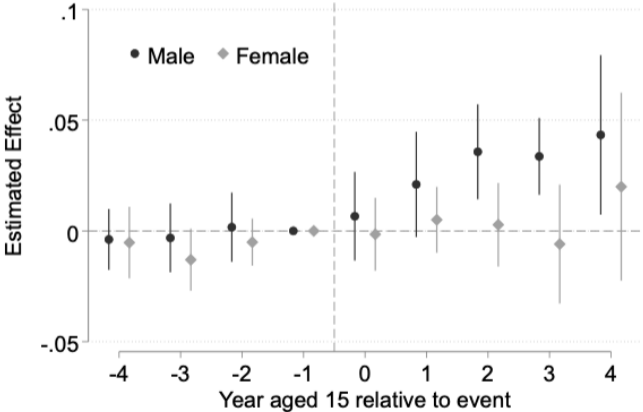
- **Cohort-based ETWFE:**

$$Y_{icp} = \sum_{g \in G} \sum_{s=s_0}^{g-1} \theta_{gs}^{pre} D_{igs} + \sum_{g \in G} \sum_{s=g}^C \theta_{gs}^{post} D_{igs} + \xi_p + \phi_c + \varepsilon_{icp} \quad (1)$$

- Y_{icp} : educational, occupation choices, eta for individual i who was born in year c and province p
 - D_{igs} : eventstudy indicators for each group g (by year of implementation)
 - ξ_p : province fixed effects
 - ϕ_c : cohort fixed effects
- Reference cohort: aged 16 in the year of reform
 - **Assumptions:** parallel cohort trends in latent abilities and no anticipatory
 - Estimated **by gender**

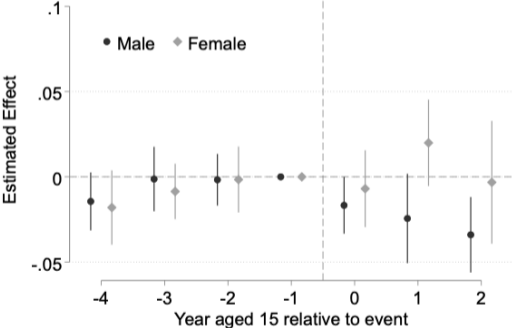
Main Results: Educational Choice

(a) High school enrollment

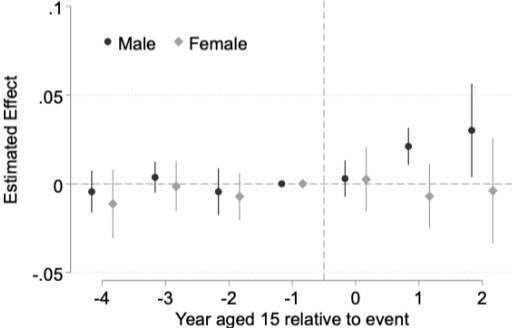


Main Results: Occupation Choice

(a) Rural low-skill (conditional)



(b) Urban high-skill (conditional)



Main Results: All Results

	Education		Labor Market			
	(1)	(2)	(3)	(4)	(5)	(6)
	High school	College	Currently working	Rural low-skill	Urban high-skill	Log income
Panel A. Males						
RLCL at age 15	0.029*** (0.009)	0.030*** (0.010)	-0.002 (0.010)	-0.022** (0.009)	0.013*** (0.005)	0.011* (0.006)
Mean dep var	0.403	0.170	0.873	0.364	0.125	10.522
Number of clusters	29	29	29	29	29	29
Observations	98581	98581	76610	66851	66851	66851
Panel B. Females						
RLCL at age 15	0.003 (0.009)	0.014 (0.009)	-0.016* (0.008)	0.003 (0.009)	-0.002 (0.008)	0.007 (0.007)
Mean dep var	0.382	0.178	0.691	0.344	0.152	9.994
Number of clusters	29	29	29	29	29	29
Observations	92303	92303	71704	49555	49555	49555

Main Results: Interpretation

- **What we identify:**
 - Education: both security-only and education-enabled switchers
 - Rural low-skill occupation: only education-enabled switchers (require both education and reform)
- **Key assumptions:**
 - Common cohort trends in latent abilities and no confounding shocks
 - Exclusion restriction: occupation switching driven only by education increase Edu × occu
- **What we miss:**
 - Switchers who find education unattractive but prefer manufacturing without education
 - Current workforce analysis captures this group plus security-only switchers
- **Implication:** focusing only on security-only switchers underestimates misallocation

Main Results: Robustness Checks

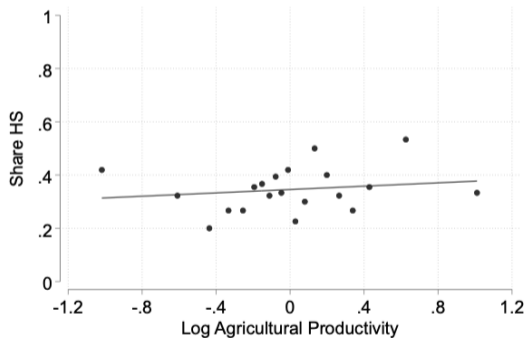
- **Validation of age-15 cutoff:** Test exposure ages 15-18 Age cutoff
 - Largest education effects at age 15; older ages attenuate effects
 - Confirms age 15 as optimal cutoff for separating cohorts with different adjustment flexibility
- **Agricultural tax reform (2004):** Results robust to controlling for agricultural tax rates Tax control
- **Urban placebo test:** No effects on urban residents Urban placebo
 - Rules out other province-level policy changes affecting cohort trends
 - RLCL specifically targets rural land rights
- **Hukou relocation:** No evidence that RLCL increases the fraction of urban *hukou* holders for the relevant cohorts Hukou effects
- **NFP replication:** Similar results but larger magnitudes (0.08 pp increase in HS enrollment for males) NFP results

Heterogeneity Analysis: Comparative Advantage

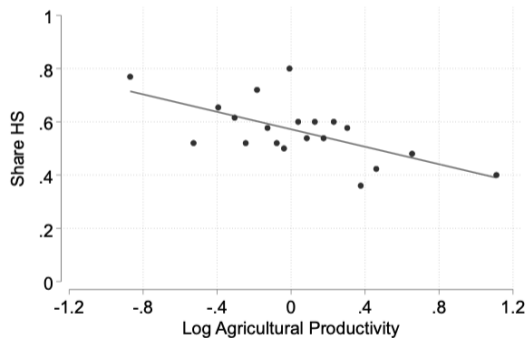
- **Key prediction:** Land security effects vary by household comparative advantage in agriculture vs. non-agriculture
- **Proxy for comparative advantage:** Pre-reform agricultural productivity of the household
 - Measure: Marginal product of land (MPL) from NFP dataset (Chari et al., 2021)
 - Higher MPL → stronger comparative advantage in agriculture
- **Key assumptions:**
 - Pre-reform MPL validly proxies true comparative advantage Comparative advantage
 - MPL not systematically correlated with other drivers of educational investment, such as income increase Income increase
- **Expected pattern:** Stronger educational responses for male children from households with lower agricultural productivity

Heterogeneity Analysis: Education Responses, Male

(a) No RLCL at age 15, male HS

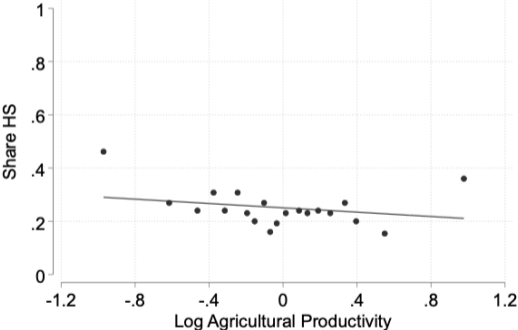


(b) RLCL at age 15, male HS

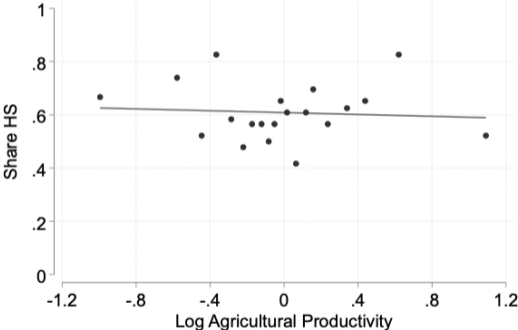


Heterogeneity Analysis: Education Responses, Female

(a) No RLCL at age 15, female HS



(b) RLCL at age 15, female HS



Heterogeneous Impacts by Household Productivity

	Time effects			Cohort effects	
	Household Income (log)	Labor days per capita		High School (Male)	High School (Female)
		Agriculture	Non-agriculture		
Panel A: Low-productivity households					
RLCL (at age 15)	0.025** (0.012)	0.196 (1.170)	2.675** (1.141)	0.215*** (0.053)	0.075 (0.070)
Dep. Var. Mean	9.430	79.921	35.154	0.439	0.402
Clusters	8825	8792	8792	28	28
Observations	92253	75984	75984	2117	1952
Panel B: High-productivity households					
RLCL (at age 15)	0.023** (0.012)	3.192*** (1.239)	-0.234 (1.072)	0.084* (0.046)	0.056 (0.083)
Dep. Var. Mean	9.476	80.741	31.661	0.440	0.417
Clusters	8212	8176	8176	28	28
Observations	86589	71358	71358	2048	1769
Diff p-value	0.969	0.064	0.049	0.044	0.721

Conclusion

- **Key findings:** Improved land security leads to
 - Short-run effects: labor reallocation out of agriculture and income gains
 - Long-run (cohort) effects: talent reallocation driven by younger cohorts reoptimizing education
 - Interpretation: the reform improves talent-occupation among young cohorts, while misallocation persists among older cohorts with fixed human capital
- **Policy implications:**
 - Benefits of mobility-enhancing reforms manifest primarily in the long run
 - Complement mobility reforms with policies that allow older individuals to acquire new skills and credentials
 - Decouple human capital investments from family- or place-based constraints to promote social and intergenerational mobility (Nakamura et al., 2022; Ager et al., 2025; Almgren et al., 2025)

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Roll-out of RLCL

Province	Document Name	Announcement Date	Effective Date
Shanghai	Hu Fu Fa (2003) No. 29	04/25/2003	04/25/2003
Hunan	Hunan Province People's Congress Standing Committee (2004) No. 35	07/30/2004	10/01/2004
Shandong	Shandong Province People's Congress Standing Committee (2004) No. 37	07/30/2004	10/01/2004
Anhui	Anhui Province People's Congress Standing Committee (2005) No. 57	06/17/2005	10/01/2005
Fujian	Fujian Province People's Congress Standing Committee (Min Chang (2005) No. 18)	09/30/2005	11/01/2005
Jiangsu	Jiangsu Province Government Order (2003) No. 21	12/18/2003	02/01/2004
Jilin	Jilin Province People's Congress Standing Committee (2005) No. 29	01/20/2005	03/01/2005
Liaoning	Liaoning Province People's Congress Standing Committee (2005) No. 28	01/28/2005	04/01/2005
Shanxi	Shanxi Province People's Congress Standing Committee (2004) No. 117	09/25/2004	01/01/2005
Tianjin	Jin Zheng Fa (2005) No. 009	02/05/2005	02/05/2005
Xinjiang	Xinjiang People's Congress Standing Committee (2005) No. 24	07/29/2005	10/01/2005
Gansu	Gansu Province People's Congress Standing Committee (Ganzheng Ban Fa (2006) No. 92)	05/29/2006	08/03/2006
Guangxi	Gui Zheng Ban Fa (2006) No. 141	11/14/2006	11/14/2006
Hainan	Hainan Province People's Congress Standing Committee (2006) No. 44	07/28/2006	10/01/2006
Sichuan	Sichuan Province People's Congress Standing Committee (2007) No. 110	11/29/2007	03/01/2008
Yunnan	Yunnan Province People's Congress Standing Committee (2006) No. 41	07/28/2006	09/01/2006
Chongqing	Chongqing Municipality People's Congress Standing Committee (2007) No. 6	04/02/2007	07/01/2007
Jiangxi	Jiangxi Province People's Congress Standing Committee (2007) No. 102	07/27/2007	10/01/2007
Shaanxi	Shaanxi Province People's Congress Standing Committee (2006) No. 59	09/28/2006	01/01/2007
Zhejiang	Zhejiang Province People's Congress Standing Committee (2006) No. 59	09/30/2006	01/01/2007
Inner Mongolia	Inner Mongolia People's Congress Standing Committee (2009) No. 10	07/30/2009	10/01/2009
Qinghai	Qinghai Province People's Congress Standing Committee (2009) No. 15	11/10/2009	03/01/2010
Hebei	Hebei Province Rural Land Contracting Regulation	07/25/2013	11/01/2013
Hubei	Hubei Province Rural Land Contracting Management Regulation	07/27/2012	10/01/2012

Note: Provinces that have not announced any regulation before 2014: Beijing, Heilongjiang, Henan, Guangdong, Guizhou, Tibet, and Ningxia.

Occupation Characteristics

Table: Rural and Agricultural *Hukou* Share by Occupation Category

Occupation Category	Rural Share (%)	Agricultural <i>Hukou</i> Share (%)
Agricultural Workers	86.38	98.70
Construction Workers	58.41	87.32
Low-skilled Service Workers	23.72	51.32
Low-skilled Manufacturing Workers	41.22	63.59
Other Low-skilled Workers	31.42	59.74
High-skilled Workers	17.77	26.86

Education × Occupation

	(1)	(2)	(3)	(4)
	No HS + Low-skill	HS + Low-skill	No HS + Non-Low-skill	HS + Non-Low-skill
RLCL at age 15	-0.023* (0.012)	0.001 (0.007)	-0.005 (0.012)	0.027** (0.011)
Mean dep var	0.291	0.073	0.352	0.283
Observations	66851	66851	66851	66851

- The shift in education and occupation go almost hand in hand
- Column (1): Young gen. less likely to have no HS education and work in low-skill occupation: education-driven occupation switch
- Column (2): Little evidence of complementarity between education and low-skill jobs
- Column (3): Very little switch to non-low-skill without education
- Column (4): Education-driven switch dominates

Validating age-15 cutoff

Table: The Effects of RLCL on the Outcomes at Different Exposure Ages

	Education Effects				Age	Labor Market Effects			
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)
Age	15	16	17	18	15	16	17	18	
Panel A: High School					Panel D: Rural Low-skill				
ATT	0.029***	0.012	0.013*	0.011	ATT	-0.022**	-0.010*	0.003	0.010
	(0.009)	(0.010)	(0.008)	(0.009)		(0.009)	(0.006)	(0.011)	(0.009)
Obs.	98,581	98,781	99,448	100,294	Obs.	66,851	67,098	66,639	64,317
Panel B: College					Panel E: Urban High-skill				
ATT	0.030***	0.020***	0.010**	0.017**	ATT	0.013***	0.019***	0.001	-0.001
	(0.010)	(0.007)	(0.005)	(0.008)		(0.005)	(0.005)	(0.008)	(0.010)
Obs.	98,581	98,781	99,448	100,294	Obs.	66,851	67,098	66,639	64,317
Panel C: Currently Working					Panel F: Log Income				
ATT	-0.002	0.007	0.002	-0.011***	ATT	0.011*	0.009	0.006	0.006
	(0.010)	(0.005)	(0.008)	(0.003)		(0.006)	(0.006)	(0.010)	(0.009)
Obs.	76,610	75,812	74,522	71,340	Obs.	66,851	64,585	57,132	46,989

Tax reforms

Table: Effects of the RLCL on education and labor market outcomes, controlling for tax reforms

	Education		Labor Market			
	(1) High school	(2) College	(3) Currently working	(4) Rural low-skill	(5) Urban high-skill	(6) Log income (predicted)
Panel A. Males						
RLCL at age 15	0.029*** (0.010)	0.030*** (0.011)	-0.002 (0.010)	-0.020** (0.008)	0.014*** (0.005)	0.012* (0.006)
Mean dep var	0.403	0.171	0.873	0.364	0.125	10.521
Number of clusters	29	29	29	29	29	29
Observations	97810	97810	75839	66223	66223	66223
Panel B. Females						
RLCL at age 15	0.003 (0.009)	0.014 (0.009)	-0.017* (0.008)	0.004 (0.010)	0.001 (0.007)	0.007 (0.007)
Mean dep var	0.383	0.179	0.691	0.345	0.152	9.994
Number of clusters	29	29	29	29	29	29
Observations	91619	91619	71020	49108	49108	49108

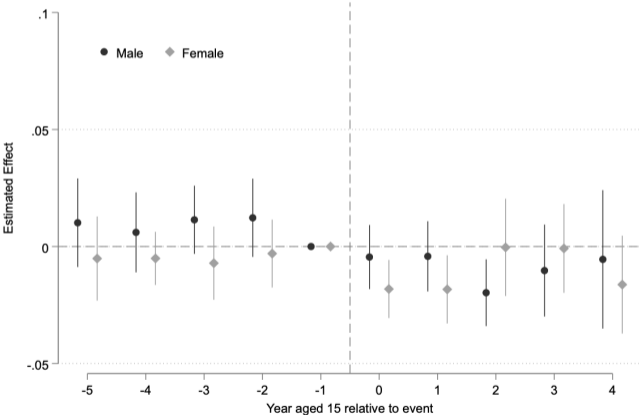
Urban placebo

Table: Placebo Tests: Effects on Urban Sample

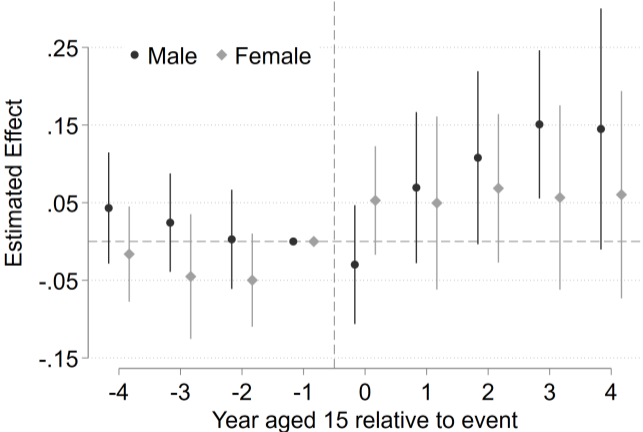
	Education		Labor Market			
	(1)	(2)	(3)	(4)	(5)	(6)
	High school	College	Currently working	Rural low-skill	Urban high-skill	Log income (predicted)
Panel A. Males						
RLCL at age 15	0.007 (0.018)	0.020 (0.018)	-0.013 (0.009)	0.000 (0.008)	0.003 (0.010)	-0.011 (0.009)
Mean dep var	0.735	0.479	0.793	0.053	0.351	10.797
Number of clusters	29	29	29	29	29	29
Observations	45052	45052	34730	27543	27543	27543
Panel B. Females						
RLCL at age 15	0.018* (0.010)	0.018 (0.011)	-0.003 (0.014)	0.003 (0.007)	0.012 (0.014)	0.010 (0.009)
Mean dep var	0.727	0.502	0.655	0.063	0.444	10.421
Number of clusters	29	29	29	29	29	29
Observations	46316	46316	36505	23910	23910	23910

Hukou relocation

Figure: Effects of the RLCL on *hukou* type

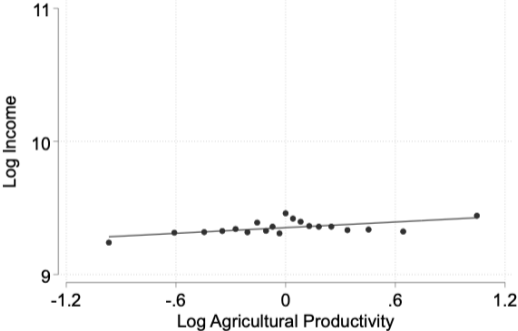


NFP replication

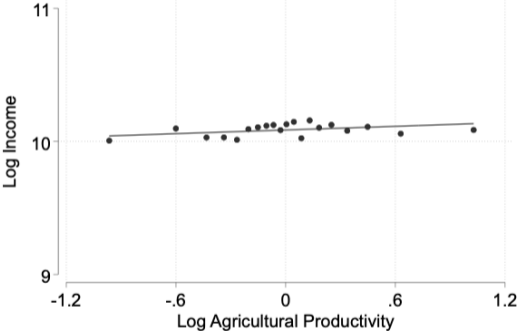


Descriptive Evidence: Income Effects

(a) Household income before RLCL

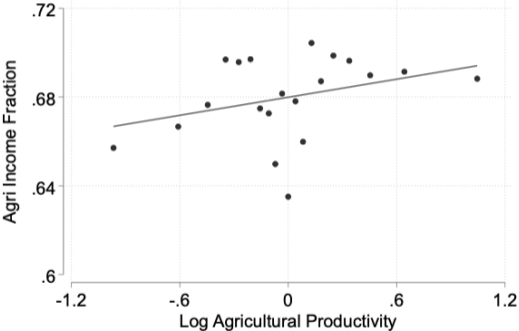


(b) Household income after RLCL



Descriptive Evidence: Comparative Advantage

(a) Agricultural income fraction before RLCL



(b) Wage income fraction before RLCL

